Surgery Essence

Third Edition

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Dedicated to

My Parents
and
Uncle, Dr CP Singh

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Preface to the Third Edition

I thought writing the preface for the third time would be an easier job but it is actually a lot tougher because now you already know me very well. This brings many responsibilities with it, the most important of which is to keep the students satisfied.

I can proudly say that all my students have contributed a lot to get me to this place, where I am today. They have helped me in becoming a better teacher, a better author and most importantly a better human being. I take this opportunity to thank all of you. The happiness you all give me keeps me telling always to work harder to bring a positive change in the life of my students. This will be reflected in the pages of this book. I always strive to provide a winning edge to my students.

Higher education has become necessary, as graduation alone is found inadequate in this highly competitive and dynamic world. Trends in the way the questions are being asked are changing continuously. I am pleased to present this edition of Surgery Essence replete with new trends in the field of surgery. The recent questions and their concepts have been highlighted and have been written in a way that will help the students to remember and reproduce them in the examination hall. The information provided is cogent but concise to save the precious time, as we all know the clock is ticking. Time is one thing that can never be recovered once gone. Be careful!

I am passionate about excellence. Excellence in the field of education and in my efforts to groom my students to make them confident enough, that they lose the fear of failure. In order to succeed, your desire for success should be greater than your fear of failure.

PG entrance examination has made the medical world very competitive and has made it imperative for students to acquire all the skills and competencies to deliver results. My aim as an author is to provide students with a learning experience which when amalgamated with perseverance and commitment helps them in achieving goals.

I still am not sure about one thing that who is more happy when a student achieves something, the student or the teacher, but I am very sure that the teacher is more satisfied when he sees his students achieving what they deserve and desire. I am working day and night to get that satisfaction and you have to work equally hard so that you do not let me down.

I always tell my students to dream big but not while sleeping. When you dream of moon, you will at least fall amongst stars. But these dreams should always be accompanied with intelligence and hard work. To guide you work intelligently this book and the author, both are there with you throughout the year. But the hard work is totally in your hands. Accept responsibility for your life. Know it is you who will get you where you want to go, no one else.

I believe that all my students should know the importance of challenges. Challenges are what make life interesting and overcoming them is what makes life meaningful. For the time being the only challenge that you should be facing is to secure a good rank in the entrance exam. One of the most important keys to success is having the discipline to do what you know you should do, even when you do not feel like doing it. Nobody ever wrote down a plan to be broke, lazy or stupid. These things happen when you do not have a plan.

I should now conclude with my prayers and wishes for all of you. Hope you all reach your dreams. All the best...

Pritesh Kumar Singh

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Preface to the Second Edition

Today is the world of specialization and for students of medical profession, obtaining specialization in one field is of utmost significance. From my experience till now, I have come to a conclusion that there is a dearth of good books on postgraduation entrance exam in surgery. Thus, in the form of this book I have made an attempt to make a meaningful contribution for the same. I had started working on this project soon after I joined my postgraduation course and after four years of regular hard work which includes the period of preparation for my super specialization, I could bring this book. The writing of this book has also helped me in understanding the subject in a better way and I feel that I have grown better as a surgeon while writing this book.

The pattern of questions in postgraduation entrance examination has changed after introduction of NEET but when one is thorough with the subject it is a lot easier to secure a good rank in the exam. For that matter, I have incorporated explanations with every question to broaden the scope of the question. The explanations have been written in a cogent manner and without any ambiguity. The sources have been mentioned in the references so that in case of a doubt one can always go back to the textbooks. The explanations have been taken from standard textbooks available for super specialty and recent journal review articles so that one can get the best preparation without wastage of precious time of going through all those books. This has also helped me to prepare better for the controversial questions which always bring anxiety in the minds of the students.

For the best results, along with hard work, one has to strike a proper balance between the way of attempting questions, which should be strategy and time management. Time management is required not just during the examination but also during the preparation of that exam. That is why they say that one who fails to plan is planning to fail. I have tried my best to provide thorough information about a particular topic which is required for the exams coupled with effective utilization of the available time.

Most of us are generally busy in marking the facts which are important in the books without realizing that the effort would go in drain if we do not get the time to revise the same. So the practice of taking only a single reading from any book should be avoided as the net output required to be produced during the exams is not fulfilled. In this book, such key points and facts have already been highlighted; tables and line diagrams have been provided to help you revise the subject quickly before the exams.

Although every effort has been made to minimize the scope of error but still some mistakes might be there which should be brought to the notice of the author through e-mail address or in writing.

I would like to express my immense gratitude to all my colleagues, friends, teachers and family because this book is the result of encouragement, appreciation and guidance from all of them.

Wishing you all the best and looking forward for your feedback and suggestions…

www.drpriteshsurgeryclasses.com

Pritesh Kumar Singh

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I am grateful to **Dr MP Arora** for the continuous support for the project, from initial advice and contacts in the early stages of conceptual inception and through ongoing advice and encouragement to this day.

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Annexures

Annexure 1

NAMED CLASSIFICATION FOR TUMORS

Important Tumor Classification	
Chang staging[Q]	Medulloblastoma[Q]
Masoaka staging[Q]	Thymoma[Q]
Shimda index[Q]	Neuroblastoma[Q]
Reiss and **Ellsworth** classification **Esson prognostic index**[Q]	Retinoblastoma[Q]
Bloom-Richardson grading[Q]	CA breast[Q]
Naguchi classification[Q]	Adenocarcinoma lung[Q]
Sullivan modification of **Macfalene system**[Q]	Adrenocortical carcinoma[Q]
Gleason	CA prostate[Q]
Nevine staging	CA GB[Q]
Duke staging	Colorectal carcinoma[Q]
Robson staging	RCC[Q]
Jackson	CA penis[Q]

Annexure 2

GENES AND CHROMOSOMES

Syndrome	Genes	Locations
Breast/ovarian syndrome	BRCA1	17
	BRCA2[Q]	13[Q]
Cowden's disease	PTEN[Q]	10[Q]
FAP	APC[Q]	5[Q]
HNPCC	hMLH1[Q]	3[Q]
	hMSH2[Q]	**2**[Q]
	hMSH6	**2**[Q]
	hPMS1	**2**[Q]
	hPMS2	**7**[Q]

Hereditary papillary RCC	**MET^{Q}**	**7^{Q}**
Li-Fraumeni	**p53^{Q}**	**17^{Q}**
	hCHK2	22
MEN-1	MEN1^{Q}	11^{Q}
MEN-2	RET^{Q}	10^{Q}
NF-1	NF1^{Q}	17^{Q}
NF-2	NF2^{Q}	22^{Q}
Peutz-Jeghers syndrome	STK11^{Q}	19^{Q}
Retinoblastoma	RB^{Q}	13^{Q}
Tuberous sclerosis	TSC1^{Q}	9^{Q}
	TSC2^{Q}	16^{Q}
VHL syndrome	VHL^{Q}	3^{Q}
Wilms' tumor	WT^{Q}	11^{Q}

Annexure 3

NAMED TRIADS

Important Triads		
Triad	**Seen in**	**Components**
Virchow's Triad[Q]	**Thrombosis**	Hypercoagulability + Stasis + Endothelial injury[Q]
Galezia's Triad[Q]		**Dupuytren's contracture** + **Retroperitoneal fibrosis** + **Peyronie's disease** of penis[Q]
Cushing's Triad[Q]	**Intracranial hypertension**	**BP** + **Bradycardia** + **respiratory rate**
Hutchison's Triad[Q]	**Congenital syphilis**	**Hutchison's teeth** (notched upper incisors) + **Interstitial keratitis** + **Nerve deafness**[Q]
Trotter's Triad[Q]	**Nasopharyngeal Carcinoma**	**Conductive hearing loss** + **Immobility** of **homolateral soft palate** + **Trigeminal neuralgia**[Q]

Important Triads		
Triad	**Seen in**	**Components**
Saints Triad		Hiatus hernia + Gallstones+ Colonic diverticulosis[Q]
Dieulafoy's Triad[Q]	**Acute appendicitis**	**Hypersensitiveness** of skin + Reflex **muscular contraction** + **tenderness** at Mac Burney's point[Q]
Quinck's Triad[Q]	**Hemobilia**	**GI hemorrhage** + **biliary colic** + **jaundice**[Q]
Borchardt's Triad[Q]	**Gastric Volvulus**	**Epigastric pain** + **Inability** to **vomit** + **Inability** to **pass** a **NG tube**[Q]
Tillaux's Triad[Q]	**Mesenteric cyst**	Soft **fluctuant swelling** in **umbilical region** + Freely **mobile perpendicular** to **mesentery** + Zone of **resonance** all around[Q]
Mackler's Triad[Q]	**Boerhaave's syndrome**	**Thoracic pain** + **vomiting** + **cervical subcutaneous emphysema**[Q]
Rigler's Triad[Q]	**Gall stone ileus**	**Small bowel obstruction** + **Pneumobilia** + **Ectopic gallstone**[Q]
Whipple's Triad[Q]	**Insulinoma**	**Symptoms** of **hypoglycemia** + S. **glucose <45 mg/dl** + **Symptomatic relief** on **glucose ingestion**[Q]

Annexure 4

LYMPH NODES

Most Common Lymph Nodes Involved	
CA Penis	**Inguinal** LN[Q]
CA Testis	On **right: Inter-aortocaval**[Q] LN On **left: Paraaortic**[Q] LN
CA Bladder	**Obturator**[Q] LN
CA Prostate	**Obturator**[Q] LN

Important Lymph Nodes	
Rotter's nodes[Q]	• **Interpectoral** nodes (**CA breast**)[Q]
Rouvier nodes[Q]	• **Retropharyngeal** nodes (**CA Nasopharynx**)[Q]
Delphian nodes[Q]	• **Pre-cricoid/Pre-tracheal/Pre-laryngeal** lymph nodes[Q]
Irish nodes[Q]	• Nodes in **left axilla** (**CA stomach**)[Q]
Sister Mary Joseph nodes[Q]	• **Periumbilical metastatic cutaneous** nodules
Virchow nodes[Q]	• **Left supraclavicular** node[Q]
Cloquet node[Q]	• **Femoral canal** node[Q]
LN of **Lund**[Q]	• **Cystic** lymph node[Q]
Krouse Lymph node	• **Jugular fossa** lymph node[Q]

Annexure 5

METASTASIS

Carcinoma Thyroid	
Type	**Mode of spread**
Papillary carcinoma	**Lymphatic**[Q] spread
Follicular carcinoma	**Hematogenous**[Q] spread
Medullary carcinoma	Both **lymphatic** and **hematogenous**[Q] spread
Anaplastic carcinoma	**Direct invasion**[Q]

Carcinoma Thyroid	
Type	**MC site of Metastasis**
Papillary carcinoma	**Lungs**[Q]
Follicular carcinoma	**Bones**[Q]
Medullary carcinoma	**Liver**[Q]
Anaplastic carcinoma	**Lungs**[Q]

Pulsating Secondaries
1. Follicular carcinoma thyroid[Q]
2. RCC[Q]

Bone Metastasis in Carcinoma Thyroid	
Follicular carcinoma	**Osteolytic** metastasis (**Pulsating secondaries** in **flat bones**)[Q]
Medullary carcinoma	**Osteoblastic** metastasis[Q]

Metastatic Tumors
Metastatic Tumors of Thyroid • Rare, most cases are found in autopsy • MC site of primary: **CA Breast**[Q] > CA Lung • If thyroid metastases is detected pre-mortem, MC site of primary: **RCC**[Q] > CA Breast > CA Lung
Metastatic Tumors to lung, MC primary: CA breast[Q]
Metastatic Tumors to Pancreas • MC site of primary: **RCC**[Q] > Malignant melanoma • On **autopsy**, MC site of primary: **CA lung**[Q]
Metastatic Tumors Adrenal, MC site of primary: **CA Lung**[Q]
Metastatic Tumors to Small Bowel • Metastatic tumors involving small bowel are more common than primary tumors • MC site of primary: Other intra-abdominal organs • MD extra-abdominal source: **Melanoma**> CA Breast> CA Lung
Metastatic Tumors
Metastatic Tumors to Skin • MC site of primary in males: **CA Lung**[Q] • MC site of primary in females: **CA Breast**[Q] • **Scalp** is **MC site** for **cutaneous metastatic disease**[Q]
Metastatic Tumors to Liver • MC site of primary: **CA Lung**[Q]> **CA Colon**> CA Pancreas> CA Breast> CA Stomach

Metastatic Tumors to CNS • MC site of primary for **brain** metastases: **CA Lung**[Q] > **CA Breast** • MC site of primary for **leptomenigeal metastases**: **CA Breast**[Q]
Metastatic Tumors to esophagus, MC primary: CA lung[Q]
Metastatic Tumors to spleen • MC site of primary: **CA lung**[Q] **>CA breast >Melanoma**
Metastatic Tumors to Heart • MC primary in **males: CA lung**[Q] • MC primary in **females: CA breast**[Q]
Metastatic Tumors to Testis • MC site of primary: **CA prostate**[Q] **> CA lung >GI malignacies >melanoma >kidney**
Metastatic Tumors to penis, MC site of primary: CA bladder[Q]

Annexure 6

MOST COMMON SYMPTOMS AND CHEMOTHERAPY

GI Malignancy	Chemotherapy
• CA **Esophagus**	**ECF** (**E**pirubicin + **C**isplatin + 5-**F**U)[Q]
• CA **Stomach**	**ECF** (**E**pirubicin + **C**isplatin + 5-**F**U)[Q]
• CA **Pancreas**	**Gemcitabine**[Q]
• **NET of pancreas**	**Streptozocin + 5-FU**[Q]
• **Cholangiocarcinoma**	**Gemcitabine + Cisplatin**[Q]
• **CA GB**	**Gemcitabine + Cisplatin**[Q]
• **Small intestine** adenocarcinoma	5-FU[Q]
• **Colorectal carcinoma**	**FOLFOX-IV** (**5-FU + Leucovorin + Oxaliplatin**)[Q]
• **CA anal canal**	**Nigro Regimen: Chemoradiation** (**5-FU + Mitomycin C + Radiation**)[Q]

Most Common Symptom	
CA Esophagus	• **Dysphagia** >weight loss[Q]
CA stomach	• **Abdominal pain** >weight loss[Q]
Periampullary carcinoma (including **CA head** of **pancreas**)	• **Jaundice**[Q]
HCC	• **Abdominal pain** >weight loss[Q]
Cholangiocarcinoma	• **Painless progressive jaundice**[Q]
CA Gallbladder	• **Biliary colic**[Q]
CA small bowel	• **Abdominal pain**[Q]
CA colon	• **Abdominal pain**[Q]
CA rectum	• **Bleeding PR**[Q]
CA anal canal	• **Bleeding PR**[Q]

Annexure 7

MOST COMMON SITES

Important Most Common Sites	
• **Gastric ulcer**[Q]	**Lesser curvature (near incisura angularis)**
• **Peptic ulcer**[Q] • **Gastric outlet obstruction**[Q]	**1st part of duodenum**
• **Small bowel**[Q] **adenocarcinoma** • **Atresia**[Q]	**Duodenum**
• **Polyps** in **PJS**[Q] • **Pneumatosis intestinalis**[Q]	**Jejunum**
• **Crohn's** disease[Q] • **Fistula, perforation** and **carcinoma in Crohn's** disease[Q] • **Typhoid** ulcer[Q] • **Tubercular** ulcer[Q] • **Small intestinal lymphoma**[Q] • **Gallstone ileus**[Q]	**Terminal Ileum**
• **Amebic colitis**[Q] • Bleeding in **angiodysplasia**[Q] • **Bleeding** in **colonic diverticula**[Q]	**Cecum and ascending colon**
• **Ischemic colitis**[Q]	**Splenic flexure**
• **Colonic diverticula**[Q] • **Stricture** after **ischemic colitis**[Q] • **Volvulus**[Q]	**Sigmoid**
• **Ulcerative colitis**[Q] • **Colorectal cancer**[Q] • **Hirschprung's disease**[Q]	**Rectum**

Annexure 8

TREATMENT OF CHOICE

Condition	Treatment of Choice
Duodenal Atresia	Duodenoduodenostomty[Q]
Annular pancreas	Duodenoduodenostomty[Q]
Superior mesenteric artery syndrome	Duodenojejunostomy[Q]

Enucleation is treatment of choice in
1. **Hemangioma liver**[Q]
2. **Leiomyoma esophagus**[Q]
3. **Chylolypmhatic cyst**[Q]
4. **Insulinoma involving head of pancreas**[Q]

Annexure 9

CHARACTERISTIC RADIOLOGICAL APPEARANCES

Radiological Features	Seen in
• **Apple core lesion** on barium enema	**Carcinoma colon**[Q]
• **Claw appearance** on barium enema	**Intussusception**[Q]
• **Saw tooth appearance**	**Colonic diverticula**
• **Bird beak appearance**	**Achalasia**[Q] **Volvulus**
• **Cork screw appearance** • **Rosary bead** appearance • **Pseudodiverticula** appearance	**Diffuse esophageal spasm**[Q]
• **String sign** of **Kantor**	**Crohn's disease**[Q] **Tuberculosis**
• **Thumb print** sign	**Ischemic colitis**[Q]
• **Squeeze sign**, **Cushion** sign, **Tenting** sign, **naked fat** sign	**Colonic lipoma**[Q]
• **Rat tail appearance**	**Achalasia**[Q]

Characteristic Appearances	
ADPKD	• **Spider leg** or **Bell deformity**[Q] • **Bubble** or **Swiss cheese** appearance on **IVP**[Q]
Infantile PKD	• **Sunburst pattern** on **IVP**[Q]
Medullary Sponge Kidney	• **Bristles on brush** appearance[Q] • **Bouquet of flower** appearance on **IVP**[Q]
Multicystic Dysplastic Kidney	• **Bunch of grapes** appearance[Q]
Renal Artery Aneurysm	• **Ring like calcification**[Q]
Ectopic Ureteric Orifice	• **Drooping lily sign** on **IVP**[Q]
Retrocaval Ureter	• **Fish hook** or **Reverse 'J' deformity** on **IVP**[Q]
Retroperitoneal Fibrosis	• **Medial pulling** of ureter or **pipestem ureter**[Q] (**Pipestem ureter** is also seen in **TB**)
CA Renal Pelvis	• **Goblet sign** or **stipple sign** on **RGP**[Q]

Radiological feature	Disease
• **Rim/crescent** sign[Q] • **Soap bubble** appearance[Q]	**Hydronephrosis**
• **Spider leg** appearance[Q]	**Polycystic Kidney**
• **Flower vase** appearance of **ureter**[Q]	**Horse shoe Kidney**
• **Golf hole ureter**[Q]	**TB bladder**
• **Drooping lily** sign[Q]	**Ectopic ureter**
• **Cobra head** or **Adder head** appearance[Q] • **Spring onion** appearance[Q]	**Ureterocele**
• **Egg in cup** appearance[Q]	**Analgesic nephropathy causing papillary necrosis**
• **Thimble bladder**[Q]	**Tubercular chronic cystitis**
• **Sandy patches**[Q]	**Schistosomiasis of bladder**

• **Chalice/ Bergman sign**[Q]	**Ureteric dilatation distal to neoplasm**
• **Fish hook bladder**[Q]	**BPH**
• **B/L spider leg** appearance[Q] • **Swiss- cheese nephrogram**[Q] • **Sun burst nephrogram**[Q]	**Polycystic kidney**

Radiological Appearance		
Acute Pancreatitis	**Chronic Pancreatitis**	**CA Pancreas**
• **Renal halo** sign[Q] • **Gasless abdomen**[Q] • **Ground glass appearance**[Q] • **Colon cut off** sign[Q] • **Sentinel loop**[Q]	• **Chain** of **lakes appearance**[Q] • **String** of **pearl appearance**[Q] • **Beaded appearance**[Q] • Numerous **irregular calcifications**[Q] are pathognomonic (on X-ray)	• **Double contour** of medial border of duodenal C loop • **Double duct sign**[Q] • **Dilated/widening** of **duodenal C loop**[Q] • **Mucosal irregularity**[Q] • **Scrambled egg appearance** • **Inverted/reverse 3 sign** of **Frostberg**[Q] • **Rose thorning** of **medial wall** of **2nd** part of duodenum[Q]

Annexure 10

ABDOMINAL EXAMINATION SIGNS

Abdominal Examination Signs		
Sign	**Description**	**Diagnosis**
Aaron sign	**Pain** or pressure **in epigastrium** or **anterior chest** with **persistent firm pressure** applied to **McBurney's point**[Q]	**Acute appendicitis**[Q]
Bassler sign	Sharp pain created by compressing appendix between abdominal wall and iliacus	Chronic appendicitis
Blumberg's sign	Transient abdominal wall **rebound tenderness**[Q]	**Peritoneal inflammation**
Carnett's sign	Loss of abdominal tenderness when abdominal wall muscles are contracted	Intra-abdominal source of abdominal pain
Chandelier sign	Extreme lower abdominal and pelvic pain with movement of cervix	Pelvic inflammatory disease
Claybrook sign	Accentuation of breath and cardiac sounds through abdominal wall	Ruptured abdominal viscus
Courvoisier's sign	**Palpable gallbladder** in presence of **painless jaundice**[Q]	**Periampullary tumor**[Q]
Cruveilhier sign	**Varicose veins** at **umbilicus** (**caput medusae**)[Q]	**Portal hypertension**[Q]
Danforth sign	Shoulder pain on inspiration	Hemoperitoneum
Fothergill's sign	Abdominal wall mass that does not cross midline and remains palpable when rectus contracted	Rectus muscle hematomas
Mannkopf's sign	Increased pulse when painful abdomen palpated	Absent if malingering
Ransohoff sign	**Yellow discoloration** of **umbilical region**	**Ruptured CBD**[Q]
Ten Horn sign	**Pain** caused by **gentle traction of right testicle**[Q]	**Acute appendicitis**[Q]

Annexure 11

FAMILIAL CANCER SYNDROMES

Familial Cancer Syndromes			
Syndrome	**Genes**	**Locations**	**Cancer Sites and Associated Traits**
Breast/ovarian syndrome	**BRCA1**	**17**q21^{Q}	Cancer of **breast, ovary, colon, prostate**^{Q}
	BRCA2	**13**q12.3^{Q}	Cancer of **breast, ovary, colon, prostate, gallbladder and biliary tree, pancreas, stomach; melanoma**^{Q}
Cowden's disease	**PTEN**	**10**q23.3^{Q}	Cancer of **breast, endometrium, thyroid**^{Q}
FAP	**APC**	**5q21**^{Q}	Cancer of breast, endometrium, thyroid
Familial melanoma	p16	9p21	Melanoma, pancreatic cancer, dysplastic nevi, atypical moles
	CDK4	12q14	
Hereditary diffuse gastric cancer	CDH1	16q22	Gastric cancer
HNPCC	**hMLH1**^{Q}	**3**p21^{Q}	**Colorectal** cancer, **endometrial** cancer, **transitional cell carcinoma** of **ureter** and **renal pelvis**, **carcinomas** of the **stomach, small bowel, pancreas, ovary**^{Q}
	hMSH2^{Q}	**2**p22-21	
	hMSH6	**2**p16^{Q}	
	hPMS1	**2**q31.1	
	hPMS2	**7**p22.2^{Q}	
Hereditary papillary RCC	**MET**^{Q}	**7**q31^{Q}	Renal cell cancer
Hereditary paraganglioma and pheochromocytoma	SDHB	1p36.1-p35	Paraganglioma, pheochromocytoma
	SDHC	1q21	
	SDHD	11q23	
Juvenile polyposis coli	BMPRIA	10q21-q22	Juvenile polyps of the gastrointestinal tract, gastrointestinal malignancies
	SMAD4/DPC4	18q21.1	
Li-Fraumeni	**p53**	**17**p13^{Q}	**Breast** cancer, **soft tissue sarcoma, osteosarcoma, brain** tumors, **adrenocortical** carcinoma, **Wilms'** tumor, **phyllodes** tumor **(breast), pancreatic** cancer, **leukemia, neuroblastoma**^{Q}
	hCHK2	22q12.1	
MEN-1	**MENIN**^{Q}	**11**q13^{Q}	**Pancreatic islet cell** tumors, **parathyroid hyperplasia, pituitary adenomas**^{Q}
MEN-2	**RET**^{Q}	**10**q11.2	**Medullary thyroid** cancer, **pheochromocytoma, parathyroid hyperplasia**^{Q}
MYH-associated adenomatous polyposis	MYH	1p34.3-p32.1	Cancer of the colon, rectum, breast, stomach
Neurofibromatosis-1	**NF1**^{Q}	**17**q11^{Q}	**Neurofibromas, neurofibrosarcoma, acute myelogenous leukemia, brain** tumors^{Q}
Neurofibromatosis -2	**NF2**^{Q}	**22**q12^{Q}	**Acoustic neuromas, meningiomas, gliomas, ependymomas**^{Q}
Nevoid basal cell carcinoma	PTC	9q22.3	Basal cell carcinoma
Peutz-Jeghers syndrome	**STK11**^{Q}	**19**p13.3^{Q}	**Gastrointestinal carcinomas, breast** cancer, **testicular** cancer, **pancreatic** cancer, **benign pigmentation** of **skin** and **mucosa**^{Q}
Retinoblastoma	**RB**^{Q}	**13**q14^{Q}	**Retinoblastoma, sarcomas, melanoma, malignant neoplasms** of the **brain** and **meninges**^{Q}
Tuberous sclerosis	**TSC1**	**9**q34	**Multiple hamartomas, RCC, astrocytoma**
	TSC2	**16**p13	
von Hippel-Lindau syndrome	**VHL**^{Q}	**3**p25^{Q}	**RCC, hemangioblastomas** of **retina and CNS, pheochromocytoma**^{Q}
Wilms' tumor	**WT**^{Q}	**11**p13^{Q}	**Wilm's tumor, aniridia, genitourinary abnormalities, mental retardation**^{Q}

Annexure 12

SUTURES

Suture	Types	Raw material	Tensile strength	Absorption rate
Silk	Braided or twisted **multifilament**; Coated (with wax or silicone) or uncoated	Natural protein Raw silk from silkworm	Loses 20% when wet; 80–100% lost by 6 months	Fibrous encapsulation in body at 2–3 weeks ; **Absorbed** slowly over **1–2 year**[Q]
Catgut	Plain	Collagen derived from healthy **sheep** or catle	Lost within 7–10 days	**Phagocytosis** and **enzymatic degradation** within **7–10 days**[Q]
Catgut	**Chromic**	Tanned with **chromium salts** to **improve handling** and **resist degradation** in tissue[Q]	Lost within 21–28 days	Phagocytosis and enzymatic degradation **within 90 days**
Polyglactin (Vicryl)	Braided multifilament	Copolymer of **lactide** and **glycolide**[Q] in a ratio of 90:10, coated with polyglactin and calcium stearate	Approx, 60% remains at 2 weeks; 30% remains at 3 weeks	Hydrolysis minimal until 5-6 weeks; Complete absorption **60-90 days**[Q]
Polyglyconate	Monofilament Dyed or undyed	Copolymer of **glycolic acid** and **trimethylene carbonate**[Q]	Approx, 70% remains at 2 weeks; 55% remains at 3 weeks	Hydrolysis minimal until 8-9 weeks; Complete absorption **180 days**[Q]
Polyglycaprone	Monofilament	Coplymer of **glycolite** and **caprolactone**[Q]	21 days maximum	**90–120 days**[Q]
Polyglycolic acid (Dexon)	Braided multifilament Dyed or undyed Coated or Uncoated	Polymer of **polyglycolic acid**[Q]	Approx, 40% remains at 1 weeks; 20% remains at 3 weeks	**Hydrolysis**[Q] minimal at 2 weeks; significant at 4 weeks; Complete absorption **60–90 days**[Q]
Polydioxanone (PDS)	Monofilament dyed or undyed	**Polyester polymer**[Q]	Approx, 70% remains at 2 weeks; 50% remains at 4 weeks; 14% remains at 8 weeks	**Hydrolysis** minimal at 90 days; Complete absorption **180 days**[Q]

Guidelines for Day of Suture Removal by Area			
Body Regions	**Removal**	**Body Regions**	**Removal**
Eyelid	**3–4**	Chest, abdomen	8–10
Eyebrow	**3–5**	Ear	10–14
Nose	**3–5**	**Back**	**12–14**
Lip	**3–4**[Q]	**Extremities**	**12–14**
Face (other)	**3–4**[Q]	**Hand**	**10–14**
Scalp	**6–8**[Q]	**Foot, sole**	**12–14**

Annexure 13

NEW DRUGS IN SURGERY

New Drugs in CA Breast	
Ixabepilone	• Used for **antracycline** and **taxane resistant** breast cancer[Q]
Lapatinib	• Inhibitor of Her-2-neu and EGFR tyrosine kinase • **Second line Her-2-neu therapy**[Q]
Sunitinib	• Approved for **advanced renal cancer** and **refractory metastatic breast cancer**[Q]

New Drugs	
Drug	Indication
Imatinib mesylate	• GIST • CML
Sunitinib	• **Imatinib resistant GIST** • **Advanced Renal cancer** • **Refractory metastatic breast cancer**[Q]
Sorafenib	• **Unresectable HCC**[Q]
Geftinib	• **Adenocarcinoma lung in non-smoking females**
Lapatinib	• Inhibitor of Her-2-neu and EGFR tyrosine kinase • **Second line Her-2-neu therapy**[Q]

Annexure 14

INHERITANCE PATTERN

Autosomal dominant	Autosomal Recessive	X-Linked Disorders
- Familial hypercholesterolemia - **HNPCC** - **FAP**[Q] - **BRCA1** and **BRCA2** breast cancer - Hereditary hemorrhagic telengiectasia - **Marfan's syndrome**[Q] - **Hereditary spherocytosis**[Q] - **Adult polycystic kidney disease** - **Huntington's chorea**[Q] - **Acute intermittent porphyria**[Q] - **Osteogenesis imperfecta**[Q] - **von Willebrand's disease**[Q] - **Myotonic dystrophy**[Q] - Familial hypertrophic cardiomyopathy - **Neurofibromatosis**[Q] - **Tuberous sclerosis**[Q] - **Otospongiosis**[Q] - **Achondroplasia**[Q]	- Deafness - **Albinism**[Q] - **Wilson's disease**[Q] - **Hemochromatosis**[Q] - **Sickle cell anemia**[Q] - **beta thalassemia**[Q] - **Cystic fibrosis**[Q] - **Hereditary emphysema (α_1 antitrypsin deficiency)** - **Homocystinuria**[Q] - **Freidrich's ataxia**[Q] - **Phenylketonuria**[Q] - **Fanconi's Syndrome** - **Gaucher's Disease**	- **Hemophilia A**[Q] **(recessive)** - **G6PD deficiency**[Q] **(recessive)** - **Ducchene/Becker muscular dystrophy**[Q] **(recessive)** - Fabry's disease - Ocular albinism - Testicular feminization - Chronic granulomatous disease - **Hypophosphatemic rickets**[Q] **(dominant)** - **Fragile-X syndrome**[Q] **(recessive)** - **Color blindness**[Q]

Annexure 15

MOST COMMON TYPE OF STONES

Most Common Type of Stones	
Gall bladder	**Cholesterol**[Q] (**Mixed** if given in the option)
Pancreas	**Calcium carbonate**[Q]
Kidney	**Calcium oxalate**[Q]
Primary Bladder Stone	**Ammonium urate**[Q]
Secondary Bladder Stone	**Uric acid >Struvite**[Q]
Prostate	**Calcium phospahte**[Q]
Salivary gland (Submandibular)	**Calcium carbonate**[Q]

Annexure 16

NAMED HERNIA

Gibbon's hernia	• **Hernia with hydrocele**[Q]
Berger's hernia	• **Hernia** into **pouch** of **Douglas**[Q]
Beclard's hernia	• **Femoral hernia** through **opening of saphenous vein**[Q]
Amyand's hernia	• Inguinal hernia **containing appendix**[Q]
Ogilive's hernia	• Hernia through the **defect in conjoint tendon** just lateral to where it inserts with the rectus sheath[Q]
Stammer's hernia	• **Internal hernia** occurring **through window in** the **transverse mesocolon after** retrocolic **gastrojejunostomy**[Q]
Peterson hernia	• Hernia **under Roux limb** after **Roux-en-Y gastric bypass**[Q]

Annexure 17

IDEAL TIME FOR TREATMENT

Ideal time for Treatment	
Undesended testis	**6 months**[Q]
Hypospadias	**6–12 months**[Q]
Umbilical hernia	**5 years**[Q]
Cleft lip	**3–6 months**[Q]
Cleft palate	**6–18 months**[Q]

Annexure 18

INVESTIGATION OF CHOICE

Investigation of Choice	
Barium swallow	Hiatus hernia[Q] Zenkers diverticula[Q] Leiomyoma[Q]
Barium meal	Gastric diverticula[Q]
Barium meal follow-through	Small bowel diverticula[Q]
Enteroclysis	Crohn's disease[Q]
Barium enema	Colonic diverticula[Q]
CECT	Divericulitis[Q] GIST[Q] Mesenteric cyst[Q] GI tuberculosis[Q] Acute pancreatitis[Q] Chronic pancreatitis[Q] Carcinoma pancreas[Q] Pancreatic pseudocyst[Q] Carcinoma gall bladder[Q] Hepatocellular carcinoma[Q] (Triple phase CT) Renal cell carcinoma[Q] Retroperitoneal fibrosis[Q] Retroperitoneal sarcoma[Q] Renal tuberculosis[Q] ADPKD[Q]
MRI	Brain tumors[Q] Spinal cord tumors[Q] Pancoast tumor[Q] Soft tissue sarcoma[Q] Staging of carcinoma penis[Q]
Endoscopy with biopsy	Barrett's esophagus[Q] Carcinoma esophagus[Q] Carcinoma stomach[Q]
Colonoscopy with biopsy	Carcinoma colon[Q]
Sigmoidoscopy with bioopsy	Carcinoma rectum[Q]
Proctoscopy with biopsy	Carcinoma anal canal[Q]
Cystoscopy with biopsy	Carcinoma bladder[Q]
FNAC	Carcinoma breast[Q] Parotid tumors[Q] Thyroid malignanies[Q]
Biopsy	Skin malignancies[Q] Carcinoma penis[Q] Oral cavity malignancies[Q]
Manometry	Achalasia cardia[Q] Diffuse esophageal spasm[Q] Nutcrackers esophagus[Q]
24-hours pH monitoring	GERD[Q]

Somatostatin receptor scintigraphy (IOC for localization)	**All neuroendocrine tumors of pancreas except insulinoma[Q]** **Carcinoid tumors[Q]**
Ultrasound	**Gallstones[Q]** **Acute cholecystitis[Q]** **Chronic cholecystitis[Q]**

Investigation of Choice	
Acute mesenteric ischemia	• **Angiography[Q]**
Mesenteric venous thrombosis	• **CECT[Q]**
Chronic mesenteric ischemia	• **Aortography[Q]**

Investigation of Choice	
ADPKD **Retroperitoneal Fibrosis**	**CT scan[Q]**
Medullary Sponge Kidney	**IVP[Q]**
VUR	**MCU[Q]**
Retrocaval ureter	**MRI[Q]**
PUJ Obstruction	**DTPA scan[Q]**
Renal structure or surface	**DMSA scan[Q]**

Annexure 19

TUMOR MARKERS

Markers	Associated Cancers	Non-neoplastic Conditions
Hormones		
• **Human chorionic gonadotropin** • **Calcitonin** • **Catecholamines**	• **Trophoblastic tumors[Q]**, **nonseminomatous** testicular tumors • **Medullary carcinoma[Q]** of thyroid • **Pheochromocytoma[Q]**	• Pregnancy
Oncofetal Antigens		
• Alpha-Fetoprotein • **CEA**	• **Liver[Q]** cell cancer, **nonseminomatous[Q]** germ cell tumor of testis, **lung[Q]** cancer • Adenocarcinoma of the **colon[Q]**, **pancreas[Q]**, **lung[Q]**, **breast[Q]**, **ovary[Q]**, **prostate[Q]**	• Cirrhosis, hepatitis • Pancreatitis, hepatitis, inflammatory bowel disease, smoking
Isoenzymes		
• Prostatic acid phosphatase • **Neuron-specific enolase** • Lactate dehydrogenase	• Prostate cancer • **Small cell** cancer of lung[Q], **Neuroblastoma[Q]** • Lymphoma, Ewing sarcoma	• Prostatitis, prostatic hypertrophy • Hepatitis, hemolytic anemia, many others
Specific proteins		
• **Immunoglobulins** • PSA and prostate specific membrane antigen	• **Multiple myeloma[Q]** and other gammopathies • Prostate cancer[Q]	• Infection, MGUS • Prostatitis, prostatic hypertrophy[Q]
Mucins and other Glycoproteins		
• **CA-125** • **CA-19-9** • **CD30** • **CD25**	• **Cancer of ovary[Q]**, fallopian tube, **endometrium[Q]**, **cervix**, **breast[Q]**, **lung[Q]**, **pancreas[Q]** and **colon[Q]** • **Colon[Q]** cancer, **pancreatic[Q]** cancer • **Hodgkin's disease[Q]**, anaplastic large cell lymphoma • **Hairy cell leukemia**, **adult T cell leukemia/ lymphoma[Q]**	• **Pregnancy[Q]**, **endometriosis[Q]**, **PID[Q]**, **uterine fibroids[Q]** • **Pancreatitis,** Ulcerative colitis

Annexure 20

MOST COMMON

Small-Bowel Neoplasm
• **MC tumor** of **small bowel**: **Leiomyoma**[Q] **>Adenoma**[Q]
• **MC tumor** of **small bowel in children**: **Lymphoma**[Q]
• **MC malignant tumor** of **small bowel**: **Carcinoid >Adenocarcinoma**[Q]
• **MC site** of small bowel **malignancy, carcinoids, lymphoma: Ileum**[Q]
• **MC site of carcinoid tumors or distribution** (**BIRACS**)[Q]: **B**ronchus> **I**leum > **R**ectum > **A**ppendix > **C**olon > **S**tomach

Liver Neoplasm
• **MC malignancy of liver**: **Metastasis**[Q]
• **MC primary malignancy of liver**: **HCC**[Q]
• **MC primary malignancy of liver in children**: **Hepatoblastoma**[Q]
• **MC benign tumor of liver: Hemangioma**[Q]

- **MC complication** of **both end** and **loop colostomy**: **Parastomal hernia**[Q]
- **Complications** (**both parastomal hernia** and **prolapse**) are **more common in loop colostomy**[Q] as compared to end colostomy.
- **MC complication** of **ileostomy: Skin irritation**[Q]
- **MC early complication** of **ileostomy**: **Ischemic necrosis**[Q]

Indications of Liver Transplantation
• **MC indication** for LT: Cirrhosis from Hepatitis C (**HCV**)[Q]
• **2nd MC indication** for LT: **Alcoholic liver disease**[Q]
• MC indication for LT in **children**: **Biliary atresia**[Q]
• MC **metabolic disorder** requiring LT: **Alpha-1 antitrypsin deficiency**[Q]
• MC indication for LT following **acute liver failure**: **Acetaminophen toxicity**[Q]

Pediatric Tumors	
• **MC malignant** tumor of **infancy** • **MC extracranial solid** tumor in **children** • **MC abdominal** malignancy in **children**	Neuroblastoma[Q]
• **MC primary malignant renal** tumor of **childhood**	Wilm's tumor[Q]
• **MC renal tumor** of **infancy**	Congenital mesoblastic nephroma[Q]
• **MC soft tissue** tumor in **infants** and **children**	Rhabdomyosarcoma[Q]
• **MC solid tumor** of **childhood**	Brain tumor[Q]
• **MC cancer of childhood**	**Leukemia**[Q] (30%) **>Brain tumors**[Q] (22%)

• **MC cancer** in **males** (**PLC**): **Prostate >Lung >Colorectal**[Q]
• **MC cancer** in **females** (**BLC**): **Breast >Lung >Colorectal**[Q]
• **Cancer deaths** in **males** (**LPC**): **Lung >Prostate >Colorectal**[Q]
• **Cancer deaths** in **females** (**LBC**): **Lung >Breast >Colorectal**[Q]

Annexure 21

MISCELLANEOUS

- **Widest portion** of colon: **Cecum**[Q]
- **Narrowest portion** of colon: **Sigmoid**[Q]
- **MC site** of **colonic rupture** caused **by distal obstruction**: **Cecum**[Q]
- **Colon absorbs water, NaCl**[Q]**; secretes K^+, HCO_3** and **mucus**[Q]
- **MC site of ischemic colitis: Splenic flexure**

Sarcomas with Lymph Node Metastasis (MARCES)	
• **M**alignant fibrous histiocytoma[Q]	• **C**lear cell sarcoma[Q]
• **A**ngiosarcoma[Q]	• **E**pithelial sarcoma[Q]
• **R**habdomyosarcoma[Q]	• **S**ynovial sarcoma[Q]

Tumors with Spontaneous Regression (NCR MR)	
• **N**euroblastoma[Q]	• **M**alignant melanoma[Q]
• **C**horiocarcinoma[Q]	• **R**etinoblastoma[Q]
• **R**enal cell carcinoma[Q]	

Malignancies associated with Migratory Thrombophlebitis	
• **CA pancreas (MC)**[Q]	• **Prostate cancer**[Q]
• **CA lung**[Q]	• **Ovarian** cancer[Q]
• **GI malignancies**[Q]	• **Lymphoma**[Q]

- **Trousseau's syndrome**: **Migratory thrombophlebitis**[Q]
- **Trousseau's sign: Carpopedal spasm** in **hypocalcemia**[Q]
- **Troisier's sign: Palpable left supraclavicular LN** (**Virchow's node**)[Q]

Condition	Seen in
Necrolytic erythema migrans	• **Glucagonoma**
Erythema chronicum migrans	• **Lyme's disease**
Erythema infectiosum (fifth disease)	• **Parvovirus B19**
Erythema marginatum	• **Acute rheumatic fever**

Perineural Spread is seen in	
1. **Adenoid cystic carcinoma**[Q]	4. **Ductal adenocarcinoma** of pancreas[Q]
2. **CA GB**[Q]	
3. **Cholangiocarcinoma**[Q]	

Small Round Blue Cell Tumors (WEL PNR)	
• **Wilm's tumor**	• **Primitive neuroectodermal tumor**
• **Ewing's sarcoma**	• **Neuroblastoma**
• **Lymphoma**	• **Rhabdomyosarcoma**
• **Medulloblastoma**	• **Askin tumor**
• **Small cell variant of osteosarcoma**	• **Desmoplastic small cell tumor**

Causes of Postoperative Fever	
Day	**Cause**
2–5 days	• **Atelectasis** of the lung[Q]
3–5 days	• **Superficial** and **deep wound infection**[Q]
5 days	• **Chest infection** including viral respiratory tract infection, **UTI** and **thrombophlebitis**[Q]
>5 days	• **Wound infection**, anastomotic leakage, intracavitary collections and abscesses[Q]

New Recommendations
• **Aspirin need not be stopped before surgery**[Q]
• **Thyroid medications** should be **continued**[Q]
• **Anti-hypertensives** should be **continued** (even losartan)[Q]
• **OCPs** should be **continued till day of surgery**[Q]
• **Anti-depressants, anti-epileptics, anti-psychotics** should be **continued except TCA**, which should be **stopped 3 weeks before surgery** due to risk of **intra operative arrhythmia**[Q]
• **Ticlopidine: 14 days** before surgery[Q]
• **Clopidogrel: 7 days** before surgery[Q]
• **Warfarin: 3 days** before surgery[Q]
• **LMWH: 12 hours** before surgery[Q]

Increased Cancer Risk in Obese Patients (PEEL CP GO KBC)		
• **Prostate**[Q]	• **Cervix**[Q]	• **Kidney**[Q]
• **Endometrial**[Q]	• **Pancreas**[Q]	• **Bile duct**[Q]
• **Esophagus**[Q]	• **Gall Bladder**[Q]	• **Breast**[Q]
• **Liver**[Q]	• **Ovarian**[Q]	• **Colon and rectum**[Q]

Psammoma Bodies (PSM)
1. **P**apillary carcinoma thyroid[Q]
2. **P**apillary carcinoma (RCC)[Q]
3. **S**erous cystadenoma[Q]
4. **M**eningioma[Q]

Proctoscope	**10–12 cm**[Q]
Rigid sigmoidoscope	**25 cm**[Q]
Flexible sigmoidoscope	**60 cm**[Q]
Colonoscope	**160 cm**[Q]

Most radiosensitive ovarian tumor	• **Dysgerminoma**[Q]
Most radiosensitive **brain** tumor	• **Medulloblastoma**[Q]
Most radiosensitive **testicular** tumor	• **Seminoma**[Q]
Most radiosensitive **lung** tumor	• **Small cell CA**[Q]
Most radiosensitive **kidney** tumor	• **Wilms tumor**[Q]
Most radiosensitive **bone** tumor	• **Ewing's Sarcoma**[Q] and **Multiple myeloma**[Q]

Condition	Seen in
Necrolytic erythema migrans	• **Glucagonoma**
Erythema chronicum migrans	• **Lyme's disease**
Erythema infectiosum (fifth disease)	• **Parvovirus B19**
Erythema marginatum	• **Acute rheumatic fever**

Screening Immunohistochemistry
• **Epithelial Markers**: **Cytokeratin** (positive in **carcinomas**)[Q]
• **Lymphoid Markers**: **CD-45** (positive in **lymphoma**)[Q]
• **Melanocytic Markers**: **S-100** (positive in **melanoma**)[Q]
• **Mesenchymal Markers**: **Vimentin** (positive in **sarcoma**)[Q]
• **Neuroendocrine Markers**: **Chromagranin** and **neuron specific enolase**[Q]

SECTION 1

ENDOCRINE SURGERY

CHAPTERS

- Chapter 1 Breast
- Chapter 2 Thyroid
- Chapter 3 Parathyroid and Adrenal Glands

CHAPTER 1

Breast

MULTIPLE CHOICE QUESTIONS

NIPPLE DISCHARGE

1. Blood stained nipple discharge is seen in: *(DNB 2013, DNB 2011, Orissa 2011, PGI June 2009, UPPG 2010, AIIMS Nov 2003, All India 2005)*

a. Breast abscess
b. Fibroadenoma
c. Ductal papilloma
d. Fat necrosis of breast

2. Bleeding from nipple is seen in: *(PGI June 2001, June 97)*

a. Fibroadenoma
b. Duct ectasia
c. Ductal papilloma
d. Chronic breast abscess
e. CA breast

3. Green discharge is most commonly seen with: *(WBPG 2015, AIIMS Nov 98)*

a. Duct papilloma
b. Duct ectasia
c. Retention cyst
d. Fibroadenosis

4. A 25-years old female complains of discharge of blood from a single duct in her breast. The most appropriate treatment is: *(All India 2008)*

a. Radical excision
b. Microdochectomy
c. Radical mastectomy
d. Biopsy to rule out carcinoma

5. True statement (s) about nipple discharge is/are: *(PGI June 2004)*

a. Mammography
b. Cone excision done in single intraductal tumour
c. Mammography done when duct papilloma is <4.5cm
d. Red discharge indicate malignancy
e. Blue-black discharge indicate duct ectasia

6. A 25-years old lady presents with spontaneous nipple discharge of 3-months duration. On examination the discharge is bloody and from a single duct. The following statements about management of this patient are true except: *(AIIMS Nov 2004)*

a. Ultrasound can be a useful investigation
b. Radical duct excision is the operation of choice
c. Galactogram, though useful, is not essential
d. Majority of blood stained nipple discharges are due to papillomas or other benign condition

CARCINOMA BREAST INVESTIGATIONS

7. Triple assessment for CA Breast includes: *(DNB 2010, All India 2009)*

a. History, clinical examination and mammogram
b. History, clinical examination and FNAC
c. USG, mammogram and FNAC
d. Clinical examination, mammogram and FNAC

8. Best diagnostic method for breast lump is: *(AIIMS June 95)*

a. USG
b. Mammogram
c. Biopsy
d. FNAC

9. A 45-years old woman presents with a hard and mobile lump in the breast. Next investigation is: *(All India 2001)*

a. FNAC
b. USG
c. Mammography
d. Excision biopsy

10. A female patient present with a hard mobile lump in her right breast. Which investigation would be most helpful in making the diagnosis? *(AIIMS Nov 2001)*

a. FNAC
b. Needle biopsy
c. Excision biopsy
d. Mammography

11. Investigation of choice for High risk breast cancer in female is: *(DNB 2014)*

a. MRI
b. CT-PET
c. Mammography
d. USG

MAMMOGRAPHY

12. Most sensitive imaging for ductal carcinoma in situ of breast is: *(AIIMS Nov 2010)*

a. Mammography
b. MRI
c. PET
d. USG

13. True about screening mammography: *(PGI June 2004)*

a. Indicated in 50–70 years of age
b. Mortality reduced by 30%
c. Radiation due to mammography can cause carcinoma
d. MRI is better than mammography
e. USG is better than mammography

14. On mammogram all of the following are the features of a malignant tumor except: *(AIIMS Nov 2003)*

a. Spiculation
b. Microcalcification
c. Macrocalcification
d. Irregular mass

15. BIRADS stands for: *(AIIMS Nov 2012)*

a. Breast Imaging Reporting and Data System
b. Best Imaging Reporting and Data System
c. Brain Imaging Reporting and data system
d. Best imaging reporting and data system

16. All are indicators of malignancy in a mammography except: *(PGI Dec 99)*

a. Nodular calcification
b. Speckled margin
c. Attenuated architecture
d. Irregular mass

17. Popcorn calcification in mammography is seen in: *(AIIMS June 2000)*

a. Fibroadenoma
b. Fat necrosis
c. Cystosarcoma phyllodes
d. CA Breast

18. A 55-years old post menopausal woman, on hormone replacement therapy (HRT), presents with heaviness in both breasts. A screening mammogram reveals a high density speculated mass with cluster of pleomorphic microcalcification and ipsilateral large axillary lymph nodes. The mass described here most likely represents: *(AIIMS Nov 2003)*

a. Cystosarcoma phyllodes
b. Lymphoma
c. Fibroadenoma
d. Carcinoma

19. With reference to mammography, which one of the following statements is correct? *(UPSC 2005)*
a. A baseline study should be done for all women at age 30
b. It uses less radiation energy than a chest X-ray
c. It should be part of the regular follow up of a woman following therapy for unilateral breast cancer
d. It provides an effective substitute for biopsy of suspicious lesions

20. What is the age of routine screening mammography? *(DNB 2014)*
a. 20 years b. 30 years
c. 40 years d. 50 years

CARCINOMA BREAST RISK FACTORS

21. Risk factor for carcinoma breast: *(PGI Nov 2011, Nov 2010)*
a. Nulliparity b. OCP
c. Family history d. BRCA-1 mutation
e. Estrogen

22. Which of the following is a predisposing factor for carcinoma of breast? *(MHSSMCET 2005)*
a. Sclerosing adenosis
b. Epithelial hyperplasia
c. Fibrocystic disease of breast
d. Fibroadenoma

23. Moderately increased risk of invasive breast carcinoma is associated with which of the following benign lesions of the breast? *(All India 2009)*
a. Sclerosing adenosis
b. Atypical lobular hyperplasia
c. Apocrine metaplasia
d. Squamous metaplasia

24. Moderately increased risk for invasive breast carcinoma is associated with which of the following?
a. Sclerosing adenoma *(DNB 2010, Kerala 2000)*
b. Apocrine metaplasia
c. Duct ectasia
d. Atypical ductal hyperplasia
e. Fibro adenoma

25. True regarding breast carcinoma is: *(MCI March 2008)*
a. Occurs most commonly in upper inner quadrant
b. Late menarche and early menopause predisposes for breast malignancy
c. Commoner in nulliparous women
d. Unrelated with the family history of breast cancer

26. All of the following are predisposing factors for breast carcinoma except: *(DNB 2008, MCI Sept 2008)*
a. Family history of breast carcinoma
b. First child at a younger age
c. Early menarche and late menopause
d. Nulliparous women

27. BRCA-1 positive woman have _____% increased risk of breast carcinoma: *(JIPMER 2011)*
a. 10 b. 20
c. 40 d. 60

28. Gail model of risk assessment is used for: *(Recent Questions 2013)*
a. CA stomach b. CA esophagus
c. CA breast d. CA prostate

29. Which of the following cancer is least associated with genetic and familial cause? *(DNB 2008)*
a. Ovarian b. Prostate
c. Lung d. Breast

30. Breast cancer more commonly seen in: *(PGI Dec 2002)*
a. Increased risk in relatives b. Early marriage <20 years
c. Nullipara d. High fat diet
e. Who avoided breast feeding

31. Least risk of CA breast is seen in: *(AIIMS Nov 2006)*
a. BRCA-1 b. BRCA-2
c. Li-Fraumeni syndrome d. Ataxia telangiectasia

32. BRCA-1 gene is associated with: *(DPG 2008)*
a. Ductal carcinoma b. Lobular carcinoma
c. Medullary carcinoma d. Colloid carcinoma

33. Type of fibroadenosis most likely to undergo malignant change is: *(AIIMS June 93)*
a. Adenosis b. Epitheliosis
c. Sclerosing adenosis d. Cystic

34. Doesn't lead to carcinoma breast: *(DPG 2006)*
a. Sclerosing adenosis b. Epithelial hyperplasia
c. Fibrocystic change d. Papillomatosis

35. Which of the following is an increased risk of breast cancer? *(PGI Dec 2005)*
a. Sclerosing adenosis b. Atypical hyperplasia
c. Fibroadenoma d. Florid hyperplasia

36. Risks for carcinoma breast are: *(PGI Dec 2000)*
a. First degree relative b. Atypical hyperplasia
c. Sclerosing adenosis d. Increased fat intake

37. Breast carcinoma is seen in women who: *(PGI June 2002)*
a. Consume fatty food b. Have early menopause
c. Smoke d. Have multiple sex-partners
e. Did not breastfed their children

38. Breast cancer is more common in: *(PGI Dec 2001)*
a. Those who avoid breast-feeding to the infant
b. Multiparity
c. Nulliparity
d. High fat diet
e. Family history of breast cancer

39. Following are risk factors for CA breast except:
a. Maternal grand mother had history *(PGI Dec 96)*
b. Paternal grand mother had history
c. Long term estrogen
d. Fat necrosis

40. The incidence of carcinoma of the breast is increased in woman who: *(AIIMS 78, 84)*
a. Have an early menarche and late menopause
b. Take an estrogen progestogen oral contraceptive
c. Have their first child after the age of 35 years
d. Avoid breast feeding
e. Are nuns

41. Risk factor for carcinoma breast: *(All India 89)*
a. Fibroadenoma on one side b. Sister died from cancer
c. Jewish origin d. All

42. Which one predisposes to breast cancer? *(AIIMS 92)*
a. Adenosis b. Fibrosis
c. Blue domed cysts d. Epitheliosis

43. Which of the following is the most significant risk factor for developing breast cancer is? *(Karnataka 96)*
a. The presence of sclerosing adenosis
b. Nullipartiy
c. Atypical lobular hyperplasia
d. Atypical ductal hyperplasia

44. Statistically important risk factors identified for breast cancer: *(PGI 2002)*
a. Early age at marriage
b. Females of non vegetarian diet
c. Those who have not breast fed their children
d. Smoking

45. All are risk factors for carcinoma breast except: *(Recent Questions 2013)*
a. Early menarche
b. Late menopause
c. Ovarian cancer
d. Early full term pregnancy

CARCINOMA BREAST

46. In which of the following types of carcinoma breast, comedo growth pattern is seen?
a. Ductal carcinoma in-situ
b. Medullary carcinoma
c. Lobular carcinoma in-situ
d. Infiltrating lobular carcinoma

47. Bilateral, multicentric type of carcinoma in breast is usually: *(COMEDK 2011)*
a. Mucoid carcinoma
b. Invasive lobular carcinoma
c. Infiltrating ductal carcinoma
d. Noninfiltrating ductal carcinoma

48. False about lobular carcinoma breast is: *(DNB 2008)*
a. Present as breast mass
b. Frequently bilateral
c. Poor prognosis
d. Multicentric

49. True about histology in infiltrating lobular breast carcinoma: *(JIPMER 2012, 2011)*
a. Single file\pattern
b. Pleomorphic cells in sheets
c. Cribiform pattern
d. Pin wheel pattern

50. Lymph node first involved in CA breast is/are: *(PGI Nov 2009)*
a. Axillary LN
b. Internal mammary LN
c. Supraclavicular LN
d. Contralateral axillary LN

51. In breast cancer following are expressed: *(PGI Dec 2007)*
a. Her-2-neu
b. p53
c. BRCA-1
d. BCL-1
e. CEA

52. Most common presentation of lobular carcinoma breast is:
a. Nipple discharge *(DNB 2012)*
b. Breast mass
c. Mammographic calcification
d. Nipple retraction

53. Carcinoma breast is most commonly seen in which quadrant of breast: *(MHSSMCET 2005)*
a. Upper outer
b. Upper inner
c. Lower inner
d. Lower outer

54. Nottingham Prognostic Index for CA breast is:
a. I = (0.2 x size) + grade + nodes *(MHSSMCET 2008)*
b. I = (0.4 x size) + grade + nodes
c. I = (0.6 x size) + grade + nodes
d. I = (0.8 x size) + grade + nodes

55. Rare histological variants of carcinoma breast with better prognosis include all except: *(DPG 2009 March)*
a. Colloid carcinoma
b. Medullary carcinoma
c. Inflammatory carcinoma
d. Tubular carcinoma

56. All of the following are invasive carcinoma breast except:
a. Comedocarcinoma *(PGI 89)*
b. Colloid carcinoma
c. Lobular carcinoma in-situ
d. Medullary carcinoma

57. Which carcinoma breast is not invasive? *(DPG 79,93)*
a. Comedocarcinoma
b. Schirrhous carcinoma
c. Lobular carcinoma
d. Paget's disease

58. In which of the following types of carcinoma breast, comedo growth pattern is seen? *(Karnataka 2006)*
a. Ductal carcinoma in-situ
b. Medullary carcinoma
c. Lobular carcinoma in-situ
d. Infiltrating lobular carcinoma

59. Histological variety of breast carcinoma with best prognosis is: *(DNB 2012, 2008, 2005, 2002)*
a. Medullary
b. Colloid
c. Lobular
d. Tubular

60. Breast cancer which is multicentric and bilateral? *(DPG 2008, AIIMS Feb 97, May 95, All India 96, PGI June 95)*
a. Ductal carcinoma
b. Lobular carcinoma
c. Mucoid carcinoma
d. Colloid carcinoma

61. Single file pattern is seen breast cancer type: *(APPG 2004)*
a. Intraductal
b. Infiltrating lobular
c. Infiltrating ductular
d. None

62. In which of the following type of carcinoma of the breast, is a biopsy of the opposite breast advised? *(UPSC 2002)*
a. Inflammatory carcinoma
b. Medullary carcinoma
c. Lobular carcinoma
d. Scirrhous carcinoma

63. In which of the following type of breast carcinoma, would you consider biopsy of opposite breast? *(All India 2006)*
a. Adenocarcinoma poorly differentiated
b. Medullary carcinoma
c. Lobular carcinoma
d. Comedo carcinoma

64. The type of mammary ductal carcinoma is situ (DCIS) most likely to result in a palpable abnormality in the breast is: *(All India 2006)*
a. Apocrine DCIS
b. Neuroendocrine DCIS
c. Well differentiated DCIS
d. Comedo DCIS

65. Not true about CA breast in India: *(AIIMS June 98)*
a. Incidence is 20/1,00,000
b. Average age 42 years
c. Positive family history is a risk factor
d. More common in muslims

66. Best prognosis amongst the following histological variants of breast carcinoma is seen with: *(All India 98)*
a. Intraductal
b. Colloid (Mucinous)
c. Lobular
d. Medullary

67. Which of the following carcinoma is familial? *(All India 99)*
a. Breast
b. Prostate
c. Cervix
d. Vaginal

68. Group of lymph node involved in breast carcinoma are all of the following except: *(MCI March 2005)*
a. Supraclavicular
b. Pretracheal
c. Axillary
d. Internal mammary

69. Both breasts are affected in which type of breast carcinoma? *(MCI Sept 2009)*
a. Inflammatory
b. Infiltrative
c. Ductal
d. Lobular

70. True about breast carcinoma are all except:
a. Positive family history *(MCI March 2007)*
b. Median age of presentation is about 40 years
c. More common in muslims
d. Peau d'orange is due to subcutaneous lymphatic involvement

71. 'Peau-d-orange' appearance of the mammary skin is due to: *(DNB 2012, PGI June 95, Dec 95)*
a. Intra-epithelial cancer
b. Sub-epidermal cancer
c. Lymphatic permeation
d. Vascular embolisation

72. 'Peau-d-orange' is seen in: *(PGI 88)*
a. Carcinoma breast b. Fibroadenoma
c. Chronic abscess d. Mondor's disease

73. Most common site of metastasis from breast carcinoma: *(DNB 2012)*
a. Thoracic vertebra b. Pelvis
c. Femur d. Lumbar vertebra

74. Carcinoma breast with high incidence of involving opposite breast is: *(AIIMS Nov 94)*
a. Lobular carcinoma
b. Medullary carcinoma
c. Scirrhous adenocarcinoma
d. Atrophic scirrhous carcinoma

75. All are true about CA breast, except: *(AIIMS May 93)*
a. Affected sibling is a risk factor
b. Paget's disease of nipple is intraductal type of CA
c. Common in aged nulliparous
d. Increased incidence with prolonged breast feeding

76. Which of the following indicate CA breast? *(PGI Dec 2002)*
a. Serous discharge
b. Recent retraction of nipple
c. Ulceration of nipple
d. Cracked nipple
e. Cellular atypia

77. 'Peau-d-orange' is due to: *(DNB 2009, 2008, AIIMS Nov 93)*
a. Arterial obstruction
b. Blockage of subdermal lymphatics
c. Invasion of skin with malignant cells
d. Secondary infection

78. 'Peau-d-orange' of breast is due to:
a. Obstruction of Vein *(MCI Sept 2005, 2010, March 2007)*
b. Obstruction of lymphatic ducts
c. Obstruction of glandular ducts
d. Obstruction of arteries

79. True about lymphatic spread of CA Breast: *(PGI June 2005)*
a. Axillary nodes are most commonly involved
b. Internal mammary nodes are also involved
c. If supraclavicular lymph node is involved then it is N3
d. Axillary nodes are treated by surgical resection

80. Secondary deposits from carcinoma breast is commonest in: *(DNB 2010, 2001, All India 89)*
a. Lung b. Liver
c. Brain d. Bone

81. Most common type of breast carcinoma: *(WBPG 2014)*
a. LCIS b. DCIS
c. Phyllodes tumour d. Invasive ductal carcinoma

82. Carcinoma breast is least commonly seen in: *(Recent Questions 2013)*
a. Superior outer quadrant
b. Inferior outer quadrant
c. Subareolar
d. Lower inner quadrant

83. Nipple inversion occurs due to involvement of: *(DNB 2014)*
a. Cooper's ligament
b. Subareolar duct
c. Parenchyma of breast
d. Subdermal lymphatics

84. Van Nuys grading system is used for: *(DNB 2014)*
a. LCIS
b. DCIS
c. Inflammatory
d. Medullary Carcinoma breast

85. Which of the following statements is fully true? *(APPG 2015)*
a. Paget's disease of the nipple is a type of breast cancer with prominent Paget cells and presence of S-100 Ag immunostaining
b. BRCA 1 and 2 gene mutations cause breast cancer and are passed from mother to daughter by mitochondrial inheritance
c. Raloxifene is a SERM that prevents breast cancer but increases risk of endometrial cancer
d. Lobular carcinoma in situ arises from epithelial lining of the minor ducts and 10% occur in males

CARCINOMA BREAST STAGING

86. A 45-years old postmenopausal lady presents with an 8-cm breast lump that is adherent to the skin, with one firm apical lymph node in the axilla and one more node in the ipsilateral supraclavicular area with no clinical evidence of distant metastasis. The staging is: *(COMEDK 2010)*
a. T3 N2 M1 b. T4 N3c M0
c. T4 N2c M1 d. T3 N3 M0

87. In patients with breast cancer, chest wall involvement means involvement of any one of the following structures except: *(DPG 2010, AIIMS Nov 2005)*
a. Serratus anterior
b. Pectoralis major
c. Intercostal muscles
d. Ribs

88. Ipsilateral supraclavicular lymph nodes are positive in a patient of CA breast. Stage is: *(Recent Question 2013, AIIMS Nov 2008)*
a. II b. III B
c. III C d. IV

89. CA breast stage T4b involves all except: *(AIIMS May 2012)*
a. Nipple retraction
b. Skin ulcer over the swelling
c. Dermal edema
d. Satellite nodule

90. 4 cm breast nodule with ipsilateral mobile LN in axilla staging: *(PGI June 2000, Dec 99)*
a. T2N1M0 b. T2N2M0
c. T1N1M0 d. T3N2M1

91. Which of the following stage of breast cancer corresponds with following feature: Breast mass of 6×3 cm size with hard mobile ipsilateral axillary lymph node and ipsilateral supraclavicular lymph node: *(AIIMS June 2000)*
a. T4N2M0 b. T3N1M1
c. T4N1M1 d. T3N3M0

92. A 43-years old lady presents with a 5cm lump in right breast with a 3cm node in the supraclavicular fossa. Which of the following TNM stage she belongs to as per the latest AJCC staging system? *(AIIMS June 2004)*
a. T2N0M1 b. T1N0M1
c. T2N3M0 d. T2N2M0

93. Patient with 1.2 cm breast lump with three lymph nodes in the axilla with no metastasis is in which stage as per AJCC? *(COMEDK 2014)*
a. T1N0M0 b. T1bNibM0
c. T1cN1bM0 d. T2N1cM0

94. A 45-years old lady present with a lump in her right breast. The lump is 4 cms in diameter with evidence of cutaneous edema (Peau d' orange), not fixed to pectoralis major muscle. The axillary lymph nodes are not enlarged. What is the status of T in TNM classification: *(ICS 2000)*

a. T1>2 cm
b. T2 is 2-5 cm
c. T3>5 cm
d. T4 is any size

95. TNM staging of breast carcinoma with positive bilateral supraclavicular lymph nodes is? *(DNB 2014)*

a. N3a
b. N3b
c. N3c
d. M1

CARCINOMA BREAST MANAGEMENT

96. True about modified radical mastectomy is:

a. Pectoralis major is removed *(Punjab 2007)*
b. Axillary lymph nodes are preserved
c. Pectoralis minor is divided
d. Internal mammary lymph nodes are removed

97. Breast conservation surgery includes: *(PGI Dec 2007)*

a. Lumpectomy
b. Radiotherapy
c. Chemotherapy
d. Axillary LN dissection
e. Sentinel LN biopsy

98. Contraindication for radical mastectomy in CA breast:

a. Distant metastasis *(PGI Dec 2006)*
b. Fixity to chest wall
c. Axillary LN involvement
d. Supraclavicular LN involvement

99. Breast conservation surgery indicated in: *(PGI Nov 2011)*

a. Tumor size < 4 cm
b. Central
c. Mobile
d. Pendulous breast
e. Diffuse microcalcification

100. All of the following are removed in radical mastectomy except: *(MHPGMCET 2005, AIIMS 92)*

a. Pectoralis major
b. Pectoralis minor
c. Axillary lymph node
d. Supraclavicular lymph node

101. In Patey's modified mastectomy, which of the following is preserved? *(MHSSMCET 2006)*

a. Intercostobrachial nerve
b. Pectoralis major
c. Pectoralis minor
d. Axillary fascia

102. Patey's mastectomy following are preserved except: *(MHSSMCET 2009)*

a. Teres Major
b. Teres Minor
c. Axillary vein
d. Breast

103. Drug used in estrogen dependent breast cancer: *(AIIMS May 2012)*

a. Tamoxifene
b. Clomiphene citrate
c. Estrogen
d. Adriamycin

104. Components of QUARTZ except: *(MHSSMCET 2009)*

a. Quadrantectomy
b. Axillary dissection
c. Radiotherapy
d. Tamoxifen

105. Chronic treatment with tamoxifen can cause carcinoma of: *(COMEDK 2010, 2007)*

a. Ovary
b. Endometrium
c. Cervix
d. Vulva

106. Use of tamoxifen for breast cancer can cause all of the following adverse effects, except: *(AIIMS May 2011, DPG 2011, PGI Dec 2001)*

a. Thromboembolism
b. Endometrial carcinoma
c. Carcinoma in contralateral breast
d. Cataract

107. A 75-years old hypertensive lady has a 2 × 2cm infiltrating duct cell carcinoma in the subreolar region. There are not palpable lymph nodes and distant metastases. However, she had been treated for pulmonary tuberculosis 20 years ago. The best course of management would be: *(UPSC 2004)*

a. Modified radical mastectomy followed by radiotherapy
b. Modified radical mastectomy followed by 6 cycles of chemotherapy
c. Breast conservation surgery followed by radiotherapy
d. Modified radical mastectomy followed by hormone therapy

108. True about treatment of early breast cancer:

a. Aromatase inhibitors are replacing tamoxifen in premenopausal women *(AIIMS May 2008)*
b. Postmastectomy radiation therapy is given when 4 or more lymph nodes are positive
c. Tamoxifen is not useful in post-menopausal women
d. In premenopausal women, multidrug chemo-therapy is given in selected patients

109. Simple mastectomy includes removal of:

a. Only breast *(MCI Sept 2005, 2006)*
b. Breast and axillary nodes
c. Breast + axillaries nodes + pectoralis major muscle
d. Breast + axillaries nodes + pectoralis major muscle+ pectoralis minor muscle

110. Superolateral boundary of axillary dissection is: *(DNB 2010)*

a. Clavipectoral fascia
b. Brachial plexus
c. Axillary artery
d. Axillary vein

111. A 50-years old female has under gone mastectomy for CA breast. After mastectomy patient is not able to extend adduct and internally rotate the arm. Now supply to which of the following muscle is damaged? *(AIIMS May 2012)*

a. Pectoralis major
b. Teres minor
c. Lattisimus dorsi
d. Long head of triceps

112. In Patey's mastectomy, the step not done is: *(PGI 95)*

a. Nipple and areola removed
b. Surrounding normal tissue of tumor is removed
c. Pectoralis major removed
d. Pectoralis minor removed

113. Which is used in CA Breast? *(DPG 2007)*

a. Daunorubicin
b. Doxorubicin
c. Cisplatin
d. Actinomycin D

114. Malti, a 45-years female patient with a family history of breast carcinoma, showed diffuse microcalcifi-cation on mammography. Indraductal carcinoma is situ was seen on biopsy. Most appropriate management is: *(NEET 2013) (AIIMS June 2001)*

a. Quadrantectomy
b. Radical mastectomy
c. Simple mastectomy
d. Chemotherapy

115. CA Breast stage I and II managed by: *(PGI Dec 2002)*

a. Total mastectomy
b. Modified radical mastectomy
c. Lumpectomy and axillary clearance
d. Lumpectomy, axillary clearance and radiotherapy

116. For CA breast best chemotherapeutic regimen: *(AIIMS Sept 96, PGI June 96)*

a. Cyclophosphamide, methotrexate, 5-fluorouracil
b. Methotrexate, cisplatin
c. Cisplatin, adrimaycin, steroid
d. Methotrexate, adriamycin, steroid

117. A 30-years old female presented with unilateral breast cancer associated with axillary lymph node enlargement. Modified radical mastectomy was done, further treatment plan will be: *(AIIMS May 2007)*
a. Observation and follow-up
b. Adriamycin based chemotherapy followed by tamoxifen depending on estrogen/progesterone receptor status
c. Adriamycin based chemotherapy only
d. Tamoxifen only

118. True about adjuvant therapy in breast cancer:
a. Prognosis is better, if given in young female
b. Increases survival by 20% *(PGI Dec 2003)*
c. Nodal status positive gives good result
d. Hormone receptor positive gives good result
e. Not associated with increased survival

119. Conservative surgery in breast cancer is not to be done in:
a. Low socio-economic status *(PGI Dec 2002)*
b. Age >40 years
c. Multicentricity
d. Lymph nodes involvement in axilla
e. Family history of breast cancer

120. Breast conservative surgery is done in all except:
a. Young patients *(DPG 2010, UPPG 2000)*
b. Ductal carcinoma in situ
c. Lobular carcinoma
d. Infiltrative ductal carcinoma

121. Breast conservation surgery is not indicated in:
a. Large pendular breast b. SLE *(PGI Dec 2005)*
c. Diffuse microcalcification d. Bilateral carcinoma
e. Family history

122. Absolute contraindication of conservative breast cancer therapy is: *(PGI Dec 2005)*
a. Large pendulous breast
b. History of previous radiation
c. Axillary node involvement
d. Subareolar lump present
e. 1st trimester pregnancy

123. In breast conservation surgery, the healthy margion excised is typically: *(DNB 2013)*
a. 1 cm b. 2 cm
c. 3 cm d. 5 cm

124. In the breast conservation surgery, which of the following investigation is required: *(DNB 2002)*
a. Serum calcium b. Total body scan
c. Sentinel node biopsy d. Tumor markers

125. Post operative radiotherapy in breast is given for:
a. To prevent metastasis *(JIPMER 95)*
b. For ablation of remnant of cancer tissue
c. To prevent recurrence
d. Prevents distant metastasis

126. A 40-years old female with a 2 cms nodule in the breast and a proved metastatic node in the axilla, treatment is:
a. Quadrantectomy *(PGI 96)*
b. Mastectomy with local radiotherapy
c. Patey's with adjuvant chemotherapy
d. Halstedt's operation with tamoxifen

127. Treatment of hormone dependent fungating carcinoma of breast with secondaries in the lung in a female patient aged 30 years is: *(MAHE 2005)*
a. Simple mastectomy followed by oophorectomy
b. Radical mastectomy followed by oophorectomy
c. Adrenalectomy
d. Lumpectomy followed by castration

128. A premenopausal lady presents with pulmonary metastasis. She underwent mastectomy 3 years back. True statement regarding her management: *(PGI Nov 2011)*
a. It was better if she took adjuvant therapy after mastectomy
b. First analyze estrogen and progesterone receptor levels on the tumor
c. Response of chemotherapy is dose dependent
d. Combined chemotherapy is better than monotherapy
e. She should now be given chemotherapy with radiotherapy

129. Aromatase inhibitors used in CA breast are: *(PGI June 2007)*
a. Letrozole b. Anastrozole
c. Exemestane d. Tamoxifen

130. According to NSABP tamoxifen given in breast carcinoma for: *(WBPG 2014)*
a. 5 years b. 3 years
c. 10 years d. Lifelong

CARCINOMA BREAST PROGNOSTIC INDICATORS

131. The most important prognostic factor of carcinoma breast is: *(COMEDK 2010)*
a. Tumour size b. DNA content of tumour
c. Histologic subtype d. Tumour grade

132. Prognosis of breast cancer depends mostly upon:
a. Size of tumour *(Punjab 2008)*
b. Axillary lymph node status
c. Grade of tumour
d. Estrogen and progesterone receptor

133. Good prognostic markers in breast cancer: *(PGI Dec 2006)*
a. ER +ve b. PR +ve
c. HER-2-neu +ve d. CD44 +ve
e. p53 +ve

134. Not a poor prognostic factor in breast carcinoma:
a. Her-2-neu +ve *(PGI May 2011)*
b. Progesterone receptor +ve
c. Extranodal metastasis
d. Vascularity of tumor
e. ER +ve

135. Good prognosis in carcinoma breast are all except:
a. Positive estrogen progesterone hormone receptor
b. High HER-2-neu oncogene *(UPPG 2010)*
c. DNA flow cytometry shows-diploidy
d. Low cathepsin-D
e. Tumour labeling index <3%

136. The most important prognostic factor in carcinoma breast is: *(DPG 2009 Feb)*
a. Size of tumour b. Skin involvement
c. Involvement of muscles d. Axillary LN involvement

137. Prognosis of breast cancer is best determined by:
a. Estrogen/progesterone receptors *(APPG 2008)*
b. Axillary lymph node status
c. Clinical assessment
d. CT

138. Most unfavorable/poor prognosis is seen in which type of breast cancer? *(MCI Sept 2007)*
a. Tubular carcinoma b. Medullary carcinoma
c. Colloid carcinoma d. Inflammatory carcinoma

139. Most important prognostic factor for breast carcinoma is: *(MCI March 2005)*
a. Age of the patient
b. Lymph node involvement
c. Genetic factors
d. Family history

140. In case of CA breast most important prognostic factor is: *(AIIMS Nov 96, Feb 97)*
a. Size of tumor
b. Lymph node status
c. Presence of estrogen receptor
d. Age of menopause

141. Prognosis in male breast cancer depends mainly on: *(AIIMS May 95)*
a. Duration of disease
b. Nipple discharge
c. Ulceration of nipple
d. Lymph node status

142. The risk factor for increased incidence of relapse in stage I carcinoma breast includes all except:
a. Negative estrogen/progesterone receptor status
b. High 'S' phase *(All India 98)*
c. Aneuploidy
d. Decreased Her-2-neu oncogene

143. In breast cancer following are expressed: *(PGI Dec 2007)*
a. Her-2-neu
b. p53
c. BRCA-1
d. BCL-1
e. CEA

144. In breast carcinoma metastasis, prognosis depends best upon: *(All India 98)*
a. Estrogen receptor status
b. Axillary lymph node status
c. Size of tumour
d. Site of tumour

145. Features, which are evaluated for histological grading of breast carcinoma, include all of the following except: *(AIIMS Nov 2005)*
a. Tumour necrosis
b. Mitotic count
c. Tubule formation
d. Nuclear pleomorphism

146. The most important prognostic factor in breast carcinoma is: *(All India 2006)*
a. Histological grade of the tumour
b. Stage of the tumour at the time of diagnosis
c. Status of estrogen and progesterone receptors
d. Over expression of p53 tumor suppressor gene

147. Molecular classification of breast cancer is based on: *(AIIMS November 2014)*
a. Serum hormone levels
b. Expression of hormone receptors (ER/PR)
c. In-vitro response to chemotherapeutic agents
d. Gene expression profiling

148. Estrogen receptor studies in carcinoma breast is done on: *(JIPMER 87)*
a. Blood
b. Urine
c. Tumour tissue
d. Ovary

COMPLICATIONS OF MASTECTOMY

149. Distressing complication after modified radical mastectomy? *(APPG 2008, Orissa 90)*
a. Lymphedema
b. Axillary vein thrombosis
c. Seroma
d. Death

150. The tumour, which may occur in the residual breast or overlying skin following wide local excision and radiotherapy for mammary carcinoma is: *(All India 2004)*
a. Leiomyosarcoma
b. Squamous cell carcinoma
c. Basal cell carcinoma
d. Angiosarcoma

151. Complication of post mastectomy lymphedema is: *(JIPMER 95)*
a. Metastases of cancer
b. Recurrence
c. Lymphosarcoma
d. Pain

152. Pain along medial aspect of arm in a post-mastectomy patient is due to: *(DNB 2009, 2008)*
a. Phantom breast pain
b. Intercostobrachial neuralgia
c. Neuroma pain
d. Other nerve injury pain

BREAST RECONSTRUCTION

153. Reconstruction surgery in breast carcinoma, best myocutaneous flap is: *(UPPG 2009)*
a. Pectoralis minor
b. Pectoralis major
c. Latissimus dorsi
d. Transverse rectus abdominis

154. Flap commonly used in breast reconstruction is: *(TN 2003)*
a. Serratus anterior
b. TRAM
c. Flap from arm
d. Delto pectoral flap

155. All of the following are used for reconstruction of breast except: *(AIIMS Nov 2000)*
a. Transverse rectus abdominis myocutaneous flap
b. Latissimus dorsi myocutaneous flap
c. Pectoralis major myocutaneous flap
d. Transversus rectus abdominis free flap

156. Which of the following flaps gives best cosmetic results for breast reconstruction? *(MHPGMCET 2008)*
a. Pectoralis major muscle flap
b. Latissimus dorsi flap
c. Transversus rectus abdominis muscle flap
d. Serratus anterior muscle flap

INFLAMMATORY CARCINOMA BREAST

157. Most malignant type of carcinoma breast is:
a. Paget's disease *(NIMHANS 86, JIPMER 87)*
b. Anaplastic carcinoma
c. Scirrhous carcinoma
d. Atrophic Scirrhous carcinoma
e. Mastitis carcinomatosa

158. In inflammatory carcinoma breast with metastasis of axilla, treatment of choice is: *(PGI Dec 96)*
a. Radical mastectomy + chemotherapy
b. Radical mastectomy + radiotherapy
c. Simple mastectomy + radiotherapy
d. Chemotherapy + radiotherapy

MALE BREAST CANCER

159. True about breast carcinoma in men:
a. Estrogen receptor positive *(NIMHANS 86, JIPMER 87)*
b. Associated with gynaecomastia
c. Radiotherapy contraindicated due to close proximity to chest wall
d. Seen in young males

160. What is true about male breast carcinoma? *(DPG 2008)*
a. Gynaecomastia is a predisposing factor
b. More common on right side
c. Tamoxifen is not given
d. No estrogen present

161. True regarding male breast cancer: *(PGI June 2009)*
a. MC lobular type
b. Estrogen receptor positive
c. History of gynaecomastia may be present
d. Paget's disease of nipple is more common in male than female
e. Undescended testis is a risk factor

162. True about male breast cancer is all except: *(MHPGMCET 2009)*
a. Less than 2% of all cases of breast cancer
b. Most commonly it is infiltrating duct carcinoma
c. Most commonly it is infiltrating lobular carcinoma
d. Exocrine or endocrine estrogen exposure can predispose to it

CARCINOMA BREAST IN PREGNANCY

163. True about breast cancer in pregnancy:
a. Occurs in 1 of every 3000 pregnant women
b. MC non-gynecologic malignancy associated with pregnancy
c. Ductal carcinoma is MC type, accounting for 75-90% of breast cancer in pregnancy
d. All of the above

MONDOR'S DISEASE

164. Mondor's disease is: *(DNB 2014, All India 96)*
a. Thrombophlebitis of the superficial veins of breast
b. Carcinoma of the breast
c. Premalignant condition of the breast
d. Filariasis of the breast

165. About Mondor's disease: *(PGI Dec 2006, Dec 2002)*
a. Superficial thrombophlebitis
b. Lymphatic infiltration tumour cell
c. Cord like appearance of subcutaneous veins
d. Occurs all over the body

166. Mondor's disease is superficial thrombophlebitis of: *(COMEDK 2005)*
a. Axillary vein
b. Long saphenous vein
c. Veins of the breast
d. Internal mammary vein

DUCTAL ANOMALIES

167. Treatment of choice in duct papilloma of breast is: *(All India 98, All India 96)*
a. Simple mastectomy
b. Microdochectomy
c. Local wide excision
d. Chemotherapy

168. Treatment for duct ectasia: *(MAHE 2008)*
a. Hadfield's operation
b. Patey's mastectomy
c. Modified radical mastectomy
d. Radical mastectomy

169. A woman noticed mass in her left breast with bloody discharge. Histopathology revealed duct ectasia. Treatment is: *(AIIMS Nov 2008)*
a. Simple mastectomy
b. Microdochotomy
c. Lobectomy
d. Hadfield operation

170. Sign seen in large duct papilloma is: *(DNB 2012)*
a. Nipple discharge
b. Breast mass
c. Skin excoriation
d. Lymphnode involvement

CYSTOSARCOMA PHYLLODES

171. Treatment of cystosarcoma phyllodes in a young woman:
a. Wide excision with a margin *(JIPMER 2011)*
b. Wide excision with chemotherapy
c. Wide excision with radiotherapy
d. MRM

172. Cystosarcoma phyllodes is treated by: *(AIIMS May 93)*
a. Simple mastectomy
b. Radical mastectomy
c. Modified radical mastectomy
d. Antibiotic with conservative treatment

173. Which one of the following statements is true of cystosarcoma phyllodes? *(UPSC 96)*
a. It is a malignant tumour
b. It often metastasizes to axillary nodes
c. It is usually bulky and may fungate through the skin
d. It is treated by radical mastectomy

174. A mobile, variegated large lump in the breast of a 20-years old female is most likely to be due to:
a. Medullary carcinoma *(UPSC 97)*
b. Inflammatory carcinoma
c. Cystosarcoma phyllodes
d. Lobular carcinoma

175. True about cystosarcoma phyllodes is: *(DNB 2007)*
a. Calcification
b. Cystic compondent
c. Tendency to recur
d. All of the above

GYNECOMASTIA

176. Gynecomastia may be seen in all of the following conditions except: *(All India 98)*
a. Klinefelter's syndrome
b. Cirrhosis of liver
c. Cryptorchidism
d. Sex-cord tumour of sertoli cells

177. All of the following statements about gynecomastia are true except: *(All India 2007)*
a. Subcutaneous mastectomy is the initial treatment of choice
b. Seen in liver disease
c. There may be estrogen/testosterone imbalance
d. Can be drug induced

178. All are true regarding gynaecomastia except:
a. May be seen in Addison's disease *(AIIMS Nov 93)*
b. Usually unilateral in young males
c. Acini are not involved
d. Bilaterality is due to endocrinopathy

179. Gynaecomastia may be seen in patient with all except: *(UPSC 88)*
a. Cimetidine therapy
b. Cirrhosis of liver
c. Klinefelter's syndrome
d. Turner's syndrome

180. An adolescent boy presents with bilateral prominence of breasts and wants the breasts to be removed. Which one of the following incisions would be ideal?
a. Radial *(UPSC 97)*
b. Incision along the areolar margin
c. Submammary incision
d. Elliptical incision

181. Which of the following is least likely to be associated with gynecomastia? *(All India 2012)*
a. Prolactinoma
b. Adrenal tumors
c. hCG secreting tumors
d. Estrogen secreting tumors

PAGET'S DISEASE OF NIPPLE

182. Paget's disease of breast, true statements are: *(PGI Nov 2009)*
a. Intraductal carcinoma
b. Mastectomy needed
c. Malignant
d. Bilateral

183. Consider the following statements regarding Paget's disease of the breast: *(UPSC 2008)*
1. It is a malignant disease
2. Diagnosis can be established by scrape cytology
3. Lymph nodes involvement is an associated clinical feature
4. Treatment of choice is simple mastectomy

Which of the statements given above is/are correct?
a. 1, 2 and 4 only
b. 1, 2 and 3 only
c. 3 and 4 only
d. 1, 2, 3 and 4

184. Paget's disease: *(DPG 2006)*
a. Incidence is 1:1000
b. Has underlying intralobular carcinoma
c. May have underlying carcinoma
d. Blood stained discharge

185. Primarily a disease of nipple and areola: *(DNB 2007)*
a. Duct papilloma
b. Paget's disease
c. Periductal mastitis
d. Fibroadenoma

186. Paget's disease of breast following are true except:
a. Treated by simple mastectomy *(PGI Dec 97)*
b. Represents underlying malignancy
c. Presents as eczema
d. Cytology diagnostic

187. Characteristic feature of Paget's cell is: *(Kerala 94)*
a. Eosinophilic cytoplasm
b. Abundant clear cytoplasm
c. Glycogen mass
d. Multinucleated giant cell

188. True about Paget's disease of the nipple is: *(Kerala 95)*
a. Always there is underlying carcinoma
b. Often bilateral eczema of nipple seen
c. Histology reveals giant cells
d. Highly malignant

189. All are true about Paget disease of breast except: *(DNB 2014)*
a. 1% associated with underlying invasive carcinoma of breast
b. Hormone receptor negative
c. Poor prognosis
d. Wedge or punch is biopsy taken from nipple for diagnosis

190. Following are true of Paget's disease of breast except:
a. Usually bilateral *(Karnataka 98)*
b. Associated intraductal carcinoma
c. Prognosis good in absence of lump
d. Treatment simple mastectomy with axillary clearance

191. Which is not having underlying malignancy? *(APPG 2008)*
a. Paget disease of bone
b. Paget disease of nipple
c. Paget disease of vulva
d. Paget disease of anal region

MASTITIS AND BREAST ABSCESS

192. Retromammary abscess arises from: *(JIPMER 86, 87, Kerala 87)*
a. Tuberculous rib
b. Infected hematoma
c. Chronic empyema
d. All of the above

193. Acute mastitis commonly occurs during: *(DNB 2000, UPSC 86, JIPMER 88)*
a. Pregnancy
b. Puberty
c. Lactation
d. Infancy

194. A lactating female presented with breast abscess. Most common organism responsible for her mastitis and abscess formation is: *(Punjab 2011)*
a. S. aureus
b. E. coli
c. Streptococci
d. Anaerobes

ANDI FIBROADENOMA AND FIBROADENOSIS

195. Fibroadenoma of the breast are: *(TN 89)*
a. Fixed mass
b. Diffuse mass
c. Multiple diffuse mass
d. Solitary mobile mass

196. Pre-menstrual fullness in breast in 21-years old unmarried female is: *(AIIMS 98)*
a. Galactocele
b. Fibroadenoma
c. Fibroadenosis
d. Breast cancer

197. Regarding cystic disease of breast, which one is true?
a. Common in 25 years of age *(AIIMS Nov 97)*
b. Excision is the treatment
c. May turn into malignant
d. Aspiration is the treatment

198. The following are suitable for simple mastectomy except:
a. Pagets disease *(Recent Questions 2013)*
b. Fibroadenoma
c. Cystosarcoma phyllodes
d. None

199. A 17-year-old female underwent Fine Needle Aspiration cytology (FNAC) for a lump in the breast which was non-tender, firm and mobile. Which of the following features would suggest finding of a benign breast disease? *(AIIMS November 2014, May 2013)*
a. Dyscohesive ductal epithelial cells without cellular fragments
b. Tightly arranged ductal epithelial cells with dyscohesive bare nuclei
c. Stromal predominance with spindle cells
d. Polymorphism with single or arranged ductal epithelial cells

MISCELLANEOUS

200. Cracked nipple may be: *(AIIMS 84)*
a. Due to syphilitic chancre
b. Cause of retention cyst
c. Paget's disease of nipple
d. Forerunner of breast abscess

201. Lymphatic drainage of breast: *(PGI Dec 2003)*
a. Axillary
b. Supraclavicular
c. Internal mammary
d. Mediastinal
e. Celiac

202. Breast examination is done yearly in patients with: *(PGI 88)*
a. Multiple fibroadenoma
b. Family history of CA breast
c. Carcinoma cervix
d. Endometrial carcinoma

203. A 50-years old woman complains of intermittent bleeding from the left nipple over the past 3 months. No mass is palpable, but a bead of blood can be expressed from the nipple. The ideal procedure in this case would be: *(UPSC 97)*
a. Cytological examination of discharge and if no malignant cells, to be kept under careful observation
b. Segmental excision of breast
c. Microdochotomy
d. Simple mastectomy

204. Tylectomy literally means: *(DNB 91)*
a. Excision of a lump
b. Excision of LN
c. Excision of breast
d. Excision of skin

205. True about galactorrhoea: *(PGI Dec 2008)*
a. Always bilateral
b. Found in pregnancy and lactation
c. Associated with prolactinoma and other endocrinopathies
d. Surgery is done
e. Hypothyroidism can cause galactorrhoea

206. Large breast is not seen in: *(AIIMS Dec 95)*
a. Filariasis
b. Giant fibroadenoma
c. Cystosarcoma phylloides
d. Schirrhous carcinoma

207. A 14-years old healthy girl of normal height and weight for age, complains that her right breast has developed twice the size of her left breast since the onset of puberty at the age of 12. Both breasts have a similar consistency on palpation with normal nipples areolae. The most likely cause for these findings is: *(AIIMS Nov 2003)*
a. Cystosarcoma phyllodes
b. Virginal hypertrophy
c. Fibrocystic disease
d. Early state of carcinoma

208. Haagensen's sing of inoperability of carcinoma include all except: *(DNB 91)*
a. Edema of skin of breast or arm
b. Satellite tumor nodules in skin of breast
c. Proved supraclavicular or distant metastases
d. Parasternal tumorous growth
e. None of the above

209. Unilateral amastia is associated 90% of the time with absence or hypoplasia of following muscle: *(COMEDK 2004)*
a. Latissimus doris
b. Subclavian
c. Pectoral
d. Serratus anterior

210. True about leiomyosarcoma breast: *(PGI Nov 2010)*
a. Axillary lymph node dissection is mandatory
b. Well encapsulated
c. Follow up not required
d. Mastectomy is mainstay treatment
e. Metastasize by lymphatic channel

211. Most frequent site of accessory breast: *(Orissa 2011)*
a. Axilla
b. Groin
c. Buttock
d. Thigh

212. Zuska's disease common is smokers causes:
a. Acute mastitis *(DNB 2012, 2007)*
b. Chronic areolar abscess
c. Fibroadenosis
d. Acute abscess formation

213. Lymphatic from left upper quadrant of breast brain into all of the following group of lymphnodes except: *(DNB 2001)*
a. Anterior axillary
b. Central
c. Apical
d. Parasternal

214. A lady 35 years old lactating mother presented with a painful breast lump. Most appropriate initial investigation should be: *(AIIMS Nov 2012)*
a. Mammography
b. USG
c. MRI
d. X-ray

215. In sentinel node biopsy for breast cancer, the most commonly injured nerve is: *(AIIMS May 2013)*
a. Lateral pectoral nerve
b. Nerve to lattissimus dorsi
c. Intercostobrachial nerve
d. Long thoracic nerve (Nerve to serratus anterior)

216. Intraoperative sentinel lymph node detection in axilla is done by using: *(Recent Question 2013)*
a. Mammography
b. Isosulfan blue dye
c. MRI
d. CT

217. Sentinel lymph node biopsy in carcinoma breast is done if:
a. LN palpable *(Recent Question 2013)*
b. Breast mass but no lymph node palpable
c. Breast lump with palpable axillary node
d. Metastatic CA breast

EXPLANATIONS

NIPPLE DISCHARGE

1. **Ans. c. Ductal papilloma** *(Ref: Schwartz 10/e p554, 9/e p467; Sabiston 19/e p828; Bailey 26/e p802, 25/e p831)*

Nipple Discharge	
Colour	**Cause**
Blood-stained	• **Duct Papilloma**[Q] • Intraductal carcinoma[Q] • Duct ectasia[Q]
Serous	• **Fibrocystic disease**[Q] • Duct ectasia[Q] • Carcinoma[Q]
Black, green, paste like or grumous discharge	• Duct ectasia[Q]

- **MC cause** of **greenish discharge: Duct ectasia**[Q]
- **MC cause** of **blood-stained discharge: Duct papilloma**[Q]

2. **Ans. b. Duct ectasia, c. Ductal papilloma, e. CA breast**
3. **Ans. b. Duct ectasia.**
4. **Ans. b. Microdochectomy** *(Ref: Bailey 26/e p802, 25/e p831; CSDT 12/e p299; Schwartz 10/e p526, 9/e p448)*

Nipple Discharge

- **Unilateral, spontaneous, serous** or **serosanguinous discharge** from a **single duct** is usually caused by an **intraductal papilloma**[Q], or rarely by an **intraductal cancer.**
- **Mostly** the underlying **cause** is a **duct papilloma** or **duct ectasia**[Q], but since the **chances** of **malignancy** are high, it must be investigated further.
- **Risk of malignancy** increases if an **underlying mass**[Q] is present.[Q]

Investigations

- **Mammography:** Can show underlying suspicious lesions
- **Cytological examination:** (may identify malignant cells, but a negative finding doesn't rule out cancer)

Ductography
• **Primary indication: Nipple discharge**[Q] (particularly when the fluid contains **blood**)
• Radiopaque contrast media is injected into one or more of the major ducts and mammography is performed
• **Intraductal papillomas: Small filling defects**[Q] surrounded by contrast media
• **Cancers: Irregular masses** or as **multiple intraluminal filling defects**[Q]
• **Duct Ectasia: Dilated cystic structure**[Q]

- **Ultrasound:** May show presence of an underlying mass or duct ectasia

Final Diagnosis

- Final diagnosis is made by **excising** the **involved duct (Microdochectomy)**[Q] and any **underlying mass** if present and subjecting then for a histopathological diagnosis.
- **Radical duct excision** (removal of all lactiferous ducts) is **not done**[Q].

Treatment

- Firstly **exclude a carcinoma** by **occult blood test** and **cytology.**
- **Simple reassurance** may then be sufficient but, if the **discharge** is proving **intolerable**, an **operation to remove the affected duct** or **ducts** can be performed **(microdochectomy).**

5. **Ans. a. Mammography, b. Cone excision done in single intraductal tumour, d. Red discharge indicate malignancy, e. Blue-black discharge indicate duct ectasia**
6. **Ans. b. Radical duct excision is the operation of choice.**

CARCINOMA BREAST INVESTIGATIONS

7. **Ans. d. Clinical examination, Mammogr am and FNAC** *(Ref: Schwartz 10/e p522-523, 9/e p444-446; Sabiston 19/e p840-842; Bailey 26/e p799-801, 25/e p829-832)*

- **Triple Assessment** includes a combination of **clinical assessment, radiological imaging** (USG/ Mammography) and **tissue sample analysis** (FNAC/Biopsy)[Q]
- The **positive predictive value** of Triple Assessment should **exceed 99.9%**[Q]

Breast Cancer

- **MC cancer** in **women** in the **world**[Q] and **MC cancer** in **urban**[Q] **women** in **India**
- MC type is **adenocarcinoma**[Q] and most carcinoma arises from **terminal duct lobular unit**[Q]
- **MC type** of CA breast: **Invasive ductal** (schirrous) **carcinoma**[Q]
  - **Most malignant** type of CA breast: **Inflammatory breast cancer**[Q]
  - **MC site** of CA breast: **Upper outer quadrant**[Q] (**left**[Q] breast >right)
  - **MC site** of **metastasis** is **Bone**[Q] **(Osteolytic deposits in Lumbar vertebra >Femur >Thoracic vertebra >Rib >Skull)**
- **Metastatic disease (Malignant pleural effusion**[Q]**)** is the **principal cause of death** from **breast cancer.**
- **2nd MC cause** of **cancer related death** in **women**[Q] **(MC** is **CA lung** in both **males** and **females)**[Q]

Clinical Features

- **Early breast cancer** may be **asymptomatic**[Q]

Symptoms indicating possibility of **breast cancer**
– **Change in size** or **shape** of breast[Q]
– **Skin dimpling, nipple retraction**[Q]
– **Single duct discharge,** particularly **blood stained**[Q]
– **Axillary node** enlargement[Q]

- **Symptoms** indicating possibility of **Metastasis:**
  - **Breathing difficulty, bone pain,** symptoms of **hypercalcemia**[Q]
  - Abdominal distention, jaundice

Evaluation

Triple Assessment
• **Clinical examination**[Q]
• **Imaging (USG** or **mammography)**[Q]
• **Tissue sampling (FNAC** or **true cut biopsy)**[Q]
• **Confident diagnosis** by **triple assessment** in **99.9%**

- **First investigation: FNAC**[Q]
- **Best and diagnostic investigation: Biopsy**[Q]

- **MC cancer** in **women** in **India: CA cervix**[Q]
- **MC cancer** in **women** in the **world: CA breast**[Q]
- **2nd MC cause** of **cancer related death** in **women: CA breast** [Q]
- **MC cancer** in **urban women** in **India: CA breast**[Q]
- **MC cause** of **cancer related death** in **men** and **women: CA lung**[Q]

8. **Ans. c. Biopsy** *(Ref: Schwartz 10/e p529-530, 9/e p450; Sabiston 19/e p830-831; Bailey 26/e p800, 25/e p829; Devita 9/e p1407)*

CA Breast

- First investigation: FNAC[Q]
- Best and diagnostic investigation: Biopsy[Q]

FNAC	True-cut (core-cut) Biopsy
• **FNA** is **easily performed**, but **requires** a **trained cytopathologist**[Q] for accurate specimen interpretation.	• Core cutting needle biopsy provides a **histologic specimen** suitable for **interpretation by any pathologist**[Q]**.**
• **False-negative results**[Q] are **most common** in **fibrotic** or **well-differentiated tumors.**	• **ER, PR status** and **presence of HER-2 overexpression** can be **routinely determined**[Q] from core biopsy specimens,
• **FNA does not reliably distinguish invasive cancer from DCIS**[Q]**,** potentially leading to the overtreatment of gross DCIS.	• **Diagnostic technique of choice** for patients who will **receive preoperative systemic therapy**[Q]**.**

Biopsy Techniques for Breast Lesions		
Technique	**Advantages**	**Disadvantages**
FNAC	• Rapid, painless, inexpensive. • No incision prior to selection of local therapy	• **Does not distinguish invasive from in situ cancer**[Q]**.** • Markers **(ER, PR, HER-2) not routinely available**[Q]**.** • Requires **experienced cytopathologist**[Q]**.** • False negatives and insufficient specimens occur.

True-cut (core-cut) **Biopsy**	• Rapid, relatively painless, inexpensive. No incision. • Can be **read by any pathologist**[Q], markers **(ER, PR, HER-2) routinely available**[Q].	• False-negative results, incomplete lesion characterization can occur.
Excisional biopsy	• False-negative results rare. • Complete histology before treatment decisions. • May serve as definitive lumpectomy.	• **Expensive, more painful.** • Creates an **incision** to be incorporated into definitive surgery. • Unnecessary surgery with potential for cosmetic deformity in patients with benign abnormalities.

9. Ans. a. FNAC *(Ref: Schwartz 10/e p523-529, 9/e p447-450; Sabiston 19/e p830-832; Bailey 26/e p799-801, 25/e p828-829)*

- First investigation: FNAC[Q]
- Best and diagnostic investigation: Biopsy[Q]

Investigations in CA Breast	
Mammography	• **Initial investigation** for symptomatic breast in **women >35 years** and for **screening**[Q] • **IOC** for **microcalcification**[Q]
Ultrasound	• **Initial investigation** for palpable lesions in **women <35 years**[Q] • Not useful in screening
MRI	• Indicated in scarred breast, implants and borderline lesions for breast conservation • **IOC** for **implant related complications**[Q] • **Gold standard** for **imaging breast** in females **with implants**[Q]
PET scan	• **IOC** for **detecting recurrences** in **scarred breast**[Q] • Useful in multifocal disease and in helping detect axillary involvement

Ultrasonography in Breast Disease

- **Initial investigation** for palpable lesions in **women <35 years**[Q]
- **Young woman's breast** contains a **large proportion** of **glandular tissue** which appears as a **soft tissue density**[Q] and **lowers the sensitivity of mammogram**[Q].
- The **sensitivity of ultrasound** for **detecting DCIS** is **significantly lower than mammography** [Q] that is why USG is not a useful screening test for breast cancer.
- Ultrasonography is an important method of:
  - **Resolving equivocal mammographic findings**
  - Defining cystic masses
  - Demonstrating the echogenic qualities of specific solid abnormalities

Breast cysts	**Smooth margins** and echo-free center
Benign breast masses	**Smooth contours,** round or oval shapes, weak internal echoes **Well-defined anterior** and **posterior margins**[Q].
Breast cancer	**Irregular walls**[Q] but may have smooth margins with acoustic enhancement

10. Ans. a. FNAC

11. Ans. a. MRI

MAMMOGRAPHY

12. Ans. a. Mammography *(Ref: Grainger 5/e p1190, 1188)*

- **Mammography** remains **more sensitive for detecting Ductal carcinoma in sits (DCIS)**[Q]
- Screening with **MRI** is **superior to mammography** in **detecting invasive breast cancer in younger women**[Q], where the **sensitivity of mammography is low** due to **presence of mammographically dense breast parenchyma**[Q]
- Although mammography remains more sensitive for detecting Ductal carcinoma in-situ (DCIS)[Q]
- **Mammography** is the **screening modality of choice** for **breast cancer** because it can **detect microcalcification** which is often the **only manifestation of DCIS**[Q].
- The sensitivity of ultrasound for detecting DCIS is significantly lower than mammography[Q] that is why USG is not a useful screening test for breast cancer.
- **MRI can not detect calcification**[Q]

Indications for Breast MRI
1. **Lobular carcinoma**[Q]: Difficult to detect and measure by conventional method because of multifocal and infiltrating growth pattern
2. **Staging of primary breast cancer**[Q]
3. **Occult primary tumour** with malignant axillary lymphadenopathy and **normal mammogram** and **breast USG**[Q]
4. **Screen younger women** with **high familial risk** of breast cancer[Q]
5. Assessing the **integrity of breast implant**[Q]

13. Ans. a. Indicated in 50–70 years of age, b. Mortality reduced by 30%

(Ref: Schwartz 10/e p523-525, 9/e p447; Sabiston 19/e p831-832; Bailey 26/e p799, 25/e p828)

Mammography

- **Delivers** a radiation dose of **0.1 cGy**[Q] per study (**chest radiography** delivers **25%** of this dose)[Q]
- **No increased breast cancer risk**[Q] associated with the radiation dose delivered with screening mammography.
- Used to detect **unexpected breast cancer** in **asymptomatic women**.
- Two views of the breast are obtained, the **craniocaudal view** and **mediolateral oblique view**

  - The **MLO view** images the **greatest volume**[Q] of breast tissue, including the **upper outer quadrant** and **axillary tail** of Spence
  - The **CC view** provides better visualization of the **medial aspect** of the breast and permits **greater breast compression**[Q]

- Mammography also is used to guide interventional procedures, including needle localization and needle biopsy.
- **Sensitivity** is much **reduced in younger** or **dense breasts**, considered **inappropriate** in patients **<35 years**[Q].

Mammographic features suggestive of breast cancer

- A **solid mass** with or without **stellate features**[Q]
- **Asymmetric thickening**[Q] of breast tissues
- **Clustered microcalcifications**[Q]

  - The presence of **fine, stippled calcium** in and around a suspicious lesion is suggestive of breast cancer and occurs in as many as **50%** of **nonpalpable cancers**[Q]
  - These microcalcifications are an **especially important** sign of cancer **in younger women**, in whom it may be the **only mammographic abnormality**[Q]

Advantages

- Around **33% reduction in mortality**[Q] for women after screening mammography.
- **Mammography** was **more accurate than clinical examination** for the detection of **early breast cancers**, providing a true-positive rate of **90%**.
- Starting at age **40 years**, **breast examinations** should be performed **yearly** and a **yearly mammogram** should be taken[Q].
- Mammography helps in **40% reduction in stage II, III,** and **IV cancer** in the screened population, with a **30% increase in overall survival**[Q].

14. Ans. c. Macrocalcification *(Ref: Schwartz 10/e p523-525, 9/e p447; Sabiston 19/e p831-832; Bailey 26/e p799, 25/e p828)*

Mammography		
	Benign	**Malignant**
Opacity	• **Smooth** margin • **Low density** • Homogeneous • **Thin halo**	• **Ill defined**[Q] margin, **irregular stellate**, **spiculated**[Q] margin, **comet tail**[Q] • **High density**[Q] • Heterogeneous • **Wide halo**[Q]
Calcification	• **Macrocalcification**[Q] (>0.5 mm in diameter)	• **Microcalcification**[Q] (<0.5 mm in diameter)
Breast Parenchyma	• Normal	• Architectural distortion[Q]
Nippl/eareola	• Normal	• **± Retracted**
Skin	• Normal	• Thickened[Q]
Cooper ligaments	• Normal	• **Thickened**[Q], increased number
Subcutaneous retro mammary space	• Normal	• **Obliterated**[Q]

15. **Ans. a. Breast Imaging Reporting And Data System** *(Ref: Sabiston 19/e p834)*

BIRADS (Breast Imaging Reporting And **Data** System)	
Category	Definition
0	**Incomplete assessment,** need **additional imaging** evaluation[Q]
1	**Negative, routine mammogram** in 1 year is recommended[Q]
2	**Benign** findings, **routine mammogram** in 1 year is recommended[Q]
3	**Probably benign** findings, short term **follow-up** suggested[Q]
4	**Suspicious** abnormality, **biopsy** should be considered[Q]
5	**Highly suggestive** of malignancy, **appropriate action** should be taken[Q]
6	Known **biopsy-proven malignancy**

16. **Ans. a. Nodular calcification**

17. **Ans. a. Fibroadenoma** *(Ref: Robbins 7/e p1149)*

Pattern of Calcification in Breast Diseases	
Carcinoma	**Microcalcification,** punctate, branching[Q]
Fibroadenoma	**Popcorn**[Q] (coarse, granular, crushed stone)
Fibrocystic disease	Powdery
Fat necrosis	Curvilinear

18. **Ans. d. Carcinoma**

19. **Ans. c. It should be part of the regular follow up of a woman following therapy for unilateral breast cancer**

20. **Ans. c. 40 years**

CARCINOMA BREAST RISK FACTORS

21. **Ans. a. Nulliparity, c. Family history, d. BRCA-1 mutation, e. Estrogen**
(Ref: Schwartz 10/e p511-512, 9/e p436-438; Sabiston 19/e p834; Bailey 26/e p808-809, 25/e p837)

Risk Factors for Breast Cancer	
1. **Age**: Incidence **increases with age**[Q]	6. **Alcohol** and **high fat diet**[Q]
2. **Country of birth**: More common in **western countries**[Q]	7. **Personal history** of malignancy:
3. **Family history** and **genetic risk factors** (BRCA)[Q]	– Contralateral **breast cancer**[Q]
4. **Hyperestrogenemia:**	– **Ovarian** and **endometrial cancer**[Q]
– **Early menarche**[Q], **late menopause**[Q]	8. Previous **benign breast disease**[Q]
– **Nulliparity**[Q]	9. **High socioeconomic status**[Q]
– **Obesity**[Q]	10. **Radiation** exposure[Q]
5. **Late first** full term **pregnancy**[Q]	11. **Hormone replacement therapy**[Q]

- **Combined (estrogen + progesterone) HRT** is associated with **increased risk** of **CA breast.**[Q]
- **Only estrogen HRT** is **not associated** with increased **risk of CA breast**[Q]**.**

  - **Smoking**[Q] and **OCPs**[Q] **doesn't** appear to **increase risk** of **breast cancer**
  - **Longer duration** of **breast feeding** has a **protective effect**[Q]

22. **Ans. b. Epithelial hyperplasia** *(Ref: Schwartz 10/e p508, 9/e p433-434; Sabiston 19/e p835; Bailey 26/e p809, 25/e p837)*

Proliferative Lesions Relative Risks for Developing Invasive Breast Cancer	
Nonproliferative changes: 70% Relative Risk = 1.0	• Adenosis • Cysts and apocrine change • Ductal ectasia • Mild epithelial hyperplasia of usual type
Proliferative disease without atypia**: 26%** **Relative Risk = 1.5–2.0**	• **Hyperplasia** of usual type, moderate or florid • **Papilloma** • **Sclerosing adenosis**
Proliferative disease with **atypia: 4%** **Relative Risk = 4–5**	• **Atypical ductal hyperplasia**[Q] • **Atypical lobular hyperplasia**[Q]

23. Ans. b. Atypical lobular hyperplasia *(Ref: Schwartz 10/e p508, 9/e p434; Sabiston 19/e p835; Bailey 26/e p809, 25/e p837)*

Cancer Risk Associated (with Benign Breast Disorders and In Situ Carcinoma of the Breast)	
Abnormality	**Relative Risk**
Nonproliferative lesions of the breast	No increased risk
Sclerosing adenosis	No increased risk
Intraductal papilloma	No increased risk
Florid hyperplasia	1.5 to 2-fold
Atypical lobular hyperplasia[Q]	**4–fold**
Atypical ductal hyperplasia[Q]	**4–fold**
Ductal involvement[Q] by cells of atypical ductal hyperplasia	**7–fold**
Lobular carcinoma in situ[Q]	**10–fold**
Ductal carcinoma in situ[Q]	**10–fold**

24. Ans. d. Atypical ductal hyperplasia **25. Ans. c. Commoner in nulliparous women** **26. Ans. b. First child at a younger age**

27. Ans. d. 60

(Ref: Schwartz 10/e p514-515, 9/e p437-440; Sabiston 19/e p835-837; Bailey 26/e p817-818, 25/e p846; Harrison 18/e p754-755; Devita 9/e p1373)

- Harrison says "Women who inherit a mutated allele of **BRCA-1 gene** from either parent have at least a **60–80% lifetime chance of developing breast cancer** and about a **33% chance of developing ovarian cancer."**
- Schwartz says "Germline mutations in BRCA1 represent a predisposing genetic factor in as many as 45% of hereditary breast cancers and in at least 80% of hereditary ovarian cancers. Female mutation carriers have up to a 90% lifetime risk for developing breast cancer and up to a 40% lifetime risk for developing ovarian cancer."

BRCA-1	BRCA-2
• Chromosome: **17**[Q]	• Chromosome: **13**[Q]
• **BRCA-1 associated** breast cancers:	• **BRCA-2 associated** cancers:
– Invasive **ductal carcinomas**	– Invasive ductal carcinomas
– **Poorly differentiated**[Q]	– **Well differentiated**[Q]
– **Hormone-receptor negative**[Q]	– **Hormone-receptor positive**[Q].
– **Early age** of **onset**	– **Early age** of onset
– **Bilateral**	– **Bilateral**
• Associated **ovarian, colon** and **prostate cancers**[Q].	• Associated **ovarian, colon, prostate, pancreas, gall bladder**, **stomach** cancers and **melanoma**[Q]. (95 m)

28. Ans. c. CA breast

Carcinoma Breast Risk Assessment Models

Gail Model[Q]	Claus Model[Q]
• **Most frequently used** model • Incorporates: 1. **Age** at **menarche** 2. **Number** of **breast biopsies** 3. **Age** at **first live birth** 4. **Number** of **first-degree relatives** with breast cancer • Predicts the **cumulative risk of breast cancer** according to decade of life	• Based on assumptions about the prevalence of high-penetrance breast cancer susceptibility genes. • Incorporates **more information about family history** but excludes other risk factors. • Estimates of breast cancer risk according to: **decade of life** based on presence of **1st** and **2nd-degree relatives** with breast cancer and their **age** at **diagnosis**.

- Risk factors that are less consistently associated with breast cancer (diet, use of OCPs, lactation) or are rare in the general population (radiation exposure) are not included in either the Gail or Claus risk assessment model
- None of these models accounts for the risk associated with mutations in BRCA1 and BRCA2

29. Ans. c. Lung

30. **Ans. a. Increased risk in relatives, c. Nullipara, d. High fat diet, e. Who avoided breast feeding**

31. **Ans. d. Ataxia telangiectasia** *(Ref: Schwartz 10/e p514-515, 9/e p438; Sabiston 19/e p835-836; Bailey 26/e p817, 25/e p846)*

Incidence of Sporadic, Familial and Hereditary Breast Cancer	
Sporadic breast cancerQ	**65-75%**
Familial breast cancerQ	20-30%
Hereditary breast cancer	5-10%
• **BRCA1**Q	**45%**
• **BRCA2**Q	**35%**
• **p53** (**Li-Fraumeni** syndrome)Q	1%
• **STK11/LKB1a** (**Peutz-Jeghers** syndrome)Q	<1%
• **PTENa** (**Cowden** disease)Q	<1%
• **MSH2/MLH1a** (**Muir-Torre** syndrome)Q	<1%
• **ATMa** (**Ataxia-telangiectasia**)Q	<1%
• **Unknown**	20%

Hereditary Breast Cancer
• **BRCA** and **PLACH**: **P**JS, **L**i-Fraumeni, **A**taxia telangiectasia, **C**owden's, **H**NPCC

32. **Ans. a. Ductal carcinoma** *(Ref: Schwartz 10/e p514-515, 9/e p438-440; Sabiston 19/e p835-836; Bailey 26/e p817, 25/e p846)*

33. **Ans. b. Epitheliosis**

34. **Ans. c. Fibrocystic change** *(Ref: Robbins 7/e p1127)*
    - Fibrocystic change doesn't lead to carcinoma breast.
    - Robbins says "**Fibrocystic changes** (**Non-proliferative breast changes**): Non-proliferative changes are most likely part of the **spectrum of histologic features** that can be **observed in normal breast.**"

35. **Ans. b. Atypical hyperplasia, d. Florid hyperplasia**

36. **Ans. a. First degree relative, b. Atypical hyperplasia, d. Increased fat intake**

37. **Ans. a. Consume fatty food, e. Did not breastfed their children**

38. **Ans. a. Those who avoid breast-feeding to the infant, c. Nulliparity, d. High fat diet, e. Family history of breast cancer**

39. **Ans. b. Paternal grandmother had history, d. Fat necrosis**

40. **Ans. a. Have an early menarche and late menopause, c. Have their first child after the age of 35 years, d. Avoid breast feeding, e. Are nuns**

41. **Ans. b. Sister died from cancer, c. Jewish origin**

42. **Ans. d. Epitheliosis**

43. **Ans. c. Atypical lobular hyperplasia, d. Atypical ductal hyperplasia**

44. **Ans. c. Those who have not breast fed their children**

45. **Ans.** d. Early full term pregnancy

CARCINOMA BREAST

46. **Ans. a. Ductal carcinoma in-situ** *(Ref: Schwartz 10/e p520, 9/e p444; Sabiston 19/e p840-842; Bailey 26/e p810, 25/e p838)*

DCIS (Ductal carcinoma in situ)	
• Among the **mammographically detected** cancer, almost **half** are **DCIS**. • **DCIS** most frequently **presents as mammographic calcifications**.	
Histological types of DCIS (five types) **1.** Comedocarcinoma**Q** **2.** Cribiform**Q** **3.** Micropappilary**Q** **4.** Solid **5. Papillary**Q	**Low Grade:** Cribifrom, Papillary and Micropapillary **High Grade: Solid** and **Comedocarcinoma**

47. **Ans. b. Invasive lobular carcinoma** *(Ref: Schwartz 10/e p519-522, 9/e p444-446; Sabiston 19/e p842; Bailey 26/e p809, 25/e p838)*

Lobular Carcinoma

- LCIS originates from the **terminal duct lobular units** and develops **only in** the **female breast**Q.
- **LCIS** is **mostly multicentric** and **bilateral**
- Increased **risk of invasive carcinoma** is in **the both breasts**Q.

Histopathology

- Characterized by **distention** and **distortion** of the **terminal duct lobular units**Q by cancer cells, which are large but maintain a normal nuclear:cytoplasmic ratio.

  - **Cytoplasmic mucoid globules**Q are a distinctive cellular feature.
  - **Histologic hallmark** of **invasive** lobular carcinoma is **tendency** of **tumor cells** to **invade** in **linear strands** (**Indian file pattern**)Q

Clinical Characteristics

- **Presenting symptom** in most cases is **breast mass with ill-defined margins**
- Usually presents as an **incidental finding**Q, on breast biopsy performed for other indication.
- The average age at diagnosis is **44-47 years**, more common in **white women**Q
- **Invasive breast cancer** develops in **25-35%** of women with LCIS, **in either breast**, regardless of which breast harbored the initial focus of LCIS, and is **detected synchronously** with **LCIS** in **5%** of cases.
- In women with LCIS, up to **65%** of subsequent **invasive cancers** are **ductal**, not lobular, in origin.

  - **Marker** of **increased risk** for **invasive breast cancer**Q rather than as an anatomic precursor.
  - **Invasive lobular carcinoma**: **Different pattern** of metastases, propensity to **involve peritoneal surface** and **meninges**Q, less likely to metastasize to lungs or bone.

Diagnosis

- Calcifications associated with LCIS typically occur in adjacent tissues (**neighborhood calcification**)Q
- **Neighborhood calcification** is a **unique feature** of **LCIS**Q and contributes to its diagnosis.
- Treatment
- **Observation/ Chemoprevention/ Prophylactic bilateral mastectomy**Q

48. **Ans. c. Poor Prognosis**
49. **Ans. a. Single file pattern**
50. **Ans. a. Axillary LN, b. Internal mammary LN** *(Ref: Bailey 26/e p810, 25/e p839; BDC 4/e pvol-I /42-43)*

Lymphatic metastasis in CA Breast

- **Lymphatic spread** in CA breast occurs **through subareolar lymphatic plexus of Sappey's** lymphatic plexus, **cutaneous lymphatics** and **inflammatory lymphatics**Q.

  - **Lymphatic metastasis** occurs **primarily to** the **axillary** (**75%**)Q and the **internal mammary lymph nodes**Q.
  - **Tumors** in the **posterior one third** of the breast are more likely to drain to the **internal mammary nodes**Q.

- The involvement of lymph nodes has both biological and chronological significance.
- It represents not only an evolutional event in the spread of the carcinoma but is also a **marker for** the **metastatic potential**Q of that tumour.
- Involvement of **supraclavicular nodes** and of **any contralateral lymph nodes** represents **advanced disease**Q.
- LN metastasis is treated by **surgical dissection** or **radiotherapy**

51. **Ans. a. Her-2-neu, b. p53, c. BRCA-1, e. CEA** *(Ref: Schwartz 9/e p438; Sabiston 19/e p835-836; Bailey 26/e p817, 25/e p846; Harrison 17/e p604, 483)*
    - **BCL-1** gene is expressed in **mantle cell lymphoma**Q.
    - **Her-2-neu, p53, BRCA-1** and **CEA** is expressed in **CA breast**Q.
52. **Ans. b. Breast mass**
53. **Ans. a. Upper outer**
54. **Ans. a. {I= (0.2 x size) + grade + nodes}** *(Ref: Bailey 25/e p841)*

Nottingham Prognostic Index (NPI)

- **NPI= (0.2** X **tumor size** in cm) + **Tumor grade** (1-3) + **LN stage** (1-3)Q
- Used to select patients for **adjuvant treatment**

55. **Ans. c. Inflammatory carcinoma** *(Ref: Schwartz 10/e p520-522, 9/e p468; Sabiston 19/e p864-865; Devita 7/e p1420)*

Inflammatory Carcinoma

- **Ominous clinical category**[Q] associated with **diffuse tumor involvement of the lymphatic channels**[Q] within the breast and overlying skin

WHO Classification of Breast Cancer		
In-situ Carcinoma	**Invasive Carcinoma (MC)**	**Paget's Disease of Nipple**
• Ductal carcinoma in–situ • Lobular carcinoma in–situ	• Ductal carcinoma (**MC**) • Lobular carcinoma • **Tubular (Cribiform)** carcinoma • **Mucinous (Colloid)** carcinoma • **Medullary** carcinoma • **Papillary** carcinoma • Metaplastic carcinoma • Inflammatory carcinoma	

Invasive Breast Carcinoma

- Invasive ductal carcinoma
- **Invasive ductal carcinoma** of the breast with **productive fibrosis** (**scirrhous**[Q], simplex, NST) accounts for **80%** of breast cancers
- Presents with macroscopic or microscopic **axillary LN metastases** in up to **60%**[Q] of cases.
- Usually occurs in **perimenopausal** or **postmenopausal women** in the **5th to 6th** decades of life
- Presents as a **solitary, firm mass**[Q].

Medullary Carcinoma

- **Special-type** breast cancer, accounts for 4% of all invasive breast cancers
- Frequent phenotype of **BRCA-1** hereditary breast cancer.
- Grossly, the cancer is **soft** and **hemorrhagic**.
- A **rapid increase in size** may occur secondary to necrosis and hemorrhage.
- On physical examination, it is **bulky** and often **positioned deep** within the breast.

Medullary Carcinoma is Characterized Microscopically by
• **Dense lymphoreticular infiltrate** of **lymphocytes** and **plasma cell**
• **Large pleomorphic nuclei**
• **Sheet-like growth pattern**

- **Better 5-year survival rate** than those with NST or invasive lobular carcinoma.

Mucinous Carcinoma (Colloid Carcinoma)

- **Special-type** breast cancer, accounts for 2% of all invasive breast cancers
- Typically presents in the **elderly population** as a **bulky tumor**.
- Characterized by **extracellular pools of mucin**
- **Analysis of multiple sections** is essential **to confirm the diagnosis**
- **LN metastases** occur in 33% of cases, and 5- and 10-year survival rates are 73 and 59%, respectively.

Papillary Carcinoma

- **Special-type** cancer of the breast that accounts for 2% of all invasive breast cancers.
- Presents in the **7th decade** of life and occurs in a disproportionate number of **nonwhite women.**
- Typically **small** and rarely attain a size of 3 cm in diameter.
- Defined by **papillae with fibrovascular stalks** and **multilayered epithelium**.
- **Low frequency** of axillary **LN metastases** and had 5- and 10-year survival rates similar to those for mucinous and tubular carcinoma.

Tubular Carcinoma

- **Special-type** breast cancer and accounts for 2% of all invasive breast cancers.
- Usually diagnosed in the **perimenopausal** or **early menopausal periods**.

- Distant metastases are rare in tubular carcinoma with long-term survival approaches 100%.

Invasive Lobular Carcinoma

- Accounts for 10% of breast cancers.

- Invasive lobular carcinoma is frequently multifocal, multicentric, and bilateral.

56. Ans. a. Comedocarcinoma, c. Lobular carcinoma in situ
57. Ans. a. Comedocarcinoma
58. Ans. a. Ductal carcinoma in situ
59. Ans. d. Tubular
60. Ans. b. Lobular carcinoma
61. Ans. b. Infiltrating lobular
62. Ans. c. Lobular carcinoma
63. Ans. c. Lobular carcinoma

64. Ans. d. Comedo DCIS **65. Ans. d. More common in Muslims** **66. Ans. b. Colloid (Mucinous)**

67. Ans. a. Breast *(Ref: Robbins 7/e p285; Sabiston 19/e p705)*

Familial Cancers

- Familial cancers occur at **higher frequency** in **certain families without** a clearly **defined pattern of transmission** Q.
- **Examples include carcinomas of:**
  - **Breast** Q**, colon** Q**, ovary** Q
  - **Brain** Q**, melanoma** Q

Familial Cancer Syndromes			
Syndrome	**Genes**	**Locations**	**Cancer Sites and Associated Traits**
Breast/ovarian syndrome	**BRCA1**	**17**q21 Q	Cancer of **breast, ovary, colon, prostate** Q
	BRCA2	**13**q12.3 Q	Cancer of **breast, ovary, colon, prostate, gallbladder and biliary tree, pancreas, stomach; melanoma** Q
Cowden's disease	**PTEN**	**10**q23.3 Q	Cancer of **breast, endometrium, thyroid** Q
FAP	**APC**	**5q21** Q	Cancer of breast, endometrium, thyroid
Familial melanoma	p16	9p21	Melanoma, pancreatic cancer, dysplastic nevi, atypical moles
	CDK4	12q14	
Hereditary diffuse gastric cancer	CDH1	16q22	Gastric cancer
HNPCC	**hMLH1** Q	**3**p21 Q	**Colorectal** cancer, **endometrial** cancer, **transitional cell carcinoma** of **ureter** and **renal pelvis**, **carcinomas** of the **stomach, small bowel, pancreas, ovary** Q
	hMSH2 Q	**2**p22-21	
	hMSH6	**2**p16 Q	
	hPMS1	**2**q31.1	
	hPMS2	**7**p22.2 Q	
Hereditary papillary RCC	**MET** Q	**7**q31 Q	Renal cell cancer
Hereditary paraganglioma and pheochromocytoma	SDHB	1p36.1-p35	Paraganglioma, pheochromocytoma
	SDHC	1q21	
	SDHD	11q23	
Juvenile polyposis coli	BMPRIA	10q21-q22	Juvenile polyps of the gastrointestinal tract, gastrointestinal malignancies
	SMAD4/DPC4	18q21.1	
Li-Fraumeni	**p53**	**17**p13 Q	**Breast** cancer, **soft tissue sarcoma, osteosarcoma, brain** tumors, **adrenocortical** carcinoma, **Wilms'** tumor, **phyllodes** tumor **(breast), pancreatic** cancer, **leukemia, neuroblastoma** Q
	hCHK2	22q12.1	
MEN-1	**MENIN** Q	**11**q13 Q	**Pancreatic islet cell** tumors, **parathyroid hyperplasia, pituitary adenomas** Q
MEN-2	**RET** Q	**10**q11.2	**Medullary thyroid** cancer, **pheochromocytoma, parathyroid hyperplasia** Q
MYH-associated adenomatous polyposis	MYH	1p34.3-p32.1	Cancer of the colon, rectum, breast, stomach
Neurofibromatosis-1	**NF1** Q	**17**q11 Q	**Neurofibromas, neurofibrosarcoma, acute myelogenous leukemia, brain** tumors Q
Neurofibromatosis -2	**NF2** Q	**22**q12 Q	**Acoustic neuromas, meningiomas, gliomas, ependymomas** Q
Nevoid basal cell carcinoma	PTC	9q22.3	Basal cell carcinoma
Peutz-Jeghers syndrome	**STK11** Q	**19**p13.3 Q	**Gastrointestinal carcinomas, breast** cancer, **testicular** cancer, **pancreatic** cancer, **benign pigmentation** of **skin** and **mucosa** Q
Retinoblastoma	**RB** Q	**13**q14 Q	**Retinoblastoma, sarcomas, melanoma, malignant neoplasms** of the **brain** and **meninges** Q
Tuberous sclerosis	**TSC1**	**9**q34	**Multiple hamartomas, RCC, astrocytoma**
	TSC2	**16**p13	
von Hippel-Lindau syndrome	**VHL** Q	**3**p25 Q	**RCC, hemangioblastomas** of **retina and CNS, pheochromocytoma** Q
Wilms' tumor	**WT** Q	**11**p13 Q	**Wilm's tumor, aniridia, genitourinary abnormalities, mental retardation** Q

68. **Ans. b. Pretracheal**

69. **Ans. d. Lobular** *(Ref: Schwartz 10/e p550-552, 9/e p444; Sabiston 19/e p840-842; Bailey 26/e p809, 25/e p838)*

	LCIS	DCIS
Age (years)	44–47 (Early)	**54–58 (Late)** Q
Incidence	2-5% (Less common)	**5-10% (More common)** Q
Clinical signs	None	Mass, pain, nipple discharge
Mammographic signs	None	**Microcalcifications**Q
Premenopausal	**2/3**Q	1/3
Incidence of synchronous invasive carcinoma	5%	**2–46%**Q
Multicentricity	**60–90%**Q	40–80%
Bilaterality	**50–70%**Q	10–20%
Axillary metastasis	1%	**1–2%**Q
Subsequent carcinomas:		
Incidence	25-35%	**25–70%**Q
Laterality	**Bilateral**Q	Ipsilateral
Interval to diagnosis	**15–20 years**Q	5-10 years
Histologic type	**Ductal**	**Ductal**

70. **Ans. c. More common in muslims**

71. **Ans. c. Lymphatic permeation** *(Ref: Bailey 26/e p811, 25/e p840)*

PEAU-D-ORANGE

- Peau-d-orange is due to **cutaneous lymphatic edema**, where the infiltrated skin is tethered by sweat ducts, it can not swell, leading to an appearance like **orange skin**Q.
- Due to **obstruction** of **subdermal lymphatics** (**lymphatic permeation** by **tumor cells**)
- Seen in **advanced breast cancer** (may be seen in **chronic abscess**)

72. **Ans. a. Carcinoma breast, c. Chronic abscess**

73. **Ans. d. Lumbar vertebra** *(Ref: Bailey 26/e p811)*

- Most common site of metastasis from breast carcinoma is lumbar vertebra.

Bailey says that "It is by this route (**spread by the bloodstream**) that **skeletal metastases** occur, although the initial spread may be via the lymphatic system. **In order of frequency** the **lumbar vertebrae, femur, thoracic vertebrae, rib and skull are affected** and these deposits are generally **osteolytic**."

74. **Ans. a. Lobular carcinoma**

75. **Ans. d. Increased incidence with prolonged breast feeding**

76. **Ans. b. Recent retraction of nipple, e. Cellular atypia**

77. **Ans. b. Blockage of subdermal lymphatics**

78. **Ans. b. Obstruction of lymphatic ducts**

79. **Ans. a. Axillary nodes are most commonly involved, b. Internal mammary nodes are also involved, c. If supraclavicular lymph node is involved then it is N3, d. Axillary nodes are treated by surgical resection** *(Ref: Bailey 25/e p839; BDC 4/e pvol-I /42-43)*See question no. 49.

80. **Ans. d. Bone**

81. **Ans. d. Invasive ductal carcinoma**

82. **Ans. d. Lower inner quadrant** *(Ref: Bailey 25/e p840)*

- Upper inner (12–15%) • Upper outer (~ 50%) • Lower inner (3–5%) • Lower outer (6–10%) • Central/areolar (20%)

83. **Ans. b. Subareolar duct** *(Ref: Bailey 25/e p834)*

- Retraction of nipple is due to fibrosis in and around subareolar duct
- Retraction/dimpling of skin is due to involvement of cooper's ligament
- Peau-D-orange is due to blockage of subdermal lymphatics

84. Ans. b. DCIS *(Ref: Bailey 25/e p838)*

VAN NUYS PROGNOSTIC INDEX (VNPI)

- Van Nuys prognostic index (VNPI) is widely used to classify ductal carcinoma in situ (DCIS) into dissimilar risk categories that may be treated accordingly. Attempts have been made to identify subsets of DCIS for which wide excision without irradiation would provide sufficient local control.
- Silverstein and colleagues derived the **Van Nuys criteria** from a series of DCIS patients treated by wide excision with and without radiation therapy and proposed a system to identify patients who do not need radiation therapy based on:
  1. Patient's age
  2. DCIS nuclear grade and presence of microcalcification
  3. Size of the lesion
  4. Width of the surgical margin.

85. Ans. c. Raloxifene is a SERM that prevents breast cancer but increases risk of endometrial cancer

CARCINOMA BREAST STAGING

86. Ans. d. T3 N3 M0 *(Ref: Schwartz 10/e p532, 9/e p452; Sabiston 19/e p847; Bailey 25/e p841)*

7th AJCC (2010) TNM Staging for Breast Cancer	
T: Primary tumor	
T1: Tumor **≤2 cm**	**T4b**: **Edema** (including peau d'orange) or **ulceration** of skin, or **satellite skin nodules** confined to the same breast
T2: Tumor **>2 cm** and **≤5 cm**	**T4c**: Both T4a and T4b
T3: Tumor **>5 cm**	**T4d**: **Inflammatory carcinoma**
T4a: Extension to **chest wall**, not including pectoralis muscle	
N: Regional lymph nodes	
N1: Metastasis to **movable ipsilateral axillary LNs**	**N3a**: Metastasis in **ipsilateral infraclavicular LNs**
N2a: Metastasis in **ipsilateral axillary LNs fixed** or matted	**N3b**: Metastasis in **ipsilateral internal mammary LNs** and **axillary LNs**
N2b: Metastasis in **clinically apparent ipsilateral internal mammary LNs** and in the absence of clinically evident axillary LNs metastasis	**N3c**: Metastasis in **ipsilateral supraclavicular LNs**
M: Distant metastases	
M0: No distant metastasis; M1: Distant metastasis	

[Note: Clinically apparent is defined as detected by **imaging studies** (excluding lymphoscintigraphy) or by **clinical examination** or **grossly visible pathologically**.]

Stage I	Stage IIA	Stage IIB	Stage IIIA	Stage IIIB	Stage IIIC	Stage IV
T1 N0M0	T0**N1** M0 **T1N1** M0 **T2** N0M0	**T2N1** M0 **T3** N0M0	T0 **N2** M0 **T1-2 N2** M0 **T3 N1-2** M0	**T4 N0-2** M0	AnyT **N3** M0	AnyT anyN **M1**

Special Conditions in Staging	
Positive LN in **opposite axilla**	**Metastasis**
Two mass in same breast	Staging according to **big mass**
Mass in **both breasts**	**Separate staging** for **both breasts**

87. Ans. b. Pectoralis major *(Ref: Schwartz 9/e p452; Sabiston 19/e p847; Bailey 25/e p841)*

- **Chest wall involvement** means involvement of **ribs**Q, **intercostal muscles**Q or **Serratus anterior**Q as **chest wall** is formed by these structures **not** the **pectoralis major.**

88. Ans. c. IIIC

89. Ans. a. Nipple retraction

90. Ans. a. T_2N1M0

91. Ans. d. T3N3M0

92. Ans. c. T2N3M0

93. Ans. c. T1cN1bM0

94. Ans. d. T_4 is any size

95. Ans. d. M1

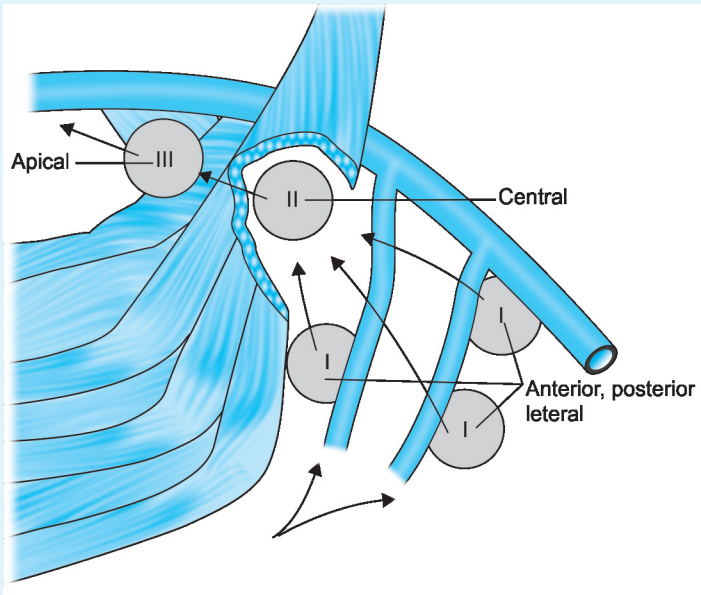
CARCINOMA BREAST MANAGEMENT

96. Ans. c. Pectoralis minor is divided *(Ref: Schwartz 10/e p547-549, 9/e p460-461; Sabiston 19/e p849-853; Bailey 26/e p813-814, 25/e p842)*

Types of Mastectomy	
Simple or Total mastectomy	Removal of **breast tissue, nipple-areola complex**, and **skin**Q.
Extended simple mastectomy	Simple mastectomy + removal of **level I** axillary LNs.
Modified radical mastectomy	Removes all **breast tissue**, **nipple-areola complex**, **skin** and level **I** and **II** axillary LNsQ.
Halstead's radical mastectomy	Removes all **breast tissue** and **skin**, **nipple areola complex**, **pectoralis major** and **minor** muscles and the level **I, II** and **III** axillary LNsQ.
Extended radical mastectomy	**Radical mastectomy +** Removal of **internal mammary LNs**
Super radical mastectomy	**Radical mastectomy +** Removal of **internal mammary, mediastinal** and **supraclavicular LNs**

Variants of MRM	
Auschincloss Procedure	Removes all **breast tissue**, **nipple-areola complex**, **skin** and level **I** and **II** axillary LNsQ.
Patey's Procedure	**Pectoralis minor** is **removed** to allow complete dissection of **level III** axillary LNsQ
Scanlon's modification of Patey's procedure	**Pectoralis minor** is **divided** instead of removingQ. Division of pectoralis minor allows **complete removal** of **level III** axillary LNsQ

Axillary LN Levels in relation with Pectoralis minor		
Level	**Relation with Pectoralis minor**	**Axillary LNs Included**
I	Below or lateral	Anterior, posterior, lateralQ
II	Posterior (behind)	Central, InterpectoralQ
III	Medial or above	ApicalQ



97. Ans. a. Lumpectomy, b. Radiotherapy, d. Axillary LN dissection, e. Sentinel LN biopsy *(Ref: Schwartz 10/e p547, 9/e p460-461; Sabiston 19/e p850-851; Bailey 26/e p813-814, 25/e p843)*

Breast Conservative Surgery (BCT)

- Involves **resection** of **primary breast cancer** with a margin of normal appearing breast tissue, **adjuvant radiation therapy** with or without **assessment** of **axillary LN status**[Q].
- Surgical procedures employed: **wide local excision, lumpectomy, quadrantectomy**
- BCT is currently treatment for women with **DCIS, Stage I and Stage II invasive breast cancer**[Q].

Suitable candidates for BCT

- The cancer is **solitary**, with no clinical or mammographic evidence of cancer elsewhere in the breast.
- The tumour can be **excised with tumor free surgical margins** without producing a cosmetically unacceptable breast.
- There are **no contraindications to radiation**
- The patients is **willing** and **motivated** for breast conservation

Contraindications for BCT

Absolute contraindications	Relative contraindications
1. **Pregnancy**[Q] is an absolute contraindication to the use of breast irradiation. 2. Women with **two** or **more primary tumors** in **separate quadrants** of the breast or with **diffuse malignant** appearing **micro calcifications**[Q]. 3. A **history** of prior **therapeutic irradiation**[Q] to the breast region that would require treatment to an excessively high total-radiation dose to a significant volume 4. **Persistent positive margins**[Q] after reasonable surgical attempts	1. History of **collagen vascular disorders**[Q] (**Scleroderma** and **active lupus erythematosus** but not the rheumatoid arthritis) 2. Presence of **multiple gross tumours** in the **same quadrant** and **indeterminate calcifications**[Q] 3. **Large tumour** in **small breast**[Q] 4. **Breast size, large pendulous breast**[Q] presents difficulty in delivering uniform radiation dose 5. **Centrally located tumour**[Q], for which removal of nipple-areola complex is required to obtain a tumour free margin

98. Ans. a. Distant metastasis *(Ref: Breast diseases by Jay R. Harris 2/e p354; Bailey 25/e p839, 840)*

Radical Mastectomy

Indications	Contraindications
• **Large, bulky tumor involving** the **pectoralis major** muscle or the **fascia** • **Bulky axillary LN** involvement • **Grossly involved interpectoral nodes** in whom posterior fascia of muscle is also involved	• **Non-palpable** or **small tumor**[Q] • **Advanced disease** with **distant metastasis**[Q] • Who wants **reconstructive surgery** • Need of **improved cosmetic result** that is achieved by **MRM**[Q] • Co-existing **severe systemic diseases** like **DM, CHF** or **CRF**[Q]

99. Ans. a. Tumor size <4cm c. Mobile.

100. Ans. d. Supraclavicular lymph node *(Ref: Schwartz 9/e p461; Bailey 26/e p813, 25/e p842)*

Halstead's Radical mastectomy

Structures Removed	Structures Preserved (ABC)
• Whole **breast, skin** and **nipple-areola complex**[Q]. • Subcutaneous fat, deep fascia **vertically** from **lower border** of the **clavicle** upto the **upper quarter of** the sheath of the **rectus** abdominis and **horizontally** from **sternum** to **anterior border** of **lattissimus dorsi**. • **Pectoralis major** and **minor** muscle[Q] with **clavipectoral fascia**[Q] • Level **I, II** and **III** axillary LNs[Q]	• **A**xillary vein and **c**ephalic **vein**[Q] • **Long thoracic nerve** of **B**ell (Nerve to serratus anterior)[Q].

101. Ans. b. Pectoralis major

102. Ans. d. Breast

103. Ans. a. Tamoxifene *(Ref: Schwartz 10/e p552, KDT 6/e p304; Goodman and Gillman's 10/e p1440, 1441)*

Tamoxifen

- **Tamoxifen** is a **standard hormonal treatment** of breast cancer in both **premenopausal** and **postmenopausal women**[Q]
- Tamoxifen is **effective in Estrogen Receptor** (ER) **positive breast carcinoma** but some ER negative tumors also respond to tamoxifen[Q].

> - Tamoxifen is **approved for primary prophylaxis** of breast cancer in **high risk women**[Q]
> - It **reduces the recurrence rate** of **breast cancer** in **ipsilateral** as well **contralateral breast**[Q]
> - **Tamoxifen** is associated with **reduced risk of cancer** in the **contralateral breast**[Q].

- **Dose: 10 mg BD X 5-years**[Q]
- While tamoxifen blocks estrogen receptors on the breast, it stimulates these receptors in the uterus (because tamoxifen is a **partial against of ER**), may **lead** to **endometrial hyperplasia** and **endometrial cancer**[Q]

Tamoxifen
• **Potent antagonist** in **breast carcinoma cells**, **blood vessels** and at some peripheral sites[Q]
• **Partial agonist** in the **uterus, bone, liver** and **pituitary**[Q]

- Tamoxifen causes **retinal deposits**, **decreased visual acuity** and **cataracts** in occasional patients[Q]
- Tamoxifen **increases** the **risk of thromboembolic events**[Q]

104. Ans. d. Tamoxifen

- **QUARTZ: Quadrantectomy + Axillary LN dissection + Radiotherapy**[Q]

105. Ans. b. Endometrium *(Ref: KDT 6th /304; Goodman and Gillman's 10/e p1440, 1441)*

Adverse Effects of Tamoxifen	
• **Hot flushes**, nausea and vomiting (**MC**)[Q] • **Menstrual irregularities**[Q], vaginal bleeding, discharge, pruritus vulvae and dermatitis • **Endometrial cancer**[Q]	• **Thromboembolism**[Q] • **Cataract**[Q] • Retinal deposits and decreased visual acuity

106. Ans. c. Carcinoma in contralateral breast

107. Ans. d. Modified radical mastectomy followed by hormone therapy

(Ref: Schwartz 10/e p537-544, 9/e p454-457; Sabiston 19/e p858-864; Bailey 26/e p812-816, 25/e p841-842)

Breast Cancer Treatment

A. Early Invasive Breast Cancer (Stage I, IIA, IIB):

- **Mastectomy + Axillary LN status assessment**[Q] or
- **BCT + Axillary LN status assessment + RT**[Q]
- If sentinel LN can not be identified or found to harbor metastatic disease, axillary LN dissection (**Level I+II**) should be done

Indications of adjuvant chemotherapy
1. LN positive[Q]
2. Tumor >1 cm[Q]
3. LN negative, **>0.5 cm** with **adverse prognostic factors:**
– **Blood vessel** or **lymph vessel** invasion[Q]
– **High** nuclear or histologic **grade**[Q]
– **Her-2-neu** over expression[Q]
– **Negative hormone receptor** status[Q]

> - **Tamoxifen** should be given for **hormone receptor positive,** cancer **>1 cm**[Q]
> - **Trastazumab** should be given for **Her-2-neu positive** cancer[Q]

B. Locally Advanced Breast Cancer (Stage IIIA, IIIB, IIIC)[Q]:

- **Neoadjuvant chemotherapy + MRM + Adjuvant RT**[Q]
- **BCT** for **IIIA** with **N1** with patients who achieve **good response** to **neoadjuvant chemotherapy**[Q]
- Systemic **chemotherapy + radiotherapy** are indicated in treatment of grossly involved internal mammary nodes (**N3b**)

C. Distant Metastases (Stage IV):

- **Prolong survival** and **improve quality** of life[Q]
- **Hormonal therapies** are **preferred** to cytotoxic therapy as it is associated with **minimal toxicity**[Q]

Indications of Hormonal Therapy	Indications of Systemic Chemotherapy
1. Hormone receptor positive (**ER/PR positive**)Q	1. Hormone receptor **negative**Q
2. **Bone** or **soft tissue metastases only**Q	2. Hormone **refractory**Q (after 3 endocrine regimens)
3. **Limited** or **asymptomatic** visceral metastases	3. **Symptomatic visceral metastases**Q

Local Regional Recurrence
• Who had **mastectomy**: **Resection** of local regional recurrence **with reconstruction** + **chemotherapy** + **hormonal therapy** + **RT** (if not received RT previously)Q • Who had **lumpectomy**: Mastectomy with reconstruction + chemotherapy + hormonal therapyQ

108. Ans. b. Postmastectomy radiation therapy is given when 4 or more lymph nodes are positive

(Ref: Schwartz 10/e p550, 9/e p463; Sabiston 19/e p858; Bailey 26/e p814, 25/e p843)

Indications of Radiotherapy in Carcinoma Breast

- **Locally Advanced Breast Cancer**Q (to decrease recurrence rate)
- **Margin** is **positive** after mastectomyQ
- After **breast conservation surgery**Q
- Metastases to **4** or **more lymph nodes**Q

- **Metastatic disease** is the **principal cause of death** from **breast cancer**Q.

109. Ans. a. Only breast

110. Ans. d. Axillary vein *(Ref: Gray's 39/e p841)*

Axillary Node Clearance

- Axillary node clearance can be defined as clearing the axillary contents bounded by:
  - **Laterally:** Axillary skin
  - **Superiorly:** Lower border of **axillary vein**Q
  - **Medially:** Chest wall
  - **Posteriorly:** Lattisimus dorsi, Teres major and Subscapularis
  - **Anteriorly:** Pectoralis muscle

111. Ans. c. Latissimus dorsi *(Ref: BDC 4/e vol-I/p62)*

- **Latissimus dorsi** is active in **adduction, extension** and especially in **medial rotation** of the humerus.

112. Ans. c. Pectoralis major removed

113. Ans. b. Doxorubicin *(Ref: Bailey 26/e p815, 25/e p844; Schwartz 10/e p550-551, 9/e p263)*

Chemotherapy In CA Breast

- **First-generation regimen** such as a 6-monthly cycle of **cyclophosphamide, methotrexate** and **5-fluorouracil** (**CMF**)Q will achieve a **25% reduction** in the **risk of relapse** over a 10- to 15-year periodQ.
- **CMF** is **no longer** considered **adequate adjuvant chemotherapy**Q
- Modern regimens include an **anthracycline** (**doxorubicin** or **epirubicin**) and **taxanes**.

  - The effect of **combining hormone** and **chemotherapy** is **additive** although **hormone therapy** is **started after completion** of **chemotherapy** to reduce side-effects.

- The most popular combinations were **CMF** and **CAF**Q (Cyclophosphamide, **Adriamycin [doxorubicin]**, and 5-fluorouracil,).
- In the United States, a **combination** of **Adriamycin (doxorubicin)** and **cyclophosphamide** (AC) or **AC plus a taxane** (**docetaxel, paclitaxel**) are likely to be used as **polychemotherapy**Q.
- For **HER-2–positive breast cancer**, adding **trastuzumab**Q to polychemotherapy is approved for use as a surgical adjuvant.
- **Anthracycline-containing combinations** are significantly **better than** no treatment, **single-agent treatment,** or **CMF**Q**.**

New Drugs in CA Breast	
Ixabepilone	• Used for **antracycline** and **taxane resistant** breast cancerQ
Lapatinib	• Inhibitor of Her-2-neu and EGFR tyrosine kinase • Second line Her-2-neu therapyQ
Sunitinib	• Approved for **advanced renal cancer** and **refractory metastatic breast cancer**Q

114. Ans. c. Simple mastectomy

115. Ans. b. Modified radical mastectomy, d. Lumpectomy, axillary clearance and radiotherapy

116. Ans. a. Cyclophosphamide, methotrexate, 5-fluorouracil

117. Ans. b. Adriamycin based chemotherapy followed by tamoxifen depending on estrogen/progesterone receptor status

118. Ans. a. Prognosis is better, if given in young female, b, Increases survival by 20%, d. Hormone receptor positive gives good result

(Ref: Bailey 26/e p811, 25/e p844)

- **CA breast** in **young females** are found to have a **bad prognosis** and **more chances of recurrence** than carcinomas in older women, more likely to be **hormone receptor**[Q] **negative**. Prognosis is improved in young women, if **adjuvant therapy** is given to them.
- Appropriate use of **adjuvant chemotherapy** or **hormone therapy** will **improve relapse-free survival** by approximately **30%**[Q] which ultimately translates into an absolute improvement in survival of the order of 10% at 15 years.
- **Hormonal therapy** is **effective**[Q] in tumors positive for ER and PR.

119. Ans. a. Low socio-economic status, c. Multicentricity

120. Ans. c. Lobular carcinoma *(Ref: Schwartz 9/e p460-461; Sabiston 19/e p850-851; Bailey 26/e p811, 25/e p843)*

- **Lobular carcinoma** is frequently **multifocal, multicentric** and **bilateral** and is **contraindication** for **breast conservative surgery**[Q].

121. Ans. a. Large pendular breast, b. SLE, c. Diffuse microcalcification

122. Ans. b. History of previous radiation, e. 1st trimester pregnancy

123. Ans. a. 1 cm *(Ref: Mastery of Surgery 5/e p525)*

Breast Conservation Surgery

- The amount of breast tissue excised with the lesion may vary with the clinical situation, but is **typically 5 mm to 10 mm in all directions**.
- BCS may consist of **removal of tumor with 1 cm margin of normal tissue** (wide local excision) or a more extensive excision of a whole quadrant of breast (Quadrantectomy).

124. Ans. c. Sentinel node biopsy

125. Ans. c. To prevent recurrence

126. Ans. c. Patey's with adjuvant chemotherapy

127. Ans. a. Simple mastectomy followed by oophorectomy

128. Ans. a. It was better if she took adjuvant therapy after mastectomy, b. First analyze estrogen and progesterone receptor levels on the tumor

129. Ans. a. Letrozole, b. Anastrozole, c. Exemestane *(Ref: Schwartz 10/e p552-553, 9/e p465-467; Sabiston 19/e p862-864; Bailey 25/e p844)*

Hormonal Therapy in Carcinoma Breast
1. Ovarian suppression or ablation: – Bilateral oophorectomy[Q] – Medically by LHRH agonist (**Goserelin**, **Leuperolide**)[Q]
2. SERM: Tamoxifen and **Raloxifene**[Q]
3. Aromatase Inhibitors: – **Non-steroidal**: **Letrozole** and **Anastrazole**[Q] – **Steroidal**: **Exmestane**[Q]
4. Anti-estrogens: Fulvestrant[Q]
5. Progestins: Megesterol and Medroxyprogesterone acetate

Aromatase Inhibitors
• **No increased risk** of **endometrial carcinoma**[Q] • **Decreases bone mineral density** and increases risk of **fracture**[Q] • **Used** in **post-menopausal patients**[Q]

Hormonal Therapy in Carcinoma Breast
• **Tamoxifen** is **DOC** in both **pre-menopausal** and **post-menopausal** patients[Q]

130. Ans. a. 5 years

CARCINOMA BREAST PROGNOSTIC INDICATORS

131. Ans. a. Tumor size *(Ref: Schwartz 10/e p535-536, 9/e p453-454; Bailey 26/e p811, 25/e p841; Harrison 17/e p566)*

- The **most important** prognostic variables are provided by **tumor staging**[Q].
- The **size** of the tumor and status of the **axillary LN** provide resonably **accurate information** on the likelihood of **tumor relapse**[Q].

Prognostic factors in carcinoma Breast

- The **lymph node status** is the **most important prognostic indicator** for **tumor localized to breast**[Q]
- **In case of metastasis**, the **prognosis no more depends upon** the **lymph node status**[Q]

> - In **breast carcinoma metastasis**, prognosis **best depends upon estrogen and progesterone receptor status**[Q] (ER and PR status)

- Prognostic markers like **PCNA, Ki-67, bcl-2, bax:bcl-2, VEGF, HER 2/neu, EGFr expressions** are associated with **poor prognosis**[Q].

Prognostic and Predictive Factors for Invasive Breast Cancer	
Tumor Factors	**Host Factors**
• **Nodal status**	• Age
• Tumor **size**	• Menopausal status
• Histologic/nuclear **grade**	• Family history
• **Lymphatic/vascular invasion**	• Previous breast cancer
• Pathologic **stage**	• Immunosuppression
• **Hormone receptor status**	• Nutrition
• DNA content (**ploidy**, **S-phase fraction**)	• Prior chemotherapy
• Extent of **intraductal component**	• Prior radiation therapy
• **HER-2/*neu* expression**	

132. Ans. b. Axillary lymph node status *(Ref: Schwartz 10/e p535-536, 9/e p453-454; Bailey 26/e p811, 25/e p841)*

Best Prognostic Factors	
Carcinoma Breast	**Stage >Axillary LN status**[Q]
Metastatic carcinoma breast	**Hormone receptor** (ER, PR) status[Q]
Wilm's Tumor	**Histology**[Q]

133. Ans. a. ER +ve, b. PR +ve

134. Ans. b. Progesterone receptor +ve, e. ER +ve

135. Ans. b. High HER-2-neu oncogene

136. Ans. d. Axillary LN involvement

137. Ans. b. Axillary lymph node status

138. Ans. d. Inflammatory carcinoma

139. Ans. b. Lymph node involvement

140. Ans. b. Lymph node status

141. Ans. d. Lymph node status *(Ref: Schwartz 10/e p555, 9/e p468; Sabiston 19/e p865-866; Bailey 26/e p819, 25/e p848)*

Prognosis in Male Breast Cancer

- **Stage >Lymph node status** is the **best prognostic indicator**[Q] as in female breast carcinoma.

142. Ans. d. Decreased Her-2-neu oncogene

143. Ans. a. HER-2-neu, b. p53, c. BRCA-1, e. CEA

144. Ans. a. Estrogen receptor status

145. Ans. a. Tumour necrosis *(Ref: Bailey 25/e p838)*

Bloom-Richardson Grading (TNM)
1. Tubule formation[Q]
2. Nuclear pleomorphism[Q]
3. Mitotic count[Q]

Important Tumor Classification	
Chang staging[Q]	Medulloblastoma[Q]
Masoaka staging[Q]	Thymoma[Q]
Shimda index[Q]	Neuroblastoma[Q]
Reiss and **Ellsworth** classification **Esson prognostic index**[Q]	Retinoblastoma[Q]
Bloom-Richardson grading[Q]	CA breast[Q]
Naguchi classification[Q]	Adenocarcinoma lung[Q]
Sullivan modification of **Macfalene system**[Q]	Adrenocortical carcinoma[Q]

Gleason	CA prostate[Q]
Nevine staging	CA GB[Q]
Duke staging	Colorectal carcinoma[Q]
Robson staging	RCC[Q]
Jackson	CA penis[Q]

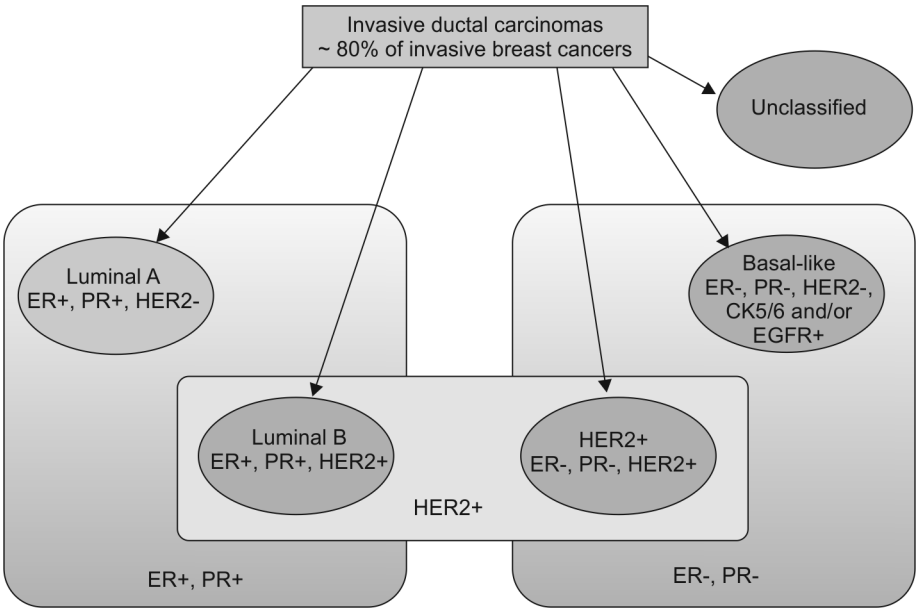
146. Ans. b. Stage of the tumour at the time of diagnosis

147. Ans. d. Gene expression profiling *(Ref: Robbins 8/e p1084; Harrison 18/e p757; Schwartz 9/e p453; Sabiston 19/e p842-845; Bailey 26/e 816, 25/e p838)*

Molecular classification of breast cancer is based on gene expression profiling.

- "Gene expression profiling, *which can measure the relative quantities of mRNA for essentially every gene, has* identified five major patterns of gene expression in the NST group: luminal A, luminal B, normal, basal-like, and HER2 positive. These molecular classes correlate with prognosis and response to therapy, and thus have taken on clinical importance."- *Robbins 8/e p1084*

- "One of the most exciting aspects of breast cancer biology has been its recent subdivision into at least five subtypes based upon gene expression profiling."- *Harrison 18/e p757*



Luminal criteria

Luminal criteria	
Type	**Properties**
Luminal A	**ER** and **PR +ve,** Her-2-neu –ve[Q]
Luminal B	**ER, PR** and **Her-2-neu +ve** (Triple positive)[Q]
Normal breast-like	Well-differentiated, ER-positive
Basal cell type	**Triple negative, positive** for **myoepithelial markers**[Q] (basal keratins, P-cadherin, p63, or laminin)**, CK-5, 6 and 17, EGFR**
Her-2 type	**Her-2-neu +ve, ER** and **PR –ve**[Q]

Immunohistochemistry in CA Breast
• **Most widely used** test for **ER and PR** receptor status[Q]
• Immunohistochemistry analysis of **heat-treated paraffin sections (of tumor tissue)** has largely superseded ELISA ligand-binding assay.
• **ER and PR positive status (>10 fmol** on **ELISA; >15 H-score** on Immunohistochemistry)[Q] predict **improved response** to **endocrine treatment, time to relapse** and **overall survival**[Q].

Heat Map
• **Portrayal of global gene expression**Q is called heat map • This illustration provides an **unbiased look at breast cancer** according to **gene expression**Q

148. Ans. c. Tumour tissue *(Ref: Schwartz 9/e p453; Sabiston 19/e p842-845; Sabiston 19/e p844; Bailey 26/e p816, 25/e p838)*

COMPLICATIONS OF MASTECTOMY

149. Ans. a. Lymphedema *(Ref: Schwartz 9/e p461; Sabiston 19/e p852-853; Bailey 26/e p813, 25/e p842)*

Complications of Mastectomy
• **Seroma** – **MC complication**Q, beneath skin flaps and axilla, occurs in **30%** cases – Catheter is retained until drainage is <30 ml/day
• **Wound infection** – Majority are due to **skin flap necrosis**
• **Lymphedema** – Occurs less frequently with the standard axillary dissections. – Extensive LN dissection, radiation therapy, presence of positive LNs, obesity are predisposing factorsQ.
• **Injury to Long Thoracic (Motor) Nerve** – Seen in **10%** of all cases. – Result in a palsy of the Serratus anterior muscle (classical **winged scapula**)
• **Injury to Thoracodorsal Nerve:** – Leads to palsy of the latissimus dorsi muscle.
• **Redundant Axillary Fat Pad**

150. Ans. d. Angiosarcoma *(Ref: Schwartz 9/e p469; Sabiston 19/e p845; Bailey 26/e p816, 25/e p845)*

Angiosarcoma

- Classified as **de novo**, as **postradiation**, or as arising in **association with postmastectomy lymphedema.**
- Stewart and Treves described **lymphangiosarcoma** of the **upper extremity** in women with **ipsilateral lymphedema** after **radical mastectomy**. (**Stewart-Treves Syndrome**)Q
- Classified as **de novo**, as **postradiation**, or as arising in **association with postmastectomy lymphedema.**
- Stewart and Treves described **lymphangiosarcoma** of the **upper extremity** in women with **ipsilateral lymphedema** after **radical mastectomy**. (**Stewart-Treves Syndrome**)Q
- Angiosarcoma is now the preferred name.
- The **average interval** between MRM or radical mastectomy and the development of an angiosarcoma is **10.5 years**Q.
- **60% of women** developing this cancer have a **history of adjuvant radiation therapy**Q**.**

Clinical Features

- **Acute worsening** of **edema**
- Appearance of **sub-cutaneous nodules** with propensity towards **hemorrhage and ulceration**

Radiation-Induced Angiosarcoma	Angiosarcoma (in the absence of previous radiation therapy or surgery)
• **Reddish brown** to **purple raised rash** within the radiation portals and on the skin of the breast	• May form a **mass within** the **parenchyma of the breast**

Treatment

- **Pre-operative chemotherapy** and **radiotherapy** followed by **surgical excision** (**radical amputation**)Q
- Associated with **poor prognosis**Q
- **Forequarter amputation** may be necessary to palliate the ulcerative complications and advanced lymphedema.

151. Ans. c. Lymphosarcoma

152. Ans. b. Intercostobrachial neuralgia *(Ref: Medical Care of Cancer Patients by Sai-Ching Jim Yeung, Carmen P. Escalanate, Robert F)*

Post-Mastectomy Pain

- The breast, axilla and upper arm are innervated by variety of nerves; the lateral cutaneous branch of T2 (**intercostobrachial nerve**), T3 and T4 provides innervation to the anterior chest wall and upper back, the torso and nipple.
- Sympathetic innervation of the cutaneous structures of the breast is provided by the medial and lateral branches of the ventral ramus of 3rd to 6th intercostal nerves.
- While both nociceptive pain (due to damage of muscle and ligaments) and neuropathic pain can occur after surgery for breast cancer, **neuropathic pain is more likely to persist after wound healing** has occurred.

Four Pain Syndromes have been distinguished
1. **Phantom Breast Pain:** Painful (often knife like or shooting) sensation that the removed breast is still present
2. **Intercostobrachial neuralgia:** Usually known as **post-mastectomy pain syndrome (PMP),** consists of **pain in axilla, medial upper arm and anterior chest wall** and is often is caused by nerve damage during axillary node dissection.
3. **Neuroma Pain:** Can occur from scars from either mastectomy or lumpectomy but is more common if surgery is followed by radiotherapy.
4. **Other Nerve Injury Pain:** Can occur even if intercostobrachial nerve is spared and is more common in breast reconstruction and implants.

BREAST RECONSTRUCTION

153. Ans. d. Transverse rectus abdominis *(Ref: Schwartz 10/e p549-550, 9/e p462-463; Sabiston 19/e p871-875; Bailey 26/e p816-817, 25/e p845)*

Breast Reconstruction		
Autogenous	**Alloplastic**	**Combined**
• **TRAM flap (MC)**[Q] • **Lattisimus dorsi flap**[Q] • Gluteal flap • **Ruben's flap**[Q] • Thoracoepigastric flap • Lateral thigh flap	• **Silicone gel** implant[Q] • **Silicone implant** with **saline refill**[Q]	• **Lattisimus dorsi flap** with **implant**[Q] • **TRAM flap** with **implant**[Q]

- Placement of the **implant in a submuscular plane** beneath the **pectoralis major**[Q], **superior portion** of the **rectus abdominis**, and **serratus anterior muscles** provides **better protection** against **implant extrusion**, as well as **decreased risk** for **capsular contracture** and **implant displacement**[Q]

154. Ans. b. TRAM *(Ref: Schwartz 10/e p549-550, 9/e p462-463; Sabiston 19/e p871-875; Bailey 26/e p816-817, 25/e p845)*

Common Reconstructive Options after Mastectomy		
Type	**Advantages**	**Disadvantages**
Implant	**One stage** procedure, minimal prolongation, hospitalization, or recovery, low cost	**Poor symmetry**[Q] if skin removed or in large ptotic breasts. **Capsular contracture, leakage, rupture**[Q] possible.
Tissue expander	Short operative time, hospitalization, recovery not prolonged, low cost	**Multiple** physician **visits** post-op. **Poor symmetry** large or ptotic breasts. **Capsular contracture, leakage rupture**[Q] possible.
Latissimus dorsi flap	Short operative time, hospitalization, recovery not prolonged, low cost	**Donor site scar**[Q] Usually **requires an implant**[Q] Moderate prolongation hospitalization and recovery.
TRAM flap	Natural contour. Good match for large or ptotic breasts. Abdominoplasty.	**Donor site scar**[Q] **Fat necrosis, flap loss** possible. **Abdominal wall weakness** and **hernia**[Q]. Significant prolongation hospitalization plus recovery.

- **MC method** of **breast reconstruction**: Implants (**silicon implants**)[Q]
- **Surgical breast reconstruction** should **never done prior to RT**[Q].

155. Ans. c. Pectoralis major myocutaneous flap

156. Ans. c. Transversus rectus abdominis muscle flap

INFLAMMATORY CARCINOMA BREAST

157. Ans. e. Mastitis carcinomatosa *(Ref: Schwartz 10/e p555, 9/e p468; Sabiston 19/e p864-865)*

- **MC type** of CA breast: **Invasive ductal carcinoma**[Q]
- **Most malignant** type of CA breast: **Inflammatory breast cancer**[Q]

158. Ans. None *(Ref: Schwartz 10/e p555, 9/e p468; Sabiston 19/e p864-865)*

Inflammatory Breast Carcinoma (Mastitis Carcinomatosa)

- IBC (stage **IIIB**) accounts for **<3%** of breast cancers.
- Characterized by the skin changes of **brawny induration**, **erythema** with a raised edge, and **edema** (**rapid onset** peau d'orange) involving **>33%** of **skin** of breast[Q].

Pathology

- **Permeation** of the **dermal lymph vessels** by **cancer cells** is seen in **skin biopsy** specimens[Q].
- There **may be** an associated **breast mass**[Q].

Clinical Features

- Characterized by the skin changes of **brawny induration**, **erythema** with a raised edge, and **edema** (peau d'orange)[Q].
- IBC may be **mistaken for** a **bacterial infection**[Q] of the breast.
- More than **75%** of women present with **palpable axillary lymphadenopathy**[Q]
- **Distant metastases at diagnosis** in **25%** of white women with IBC.

Treatment

- Multimodal approach (NACT +Mastectomy + RT ± Hormonal therapy)[Q]
- **Chest wall**, **supraclavicular**, **internal mammary** and **axillary** lymph node basins receive **adjuvant radiation therapy**.
- This **multimodal approach** results in **5-year survival rates** that approach **30%**[Q].

Inflammatory Breast Cancer	Non-inflammatory Breast Cancer
• **Dermal lymph vessel invasion**[Q] is present with or without inflammatory changes.	• **Inflammatory changes** are present **without** dermal **lymph vessel invasion**.
• Cancer is **not sharply delineated**.	• Cancer is **better delineated**.
• **Erythema** and **edema** frequently involve **>33%** of the **skin** over the breast[Q].	• Erythema is usually **confined** to the **lesion**, and edema is less extensive.
• **Lymph node** involvement is present in **>75%** of cases[Q].	• Lymph nodes are involved in approximately **50%** of the cases.
• **Distant metastases** are present in **25%** of cases.	• Distant metastases are **less common** at presentation.
• **Distant metastases** are more **common** at **initial presentation**[Q].	

- Both **inflammatory breast cancer** and **Paget's disease may** or **may not** be **associated** with **breast mass**.

MALE BREAST CANCER

159. Ans. a. Estrogen receptor positive, b. Associated with gynaecomastia

(Ref: Schwartz 10/e p555, 9/e p468; Sabiston 19/e p1935; Bailey 26/e p819, 25/e p848)

Carcinoma of Male Breast

- Peak in **sixth decade**[Q] of life, accounts for less than **1%** of all cases of breast cancer.
- Most common variety is **infiltrating ductal carcinoma**[Q].

- Male breast cancer is **preceded by gynecomastia** in **20% of men**[Q].
- **Hormone receptor positive: 80%; Her-2-neu positive: 35%**

- **Lobular carcinoma** (both in-situ and invasive) is **rarely seen** due to **absence of lobules** in **males.**

Predisposing factors

- Excess endogenous or exogenous **estrogen** (Testicular disease, **infertility, obesity, cirrhosis**)[Q]
- **Radiation** therapy, **Klinefelter's syndrome** and **testicular feminizing syndromes**[Q].
- **BRCA2 mutations**[Q]

- **Gynecomastia** is **not a risk factor** for **carcinoma male breast**[Q].

Clinical Features

- The median **age** at diagnosis is **68** years
- Most common presentation is as **lump**[Q].
- Local pain, axillary adenopathy, nipple retraction, ulceration, bleeding, and discharge.

- **Breast cancer** in **men** more commonly **involves** the **pectoralis major muscle**[Q] due to **scanty breast tissue**.

Diagnosis

- Evaluation includes **breast imaging** studies and diagnostic **needle** or **surgical biopsy**.

Treatment

- The treatment of male breast cancer is **surgical** (Most common procedure: **MRM**)[Q]
- **Adjuvant radiation therapy** is in **high risk cases** for local-regional recurrence.
- **Eighty percent** of male breast cancers are **hormone receptor positive**, and adjuvant **tamoxifen** is considered.

Prognosis

- **Stage >Lymph node status** is the **best prognostic indicator**[Q] as in female breast carcinoma.
- **Stage by stage prognosis** is **same** as **female CA breast**[Q]

160. Ans. a. Gynaecomastia is a predisposing factor *(Ref: Schwartz 9/e p468; Sabiston 19/e p865-866; Bailey 25/e p848)*

- Male breast cancer is preceded by gynecomastia in 20% of men[Q].

161. Ans. b. Estrogen receptor positive, c. History of gynaecomastia may be present, e. Undescended testis is a risk factor

162. Ans. c. Most commonly it is infiltrating lobular carcinoma

CARCINOMA BREAST IN PREGNANCY

163. Ans. d. All of the above *(Ref: Schwartz 10/e p554, 9/e p467; Sabiston 19/e p2035-2037; Bailey 26/e p818, 25/e p846)*

Breast Cancer during Pregnancy

- Occurs in **1 of every 3000**[Q] pregnant women
- **MC non-gynecologic malignancy** associated with **pregnancy**[Q].
- **Ductal carcinoma** is **MC type,** accounting for **75-90%**[Q] of breast cancer in pregnancy.

Clinical Features

- Presents as **painless palpable mass**[Q] with or without nipple discharge
- **Axillary LN metastases** in upto **75%** patients
- Approx. **<25% nodules** developing during **pregnancy** and **lactation** will be **cancerous**[Q]
- **Present at a later stage** of disease because breast changes occurring in hormone-rich environment of pregnancy obscure early cancer

Diagnosis

- **USG** and **needle biopsy**[Q] are used for diagnosis
- **Mammography** is rarely indicated due to its **decreased sensitivity** during **pregnancy** and **lactation**

Treatment: Mainstay of therapy is surgical resection

Stage I and II	Mastectomy with axillary dissection[Q]
LABC	NACT after 1st trimester + MRM in 2nd trimester + RT after delivery[Q]

LABC in Pregnancy

- **MRM** can be performed during **first and second** trimester (increased risk of spontaneous abortion after first-trimester anesthesia), **chemotherapy after first trimester** and **radiotherapy after delivery**.
- **Chemotherapy** during **first trimester** carries a risk of **spontaneous abortion** and **12%** risk of **birth defects, given after first trimester.**
- No evidence of teratogenecity by chemotherapy during second and third trimester.

Remember

- Breast cancer in pregnancy have **prognosis stage by stage similar** to that of non-pregnant patient
- **Elective termination of pregnancy** to receive appropriate therapy without the risk for fetal malformation is **no longer routinely recommended** because no improvement in survival has been demonstrated.

MONDOR'S DISEASE

164. Ans. a. Thrombophlebitis of the superficial veins of breast
(Ref: Schwartz 10/e p507, 9/e p433; Sabiston 19/e p1594; Bailey 26/e p805, 25/e p833)

Mondor's Disease

- A variant of **thrombophlebitis** involving the **superficial veins** of the **anterior chest wall**Q and breast.
- Also known as "**string phlebitis**," a thrombosed vein presenting as a **tender, cord-like structure**Q.
- Frequently involved veins: **Lateral thoracic vein**, **thoracoepigastric vein**, superficial epigastric vein.
- This **benign**, **self-limited disorder** is not indicative of a cancer.

Clinical Features

- **Acute pain** in the **lateral aspect** of the **breast** or the **anterior chest wall**Q.
- **A tender, firm cord** is found to follow the distribution of one of the major superficial veins.

Diagnosis

- When the diagnosis is **uncertain**, or when a **mass** is present near the tender cord, **biopsy** is indicated.

Treatment

- **NSAIDs** and application of **warm compresses**Q along the symptomatic vein with **restriction of motion** and **brassiere support** of the breast
- Usually **resolves** within **4–6 weeks**.
- When symptoms **persist** or are **refractory to therapy**, **excision** of the involved vein segment

165. Ans. a. Superficial thrombophlebitis, c. Cord like appearance of subcutaneous veins

166. Ans. c. Veins of the breast

DUCTAL ANOMALIES

167. Ans. b. Microdochectomy *(Ref: Bailey 26/e p802, 25/e p830)*

Duct Papilloma

- Intraductal pailloma are true polyps of epithelium lined breast ducts.
- **Benign**Q lesions (**not pre-cancerous**)
- **Mostly solitary**Q, located under the areola (within 4-5 cm of nipple orifice)
- Generally **<1 cm**, can grow upto 4–5 cm

Clinical Features

- **MC presentation**: **Bloody nipple discharge**Q
- **Intraductal papilloma** is **MC cause** of **bloody nipple discharge**Q

Diagnosis

- **Ductography: Small filling defects**Q surrounded by contrast media

Treatment

- **Microdochectomy:** Complete **excision** of the **involved duct** along with **tumor**Q

168. Ans. a. Hadfield's operation *(Ref: Bailey 26/e p805, 25/e p834)*

Duct ectasia (Periductal Mastitis)

- **Dilatation** of the **breast ducts**, which is often associated **with periductal inflammation**.
- Pathogenesis is obscure, **more common** in **smokers**Q**.**

Pathology

- First stage in the disorder is a **dilatation** in **one or more** of the **larger lactiferous ducts**, which fill with a stagnant **brown** or **green secretion**Q, this may discharge.
- These fluids then set up an **irritant reaction** in surrounding tissue leading to periductal **mastitis** or even abscess and fistula formation.

- **Dilatation** of the **breast ducts**, which is often associated **with periductal inflammation**.
- Pathogenesis is obscure, **more common** in **smokers**Q**.**

Pathology

- First stage in the disorder is a **dilatation** in **one or more** of the **larger lactiferous ducts**, which fill with a stagnant **brown** or **green secretion**Q, this may discharge.
- These fluids then set up an **irritant reaction** in surrounding tissue leading to periductal **mastitis** or even abscess and fistula formation.
- In some cases, a **chronic indurated mass** forms beneath the areola, which mimics a carcinoma.
- **Fibrosis** eventually develops, which may cause **slit-like nipple retraction**.

Clinical Features

- **Nipple discharge** (of **any colour**), a **subareolar mass**, **abscess**, **mammary duct fistula** and/or **nipple retraction**[Q] are the most common symptoms.

Diagnosis

- **Ductography: Dilated cystic structure**[Q] in duct Ectasia
- In the case of a **mass** or **nipple retraction**, a **carcinoma** must be **excluded** by obtaining a **mammogram** and **negative cytology** or histology.

Treatment

- **Hadfield's operation**[Q]**:** Excision of all of the major ducts
- Shave the back of the nipple to ensure that **all terminal ducts** are **removed** to prevent recurrence.
- **Cessation of smoking**[Q] increases the chance of a long-term cure.
- Antibiotic therapy may be tried

169. Ans. d. Hadfield's operation

170. Ans. a. Nipple discharge

CYSTOSARCOMA PHYLLODES

171. Ans. a. Wide excision with a margin *(Ref: Schwartz 10/e p555, 9/e p468; Sabiston 19/e p845; Bailey 25/e p836)*

PHYLLODES TUMORS

- Tumors of mixed connective tissue and epithelium (biphasic proliferation of **stroma** and mammary **epithelium**)[Q]
- Also known as **serocystic disease of Brodie**[Q]
- Classified as benign, borderline, or malignant.
- **Borderline tumors** have a greater potential for **local recurrence**.

Pathology

- Sharply demarcated from the surrounding breast tissue, which is compressed and distorted.
- **Connective tissue** composes the **bulk** of these tumors, which have mixed gelatinous, solid, and cystic areas.
- **Cystic areas** represent sites of **infarction** and **necrosis**.
- Gross cut tumor surface: **Classical leaf-like (phyllodes) appearance**[Q]**.**
- **Stroma** of a phyllodes tumor has **greater cellular activity** than fibroadenoma.

Stromal cells of **fibroadenomas**	Either **polyclonal** or **monoclonal**[Q]
Stromal cells of **phyllodes tumors**	**Always monoclonal**[Q]

- Most **malignant phyllodes tumors** contain **liposarcomatous** or **rhabdomyosarcomatous elements** rather than fibrosarcomatous elements[Q].
- Evaluation of the **number of mitoses** and **presence or absence of invasive foci** at the tumor margins may help to identify a **malignant tumor**[Q].

Clinical Features

- **Smooth, rounded**, usually **painless** multinodular lesions
- Average **age: 4th decade**.
- Large, mostly **massive size** but always **mobile over chest wall**[Q]
- **Bosselated surface** with **pressure necrosis** of **overlying skin**[Q]
- The diagnosis is suggested by the **larger size**, a history of **rapid growth**[Q], and occurrence in **older patients**.
- **Differentiated from carcinoma** by: **No fixity to skin** and **pectoralis**, **no nipple retraction**, **no LN involvement**[Q]

Diagnosis

- Mammographic evidence of **calcifications** and **morphologic evidence** of **necrosis do not distinguish** between benign, borderline, and malignant phyllodes tumors.
- **Ultrasound:** Discrete structure with **cystic spaces**
- **Diagnosis** is best made by **biopsy**[Q]

Treatment

Small phyllodes tumors	**Wide local excision**[Q]
Large phyllodes tumors	**Mastectomy**[Q]
Phyllodes tumor with **suspicious malignant elements**	**Re-excision** of biopsy site **to ensure complete excision** of tumor with a **1-cm margin**

- **Axillary dissection** is **not recommended** because axillary LN metastases rarely occur[Q].
- **Metastases** from malignant phyllodes tumors occur **via hematogenous spread**, with common sites including **lung, bone**, abdominal viscera and mediastinum.

172. Ans. a. Simple mastectomy

173. Ans. c. It is usually bulky and may fungate through the skin

174. Ans. c. Cystosarcoma phyllodes

175. Ans. d. All of the above

GYNAECOMASTIA

176. Ans. c. Cryptorchidism *(Ref: Schwartz 10/e p505-506, 9/e p430-432; Sabiston 19/e p828; Bailey 25/e p847)*

Physiologic Gynecomastia

- **Excess** of circulating **estrogens** in relation to circulating testosterone: Neonatal period, adolescence and senescence.

Neonatal gynecomastia

- Action of **placental estrogens**[Q] on neonatal breast tissues
- Usually disappear in few weeks

Adolescent gynecomastia

- Excess of **estradiol** relative to testosterone[Q]
- **Usually unilateral**, asymmetrical if bilateral, occurs between **12–15** years[Q]
- **Regresses spontaneously**[Q] within 3 years

Senescent Gynecomastia

- Circulating testosterone level falls resulting in **relative hyperestrinism**[Q]
- **Usually bilateral**[Q]

Pathological Gynecomastia

- **Causes: Idiopathic (MC)**[Q], Relative estrogen excess, Absolute estrogen excess, Drugs

Relative Estrogen Excess

- Occurs because of **failure** of **testosterone synthesis** or **action**[Q]

Congenital Defects	Secondary Testicular Failure
• Anorchia	• Viral **orchitis** (mumps)
• **Klinefelter's syndrome**	• Trauma
• Androgen resistance	• **Castration**
– Testicular feminization syndrome	• **Leprosy**
– Reinfenstein syndrome	• Myotonic dystrophy, spinal cord injury
• Defects in testosterone synthesis	• **Renal failure**

Absolute Estrogen Excess

1. Increased Testicular Estrogen Secretion: – Testicular tumors (**Leydig** cell, **sertoli** cell, **granulos/etheca cell** tumors)[Q] – **Bronchogenic carcinoma** and **TCC** of urinary tract (secrete hCG)[Q] – True hermaphroditism (Both testicular and ovarian components are active)
2. Increased substrate for Peripheral Aromatization: – **Adrenal carcinoma** and **congenital adrenal hyperplasia**[Q] (increased adrenal androgens) – Exogenous androgen administration – **Cirrhosis**[Q] (decreased hepatic catabolism) – Starvation with refeeding (decreased hepatic catabolism) – Thyrotoxicosis (increased production by adrenals)
3. Increase in Extraglandular aromatization

Drugs

Estrogen Related Drugs	Drugs Enhancing Endogenous Estrogen Formation	Drugs inhibiting Testosterone synthesis/ action (MACKS)	Unknown Mechanism (CBI inquires PMT)
• **DES**[Q] • OCPs[Q] • **Digitalis**[Q]	• **Gonadotropins**[Q] • **Clomiphene**[Q]	• **M**etronidazole[Q] • **A**lkylating agents[Q] • **C**imetidine[Q] • **C**isplatin[Q] • **K**etoconazole[Q] • **S**pironolactone[Q] • **F**lutamide[Q]	• **C**aptopril[Q] • **C**CB[Q] • **B**usulphan[Q] • **INH**[Q] • **P**enicillamine[Q] • **M**ethyldopa[Q] • **TCA**[Q]

177. Ans. a. Subcutaneous mastectomy is the initial treatment of choice *(Ref: Schwartz 10/e p505-506, 9/e p430-432; Sabiston 19/e p828; Bailey 25/e p847; Williams Endocrinology 10/e p741)*

Gynecomastia

- **Enlarged male breast** due to growth of **ductal tissue** and **stroma**Q
- Basic mechanism: **Excess of estrogen** (relative or absolute) Q

Clinical Classification of Gynecomastia	
Grade I	**Mild** breast enlargement without skin redundancy
Grade IIa	**Moderate** breast enlargement without skin redundancy
Grade IIb	**Moderate** breast enlargement with **skin redundancy**
Grade III	**Marked** breast enlargement with **skin redundancy** and **ptosis**, which simulates a female breast

Diagnosis

- In the **nonobese male**, **breast tissue** measuring **at least 2 cm** in diameterQ

Treatment

- **Most cases resolve spontaneously**Q
- **Non-surgical management**: Correction of underlying cause, cessation of offending drug
- **Pharmacological agents**: Antiestrogens (Tamoxifen), Aromatase inhibitors and danazol to inhibit gonadotropin secretion

Indications of Surgery in Gynecomastia
1. Gynecomastia of **longer duration** (>1 year) Q
2. Continued growthQ
3. Psychological or **cosmetic** problemQ
4. TendernessQ
5. Suspected malignancyQ

- Surgical Procedures: **Mastectomy, subtotal mastectomy, subcutaneous mastectomy, reduction mammoplasty**Q.

Suction Assisted Lipectomy
• **Removes only adipose tissue**Q, if performed as a sole method
• Performed as an **adjunct surgical procedure**Q
• Use is limited in cases that are severe or in fibrous breasts
• **Reduces overall breast size** and may result improved appearance, but it **does not remove** the **glandular tissue** (does not correct gynecomastia) Q

- **Most cases** of gynecomastia are **amenable** to **simple liposuction** with minimal glandular resection through **periareolar incision** as necessaryQ.

178. Ans. a. May be seen in Addison's disease, b. Usually unilateral in young males

179. Ans. d. Turner's syndrome

180. Ans. b. Incision along the areolar margin

181. Ans. a. Prolactinoma *(Ref: Harrison 18/e p2889)*

Prolactinoma

- **Prolactinomas** are essentially **associated with galactorrhea, not the gynecomastia**Q.
- Gynecomastia does not result from either excess or deficiency of prolactin.

PAGET'S DISEASE OF NIPPLE

182. Ans. a. Intraductal carcinoma, b. Mastectomy needed c. Malignant *(Ref: Schwartz 10/e p506-521, 9/e p444-445; Sabiston 19/e p865; Bailey 25/e p838)*

Paget's Disease of Nipple

- Chronic eczematous eruption of nipple which may progress to an ulcerated weeping lesion.
- Differentiated by superficial spreading melanoma by **CEA positivity**Q

Histopathology

- Paget cell is **large**, pale staining with **round nuclei** and **large nucleoli**Q

- Paget cells **spread into lactiferous sinuses**[Q] under the nipple and upward to invade overlying epidermis of the nipple
- Paget cells **does not invade dermal basement membrane**[Q] (carcinoma in situ)

Clinical Features

- Most (**>97%**) patients with Paget's disease have an **underlying ductal carcinoma**[Q] (in situ or invasive)
- Paget's disease **may** (**54%**) or **may not** (**46%**) be accompanied by a **mass**[Q]
- **Invasive breast cancer coexists** with Paget's disease in **93%** of patients **with mass** and in **38%** of patients **without mass**[Q]

Diagnosis

- **Complete mammography** and **biopsy** is required to rule out occult multicentric disease
- **Biopsy** showing **Paget cell is diagnostic**[Q]

Treatment

- Most commonly utilized procedure is **simple mastectomy**[Q]
- Wide excision of nipple and areola to achieve clear ,margins + Radiotherapy + Axillary staging
- Lumpectomy + Radiotherapy + Axillary LN dissection

183. Ans. d. 1, 2, 3 and 4

184. Ans. c. May have underlying carcinoma

185. Ans. b. Paget's disease

186. Ans. d. Cytology diagnostic

187. Ans. b. Abundant clear cytoplasm

188. Ans. a. Always there is underlying carcinoma

189. Ans. a. 1% associated with underlying invasive carcinoma of breast

190. Ans. a. Usually bilateral

191. Ans. a. Paget disease of bone

MASTITIS AND BREAST ABSCESS

192. Ans. d. All of the above *(Ref: http://nobleboss.awardspace.com/mednotes/surgnotes/operativ/ebreast_abscess.htm)*

Retromammary Breast Abscess

- It may an **extension of Breast abscess**, **Empyema thoracis**, **Osteomyelitis** of the **ribs**[Q]
- **No need to drain** retromammary abscess, **only conservative treatment**[Q]

193 Ref: c. Lactation *(Ref: Schwartz 10/e p506, 9/e p432; Sabiston 19/e p839; Bailey 25/e p832-833)*

Nonepidemic (sporadic) Puerperal Mastitis

- **Involvement** of the **interlobular connective tissue** of the breast by an infectious process.
- The patient develops **nipple fissuring** and **milk stasis**, which initiate a **retrograde bacterial infection**[Q].
- **Emptying of the breast** using breast suction pumps **shortens** the **duration** of symptoms[Q] and **reduces** the incidence of **recurrences.**
- The addition of **antibiotic therapy**[Q] results in a satisfactory outcome in >95% of cases.

194. Ans. a. S. aureus *(Ref: Schwartz 10/e p506, 9/e p432; Sabiston 19/e p839; Bailey 25/e p832-833)*

Breast Abscess

- Typically seen in **staphylococcal infections**[Q]
- Present with point tenderness, erythema, and hyperthermia
- **Related to lactation** and occur **within** the **first few weeks** of **breastfeeding**[Q].
- **S. aureus** are **transmitted** via **suckling neonate**[Q]

Staphylococcal infections **(MC)**	**Localized** and situated **deep** in the breast tissues
Streptococcal infections	**Diffuse superficial involvement**

Diagnosis

- Preoperative **ultrasonography** is effective in **delineating the required extent** of the drainage procedure

Treatment

- Local wound care, including application of warm compresses, and the administration of IV antibiotics (penicillins or cephalosporins).
- **Drainage procedure** is best accomplished via **circumareolar incisions** or incisions **paralleling Langer's lines**[Q].
- **Biopsy** of **abscess cavity wall** at the time of incision and drainage **to rule out** underlying or coexisting **breast cancer** with **necrotic tumor**[Q].

ANDI FIBROADENOMA AND FIBROADENOSIS

195. Ans. d. Solitary mobile mass *(Ref: Bailey 25/e p836; Schwartz 10/e p510, 9/e p433-434; Sabiston 19/e p827)*

Fibroadenoma

- **MC benign tumor** of **female breast**[Q]
- MC age group: **15–30 years**[Q]
- Known as **breast mouse**[Q]
- Etiology: **Increased sensitivity** of **focal areas** of breast tissue **to estrogen**[Q]

Pathology

- **Encapsulated** spherical lesion, composed of **fibrous** and **glandular tissue**[Q]
- Arise from interlobular stroma, stromal cells can be monoclonal or polyclonal

Types

- **Pericanalicular** (**Hard**): Due to proliferation of connective tissue **inside** the **elastic lamina**
- **Intracanalicular** (**Soft**): Due to proliferation of connective tissue **outside** the **elastic lamina**

Clinical Features

- **Painless,** slowly growing **solitary mobile lump** in the breast (**Breast mouse**)[Q]

Diagnosis

- Characteristic **popcorn calcification**[Q] on mammography
- **IOC** is **FNAC**[Q]

Treatment

- **No treatment**[Q] is necessary when diagnosis is confirmed.
- **Excision biopsy** is the treatment of choice for **suspicious lesion**[Q] and for cosmetic indications.

196. Ans. c. Fibroadenosis *(Ref Schwartz 10/e p507, 9/e p433-435; Sabiston 19/e p827-828; Bailey 25/e p835)*

- **Fibroadenosis** or **fibrocystic disease** is the cause of pre-menstrual fullness in breast in 21 years old unmarried female.
- Rest of the options are highly unlikely.

Aberrations of Normal Development and Involution

- ANDI classification encompasses all aspects of the breast condition, including pathogenesis and the degree of abnormality.

Early Reproductive Years

- **Fibroadenomas** in younger women aged **15 to 25 years**
- Nipple inversion is a disorder of development of the major ducts, which prevents normal protrusion of the nipple.
- Mammary duct fistulas arise when nipple inversion predisposes to major duct obstruction, leading to recurrent subareolar abscess and mammary duct fistula.

Later Reproductive Years

- **Cyclical mastalgia** and **nodularity** usually are associated with **premenstrual enlargement** of the breast and are regarded as normal.
- In epithelial hyperplasia of pregnancy, papillary projections sometimes give rise to bilateral bloody nipple discharge.

Involution

- **Macrocysts** are common, are often **subclinical,** and do not require specific treatment.
- **Sclerosing adenosis** is considered a disorder of both the proliferative and the involutional phases of the breast cycle.
- **Duct ectasia** (dilated ducts) and periductal mastitis are other important components.
- **Sixty percent** of women **70 years** of age exhibit some degree of **epithelial hyperplasia**.
- **Atypical** proliferative diseases include **ductal** and **lobular hyperplasia**, both of which display **some features** of **carcinoma in situ**.
- Women with **atypical ductal** or **lobular hyperplasia** have a **fourfold increase** in **breast cancer risk**.

ANDI Classification of Benign Breast Disorders

	Normal	Disorder	Disease
Early reproductive years (age 15–25 years)	Lobular development Stromal development Nipple eversion	**Fibroadenoma**[Q] Adolescent hypertrophy Nipple inversion	Giant fibroadenoma Gigantomastia Subareolar abscess Mammary duct fistula

Later reproductive years (age 25–40 years)	Cyclical changes of menstruation Epithelial hyperplasia of pregnancy	**Cyclical mastalgia**[Q] Nodularity Bloody nipple discharge	**Incapacitating mastalgia**[Q]
Involution (age 35–55 years)	Lobular involution Duct involution Dilatation Sclerosis Epithelial turnover	Macrocysts Sclerosing lesions Duct ectasia Nipple retraction **Epithelial hyperplasia**	Periductal mastitis **Epithelial hyperplasia with atypia**[Q]

197. Ans. d. Aspiration is the treatment *(Ref: Schwartz 10/e p51; Bailey 25/e p836)*

Breast Cyst

- Occur most commonly in the **last decade** of **reproductive life**[Q] as a result of a non-integrated involution of stroma and epithelium.

Clinical Features

- Often **multiple**, may be **bilateral**[Q] and can mimic malignancy.
- Typically **present suddenly** and cause great alarm; **prompt diagnosis** and **drainage** provides **immediate relief**[Q].

Diagnosis

- Diagnosis can be confirmed by **aspiration** and/or **ultrasound**[Q].

Treatment

- **Aspiration** for Solitary cyst: If they **resolve completely**, and if the fluid is **not blood-stained, no further treatment** is required (**30%** will **recur** and require **reaspiration**) [Q]
- **Core biopsy** or **local excision**[Q]: If there is a **residual lump** or if the fluid is **blood-stained**, **for histological diagnosis** (exclude cystadenocarcinoma, which is more common in elderly women)

198. Ans. b. Fibroadenoma

199. Ans. b. Tightly arranged ductal epithelial cells with dyscohesive bare nuclei *(Ref: Winfred Grays diagnostic cytopathology 2/e p279-280)*

Non-tender, firm and mobile breast lump in a female of age 17 years is suggestive of fibroadenoma, in which tightly arranged ductal epithelial cells with dyscohesive bare nuclei are seen on FNAC. (AIIMS May 2013 repeat)

Fibroadenoma:

- Diagnostic findings on needle biopsy consist of:
  - **Abundant stromal cells** which appear as **bare bipolar nuclei**
  - **Sheets of fairly uniform-size epithelial** cells that **are typically arranged in either an antler like pattern or a honeycomb pattern.**
  - Foam cells and apocrine cells may also be seen, although these are less diagnostic features.

MISCELLANEOUS

200. Ans. d. Forerunner of breast abscess *(Ref: Bailey 25/e p830)*

Cracked Nipple

- This may occur **during lactation** and be the **forerunner of acute infective mastitis**[Q].
- If the **nipple** becomes **cracked during lactation**, it **should be rested for 24–48 hours** and the breast should be **emptied with** a **breast pump**[Q].
- Feeding should be resumed as soon as possible.

201. Ans. a. Axillary, b. Supraclavicular, c. Internal mammary

Important Lymph Nodes	
Rotter's nodes[Q]	**Interpectoral** nodes (**CA breast**) [Q]
Rouvier nodes[Q]	**Retropharyngeal** nodes (**CA Nasopharynx**) [Q]
Delphian nodes[Q]	**Pre-cricoid** lymph nodes[Q]
Irish nodes[Q]	Nodes in **left axilla** (**CA stomach**) [Q]
Sister Mary Joseph nodes[Q]	**Periumbilical metastatic cutaneous** nodules
Virchow nodes[Q]	**Left supraclavicular** node[Q]
Cloquet node[Q]	**Femoral canal** node[Q]
LN of **Lund**[Q]	**Cystic** lymph node[Q]

202. Ans. b. Family history of CA breast

203. Ans. c. Microdochotomy

204. Ans. a. Excision of a lump

- **Lumpectomy (Tylectomy):** Surgical procedure designed to remove a discrete lump

205. Ans. c. Associated with prolactinoma and other endocrinopathies, d. Surgery is done, e. Hypothyroidism can cause galactorrhoea *(Ref: Harrison 17/e p2204-2205; Dutta Gynecology 5/e p548-549)*

Galactorrhea

- Secretion of **milk looking discharge** from **one** or **both breasts unrelated to pregnancy**[Q] is called galactorrhea.
- Physiological galactorrhea is the continued production of milk after lactation has ceased and menses resumed and is often caused by continued mechanical stimulation of the nipple.
- In both **men** and **women**[Q], galactorrhea may **vary in colour** and **consistency**.
- Galactorrhoea is commonly **associated with prolactinoma**[Q].

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- In both **men** and **women**[Q], galactorrhea may **vary in colour** and **consistency**.
- Galactorrhoea is commonly **associated with prolactinoma**[Q].

Treatment

- Treatment is aimed at **normalizing prolactin level**[Q].
- **Bromocriptine**[Q] (dopamine agonist) is the **drug of choice**.
- **Surgery** is considered when there is **failure of medical therapy**[Q] (**Trans-nasal trans-sphenoidal excision** of **pituitary adenoma** is done[Q])

206. Ans. d. Schirrhous carcinoma *(Ref: Norman Brows/e277)*

Causes of Massive Breast Enlargement	
1. Benign hypertrophy[Q] (usually bilateral)	**4. Sarcoma**[Q]
2. Cystosarcoma phyllodes[Q]	**5. Colloid carcinoma**[Q]
3. Giant fibroadenoma[Q]	**6. Filarial elephanitiasis**[Q]

207. Ans. b. Virginal hypertrophy *(Ref: CPDT 16/e p1128)*

Virginal Hypertrophy

- **Massive enlargement** of **usually both breasts**[Q]
- It **can** also **be unilateral**
- Usually occurs due to an **alteration** in the **normal sensitivity** of the **breast to estrogenic hormones**[Q]
- **Treatment: Reduction mammoplasty**[Q]

208. Ans. e. None of the above *(Ref: NMS surgery 4/e p456)*

Haagensen's Criteria of Inoperability	
1. Extensive edema of the **breast**[Q]	**5.** A **parasternal tumor**[Q], indicating spread to the internal mammary LNs
2. Satellite nodule[Q] of carcinoma	**6. Edema of arm**[Q]
3. Inflammatory carcinoma[Q]	**7. Distant metastasis**[Q]
4. Supraclavicular metastasis[Q]	

209. Ans. c. Pectoral *(Ref: Bailey 25/e p831)*

Amazia

- **Congenital absence** of the **breast**[Q] may occur on one or both sides.
- It is sometimes **associated with absence** of the **sternal portion** of the **pectoralis major** (**Poland's syndrome**)[Q].
- It is **more common** in **males**[Q].

210. Ans. b. Well encapsulated, d. Mastectomy is mainstay treatment *(Ref: Cancer of Breast by Donegau 5/e p933-936; Breast Cancer by Roses 2/e p207-208)*

Breast Leiomyosarcoma

- **Leiomyosarcomas** are **malignant tumors**[Q] composed of cells showing smooth muscle features
- **Locally aggressive tumor** and **hematogenous metastasis**[Q]
- **Palpable axillary lymphadenopathy** is **uncommon**[Q] and when encountered usually represents **reactive LNs uninvolved by metastatic disease**[Q]
- A **clinically negative axilla** in presence of **large tumor** may be indicative of breast sarcoma
- Tumor is **well circumscribed** or **encapsulated**[Q]

Treatment

- **Simple mastectomy** is **gold standard**[Q] of treatment
- **Axillary lymph node dissection** is **not indicated**[Q]
- **Postoperative radiation** may be used in patient undergoing mastectomy because chest wall recurrence are observed

211. Ans. a. Axilla *(Ref: Bailey 26/e p803, 25/e p831)*

Polymazia (Accessory breasts)

- Polymazia or accessory breasts have been recorded in the **axilla** (**MC site**)[Q], **groin, buttock** and **thigh.**
- They have been known to **function during lactation**[Q].

212. Ans. b. Chronic areolar abscess *(Ref: Schwartz 10/e p506, 9/e p433)*

Zuska's Disease (Recurrent Periductal Mastitis)

- Condition of **recurrent retroareolar infections** and **abscesses**
- **Smoking** has been implicated as a **risk factor**
- Managed symptomatically by **antibiotics** with **incision** and **drainage**

Prognosis

- The prognosis is favorable, with **5-** and **10-year** survival rates of **74** and **51%**, respectively.

213. Ans. d. Parasternal *(Ref: Bailey 25/e p839)*

214. Ans. b. USG *(Ref: Sutton's Radiology 7/e p1456; Schwartz 9/e p467; Sabiston 19/e p2035-2037; Bailey 25/e p846)*

Indications of Breast Ultrasound: (*Sutton's Radiology 7/e p1456*)

- **Symptomatic breast lump** in women **<35 years**
- **Breast lump during lactation and pregnancy**
- Assessment of mammographic abnormality
- Assessment of MRI or scintimammography detected lesions (± further mammographic views)
- **Clinical breast mass with negative mammogram**
- **Breast inflammation**
- Augmented breast (together with MRI)
- Breast lumps in males (together with MRI)
- **Guidance of needle biopsy or localization**
- Follow-up of breast carcinoma treated with adjuvant chemotherapy

215. Ans. c. Intercostobrachial nerve

216. Ans. b. i.e., Isosulfan blue dye *(Ref: Schwartz 9/e p259)*

Lymphetic mapping is performed by using isosulfan blue dye, technetium-labled sulfur colloid ablumin or a combination of both

217. Ans. b. Breast mass but no lymph node palpable. *(Ref: Schwartz 9/e p258)*

CHAPTER 2

Thyroid

MULTIPLE CHOICE QUESTIONS

PAPILLARY CARCINOMA

1. A 35-years old female presented with a swelling in the neck for the past 2 months, she had the treatment for Hodgkin's lymphoma when she was 22 years with irradiation. On, examination, her vitals were normal, there was a single, firm, irregular nodule, moving with deglutition in the left side of midline. Clinical examination also revealed a single node in the left side of the neck. The most likely clinical diagnosis of this condition is: *(COMEDK 2011)*
a. Recurrence of lymphoma
b. Malignant goiter
c. Benign multinodular goiter
d. Toxic nodular goiter

2. Most probable pathological diagnosis would be: *(COMEDK 2011)*
a. Anaplastic carcinoma
b. Follicular carcinoma
c. Medullary carcinoma
d. Papillary carcinoma

3. The FNAC of the lesion should reveal: *(COMEDK 2011)*
a. 'Orphan-Annie eye' nucleus cells
b. Amyloid deposits
c. Epitheloid cells and giant cells
d. Follicular cells

4. The ideal treatment of the above condition would be:
a. Total thyroidectomy with lymph nodal dissection of the same side *(COMEDK 2011)*
b. Radiotherapy
c. Lobectomy
d. Lobectomy with isthmusectomy

5. About papillary carcinoma what is/are true? *(PGI Dec 2008)*
a. Often encapsulated
b. Prognosis is bad
c. Lymph node metastases is common
d. Can metastasize to lung
e. Multiple foci of tumour is seen

6. Variant of papillary carcinoma thyroid: *(PGI June 2007)*
a. Medullary
b. Warthin
c. Columnar
d. Insular
e. Diffuse sclerosing

7. Papillary carcinoma thyroid: *(PGI June 2007)*
a. Most common thyroid cancer
b. Psammoma bodies seen
c. Encapsulated
d. Blood borne metastasis is common

8. Which of the following would be the best treatment for a 2 cm thyroid nodule in a 50 year old man with FNAC revealing it to be a papillary carcinoma? *(AIIMS May 2011)*
a. Hemithyroidectomy
b. Total thyroidectomy with left sided modified neck dissection
c. Near total thyroidectomy with radiotherapy
d. Hemithyroidectomy with modified neck dissection

9. Psammoma bodies may be seen in all of the following, except: *(All India 2011)*
a. Follicular carcinoma of thyroid
b. Papillary carcinoma of thyroid
c. Meningioma
d. Serous cystadenocarcinoma of ovary

10. Features of papillary carcinoma includes: *(PGI May 2011)*
a. FNAC easy
b. Almost always unifocal
c. Psammoma body
d. Spread to cervical LN
e. Bad prognosis

11. About papillary carcinoma true statement is/are:
a. Radiation is a risk factor *(PGI Nov 2010)*
b. Multifocal
c. Hematogenous spread is common
d. Distant metastasis is seen

12. Most common thyroid malignancy is:
a. Anaplastic carcinoma *(DNB 2012, MHPGMCET 2002)*
b. Follicular carcinoma
c. Medullary carcinoma
d. Papillary carcinoma

13. Which thyroid malignancy is common after radiation exposure? *(MHSSMCET 2005)*
a. Follicular
b. Papillary
c. Medullary
d. Anaplastic

14. A 10-years old boy presented with cervical lymph adenopathy. Needle biopsy from the nodes revealed secondaries from papillary carcinoma of thyroid. The child under went complete removal of tumor near total thyroidectomy and radical neck dissection. What should be the immediate next line of management? *(All India 2012)*
a. Start thyroxine suppression therapy
b. I-131 whole body scan to assess the extent of disease
c. Bone scan to evaluate secondaries
d. CECT scan to assess any residual disease

15. Orphan Annie-eye nuclei seen in: *(Orissa 2011)*
a. Papillary carcinoma of thyroid
b. Medullary carcinoma of thyroid
c. Anaplastic carcinoma of thyroid
d. Follicular carcinoma of thyroid

16. Psammoma bodies are seen in following except: *(PGI 2002)*
a. Serous cystadenoma of ovary
b. Mucinous cystadenoma of ovary
c. Meningioma
d. Papillary carcinoma of thyroid

17. Which of the following would be the best treatment for a 2 cm thyroid nodule in a 50-years old man with FNAC revealing it to be a papillary carcinoma? *(All India 2009)*
a. Hemithyroidectomy
b. Subtotal thyroidectomy with modified neck dissection
c. Near total thyroidectomy with modified neck dissection
d. Hemithyroidectomy with modified neck dissection

18. True regarding papillary carcinoma of thyroid: *(MCI March 2006)*
a. Undifferentiated carcinoma
b. Blood-borne metastasis is commoner
c. Excellent prognosis
d. Capsulated

19. True about papillary carcinoma thyroid is: *(PGI Dec 99)*
a. Comprises 10-15% of all thyroid cancers
b. Cells have intranuclear vacuolation
c. Amyloid deposition seen
d. Encapsulated

20. Papillary carcinoma thyroid usually presents as:
a. Diffuse nodular swelling *(PGI Dec 96)*
b. Only lymphadenopathy
c. Hormonal disturbance
d. Single nodule + local lymph node

21. Which type of thyroid carcinoma has the best prognosis?
a. Papillary carcinoma *(DNB 2010, All India 96)*
b. Anaplastic carcinoma
c. Follicular carcinoma
d. Medullary carcinoma

22. One of the following is not correct in papillary carcinoma of thyroid:
a. Can be reliably diagnosed using fine needle aspiration cytology
b. Always unifocal
c. Typically spreads to the cervical lymph nodes
d. Requires a total thyroidectomy for large tumors

23. Compared to follicular carcinoma, papillary carcinoma of thyroid have: *(PGI Dec 2007, June 2005, Dec 2006)*
a. More male preponderance
b. Bilaterality
c. Local recurrence common
d. Increased lymph node metastasis
e. Increased mortality

24. Occult thyroid malignancy with nodal metastasis is:
a. Medullary carcinoma *(DNB 2005, 2001, AIIMS Sept 96)*
b. Follicular carcinoma
c. Papillary carcinoma
d. Anaplastic carcinoma

25. Least malignant thyroid cancer is: *(AIIMS Nov 2003)*
a. Papillary carcinoma b. Follicular carcinoma
c. Anaplastic carcinoma d. Medullary carcinoma

26. Lateral aberrant thyroid refers to: *(AIIMS June 2002)*
a. Congenital thyroid abnormality
b. Metastatic foci from primary in thyroid
c. Struma ovarii
d. Lingual thyroid

27. Treatment of papillary carcinoma of thyroid with bony metastasis: *(PGI June 2004)*
a. Radiotherapy
b. Radioiodine
c. Near total thyroidectomy with radiotherapy
d. Near total thyroidectomy with radioiodine and radiotherapy

28. Cervical lymph node involvement in papillary carcinoma thyroid, best treatment is: *(PGI June 97)*
a. Radioactive iodine b. Chemotherapy
c. Radical neck dissection d. Steroid

29. Which of the following is used in the treatment of differentiated thyroid cancer? *(All India 2006)*
a. I-131 b. 99mTc
c. P-32 d. I-131 MIBG

30. In treatment of papillary carcinomas thyroid, radioiodine destroys the neoplastic cells predominantly by: *(AIIMS Nov 2005)*
a. X-rays b. Beta rays
c. Gamma rays d. Alpha particles

31. A 21-years old woman has 3 cm node in the lower deep cervical chain on the left. The biopsy is interpreted as revealing normal thyroid tissue in a lymph node. The most likely diagnosis is: *(DNB 2012, DPG 2009 Feb)*
a. Subacute thyroiditis
b. Metastatic carcinoma thyroid
c. Hashimoto's disease
d. Lateral aberrant thyroid

32. All of the following regarding papillary carcinoma thyroid is true except: *(All India 90)*
a. Multicentric origin
b. Secondaries to lymph nodes
c. Slowing growing
d. Bony metastasis in early stage

FOLLICULAR CARCINOMA

33. All of the following are true for follicular carcinoma of thyroid except: *(COMEDK 2006)*
a. Lymph node involvement rare
b. Vascular involvement common
c. Younger patients have good prognosis
d. Diagnosis by FNAC

34. Thyroid carcinoma with pulsating vascular skeletal metastasis is: *(COMEDK 2007, All India 95)*
a. Follicular b. Anaplastic
c. Medullary d. Papillary

35. Follicular carcinoma of thyroid is due to mutation of:
a. RAS b. HGF *(JIPMER 2010)*
c. RET d. ABL

36. A well differentiated follicular carcinoma of thyroid can be best differentiated from a follicular adenoma by:
a. Hurthle cell change *(All India 2011, 2009)*
b. Lining of tall columnar and cuboidal cells
c. Vascular invasion
d. Nuclear features

37. FNAC is useful in all the following types of thyroid carcinoma except: *(UPPG 2010, MCI March 2005, All India 95)*
a. Papillary b. Follicular
c. Anaplastic d. Medullary

38. Most probable malignancy that develops in a case of long-standing goiter is: *(All India 96, AIIMS Feb 97, Nov 2001)*
a. Follicular carcinoma b. Anaplastic carcinoma
c. Papillary carcinoma d. Medullary carcinoma

39. Bone metastasis is common in which thyroid tumor:
a. Follicular b. Papillary *(AIIMS Nov 99)*
c. Hurthle cell tumour d. Anaplastic

40. Thyroid nodule of 4 cm size, mobile but causing compressive symptoms. All are true except: *(DNB 2011)*
a. FNAC is investigation of choice
b. FNAC cannot distinguish follicular adenoma from carcinoma
c. Managed by sub-total thyroidectomy
d. Cold nodules are diagnostic of malignancy

41. In case of adenomatoid goiter which carcinoma is commonest to occur: *(AIIMS Nov 98)*
a. Medullary carcinoma b. Follicular carcinoma
c. Papillary carcinoma d. Anaplastic carcinoma

42. Carcinoma thyroid with blood borne metastasis is:
a. Follicular b. Papillary *(AIIMS Feb 97)*
c. Medullary d. Anaplastic

43. Lymph node metastasis is least commonly seen with: *(All India 94)*
a. Papillary CA Thyroid b. Medullary CA Thyroid
c. Follicular CA Thyroid d. Anaplastic CA Thyroid

44. A 20-years old female patient presented with a thyroid swelling. Most probably, the fine needle aspiration cytology will not diagnose: *(AIIMS Nov 97)*
a. Papillary carcinoma of thyroid
b. Medullary carcinoma of thyroid
c. Non-Hodgkin's lymphoma of thyroid
d. Follicular carcinoma of thyroid

45. Hurthle cells tumour is: *(WBPG 2012, DPG 2007)*
a. Papillary carcinoma thyroid
b. Follicular carcinoma thyroid
c. Medullary carcinoma thyroid
d. Anaplastic carcinoma

46. Metastasis from follicular carcinoma should be treated by: *(MCI Sept 2006)*
a. Radioiodine b. Surgery
c. Thyroxine d. Observation

47. True regarding follicular carcinoma of thyroid: *(JIPMER 2014, 2013)*
a. Hematogemous spread
b. Commonly multifocal
c. Readily diagnosed by face
d. Most commonly carcinoma of thyroid

48. The microscopic feature that differentiates a follicular carcinoma from a follicular adenoma: *(COMEDK 2014)*
a. Nuclear pleomorphism b. Hurthle cell change
c. Capsular invasion d. Absence of colloid

49. FNAC cannot detect which of the following? *(AIIMS November 2014)*
a. Follicular carcinoma b. Papillary carcinoma
c. Colloid goiter d. Hashimoto's thyroiditis

MEDULLARY CARCINOMA

50. Screening method of medullary carcinoma thyroid is:
a. Serum calcitonin *(All India 97, AIIMS Nov 95)*
b. Serum calcium
c. Serum alkaline phosphate
d. Serum acid phosphatase

51. Treatment of medullary carcinoma thyroid:
a. Surgery and Radiotherapy *(AIIMS May 2011)*
b. Radiotherapy and Chemotherapy
c. Surgery only
d. Radioiodine ablation

52. False statement about feature of MTC: *(PGI Nov 2011)*
a. Familial MTC may presents in 2nd decade
b. It has characteristic amyloid stroma
c. Secrete serotonin
d. Take up radioiodine
e. Secrete calcitonin

53. Thyroid radioiodine ablation therapy is useful in all except:
a. Recurrent papillary carcinoma *(PGI May 2011)*
b. Residual papillary carcinoma
c. Anaplastic carcinoma
d. Follicular carcinoma
e. Medullary carcinoma

54. Feature(s) of medullary carcinoma thyroid: *(PGI Nov 2010)*
a. Arises from parafollicular cells
b. Amyloid stroma is present on histology
c. 10-26% cases are familial
d. Diarrhea occurs
e. Total thyroidectomy is performed

55. Age for prophylactic thyroidectomy in MEN IIB syndrome? *(MHSSMCET 2009)*
a. 1 month b. 2 months
c. 4 months d. 6 months

56. Thyroid carcinoma associated with hypocalcemia is: *(AIIMS Dec 94)*
a. Follicular carcinoma b. Medullary carcinoma
c. Anaplastic carcinoma d. Papillary carcinoma

57. Medullary carcinoma thyroid arises from: *(AIIMS Nov 93)*
a. Parafollicular cells b. Cells lining the acini
c. Capsule of thyroid d. Stroma of the gland

58. Which of the following is true regarding medullary carcinoma of the thyroid? *(PGI Dec 2001)*
a. Arises from parafollicular cells
b. Secretes calcitonin
c. Occurs in families
d. Amyloid in stroma
e. Commonly malignant

59. Amyloid deposition is seen in which type of carcinoma thyroid: *(MCI Sept 2009)*
a. Follicular b. Papillary
c. Anaplastic d. Medullary

60. All of the following are true regarding medullary carcinoma of thyroid except: *(MCI March 2010)*
a. Total thyroidectomy is done
b. Parafollicular cells involved
c. TSH dependent
d. Releases calcitonin

61. Treatment of medullary carcinoma thyroid:
a. Surgery and radiotherapy *(AIIMS Nov 2008)*
b. Radiotherapy and chemotherapy
c. Surgery only
d. Radioiodine ablation

62. Needle biopsy of solitary thyroid nodule in a young woman with palpable cervical lymph nodes on the same sides demonstrates amyloid in stroma of lesion. Likely diagnosis is: *(All India 2002)*
a. Medullary carcinoma thyroid
b. Follicular carcinoma thyroid
c. Thyroid adenoma
d. Multinodular goiter

63. In medullary carcinoma thyroid tumour marker is: *(WBPG 2014, AIIMS June 98)*
a. TSH b. Calcitonin
c. T3, T4 and TSH d. Alpha Fetoprotein

64. After thyroidectomy for medullary carcinoma of thyroid, which is important for determining recurrence of tumour?
a. Thyroglobulin b. TSH *(MCI Sept 2009)*
c. CEA d. Thyroxine levels

65. The expression of the following oncogene is associated with a high incidence of medullary carcinoma of thyroid: *(AIIMS Nov 2005)*
a. p53
b. Her-2-neu
c. Ret proto-oncogene
d. Rb gene

66. A 26-years women presents with a palpable thyroid nodule, and needle biopsy demonstrates amyloid in the stroma of the lesion. A cervical lymph node is palpable on the same side as the lesion. The preferred treatment should be:
a. Removal of the involved node, the isthmus, a portion of the opposite bone and he enlarged lymph node
b. Removal of the involved lobe, the isthmus, a portion of the opposite lobe, and he enlarged lymph node
c. Total thyroidectomy and modified neck dissection on the side of the enlarged lymph node
d. Total thyroidectomy and irradiation of the cervical lymph nodes *(All India 2002)*

67. Amyloid stroma is seen in which carcinoma thyroid: *(AIIMS June 2000)*
a. Papillary carcinoma b. Medullary carcinoma
c. Anaplastic carcinoma d. Follicular carcinoma

68. A patient has pituitary tumour and pheochromocytoma and a thyroid nodule. Which carcinoma is most likely to occur? *(AIIMS Nov 2000)*
a. Follicular carcinoma b. Medullary carcinoma
c. Papillary carcinoma d. Anaplastic carcinoma

69. A 52-years female patient presents with symptoms of pheochromocytoma. She also has a thyroid carcinoma. Her thyroid carcinoma is of which type: *(AIIMS June 99)*
a. Anaplastic b. Medullary
c. Follicular d. Papillary

70. MEN-2 is seen with the following type of thyroid carcinoma:
a. Papillary b. Medullary *(All India 97)*
c. Anaplastic d. Follicular

71. Serum calcitonin is a marker for: *(DNB 2003, All India 94)*
a. Anaplastic carcinoma b. Papillary carcinoma
c. Medullary carcinoma d. Follicular carcinoma

72. Treatment of choice for medullary carcinoma of thyroid is:
a. Total thyroidectomy *(AIIMS May 2005)*
b. Partial thyroidectomy
c. I-131 ablation
d. Hemithyroidectomy

73. Treatment of medullary carcinoma of thyroid with lymph node metastasis: *(PGI June 2005)*
a. Subtotal thyroidectomy + Radioiodine
b. Subtotal thyroidectomy + Radiotherapy
c. Near total thyroidectomy + Radioiodine
d. Neat total thyroidectomy + Radiotherapy
e. Total thyroidectomy + Radiotherapy

74. All of the following are helpful for diagnosis of medullary carcinoma thyroid except: *(PGI 2000)*
a. Spindle cell stroma with few follicles
b. Amyloid deposition
c. Calcitonin in stroma
d. Histological mitochondria is essential for diagnosis

75. Which of the following gene defects is associated with development of medullary carcinoma of thyroid?
a. Ret proto-oncogene b. FAP gene *(All India 2004)*
c. Rb gene d. BRCA-1 gene

76. Commonest presenting complaints of medullary carcinoma thyroid: *(PGI 84)*
a. Diarrhea b. Dysphagia
c. Hoarseness d. Flushing

77. Which of the following is true about medullary carcinoma?
a. Calcitonin is not a marker *(DPG 2008)*
b. Arises from parafollicular C cells
c. Produces PTH
d. Take up radioiodine

78. True about medullary carcinoma thyroid: *(DPG 2007)*
a. Good prognosis
b. Associated with MEN-1
c. Increased calcitonin is not associated with hypocalcemia
d. Treated by near total thyroidectomy

79. All are true regarding medullary carcinoma or thyroid except: *(JIPMER 2014, 2013)*
a. It arises from 'C' cells
b. Secrete high levels of calcitonin
c. It is dependent on TSH
d. Most cases are familial

ANAPLASTIC CARCINOMA

80. Regarding anaplastic carcinoma which statements(s) is/are true: *(PGI Dec 2008)*
a. Common in elderly
b. Well encapsulated
c. Surrounding neck tissue is usually free
d. Distant metastasis is common
e. Some degree of differentiation to papillary and follicular type is seen

81. Not true about anaplastic thyroid carcinoma:
a. Local infiltration common *(PGI May 2011)*
b. Spread by lymphatic route
c. Long term survival in patient undergoing surgery
d. Surgery is of limited value
e. Highly chemosensitive

82. A patient with long standing multinodular goitre develops hoarseness of voice and swelling undergoes sudden increase in size. Likely diagnosis is: *(All India 2001)*
a. Follicular carcinoma b. Papillary carcinoma
c. Medullary carcinoma d. Anaplastic carcinoma

83. The treatment of choice for anaplastic carcinoma of thyroid infiltrating trachea and sternum will be: *(AIIMS Nov 2005)*
a. Radical excision
b. Chemotherapy
c. Radiotherapy
d. Palliative/Symptomatic treatment

84. Regarding anaplastic carcinoma which statements (s) is/are true:
a. Common in elderly *(PGI Dec 2008, June 2004)*
b. Associated with p53 mutation
c. Surrounding neck tissue is usually free
d. Radiotherapy cures
e. Lymphatic spread occur

THYROID METASTASIS

85. Metastasis in thyroid gland come most commonly from carcinoma of: *(PGI June 98)*
a. Testis b. Prostate
c. Breast d. Lungs

THYROID LYMPHOMA

86. All of the following are true about lymphoma of the thyroid except: *(All India 2007)*
a. More common in females
b. Slow growing
c. Clinically confused with undifferentiated tumors
d. May present with respiratory distress and dysphagia

CARCINOMA THYROID

87. False statement regarding thyroid carcinoma: *(PGI Nov 2011)*
a. Medullary thyroid carcinoma is associated with MEN-2A
b. Follicular carcinoma -Most common type of carcinoma
c. Papillary carcinoma -Multifocal
d. Thyroid lymphoma is often associated with Hashimoto thyroiditis
e. Anaplastic carcinoma occur in old age women

88. True about thyroid carcinoma: *(PGI Dec 2006)*
a. Follicular carcinoma have worse prognosis than papillary carcinoma
b. Papillary carcinoma spreads by hematogenous route more frequently than follicular carcinoma
c. Papillary carcinoma have increased mortality than follicular carcinoma
d. Follicular carcinoma are more bilateral than papillary carcinoma
e. Follicular carcinoma have more male incidence than papillary carcinoma

89. Low risk in carcinoma thyroid: *(PGI Dec 2006)*
a. Men <50 years b. Women <40 years
c. Papillary carcinoma <4cm d. Metastasis
e. Follicular carcinoma >5cm

90. The most common histologic type of thyroid cancer is: *(All India 2008, 2004, AIIMS Nov 05, PGI Dec 2005)*
a. Medullary type b. Follicular type
c. Papillary type d. Anaplastic type

91. Which of the following is not a histological variant of thyroid neoplasm? *(All India 2007)*
a. Follicular b. Merkel cell
c. Insular d. Anaplastic

92. Thyroid carcinoma: *(PGI 82, UPSC 87)*
a. Is often associated with hypothyroidism
b. Often produces hyperthyroidism
c. Is usually euthyroid
d. Occurs in toxic nodules

93. Amount of I-131 given for carcinoma thyroid: *(DPG 2006)*
a. 5 micro curie b. 50 micro curie
c. 5 milli curie d. 50 milli curie

94. Thyroxine can be given in which thyroid carcinoma: *(MCI Sept 2009)*
a. Papillary b. Medullary
c. Anaplastic d. Undifferentiated

95. Thyroid carcinoma causes laryngeal paralysis due to:
a. Recurrent laryngeal nerve palsy *(PGI June 96)*
b. Vagus nerve palsy
c. Glossopharyngeal nerve palsy
d. Hypoglossal nerve palsy

96. Which of the following is used in the treatment of thyroid malignancy? *(PGI June 2001)*
a. I-131 b. I-125
c. Tc-99 d. P-32
e. Strontium

97. Which of the following is used in the treatment of well differentiated thyroid carcinoma: *(Recent Questions 2013)*
a. I^{131} b. 99m Tc
c. 32P d. MIBG

SOLITARY THYROID NODULE

98. Most sensitive investigation of thyroid nodule:
a. MRI b. PET Scan *(Punjab 2011)*
c. USG d. Clinical examination

99. True about solitary thyroid nodule: *(PGI Dec 2006)*
a. THR-Antibody
b. Lined by columnar epithelium
c. Diffuse hyperplasia of thyroid
d. Common in female
e. Thyroidectomy done

100. A case of solitary thyroid nodule, investigation of choice is: *(PGI June 97, 96, AIIMS Nov 97)*
a. T3, T4 estimation b. Thyroid scan
c. FNAC d. Excision biopsy

101. Initial preferred investigation for thyroid nodule is:
a. FNAC b. Radionucleide test
c. Thyroid function test d. USG *(DPG 2008)*

102. Investigation of choice in discrete thyroid swelling is:
a. Isotope scans b. Ultrasonography
c. Autoantibody titres d. FNAC *(DPG 2008)*

103. A patient came with a small solitary nodule in right lobe of thyroid. FNAC shows follicular adenoma. The best surgery is: *(DNB 2002)*
a. Enucleation b. Sub-total thyroidectomy
c. Right hemithyroidectomy d. Near-total thyroidectomy

104. Most common cause of solitary thyroid nodule is:
a. Physiological goiter b. Follicular adenoma
c. Colloid degenerations d. Cysts *(MCI Sept 2008)*

105. A 45-years old male presents with 4X4 cm, mobile right solitary thyroid nodule of 5 months. The patient is euthyroid. The following statements about his management are true except: *(AIIMS Nov 2005)*
a. Cold nodule on thyroid scan is diagnostic of malignancy
b. FNAC is the investigation of choice
c. The patient should undergo hemithyroidectomy if FNAC report is inconclusive
d. Indirect laryngoscopy be done in the preoperative period to assess mobility of vocal cords

106. Most common solitary thyroid nodule is:
a. Follicular adenoma *(AIIMS Nov 2004, June 93)*
b. Hurthle cell carcinoma
c. Papillary carcinoma
d. Solitary idiopathic goiter

107. What is the most appropriate operation for a solitary nodule in one lobe of thyroid? *(All India 2003, AIIMS Nov 95)*
a. Lobectomy
b. Hemithyroidectomy
c. Nodule removal
d. Partial lobectomy with 1 cm margin around nodule

108. Percentage of cold nodules that becomes malignant are?
a. 5% b. 15% *(DNB 2014)*
c. 20% d. 40%

109. Which is the investigation of choice to differentiate between benign and malignant thyroid nodule? *(DNB 2014)*
a. USG b. FNAC
c. Scintigraphy d. Biopsy

GOITRE

110. Multi-nodular goiter (MNG) secondary thyrotoxicosis is seen how much percentage of patient with MNG:
a. 10% b. 20% *(MHSSMCET 2005)*
c. 30% d. 40%

111. The most common presentation of endemic goiter is: *(All India 96)*
a. Hypothyroid b. Diffuse goiter
c. Hyperthyroid d. Solitary nodule

112. Thoracic extension of cervical goitre is usually approached through: *(AIIMS May 2005)*
a. Neck b. Chest
c. Combined cervico-thoracic d. Thoracoscopic

113. A 20 years old girl presents with 9 months history of neck swelling with thyrotoxic symptoms. On investigation increased T4 and decreased TSH with palpable 2 cm nodule was found. Next investigation will be: *(AIIMS May 2007)*
a. USG b. Thyroid scan
c. Radioactive iodine uptake d. CT scan

114. Indication of surgery in a case of thyroid swelling is/are:
a. Cosmetic b. Pressure symptoms
c. Myxedema d. Pain *(PGI June 2004)*
e. Swelling with symptoms

115. In a patient presenting with a swelling of the thyroid, the radionuclide scan showed a cold nodule and the ultrasound showed a non cystic solid mass. The management of this patient would be: *(AIIMS June 2002)*
a. Lobectomy b. Hemithyroidectomy
c. Eltroxin d. Radio Iodine therapy

116. Symptoms of endemic goitre are all except: *(JIPMER 86)*
a. Cold intolerance b. Hoarseness
c. Dysphagia d. Heat intolerance

117. What percentage of cold thyroid nodules are malignant?
a. 70-80% b. 50-60% *(JIPMER 87)*
c. 40-50% d. 10-20%

118. Treatment of choice in cold nodule of thyroid: *(JIPMER 93)*
a. Subtotal thyroidectomy b. Wait and watch
c. I-131 d. Hemithyroidectomy

119. Which of the following is true? *(AIIMS May 2011)*
a. Colloid goiter mostly presents as hyperthyroidism
b. Thyroid storm, the clinical features are primarily due to increased thyroxine
c. Excess calcium intake can lead to hyperthyroidism
d. Goitre more than 5 percent of population is endemic goitre

120. A 12-year old girl presents with nodular goiter. Which of the following statements regarding her evaluation and management is incorrect? *(AIIMS May 2014)*
a. 99 m-Tc scan should be performed to determine whether the nodules are hypofunctioning or hyperfunctioning
b. Functional thyroid nodules are usually benign
c. All nodules > 4 cm should be resected irrespective of cytology
d. FNAC should be performed for allnodules > 1 cm in diameter

RETROSTERNAL GOITRE

121. Most common symptom of retrosternal goiter:
a. Dysphagia b. Stridor *(Punjab 2010, PGI June 97)*
c. Dyspnea d. Superior vena cava syndrome

122. Retrosternal tumor cause: *(TN 89)*
a. Bluish discoloration of the face
b. Edema of face
c. Can occur in thyroid tumors
d. All

123. Retrosternal goiter is characterized by: *(DPG 2005)*
a. Stridor b. Always malignant
c. Bilateral d. None of the above

THYROTOXICOSIS

124. Thyroid storm after operation is due to: *(COMEDK 2007)*
a. Inadequate control of hyperthyroidism
b. Massive bleeding
c. Recurrent laryngeal nerve injury
d. Postoperative infection

125. Which of the following is the agent of choice for treating thyrotoxicosis during pregnancy? *(COMEDK 2010)*
a. Carbimazole b. Propylthiouracil
c. Methimazole d. Radioactive I-131

126. All of the following are features of thyrotoxicosis, except:
a. Diastolic murmur
b. Soft non ejection systolic murmur
c. Irregularly, irregular pulse
d. Scratching sound in systole

127. Dancing carotid is seen in: *(AIIMS Dec 98)*
a. Thyrotoxicosis b. Hypothyroidism
c. AV Fistula d. Blow out carotid

128. The best marker to diagnose thyroid related disorder is:
a. T3 b. T4
c. TSH d. Thyroglobulin

129. The laboratory investigation of patient shows ↓ in T3, ↓in T4 and ↓in TSH, it cannot be:
a. Primary hypothyroidism b. Pan-hypopituitarism
c. Liver disease d. None of the above

130. The occurrence of hypothyroidism following administration of supplemental iodine to subjects with endemic iodine to subjects with endemic iodine deficiency goiter is known as: *(All India 2004)*
a. Jod- Basedow effect
b. Wolff-Chaikoff effect
c. Thyrotoxicosis factitia
d. De Quervain's thyroiditis

131. In thyrotoxicosis, β-blockers do not control: *(All India 94)*
a. Anxiety b. Tremors
c. Tachycardia d. Oxygen consumption

132. All of the following are associated with thyroid storm, except: *(All India 2002)*
a. Surgery for thyroiditis
b. Surgery for thyrotoxicosis
c. Stressful illness in thyrotoxicosis
d. I-131 therapy for thyrotoxicosis

133. Cardiovascular findings in an elderly thyrotoxicosis patient are all, except: *(All India 2000)*
a. Early diastolic murmur
b. Systolic ejection murmur
c. Scratch in left 2nd intercostal space
d. Irregularly irregular pulse

134. Treatment of thyroid storm includes all, except: *(AIIMS Nov 2003)*
a. Propranolol b. Radioactive iodine
c. Hydrocortisone d. Lugol's iodine

135. Difference between thyrotoxicosis and malignant hyperthermia is: *(AIIMS June 2001)*
a. Hyperthermia
b. Tachycardia
c. Muscle rigidity
d. Elevated serum CPK level

136. In thyrotoxicosis, which of the following is seen? *(TN 89)*
a. Pretibial myxedema b. Glycosuria
c. Unilateral exophthalmos d. All

137. Toxic adenoma on scanning appear as: *(JIPMER 98)*
a. Hot nodule b. Cold nodule
c. Warm nodule d. Neutral

138. Thyroid storm after operation is due to: *(COMEDK 2007)*
a. Inadequate control of hyperthyroidism
b. Massive bleeding
c. Recurrent laryngeal nerve injury
d. Postoperative injection

139. A 48-years old woman underwent subtotal thyroidectomy. She has vague family history of malignant hyperthermia. She develops agitation, restlessness, fever, tremor, shivering, and tachypnea. Thyrotoxic crises can be best distinguished from malignant hyperthermia by estimating: *(Kerala 2004)*
a. Temperature variation b. Increased CPK levels
c. LDH d. Muscular rigidity

140. A 55-years old male patient underwent cholecystectomy for Gall stone calculus. During surgery the patient's pulse was irregularly irregular, 160/min, BP = 80/50 mm of Hg, temp. 40°c. On examination a swelling in the neck was found. Most likely diagnosis is: *(MAHE 2007)*
a. Thyroid storm b. Myocardial infarction
c. Arrythmias d. Stridor

141. All of the following conditions are associated with hyperthyroidism, except: *(All India 2011)*
a. Hashimoto's thyroiditis b. Grave's disease
c. Toxic multinodular goiter d. Struma ovary

142. Hyperthyroidism occurs in: *(PGI Nov 2011)*
a. Hashimoto thyroiditis
b. Graves' disease
c. Medullary thyroid carcinoma
d. Plummer's disease
e. Struma ovarii

143. Features of hyperthyroidism are all except: *(MCI March 2005)*
a. Voracious appetite b. Cold intolerance
c. Emotional disturbance d. Sleeplessness

144. Which of the following is not a symptom of hypothyroidism: *(JIAMER 2014, 2007)*
a. Hyperactivity b. Palpitation
c. Diarrhoea d. Hair loss

GRAVE'S DISEASE

145. All of the following are features of Grave's disease except:
a. More common in males *(MCI Sept 2005)*
b. Tremor
c. Pretibial myxoedema
d. Intolerance to heat

146. All of the following are true regarding Grave's disease except: *(MCI Sept 2006)*
a. Orbital proptosis
b. Presents as primary thyrotoxicosis
c. Anti-TPO antibodies
d. Pretibial myxoedema

147. Complications of therapy with radioactive iodine includes: *(UPSC 87, 88)*
a. Thyroid malignancy b. Hypothyroidism
c. Leukemia d. All of the above

148. Which of the following conditions is most common complication of radioiodine treatment of Grave's disease? *(COMEDK 2005, 2004)*
a. Thyroid storm b. Subacute thyroiditis
c. Thyroid cancer d. Hypothyroidism

149. In which of the following conditions radioactive iodine (Irradiation) can be used in Grave's disease: *(PGI Nov 2010)*
a. Recurrence b. Age >40 years
c. Elderly d. Pregnant
e. Presence of associated co-morbidities

150. Pretibial myxedema is seen in: *(MHPGMET 2005)*
a. Thyrotoxicosis b. Hypothyroidism
c. Hyperparathyroidism d. All

151. Therapy of choice for diffuse toxic goiter in a patient over 45 years: *(JIPMER 87)*
a. Surgery b. Antithyroid drugs
c. Radio iodine
d. Antithyroid drugs first followed by surgery

152. All of the following are true about Graves disease except:
a. Cardiac failure is common *(JIPMER 2013)*
b. Hypertrophy and hyperplasia or thyroid gland is due to TSH-Rab
c. Remissions and exacerbations are not infrequent
d. It is highly vascular with audible bruit

HYPOTHYROIDISM

153. In case of hypothyroidism which investigation is most informative and most commonly used: *(AIIMS June 98)*
a. Serum TSH level b. Serum T3, T4 level
c. Serum calcitonin assay d. Serum TRH assay

154. Hypothyroidism with increased TSH level is seen in all except: *(PGI 90)*
a. Sheehan's syndrome b. Lithium carbonate therapy
c. Post radioiodine ablation d. Endemic goitre

POST THYROIDECTOMY COMPLICATIONS

155. During thyroidectomy, inferior thyroid artery is ligated at:
a. Maximally away from the gland *(MCI Sept 2005)*
b. Close to the gland
c. Half way from the gland
d. None of the above

156. Complications of total thyroidectomy include all except: *(AIIMS May 2005)*
a. Hoarseness b. Airway obstruction
c. Hemorrhage d. Hypercalcemia

157. Two hours after subtotal thyroidectomy for thyrotoxicosis, young woman rapidly becomes agitated and complains of increasing difficulty in breathing. Her pulse rate rises and central cyanosis is noticed on examination, her neck is found to be tensely swollen beneath the stitches. The most appropriate management in this case would be: *(DPG 2011)*
a. Intranasal oxygen
b. Passing an endotracheal tube in the ward
c. Removing sutures from all layers in the ward and evacuation of hematoma
d. Immediate transfer of the patient to the operation theatre for tracheostomy

158. Horner's syndrome, all are true except: *(AIIMS May 2011)*
a. Miosis b. Anhydrosis
c. Hyperchromatic iris d. Apparent exophthalmos

159. Horner's syndrome is seen in all except: *(AIIMS Nov 2010)*
a. Carotid artery aneurysm
b. Medial medullary syndrome
c. Can occur following surgery for Raynaud's syndrome
d. Multiple sclerosis

160. Horner's syndrome does not include: *(COMEDK 2004)*
a. Ptosis
b. Anhydrosis
c. Flushing
d. Mydriasis

161. During thyroidectomy, inferior thyroid artery ligation is done at what level? *(MHPGMCET 2003)*
a. As close to the thyroid gland as possible
b. As far away as possible from the thyroid gland
c. In the trachea-esophageal groove
d. Any of the above

162. About thyroid surgery all are true except: *(Punjab 2008)*
a. Superior thyroid artery is ligated near the gland
b. Capsule is removed
c. Inferior thyroid artery is ligated away from gland
d. Capsule is kept intact

163. Hypoparathyroidism following thyroid surgery occurs within: *(AIIMS Nov 2004, Nov 2003)*
a. 24 hours
b. 2-5 days
c. 7-14 days
d. 2-3 weeks

164. Complications of hemithyroidectomy include all of the following except? *(All India 2008)*
a. Hypocalcemia
b. Wound hematoma
c. Recurrent laryngeal nerve palsy
d. External branch of superior laryngeal nerve palsy

165. A patient undergoes thyroid surgery, following which he develops perioral tingling. Blood calcium is 8.9 meq/L. Next step is: *(All India 2001)*
a. Vitamin D orally
b. Oral calcium and vitamin D
c. Intravenous calcium gluconate and serial monitoring
d. Wait for calcium to decrease to <7.0 before talking further action

166. Patient after thyroid surgery presents with perioral paresthesia. Serum calcium level is 7 mg/dl. What will be the best management: *(AIIMS Nov 2000)*
a. Oral vitamin D3
b. Oral vitamin D3 with calcium
c. IV calcium gluconate
d. Oral calcium

167. A post-thyroidectomy patient develops signs and symptoms of tetany. The management is: *(All India 2000)*
a. IV calcium gluconate
b. Bicarbonate
c. Calcitonin
d. Vitamin D

168. In postoperative room after thyroid surgery patient developed sudden respiratory distress, dressing was removed and it was found to be slightly blood stained and wound was bulging. What will be first thing to be done? *(AIIMS June 2000, Nov 2000)*
a. Tracheostomy
b. Cricothyroidotomy
c. Laryngoscopy and intubation
d. Remove the stitch and take the patient to O.T.

169. A patient presents with swelling in the neck following a thyroidectomy; what is the most likely resulting complication? *(All India 2001)*
a. Respiratory obstruction
b. Recurrent laryngeal nerve palsy
c. Hypovolemia
d. Hypocalcemia

170. Patient presents with neck swelling and respiratory distress few hours after a thyroidectomy surgery. Next management would be: *(All India 2001)*
a. Open immediately
b. Trecheostomy
c. Wait and watch
d. Oxygen by mask

171. Most dangerous complication in a patient who had undergone thyroid surgery and develop hematoma at the operative site: *(AIIMS Nov 99)*
a. Respiratory obstruction
b. Recurrent laryngeal nerve palsy
c. Dysphagia
d. Shock

172. After thyroidectomy, patient developed stridor within 2 hours. All are likely cause of stridor except:
a. Hypocalcemia *(AIIMS Nov 2001, Nov 2000)*
b. Recurrent laryngeal nerve palsy
c. Laryngomalacia
d. Wound hematoma

173. A 50-years old male is suffering from severe dyspnea after thyroid surgery, treatment of choice is: *(AIIMS June 97)*
a. Tracheostomy
b. Open the operative site
c. Wait and watch
d. Cricothyroidotomy

174. A patient operated for thyroid surgery for a thyroid swelling, later in the evening developed difficulty in breathing. There was swelling in the neck. The immediate management would be: *(AIIMS June 2002)*
a. Epinephrine injection
b. Tracheostomy
c. IV calcium gluconate
d. Open the wound sutures in the ward

175. Replacement dose of thyroxine is: *(All India 93)*
a. 0.1-0.2 mg
b. 0.3-0.4 mg
c. 1-2 mg
d. 3-4 mg

176. All of the following are early life threatening complications of thyroid operation except: *(DPG 2010, SGPGI 2005)*
a. Tracheomalacia and collapse of the larynx
b. Wound hematoma with compression of the trachea
c. Hypocalcemia
d. Thyroid storm

177. Vocal cord palsy in thyroid surgery is due to injury to:
a. Superficial laryngeal nerve *(COMEDK 2008, UPSC 2008)*
b. Recurrent laryngeal nerve
c. Ansa cervicalis
d. Vagus nerve

THYROIDITIS

178. Thyroid biopsy of a patient showed the presence of Hurthle cells. Antibodies found in this condition are: *(Punjab 2011)*
a. Anti-TPO
b. Anti-mitochondrial
c. Anti-RNP
d. Anti-dsDNA

179. A 40-years old female presents with fever, fatigue, diffuse painful swelling in the midline of the neck, FNAC of the same reveals epitheloid cells and giant cells, the likely diagnosis is:
a. Acute thyroiditis
b. Subacute thyroiditis
c. Tubercular lymphadenitis
d. Hashimotos thyroiditis

180. A patient with autoimmune thyroiditis present with hypothyroidism. Which of the following is true?
a. Thyroid peroxidase antibodies *(JIPMER 2011)*
b. Painless enlargement of thyroid
c. Common in men
d. No malignant risk

181. A person has fever and pain in thyroid gland. True statement(s) is/are: *(PGI June 2009)*
a. T3 and T4 level normal
b. ↑ESR
c. ↑TSH
d. It is due to TB
e. Radioactive iodine uptake is ↑ed

182. Hashimoto's thyroiditis, all are true except:
a. Follicular destruction *(AIIMS May 2011)*
b. Increase in lymphocytes
c. Oncocytic metaplasia
d. Orphan Annie eye nuclei

183. The laboratory investigation of a patient shows ↓T4, and ↑TSH. Which of the following is the most likely diagnosis: *(All India 2011)*
a. Grave's disease
b. Hashimoto's disease
c. Pituitary failure
d. Hypothalamic failure

184. Which of the following conditions is associated with hypothyroidism? *(All India 2011)*
a. Hashimoto's thyroiditis
b. Grave's disease
c. Toxic multinodular goiter
d. Struma ovary

185. Most common cause of thyroiditis is: *(All India 2000)*
a. Reidel's thyroiditis
b. Subacute thyroiditis
c. Hashimoto's thyroiditis
d. Viral thyroiditis

186. All of the following are true of de-Quervain's thyroiditis except: *(All India 1996)*
a. Pain
b. Increased ESR
c. Increased radioactive iodine uptake
d. Fever

187. Not a feature of de-Quervain's disease: *(All India 2002)*
a. Autoimmune in etiology
b. ↑ ESR
c. Tends to regress spontaneously
d. Painful and associated with enlargement of thyroid

188. Decreased radio iodine uptake is/are seen in: *(PGI Dec 2000)*
a. Toxic multinodular goiter
b. Grave's disease
c. Subacute thyroiditis
d. Factitious thyroiditis

189. Which of the following is wrong about subacute thyroiditis?
a. Usually presents with painful enlargement of thyroid gland *(Orissa 2011)*
b. There may be features of hyperthyroidism or hypothyroidism
c. In the thyrotoxic phase radioiodine uptake is increased
d. High ESR

190. 'Hurthle cells ' are seen in: *(All India 95)*
a. Agranulomatous thyroiditis
b. Hashimoto's thyroiditis
c. Papillary carcinoma of the thyroid
d. Thyroglossal cyst

191. A patient presents with bilateral proptosis, heat intolerance and palpitations. Most unlikely diagnosis here would be: *(All India 2001)*
a. Hashimoto's thyroiditis
b. Thyroid adenoma
c. Diffuse thyroid goitre
d. Reidel's thyroiditis

192. A 25-years male presents with ophthalmologic signs of thyrotoxicosis. All are possibilities, except: *(All India 2002)*
a. Diffused thyroid goitre
b. Hashimoto's thyroiditis
c. Riedel's thyroiditis
d. Adenomatous goitre

193. A young patient has a midline, tender swelling in neck occurring after an attack of sore throat. The diagnosis is: *(AIIMS Nov 93)*
a. Acute thyroiditis
b. Thyroglossal cyst
c. Subacute thyroiditis
d. Toxic goiter

194. In Hashimoto's disease serum antibodies are mainly against: *(JIPMER 79, AIIMS 84, 85)*
a. Thyroid follicles
b. Thyroxine
c. Thyroglobulins
d. Iodine

195. The only reason for operating in case thyroiditis: *(JIPMER 79, AIIMS 86)*
a. To prevent cancerous degeneration
b. For relief of pain in neck and ear
c. To overcome pressure on trachea or esophagus
d. To cure the toxic reaction
e. If there is auto immune reaction

196. All are true abut Hashimoto's thyroiditis except: *(Kerala 95)*
a. Antithyroid microsomal antibodies
b. Antithyroid nuclear antibodies
c. Anti-TSH receptor antibodies
d. Increased level of thyroid hormones

197. The thyroiditis also known as "Painless Thyroiditis":
a. Subacute lymphocytic thyroiditis *(MAHE 2007)*
b. de-Quervain's thyroiditis
c. Hashimoto's thyroiditis
d. Riedel's thyroiditis

198. Anti-TPO antibodies are present in: *(MCI Sept 2006)*
a. Reidel's thyroiditis
b. Grave's disease
c. Hashimotos thyroiditis
d. de-Quervain's thyroiditis

199. A patient present with bilateral proptosis, heat intolerance and palpitations; most unlikely diagnosis here would be:
a. Hashimoto's thyroiditis *(All India 2001, 2000)*
b. Thyroid adenoma
c. Diffuse thyroid goiter
d. Reidel's thyroiditis

200. De Qver vain's thyroiditis is characterised by:
a. Mono nuclear cell infiltration *(COMEDK 2014)*
b. Histiocyte reaction
c. Glant cell infiltration
d. Eosinophilia

THYROGLOSSAL CYST AND FISTULA

201. Hyoid bone is closely associated with: *(Orissa 2011)*
a. Bronchogenic cyst
b. Cystic hygroma
c. Branchial cyst
d. Thyroglossal cyst/fistula

202. True about thyroglossal cyst is all except:
a. Does not move with deglutition *(MHPGMCET 2003)*
b. Move with protrusion of tongue
c. Sistrunk's operation is treatment of choice
d. Most common site is subhyoid region

203. Sistrunk's operation is done in: *(MHPGMCET 2008, 2006)*
a. Parotid tumor
b. Thyroglossal fistula
c. Thyroglossal cyst
d. Branchial fistula

204. Most common site of thyroglossal cyst: *(NEET 2013)*
(DNB 2009, 2007, 2005, 2003, MHSSMCET 2005, AIIMS June 97)
a. Suprahyoid
b. Hyoid
c. Subhyoid
d. Intra-thyroid

205. The following statements about thyroglossal cyst are true, except: *(All India 2006)*
a. Frequent cause of anterior midline neck masses in the first decade of life
b. The cyst is located within 2 cm of the midline
c. Incision and drainage is the treatment of choice
d. The swelling moves upwards on protrusion of tongue

206. Thyroglossal cyst may occasionally give rise to carcinoma:
a. Papillary
b. Medullary
c. Anaplastic
c. Follicular

207. Sistrunk's operation consists of: *(DPG 2009 March)*
a. Excision of hyoid bone and cone of tongue muscle
b. Excision of hyoid bone and the cyst
c. Excision of central part of hyoid bone and cone of tongue muscles upto foramen caecum
d. Excision of cyst only

208. A central midline neck swelling is noted in a 4 years old girl posted for tonsillectomy. The swelling is, painless, mobile, and cystic, just below the hyoid bone of size 2x1.1x1cm. USG showed a thick walled cystic lesion. Management would include: *(AIIMS Nov 97)*
a. Surgical removal
b. Antibiotics
c. Percutaneous aspiration
d. Chest X-ray

THYROID ANATOMY AND PHYSIOLOGY

209. The occurence of hyperthyroidism following administration of supplemental iodine to subject with endemic iodine deficiency goitre is known as: *(All India 2012)*
a. Jod-Basedow effect
b. Wolff-Chaikoff effect
c. Thyrotoxicosis factitia
d. De-Quervains thyroiditis

210. Which of the following most closely represents the lowest detection limit for third generation TSH assays? *(All India 2012)*
a. 0.4 mIU/L
b. 0.04 mIU/L
c. 0.004 mIU/L
d. 0.0004 mIU/L

211. Recurrent laryngeal nerve is in close association with: *(AIIMS Nov 93)*
a. Superior thyroid artery
b. Inferior thyroid artery
c. Middle thyroid vein
d. Superior thyroid vein

212. Normal thyroid weight varies …….. with dietary iodine content: *(DPG 82)*
a. Directly proportional
b. Inversely
c. Inverse cubically
d. Not fixed

213. Average weight of thyroid gland where diet is rich in iodine is: *(UPSC 83)*
a. 10-12 gm
b. 14-16 gm
c. 18-20 gm
d. 28-30 gm

214. Protein bound iodine measures secretary function of thyroid in all of the following circumstances except: *(All India 90)*
a. Nephrotic syndrome
b. Following hemithyroidectomy
c. During ampicillin therapy
d. Asthamatics on ephedrine

215. Isthmus of thyroid gland overlies the: *(DPG 97)*
a. 1st tracheal cartilage
b. 1st and 2nd tracheal cartilage
c. 2nd and 3rd and 4th tracheal cartilage
d. 3rd and 4th tracheal cartilage

MISCELLANEOUS

216. Scabard trachea is seen in: *(Karnataka 99)*
a. Thyroid cancer
b. Thyroiditis
c. Goitre
d. All of the above

217. A new born with a goiter large enough to cause dyspnoea is best treated with: *(AIIMS 81, 84)*
a. Sulfonamides
b. Tracheostomy
c. T3
d. Iodides

218. Which of the following factors contribute to the development of duodenal ulcer? *(PGI 2001)*
a. I-131
b. I-125
c. Tc-99
d. P-32

219. In pregnancy: *(APPG 2004)*
a. Radioiodine contraindicated
b. Thiouracil is contraindicated
c. Surgery is contraindicated
d. None

220. Pendred's syndrome is due to a defect in: *(COMEDK 2007, 2008)*
a. Chromosome 7p
b. Chromosome 7q
c. Chromosome 8p
d. Chromosome 8q

221. Reddish swelling in the region of foramen caecum:
a. Lingual thyroid
b. Lingual tonsil *(DPG 2007)*
c. Ranula
d. Thyroglossal cyst

222. True about Struma Ovarii: *(PGI June 2007)*
a. Ectopic thyroid
b. Ectopic ovary
c. Malignancy
d. Benign lesion
e. Included in teratoma

223. Absent parathyroid, thymic aplasia with immuno-deficiency and cardiac defects are features of: *(MHPGMCET 2009)*
a. Autoimmune polyglandular syndrome
b. Pendred syndrome
c. Di-George syndrome
d. Lesch-Nyhan syndrome

EXPLANATIONS

PAPILLARY CARCINOMA

1. **Ans. b. Malignant goiter** *(Ref: Schwartz 10/e p1542-1544, 9/e p1361-1363; Sabiston 19/e p906-909; Bailey 26/e p765-768, 25/e p793-796; Harrison 18/e p2936)*

Papillary Carcinoma of Thyroid

- Accounts for **80%** of all thyroid malignancies in **iodine-sufficient areas**[Q]
- **MC thyroid cancer** in **children** and **individuals** exposed to **external radiation**[Q].
- More often in **women, 30-40** years.

Pathology

- **Grossly: Hard** and **whitish** and **remain flat** on sectioning with a blade with macroscopic **calcification, necrosis**, or **cystic changes**

> - **Multifocality**[Q] is **common** (up to **85%** of cases) on **microscopic examination**.
> - **Multifocality** is associated with an **increased risk** of **cervical nodal metastases**[Q], **rarely invade adjacent structures** such as the trachea, esophagus, and RLNs.

- **Rarely encapsulated**[Q] (PCT are **seldom encapsulated**)
- **Other variants: Tall cell**[Q], **insular**[Q], columnar, diffuse sclerosing, clear cell, **trabecular**, and poorly differentiated types; account for about **1%**; associated with a **worse prognosis**.

Histological characteristics of Papillary Carcinoma Thyroid

- **Papillary projections**[Q]**:** PTC contains branching papillae of cuboidal epithelial cells
- **Orphan Annie eye nuclei**:
  - The nuclei contain finely dispersed chromatin, which imparts an **optically clear** or **empty appearance**, giving rise to term **ground glass** or **Orphan Annie eye nuclei**[Q]**.**
  - **Invaginations** of **cytoplasm** in cross-sections: **Intranuclear inclusions**[Q] (**pseudo-inclusion**) or **intranuclear grooves**[Q].
  - **Diagnosis** of PTC is **based on** these **nuclear characteristics**[Q] even in the absence of papillary structures.
- **Psammoma bodies**[Q]: **Microscopic, calcified deposits** representing clumps of sloughed cells

Clinical Features

- Most patients are **euthyroid** and present with a **slow-growing painless mass**[Q] in the neck.
- Dysphagia, dyspnea and dysphonia are associated with locally advanced invasive disease.
- **Lymph node metastases** are **common**[Q], especially in **children** and **young adults**, and may be the presenting complaint.

> - **"Lateral aberrant thyroid"** almost always denotes a **cervical lymph node** that has been **invaded by metastatic cancer**[Q]**.**

- **Distant metastases** are **uncommon** at initial presentation, but may ultimately develop in up to **20%** of patients.
- The **MC sites of metastasis**: **Lungs**[Q] >bone >liver >brain.

Diagnosis

- **Diagnosis i**s established by **FNAC** of the **thyroid mass** or **lymph node**[Q].
- Once thyroid cancer is diagnosed on FNAC, a **complete neck ultrasound** to evaluate the **contralateral lobe** and for **LN metastases** in the central and lateral neck compartments.

Treatment Total or near-total thyroidectomy[Q]

- During thyroidectomy, **enlarged central neck nodes** should be **removed**[Q].
- **Biopsy-proven lymph node metastases** detected clinically or by imaging in the lateral neck in patients with papillary carcinoma are managed with **modified radical neck dissection**.

Prognosis

- PTC have an **excellent prognosis** with a **>95% 10-year survival rate**[Q].

2. **Ans. d. Papillary carcinoma**
3. **Ans. a. 'Orphan-Annie eye' nucleus cells**
4. **Ans. a. Total Thyroidectomy with lymph nodal dissection of the same side**
5. **Ans. c. Lymph node metastases is common; d. Can metastasize to lung; e. Multiple foci of tumour is seen**

Papillary carcinoma are rarely encapsulated[Q]

6. **Ans. c. Columna d. Insular; e. Diffuse sclerosing** *(Ref: Schwartz 10/e p1542, 9/e p1361-1363; Sabiston 19/e p906-909; Bailey 26/e p765, 25/e p793-796)*

Types of Papillary Carcinoma Associated with Poor Prognosis	
1. **Tall cell**[Q]	5. **Clear cell**[Q]
2. **Insular**[Q]	6. **Trabecular**[Q]
3. **Columnar**[Q]	7. Poorly differentiated type
4. **Diffuse sclerosing**[Q]	

7. **Ans. a. Most common thyroid cancer; b. Psammoma bodies seen; c. Encapsulated**
8. **Ans. b. Total thyroidectomy with left sided modified neck dissection**
9. **Ans. a. Follicular carcinoma of thyroid** *(Ref: Schwartz 10/e p1542, 9/e p1362; Sabiston 19/e p906; Bailey 26/e p765, 25/e p793)*

Psammoma Bodies (PSM)	
1. **P**apillary carcinoma thyroid[Q]	2. **P**apillary carcinoma (RCC)[Q]
3. **S**erous cystadenoma[Q]	4. **M**eningioma[Q]

10. **Ans. a. FNAC easy; c. Psammoma body; d. Spread to cervical LN**
11. **Ans. a. Radiation is a risk factor; b. Multifocal; d. Distant metastasis is seen**
12. **Ans. d. Papillary carcinoma**
13. **Ans. b. Papillary**
14. **Ans. a. Start thyroxine suppression therapy** *(Ref: Schwartz 10/e p1549, 9/e p1365-1367; Sabiston 19/e p911; Bailey 26/e p766-768)*

Well Differentiated Thyroid Cancer	
1. **Papillary** carcinoma of thyroid[Q]	2. **Follicular** carcinoma of thyroid[Q]
3. **Follicular variant** of **papillary** carcinoma thyroid[Q]	4. **Hurthle cell carcinoma** (variant of follicular carcinoma thyroid)[Q]

Postoperative Management of Well-Differentiated Thyroid Cancer

Radioiodine Therapy

- Postoperative RAI therapy **reduces recurrence** and provides a small **improvement in survival**, even in low-risk patients[Q].
- **Metastatic differentiated thyroid carcinoma** can be **detected** and **treated by** ^{131}**I** in about **75%** of patients[Q].
- RAI **effectively treats >70% of lung micrometastases**[Q] that are detected by RAI scan in the presence of a normal chest x-ray, whereas the success rates drop to <10% with pulmonary macrometastases. Early detection therefore appears to be very important to improve prognosis.

RAI Ablation Currently is Recommended for
• **All** patients with **stage III or IV disease**[Q]
• **All** patients with **stage II** disease **<45 years**[Q]
• **Most** patients **45 years** or older with **stage II disease**[Q]
• Patients with **stage I disease** who have **aggressive histologies**, **nodal metastases, multifocal disease,** and **extrathyroid** or **vascular invasion**[Q]

- **T4 therapy** should be **discontinued for 6 weeks** before scanning with ^{131}I. Patients should **receive** T_3 during this time period to decrease the period if hypothyroidism. T_3 has a shorter half-life than T_4 (**1 day vs. 1 week**) and needs to be **discontinued for 2 weeks** to allow **TSH levels to rise** before treatment[Q].
- A **low-iodine diet** also is recommended **during this 2-week period**[Q].
- The usual protocol involves administering a **screening dose** of **1 to 3 mCi of** ^{123}**I** and measuring uptake 24 hours later. **After a total thyroidectomy**, this value should be **<1%.** A **"hot" spot** in the neck after initial screening usually represents **residual normal tissue** in the thyroid bed.
- If there is **significant uptake**, then a **therapeutic dose** of ^{131}**I, 30 to 100 mCi**[Q] should be administered **to low-risk patients** and **100 to 200 mCi in high-risk patients**[Q].
- Approximately **one third** of these patients **demonstrate uptake** on posttreatment imaging, and **Tg levels usually decrease** in these patients, **documenting therapeutic benefit**[Q].
- Patients with **previously positive scans** and patients with **serum Tg levels >2 ng/mL**[Q] usually need **another** ^{131}**I treatment** after **6 to 12 months** until one or two negative scans are obtained.
- The **follow-up scan** can be done **after hormone withdrawal** or **after recombinant TSH**. The **latter is more expensive**[Q] but is preferred by patients.

External Beam Radiotherapy and Chemotherapy

- **EBRT** is occasionally required to **control unresectable, locally invasive** or **recurrent disease** and to **treat metastases** in **support bones**[Q] to decrease the risk of fractures.

- EBRT is of value for the **treatment** and **control of pain** from **bony metastases**[Q] when there is **minimal** or **no RAIU**[Q].
- **Single** and **multidrug chemotherapy** has been used with **little success**[Q] in disseminated thyroid cancer, and there is **no role for routine chemotherapy**
- **Doxorubicin** (Adriamycin) and **paclitaxel** (Taxol) are the **most frequently use**d agents.

Thyroid Hormone

- **T4** is necessary as **replacement therapy**[Q] in patients after total or near-total thyroidectomy
- Has the **additional effect** of **suppressing TSH**[Q] and **reducing the growth stimulus**[Q] for any **possible residual thyroid cancer cells**[Q].
- **TSH suppression reduces tumor recurrence** rates[Q].
- T_4 should be administered to ensure that the **patient remains euthyroid**[Q], with circulating TSH levels at about 0.1 U/L in low-risk patients, or <0.1 U/mL in high-risk patients.

Follow-Up of Patients with Differentiated Thyroid Cancer

Thyroglobulin Measurement

- **Tg levels** in patients who have undergone total thyroidectomy should be **<2 ng/mL**[Q] when the patient is **taking T4** , and **<5 ng/mL** when the patient is **hypothyroid**.

  - A **Tg level >2 ng/mL** is **highly suggestive** of **metastatic disease** or **persistent normal thyroid tissue**[Q], especially if it increases when TSH levels increase when hypothyroid during preparation for RAI scanning or after recombinant TSH.

- Approximately **95%** of patients with **persistent or recurrent thyroid cancer** of **follicular** cell origin will have **Tg levels >2 ng/mL**[Q].
- **Tg** and **anti-Tg antibody** levels should be measured initially at **6-month intervals** and then **annually** if the patient is clinically disease free.
- More recently, **Tg measurements** in **FNAC aspirates** have been shown to be **useful in** the **detection** of **nodal metastatic disease**.

Imaging

- After the first posttreatment scan, low-risk patients with negative TSH-stimulated Tg and cervical ultrasound do not require routine diagnostic whole body radioiodine scans.
- **Diagnostic whole body scans 6 to 12 months after remnant ablation** may be of value in the follow-up of patients with **high** or **intermediate risk** of **persistent disease**[Q].

  - **Cervical ultrasound** to evaluate the **thyroid bed** and **central** and **lateral cervical nodal compartments** should be performed at **6** and **12 months post-thyroidectomy** and then **annually** [Q]for **at least 3 to 5 years**, depending on the patients' risk for recurrent disease and Tg status.
  - If **RAI** and **ultrasound scans** are **negative** but **Tg levels remain elevated**, **FDG PET scans** can help to **localize the disease**[Q].

15. **Ans. a. Papillary carcinoma of thyroid**
16. **Ans. b. Mucinous cystadenoma of ovary**
17. **Ans. c. Near total thyroidectomy with modified neck dissection**
18. **Ans. c. Excellent prognosis**
19. **Ans. d. Encapsulated**
20. **Ans. d. Single nodule + local lymph node**
21. **Ans. a. Papillary carcinoma**
22. **Ans. b. Always unifocal**
23. **Ans. b. Bilaterality; c. Local recurrence common; d. Increased lymph node metastasis** *(Ref: Schwartz 10/e p1542-1545, 9/e p795; Sabiston 19/e p906, 910; Bailey 25/e p794)*

	Papillary	Follicular
Male incidence	+	++[Q]
Lymph node metastasis	+++[Q]	+
Blood vessel invasion	+	+++[Q]
Recurrence rate	+	++[Q]
Overall mortality	+	++[Q]
Location of recurrent carcinoma		
Distant metastasis	+	++
Nodal metastasis	+++[Q]	+
Local recurrence	++[Q]	+
Bilaterality	+++[Q]	+

24. Ans. c. Papillary carcinoma **25. Ans. a. Papillary carcinoma**

26. Ans b. Metastatic foci from primary in thyroid *(Schwartz 10/e p1542, 9/e p1345; Sabiston 19/e p907)*

Lateral Aberrant Thyroid

- **Any thyroid tissue found laterally** separate from the thyroid gland, is always considered to be a **metastasis in a cervical lymph node**[Q], as aberrant thyroid tissue never occurs in lateral position.
- Aberrant thyroid tissues are **found along** the **course of** the **thyroglossal tract**:
  - **Lingual**[Q] – **Cervical**[Q] – **Thoracic**[Q]
- **Papillary carcinoma** of thyroid is **MC associated**[Q] with lateral aberrant thyroid

27. Ans. d. Near total thyroidectomy with radioiodine and radiotherapy

28. Ans. c. Radical neck dissection **29. Ans. a. I^{131}**

30. Ans. b. Beta rays *(Schwartz 10/e p1546, 9/e p1355, 1365; Sabiston 19/e p898, 911; Bailey 26/e p767-768, 25/e p787, 791; William's Endocrinology 10/e p479)*

Radioactive Iodine (I131) Therapy

- **I^{131}** is an **effective agent** for **delivering high radiation doses** to the **thyroid tissue**[Q]
- It **emits mainly beta radiation (90%)**, which **penetrates** only **0.5 mm**[Q] of the **tissue** and thus allow therapeutic effects on the thyroid **without any damage** to the surrounding structures, particularly the **parathyroids.**

Mechanism of Action

- **I^{131}** emits **beta particles**[Q] and **X-rays**.
- **Beta rays** are utilized for their **destructive effects** on **thyroid**[Q] cells.
- **X-rays** are useful for **tracer studies**.

Indications in Carcinoma Thyroid	Contraindications of I^{131} Therapy
1. **Distant metastasis**[Q] at diagnosis	1. **Childhood**[Q]
2. Incomplete tumor resection[Q]	2. **Pregnancy**[Q]
3. Patients at **high risk** for **mortality** or **recurrence**[Q]	3. **Lactation**[Q]

31. Ans. d. Lateral aberrant thyroid

32. Ans. d. Bony metastasis in early stage *(Ref: Schwartz 9/e p1362, 1363, 1367, 1368; Sabiston 19/e p906, 909, 912, 913; Bailey 26/e p765-768, 25/e p795-797)*

Carcinoma Thyroid	
Type	**Mode of spread**
Papillary carcinoma	**Lymphatic**[Q] spread
Follicular carcinoma	**Hematogenous**[Q] spread
Medullary carcinoma	Both **lymphatic** and **hematogenous**[Q] spread
Anaplastic carcinoma	**Direct invasion**[Q]

Carcinoma Thyroid	
Type	**MC site of Metastasis**
Papillary carcinoma	**Lungs**[Q]
Follicular carcinoma	**Bones**[Q]
Medullary carcinoma	**Liver**[Q]
Anaplastic carcinoma	**Lungs**[Q]

Pulsating Secondaries
1. **Follicular carcinoma thyroid**[Q]
2. **RCC**[Q]

Bone Metastasis in Carcinoma Thyroid	
Follicular carcinoma	**Osteolytic** metastasis (**Pulsating secondaries** in **flat bones**)[Q]
Medullary carcinoma	**Osteoblastic** metastasis[Q]

FOLLICULAR CARCINOMA

33. Ans. d. Diagnosis by FNAC *(Ref: Schwartz 10/e p1544, 9/e p1364, 1357; Sabiston 19/e p901-902; Bailey 26/e p765, 25/e p775)*

Limitations of FNAC in Thyroid Diseases

1. **Not able** to **distinguish follicular adenoma** from **follicular carcinoma**[Q]
2. Not able to distinguish **Hurthle cell adenoma** from **Hurthle cell carcinoma**[Q]
3. **Useless** in **Reidel's thyroiditis**[Q] (Biopsy is preferred)[Q]
4. FNAC is **less reliable** in patients who have **history** of **head** and **neck irradiation** or **family history** of **thyroid cancer** due to higher likelihood of **multifocal lesions** and **occult cancer**[Q]

34. Ans. a. Follicular

35. Ans. a. RAS *(Ref: Schwartz 10/e p1541, 9/e p1361; Sabiston 19/e p905)*

- **Genes implicated in FCT: p53**[Q]**, PTEN**[Q]**, Ras**[Q] **, PAX8/PPAR1**

Oncogenes and Tumor-Suppressor Genes Implicated in Thyroid Tumorigenesis		
Gene	**Function**	**Tumor**
Oncogenes		
RET[Q]	Membrane receptor with tyrosine kinase activity	Sporadic and familial **MTC, PTC** (RET/PTC rearrangements)
MET[Q]	Same	Overexpressed in **PTC**
TRK1	Same	Activated in some **PTC**
TSH-R	Linked to heterotrimeric G protein	**Hyperfunctioning adenoma**
Gs (gsp)	Signal transduction molecule (GTP binding)	**Hyperfunctioning adenoma, follicular adenoma**
Ras[Q]	Signal transduction protein	**Follicular adenoma** and **carcinoma, PTC**
PAX8/PPAR1	Oncoprotein	**Follicular adenoma,** follicular **carcinoma**
B-Raf (BRAF)[Q]	Signal transduction	**PTC, tall cell** and **poorly differentiated, anaplastic**
Tumor suppressors		
p53[Q]	Cell cycle regulator, arrests cells in G_1, induces apoptosis	De-differentiated **PTC, FTC, anaplastic cancers**
p16[Q]	Cell cycle regulator, inhibits cyclin dependent kinase	Thyroid cancer cell lines
PTEN[Q]	Protein tyrosine phosphatase	**Follicular adenoma** and **carcinoma**

36. Ans. c. Vascular invasion *(Ref: Schwartz 10/e p1544, 9/e p1363-1365; Sabiston 19/e p909-912; Bailey 26/e p765-768, 25/e p794-796; Harrison 18/e p2936)*

Follicular Carcinoma of Thyroid

- FTC account for **10%** of **thyroid cancers**
- Occurs more commonly in **iodine-deficient areas**[Q].
- **More common** in **women** with mean age of **50 years**
- **Genes** implicated in **FCT: p53**[Q]**, PTEN**[Q]**, Ras**[Q] **, PAX8/PPAR1**

Pathology

- Usually **solitary lesion** surrounded by **capsule**[Q].
- Histologically, **follicles** are present, but the **lumen** may be **devoid of colloid**[Q].
- **Malignancy** is defined by the presence of **capsular** and **vascular invasion**[Q].
- **Tumor infiltration** and **invasion**, as well as **tumor thrombus** within the **middle thyroid** or **jugular veins**, may be apparent at operation.

Clinical Features

- Usually present as **solitary thyroid nodules**, occasionally with a history of **rapid size increase**, and **long-standing goiter**[Q].
- Pain is uncommon, unless hemorrhage into the nodule has occurred.
- **Cervical lymphadenopathy** is **uncommon** at initial presentation (about 5%)
- Preoperative clinical diagnosis of cancer is difficult unless distant metastases are present.
- Large follicular tumors **(>4 cm)** in **older men** are **more likely** to be **malignant**[Q].

MC site of **metastasis** is **bone** (**Osteolytic** metastasis with **pulsating secondaries** in **flat bones**)[Q]

Diagnosis

- **FNAC** is **unable to distinguish benign** follicular lesions **from follicular carcinomas**[Q].

- **Intraoperative frozen-section** examination usually is **not helpful**, but should be **performed** when there is evidence of **capsular** or **vascular invasion**, or when **adjacent lymphadenopathy** is present.

Treatment

- **Follicular lesion: Hemithyroidectomy**[Q] (**80%** of these patients will have **benign** adenomas)
- **Thyroid cancer: Total thyroidectomy**[Q]
- **Total thyroidectomy** in **older patients** with follicular lesions **>4 cm** because of the **higher risk of cancer** in this setting (**50%**)[Q].
- **Prophylactic nodal dissection** is **unwarranted**[Q] because nodal involvement is infrequent

Prognosis

- The **cumulative mortality**: **15%** at **10 years** and **30%** at **20 years**.
- **Most important** prognostic factor: **Age** and **distant metastasis**.

Poor long-term prognosis	
• Age **>50 years**[Q]	• Marked **vascular invasion**[Q]
• Tumor size **>4 cm**[Q]	• **Extrathyroidal invasion**[Q]
• **Higher tumor grade**[Q]	• Distant **metastases**[Q]

37. **Ans. b. Follicular**
38. **Ans. a. Follicular carcinoma**
39. **Ans. a. Follicular**
40. **Ans. d. Cold nodules are diagnostic of malignancy**
41. **Ans. b. Follicular carcinoma**
42. **Ans. a. Follicular; c. Medullary**
43. **Ans. c. Follicular CA Thyroid**
44. **Ans. d. Follicular carcinoma of thyroid**
45. **Ans. b. Follicular carcinoma thyroid** *(Ref: Schwartz 10/e p1546, 9/e p1364; Sabiston 19/e p912)*

Hürthle Cell Carcinoma

- Hürthle cell carcinomas account for approximately **3%** of all thyroid malignancies
- Considered to be a **subtype** of **follicular thyroid cancer**[Q]

Hürthle cell Tumors Differ from Follicular Carcinomas in
1. More often **multifocal** and **bilateral** (about 30%)[Q]
2. Usually **do not take** up **RAI** (about 5%)[Q]
3. More likely to **metastasize** to **local nodes** (25%) and **distant sites**[Q]
4. Associated with a **higher mortality rate**[Q] (about 20% at 10 years)

Pathology

- Characterized by **vascular** or **capsular invasion** and **can't be diagnosed** by **FNAC**[Q].
- Tumors contain sheets of **eosinophilic cells** packed with **mitochondria**, which are derived from the **oxyphilic cells** of the thyroid gland.

Treatment

- **Unilateral Hürthle cell adenomas**: **Hemithyroidectomy**[Q]
- **Invasive Hürthle cell neoplasms**: **Total thyroidectomy + Routine central neck node removal**[Q] (**MRND** when **lateral neck nodes** are **palpable**)
- **Retinoic acid**, **PPAR agonists** have shown **some utility** in treating these tumors in vitro

46. **Ans. a. Radioiodine**
47. **Ans. a. Hematogenous spread**
48. **Ans. c. Capsular invasion**
49. **Ans. a. Follicular carcinoma**

MEDULLARY CARCINOMA

50. **Ans. a. Serum calcitonin** *(Ref: Schwartz 10/e p1549-1550, 9/e p1367-1368; Sabiston 19/e p912-913; Bailey 26/e p768-769, 25/e p797; Harrison 18/e p2938)*

Medullary Carcinoma Thyroid

- Neuroendocrine carcinoma **arising from parafollicular 'C' cells**[Q] of thyroid
- **Parafollicular 'C' cells** are derived from the **ultimobranchial bodies**[Q] and **secrete calcitonin**[Q]
- **'C' Cells** are concentrated **superolaterally** in thyroid lobes, from where MTC usually develops
- **Most MTCs** (75-80%) arise **sporadically**[Q]
- **Spread** is both **lymphatic** and **hematogenous**[Q]
- **MC site** of **metastasis: Liver**[Q]

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Medullary Carcinoma Thyroid	
Sporadic: 80%[Q]	**Familial: 20%**[Q] **(Non-MEN setting/ MEN-2A / MEN-2B)**
• Originate in **one lobe**[Q] • Seen in **6th decade** • **RET protoncogene**[Q] mutation	• **Multicentric** and **bilateral**[Q] • Occur in **younger age**[Q] • Associted with **C-cell hyperplasia**[Q] • **RET protoncogene**[Q] mutation

Clinical features

Medullary carcinoma should be suspected
• **High level** of serum **Calcitonin**[Q] and **CEA**[Q] • **Cervical lymph nodes** at time of presentation (**LN involvement**, **thyroid** and **blood borne metastases** occurs **early**)[Q] • **Diarrhea**[Q] at the time of presentation. • **Amyloid**[Q] in stroma histologically. • **MEN setting**: Evidence of Pheochromocytoma/Hyperparathyroidism/Thyroid cancer in family. • (Discovery of **medullary carcinoma thyroid** makes **family surveillance advisable**)[Q]

Diagnosis

- Diagnosed by **FNAC**[Q]
- **I^{131} scan** is of **no use** as **MTC** is **TSH independent**[Q].
- **Tumor marker: Calcitonin** is raised in **almost all cases** of MTC
- **Calcitonin excess** in MTC is **not associated** with **hypocalcemia**

Treatment

- **Total thyroidectomy + Central LN dissection ± Ipsilateral MRND if tumor >1 cm**[Q]
- If **nodes** are **positive** on **ipsilateral side: Bilateral MRND**

Follow up

- Level of **Calcitonin** falls after resection and is raises again in cases of recurrence, **used for follow up**[Q].

Prognosis

- MTC is **associated** with **poor prognosis**[Q].

51. Ans. c. Surgery only *(Ref: Schwartz 10/e p1550, 9/e p1368; Sabiston 19/e p913; Bailey 26/e p769, 25/e p797)*

Treatment of Medullary Carcinoma Thyroid

- **Pheochromocytoma** must be **operated on first**[Q].
- These tumors are **generally (>50%) bilateral**. **Total thyroidectomy**[Q] is the treatment of choice for patients with MTC because of the **high incidence of multicentricity**, the **more aggressive** course, and the fact that **^{131}I therapy** usually is **not effective**.
  - **Central compartment nodes frequently** are **involved early** in the disease process, so that a **bilateral central neck node dissection** should be **routinely performed**[Q].
- In patients with palpable cervical nodes or involved central neck nodes, ipsilateral or bilateral, modified radical neck dissection is recommended.
- The role of prophylactic lateral neck dissection is controversial.
  - However, in patients with **tumors >1 cm**, **ipsilateral prophylactic modified radical neck dissection** is recommended because **>60%** of these patients have **nodal metastases**[Q].
  - If **ipsilateral nodes** are **positive**, a **contralateral node dissection**[Q] should be performed.
- In the case of locally recurrent or metastatic disease, tumor debulking is advised not only to ameliorate symptoms of flushing and diarrhea, but also to decrease risk of death from recurrent central neck or mediastinal disease.
- External beam radiotherapy is controversial, but is recommended for patients with unresectable residual or recurrent tumor.
- There is **no effective chemotherapy regimen**[Q].
- **Radiofrequency ablation** done laparoscopically appears promising in the palliative treatment of **liver metastases >1.5 cm.**

- In patients who have **hypercalcemia** at the time of thyroidectomy, only **obviously enlarged parathyroid glands should be removed**[Q].
- The other parathyroid glands should be preserved and marked in patients with normocalcemia, as only about 20% of patients with MEN2A develop HPT.
- When a **normal parathyroid** cannot be maintained on a vascular pedicle, it should be removed, biopsied to confirm that it is a parathyroid, and then **autotransplanted** to the **forearm** of the **nondominant arm**[Q].

> - **Total thyroidectomy** is indicated in ***RET* mutation carriers** once the mutation is confirmed. The procedure should be performed **before age of 5 years** in **MEN2A**[Q] patients and **before age 1 year** old in **MEN2B patients**[Q].

- **Central neck dissection** can be **avoided in children**[Q] who are *RET* -positive and calcitonin-negative with a normal ultrasound examination.
- When the **calcitonin** is **increased** or the ultrasound suggests a **thyroid cancer**, a **prophylactic central neck dissection**[Q] is indicated.

52. Ans. d. Take up radioiodine

- **I^{131} scan is of no use as MTC is TSH independent**[Q]**, so MTC does not take up radioiodine (I^{131}).**

53. Ans. c. Anaplastic carcinoma, e. Medullary carcinoma

- **Radioactive iodine is used to destroy residual thyroid tissue (thyroid ablation) in well differentiated thyroid cancer.**

54. Ans. All

55. Ans. d. 6 months *(Ref: Schwartz 9/e p1368; Sabiston 19/e p913)*

Prophylactic Thyroidectomy in RET Mutation Carriers	
MEN-2A	Before **5 years**[Q]
MEN-2B	Before **1 year**[Q]

- **Central neck dissection** is **avoided** in **children**[Q].
- **Indications of central neck dissection** in children:
  1. **Raised calcitonin**[Q]
  2. **USG suggesting thyroid cancer**[Q] **>5 mm**
  3. **Evidence of LN metastasis**

56. Ans. None *(Ref: Sabiston 19/e p912-913)*

- Sabiston says "The **calcitonin excess** in **MTC** is **not associated with hypocalcemia.**"[Q]
- Robbins says "Notably **hypocalcemia** is **not a prominent feature** despite the **presence** of **raised calcitonin levels.**"[Q]

57. Ans. a. Parafollicular cells

58. Ans. a. Arises from parafollicular cells; b. Secretes calcitonin; c. Occurs in families; d. Amyloid in stroma; e. Commonly malignant

59. Ans. d. Medullary **60. Ans. c. TSH dependent** **61. c. Surgery only**

62. Ans. a. Medullary carcinoma thyroid **63. Ans. b. Calcitonin** **64. Ans. c. CEA**

65. Ans. c. Ret proto-oncogene

66. Ans. c. Total thyroidectomy and modified neck dissection on the side of enlarged lymph node

67. Ans. b. Medullary carcinoma **68. Ans. b. Medullary carcinoma** **69. Ans. b. Medullary**

70. Ans. b. Medullary **71. Ans. c. Medullary carcinoma** **72. Ans. a. Total thyroidectomy**

73. Ans. e. Total thyroidectomy + Radiotherapy

74. Ans. d. Histological mitochondria is essential for diagnosis

75. Ans. a. Ret proto oncogene

76. Ans. a. Diarrhea

77. Ans. b. Arises from parafollicular C cells

78. Ans. c. Increased calcitonin is not associated with hypocalcemia

79. Ans. c. It is dependent on TSH

ANAPLASTIC CARCINOMA

80. Ans. a. Common in elderly; d. Distant metastasis is common; e. Some degree of differentiation to papillary and follicular type is seen *(Ref: Schwartz 10/e p1550, 9/e p1369; Sabiston 19/e p913-914; Bailey 26/e p768, 25/e p797; Harrison 18/e p2938)*

Anaplastic carcinoma

- Accounts for **1%** of all thyroid malignancies
- **Mainly** affect **Women** in **7th** and **8th decade**[Q]
- The typical patient has a **long-standing neck mass**, which **rapidly enlarges** and may be **painful**[Q].
- **Most aggressive** form of **thyroid cancer**[Q]

Pathology

- **Grossly**: **Firm** and **whitish** in appearance.
- Microscopically, sheets of cells with marked heterogeneity and characteristic **giant** and **multinucleated cells**[Q].

Clinical features

- **Typical manifestation**: An **older patient** with **dysphagia, cervical tenderness** and a **painful, rapidly enlarging neck mass**[Q].
- **Superior vena cava syndrome** can also be part of the findings.
- The clinical situation **deteriorates rapidly** into **tracheal obstruction** and **rapid local invasion**[Q] of surrounding structures.
- Associated symptoms: **Dysphonia, dysphagia** and **dyspnea**

- **Lymph nodes** usually are **palpable** at presentation.
- **Evidence** of **metastatic spread** also may be present.
- **MC site** of **metastasis: Lungs**[Q]

Diagnosis

- Confirmed by **FNAC** revealing characteristic **giant** and **multinucleated cells**[Q].
- **Incisional biopsy** occasionally is needed to **confirm** the **diagnosis**

Treatment

- **Thyroidectomy** for **resectable mass**[Q] (may lead to a small improvement in survival, especially in younger individuals)
- Combined **radiation** and **chemotherapy** in an adjuvant setting in patients with resectable disease has been associated with **prolonged survival**[Q].
- **Tracheostomy**[Q] to alleviate **airway obstruction**.

Prognosis

- **Most aggressive thyroid malignancies**[Q], with **<6 months** survival

Anaplastic carcinoma

- On **gross inspection**, anaplastic tumors are **firm** and **whitish** in appearance.
- **Microscopically**, sheets of cells with **marked heterogeneity** are seen. Cells may be spindle shaped, polygonal, or large, multinucleated cells.
- **Foci of** more differentiated thyroid tumors, either **follicular** or **papillary**[Q], may be seen, suggesting that **anaplastic tumors arise from** more **well-differentiated tumors**[Q].

81. Ans. c. Long term survival in patient undergoing surgery; e. Highly Chemosensitive

82. Ans. d. Anaplastic carcinoma

83. Ans. d. Palliative/Symptomatic treatment

84. Ans. a. Common in elderly; b. Associated with p53 mutation; e. Lymphatic spread occur *(Ref: Schwartz 9/e p1361; Sabiston 19/e p905)*

THYROID METASTASIS

85. Ans. c. Breast *(Schwartz 10/e p1551, 9/e p1369)*

Metastatic Tumors of Thyroid

- Rare, most cases are found in autopsy
- MC site of primary: **CA Breast**[Q] > CA Lung
- If thyroid metastases is detected pre-mortem, MC site of primary: **RCC**[Q] >CA Breast > CA Lung

Metastatic Tumor To	MC site of Primary
Thyroid	CA **Breast**[Q] >CA Lung
Kidney, **E**sophagus, **P**ancreas, **S**pleen, **L**iver, **A**drenal, **B**rain, **S**kin **(KEPS LABS)**	CA **lung**[Q]
Heart	CA **lung** in **males**[Q] CA **breast** in **females**[Q]
Testis	CA **Prostate**[Q]
Penis	CA **urinary bladder**[Q]
Leptomeningeal metastasis	CA **breast**[Q]
Lung	CA **breast**[Q]

THYROID LYMPHOMA

86. Ans. b. Slow growing *(Ref: Schwartz 10/e p1551, 9/e p1369; Sabiston 19/e p914; Bailey 26/e p769, 25/e p798; Harrison 18/e p2938)*

- Lymphomas of the thyroid gland are rapidly growing tumors and usually present with goiter that has grown significantly over a short period.

Thyroid Lymphoma

- Most common type is **NHL B cell**[Q] type, of **intermediate** grade.
- Majority of patients have thyroid disease plus **cervical** or **mediastinal lymph nodes**[Q].
- More common in **females**.
- Most thyroid lymphomas **develop in** patients with **Chronic Lymphocytic Thyroiditis**[Q]

Clinical Features

- **Lymphomas** are **rapidly growing tumours,** usually present with **rapidly enlarging neck mass** which is often **painless.**
- Patients may present with **acute respiratory distress** and **dysphagia**
- About **10-30%** present with symptoms relating to local invasion, including **hoarseness**, **dyspnoea** with stridor, or **dysphagia**.

- **Painless**[Q] and associated with **fever**[Q]
- Patients with thyroid lymphoma virtually **never have hyperthyroidism** but frequently have **hypothyroidism**[Q].
- Hypothyroid patients have evidence of **autoimmune thyroiditis** or **Hashimoto's thyroiditis**[Q].

Diagnosis

- Diagnosis is confirmed by **core-needle biopsy**[Q].

Treatment: External beam radiotherapy + Chemotherapy[Q]

- Patients with **thyroid lymphoma** respond rapidly to chemotherapy (**CHOP**—cyclophosphamide, doxorubicin, vincristine, and prednisone) and associated with **improved survival**.
- Combined treatment with **radiotherapy** and **chemotherapy** often is recommended.
- To alleviate **pressure symptoms**, **surgical resection** (Thyroidectomy and nodal dissection) is recommended

CARCINOMA THYROID

87. Ans. b. Follicular carcinoma -Most common type of carcinoma *(Ref: Schwartz 9/e p1361; Sabiston 19/e p904; Bailey 26/e p763, 25/e p792)*

Type of Thyroid Carcinoma	Prevalence
Papillary (**MC**)	**80-90%**
Follicular	5-10%
Medullary	10%
Anaplastic	Rare
Lymphoma	1-%

88. Ans. a. Follicular carcinoma have worse prognosis than papillary carcinoma; e. Follicular carcinoma have more male incidence than papillary carcinoma

89. Ans. b. Women <40 years; c. Papillary carcinoma <4cm *(Ref: Schwartz 9/e p1362-1363; Sabiston 19/e p907; Bailey 26/e p766, 25/e p793-794; Harrison 17/e p2245)*

Prognostic Risk Classification for Well Differentiated Thyroid Cancer (AMES or AGES)		
Features	**Low Risk**	**High Risk**
Age	**<40**[Q] years	>40 years
Metastasis	None	**Regional** or **distant**[Q]
Size	**<4 cm**[Q]	>4 cm
Grade	Well differentiated	**Poorly differentiated**[Q]
Extent	No local extension, intrathyroidal, no capsular invasion	**Capsular invasion, extrathyroidal extension**[Q]

Prognostic Indicators of Differentiated Thyroid cancer (PTC, FTC)

AGES scoring system[Q]

- **A**ge, histologic **G**rade, **E**xtrathyroidal invasion, and metastases and tumor **S**ize to predict the risk of dying from papillary cancer.
- **Low-risk** patients are **young,** with **well-differentiated tumors, no metastases**, and **small primary lesions**
- High-risk patients are older, with poorly differentiated tumors, local invasion, distant metastases, and large primary lesions.

The MACIS scale[Q]

- This scale incorporates distant **M**etastases, **A**ge at presentation (**<40** or **>40** years old), **C**ompleteness of original surgical resection, extrathyroidal **I**nvasion, and **S**ize of original lesion.

AMES system[Q]

- To classify differentiated thyroid tumors into low- and high-risk groups using **A**ge (men <40 years old, women <50 years old), **M**etastases, **E**xtrathyroidal spread, and **S**ize of tumors (<5 or >5 cm).

90. Ans. c. Papillary type **91. Ans. b. Merkel cell** **92. Ans. c. Is usually euthyroid**

93. Ans. d. 50 milli curie *(Schwartz 9/e p1365-1366; Sabiston 19/e p911; Bailey 25/e p797; Harrison 18/e p2937)*

- Amount of I^{131} given for carcinoma thyroid is 50 milli curie (30-100 mCi).
- Schwartz says "If there is significant uptake, then a therapeutic dose of ^{131}I, 30 to 100 mCi should be administered to low-risk patients and 100 to 200 mCi in high-risk patients."

94. Ans. a. Papillary **95. Ans. a. Recurrent laryngeal nerve palsy**

- The **nerves** found in **close relationship to thyroid gland** and therefore likely to be **involved in malignant spread** and **thyroid surgery** are **recurrent laryngeal nerve** and **superior laryngeal nerve**.

96. Ans. a. I^{131} *(Ref: Schwartz 9/e p1365-1366; Sabiston 19/e p911; Bailey 26/e p767-768, 25/e p797; Harrison 18/e p2937 William's Endocrinology 10/e p479)*

97. Ans. a. I^{131}

SOLITARY THYROID NODULE

98. Ans. c. USG *(Ref: Schwartz 10/e p1540, 9/e p1360; Sabiston 19/e p900)*

- PET scans are not routinely used in the evaluation of thyroid nodules, however, they may show clinically occult thyroid lesions.
- Emedicine-Medscape says "**USG** is the **most sensitive method** for **diagnosing intrathyroid lesions**"
- CT and MRI are neither specific nor sensitive in diagnosing the intrathyroid lesions.

Ultrasound in STN

- Ultrasound is helpful in assessing a thyroid nodule.
- **Advantages**: Portability, cost-effectiveness, and lack of ionizing radiation.
- It is **extremely useful** in patients who are being **managed conservatively**[Q] because it can easily determine whether a nodule has increased in size.
- Ultrasound is **used routinely**[Q] in the office setting and is also available for intraoperative evaluation.
- It has proved **highly effective** in determining the **location** and characteristics (**cystic versus solid**) [Q] of nodules but is unable to accurately predict the diagnosis of solid nodules.

Ultrasound features of carcinoma in a Thyroid Nodule	
Feature	**Carcinoma/Malignancy**
Structure	**Hypoechoic/ Nonhomogeneous/** ***Solid***[Q]
Regressive changes	Rare
Microcalcifications	**Common**[Q]
Peripheral rim	Variable
Internal vascularity	**Common**[Q] (70-100 percent)
Lymph nodes	Relatively common[Q]

99. Ans. d. Common in female; e. Thyroidectomy done *(Ref: Schwartz 10/e p1537-1539, 9/e p1358-1361; Harrison 18/e p2938-2939, 17/e p2122-2123; Robbins 7/e p1175)*

Solitary Thyroid Nodule

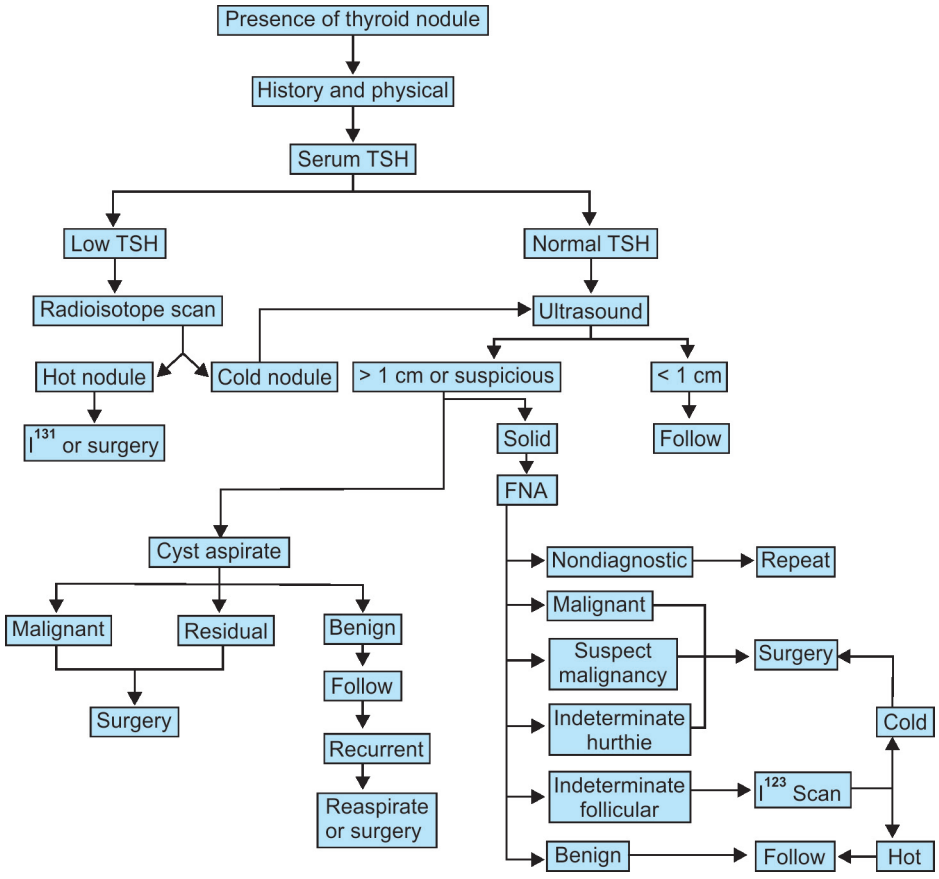
- **Palpable discrete swelling** within an otherwise apparently normal thyroid gland.
- Incidence in adults is **1-10%.**
- STN are **4 times more common** in **women**[Q] than in men.
- There is **nodular hyperplasia**[Q] (not the diffuse hyperplasia)
- **THR-Ab** is **not found** in STN.
- STN are more likely to be neoplastic than multiple nodules.
- Nodules in **younger patients** are **more likely** to be **neoplastic**[Q] than those in older patients.
- History of **radiation exposure increases** the **risk** of **malignancy**[Q]**.**
- **Cold nodules** (don't take up radioactive iodine) are **more likely** to be **malignant (15-20%)**[Q] than **hot** (take up radioactive iodine) **nodules (1-3%)**[Q]
- **STN** are **removed surgically**[Q] to exclude malignancy.

100. Ans. c. FNAC *(Ref: Schwartz 10/e p1538, 9/e p1358; Sabiston 19/e p899)*

- **FNAC** is the **investigation of choice in discrete thyroid swellings,** offers excellent patient compliance and is easy and quick to perform[Q].
- **FNAC cannot distinguish** between **benign follicular adenoma** and **follicular carcinoma**[Q]**.**

101. Ans. c. Thyroid function test *(Ref: Sabiston 19/e p899; Harrison 18/e p2938-2939, 17/e p2122-2123)*

Work-up of a Solitary Thyroid Nodule



- **Initial investigation** done in **STN** is **thyroid function test** (TFT)[Q].
- **Investigation of choice** in **STN** for diagnosis is **FNAC**[Q]**.**

Solitary Thyroid Nodule

- **Initial investigation** done in **STN** is **thyroid function test** (TFT)[Q].
- If **TFT** is **raised**, next investigation is **thyroid scan**, (For **hot nodules, RAI ablation** or **surgery** is done; For **warm or cold nodules**, **follow-up** or **surgery**)[Q]
- If **TFT** is **normal**, **USG** is **done** (**Aspiration** in **cystic lesions**, **FNAC** for **solid** or **heterogenous lesions**)[Q].
- **Investigation of choice** in **STN** for diagnosis is **FNAC[Q].**

102. Ans. d. FNAC **103. Ans. c. Right hemithyroidectomy** **104. Ans. c. Colloid degenerations**

105. Ans. a. Cold nodule on thyroid scan is diagnostic of malignancy *(Ref: Schwartz 10/e p1537, 9/e p1358; Sabiston 19/e p899; Bailey 25/e p783; Chandrasoma Taylor 3/e p849-850; Harrison 18/e p2938-2939, 17/e p2122-2123)*

Solitary Thyroid Nodule

- **MC solitary thyroid nodule** is **benign colloid nodule**[Q], it accounts for **60%** cases of solitary thyroid nodule.
- **2nd MC cause** of solitary thyroid nodule is **follicular adenoma** (30%)[Q].

History

- Details regarding the nodule, such as time of onset, change in size, and associated symptoms such as pain, dysphagia, dyspnea, or choking, should be elicited.
- **Risk factors** for **malignancy**, such as exposure to **ionizing radiation** and **family history of thyroid** and **other malignancies**[Q] associated with thyroid cancer. **Risk factors** for **malignancy**, such as exposure to **ionizing radiation** and **family history of thyroid** and **other malignancies**[Q] associated with thyroid cancer.

External Beam Radiation
• **Low-dose therapeutic radiation**[Q] has been used to treat conditions such as tinea capitis, thymic enlargement, enlarged tonsils and adenoids, acne vulgaris, and other conditions such as hemangioma and scrofula.
• **History of exposure** to **low-dose ionizing radiation**[Q] to the thyroid gland places the patient at **increased risk for** developing **papillary thyroid cancer**[Q].
• Risk is **maximum 20 to 30 years** after **exposure**[Q]

Physical Examination

- Thyroid gland is **best palpated from behind** the patient and with the **neck in mild extension**[Q].
- **Nodules** that are **hard, gritty,** or **fixed to surrounding structures** such as the trachea or strap muscles are **more likely to be malignant**[Q].

Diagnostic Investigations

Laboratory Studies
• **Most patients** with **thyroid nodules** are **euthyroid**[Q]**.**
• Determining the **blood TSH level**[Q] is helpful.
• **Risk of malignancy: 1% in hyperthyroid** nodules
• **Tg levels in patients** who have undergone total thyroidectomy for thyroid cancer and **for serial evaluation** of patients undergoing nonoperative management of thyroid nodules.
• **Serum calcitonin** in patients with **MTC** or a family history of MTC or **MEN2.**

FNAC
• **Single most important test** in the evaluation of **thyroid masses**[Q]
• **Ultrasound guidance** is recommended for nodules that are **difficult to palpate** and for **cystic** or **solid-cystic nodules** that **recur**[Q] after the initial aspiration.
• A **23-gauge needle** is used
• If a FNAC is reported as **nondiagnostic**, it generally **should be repeated**.
• **Benign lesions** include **cysts** and **colloid nodules**. The risk of malignancy in this setting is <3%.
• When **FNAC** is used in **complex nodules**, the **solid portion** should be **sampled**[Q]**.**

FNAC
• The **risk of malignancy** in the setting of a **suspicious cytology** is about **20%**. Most of these lesions are **follicular** or **Hürthle cell neoplasms**. In this situation, **diagnosis of malignancy** relies on demonstrating **capsular** or **vascular invasion**, features that cannot be determined via FNAC.
• FNAC also is **less reliable** in patients who have a **history** of **head** and **neck irradiation** or a **family history** of thyroid cancer, due to **higher likelihood** of **multifocal lesions** and **occult cancer**[Q].

Imaging
• **Ultrasound** is helpful for detecting **nonpalpable thyroid nodules**, differentiating **solid from cystic nodules,** and **identifying adjacent lymphadenopathy**.
• Ultrasound evaluation can identify features of a nodule that increase the **risk of malignancy**, such as **fine stippled calcification** and **enlarged regional nodes**; however, a **tissue diagnosis** is **strongly recommended before thyroidectomy**[Q].
• **Scanning** the thyroid with ^{123}**I** or ^{99m}**Tc** is **rarely necessary**, and thyroid scanning currently is **recommended in** the assessment of **thyroid nodules** only in patients who have **follicular thyroid nodules** on **FNAC** and a **suppressed TSH**[Q].

Management

- **Total thyroidectomy** for **malignant tumors**[Q]

Thyroid Cyst
• **Simple thyroid cysts** resolve with **aspiration**[Q] in about 75% of cases
• Hemithyroidectomy:
• If the cyst **persists after three attempts** at aspiration[Q]
• **Cysts >4 cm** in diameter[Q]
• **Complex cysts** with solid and cystic components (higher incidence of malignancy, 15%).

Colloid nodule
• **Observation** with serial **ultrasound** and **Tg** measurements[Q].
• If the **nodule enlarges**, **repeat FNAC** often is indicated.
• Although controversial, **L-thyroxine** in doses sufficient to maintain a serum TSH level between 0.1 and 1.0 U/mL may also be administered.
• Approximately **50%** of these **nodules decrease in size** in response to the **TSH suppression** of this regimen, and others may not continue to grow, but it is **most effective for nodules <3 cm**[Q]**.**
• **Hemithyroidectomy**: If a **nodule enlarges** on **TSH suppression**, causes **compressive symptoms**, or for **cosmetic reasons**[Q].
• **Total thyroidectomy**: Patient who has had **previous irradiation** of the **thyroid gland** or has a **family history of thyroid cancer**, because of the **high incidence of thyroid cancer** and **decreased reliability of FNAC** in this setting[Q].

Familial Cancer Syndromes Involving Nonmedullary Thyroid Cancer			
Syndrome	**Gene**	**Manifestation**	**Thyroid Tumor**
Cowden's syndrome	**PTEN**	Intestinal hamartomas, benign and malignant breast tumors	**FTC,** rarely PTC and Hürthle cell tumors
FAP	**APC**	Colon polyps and cancer, duodenal neoplasms, desmoids	**PTC** cribriform growth pattern
Werner's syndrome	WRN	**Adult progeroid syndrome**[Q]	**PTC, FTC, anaplastic cancer**
Carney complex type 1	PRKAR1	**Cutaneous** and **cardiac myxomas**, **breast** and **adrenal tumors**[Q]	**PTC, FTC**
McCune-Albright syndrome	GNAS1	**Polyostotic fibrous dysplasia**, endocrine abnormalities, **café-au-lait spots**[Q]	**PTC** clear cell

106. Ans. a. Follicular adenoma

- **MC STN is colloid goiter > follicular adenoma.**

107. Ans. b. Hemithyroidectomy *(Ref: Schwartz 10/e p1540, 9/e p1358-1361; Harrison 18/e p2938-2939)*

HEMITHYROIDECTOMY

- Hemithyroidectomy is **removal of one lobe** with **isthmus.**
- Hemithyroidectomy is **treatment of choice** for **follicular adenoma** and **solitary thyroid nodule.**

108. Ans. c. 20% *(Ref: Bailey 25/e p779)*

- About 80% of discrete swellings are cold. The risk of malignancy is higher in "cold" lesions (20%) compared to "hot" or "warm" lesions (< 5%).

109. Ans. b. FNAC

GOITRE

110. Ans. c. 30% *(Ref: Bailey 26/e p749, 25/e p778)*

Complications of Multi-nodular Goiter

- **Secondary Thyrotoxicosis:** Transient episodes of mild hyperthyroidism are common, occurring in up to **30%**Q of patients.
- **Carcinoma:** An increased incidence of cancer (usually **follicular**) has been reported from **endemic areas**Q.

111. Ans. b. Diffuse goiter *(Ref: Harrison 18/e p2931; Bailey 26/e p747, 24/e p782)*

Endemic Goiter

- Worldwide, **diffuse goiter** is most commonly caused by **iodine deficiency** and is termed **endemic goiter** when it affects **>5%**Q of the population.
- Endemic goiter occurs in **geographical areas** where the **soil, water** and **food** supply contains **low levels of iodine**Q.
- The **lack of iodine** leads to decreased synthesis of thyroid hormones and a **compensatory increase in TSH** which in turn leads to **follicular cell hypertrophy** and **hyperplasia** and goitrous enlargement leading to **diffuse hyperplastic goiter**Q.
- **Mostly, patients** are **euthyroid**Q.

112. Ans. a. Neck *(Ref: Schwartz 10/e p1554, 9/e p1372, 8/e p1428)*

- Virtually **all intrathoracic goiters** can be **removed via a cervical incision**Q**.**

Surgical Removal of Intrathoracic Goiter

- A goiter is considered **mediastinal** if **at least 50%**Q of the **thyroid tissue** is **located intrathoracically**.

Primary Mediastinal Goiters	Secondary Mediastinal Goiters
• Constitute approximately **1%** of all mediastinal goiters • **Arise from accessory (ectopic)** Q **thyroid tissue** located in the **chest** • **Supplied** by **intrathoracic blood vessels**Q • **Do not have any connection** to **thyroid tissue** in the **neck**Q.	• Constitute **majority**Q of mediastinal goiters • Arise from **downward extension** of **cervical thyroid tissue**Q along the fascial planes of the neck and • Derive their **blood supply from** the **superior** and **inferior thyroid arteries**Q**.**

Removal

- Virtually **all intrathoracic goiters** can be **removed via a cervical incision**Q.

Indications of Median Sternotomy
Patients who have: **1. Invasive thyroid cancers**Q **2.** Had **previous thyroid operations** and may have developed **parasitic mediastinal vessels**Q **3. Primary mediastinal goiters** with **no thyroid tissue in the neck**Q

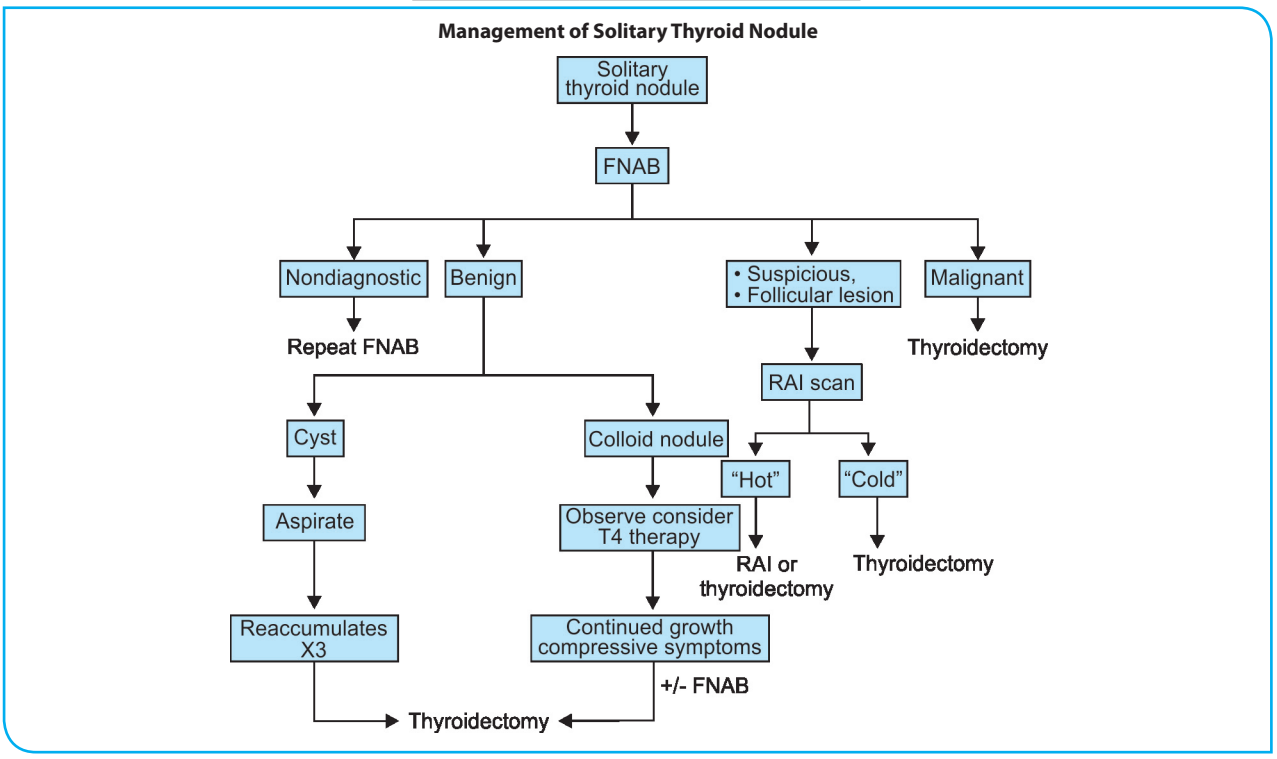
- The **chest** should be **prepared in most cases** in the event it is necessary to perform a median sternotomy to control mediastinal bleeding or completely remove an unsuspected invasive cancer.
- The goiter is **approached via a neck incision**Q.
- When sternotomy is indicated, **the sternum usually should be divided** to the level of the **third intercostal space** and then laterally on one side at the **space between** the **third** and **fourth ribs.**

113. Ans. b. Thyroid scan *(Ref: Sabiston 19/e p901; Schwartz 10/e p1537, 9/e p1360)*

Thyroid Scan

- Whereas ultrasound allows anatomic evaluation, **radionuclide scans** allow assessment of **thyroid function**[Q].
- **^{123}I** and **^{131}I** iodine scintigraphy is also used to evaluate the functional status of the gland
- Advantages of scanning with **^{123}I** include a **low dose of radiation** (30 mrad) and **short half-life**[Q].
- **^{131}I** has a **longer half-life** (8 days) and **emits higher levels of β-radiation**[Q].
- **^{131}I** is optimal for **imaging thyroid carcinoma**. It is the **screening modality of choice** for the **evaluation of distant metastasis**[Q].

Isotope	$t_{1/2}$
I^{132}	2.3 hours[Q]
I^{123}	13 hours[Q]
I^{131}	8 days[Q]



114. Ans. a. Cosmetic; b. Pressure symptoms; e. Swelling with symptoms *(Ref: Schwartz 9/e p1358; Sabiston 19/e p903; Harrison 18/e p2931-2932)*

Indications of Surgery in Thyroid Swelling

1. Neoplasia (FNAC positive, clinical suspicion)[Q]
2. Toxic adenoma[Q]
3. Pressure symptoms[Q]
4. Cosmetic reason or patient's preference[Q]

115. Ans. b. Hemithyroidectomy

116. Ans. None

117. Ans. d. 10-20%

- **Cold nodules** (don't take up radioactive iodine) are **more likely** to be **malignant (15-20%)**[Q] than **hot** (take up radioactive iodine) **nodules (1-3%)**[Q]

118. Ans. d Hemithyroidectomy

119. Ans. d. Goitre more than 5 percent of population is endemic goitre *(Ref: Harrison 18/e p2931; Bailey 24/e p782)*

120. Ans. c. All nodules > 4 cm should be resected irrespective of cytology *(Ref: Schwartz 9/e p1358; Sabiston 19/e p899; Harrison 18/e p2938-2939)*

All nodules > 4 cm should be resected irrespective of cytology, is an incorrect statement.

Solitary Thyroid Nodule:

- If the **serum TSH** is **subnormal**, a **radionuclide thyroid scan** should be obtained using either **Tc-99 pertechnate** or **I-123** to document whether the nodule is **hyperfunctioning, isofunctioning or nonfunctioning** (Ref: *American Thyroid Association, Thyroid Nodule Guidelines)*
- **Cold nodules** (don't take up radioactive iodine) are **more likely** to be **malignant (15-20%)**[Q] than **hot** (take up radioactive iodine) **nodules (1-3%)**[Q]
- **FNAC** is the **investigation of choice in discrete thyroid swellings,** offers excellent patient compliance and is easy and quick to perform[Q].
- **Treatment options for Colloid Nodule:**
  - Approximately **50%** of these **nodules decrease in size** in response to the **TSH suppression** of this regimen, and others may not continue to grow, but it is **most effective for nodules <3 cm**[Q]
  - **Hemithyroidectomy**: If a **nodule enlarges** on **TSH suppression**, causes **compressive symptoms**, or for **cosmetic reasons**[Q].
  - **Total thyroidectomy**: Patient who has had **previous irradiation** of the **thyroid gland** or has a **family history of thyroid cancer**, because of the **high incidence of thyroid cancer** and **decreased reliability of FNAC** in this setting[Q].

RETROSTERNAL GOITRE

121. Ans. c. Dyspnea *(Ref: Schwartz 9/e p1358; Sabiston 19/e p898; Bailey 26/e p753-754, 25/e p782)*

Retrosternal Goiter

- A goiter is said to be retrosternal, substernal or mediastinal if **more than half** of **thyroid tissue** is **below** the **opening** of **thoracic cage**[Q].
- Usually arises from **lower pole** of a **nodular goiter**[Q].
- **Often symptomless, discovered** on a routine **chest X-ray**[Q].
- **Tracheal deviation** and **scabard trachea**[Q] (flattening of trachea caused by compression)

Severe symptoms due to mass effect on the trachea, esophagus, great vessels and nerves
1. **Dyspnea** (**MC symptom**) particularly at night, **cough** and **stridor**[Q]
2. Dysphagia
3. Enlargement of neck veins and superficial veins on the chest wall
4. Recurrent nerve palsy
5. **Pemberton's sign**[Q]: Symptoms of faintness with evidence of facial congestion and external jugular venous obstruction when the arms are raised above the head.

122. Ans. d. All

123. Ans. a. Stridor

THYROTOXICOSIS

124. Ans. a. Inadequate control of hyperthyroidism *(Ref: Schwartz 10/e p1534, 9/e p1355; Sabiston 19/e p897; Bailey 26/e p754-758, 25/e p786-787; Harrison 18/e p2927)*

Thyroid Storm (Thyrotoxic crisis)

- It is an **emergency** due to **decompensated hyperthyroidism**[Q].

Treatment

- **Non-selective beta-blocker (Propranolol):**
  - **Most valuable measure** in **thyroid storm**[Q].
  - In thyroid storm most of the symptoms are because of adrenergic over activity due to **increased tissue sensitivity** to **catecholamines** in hyperthyroidism.
  - This **increased sensitivity** is due to **increased** number of **beta receptors**[Q].
- Quick relief is obtained by blocking **beta** receptors.
- **Propylthiouracil:**
  - **Antithyroid drug of choice** for **thyroid storm**[Q]
  - **Reduces hormone synthesis** as well as **peripheral conversion** of T_4 **to** T_3[Q]
- **Corticosteroids (Hydrocortisone):**
  - **Inhibits** both **release of thyroid hormone** from the gland and **peripheral conversion** of T_4 **to** T_3[Q]
- **Iodides (Potassium iodide** or **ipanoic acid):**
  - Used to **inhibit** further **hormone release**[Q] from the gland.
- **Other Measures:**
  - **Diltiazem,** if **tachycardia** is not controlled by propranolol alone.
  - **Rehydration, anxiolytics, external cooling** and appropriate antibiotics

125. Ans. b. Propylthiouracil *(Ref: Harrison 17/e p47)*

Hyperthyroidism in Pregnancy

- Hyperthyroidism in pregnancy should be **aggressively evaluated** and **treated**[Q].
- It is **most commonly** caused by **Graves disease**[Q], but autonomously functioning nodules, gestational trophoblastic disease, thyroiditis, and hyperemesis gravidarum should also be considered.
- Hyperthyroidism is **most difficult to control** in the **first trimester**[Q] of pregnancy and **easiest to control** in the **third trimeste**[Q]**r**.
- **Methimazole crosses** the **placenta** to a **greater degree than propylthiouracil** and has been **associated with fetal aplasia cutis**[Q].
- Treatment of choice is **propylthiouracil**[Q]**.**
- **Radioiodine should not be used during pregnancy**, either for scanning or treatment, because of effects on the fetal thyroid.

126. Ans. a. Diastolic murmur *(Ref: Harrison 18/e p2923)*

CVS Findings in Thyrotoxicosis

- **MC cardiovascular manifestation** is **sinus tachycardia**[Q], often associated with **palpitations**, occasionally caused by **supraventricular tachycardia**[Q].
- **Exertional dyspnea**[Q]
- Hyperactive precordium with **loud first heart sound**, an accentuated pulmonic component of the second heart sound, and a **thirds heart sound**[Q].
- **Systolic ejection click**[Q]
- The high cardiac output produces a **bounding pulse**, **widened pulse pressure**[Q], and an **aortic systolic murmur** and can lead to worsening of angina or heart failure in the elderly or those with preexisting heart disease.
- **Atrial fibrillation** is more common in patients **>50** years of age[Q].
- A systolic scratch, also known as **Means-Lerman scratch**[Q], is occasionally heard in 2nd left intercoastal space during expiration.
- **Systolic hypertension**

Cardiovascular manifestations of Thyrotoxicosis	
Increased Atrial irritability	**High Cardiac Output**
• **Sinus tachycardia (MC)** [Q] • Palpitations[Q] • Supraventricular tachycardia[Q] • Atrial fibrillations[Q]	• Bounding pulse • Wide pulse pressure[Q] • Hyperdynamic precordium[Q] • **Loud first heart sound**[Q], an accentuated pulmonic component of the second heart sound, and a **thirds heart sound**[Q]. • **Aortic systolic murmur**[Q] • **Means-Lerman scratch**[Q]

127. Ans. a. Thyrotoxicosis *(Ref: Harrison 18/e p2923; 16th/2108)*

Dancing Carotids may be seen in

- **Aortic regurgitation**[Q]
- **Thyrotoxicosis**[Q]

128. Ans. c. TSH *(Ref: Schwartz 9/e p1349; Sabiston 19/e p893; Bailey 26/e p743, 25/e p773; Harrison 18/e p2917)*

The **ultrasensitive TSH assay** has become the **most sensitive** and **specific test** for the **diagnosis of hyper-** and **hypothyroidism** and **for optimizing T_4 therapy**[Q]**.**

The **enhanced sensitivity** and **specificity** of **TSH assays** have **greatly improved laboratory assessment** of **thyroid function**[Q]**.**

129. Ans. a. Primary hypothyroidism *(Ref: Harrison 18/e p2920-2921)*

- A **normal TSH** level **excludes primary** (but not secondary) **hypothyroidism**[Q].
- If the TSH is elevated, an **unbound T4 level** is **needed to confirm** the **presence of clinical hypothyroidism**[Q]**,** but T_4 is inferior to TSH when used as a screening test, because it will not detect subclinical hypothyroidism.

130. Ans. b. Wolff-Chaikoff effect *(Ref: Schwartz 10/e p1526, 9/e p1348; Sabiston 19/e p892; Harrison 17/e p2241)*

Wolff-Chaikoff effect	• Iodine induced hypothyroidism[Q] (Iodine dependent transient thyroid suppression)
Jod-Basedow's effect	• Iodine induced hyperthyroidism[Q]

131. Ans. d. Oxygen consumption *(Ref: Harrison 18/e p2926; 17/e p2236)*

- **Beta-blockers do not correct** the underlying **metabolic abnormalities** (i.e. does not affect the **oxygen consumption**)

Beta-Blockers in Thyrotoxicosis	
Advantages	**Limitations**
Alleviates adrenergic manifestations: • Sweating, tremor[Q] • Tachycardia, palpitations[Q] • Nervousness, anxiety[Q]	• Beta- blockers **do not significantly affect the thyroid status[Q],** it reduces to some extent the conversion of T_4 to T_3. • Beta-blockers **do not correct**[Q] the underlying **metabolic abnormalities** (i.e. does not affect the **oxygen consumption**) [Q]

132. Ans. a. Surgery for thyroiditis **133. Ans. a. Early diastolic murmur** **134. Ans. b. Radioactive iodine**

135. Ans. d. Elevated serum CPK level

- Both thyrotoxicosis and malignant hyperthermia may cause myopathy, but in hyperthyroidism serum CPK is often normal.

136. Ans. d. All

137. Ans. a. Hot nodule *(Ref: Schwartz 10/e p1533, 9/e p1355; Sabiston 19/e p896; Bailey 26/e p755, 25/e p783; Harrison 18/e p2932)*

Toxic Adenoma (Plummer's Disease)

- Hyperthyroidism from a **single hyperfunctioning nodule**[Q] typically occurs in **younger patients**
- Usually occurs in the setting of a patient with endemic goiter.
- Increased thyroid hormone production occurs **independent of TSH control**[Q].
- **Recent growth** of a **long-standing nodule** along with the symptoms of **hyperthyroidism**[Q].
- Characterized by **somatic mutations** in the **TSH-R gene**[Q]
- Most nodules have attained a **size** of at least **3 cm before hyperthyroidis**m occurs.

Clinical Features

- **Recent growth** of a **long-standing nodule** along with the symptoms of **hyperthyroidism**[Q].
- Hyperthyroidism from a **single hyperfunctioning nodule** typically occurs in **younger patients**
- Physical examination: **Solitary thyroid nodule** without palpable thyroid tissue on the contralateral side.
- Eye signs are not common, mainly **CVS dysfunction**
- These nodules are **rarely malignant**[Q].

Diagnosis

- **RAI scanning** shows a **"hot" nodule**[Q] with suppression the rest of the thyroid gland.

Treatment

- **Smaller nodules** may be managed with **antithyroid medications** and **RAI**[Q].
- **Most patients** are **euthyroid** after **radioiodine therapy**[Q] (radioiodine preferentially accumulates in hyperfunctioning nodules)
- Surgery (**Hemithyroidectomy**) is preferred in **young** patients with **larger nodules**[Q].

138. Ans. a. Inadequate control of hyperthyroidism **139. Ans. b. Increased CPK levels**

140. Ans. a. Thyroid storm **141. Ans. a. Hashimoto's thyroiditis**

142. Ans. b. Graves' disease; c. Medullary thyroid carcinoma; d. Plummer's disease; e. Struma ovarii *(Ref: Harrison 18/e p1922; Robbins 7/e p1167)*

Causes of Thyrotoxicosis		
Primary hyperthyroidism	**Thyrotoxicosis without hyperthyroidism**	**Secondary hyperthyroidism**
• **Graves' disease**[Q] • Toxic multinodular goiter • Toxic adenoma **(Plummer's disease)** [Q] • **Functioning thyroid carcinoma metastases**[Q] • Activating mutation of the TSH receptor • McCune-Albright syndrome • **Struma ovarii**[Q] • Drugs: iodine excess **(Jod-Basedow phenomenon)** [Q]	• Subacute thyroiditis • Silent thyroiditis • Other causes of thyroid destruction: **amiodarone, radiation, infarction** of adenoma • Ingestion of excess thyroid hormone **(thyrotoxicosis factitia)** or thyroid tissue	• TSH-secreting pituitary adenoma • Thyroid hormone resistance syndrome: occasional patients may have features of Thyrotoxicosis • Chorionic gonadotropin-secreting tumors • Gestational thyrotoxicosis

143. Ans. b. Cold intolerance **144. Ans. d. Hair loss**

GRAVE'S DISEASE

145. Ans. a. More common in males *(Ref: Schwartz 10/e p1531-1533, 9/e p1353-1354; Sabiston 19/e p896-898; Bailey 26/e p755-758, 25/e p783-787; Harrison 18/e p2922-2927*

Grave's Disease (Diffuse Toxic Goiter)

- **MC cause** of **hyperthyroidism,** caused by **stimulatory autoantibodies** to **TSH-R**[Q].
- **Autoimmune disease** with strong **familial predisposition**[Q]
- More common in **females** with peak incidence between **40–60** years
- Characterized by **thyrotoxicosis, diffuse goiter** and **extrathyroidal conditions**[Q] (ophthalmopathy, dermopathy, thyroid acropachy and gynecomastia)

Etio-pathogenesis

- **Autoimmune process** with possible **triggers** (post-partum state, iodine excess, lithium therapy and bacterial or viral infections)
- Associated with **HLA-B8, HLA-DR3, HLA-DQA1*0501** and **CTLA-4**[Q]
- **HLA-DRB1*0701** is **protective** against it
- **Thyroid stimulating antibodies**[Q] stimulate thyrocytes to grow and synthesize excess thyroid hormone, which is **hallmark** of **Grave's disease**
- Associated with **type I diabetes mellitus, Addison's disease, pernicious anemia** and **myasthenia gravis**

Histopathology

- **Hyperplastic gland** with columnar epithelium and minimal colloid
- Nuclei exhibit **mitosis**
- **Papillary projections** of **hyperplastic epithelium**[Q]

Clinical Features

- **Hyperthyroid symptoms**[Q] (heat intolerance, increased sweating and thirst, weight loss despite adequate caloric intake)
- **Symptoms of adrenergic stimulation**[Q] (palpitations, nervousness, fatigue, emotional lability, hyperkinesis and tremors)
- **MC GI symptom** is **increased frequency** of **bowel movements** and **diarrhea**[Q]

  - **Female patients** often develop **amenorrhea, decreased fertility** and **increased** incidence of **miscarriage**[Q]
  - **Children** experience **rapid growth** with **early bone maturation**[Q]
  - **Older patients** present with **CVS complications** (**AF** and **CHF**)[Q]
  - **Overt cardiac failure occurs in only 6–19%, in greases with are**

- Weight loss, facial flushing, warm and moist skin, tachycardia, cutaneous vasodilatation, **collapsing pulse** is seen on examination
- A **fine tremor, muscle wasting** and **proximal muscle** group **weakness** with **hyperactive tendon reflexes** often are present[Q]

  - Overlying **bruit** or **thrill** at **upper pole**[Q] due to **increased vascularity**
  - **Loud venous hum**[Q] in supraclavicular space
  - **Ophthalmopathy** (orbital proptosis) occurs in **50%, dermopathy** in **1-2%.**[Q]
  - Dermopathy is characterized by deposition of **glycosaminoglycans** leading to **thickened skin** in **pretibial region** and **dorsum of foot**[Q] (**pretibial myxedema**).

- **Gynecomastia** is common in **young men**[Q]
- Rare bony involvement leads to **subperiosteal bone formation** and **swelling in metacarpals**[Q] (thyroid acropachy)

Diagnosis

- **Suppressed TSH** with or without an elevated free T4 or T3 level. **If eye signs are present,** other tests are generally not needed[Q].
- **In absence** of **eye signs, elevated RAIU** with **diffusely enlarged gland**[Q] confirms the diagnosis
- **Elevated TSH-R** or **thyroid-stimulating antibodies (TSAb)** are **diagnostic**[Q] of Grave's disease and increased in about **90%** patients
- **Anti-Tg** and **Anti-TPO antibodies** are **non-specific** and elevated in upto **75%** cases.
- **MRI of orbits** are useful in evaluating **Grave's ophthalmopathy**

Treatment

- Treatment modalities: **Antithyroid drugs**, thyroid ablation with radioactive ^{131}**I** and **thyroidectomy**[Q].

146. Ans. None

147. Ans. d. All of the above *(Ref: William's Endocrinology 10/e p479)*

Complications of Radioactive Iodine (I^{131}) Therapy

Acute	Long-Term
• Neck pain, swelling, tenderness • Thyroiditis, sialedenitis • **Hemorrhage**[Q] (brain metastasis) • **Cerebral edema**[Q] (brain metastasis) • **Vocal cord paralysis**[Q] • Nausea and vomiting[Q] • **Bone marrow suppression**[Q]	• **Hematologic:** - **Bone marrow suppression**[Q] - **Leukemia**[Q] • **Fertility:** - Ovarian and testicular damage - Infertility - Increased abortion rate Pulmonary fibrosis Chronic sialedenitis, taste dysfunction **Hypoparathyroidism**[Q] **Increased risk of cancer:** • Anaplastic thyroid cancer[Q] • Gastric cancer • HCC • Lung, bladder and breast cancer

148. Ans. d. Hypothyroidism

149. Ans. d. Age >40 years; c. Elderly; e. Presence of associated co-morbidities *(Ref: Schwartz 10/e p1532-1533, 9/e p1354-1355; Sabiston 19/e p897-898; Bailey 26/e p757-758, 25/e p786-787; Harrison 18/e p2925-2927)*

Treatment of Grave's Disease

- Treatment modalities are antithyroid drugs, thyroid ablation with radioactive ^{131}I, and thyroidectomy.

Antithyroid Drugs

- Administered in **preparation for RAI ablation** or **surgery**[Q].
- Drugs commonly used: **Propylthiouracil** and **methimazole**[Q].
- Most patients have **improved symptoms** in **2 weeks** and become **euthyroid** in about **6 weeks**[Q].
- Treatment is associated with a **high relapse rate** when these drugs are discontinued, with 40-80% of patients developing recurrent disease after a 1- to 2-year course.
- Patients with **small glands** are **less likely to recur**.

Treatment for curative intent is reserved for
1. **Small, nontoxic goiters** <40 gms[Q]
2. **Mildly elevated** thyroid hormone levels[Q]
3. **Rapid decrease** in **gland size** with antithyroid medications[Q]

- The **catecholamine response** of thyrotoxicosis can be **alleviated** by **propranolol**[Q].

Radioactive Iodine Therapy (^{131}I)

- ^{131}I emits **beta (90%)** and **gamma rays**[Q]

Radioactive Iodine Therapy	
Advantages	**Disadvantages**
• **Avoidance** of a **surgical procedure**[Q] and its concomitant risks • **Reduced** overall treatment **costs**[Q] • **Ease** of treatment[Q]	• **Progression** of **Grave's ophthalmopathy**[Q] • Small increased **risk** of **nodular goiter, thyroid cancer** and **hypoparathyroidism**[Q] • **Unexplained increase** in **overall** and **cardiovascular mortality**[Q] • **Higher** initial **dose** of ^{131}I: **Earlier onset** and **higher incidence** of **hypothyroidism**[Q]

Indications of RAI Therapy
1. **Older patients** with **small** or **moderate-sized goiters**[Q]
2. Patients **relapsed after medical** or **surgical therapy**[Q]
3. **Antithyroid drugs** or **surgery** are **contraindicated**[Q]

- After standard treatment with RAI, most patients become euthyroid within 2 months.
- Only 50% of patients treated with RAI are euthyroid 6 months after treatment, and the remaining are still hyperthyroid or already hypothyroid.

Contraindications of RAI	
Absolute Contraindications	***Relative Contraindications***
• **Pregnancy**[Q] • **Lactation**[Q]	• **Young patients** (children and adolescents)[Q] • **Thyroid nodules**[Q] • **Ophthalmopathy**[Q]

Surgical Treatment

- **Surgery is recommended** when **RAI is contraindicated**[Q]

Indications of Surgery	
When RAI is contraindicated	**Relative indications**
• Confirmed **cancer** or **suspicious thyroid nodules**[Q] • **Young patients**[Q] • **Pregnancy and Lactation**[Q] • **Severe reactions** to antithyroid medications • **Large goiters** causing compressive symptoms • Reluctant to undergo RAI therapy	• **Smokers**, with **moderate to severe Grave's ophthalmopathy**[Q] • Patients desiring **rapid control of hyperthyroidism** with a chance of being euthyroid • **Poor compliance** to **antithyroid medications**.

- Patients should be **rendered euthyroid before operation**[Q]
- **Antithyroid drugs** should be continued **up to the day of surgery**[Q].

Lugol's Iodide Solution or Saturated Potassium Iodide
• Administered **7-10 days preoperatively** (three drops twice daily)[Q] • **Reduce vascularity** of the gland and **decrease** the **risk** of **precipitating thyroid storm**. • The **major action** of iodine in this situation is to **inhibit release** of **thyroid hormone**[Q].

Indications of Total or near-total thyroidectomy
• Patients with **coexistent thyroid cancer**[Q] • Who **refuse RAI therapy**[Q] • Have **severe ophthalmopathy**[Q] • **Life-threatening reactions** to **antithyroid medications**[Q] (vasculitis, agranulocytosis, or liver failure)

- A **subtotal thyroidectomy**, leaving a **4-7 gm remnant**[Q], is recommended for all remaining patients.
- Remnants **<4 g** are associated with a **2-10% recurrence rate** but a **high (>40%) rate of hypothyroidism**[Q].

150. Ans. a. Thyrotoxicosis **151. Ans. c. Radioiodine**

152. Ans. c. Remissions and exacerbations are not infrequent

HYPOTHYROIDISM

153. Ans. a. Serum TSH level *(Ref: Schwartz 9/e p1349; Sabiston 19/e p893; Bailey 26/e p743, 25/e p773; Harrison 18/e p2917*

The **ultrasensitive TSH assay** has become the **most sensitive** and **specific test** for the **diagnosis of hyper-** and **hypothyroidism** and **for optimizing T_4 therapy**[Q].
The **enhanced sensitivity** and **specificity** of **TSH assays** have **greatly improved laboratory assessment** of **thyroid function**[Q].

154. Ans. a. Sheehan's syndrome *(Harrison 18/e p386)*

Sheehan's syndrome causes **hypopituitarism** leading to **decreased TSH**[Q].

POSTTHYROIDECTOMY COMPLICATIONS

155. Ans. b. Close to the gland *(Schwartz 10/e p1551-1554, 9/e p1369-1372; Sabiston 19/e p915-919; Bailey 26/e p760-761, 25/e p789-791)*

- **Both superior** and **inferior thyroid vessels** should be **ligated close** to the **thyroid**[Q].
- Superiorly, **to avoid injury** to the **external branch** of the **superior laryngeal nerve**.
- Inferiorly, to **minimize devascularization of the parathyroids** (**extracapsular**[Q] **dissection**) or **injury to the RLN**[Q].

THYROIDECTOMY: SCHWARTZ 9/E P1369-1372

- The **dissection plane** is kept as **close** to the **thyroid** as possible and the **superior pole vessels** are individually identified, skeletonized, ligated, and **divided low** on the **thyroid gland to avoid injury** to the **external branch** of the **superior laryngeal nerve**[Q]
- The **inferior thyroid vessels** are **dissected, skeletonized, ligated**, and **divided as close to the surface of the thyroid gland as possible** to **minimize devascularization of the parathyroids** (**extracapsular dissection**) or **injury to the RLN**[Q].

STEPS OF THYROIDECTOMY

- A **Kocher transverse collar incision**, typically **4 to 5 cm** in length, is placed in or parallel to a **natural skin crease 1 cm below** the **cricoid cartilage**.
- The subcutaneous tissues and platysma are incised sharply and subplatysmal **flaps are raised superiorly** to the level of the **thyroid cartilage** and **inferiorly** to the **suprasternal notch**[Q]
- The **strap muscles** are **divided in the midline** along the entire length of the mobilized flaps, and the thyroid gland is exposed.
- The **middle thyroid veins** are ligated and **divided**[Q].

> - The **dissection plane** is kept as **close** to the **thyroid** as possible and the **superior pole** vessels are individually identified, skeletonized, ligated, and divided low on the thyroid gland **to avoid injury** to the **external branch** of the **superior laryngeal nerve**[Q]

- The RLNs can be most consistently identified at the **level of the cricoid cartilage**.
- The **parathyroids** usually can be identified **within 1 cm of** the crossing of the **inferior thyroid artery** and **the RLN**[Q]

- The **inferior thyroid vessels** are **dissected, skeletonized, ligated**, and **divided as close to the surface of the thyroid gland as possible** to **minimize devascularization of the parathyroids** (**extracapsular**[Q] **dissection**) or **injury to the RLN**[Q].

- The **RLN** is **most vulnerable to injury in** the vicinity of the **ligament of Berry**. Any **bleeding** in this area should be **controlled with gentle pressure** before carefully identifying the vessel and ligating it. Use of the **electrocautery should be avoided** in proximity to the RLN[Q].
- Once the ligament is divided, the thyroid can be separated from the underlying trachea by sharp dissection.

- **Parathyroid glands** that have been **inadvertently removed** during the thyroidectomy should be resected, confirmed as parathyroid tissue by frozen section, **divided into 1-mm fragments**, and **reimplanted into** individual pockets in the **sternocleidomastoid**[Q] **muscle**. The sites should be **marked with silk sutures** and a **clip**[Q].

156. Ans. d. Hypercalcemia *(Ref: Schwartz 9/e p1372-1373; Sabiston 19/e p921; Bailey 26/e p761-762, 25/e p790-792)*

Complications of Thyroidectomy

- **Hemorrhage:**
  - Due to **slipping of ligature** on the **superior thyroid artery**[Q], **bleeding from muscular artery**
  - **Hematomas** may cause airway compromise and **must be evacuated immediately**[Q].
  - Hematomas may occur immediately or later on.
  - An **immediate bleed** occurs after or shortly before extubation when the patient lightens from anaesthesia and may **begin to cough**, causing a vessel to open.
  - Delayed hemorrhage may develop slowly and therefore may not be recognized at first.
- **Respiratory obstruction: Causes includes**
  - **Tension hematoma**[Q]
  - **Laryngeal edema (by anesthetic intubation): MC cause of respiratory obstruction**[Q]
  - **Bilateral recurrent laryngeal nerve paralysis**[Q]

Recurrent laryngeal nerve paralysis

- May be unilateral or bilateral, transient or permanent.
- Bilateral paralysis causes respiratory obstruction - Dyspnea, stridor.

- Injury to other nerves:
  - **External branches of superior laryngeal nerve**[Q]
  - Cervical sympathetic trunk - may cause Horner's syndrome.

- **Parathyroid insufficiency**
  - Due to **removal of the parathyroid glands** or **infarction due to vascular injury**[Q].
  - **Vascular injury**[Q] is more important.
  - Cases usually present **2-5 days after operation**[Q] with symptoms of **hypocalcemia** (circumoral and fingertip numbness and tingling tetany, carpopedal spasm and laryngeal stridor)[Q]
  - Treatment with **oral calcium** and **vitamin D supplements**[Q]
  - **IV calcium gluconate**[Q] may be required in severe cases.
- **Thyroid insufficiency**
- **Thyrotoxic crisis**
  - Occurs if the thyrotoxic patient has been inadequately prepared for thyroidectomy.

157. Ans. c. Removing sutures from all layers in the ward and evacuation of hematoma

158. Ans. d. Apparent exophthalmos *(Harrison 18/e p225, 237)*

Horner's syndrome	
Clinical Features	**Less Common Features**
• Ptosis[Q] • Miosis (constricted pupil)[Q] • Anhydrosis[Q] • Enopthalmos[Q] • Loss of ciliospinal reflexes[Q]	• Hyperactive accommodation • Hypochromic heterochromia • Hypotony • Hyperaemia

159. Ans. b. Medial medullary syndrome *(Ref: Harrison 17/e p2588)*

160. Ans. d. Mydriasis

161. Ans. a. As close to the thyroid gland as possible *(Ref: Schwartz 9/e p1369-1372; Sabiston 19/e p915-919)*

162. Ans. c. Inferior thyroid artery is ligated away from gland; d. Capsule is kept intact *(Ref: Schwartz 9/e p1369-1372)*

- The **inferior thyroid vessels** are **dissected, skeletonized, ligated**, and **divided as close to the surface of the thyroid gland as possible** to **minimize devascularization of the parathyroids** (**extracapsular dissection**) or **injury to the RLN**Q.
- Dissection is extracapsular (**Capsule is removed**) Q.

163. Ans. b. 2-5 days

164. Ans. a. Hypocalcemia

165. b. Oral calcium and vitamin D *(Ref: Schwartz 9/e p1373; Sabiston 19/e p921; Bailey 26/e p762, 25/e p791)*

Management of Post-operative Hypocalcemia	
Transient Hypocalcemia	**Prolonged or permanent Hypocalcemia**
• **Asymptomatic** with calcium level **>8** mg/dl: **No treatment**Q • **Mild symptoms** or calcium level **<8** mg/dl: **Oral calcium**Q • **Severe Symptoms: IV calcium**Q	• **Oral calcium** with **vitamin D**Q

- If **hypocalcemia** is expected to be **prolonged** or **permanent** (as following a 3 and 1/2 gland parathyroid resection or following total parathyroidectomy with autograft) then **oral calcium** should be started as soon as possible **with vitamin D**.

166. Ans. d. Oral calcium

167. Ans. a. IV calcium gluconate

168. Ans. d. Remove the stitch and take the patient to O.T.

169. Ans. a. Respiratory obstruction

170. Ans. a. Open immediately

171. Ans. a. Respiratory obstruction)

172. Ans. a. Hypocalcemia

173. Ans. b. Open the operative site)

174. Ans. d. Open the wound sutures in the ward

175. Ans. a. 0.1-0.2 mg *(Ref: Harrison 18/e p2922)*

- **Daily replacement dose** of **thyroxine**: **1.6 µg/Kg** body weight (**0.1-0.15 gm**) Q
- For **TSH suppression** (in **PTC** and **FTC**), dose of thyroxine: **2.7 µg/Kg** body weightQ

176. Ans. c. Hypocalcemia

- **Tracheomalacia** and **collapse** of the **larynx, wound hematoma** with **compression** of the **trachea** and **thyroid storm** are **early life threatening complications** of **thyroidectomy**Q.
- **Hypocalcemia** which occurs after **2-5 days after operation** and **severity of causing life threatening situation is least** with hypocalcemia as compared to the given options.

177. Ans. b. Recurrent laryngeal nerve

THYROIDITIS

178. Ans. a. Anti-TPO *(Schwartz 10/e p1535, 9/e p1357; Sabiston 19/e p895; Bailey 26/e p770, 25/e p799; Harrison 18/e p2929)*

Hashimoto's Thyroiditis

- First described by Hashimoto as **struma lymphomatosa**Q i.e. a transformation of thyroid tissue to lymphoid tissue.
- **MC inflammatory disorder** of the thyroid and **leading cause** of **hypothyroidism**Q.
  - **Thyroid lymphoma**Q is a rare but **well recognized complication**
  - **Papillary thyroid carcinoma**Q may be occasionally associated
- **Genetic association** has been noted with **HLA B8, DR3** and **DR5**Q.
- More common in **women** (Male: female, 1:10), near menopause (**30-50 years**).

Etiopathogenesis

- **Autoimmune** disease
- Thought to be initiated by **activation** of **CD4+T (helper) lymphocytes** which further recruit cytotoxic CD8+T cells.
- Thyroid tissue is destroyed by **cytrotoxic T cells** and **autoantibodies**Q.

Autoantibodies are directed against		
1. Thyroglobulin (Tg): 60%	**2. Thyroid peroxidase** (TPO): **95%**Q	**3.** TSH-R: 60%

- It is also thought to be **associated with:**
  - Increased intake of **iodine**
  - Drugs such as **interferon alpha, lithium, amiodarone**

Pathology

- **Gross examination**: **Mildly enlarged thyroid**Q with pale, gray-tan cut surface
- **Microscopic examination:**
  - Gland is **diffusely infiltrated** by **small lymphocytes** and **plasma cells**Q and occasionally shows well-developed germinal centers.
  - **Smaller** thyroid **follicles** with **reduced colloid** and increased interstitial connective tissue.
  - Follicles are lined by **Hürthle** or **Askanazy cells**Q (characterized by abundant eosinophilic, granular cytoplasm)

Clinical Features

- **MC** presentation**: Minimally** or **moderately enlarged firm gland**Q.
- On examination an **enlarged pyramidal lobe** is often palpable.
- Mild hyperthyroidism may be present initially (due to destruction of thyroid tissue)
- **Hypothyroidism** is inevitable and **usually permanent**Q**.**

Laboratory Findings

- **Elevated TSH** and presence of thyroid **autoantibodies confirm** the **diagnosis**Q.
- **Elevated TSH**, **reduced T4** and **T3** levelsQ.
- Presence to thyroid autoantibodies (particularly **TPO antibody**)Q
- In case of doubt, diagnosis is confirmed by **FNA biopsy**.

Management

- **Thyroid hormone replacement therapy** for overtly **hypothyroid** patients or in euthyroid patients to **shrink large goiters**Q.
- Treatment is advised especially for middle-aged patients with **cardiovascular risk factors** such as hyperlipidemia or hypertension and in **pregnant patients**.
- **Surgery** may occasionally be indicated for **suspicion of malignancy** or for **goiters** causing **compressive symptoms** or cosmetic deformity.

179. Ans. b. Subacute thyroiditis *(Ref: Schwartz 10/e p1535, 9/e p1356; Sabiston 19/e p895; Bailey 26/e p771, 25/e p800; Harrison 18/e p2928)*

Subacute /de Quervain's/ Granulomatous/ Viral Thyroiditis/ Painless or Silent Giantcell Thyroiditis

- Also termed de Quervain's thyroiditis, granulomatous thyroiditis, or viral thyroiditis.
- Peak incidence: **30-50 years**; **women** are affected three times more frequently than men.
- Usually follows **upper respiratory tract infection**Q
- A **viral etiology** has been proposed
- **Strong association** with the **HLA-B35 haplotype**Q

The Disorder Classically Progresses Through four Stages.
1. Initial **hyperthyroid phase**, due to release of thyroid hormone
2. **Euthyroid** phase
3. **Hypothyroidism**, occurs in about 20 to 30% of patients
4. **Resolution** and return to the **euthyroid state** in >90% of patients.

- In the **early stages** of the disease, **TSH** is **decreased**, and **Tg, T4 ,** and T_3 levels are **elevated** due to the release of preformed thyroid hormone from destroyed follicles.
- **ESR** is typically **>100 mm/h**Q**.**
- **RAIU** also is **decreased**Q (<2% at 24 hours), even in euthyroid patients, due to the release of thyroid hormones from destruction of the thyroid parenchyma.

Clinical Features

- **Painful** and **enlarged thyroid**, sometimes accompanied by fever.
- Features of **thyrotoxicosis** or **hypothyroidism**, depending on the phase of the illness.
- Malaise and symptoms of an **upper respiratory tract infection** may **precede** the **thyroid-related features**Q by several weeks.
- The patient typically complains of a **sore throat** and **small exquisitely tender goiter**Q
- Pain is often referred to the jaw or ear.
- **Complete resolution** is the **usual outcome**Q
- Permanent hypothyroidism can occur, particularly in those with coincidental thyroid autoimmunity.

Laboratory Findings

- **ESR** is **markedly elevated**Q
- **Antithyroid antibodies** are **low** with T4, T3 and TSH levels depend on the stage of disease.

- **RAIU** is **decreased** during the hyperthyroid stage (distinguishes from Grave's disease)
- In doubt: **FNAC** (shows characteristic **giant multinucleated cells)**Q

Treatment

- Treatment is **primarily symptomatic**, as disease is **self-limited**Q.
- **Aspirin** or other **NSAIDs** are sufficient to control symptoms in most cases.
- **Severe cases** with marked local or systemic symptoms may require **glucocorticoids**
- **Short term thyroid replacement** may be needed in the **hypothyroid phase**.
- **Thyroidectomy** is reserved for the **rare patients** who have a prolonged course **not responsive** to **medical measures.**

180. Ans. a. Thyroid peroxidase antibodies **181. Ans. b. ↑ESR** **182. Ans. d. Orphan Annie eye nuclei**

183. Ans. b. Hashimoto's disease **184. Ans. a. Hashimoto's thyroiditis** **185. Ans. c. Hashimoto's thyroiditis**

186. Ans. c. Increased radioactive iodine uptake

187. Ans. a. Autoimmune in etiology

188. Ans. c. Subacute thyroiditis; d. Factitious thyroiditis *(Ref: Schwartz 9/e p1353; Harrison 17/e p2229)*

Differential Diagnosis of Hyperthyroidism	
Increased Hormone Synthesis (Increased RAIU)	**Release of Preformed Hormone (Decreased RAIU)**
• **Grave's** disease[Q] (diffuse toxic goiter) • **Toxic multinodular goiter**[Q] • **Plummer's disease**[Q] (toxic adenoma) • **Drug induced**: amiodarone, iodine • Thyroid cancer • Struma ovarii • Hydatidiform mole	• **Thyroiditis**: Acute phase of **Hashimoto's** thyroiditis, **subacute** thyroiditis[Q] • **Factitious (iatrogenic)** Thyrotoxicosis • "Hamburger thyrotoxicosis"

189. Ans. c. In the thyrotoxic phase radioiodine uptake is increased **190. Ans. b. Hashimoto's thyroiditis**

191. Ans. d. Reidel's thyroiditis *(Ref: Schwartz 10/e p1536, 9/e p1357; Sabiston 19/e p896; Bailey 26/e p771, 25/e p800)*

Riedel's Thyroiditis

- A rare variant of thyroiditis also known as **Riedel's struma**[Q] or **invasive fibrous thyroiditis**
- Characterized by the **replacement of** all or part of the **thyroid parenchyma** by **fibrous tissue**
- Also **invades** into **adjacent tissues**[Q].
- **Etiology**: Primary **autoimmune etiology** (probably)

Riedel's Thyroiditis is Associated With		
• **Mediastinal** and **retroperitoneal** fibrosis	• **Periorbital** and **retro-orbital** fibrosis	• **Sclerosing cholangitis**

Clinical Features

- Occurs predominantly in **women**, **30-60 years**.
- Presents as a **painless, hard anterior neck mass**[Q], which progresses over weeks to years to produce **symptoms** of **compression**, including dysphagia, dyspnea, choking, and hoarseness.
- Patients may present with symptoms of **hypothyroidism** and **hypoparathyroidism**[Q] as the **gland** is **replaced** by **fibrous tissue**.
- Physical examination: **Hard, "woody" thyroid gland** with **fixation**[Q] to surrounding tissues.

Diagnosis

- Diagnosis is confirmed by **open thyroid biopsy**[Q], because the firm and fibrous nature of the gland renders **FNAC inadequate**.

Treatment

- **Surgery**[Q] is the **mainstay** of the treatment (decompress the trachea by wedge excision of the thyroid isthmus)
- Some patients show dramatic improvement with **tamoxifen** and **corticosteroids**.

192. Ans. c. Riedel's thyroiditis **193. Ans. c. Subacute thyroiditis** *(Ref: Schwartz 10/e p1535, 9/e p1356; Sabiston 19/e p895)*

Diagnosis in this case is subacute thyroiditis. Symptoms are more severe in acute thyroiditis with complications and acute thyroiditis is more common in children.

Just take a look of acute thyroiditis.

Acute (Suppurative) Thyroiditis

- Acute thyroiditis is rare and due to **suppurative infection** of the **thyroid**[Q].
- **More common** in **children** and often is **preceded by** an **upper respiratory tract infection** or **otitis media**[Q].

Etiology

- The thyroid gland is inherently resistant to infection due to its extensive blood and lymphatic supply, high iodide content, and fibrous capsule.

Infectious Agents can Seed Thyroid

1. Via **hematogenous** or **lymphatic route**Q
2. Via direct **spread** from **persistent pyriform sinus fistulae** or **thyroglossal duct cysts**Q
3. As a result of **penetrating trauma**Q
4. Due to **immunosuppression**Q

- **Streptococcus** and **anaerobes**Q account for about **70%** of cases.
- In **children** and **young adults**, **MC cause** is presence of a **pyriform sinus**Q (remnant of the fourth **branchial pouch** that connects the oropharynx with thyroid), such sinuses are predominantly **left-sided**Q.
- **Long-standing goiter** and **degeneration** in **thyroid malignancy** are risk factors in **elderly**Q.

Clinical Features

- **Thyroid pain**, often referred to the throat or ears, and a **small, tender goiter**Q
- **Fever, dysphagia** and **erythema** over the thyroid
- Systemic symptoms of a **febrile illness** and **lymphadenopathy**Q.
- Complications such as systemic sepsis, tracheal or esophageal rupture, jugular vein thrombosis, laryngeal chondritis, and perichondritis or sympathetic trunk paralysis may also occur.

Diagnosis

- **ESR** and **WBC count** are usually **increased**, but **thyroid function** is **normal**.
- **FNA biopsy** shows infiltration by **polymorphonuclear leukocytes**
- **Culture** of the sample can identify the organism.
- **Persistent pyriform sinus fistula** should be suspected in **children** with recurrent acute thyroiditis. A **barium swallow** demonstrates the anomalous tract with **80% sensitivity**Q.

Treatment

- **Parenteral antibiotics** and **drainage** of **abscesses**Q.
- Patients with **pyriform sinus fistulae** require **complete resection**Q of the sinus tract, including the area of the thyroid where the tract terminates, **to prevent recurrence**.

194. **Ans. c. Thyroglobulins**
195. **Ans. c. To overcome pressure on trachea or esophagus**
196. **Ans. b. Antithyroid nuclear antibodies**
197. **Ans. a. Subacute lymphocytic thyroiditis**
198. **Ans. c. Hashimotos thyroiditis**
199. **Ans. d. Reidel's thyroiditis**
200. **Ans. c. Gaint cell infiltration**

THYROGLOSSAL CYST AND FISTULA

201. **Ans. d. Thyroglossal cyst/fistula** *(Ref: Schwartz 10/e p1521, 9/e p1344; Sabiston 19/e p813-814)*

THYROGLOSSAL CYST

- It is **cystic swelling** developed in the remnant of the **thyroglossal duct** or **tract**
- It may be **present** in **any part** of the **thyroglossal tract**Q (thyroglossal tract extends from foramen caecum to the isthmus of thyroid)

Common sites

- **Subhyoid (MC)**Q
- Suprahyoid
- Beneath the foramen caecum
- In the region of the thyroid cartilages
- In the floor of mouth

Clinical Features

- It is a **midline swelling**Q, except in the region of the thyroid cartilage, where the thyroglossal tract is pushed to one side, usually to the left.
- Though it's a **congenital swelling**Q most common **age of presentation** is between **15-30 years**Q**.**
- Cyst can be **moved sideways** but not vertically.
- Peculiar characteristic which helps in distinguishing thyroglossal cyst from other neck swelling
  - **Moves up with protrusion of tongue**Q as the thyroglossal tract is attached to the tongue.
  - **Moves with deglutition**Q so do all thyroid swellings, subhyoid bursitis.
- Cyst is lined by pseudostratified columnar epithelium and squamous epithelium with **hetrotopic thyroid tissue** present in **20%** of cases.

Complications

- **Recurrent infections**Q
- Formation of **thyroglossal fistula**Q
- Carcinomatous change, usually **papillary carcinoma**Q

Treatment

- **Sistrunk operation**: **En-bloc cystectomy** and **excision** of the **central hyoid bone**Q to minimize recurrence.

202. Ans. a. Does not move with deglutition **203. Ans. c. Thyroglossal cyst** **204. Ans. c. Subhyoid**

205. Ans. c. Incision and drainage is the treatment of choice

206. Ans. a. Papillary

207. Ans. c. Excision of central part of hyoid bone and cone of tongue muscles upto foramen caecum

208. Ans. a. Surgical removal

THYROID ANATOMY AND PHYSIOLOGY

209. Ans. a. Jod-Basedow effect *(Ref: Schwartz 10/e p1526, 9/e p1348; Sabiston 19/e p892; Harrison 17/e p2241)*

• **Wolff-Chaikoff** effect	• Iodine induced hypothyroidism[Q] • (Iodine dependent transient thyroid suppression)
• **Jod-Basedow's** effect	• Iodine induced hyperthyroidism[Q]

210. Ans. b. 0.04 mIU/L *(The thyroid: a Fundamental and Clinical Text (Lippincott Williams) 2008/329-330)*

The lower functional limit for third generation TSH assays is about 0.01 to 0.02 mIU/L.

211. Ans. b. Inferior thyroid artery **212. Ans. b. Inversely** **213. Ans. c. 18-20 gm**

214. Ans. a. Nephrotic syndrome

- **In Nephrotic syndrome, iodine binding proteins are decreased.**

215. Ans. c. 2nd and 3rd and 4th tracheal cartilage *(Ref: Schwartz 10/e p1523, 9/e p1345; Sabiston 19/e p887; Gray's 39/e p560-564)*

Isthmus that is located just inferior to the cricoid cartilage, usually anterior to the 2nd and 3rd tracheal cartilages.

Thyroid Gland

- **Normal weight** of thyroid gland: **20-25 gms**[Q]
- **Daily iodine requirement**: **100-150 µg**[Q]
- Father of thyroid surgery: **Theodor Kocher**[Q]
- Gland weight varies **inversely with iodine intake**[Q].
- **Isthmus** that is **located just inferior** to the **cricoid cartilage**, usually anterior to the **2nd** and **3rd (mainly)** and **4th tracheal rings**[Q].
- A **pyramidal lobe** is present in about **50%** of patients.
- The **thyroid capsule** is **condensed into the posterior suspensory** or **Berry's ligament**[Q] near the cricoid cartilage and upper tracheal rings.
- The **thyroid gland** has a **thin capsule** of connective tissue, which extends into the glandular parenchyma and divides each lobe into irregularly shaped and sized lobules.
- The **external laryngeal nerve** runs **close** to the **superior thyroid artery** and the **recurrent laryngeal nerve runs close** to the **inferior thyroid artery**[Q].

MISCELLANEOUS

216. Ans. d. All the above *(www.medixon.com)*

Scabard (Saber-Sheath) Trachea

- **Flattening of trachea** caused **by lateral compression**[Q] by swellings or tumors
- Causes: **Carcinoma thyroid, thyroiditis, carcinoma larynx, goitre**[Q]

217. Ans. b. Tracheostomy *(Ref: Nelson 17/e p1881)*

Partial thyroidectomy is preferred over tracheostomy.

218. Ans. a. I^{131}

219. Ans. a. Radioiodine is contraindicated

220. Ans. b. Chromosome 7q *(Ref: Harrison 18/e p252, 2913; Schwartz 9/e p1349)*

Pendred's Syndrome

- Consists of **congenital sensorineural hearing loss + goitre**[Q]
- Due to defect in sulfate transport protein (chromosome **7q**[Q]) to the thyroid gland and cochlea

Rafetoff Syndrome	**End organ resistance** to **T4**[Q]

221. Ans. a. Lingual thyroid *(Ref: Schwartz 10/e p1522, 9/e p1345)*

Reddish swelling in the region of foramen caecum is Lingual thyroid.

Lingual Thyroid

- Forms a **rounded swelling** at the **back of tongue** at the **foramen caecum**Q
- It may represent the **only thyroid tissue present**Q
- May cause dysphasia, impairment of speech, respiratory obstruction or hemorrhage
- **Medical treatment** options include administration of **exogenous thyroid hormone** to **suppress TSH** and **RAI ablation** followed by **hormone replacement**.
- **Surgical excision** is **rarely needed** but, if required, should be preceded by an evaluation of normal thyroid tissue in the neck to avoid inadvertently rendering the patient hypothyroid.

222. Ans. d. Benign lesion; e. Included in Teratoma *(Ref: Shaws Gynecology 14/e p336-337)*

Struma Ovarii

- Highly specialized variety of **teratoma**
- A **benign ovarian tumor** containing **thyroid tissue**Q
- The tumor is solid and consisting entirely of thyroid tissue
- Some cases develop **thyrotoxicosis**Q
- Most of the tumor is **innocent**, but malignant transformation have been recorded

223. Ans. c. Di-George syndrome

Di-George Syndrome

Characterized by

- **Congenital cardiac defects**, particularly those involving great vesselsQ
- Hypocalcemic tetany due to **failure of parathyroid development**Q
- **Absence of normal thymus**, T-cell immunodeficiencyQ

CHAPTER 3

Parathyroid and Adrenal Glands

MULTIPLE CHOICE QUESTIONS

MULTIPLE ENDOCRINE NEOPLASIA

1. **A 20-years old male presents with chronic constipation, headache and habitus, neuromas of tongue, medullated corneal nerve fibers and nodule of 2X2 cm size in left lobe of thyroid. This patient is a case of:** *(All India 2004)*
   a. Sporadic medullary carcinoma of thyroid
   b. Familial medullary carcinoma of thyroid
   c. MEN-2A
   d. MEN-2B

2. **MEN-2A includes all except:** *(PGI June 2004)*
   a. Ganglioneuromas
   b. Cutaneous Lichen amyloidosis
   c. Mutation in RET in chromosome 10
   d. Adrenal adenoma

3. **True about MEN-1:** *(PGI June 2004)*
   a. ↑ VMA in urine
   b. ↑ Calcitonin
   c. Hypergastrinemia
   d. Hyperprolactinemia
   e. Hypocalcemia

4. **The most common organ involved in MEN-1 is:** *(COMEDK 2010)*
   a. Parathyroid
   b. Thyroid
   c. Adrenal
   d. Testis

5. **True about MEN-2A (Sipple syndrome):** *(PGI Dec 2006)*
   a. Pheochromocytoma
   b. Hyperparathyroidism
   c. Mucocutaneous neuromas
   d. Medullary carcinoma of thyroid

6. **Intestinal obstruction with jejunal neuromas are found in:**
   a. MEN-1 *(MHSSMCET 2006)*
   b. MEN-2A
   c. MEN-2B
   d. Familial intestinal polyposis

7. **An infant is diagnosed with MEN-2B trait. Which the following will be best line of management?**
   a. Prophylactic surgery *(MHSSMCET 2007)*
   b. Clinical observation and follow up
   c. Regular FNAC
   d. All of the above

8. **Common feature to MEN1 and MEN2?**
   a. Hyperparathyroidism *(MHSSMCET 2010, 2006)*
   b. Medullary carcinoma of thyroid
   c. Pheochromocytoma
   d. Carcinoids

PARATHYROID GLAND

9. **Primary hyperparathyroidism is caused by:** *(PGI June 2002)*
   a. Parathyroid hyperplasia
   b. Adenosis
   c. MEN-1
   d. Thyrotoxicosis
   e. CRF

10. **Treatment for parathyroid hyperplasia is:** *(UPSC 2001)*
    a. Removal of all four glands
    b. Calcitonin
    c. Removal of 3½ glands
    d. Enlarged glands to be removed

11. **Parathyroid adenoma most commonly involves which of the following site:** *(AIIMS June 2002)*
    a. Thyroid substance
    b. Superior parathyroid lobe
    c. Inferior parathyroid lobe
    d. In the mediastinum

12. **Features to differentiate parathyroid adenoma from hyperplasia would include which of the following?**
    a. Presence of excess chief cells *(AIIMS June 2002)*
    b. High levels of parathormone
    c. Infiltration of capsule
    d. Identifying hyperplasia of all 4 glands at surgery in parathyroid hyperplasia

13. **True about parathyroid carcinoma:**
    a. Parathyroid gland is palpable
    b. High calcium lebel
    c. Cinacalcet is used
    d. All of the above

14. **In case of parathyroid adenoma, treatment is:** *(AIIMS Nov 95)*
    a. Calcitonin and steroid
    b. Removal of adenoma
    c. Total parathyroidectomy and implantation in arm
    d. Total parathyroidectomy

15. **Kamli Rani, 75-years old woman present with post myocardial infarction after 6 weeks mild CHF. There was past H/O neck surgery for parathyroid adenoma 5 years ago, ECG shows slow atrial fibrillation. Serum Ca^{2+} 13.0 mg/L and urinary Ca^{2+} is 300 mg/24 hr. On examination there is small mass in the Para tracheal position behind the right clavicle. Appropriate management at this time is:** *(All India 2002)*
    a. Repeat neck surgery
    b. Treatment with technetium-99
    c. Observation and repeat serum Ca^{2+} in two months
    d. Ultrasound-guided alcohol injection of the mass

16. **Commonest cause for hyperparathyroidism is:** *(All India 89)*
    a. Single adenoma
    b. Multiple adenomas
    c. Single gland hyperplasia
    d. Multiple gland Hyperplasia

17. **Most common cause of hypercalcemic crisis is:** *(AIIMS 87)*
    a. Parathyroid adenoma
    b. Parathyroid hyperplasia
    c. Carcinoma breast
    d. Paget's disease

18. **Hypoparathyroidism occurs as a result of:** *(TN 91)*
    a. Idiopathic atrophy of parathyroids
    b. Following surgery
    c. Thyroiditis with secondary atrophy of parathyroids
    d. All of the above

19. Hypocalcemia in immediate post-op period following excision of parathyroid adenoma is due to: *(AIIMS 92)*
a. Stress
b. Increased uptake by bones
c. Hypercalciuria
d. Increased calcitonin

20. In parathyroid crisis with sudden elevations of calcium over 16 mg/dl; the treatment consist of: *(AIIMS 80, UPSC 84)*
a. Intravenous vitamin D
b. Parathyroidectomy for removal of adenoma
c. Thyrocalcitonin
d. Intravenous bicarbonate
e. All of the above

21. Hyperparathyroidism is characterized by the following except: *(PGI 80, AMU 88)*
a. Generalized osteoporosis
b. Renal calculi
c. Hypercalcemia
d. Osteosclerosis

22. A patient has hypocalcaemia which was the result of a surgical complication. Which operation could it possibly have been? *(JIPMER 89, UPSC 86)*
a. Nephrectomy
b. Thyroidectomy
c. Gastrectomy
d. Vocal cord tumour biopsy

23. The symptoms of hyperparathyroidism include:
a. Constipation and muscle weakness *(AIIMS 81, PGI 85)*
b. Anorexia and weight loss
c. Polydipsia and polyuria
d. All of the above

24. A known patient with renal stone disease developed pathological fractures along with abdominal pain and certain psychiatric symptoms. He should be investigated for:
a. Polycystic kidney
b. Renal tubular acidosis
c. Hyperparathyroidism
d. Paget's disease of bone

25. Hypocalcemia is a feature of all of the following except:
a. Chronic renal failure *(UPSC 2000)*
b. Hypoparathyroidism
c. Pseudo hypoparathyroidism
d. Total thyroidectomy

26. Which of the following is true about secondary hyperparaty-roidism?
a. Commonly occurs in CRF
b. Related to hyperphophatemia
c. Patients are generally hypocalcemic
d. All of the above

27. Which of the following is true about parathyroid?
a. Post parathyroid glands are within junction of inferior thyroid artery and RLN
b. Most common location of ectopic parthyroid glands is paraesophageal
c. Lower parathyroid is anterior to RLN
d. All of the above

ADRENAL GLANDS

28. During bilateral adrenalectomy, intra-operative dose of hydrocortisone should be given after: *(AIIMS Nov 2004)*
a. Opening the abdomen
b. Ligation of left adrenal vein
c. Ligation of right adrenal vein
d. Excision of both adrenal glands

29. A 35-years old woman has had recurrent episodes of headache and sweating. Her mother had renal calculi and died of thyroid cancer. Physical observations revealed a thyroid nodule and ipsilateral enlarged cervical lymph nodes. Before performing thyroid surgery the woman's physician should order: *(All India 2002)*
a. Thyroid scan
b. Estimation of hydroxyl indole acetic acid in urine
c. Estimation of urinary metanephrines, VMA and catecholamines
d. Estimation of TSH, and TRH levels in serum

30. Young female presents with hypertension with VMA >14 mg/day, associated with: *(PGI Dec 2002)*
a. Medullary carcinoma thyroid
b. Von-Hippel Lindau disease
c. Sturge-Weber syndrome
d. Grave's disease
e. Neurofibromatosis

31. Palpation on the costovertebral angle produces pain and tenderness in acute adrenal insufficiency. This is: *(AIIMS 87, 89)*
a. Rotch's sign
b. Rossolimo's sign
c. Rogoff's sign
d. Osler's sign

32. Commonest cause of Cushing syndrome is: *(Kerala 95)*
a. Adrenal adenoma
b. Carcinoma
c. Hyperplasia
d. Atrophy

33. Most common cause of Addison's disease in India: *(AIIMS Nov 2011)*
a. Tuberculosis
b. Post-partum
c. Autoimmune
d. HIV

34. Indication for surgery in a case of adrenal incidentaloma:
a. Size >5 cm *(MAHE 2008, 2007)*
b. Bilateral adrenal metastasis
c. Functional tumor
d. All of the above

35. Incidental finding in CT scan, a 3 cm adrenal mass, which of the following is not done? *(UPPG 2008)*
a. Adrenalectomy
b. Dexamethasone suppression test
c. Measurement of catecholamines
d. Midnight plasma cortisol

36. Accidental finding of incidentaloma (Adrenal mass) on USG is detected. Following is/are to be ruled out: *(PGI Dec 2006)*
a. Cushing's disease
b. Metastasis
c. Adrenal adenoma
d. Carcinoma
e. Adrenal hyperplasia

37. True about adrenocortical carcinoma:
a. Rare tumor
b. More than half are functional
c. Most commonly associated with Cushing syndrome
d. All of the above

38. A 50 years old male presents with severe refractory hypertension, weakness, muscle cramps and hypokalemia, the most likely diagnosis is: *(COMEDK 2011)*
a. Hypoaldosteronism
b. Hyperaldosteronism
c. Cushing syndrome
d. Pheochromocytoma

39. Which one of the following is not a CT feature of adrenal adenoma? *(AIIMS Nov 2010)*
a. Low attenuation
b. Homogeneous density and well defined borders
c. Enhances rapidly, contrast stays in it for relatively longer time and washes out late
d. Calcification is rare

40. After bilateral adrenalectomy, patient developed gradual loss of vision, with hyperpigmentation of skin, and headache. Likely cause is: *(MHSSMCET 2006)*
a. Addison's disease
b. Nelson syndrome
c. Cushing's disease
d. Hypopituitarism

41. Nonfunctional adrenal tumors are operated at what size: *(MHSSMCET 2009)*
a. >3cm b. >5cm
c. >6cm d. >10cm

42. In renal agenesis, the adrenal gland is: *(MHSSMCET 2006)*
a. Absent
b. Present on contralateral side
c. Ectopic in the iliac fossa
d. Present at the usual location

PHEOCHROMOCYTOMA

43. Which one of the following clinical features is not seen in pheochromocytoma? *(COMEDK 2011)*
a. Hypertension b. Episodic palpitations
c. Weight loss d. Diarrhea

44. Episodic hypertension is a feature of: *(JIPMER 2010)*
a. Carcinoid tumor
b. Insulinoma
c. Pheochromocytoma
d. Zollinger-Ellison syndrome

45. The investigation of choice for extra adrenal pheochromocytoma: *(PGI Dec 2007)*
a. MIBG scan b. MRI
c. CT d. X-ray
e. USG

46. All are true about pheochromocytoma except:
a. 90% are malignant *(All India 2011)*
b. 95% occur in the abdomen
c. They secrete catecholamines
d. They arise from sympathetic ganglions

47. Investigation useful for detecting extra-adrenal pheochromocytoma: *(PGI May 2011)*
a. USG
b. CT
c. T2-weighted MRI with gadolinium contrast
d. MIBG

48. True about pheochromocytoma is: *(MHPGMCET 2002)*
a. Arises from chromaffin cells of adrenal medulla
b. Bilateral in 20% of all cases
c. Hypotension rules out pheochromocytoma
d. Almost always a malignant tumor

49. Pheochromocytoma with malignant potential exclusively secretes: *(MHPGMCET 2008)*
a. Dopamine b. Epinephrine
c. Metanephrine d. Norepinephrine

50. False regarding pheochromocytoma:
a. 10% of nonfamilial adrenal pheochromocytomas are bilateral *(MHSSMCET 2006)*
b. Only 10% of hypertensive patients have an underlying pheochromocytoma
c. 10% of adrenal pheochromocytomas arise in childhood
d. FNAC is must for diagnosis

51. Commonest symptom of pheochromocytoma is: *(UPSC 88)*
a. Palpitation b. Headache
c. Sweating d. Dyspnea

52. In pheochromocytoma, the urine will contain: *(UPPG 96)*
a. VMA b. HIAA
c. Both d. None

53. False statement about pheochromocytoma:
a. 10% are bilateral *(All India 97)*
b. Arises from chromaffin cells
c. Extra adrenal tumor - increased nor adrenaline levels
d. Increased VMA levels in urine

54. Radionuclide used in pheochromocytoma is:
a. Radioactive iodine I-131 *(COMEDK 2005)*
b. Technitium pertechnate
c. Radiolabelled chromium
d. I-123 Metaiodobenzylguanidine (MIBG)

55. The most common site of ectopic pheochromo-cytoma is:
a. Organ of Zuckerkandl b. Bladder *(COMEDK 2008)*
c. Filum terminale d. Celiac plexus

56. A patient presented with headache and flushing. He has a family history of his relative having died of a thyroid tumour. The investigation that would be required for this patient would be: *(AIIMS June 99)*
a. Chest X-ray
b. Measurement of 5 HIAA
c. Measurement of catecholamine
d. Intravenous pyelography

57. Investigation of choice in case of a patient with episodic hypertension, headache and thyroid nodule: *(AIIMS Nov 97)*
a. Urinary HIAA
b. Urinary catecholamine and aspiration of nodule
c. Thyroid function test only
d. Urinary basic amino acid metabolite

NEUROBLASTOMA

58. Neuroblastomas: Good prognostic factor is: *(PGI June 2000)*
a. N-myc amplification b. RAS oncogene
c. Hyperdiploidy d. Translocations

59. Opsoclonus-Myoclonus is a phenomenon seen in: *(PGI 97)*
a. Wilm's tumor b. Neuroblastoma
c. Meningioma d. Cortical tuberculoma

60. Not seen in neuroblastoma is: *(UPPG 96)*
a. Diarrhea b. Proptosis
c. Splenomegaly d. Bone involvement

61. True about neuroblastoma: *(PGI Dec 2006)*
a. Seen in adrenal glands
b. ↑ VMA/HVA
c. Lymphatic metastasis more common than blood metastasis
d. Presents with abdominal mass
e. Old age presentation implies good prognosis

62. Which of the following statements about neuro-blastoma is not true? *(All India 2009)*
a. Most common extra cranial solid tumor in childhood
b. >50% present with metastasis at time of diagnosis
c. Lung metastasis are common
d. Often encase aorta and its branches at time diagnosis

63. Mrs. Neena noted an abdominal mass in left side of her 6 months old child, which showed calcification near the left kidney. What will be the cause? *(AIIMS Nov 2000)*
a. Leukemia b. Neuroblastoma
c. RCC d. Lymphoma

64. Tumor arising from olfactory nasal mucosa is:
a. Nasal glioma *(All India 2012)*
b. Adenoid cystic carcinoma
c. Nasopharyngeal carcinoma
d. Esthesio-neuroblastoma

EXPLANATIONS

MULTIPLE ENDOCRINE NEOPLASIA

1. **Ans. d. MEN-2B:** *(Ref: Schwartz 9/e p1377; Sabiston 19/e p995-1001; Bailey 26/e p795-797, 25/e p824-826; Harrison 18/e p3072, 3075)*

MEN-1 (WerMer's Syndrome)

Parathyroid Adenoma	Pancreatic NET (PGI)	Pituitary Adenoma
• **MC endocrine abnormality** (**>98%** of affected individuals) in MEN-1 is **multiglandular parathyroid tumors**Q. • **Hyperparathyroidism** is **MC manifestation** (**cardinal sign** of MEN-1 is **parathyroid adenoma** of **multicentricity**) Q. • **Hypercalcemia** is **first biochemical abnormality**Q detected in MEN-1 and may precede the clinical onset of a pancreatic NET or pituitary neoplasm by several years.	• Pancreatic NET is **2nd MC manifestation**Q. • **Nonfunctioning** or that secrete **pancreatic polypeptide**Q are **MC** pancreatic NET in MEN-1. • MC **functional NET** in patients with MEN-1 is **gastrinoma**Q followed by insulinoma. • MC increased pancreatic hormone: **P**ancreatic polypeptides **>G**astrin **>I**nsulinQ **(PGI)**	• **Prolactinoma** is **most common**Q. • Diagnosed by increased prolactin (>200 µg/l) and MRI.

	MEN-2A (Sipple syndrome)	MEN-2B
Components	• Medullary carcinoma thyroidQ • PheochromocytomaQ • **Parathyroid hyperplasia** or **adenoma**Q • Hirschprung's diseaseQ • Cutaneous lichen amyloidosisQ	• Medullary carcinoma thyroidQ • PheochromocytomaQ • Intestinal ganglioneuromasQ • Mucosal neuromasQ • MegacolonQ • Marfanoid featuresQ
Defect	• **RET** oncogene (**cysteine**Q codon) • Chromosome: **10**Q	• **RET** oncogene (**tyrosine kinase**Q domain) • Chromosome: **10**Q
Transmission	• Autosomal dominantQ	• Autosomal dominantQ

2. **Ans. a. Ganglioneuromas**

3. **Ans. a. ↑ VMA in urine, c. Hypergastrinemia, d. Hyperprolactinemia** *(Ref: Schwartz 9/e p1377; Sabiston 19/e p995-1001; Bailey 26/e p795-797, 25/e p824-825; Harrison 18/e p3072)*

MEN-1 (WerMer's Syndrome)

- **Autosomal dominant**Q
- **Defect: MEN1 gene**Q on chromosome **11**Q (encodes tumour suppressor protein, **menin**Q)

Characteristic Features

Common Manifestations	Less Common Manifestation
• Parathyroid hyperplasia or adenomaQ • Pancreatic NETQ • Pituitary adenomaQ	• Bronchial and thymic carcinoidsQ • Adrenocortical tumors • Subcutaneous or visceral lipomasQ • Facial cutaneous angiofibromasQ • CollagenomasQ

Parathyroid Gland

- **MC endocrine abnormality** (**>98%** of affected individuals) in MEN-1 is **multiglandular parathyroid tumors**Q.
- **Hyperparathyroidism** is **MC manifestation** (**cardinal sign** of MEN-1 is **parathyroid adenoma** of **multicentricity**) Q.
- **Parathyroid hyperplasia** is the **MC cause** of **hyperparathyroidism** in **MEN-1.**
- **Hypercalcemia** is **first biochemical abnormality**Q detected in MEN 1 and may precede the clinical onset of a pancreatic NET or pituitary neoplasm by several years.

Pancreatic Neuro-Endocrine Tumors

- Pancreatic NET is **2nd MC manifestation**Q.
- **Nonfunctioning** or that secrete **pancreatic polypeptide** are **MC** pancreatic NET in MEN-1Q.
- MC **functional NET** in patients with MEN-1 is **gastrinoma**Q followed by insulinoma.
- MC increased pancreatic hormone: **P**ancreatic polypeptides **>G**astrin **>I**nsulinQ. (**PGI**)

Pituitary Adenoma

- In pituitary, **prolactinoma** is **most common**Q.
- Diagnosed by increased prolactin (>200 ug/l) and MRI.

Principal Cause of Mortality in MEN-1
• **Malignant progression** of **duodenopancreatic neuroendocrine cancers**, or **intrathoracic malignant carcinoids**Q.
• **Werner's Syndrome: Adult progeroid syndrome + Carcinoma thyroid**Q

4. **Ans. a. Parathyroid** *(Ref: Schwartz 9/e p1377; Sabiston 19/e p995-1001; Bailey 25/e p824-825; Harrison 18/e p3072)*
5. **Ans. a. Pheochromocytoma, b. Hyperparathyroidism, d. Medullary carcinoma of thyroid**
6. **Ans. c. MEN-2B**
7. **Ans. a. Prophylactic surgery** *(Ref: Schwartz 9/e p1368; Sabiston 19/e p913)*

Prophylactic Thyroidectomy in RET Mutation Carriers	
MEN-2A	Before **5 years**Q
MEN-2B	Before **1 year**Q

8. **Ans. a. Hyperparathyroidism**

PARATHYROID GLAND

9. **Ans. a. Parathyroid hyperplasia, b. Adenosis, c. MEN-1** *(Ref: Schwartz 10/e p1559-1563, 9/e p1377-1380; Sabiston 19/e p928-932; Bailey 26/e p771-774, 25/e p800-804; Harrison 18/e p3100-3105)*

Primary Hyperparathyroidism

- PHPT arises from **increased PTH production**Q from abnormal parathyroid glands and results from a disturbance of normal feedback control exerted by serum calcium.
- More common in **women**Q

  - **Solitary adenoma**Q is the **MC cause** (in **80%**)
  - **Parathyroid adenomas** are **most commonly located** in **inferior** parathyroid glands.

- Increased PTH production leads to **hypercalcemia** via:
  - **Increased GI absorption** of calcium
  - **Increased** production of **vitamin D3**
  - **Reduced renal calcium clearance**

Etiology

- Exposure to **low-dose therapeutic ionizing radiation** and **familial predisposition**Q
- Renal leak of calcium
- **Declining renal function** with age
- **Alteration in** the **sensitivity** of parathyroid glands to suppression by calcium
- **Lithium** therapy

Genetics

- **Most cases** of PHPT are **sporadic**
- Also associated with **MEN1, MEN2A,** isolated familial HPT, and familial HPT with jaw-tumor syndrome.

Clinical Features

- Patients with PHPT formerly presented with the **"classic" pentad** of symptoms:
  - **Kidney stones**Q
  - **Painful bones**Q
  - **Abdominal groans**Q
  - **Psychic moans**Q
  - **Fatigue overtones**Q

- Alteration in the "typical" patient with PHPT due to widespread use of automated blood analyzers.
- Patients are more likely to be minimally symptomatic or asymptomatic.
- Currently, **most patients** present with **weakness,** fatigue, **polydipsia, polyuria, nocturia**, **bone** and **joint pain**, **constipation**Q, decreased appetite, nausea, heartburn, pruritus, depression, and memory loss.
- Renal **calculi** are typically composed of **calcium phosphate** or **oxalate**Q.

Osteitis fibrosa cystica in advanced PHPT
Pathognomonic radiologic findings on **x-rays** of **hands**, characterized by: • **Subperiosteal resorption**Q (most apparent on the **radial aspect**Q of **middle phalanx**Q of **2nd** and **3rd** fingers) • Bone cysts • **Tufting** of **distal phalanges**Q

Diagnosis

- **Elevated serum calcium** and **intact PTH** or two-site PTH levels, **without hypocalciuria** establishes the **diagnosis of PHPT** with virtual certainty.
- **Decreased serum phosphate** (50%) and **elevated 24-hour urinary calcium** (60%) in **PHPT**Q

Localization

- **^{99m}Tc-labeled sestamibi**: **Most widely used** and **accurate modality**Q (sensitivity >80% for detection of parathyroid adenomas)

Treatment

- **Parathyroidectomy** for patients having **"classic" symptoms** of PHPT or **<50 years**Q
- **SERM** and **bisphosphonates** are used to **lower serum calcium** and **increase BMD** in **PHPT.**

Indications for Parathyroidectomy in Asymptomatic Primary HPT	
1. Serum **calcium >1 mg/dL above** the **upper limits** of normal	6. Substantially **decreased bone mineral density** at the lumbar spine, hip, or distal radius
2. **Life-threatening hypercalcemic** episode	7. Age **<50 years**
3. **Creatine clearance** reduced by **30%**	8. Long-term medical surveillance not desired or possible
4. **Kidney stones** on abdominal x-rays	
5. Markedly **elevated 24-h urinary calcium excretion** (**≥400** mg/d)	

10. Ans. c. Removal of 3½ glands *(Ref: Harrison 18/e p3103-3105; Schwartz 10/e p156, 9/e p1384; Sabiston 19/e p936)*

Treatment of Primary Hyperparathyroidism

- **Initial correction** of **hypercalcemia** (**Rapid IV NaCl** with **furosemide**)Q
- **Neck exploration** is done and treatment is done accordingly

A **single parathyroid adenoma** (**85%**)Q	• **Resection**Q
Two adenomas (5%)	• **Resection**Q
Hyperplasia of all four glands (10-15%)	• **Resection** of **3½ glands**Q • **Resection** of **all four glands** with **autotransplantation** of a parathyroid gland in the forearm (**brachioradialis**) or **SCM muscle**Q

Parathyroid Autotransplantation

- Whenever **multiple parathyroids** are **resected**, it is preferable to **cryopreserve tissue**, so that it may be autotransplanted should the patient become hypoparathyroidQ.
- Approx. **12-14 pieces** of 1 mm are transplanted into the **nondominant forearm** in belly of **brachioradialis**Q muscle

11. Ans. c. Inferior parathyroid lobe *(Ref: Harrison 18/e p3100)*

- **Parathyroid adenomas** are **most commonly located** in **inferior**Q parathyroid glands.

12. Ans. d. Identifying hyperplasia of all 4 glands at surgery in parathyroid hyperplasia *(Ref: Harrison 18/e p3104)*

- **Parathyroid adenoma** can be **differentiated from hyperplasia** only at the **time of surgery**Q.
- In case of **adenoma**, **only one gland** is found to be **enlarged**Q, the other three are normal.
- In **hyperplasia**, **all four glands** are **enlarged**Q.

13. Ans. d. All of the above *(Ref: Schwartz 9/e p1385; Sabiston 19/e p941; Bailey 26/e p776, 25/e p804)*

Parathyroid Carcinoma

- Accounts for approximately **1%** of **PHPT** cases.
- Suspected preoperatively by the presence of **severe symptoms**[Q], serum **calcium levels >14** mg/dL, significantly **elevated PTH** levels (5 x normal), and a **palpable parathyroid** gland[Q].

Clinical Features

Parathyroid Carcinoma is suspected preoperatively by
• Presence of **severe symptoms**[Q] • Serum **calcium levels >14**[Q] mg/dL • Significantly **elevated PTH**[Q] levels (5 x normal)

- **Palpable parathyroid**[Q] gland
  - **Local invasion**[Q] is most common; LN metastases in 15% and distant metastases in 33% at presentation.
  - **Intraoperatively**: Presence of a large, gray-white to gray-brown parathyroid **tumor adherent to** or **invasive into surrounding tissues**[Q] and enlarged LN.

Diagnosis

- Accurate diagnosis necessitates **histologic examination** that reveals **local tissue invasion**, **vascular or capsular invasion**[Q], trabecular or fibrous stroma, and frequent mitoses.

Treatment

- Parathyroid cancer: **Bilateral neck exploration** + **En-bloc excision** of **tumor** and ipsilateral **thyroid lobe** ± **MRND** in presence of LN metastases[Q]
- **Reoperation** for **locally recurrent** or **metastatic disease** to **control hypercalcemia**.
- **Cinacalcet**[Q] **(reduce PTH** levels by directly **binding** to **CASR cells** on parathyroid) is useful in **controlling hypercalcemia** in **refractory parathyroid carcinoma**.

14. **Ans. b. Removal of adenoma**

15. **Ans. d. Ultrasound-guided alcohol injection of the mass** *(Ref: Harrison 18/e p3105)*
    - Patient is a case of **recurrent hyperparathyroidism**, as she was operated previously for parathyroid adenoma.
    - In the setting of recent myocardial infarction, CHF and atrial fibrillation, any operation carries a **high risk**.
    - **Ultrasound-guided alcohol injection** in the mass is preferred in this setting.

16. **Ans. a. Single adenoma**

17. **Ans. c. Carcinoma breast** *(Ref: Harrison 18/e p3106)*
    - **Parathyroid adenoma** is the **MC cause of hypercalcemia**[Q].
    - **Malignant tumors** are the **MC cause of hypercalcemic crisis**, of which **CA breast**[Q] is the common cause.

18. **Ans. b. Following surgery** *(Ref: Schwartz 9/e p1372-1373; Sabiston 19/e p921; Bailey 26/e p776-777, 25/e p790-792)*

Parathyroid Insufficiency or Hypoparathyroidism

- Mostly due to **removal of the parathyroid glands** or **infarction due to vascular injury**[Q].
- **Vascular injury**[Q] is more important.
- Cases usually present **2–5 days after operation**[Q] with symptoms of **hypocalcemia** (circumoral and fingertip numbness and tingling tetany, carpopedal spasm and laryngeal stridor)[Q]
- Treatment with **oral calcium** and **vitamin D supplements**[Q]
- **IV calcium gluconate**[Q] may be required in severe cases.

19. **Ans. b. Increased uptake by bones** *(Ref: Schwartz 8/e p1448)*

Hungry Bone Syndrome

- **Hypocalcemia** in **immediate post-op period** following excision of parathyroid adenoma is due to **increased uptake by bones**[Q].
- It is known as **Hungry Bone Syndrome**

20. **Ans. b. Parathyroidectomy for removal of adenoma, c. Thyrocalcitonin** *(Ref: Harrison 18/e p3111)*

Hypercalcemic Crisis

- Patients with PHPT may occasionally **present acutely** with **nausea, vomiting, fatigue, muscle weakness, confusion**[Q], and a decreased level of consciousness; a complex referred to as hypercalcemic crisis.

- These symptoms **result from severe hypercalcemia** from uncontrolled PTH secretion, **worsened by polyuria, dehydration,** and **reduced kidney function**[Q] and may occur with other conditions causing hypercalcemia.

- **Calcium levels** are **markedly elevated** and may be as high as **16 to 20 mg/dL**[Q].
- **Parathyroid glands** tend to be **large** or **multiple,** and the tumor may be palpable.
- Patients with **parathyroid cancer** or **familial HPT** are **more likely**[Q] to present with hypercalcemic crisis.

Treatment

- Treatment consists of **therapies to lower serum calcium levels** followed by **surgery** to correct HPT.
- **Mainstay of therapy**: **Rehydration** with a **0.9% saline** and diuresis with **furosemide**[Q]
- Other drugs used to lower serum calcium levels:
  - **Bisphosphonates, Calcitonin**[Q]
  - **Glucocorticoids** (Hydrocortisone)[Q]
  - **Mithramycin** (plicamycin), **Gallium nitrate**[Q]

21. Ans. d. Osteosclerosis **22. Ans. b. Thyroidectomy**

23. Ans. d. All of the above **24. Ans. c. Hyperparathyroidism**

25. Ans. d. Total thyroidectomy *(Ref: Harrison 18/e p3113)*

Chronic renal failure, Hypoparathyroidism, Pseudo hypoparathyroidism are causes of hypocalcemia.

26. Ans. d. All of the above *(Ref: Schwartz 9/e p1387-1388; Sabiston 19/e p938-939; Bailey 26/e p775-776, 25/e p804; Harrison 18/e p3109-3110)*

Secondary Hyperparathyroidism

- Secondary HPT **commonly occurs** in **chronic renal failure**[Q]
- May occur in hypocalcemia secondary to **inadequate calcium** or **vitamin D intake**, or **malabsorption**[Q].

Pathophysiology of HPT in Chronic Renal Failure

- Related to **hyperphosphatemia**[Q] (and resultant hypocalcemia)
- Deficiency of 1,25-dihydroxy vitamin D due to loss of renal tissue
- Low calcium intake
- Decreased calcium absorption
- Abnormal parathyroid cell response to extracellular calcium or vitamin D in vitro and in vivo.

Clinical Features

- Patients generally are **hypocalcemic** or normocalcemic.

Treatment

- Patients generally are **hypocalcemic** or normocalcemic.

- These patients generally are **treated** medically with a **low-phosphate diet**, **phosphate binders**, adequate intake of **calcium** and **1,25-dihydroxy vitamin D** and a **high calcium, low-aluminum dialysis bath**[Q].

- **Parathyroidectomy** should be considered if **PTH levels remain** high **despite optimal therapy**[Q]**.**

Tertiary Hyperparathyroidism

- **Autonomous parathyroid gland function**[Q]
- Cause problems similar to PHPT, such as pathologic fractures, bone pain, renal stones, peptic ulcer disease, pancreatitis, and mental status changes.
- **Operative intervention** is indicated in:
  - **Symptomatic disease**[Q]
  - If **autonomous PTH secretion** persists for **>1 year after** a successful **transplant**[Q]**.**

Treatment

- **Subtotal** or **total parathyroidectomy** with a**utotransplantation** + **Upper thymectomy**[Q].

27. Ans. d. All of the above *(Ref: Schwartz 9/e p1347, 1374, 1386; Sabiston 19/e p926; Bailey 26/e p742, 25/e p771-772, 803)*

Identification of Parathyroids

- Approximately **85%** of the **parathyroid glands** are found **within 1 cm** of the **junction** of the **inferior thyroid artery** and **RLNs**[Q]**.**

Upper parathyroid glands	• **Superior** to **junction** of **inferior thyroid artery** and **RLNs**[Q] • **Dorsal (posterior)** to **RLN**[Q]
Lower parathyroid glands	• **Inferior** to **junction** of **inferior thyroid artery** and **RLNs**[Q] • **Ventral (anterior)** to **RLN**[Q]

- The thin fascia overlying a "suspicious" fat lobule should be incised using a sharp curved hemostat and scalpel. This maneuver often causes the **parathyroid** gland to **"pop" out**.
- Alternatively, gentle, **blunt peanut sponge dissection** between the carotid sheath and the thyroid gland often reveals a **"float" sign**, suggesting the site of the abnormal parathyroid gland.
- **Normal parathyroids** are **light beige** and only **slightly darker** or **brown** compared to adjacent fat.
- **MC location** of **ectopic** parathyroid gland: **Paraesophageal**[Q] **>Mediastinal >Intrathymic**

ADRENAL GLANDS

28. Ans. d. Excision of both adrenal glands *(Ref: Schwartz 7/e p1639)*

- Patients undergoing surgical treatment of endogenous hypercortisolism require glucocorticoid replacement.
- Steroids are not given pre-operatively because these patients are already hypercortisolemic.
- Instead **hydrocortisone** 100 mg IV is **given after** the **removal** of **second hyperplastic adrenal gland.**

29. Ans. c. Estimation of urinary metanephrines, VMA and catecholamines

The combination of symptoms suggests **MEN-2A** (**Sipple syndrome**), so the patient should be investigated for **pheochromocytoma** by estimation of **urinary metanephrines, VMA** and **catecholamines.**

MEN-2A (Sipple Syndrome)

- **Medullary carcinoma thyroid**Q
- **Hirschprung's disease**Q
- **Pheochromocytoma**Q
- Cutaneous lichen amyloidosisQ
- **Parathyroid hyperplasia** or **adenoma**Q

30. Ans. a. Medullary carcinoma thyroid, b. Von Hippel Lindau disease, c. Sturge Weber syndrome, e. Neurofibromatosis *(Ref: Schwartz 9/e p1399-1400; Sabiston 19/e p980-984; Bailey 26/e p784-785, 25/e p813-814)*

Syndromes associated with Pheochromocytoma (MVVS)	
• **MEN-2A** and **MEN-2B**Q	• **Von-Recklinghausen syndrome**Q
• **VHL syndrome**Q	• **Sturge-Weber syndrome**Q

31. Ans. c. Rogoff's sign www.medhelp.org

ROGOFF'S SIGN

- **Costovertebral angle pain** and **tenderness** in **acute adrenal insufficiency** is known as **Rogoff's sign**Q.

32. Ans. c. Hyperplasia *(Ref: Harrison 18/e p2897)*

- **MC cause** of **Cushing's syndrome** is **iatrogenic** exogenous administration of **steroids**Q.
- **MC endogenous cause** of Cushing's syndrome is **bilateral adrenal hyperplasia**Q secondary to hypersecretion of **ACTH** from pituitary or from an ectopic non-pituitary source.

Causes of Cushing's Syndrome		
Endogenous		**Exogenous**
ADRENAL HYPERPLASIA • **Pituitary ACTH overproduction:** **– Microadenoma**Q **>**Macroadenoma • **Ectopic ACTH overproduction:** **Small cell carcinoma** lungQ – Thymus carcinoid – Carcinoma pancreas – Bronchial adenoma		• **Iatrogenic** exogenous administration of **steroids (MC cause)** Q
ADRENAL NEOPLASIA	• Adenoma**Q** • Carcinoma**Q**	

33. Ans. a. Tuberculosis *(Ref: ASI 7/e p1073)*

- **Most common cause** of **adrenal insufficiency** (**Addison's disease**) in **developing countries** is **Tuberculosis**Q followed by autoimmune disorders.

34. Ans. d. All of the above *(Ref: Schwartz 9/e p1400-1402; Sabiston 19/e p985-986; Bailey 26/e p779-780, 25/e p808-809; Harrison 18/e p2951-2952)*

INCIDENTALOMA

- **Incidentally discovered adrenal masses** discovered through imaging performed for unrelated/nonadrenal disease.
- The differential diagnosis includes both secreting and nonsecreting neoplasms.
- In patients with a **history of malignancy**, **metastatic disease** is the **most likely cause** of adrenal masses, particularly **when bilateral**Q.
- In those **without a clear history of malignancy**, at least **80% of incidentalomas** will turn out to be **nonfunctioning cortical adenomas** or other **benign lesions** that **do not require surgical management**Q.

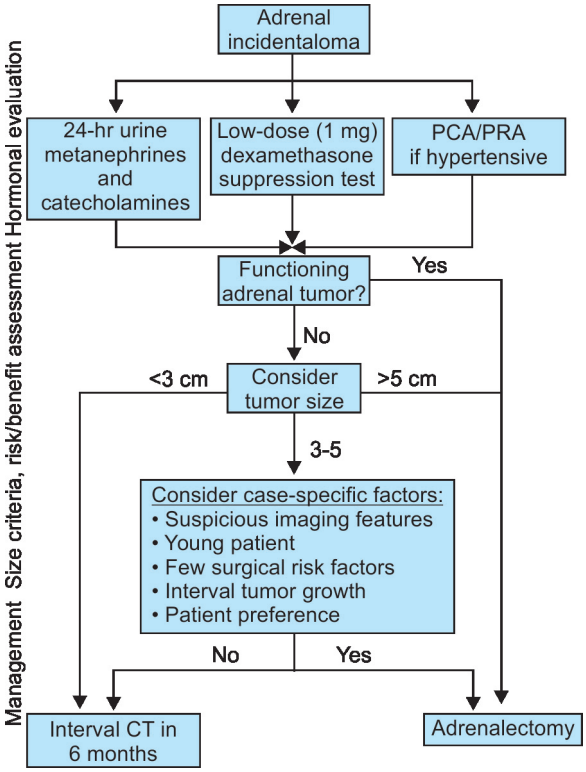
Clinical Evaluation

- The **diagnostic work-up** of an incidentaloma is aimed at **identifying patients** that would **benefit from adrenalectomy**
- The workup for adrenal incidentaloma integrates **hormonal evaluation** with **size criteria**Q.
- Evaluation begins with **history** taking, with a focus on **previous malignancy**, **hypertension**, and symptoms of **glucocorticoid** or **sex steroid excess**.
- **Biochemical investigations** for hormonally active tumors are followed by consideration of **size criteria**.
- Tumors **>6 cm** carry a **>25% risk for malignancy**Q.

- **CT-guided FNAC** is **rarely helpful**Q in the evaluation of adrenal masses and may be **hazardous**.
- The **diagnosis** of **primary adrenal malignancy cannot be reliably based** on **cytologic criteria alone**Q.

- **Use of FNAC** is generally confined to patients with a **history of extra-adrenal malignancy**[Q] in whom the clinician seeks to establish the diagnosis of **metastatic disease**[Q].
- **Pheochromocytoma must be excluded**[Q] before attempting such a procedure to avoid precipitating potentially fatal hypertensive crisis.

Management of Adrenal Incidentaloma



Treatment

- **Surgery** for **hormonally active tumors** and masses carrying **significant risk** for **malignancy**[Q].
- **Most incidentalomas** can be **removed laparoscopically**[Q], except for those displaying obvious malignant features on imaging.
- **Remove all incidentalomas** measuring **>5 cm** and to strongly consider removal of those measuring 3–5 cm, **follow up** with CT, every 6-months for **<3 cm**.

Indications of surgery in Incidentaloma 3–5 cm
1. **Suspicious** imaging characteristics (**heterogeneity, high attenuation**, or **irregular margins**)[Q]
2. **Young age**[Q]
3. **Few surgical risk factors**[Q]
4. **Interval tumor growth**[Q]
5. Patient preference

35. **Ans. a. Adrenalectomy**

36. **Ans. All** *(Ref: CSDT 11th/811-812; Bailey 25/e p808; Schwartz 9/e p1400-1402; Sabiston 19/e p985-986; Harrison 18/e p2952)*

Adrenal Incidentalomas	
Tumor Types	**Percentage**
• **Presumed non-functional adenoma**	**82%**[Q]
• **Preclinical Cushing's**[Q]	5%
• **Pheochromocytoma**[Q]	5%
• **Adrenocortical carcinoma**	5%
• **Metastatic** carcinoma	2%
• Aldosterone producing adenoma	1%

37. Ans. d. All of the above *(Ref: Schwartz 9/e p1397; Sabiston 19/e p979; Bailey 26/e p782-783, 25/e p811-812; Harrison 18/e p2953)*

Adrenocortical Carcinoma

- Adrenocortical carcinoma is a **rare tumor**
- **More than half** of adrenocortical carcinomas **are functional**[Q].
- **Cushing's syndrome**[Q] is **most commonly seen**, followed by virilization.

Pathology

- Microscopically: **Hyperchromatic cells** with and have **large nuclei**, prominent nucleoli.
- It is very difficult to distinguish benign adrenal adenomas from carcinomas by histologic examination alone.
- **Capsular** or **vascular invasion**[Q] is the **most reliable sign of cancer**.

Clinical Features

- Almost **all cases** occur in patients **40–50 years** of age
- **No gender predilection**
- **More than half** of adrenocortical carcinomas **are functional**.
- **Cushing's syndrome**[Q] is **most commonly seen**, followed by virilization.
- **Very large**[Q] at **initial evaluation** (mean tumor size, **9–12 cm**)
- Metastases to the lymph nodes, **liver**[Q], and lungs may be found.

Diagnosis

- **CT: Heterogeneous mass** with **irregular/indistinct borders**, **central necrosis**[Q], and invasion of adjacent structures.
- **Size** of adrenal mass is the **single most important criterion** to **diagnose malignancy**[Q]

Treatment

- **Radical open surgery: En-bloc resection** of **adjacent organs** or **regional lymphadenectomy**[Q] (or both).
- **Ketoconazole, aminoglutethimide** or **metyrapone** (**KAM**): control **steroid hypersecretion**[Q].

Mitotane
– Principal chemotherapeutic agent, **derivative of** insecticide **DDT**[Q]
– Mitotane: Used as an **adjuvant to surgery** and as **primary therapy** in **unresectable** or **metastatic disease**[Q].
– Use is limited by **significant gastrointestinal** and **neurologic toxicity**[Q].

Prognosis

- The **most important predictor** of **survival**: **Adequacy of resection**[Q]
- **Poor** prognosis, **5–year survival** is **15–20%**
- Patients who undergo **incomplete resection** have **extremely limited life expectancy**[Q] (median survival, **<1 year**).
- Prone to develop **local recurrence** and **metastases**, typically **within 2 years**.

38. Ans. b. Hyperaldosteronism *(Ref: Harrison 18/e p2950)*

Manifestation of Conn's Syndrome (Primary Hyperaldosteronism)	
Clinical	**Laboratory**
• **Muscle weakness** and **fatigue** (due to hypokalemia) • **Hypertension without edema** • **Polyuria** and **polydipsia**	• **Hypokalemia** • **Metabolic alkalosis** • **Hypernatremia** • Increased Aldosterone • **Low rennin**

39. Ans. c. Enhances rapidly, contrast stays in it for a relatively longer time and washes out late *(Ref: Grainger Radiology 4/e p1388; Dahnert Wolfgang Radiology Review Manual 6/e p919)*

- **Adrenal adenoma** on **contrast enhanced CT/MRI** show **rapid uptake** and relatively **rapid washout** of **contrast**[Q] material than do non adenomas.

CT Features of Adrenal Adenoma	
• **Well defined /sharply defined**[Q] • **<5 cm in size**[Q] • **Low attenuation (<10 HU) due to lipid content**[Q] • **Mild homogenous enhancement**	• **Relatively rapid washout of contrast material (due to lack of large interstitial spaces)** [Q] • **Relatively rapid washout is characteristic of adenoma**[Q]

40. Ans. b. Nelson's syndrome *(Ref: Harrison 18/e p2899)*

NELSON'S SYNDROME

- **Adrenalectomy** in the setting of **residual corticotroph adenoma** tissue predisposes to the development of Nelson's syndrome[Q].
- Characterized by **rapid pituitary tumor enlargement** and **increased pigmentation** secondary to **high ACTH** levels[Q].
- **Radiation therapy** may be indicated **to prevent** the development of **Nelson's syndrome** after adrenalectomy[Q].

Primary adrenal Cushing's syndrome → **Adrenalectomy** → **Loss of negative feedback** to pituitary → Development of **pituitary adenoma** → Nelson's syndrome.

41. Ans. b. >5cm

42. Ans. d. Present at the usual location *(Ref: Grainger Radiology 4/e p1722)*

- **Embryological development** of **kidneys** and **adrenal** is **different**, hence even in **renal agenesis, adrenal glands** will be in **normal position**[Q].

PHEOCHROMOCYTOMA

43. Ans. d. Diarrhea *(Ref: Schwartz 9/e p1399-1400; Sabiston 19/e p980-984; Bailey 26/e p784-785, 25/e p813-814; Harrison 18/e p2962-2967)*

PHEOCHROMOCYTOMA

- Tumors arise from **chromaffin cells**[Q] in adrenal medulla and elsewhere
- Peak incidence in **4th** and **5th** decade without any gender predilection
- **MC site** of **extra-adrenal tumor** is **organ of Zuckerkandl**[Q]

Also called 10% tumor because	
• 10% are **bilateral**[Q] • 10% are **malignant**[Q] • 10% occur in **pediatric patients**[Q]	• 10% are **extra-adrenal**[Q] • 10% are **familial**[Q]

Etiology and Risk Factors

- Either familial or sporadic. Familial can be syndromic or non-syndromic.

Syndromes associated with **Pheochromocytoma (MVVS)**	
• **MEN-2A** and **MEN-2B**[Q] • **VHL syndrome**[Q]	• **Von-Recklinghausen syndrome**[Q] • **Sturge-Weber syndrome**[Q]

- **Non-syndromic familial pheochromocytomas** are most commonly associated with **succinyl dehydrogenase D** and **B mutations**[Q].

Pathology

- Most are **unilateral** and **solitary**[Q]
- When pheochromocytoma develop in **MEN syndrome**, they are **rarely malignant**[Q]
- In contrast, patients with germline **SDHB mutation** appear to have **higher propensity** for **extra-adrenal** and **malignant tumors**[Q]
- Tumors are **not innervated**[Q], so catecholamines doesn't result from neural stimulation
- Tumors also secrete **endogenous opioids, adrenomedullin, erythropoetin, PTHrp, neuropeptide Y and cromagranin A**[Q].

- **Most pheochromocytoma** produce both NA and Adr with **NA>Adr**[Q].
- **Extra-Adrenal pheochromocytoma** secretes **NA exclusively**[Q] (Deficiency of enzyme PNMT- Phenylethanolamine-N-Methyltransferase).
- Pheochromocytoma associated with **MEN** secretes **Adr alone**[Q].
- Increased production of **dopamine and homovanillic acid** is usually seen in **malignant lesions**[Q].

Histologically Tumor Consists of

- Polygonal to spindle chromaffin cells clustered in small nests or alveoli (**Zelballen**) by a rich vascular network
- Nuclei are round with **salt** and **pepper chromatin**[Q]

Criteria for **malignancy** are based **exclusively** on **presence of metastases**[Q]. (because **capsular** or **vascular invasion** can be present in **benign tumors**)[Q]

Clinical Features

- Classic triad: **Headache + Diaphoresis+ Palpitation**[Q]

- **MC symptom** is **headache**Q
- **MC manifestation** is **hypertension**Q (remember hypertension is not a symptom)
- **Weight loss**Q due to increased energy expenditure
- **Cardiac manifestations**: Sinus tachycardia, sinus bradycardia, supraventricular arrythmia and ventricular premature contractions
- **Carbohydrate intolerance** and increased hematocrit (**volume depletion**)

Diagnosis

Biochemical test:

- **Most sensitive screening test: Urinary catecholamines** and **VMA level**Q
- **Best test** for **diagnosis: Fractionated plasma metanephrines**Q

Pharmacological test
• Positive response to **phentolamine** is reduction of BP of at least 35/25 mm Hg after 2 min. It is not diagnostic and biochemical confirmation is necessary. • **Glucagon infusion** increases catecholamine release and causes **paroxysm of hypertension**Q

Imaging

- **MRI** is **IOC** for **adrenal**Q**, extra adrenal pheochromocytoma**Q and in **pregnancy**Q**.**
- **MRI** is **95% sensitive** and **100% specific** for pheochromocytomaQ.
- CT scan should be performed **without contrast administration**Q to avoid hypertensive crisis.
- **MIBG scan** is useful for **extra-adrenal pheochromocytoma** but **IOC** is **MRI**Q even for extra adrenal pheochromocytoma.

Biopsy is **contraindicated** as it **precipitates hypertensive crisis**Q

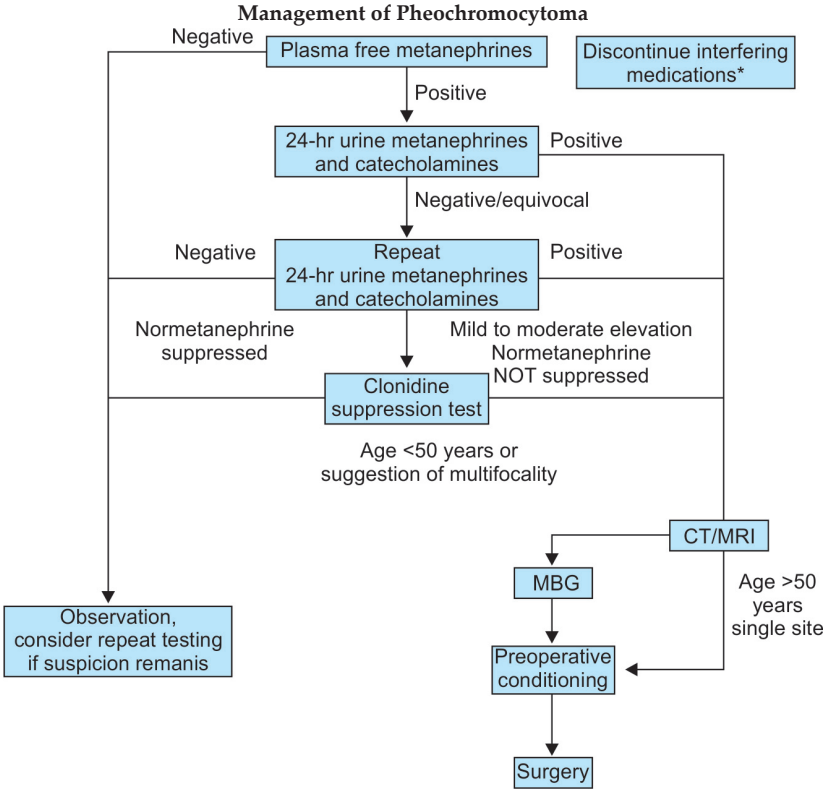
Treatment

- **Adrenalectomy** is **TOC**Q**.**
- **Laparoscopic adrenalectomy** is preferred for **<5 cm** tumorsQ.
- **Pre-operatively alpha-blockers** (**phenoxybenzamine**) Q should be given.
- **Beta-blockers** are indicated **only if tachycardia develops** and should not be given until patient if **fully alpha blocked**Q to avoid hypertensive crisis due to unopposed alpha stimulation.

- **Schwartz 9/e p1399:** Recent studies have shown that **plasma metanephrines** are the **most reliable tests** to identify **pheochromocytomas**, with **sensitivity** approaching **100%.**

44. Ans. c. Pheochromocytoma **45. Ans. b. MRI** **46. Ans. a. 90% are malignant**

Management of Pheochromocytoma



47. **Ans. c. T2-weighted MRI with gadolinium contrast**
48. **Ans. a. Arises from chromaffin cells of adrenal medulla**
49. **Ans. a. Dopamine** *(Ref: Schwartz 9/e p1400; Sabiston 19/e p984; Bailey 26/e p785, 25/e p815; Harrison 18/e p2964)*

MALIGNANT PHEOCHROMOCYTOMA

- Risk of malignancy increases with **size**[Q].
- Malignant tumors are more likely to express **p53, Bcl-2** and have **activated telomerase**[Q].

> - **Capsular** and **vascular invasion** may be seen in **benign lesions as well.**
> - **Malignancy** usually is **diagnosed** when there is evidence of **invasion** into **surrounding structures** or **distant metastasis**[Q].

- Increased production of **dopamine** and **homovanillic acid** is usually seen in **malignant lesions**[Q]
- **MC site of metastases** is **bone**[Q]> liver> lymph nodes.
- **Treatment: Resection** followed by **chemotherapy**[Q] **(cyclophosphamide + vincristine + dacarbazine)**

> **MDH: M**alignant pheochromocytoma secrete **D**opamine **and H**VA[Q]

50. **Ans. d. FNAC is must for diagnosis**
51. **Ans. b. Headache**
52. **Ans. a. VMA**
53. **Ans. (None)**
54. **Ans. d. I^{123} Metaiodobenzylguanidine (MIBG)**
55. **Ans. a. Organ of Zuckerkandl**
56. **Ans. c. Measurement of catecholamine**
57. **Ans. b. Urinary catecholamine and aspiration of nodule**

NEUROBLASTOMA

58. **Ans. c. Hyperdiploidy** *(Ref: Schwartz 9/e p1449-1450; Sabiston 19/e p1859-1861; Bailey 26/e p786, 25/e p814-815; Harrison 18/e p836; Ghai 7/e p590-591)*

Prognostic Factors in Neuroblastomas		
Variable	**Favorable**	**Unfavorable**
Stage	Stage **1, 2A, 2B, 4S**[Q]	Stage **3, 4**[Q]
Age	**<18**[Q] months	**>18** months
Evidence of **schwannian stroma** and **gangliocytic differentiation**	**Present**[Q]	Absent
Mitosis-karyorrhexis index	**<200**/5000 cells	**>200**/5000 cells
DNA ploidy	**Hyperdiploid** or **near-triploid**[Q]	Near-diploid
N-MYC	Not amplified	**Amplified**[Q]
Chromosome 17q gain	Absent	**Present**[Q]
Chromosome 1p loss	Absent	**Present**[Q]
Chromosome 11q loss	Absent	**Present**[Q]
TRKA expression	**Present**[Q]	Absent
TRKB expression	Absent	**Present**[Q]
Telomerase expression	Low or absent	**Highly expressed**[Q]

59. **Ans. b. Neuroblastoma** *(Ref: Schwartz 9/e p1449-1450; Sabiston 19/e p1859-1861; Bailey 26/e p786, 25/e p814-815; Harrison 18/e p836; Ghai 7/e p590-591)*

NEUROBLASTOMA

- Arise from **neural crest**[Q] and may originate anywhere along the distribution of sympathetic chain
- **MC tumor** diagnosed in **infants <1 year of age**[Q]
- **MC intra-abdominal malignancy** in **children**[Q]
- **Sporadic** in **majority** of cases

- **MC site**: **Adrenal (30%)** Q **>Paravertebral reteroperitoneum**Q (28%) **>Posterior mediastinum** Q (15%) >Pelvis (5%) **>Cervical area**Q

- Associated with neurofibromatosis, Hirschprung's disease, heterochromia, fetal hydantoin, featal alcohol syndrome and Freidreich's ataxia
- **Spontaneous regression** is unique behaviour especially in **stage 4S**Q**.**

Pathology

- **Classic neuroblastomas**: Small, primitive-appearing cells with dark nuclei, scant cytoplasm
- **Mitotic activity**, nuclear breakdown ("**karyorrhexis**")Q, and **pleomorphism** may be prominent.
- **Homer-Wright pseudo-rosettes**Q can be found
- Immunochemical detection of **neuron-specific enolase**Q

Clinical Features

- **MC presentation**: **Fixed, lobular mass** extending from the flank **toward the midline**Q of the abdomen.
- **Most (80%) cases** present **before 4 years** and **peak incidence** is **2 years**Q of age.
- **Metastasis** is present in **60–70%** of patients **at the time of diagnosis**Q

- **Orbital metastasis** commonly present with **peri-orbital ecchymoses** and **proptosis** called as **Raccoon eyes**Q**.**
- Infants with **stage 4S** may display **cutaneous metastasis** called as **blueberry muffin lesions**Q.
- **Chronic watery diarrhea**Q (due to secretion of **VIP**) and **opsoclonus-myoclonus**Q (**Dancing eyes, dancing feet**Q) are unusual paraneoplstic manifestations.

- **MC site** of **metastasis** in **older children** are **bones**Q **(Long bones–MC**, facial bones, skull particularly **sphenoid**), bone marrow and LN.
- In **infants** metastasis is confined to **liver** or **subcutaneous tissue**Q.
- **Lung metastasis** are **rare**Q in **neuroblastoma**

Diagnosis

- Anemia, thrombocytopenia or **thrombocytosis** (more common)
- Increased LDH, ferritin, urinary catecholamines and neuron specific enolase
- **X-ray** or **CT**: **Stippled calcification**Q (MC abdominal tumor to demonstrate calcification prior to chemotherapy)

- **Drooping Lily sign**: Neuroblastoma displaces **kidney inferolaterally**Q
- **MRI**Q is **superior to CT** in assessing **vessel encasement**, vessel **patency**, **spinal cord compression** and **bone marrow involvement**.

- **MIBG scan** or **SRS** are used in the diagnosis of primary, residual and metastatic neuroblastoma.
- **MIBG** is one of the **single best studies** to document the **presence of metastatic**Q disease.
- **Appearance** of neuroblastoma **in bone marrow** may **simulate** the appearance of **ALL**Q, differentiation can be done by monoclonal antibody phenotypeQ.

Treatment

- **Localized neuroblastoma: Excision**Q
- **Unresectable tumor: Biopsy**, initially treated by **chemotherapy** and **radiotherapy** followed by **surgical resection** of residual tumorQ
- **Disseminated disease**: **Chemotherapy**Q (Cyclophosphamide, vincristine, dacarbazine, doxorubicin, Cisplatin)

Prognosis

- **Shimada classification**Q describes prognosis based on the **degree** of **differentiation**, **mitosis-karyorrhexis index, presence** or **absence** of **schwannian stroma**Q**.**

International Neuroblastoma Staging System	
Stage	**Definition**
1	**Localized tumor** with **complete gross excision**, with or without microscopic residual disease; representative ipsilateral LNs negative for tumor microscopically (nodes attached to and removed with the primary tumor may be positive)

2A	Localized tumor with **incomplete gross excision**; representative ipsilateral nonadherent LNs negative for tumor microscopically
2B	Localized tumor with or without complete gross excision, with **ipsilateral nonadherent LNs**
3	**Unresectable unilateral tumor** with **contralateral regional LN involvement**; or midline tumor with **bilateral extension** by infiltration (unresectable) or by LN involvement
4	Any primary tumor with **dissemination** to **distant** LNs, bone, bone marrow, liver, skin, and/or other organs (except as defined for stage 4S)
4S	**Localized primary tumor** (as defined for stage 1, 2A, or 2B), with **dissemination limited to skin**, **liver**, and/or **bone marrow** (limited to infant **<1 year** of age)

Neuroblastoma Prognostic Factors

Favorable Prognosis	Unfavorable Prognosis
• Age **<1 year**[Q] • **Thoracic** primary lesion • **Shimda index** showing **well differentiated stromal rich** tumor[Q] • **Increased ratio** of **VMA/HVA** • **Normal** serum **ferritin** • **Hyperdiploid**[Q] or **near triploid**[Q] • **High level** of expression of **Trk-A gene**[Q]	• **N-myc amplification**[Q] (>10) • **Deletion** of **1p**[Q] (most characteristic cytogenetic abnormality) and **Gain** of **17q**[Q] • Expression of multidrug resistance protein • **Overexpression** of **telomerase**[Q] • **Increased** serum **ferritin** • Diploid[Q] **Older patients** of **stage III** and **IV**[Q]

60. **Ans. c. Splenomegaly**

61. **Ans. a. Seen in adrenal glands, b. ↑ VMA/HVA, d. Presents with abdominal mass**

62. **Ans. c. Lung metastasis are common** *(Ref: Nelson's 18/e p2138; Robbins 7/e p500, 501; Ghai 6th/573; Neuroblastoma by Pochedly (1990)/154)*

Neuroblastoma

- **Lung metastasis** are **rare** in **neuroblastoma**
- **Metastasis** is present in **60–70%** of patients **at the time of diagnosis**[Q]
- **Common sites of metastasis**: **Long bones (MC),** Liver, Lymph nodes and Skin
- **Encasement of abdominal aorta** and **IVC** by tumor is common
- Some neuroblastomas are sharply demarcated with a **fibrous pseudocapsule** but others are far more infiltrative and **invade surrounding strictures** including the **kidney, renal vein, IVC** and **envelop the aorta**

- **Neuroblastoma** is the **MC extracranial solid tumor** in **childhood**
- **Neuroblastoma** is the **2nd MC solid malignancy** of childhood **after brain tumors**.
- **MC solid tumor** in **childhood: Brain tumors**[Q]
- **MC intra abdominal solid tumor** in **childhood**: **Neuroblastoma**[Q]

Feature	Neuroblastoma	Wilm's Tumor
Common tumor	**MC intra-abdominal solid tumor** in **children**[Q]	**MC renal tumor** in **children**
At the time of diagnosis	Already **metastatic** in **>50% of patients**[Q]	Generally **confined to** the **kidney**
Lung Metastasis	**Rare**[Q]	**Common**
Encasement of Aorta	**Characteristic**[Q]	Uncommon
Calcification	**Common (Stippled calcification**[Q]**)**	Rare

63. **Ans. b. Neuroblastoma**

64. **Ans. d. Esthesio-neuroblastoma**

(Ref: Dhingra 5/e p217-218; Washington Manual of Surgical Pathology 2/e p45; Harrison 18/e p820)

Esthesioneuroblastoma (Olfactory neuroblastoma)

- Esthesioneuroblastoma is a **rare** unique tumor of **neural crest origin**[Q]
- Arises from the **basal neural cells** of the **olfactory mucosa** of the **cribiform plate**, upper nasal wall and superior turbinate[Q]
- Seen in **either sex** and most common in **3rd** and **4th** decade

Clinical Features

- Presents as a **unilateral polypoidal mass** in the **upper third** of the **nasal cavity** with symptoms of nasal obstruction, epistaxis and anosmia[Q]
- It is a **vascular tumor** that **bleeds profusely on biopsy**[Q]
- LN and systemic metastases can occur

Treatment

- Favored treatment is **surgical excision followed by radiation**[Q].

SECTION 2

HEPATOBILIARY PANCREATIC SURGERY

CHAPTERS

- Chapter 4 Liver
- Chapter 5 Portal Hypertension
- Chapter 6 Gallbladder
- Chapter 7 Bile Duct
- Chapter 8 Pancreas

CHAPTER 4

Liver

MULTIPLE CHOICE QUESTIONS

LIVER ABSCESS

1. Most common cause of liver abscess in chronic granulomatous disease: *(ILBS 2012)*
a. Klebsiella b. Staph. aureus
c. Peptostreptococcus d. E. coli

2. Most common cause of liver abscess: *(AIIMS GIS May 2011)*
a. E. coli b. Proteus
c. Klebsiella d. Staphylococcus

3. Which of the following is the most common cause of pyogenic liver abscess? *(All India 2012, AIIMS GIS Dec 2009)*
a. Trauma b. Biliary tract infection
c. Colonic diverculitis d. Appendicitis

4. All are true about pyogenic liver abscess except:
a. Most common route of infection is biliary tree
b. Most common site is right lobe *(JIPMER GIS 2011)*
c. Klebsiella is most common in gas forming abscess
d. Percutaneous drainage is least cured

5. All are true about amoebic liver abscess except:
a. Metronidazole is mainstay of treatment *(PGI Nov 2010)*
b. Multifocal abscess can not be treated by aspiration
c. More common in left side
d. More common in female

6. Indication of aspiration in liver abscess: *(PGI June 2008)*
a. Left lobe abscess
b. Deep and less than 5 mm size
c. Multiple
d. Recurrent
e. Refractory to treatment after 48–72 hours

7. Liver abscess ruptures most commonly in: *(AIIMS GIS 2003)*
a. Pleural cavity b. Peritoneal cavity
c. Pericardial cavity d. Bronchus

8. True about amebic liver abscess: *(AIIMS GIS May 2008)*
a. Male: female >10:1
b. Not predisposed by alcohol
c. More common in diabetics
d. E. histolytica is isolated in >50% from blood culture

9. Not an indication for percutaneous aspiration in amebic liver abscess: *(AIIMS GIS May 2008)*
a. Radiographically unresolved lesion after 6 months
b. Suspected diagnosis
c. Left lobe liver abscess
d. Compression or outflow obstruction of hepatic or portal vein

10. Commonest cause of pyogenic liver abscess: *(AIIMS Sept 96)*
a. Aspiration
b. Hematogenous spread from a distant site
c. Direct contact
d. Lymphatic spread

11. Anchovy sauce pus is a feature of: *(All India 99)*
a. Amebic liver abscess b. Lung abscess
c. Splenic abscess d. Pancreatic abscess

12. In pyogenic liver abscess commonest route of spread is: *(AIIMS Nov 98, AIIMS Nov 95)*
a. Hematogenous through portal vein
b. Ascending infection through biliary tract
c. Hepatic artery
d. Local spread

13. True about pyogenic liver abscess: *(PGI June 2001)*
a. Single and large abscess
b. X-ray features are diagnostic
c. Serology is confirmatory investigation
d. Systemic complaints, fever and jaundice common
e. Liver enzyme abnormalities are common and severe

14. True about amoebic liver abscess: *(PGI Dec 2000)*
a. Frequently associated with diarrhea at presentation
b. Most common in right lobe liver
c. Can rupture into pleural cavity
d. Almost never respond to metronidazole

15. Indications for needle aspiration in liver abscess are:
a. Recurrent *(PGI June 2006)*
b. Left lobe
c. Refractory to treatment after 48–72 hours
d. >10 cms size
e. Multiple

16. True treatment regarding hepatic amoebiasis: *(PGI 96)*
a. More common in females b. Multiple lesions
c. Mostly treated conservatively d. Jaundice is common

17. Which one of the following is not corrected regarding amoebic liver abscess? *(ICS 2005)*
a. Its usual occurrence is in the right lobe
b. Patient is toxic
c. Surgical drainage is always indicated
d. Extension of abscess from liver to pericardium is the most dreaded complication

18. All are used in treatment of amoebic liver abscess except:
a. Diloxanide furoate b. Chloroquine
c. Metronidazole d. Emetine *(MAHE 2007)*

19. Not true about amebic liver abscess is: *(DPG 2006)*
a. Adult forms are seen
b. Conservative treatment is generally seen
c. Larvae are seen
d. USG can diagnose it

20. Which of the following statement is true regarding pyogenic liver abscess? *(MCI Sept 2009)*
a. Diagnosis can be confirmed by serological test
b. Radiographic features are diagnostic
c. Usually a large and single abscess is seen in cases of direct spread
d. Systemic manifestations are uncommon

21. A patient with 8 cm x 8 cm abscess in right lobe of liver was treated with aspiration multiple times (3 times) and with systemic amebicide. Now cavity is remaining in right lobe of liver but there is nothing in the cavity. Seven days course of luminal amebicides is given. How will you follow up?
a. Stool examination only *(AIIMS Nov 2012)*
b. USG weekly for 1 month followed by monthly USG till 1 year
c. USG weekly for 3 months followed by CT scan at 3 months.
d. USG or CT scan monthly and stool examination weekly

22. A young patient presents to the emergency department with fever and right upper quadrant pain. Clinical examination reveals obvious hepatomegaly but there is no jaundice. Ultrasound reveals a solitary, homogeneous, hypoechoic lesion in the right lobe measuring 5cmx5cmx4cm. Tests for hydatid disease were negative. Which of the following is the best recommendation for initial treatment? *(All India 2011)*
a. Multiple aspirations and antiamoebics/antibiotics
b. Catheter drainage and antiamoebics/antibiotics
c. Antiamoebics/antibiotics alone
d. Hepatectomy followed by antiamoebics/antibiotics

HYDATID CYST

23. Water lily appearance in a chest radiograph suggests: *(COMEDK 2005, 2004)*
a. Metastasis
b. Cavitating metastasis
c. Aspergilloma
d. Ruptured hydatid cyst

24. Which of the following is not a sign of pulmonary hydatidosis? *(COMEDK 2010)*
a. Water lily sign
b. Rising sun sign
c. Meniscus sign
d. Drooping lily sign

25. False about hydatid cyst of liver: *(PGI Nov 2010)*
a. Hepatic resection is never done
b. Laparoscopic aspiration of cyst is performed
c. Most commonly located in the right liver
d. Mostly asymptomatic
e. Most common causative organism is Echinococcus granulosus

26. Not an indication for PAIR treatment in hydatid cyst: *(PGI Nov 2010)*
a. Size >5cm
b. Multiloculated
c. Cyst in lung
d. Recurrence after surgery
e. Perforated cyst

27. Capitonnage is used in treatment of? *(MHSSMCET 2008)*
a. Choledochal cyst
b. Dermoid cyst
c. Hydatid cyst
d. Renal cyst

28. True about hydatid cyst of liver: *(PGI June 2004)*
a. Caused by E. granulosus
b. In 80% cases cyst in single
c. Blood culture helpful
d. Surgery is the only treatment

29. In the treatment of hydatid cyst, PAIR is contraindicated in: *(PGI Dec 2006)*
a. Lung cyst
b. Size >5cm
c. Not amenable to treatment with albendazole
d. Multiple
e. Inaccessible location

30. True about hydatid disease: *(PGI June 2005)*
a. MC site is lung
b. Pre-op albendazole followed by surgery is the treatment of choice
c. 20% saline is scolicidal
d. Puncture, aspiration, injection, and respiration (PAIR) done in hepatic hydatids

31. Diagnosis of hydatid disease is by: *(PGI June 98)*
a. Biopsy
b. X-ray
c. Casoni test
d. Serum examination

32. A 40-years old male presents with a painless cystic liver enlargement of four years duration without fever or jaundice. The most likely diagnosis is: *(UPSC 96)*
a. Amoebic liver abscess
b. Hepatoma
c. Hydatid cyst of liver
d. Choledochal cyst

33. All are complications of hydatid cyst in the liver except:
a. Jaundice
b. Suppuration *(APPG 97)*
c. Cirrhosis
d. Rupture

34. During surgical exploration for hydatid cyst of the liver, any of the following agents can be used as scolicidal agent except: *(UPSC 2004)*
a. Hypertonic sodium chloride
b. Formalin
c. Cetrimide
d. Povidone iodine

35. Which of the following is true about hydatid cyst of liver?
a. Surgical management is done always *(DPG 2007)*
b. Conservative treatment is effective
c. Aspiration is safe
d. E. multilocularis is the most common cause

36. Treatment of hydatid cyst: *(APPG 2008)*
a. Excision of cyst
b. Percutaneous drainage
c. Conservative management
d. None

37. Investigation of choice for hydatid disease is:
a. CT scan
b. Elisa *(MCI Sept 2009)*
c. Biopsy
d. USG

38. Medical management of hydatid disease is indicated in *(All India 92)*
a. Pregnancy
b. Infected hydatid cyst
c. Moribund patients
d. Multiple peritoneal cyst

39. The sensitivity of Casoni's test is: *(APPG 84, Kerala 87)*
a. 50%
b. 60%
c. 75%
d. 90%
e. 95%

HEPATIC ADENOMA

40. False about hepatic adenoma: *(ILBS 2012)*
a. Chances of malignancy in 10% cases
b. Rupture in 20% cases
c. Hepatic architecture is maintained
d. Most patients are symptomatic

41. All are true about liver adenoma except: *(AIIMS GIS May 2011)*
a. Normal liver architecture
b. Increased fat
c. Increased glycogen
d. Cells arranged in cords

42. About hepatic adenoma, all are true except: *(AIIMS GIS Dec 2009)*
a. Increased glycogen and fat in hepatocytes
b. Normal liver architecture
c. Bile ductules are not seen
d. Tumor markers are normal

43. Most common cause of non-traumatic hemo-peritoneum:
a. Hepatic adenoma
b. FNH *(AIIMS GIS 2003)*
c. HCC
d. Hemangioma

44. Most common liver tumor in those on OCPs? *(MHSSMCET 2007)*
a. HCC
b. Liver cell adenoma
c. Bile duct adenoma
d. Focal nodular hyperplasia

45. All are true about hepatic adenoma except:
a. Usually multiple *(JIPMER GIS 2011)*
b. OCP is a predisposing factor
c. Has cords of benign hepatocytes
d. 50-75% are symptomatic

46. Which of the following liver tumors always merit surgery? *(DPG 2009 March)*
a. Hemangioma
b. Hepatic adenoma
c. Focal nodular hyperplasia
d. Peliosis hepatis

FOCAL NODULAR HYPERPLASIA

47. Central stellate scar is seen in: *(AIIMS GIS May 2011)*
a. FNH b. Hemangioma
c. Hepatic adenoma d. HCC

48. All of the following are true regarding FNH except: *(AIIMS GIS Dec 2010)*
a. Not frequently associated with OCPs
b. Surgical resection is required due to risk of malignancy
c. Stellate scar is diagnostic
d. Typical hepatic vascularity is not seen with spoke wheel pattern

49. True statement regarding focal nodular hyperplasia:
a. More common in young women *(PGI Nov 2011)*
b. Associated with OCP use
c. May present with abdominal pain
d. Excision biopsy may aid in diagnosis
e. Progress to cirrhosis

50. Similarity between FNH and hepatic adenoma are all except: *(AIIMS GIS 2003)*
a. Hemoperitoneum is common
b. Biliary abnormalities are seen
c. More common in females
d. Associated with OCPs

51. Which one of the following hepatic lesions can be diagnosed with high accuracy by using nuclear imaging? *(AIIMS Nov 2004)*
a. Hepatocellular carcinoma
b. Hepatic adenoma
c. Focal nodular hyperplasia
d. Hemangioma

HEMANGIOMA

52. All are true about liver hemangioma except:
a. CHF is very common *(AIIMS GIS Dec 2006)*
b. Incidental detection
c. Consumptive coagulopathy can occur
d. Spontaneous regression is seen

53. Most common benign tumor of liver is: *(DNB 2005, 2000, JIPMER GIS 2011*
a. Hemangioma b. Hepatic adenoma
c. Hepatoma d. Hamartoma

54. CECT with nodular enhancement is suggestive of: *(AIIMS GIS Dec 2006)*
a. Hepatic adenoma b. FNH
c. Hemangioma d. HCC

55. Most common nodule found in the liver is: *(PGI 87)*
a. Hepatoma b. Hamartoma
c. Hemangioma d. Cholangiodenoma

56. Which is the commonest incidentaloma detected in the liver? *(Karnataka 94)*
a. Focal nodular hyperplasia b. Hemangioma
c. Hepatocellular adenoma d. Hydatid cyst

HEPATIC CYST

57. Solitary hepoechoic lesion of the liver without septa or debris is most likely to be: *(AIIMS Nov 2005)*
a. Hydatid cyst b. Caroli's disease
c. Liver abscess d. Simple cyst

58. Simple hepatic cyst, all are true except: *(AIIMS GIS Dec 2006)*
a. Asymptomatic
b. Lined by columnar epithelium
c. Intracystic bleeding is common and deroofing is mandatory
d. Congenital

POLYCYSTIC LIVER DISEASE

59. Treatment of symptomatic polycystic liver disease is: *(DPG 2008)*
a. Deroofing of the cyst b. Injection of sclerosant
c. Hepatic resection d. Liver transplantation

HEPATOCELLULAR CARCINOMA RISK FACTORS

60. All are risk factors for HCC except: *(AIIMS GIS Dec 2006)*
a. HBV b. HCV
c. Alcohol d. IBS

61. Which of the following most significantly increases the risk of HCC? *(AIIMS May 2012)*
a. HBV b. HAV
c. CMV d. EBV

62. True regarding HCC: *(JIPMER 2010)*
a. Non alcoholic steatohepatitis is a risk factor
b. OCP's are a cause
c. Focal nodular hyperplasia may turn malignant
d. Chromosomal abnormalities are common

63. True about hepatocelluar carcinoma is: *(PGI June 2002)*
a. Associated with HBV and HCV
b. Cirrhosis is predisposing factor
c. Fibrolamellar variety is not associated with cirrhosis
d. Low propensity of vascular invasion
e. Alcoholic cirrhosis does not predispose to HCC

64. In hepatocellular carcinoma, risk factor most important is:
a. Alcoholic hepatitis *(PGI June 97)*
b. Schistosomiasis
c. Cirrhosis
d. Fasciolepsis buski infestation

HEPATOCELLULAR CARCINOMA

65. Tumor marker of HCC: *(AIIMS GIS 2003)*
a. AFP b. Alpha fucosidases
c. DCGP d. Carbohydrate antigen

66. In high risk population, HCC is best detected by:
a. USG b. CT *(AIIMS GIS 2003)*
c. MRI d. PET scan

67. All are true about AFP except: *(AIIMS GIS 2003)*
a. Not return to normal after hepatic resection
b. Levels >400 ng/mL with typical radiological findings is diagnostic of HCC
c. Can be raised in other benign conditions
d. Fibrolamellar HCC has normal levels

68. AFP is elevated in: *(PGI May 2011)*
a. HCC b. Hepatoblastoma
c. Infant hemangioendothelioma
d. Amoebic liver abscess e. Embryonic sarcoma

69. Okuda staging contains all except: *(ILBS 2012)*
a. Bilirubin b. Tumor size
c. Ascites d. AFP

70. In HCC: *(AIIMS GIS 2003)*
a. Arterial bruit is present in 80% cases
b. Two third patients present with signs of liver disease
c. Hemoperitoneum in 7% patients
d. Percutaneous biopsy is mandatory for diagnosis

71. Most common paraneoplastic syndrome of HCC: *(AIIMS GIS 2003)*
a. Hypoglycemia b. Hypertension
c. Hypercalcemia d. Erythrocytosis

72. Oncological outcome in HCC is described by all except: *(AIIMS GIS Dec 2010)*
a. MELD b. BCLC
c. CLIP d. OKUDA

73. The following are true about HCC except: *(AIIMS Nov 2003)*
a. It has a high incidence in East Africa and South East Asia
b. Its worldwide incidence parallels the prevalence of hepatitis B
c. Over 80% of tumors are surgically resectable
d. Liver transplantation offers the only chance of cure in those with unresectable disease

74. The most unlikely clinical feature of hepatocellular carcinoma is: *(All India 94)*
a. Hepatomegaly
b. Raised AFP levels
c. Raised alkaline phosphatase
d. Jaundice

75. True about carcinoma liver: *(PGI Dec 2000)*
a. AFP increased in 70% cases
b. Resection possible in few cases only
c. USG guided biopsy is good for diagnosis
d. Aflatoxin and thorotrast are not risk factor

76. True about Hepatocellular carcinoma: *(PGI Dec 2002)*
a. Most common tumor of liver
b. Resectable only in 1% cases
c. AFP increased in 70% cases
d. USG guided aspiration biopsy is used for diagnosis

77. Spontaneous rupture of the liver occurs in: *(BHU 88)*
a. Hepatoma b. Portal hypertension
c. Spherocytosis d. Secondary deposits

78. Tumour marker of hepatocelluar carcinoma: *(PGI June 2003)*
a. AFP b. CEA
c. HCG d. CA 19-9
e. CA-125

79. Tumor marker for primary hepatocellular carcinoma are all except: *(AIIMS May 2007)*
a. Alpha-feto protein b. Alpha-2 macroglobulin
c. PIVKA-2 d. Neurotensin

80. True about hepatocellular carcinoma: *(PGI June 2004)*
a. Most prevalent malignancy
b. Commonest liver tumor
c. HBV predisposes
d. Patient present in early stage
e. Prognosis good

81. All of the following are modalities of therapy for hepatocellular carcinoma except: *(AIIMS Nov 2005)*
a. Radiofrequency ablation
b. Transarterial catheter embolization
c. Percutaneous acetic acid
d. Nd-YAG laser ablation

82. Which of the following liver tumour has a propensity to invade the portal or hepatic vein? *(AIIMS June 2004)*
a. Cavernous hemangioma b. Hepatocellular carcinoma
c. Focal nodular hyperplasia d. Hepatic adenoma

83. Ramu, 40-years old male, chronic alcoholic, diagnosed as cirrhosis, presents with a lump in the right lobe of liver. Serum AFP level is normal. Most probable diagnosis is: *(AIIMS June 2001)*
a. Fibrohyperplasia b. Hepatocellular carcinoma
c. Secondaries d. Hepatocellular adenoma

84. Liver malignancies can be studied by: *(PGI 88)*
a. Radionuclide study b. Ultrasound
c. CT d. Laparoscope
e. All

85. Least common presentation of HCC: *(AIIMS GIS 2003)*
a. PUO b. Mass
c. Jaundice d. Weakness

86. Hypercalcemia is seen in: *(AIIMS GIS May 2011)*
a. Pancreatic cancer b. HCC
c. CA stomach d. CA GB

87. All are tumor markers of HCC except: *(PGI SS Dec 2010)*
a. Neurotensin b. AFP
c. CA 19-9 d. PIVKA-2

88. New drug in HCC: *(GB Pant 2010)*
a. Sorafenib b. Bevacizumab
c. Sunitinib d. Cetuximab

FIBROLAMELLAR HCC

89. All are true about fibrolamellar HCC except:
a. AFP is not raised *(AIIMS GIS Dec 2009)*
b. Recurrence is common
c. Raised neurotensin levels
d. Well demarcated and encapsulated

90. True statement about fibrolamellar carcinoma: *(GB Pant 2010)*
a. Young adults, children b. More in males
c. Related to OCP use d. Bad prognosis

91. All are true about fibrolamellar HCC except:
a. Associated with cirrhosis *(AIIMS GIS 2003)*
b. Recurrences are seen despite of better prognosis
c. Increased neurotensin and vitamin B12 binding factor
d. Lymph node metastasis is seen

92. All of the following are true about fibrolamellar carcinoma of the liver except: *(JIPMER 2012, All India 2001)*
a. More common in females
b. Better prognosis than HCC
c. AFP levels always >1000 pg/ml
d. Occur in younger individuals

LIVER SECONDARIES

93. All of the following modalities can be used for in situ ablation of liver secondaries, except: *(All India 2006)*
a. Ultrasonic waves b. Cryotherapy
c. Alcohol d. Radiofrequency

94. Multiple liver secondaries are most common in the following cancers: *(AIIMS 84)*
a. Head of pancreas b. Stomach
c. Gall bladder d. Periampullary

95. All are considered to be poor prognostic factors in liver metastasis except: *(JIPMER GIS 2011)*
a. Synchronous lesions b. Metachronous lesions
c. Extra-hepatic metastasis d. CEA >200 ng/ml

96. Calcific hepatic metastases are seen in: *(COMEDK 2009)*
a. Adenocarcinoma of the colon
b. Carcinoid tumours
c. Renal cell carcinoma
d. Lymphoma

97. Which of the following liver metastasis appear hypoechoic on ultrasound? *(All India 2012)*
a. Breast cancer b. Colon cancer
c. RCC d. Mucinous adenocarcinoma

HEPATOBLASTOMA

98. All are true about hepatoblastoma except: *(AIIMS GIS May 2008, Dec 2006)*
a. Associated with FAP b. Most cases <3 years
c. Prognosis is very poor with pulmonary metastasis
d. Treatment is chemotherapy followed by surgical resection

99. All are true about hepatoblastoma except:
a. Present in childhood *(PGI SS June 2005)*
b. Common in cirrhosis of liver due to HBV
c. Chemosensitive
d. Surgical resection is treatment of choice

100. AFP is raised in: *(KGMC 2011)*
a. 100% of hepatoblastoma b. 90% of hepatoblastoma
c. 100% of HCC d. 90% of HCC

HEMANGIOENDOTHELIOMA

101. All are true about hemangioendothelioma except:
a. Adult variant is benign *(ILBS 2012)*
b. More common in females
c. Multiple and involve bilateral lobe
d. An indication for liver transplant

102. All of the following are true regarding epitheloid hemangioendothelioma except: *(AIIMS GIS Dec 2010)*
a. Most common in males
b. Liver transplantation is treatment of choice
c. Associated with vinyl chloride
d. Factor VIII staining is used for diagnosis

CYSTADENOMA AND CYSTADENOCARCINOMA

103. False in cystadenoma: *(ILBS 2012)*
a. More common in females due to OCP use
b. Cystadenocarcinoma presents as hemorrhagic fluid
c. Internal septations are better delineated by USG than CT
d. Most patients are symptomatic

104. True about biliary cystic adenocarcinoma: *(PGI Nov 2009)*
a. CT scan is used for diagnosis
b. CA 19-9 is elevated c. Intrahepatic location
d. Extrahepatic location e. Common in males

105. All are true about hepatic cystadenoma except:
a. Age >40 years and asymptomatic *(AIIMS GIS Dec 2006)*
b. Malignant predisposition
c. Surgical resection is required
d. Large projection with thickened wall is suggestive of malignancy

LIVER TRANSPLANTATION

106. Most common indication for liver transplantation in children is: *(JIPMER GIS 2011)*
a. Biliary atresia b. Indian childhood cirrhosis
c. HCC d. Hepatitis C infection

107. Place of first liver transplant: *(ILBS 2011)*
a. Pittsburgh b. Boston
c. Colarado d. Cambridge

108. Indications of liver transplantation are all, except:
a. Biliary atresia b. Sclerosing cholangitis
c. Hepatitis A d. Cirrhosis *(PGI June 2005)*
e. Fulminant hepatic failure

109. Auxiliary orthotopic liver transplant is indicated for:
a. Metabolic liver disease *(AIIMS May 2008)*
b. As a standby procedure until finding a suitable donor
c. Drug induced hepatic failure
d. Acute fulminant liver failure for any cause

110. In orthotropic liver transplantation, which is the best way to get bile drainage in donor liver?
a. Donor bile duct with recipient bile duct or Roux-en-Y choledochojejunostomy
b. Donor bile duct with duodenum of recipien
c. Donor bile duct with jejunum of recipient
d. External drainage for few days followed by choledochojejunostomy

111. Reduced liver transplants: *(GB Pant 2011)*
a. Given to two recipients after dividing into two parts
b. Left lateral lobe divided and given to child
c. Left lateral segment divided from segment 2 and given to child
d. Part of liver segment transplanted into recipient depending upon requirement

HEPATIC RESECTION

112. Contraindications to major hepatic resection for metastatic disease includes all of the following except: *(COMEDK 2006, Karnataka 2006)*
a. Total hepatic involvement
b. Advanced cirrhosis
c. Extrahepatic tumour involvement
d. Jaundice from extrinsic ductal obstruction

113. The minimum amount of normal perfused liver parenchyma to be left intact when a hepatic resection is planned is:
a. 10% b. 20% *(COMEDK 2008, 2007)*
c. 50% d. 75%

114. Regarding hepatic artery ligation which statement is false? *(Karnataka 96)*
a. The best results are obtained in case of hemobilia
b. Not useful in primary hepatoma
c. Can cure secondary carcinoma
d. Must be covered by massive antibiotic administration

115. Vascular inflow occlusion of the liver is by: *(DNB 2012)*
a. Clamping the hepatic artery b. Occluding the portal vein
c. Clamping the hepatic veins d. The Pringle maneuver

116. Pringle Maneuver may be required for treatment of:
a. Injury to tail of pancreas *(APPG 2015)*
b. Mesenteric ischemia
c. Bleeding esophageal varices
d. Liver Laceration

117. Left trisegmentectomy involves removal of: *(GB PANT 2010)*
a. Segment II III IV V VIII b. Segment II III IV
c. Segment IV V VI VII VIII d. Segment V VI VII VIII

HEPATIC REGENERATION

118. Following resection of 2/3rd of the liver, regeneration is complete within: *(BHU 87)*
a. 2-3 months b. 8-10 weeks
c. 4-6 months d. 4-5 weeks

LIVER TRAUMA

119. A 17-years old boy is admitted to the hospital after a road traffic accident. Per abdomen examination is normal. After adequate resuscitation, his pulse rate is 80/min and BP is 110/70 mmHg. Abdominal CT reveals 1 cm deep laceration in the left lobe of the liver extending from the done more than half way through the parenchyma. Appropriate management at this time would be: *(DPG 2011, UPSC 2005)*
a. Conservative treatment
b. Abdominal exploration and packing of hepatic wounds
c. Abdominal exploration and ligation of left hepatic artery
d. Left hepatectomy

LIVER ANATOMY

120. Left posterior sector of liver consists of: *(JIPMER GIS 2011)*
a. Segment II and III
b. Segment II, III and IV
c. Segment II only
d. Segment I only

121. All of the following are true about caudate lobe except: *(AIIMS GIS Dec 2010)*
a. Blood supply from both right and left hepatic artery
b. Ductal drainage from both right and left duct
c. Venous drainage is mainly by left and middle hepatic vein
d. Supply by both branches of portal vein

122. Left medial sector contains segment: *(GB Pant 2010)*
a. III, IV
b. II, III
c. I, II
d. I, IV

123. The caudate lobe of liver corresponds to with segment of Couinaud's classification: *(PGI Dec 2006)*
a. Segment I
b. Segment II
c. Segment III
d. Segment IV
e. Segment V

124. Portal triad is not formed by: *(Punjab 2008)*
a. Hepatic artery
b. Portal Vein
c. Bile duct
d. Hepatic vein

125. Function of hepatic Kupffer cells is: *(COMEDK 2004)*
a. Formation of sinusoids
b. Vitamin A storage
c. Increase blood perfusion
d. Phagocytosis

126. Which of the following is false about portal vein?
a. Formed behind the neck of pancreas *(JIPMER 2011)*
b. Bile duct lies anterior and right to it
c. Gastro duodenal artery lies to the left and anterior to it
d. Ascends behind the 2nd part of duodenum

127. Surgeon excises a portion of liver to the left of the attachment of the falciform ligament. The segments that have been resected are: *(All India 2011, 2008)*
a. Segment 1a and 4
b. Segment 1 and 4b
c. Segment 2 and 3
d. Segment 1 and 3

128. False about hepatic duct: *(AIIMS May 2011, 2009)*
a. Left hepatic duct formed in umbilical fissure
b. Caudate lobe drains only left hepatic duct
c. Right hepatic duct formed by V and VIII segments
d. Left hepatic duct crosses IV segment

129. Surgical lobes of liver are divided on the basis of: *(PGI June 2002)*
a. Hepatic artery
b. Hepatic vein
c. Bile ducts
d. Portal vein
e. Central veins

130. In Couinaud's classification, segment IV of liver is:
a. Caudate lobe
b. Quadrate lobe
c. Right lobe
d. Left lobe *(AIIMS Nov 2007)*

131. Line of surgical division of the lobes of the liver is:
a. Falciform ligament to the diaphragm *(AIIMS 85, 87)*
b. Gall bladder bed to IVC
c. Gall bladder bed to the left crus of diaphragm
d. One inch to the left of falciform ligament to the IVC

132. What percentage of the blood flow to the liver is supplied by the hepatic artery? *(UPSC 86, JIPMER 88)*
a. 90%
b. 20%
c. 40%
d. 60%

133. With Couinaud's nomenclature, which one of the following segments of liver has an independent vascularization?
a. Segment I
b. Segment II *(UPSC 2002)*
c. Segment IV
d. Segment VIII

134. The Couinaud's segmental nomenclature is based on the position of the: *(All India 2004)*
a. Hepatic veins and portal vein
b. Hepatic veins and biliary ducts
c. Portal vein and biliary ducts
d. Portal vein and hepatic artery

135. Quadrate lobe of liver is present between: *(DPG 97)*
a. Groove for ligamentum teres and gallbladder
b. Inferior vena cava and fissure for ligamentum venosum
c. Groove for inferior vena cava and fissure for ligamentum venosum
d. Porta hepatis and falciform ligament

136. Boundary of Morrison's pouch is formed by: *(DPG 2008)*
a. Kidney
b. Falciform ligament of liver
c. Spleen
d. Pancreas

137. The right lobe of liver consists of which of the following segments: *(AIIMS 2004)*
a. V, VI, VII and VIII
b. IV, V, Vi, VII and VIII
c. I, V, VI, VII and VIII
d. I, IV, V, VI, VII and VIII

138. Liver is divided in 2 halves by all except: *(AIIMS 2004)*
a. Right hepatic vein
b. Portal vein
c. Hepatic artery
d. Common bile duct

139. Which of the following is not a capsular plate? *(AIIMS Nov 2011)*
a. Portal plate
b. Hilar plate
c. Umbilical plate
d. Cystic plate

140. Right hepatic duct drains all, except: *(AIIMS May 2009)*
a. Segment I
b. Segment III
c. Segment V
d. Segment VI

141. Number of lobes in liver as per Couinaud's classification:
a. 3
b. 4 *(MCI March 2005)*
c. 6
d. 8

LIVER FUNCTION TESTS AND JAUNDICE

142. A patient has a surgical cause of obstructive jaundice. USG can tell all of the following except: *(AIIMS Nov 2012)*
a. Biliary tree obstruction
b. Peritoneal deposits
c. Gall bladder stones
d. Ascites

143. Which is wrong about Crigler-Najjar syndrome Type-I?
a. Very high level of unconjugated bilirubin occurs in neonatal period *(Orissa 2011)*
b. Kernicterus is usual
c. It responds well to phenobarbitone
d. Hepatic histology is normal

144. Conjugated hyperbilirubinemia is seen in: *(COMEDK 2011)*
a. Dubin-Johnson syndrome
b. Criggler-Najjar syndrome
c. Criggler-Najjar syndrome- II
d. Gilbert syndrome

145. Most common surgical cause of obstructive jaundice: *(NEET 2013, Punjab 2007)*
a. Periampullary carcinoma
b. Carcinoma gallbladder
c. Carcinoma head of pancreas
d. CBD Stones

146. True about Criggler-Najjar syndrome II: *(PGI Nov 2011)*
a. Autosomal dominant
b. Kernicterus is frequently present
c. Child may alive to adolescence
d. Cause unconjugated hyperbilirubinemia
e. Phenobarbitone therapy is ineffective

147. True about obstructive jaundice: *(PGI May 2011)*
a. Unconjugated bilirubin
b. Positive indirect Vanden Bergh test
c. Pruritus
d. Pale stools
e. Icterus

148. In non hemolytic jaundice, urobilinogen is seen in: *(PGI 99)*
a. Obstructive jaundice
b. Hepatic fibrosis
c. Fatty liver
d. Infective hepatitis

149. Best test to differentiate between medical and surgical jaundice is?
a. Alkaline phosphatase
b. Bilirubin and serum enzymes
c. Enzymes
d. Ultrasound

150. Courvoisier's law is related to: *(AIIMS 79, AMC 81, 84)*
a. Jaundice
b. Ureteric calculi
c. Portal hypertension
d. The length of skin flap in skin grafting

151. Which is not elevated in a child presenting with jaundice, icterus, pruritus and clay colored stools? *(AIIMS Nov 2011, Nov 2006)*
a. Gamma glutamyl transpeptidase
b. Alkaline phosphatase
c. 5′-nucleotidase
d. Glutamate dehydrogenase

152. One is not the feature of obstructive jaundice:
a. Pruritus *(AIIMS Nov 95)*
b. Elevated level of serum bilirubin
c. Raised alkaline phosphatase
d. Raised urinary urobilinogen

153. Vitamin to be corrected in obstructive jaundice: *(DNB 2009)*
a. Vitamin K
b. Vitamin C
c. Vitamin D
d. Vitamine B12

154. A 50 years old patient presented with progressive jaundice. Liver function test was done in which conjugated serum bilirubin- 4.8% and total bilirubin- 6.7%, alkaline phosphatase- 550 IU, SGOT-50, SGPT-65. Most probable diagnosis is: *(AIIMS Nov 2013)*
a. Jaundice due to choledocholithiasis
b. Dubin-Johnson syndrome
c. Viral hepatitis
d. Malignant obstructive jaundice

MISCELLANEOUS

155. Liver biopsy is done through 8th ICS midaxillary line to avoid: *(All India 97)*
a. Lung
b. Pleural cavity
c. Subdiaphragmatic space
d. Gall bladder

156. "Crumbled egg appearance" in liver is seen in:
a. Hepatic adenoma
b. Chronic amoebic liver abscess
c. Hydatid liver disease
d. Hemangioma

157. Honey-comb liver is seen in: *(JIPMER 87)*
a. Micronodular cirrhosis
b. Dubin Johnson's syndrome
c. Actinomycosis
d. Hydatidosis

158. Primary sinusoidal dilatation of liver is also known as: *(COMEDK 2010)*
a. Hepar lobatum
b. Peliosis hepatic
c. Von-Meyerburg complex
d. Caroli's disease

159. Obstruction of IVC leads to: *(Punjab 2008)*
a. Dilatation of thoracoepigastric veins
b. Caput medusae
c. Hemorrhoids
d. Esophageal varices

160. Middle aged man presents with complaints of weakness, fatigue and hyperpigmentation. On examination hepatomegaly and hypoglycemia are present. Diagnosis: *(JIPMER 2011)*
a. Addison's disease
b. Hemochromatosis
c. IDDM
d. Cushing's syndrome

161. A 20 years old male presents with extrapyramidal symptoms and liver damage. Diagnosis:
a. Wilson's disease
b. Huntington's disease
c. Parkinson's disease
d. Hemochromatosis

162. Risk factor for angiosarcoma of liver: *(MHSSMCET 2008)*
a. OCPs
b. Phenacetin
c. Vinyl chloride
d. All of the above

163. Focal lesion of liver is best detected by: *(AIIMS GIS 2003)*
a. MRI
b. CT
c. USG
d. PET scan

EXPLANATIONS

LIVER ABSCESS

1. **Ans. b. Staph. aureus** *(Ref: Sabiston 19/e p1440-1444; Schwartz 10/e p1284-1285, 9/e p1115; Bailey 26/e p1080, 25/e p1094; Blumgart 5/e p1006-1115; Shackelford 7/e p1464-1471)*

Pyogenic Liver Abscess in Children

- In **children**, **Staphylococcus PLA**Q is most common
- Occurs in the setting of **chronic granulomatous disease**Q, disorder of granulocyte function and **hematologic malignancies**.
- In chronic granulomatous conditions, abscess are **dense and thick**, **early excision** and **treatment** with **antibiotics against Staphylococcus** aureus is recommendedQ.

PYOGENIC LIVER ABSCESS

- **Liver** is **MC site** of **abdominal visceral abscess**Q
- **PLA** accounts for **majority** of hepatic abscessesQ
- Higher incidence of **cryptogenic abscess occur** in **Asian series**Q
- **No significant gender, ethnic** or **geographic differences** in disease frequencyQ
- Associated comorbid conditions: **Cirrhosis, CRF**, history of **malignancy**

E. coli	MC in **western countries**Q
Klebsiella pneumoniae	MC in **Asian countries**Q
Staphylococcus	MC in **children**, suffering from **chronic granulomatous disease**Q

- **Multiple abscesses** occur in patients with a **biliary origin**Q
- **Solitary abscesses** are more likely than multiple abscesses to be **polymicrobial**.

Routes of Infection in PLA

- **Biliary tract (MC):**Q
  - **CBD stones** leading to cholangitis (in **Asia**)Q
  - **Hilar cholangiocarcinoma** in **western countries**Q
  - CBD strictures
- **Portal vein (2nd MC)** Q
- **Hepatic artery:** Q
  - Hematogenous spread, usually **monomicrobial**, staphylococcus or streptococcus
- **Direct extension:**
  - From subdiaphragmatic abscess
  - From suppurative cholecystitis
  - From empyema in chest
  - From perinephric abscess
- **Penetrating or blunt trauma**
- **Cryptogenic**

Clinical Features

- **MC presenting symptom** is **fever**Q.
- **MC LFT abnormality** is an elevation of **ALP**Q.
- **Classic Presentation**: Fever, **jaundice (25%)**Q, and right upper quadrant pain and tenderness
- **Fever, chills**, and **abdominal pain** are the most common presenting symptoms
- Usually **single**, involve **right lobe**Q
- Malignancy, jaundice, deranged LFT and sepsis are associated with poor prognosis.

Endogenous Endophthalmitis in PLA

- A rare complication specific to **Klebsiella**Q hepatic abscesses
- Occurring in 3% of cases.
- More common in **diabetic patients**Q.
- **Early diagnosis** and **treatment** represent the best chance to **preserve visual function**Q.

Diagnosis

- **USG** and **CT** are the **main diagnostic modalities**Q

- **Diagnosis** is **confirmed** by **aspiration** and **culture**[Q]
- **CXR:** Elevated hemidiaphragm, right sided pleural effusion or atelectasis

Treatment

- **Percutaneous catheter drainage + IV antibiotics** has become the **treatment of choice**[Q].
- After 2 weeks of parenteral antibiotics, oral agents should be used for further 4 weeks.

2. **Ans. a. E. coli**
3. **Ans. b. Biliary tract infection**
4. **Ans. d. Percutaneous drainage is least cured**
5. **Ans. c. More common in left side, d. More common in female** *(Ref: Sabiston 19/e p1445-1447; Schwartz 10/e p1285, 9/e p1115-1116; Bailey 26/e p1081, 25/e p1095; Blumgart 5/e p1016-1024; Shackelford 7/e p1471-1478)*

Amoebic Liver Abscess

- Caused **by Entamoeba histolytica** whose cysts are acquired through the **feco-oral route**[Q]
- Trophozoites reach the liver through **portal venous system**[Q].
  - **Solitary** and **more common** in **right lobe of liver**[Q].
  - **Low incidence** of **invasive amoebiasis in menstruating women**[Q]
- Majority of patients are **young men** (may be due to heavy alcohol consumption)

Pathogenesis

- MC form of invasive disease is **colitis,** frequently affects the **cecum** and **ascending colon**[Q]
- In colon: **Flask-shaped ulcers**[Q] **(MC site: Cecum** and **ascending colon)**[Q]
- **Synchronous hepatic abscess** is found in **one third** of patients with **active amebic colitis.**

Clinical Features

- **MC symptom** is **abdominal pain**[Q]
- **Typical clinical picture**: Patient of **20-40 yrs of age,** with history of travel to **endemic area**, presents with **fever,** chills, anorexia, **right upper quadrant pain**[Q].
- Results from an obligatory colonic infection, a **recent history** of **diarrhea** are **uncommon**[Q].
  - **Active colitis** and **amoebic liver abscess rarely occur simultaneously**, as a rule **colonic lesions** are **silent**[Q]
  - **Jaundice** is **rare**[Q]
  - **Raised PT** is **MC LFT abnormality**[Q].

Diagnosis

- **USG** and **CT** are the **main diagnostic modalities**[Q]
  - **Diagnosis** is **confirmed** by **serological tests**[Q] **(ELISA)** for antiamoebic antibodies.
  - **Cultures** of amoebic abscess are **usually sterile** or **negative**[Q]**.**
- **CXR:** Elevated hemidiaphragm, right sided pleural effusion or atelectasis
- ALA: **Reddish-brown anchovy paste**[Q]; **more reliable characteristic** than color is the **odour** of the fluid.

Treatment

- **Metronidazole** (750 mg orally TDS X 10-14 days) is the **mainstay of treatment** and is **curative in** over **90%** of patients[Q], clinical improvement is seen within 3 days.
- **Luminal agents** include **iodoquinol, paromomycin** and **diloxanide furoate**[Q]**.**
- The average time to **radiologic resolution** of abscess is **3-9 months**

Indications of Aspiration in ALA	
1. Diagnostic uncertainty[Q]	4. **High risk of rupture** (size **>5 cm**, **left lobe abscess**)[Q]
2. **Failure to respond** to therapy in 3-5 days[Q]	5. **Pregnancy**[Q] (Therapeutic trial with high dose Metronidazole is deemed inappropriate)
3. **Pyogenic superinfection**[Q]	

Complications

- Most frequent complications: Rupture into the **peritoneum (MC)**[Q]**,** pleural cavity, or pericardium.
- **Size** of **abscess** appears to be the **most important risk factor** for rupture
- **Laparotomy** is indicated in cases of doubtful diagnosis, **hollow viscus perforation**, **fistulization** resulting in hemorrhage or sepsis, and **failure of conservative therapy**.
- Treatment of rupture into the pleural space: **Thoracentesis**[Q]
- **Rupture into bronchi** is **self-limited** with **postural drainage** and **bronchodilators**[Q].

6. **Ans. a. Left lobe abscess, e. Refractory to treatment after 48-72 hours**
7. **Ans. b. Peritoneal cavity**
8. **Ans. a. Male: female >10:1**
9. **Ans. a. Radiographically unresolved lesion after 6 months** *(Ref: Sabiston 19/e p1447)*

Amoebic Liver Abscess

- Although **clinical improvement after adequate treatment** with antiamebic agents **is the rule**, **radiologic resolution** of the abscess cavity is **usually delayed**.
- The **average time to radiologic resolution** is **3 to 9 months** and can take as long as years in some patients.
- Studies have shown that **more than 90%** of the **visible lesions disappear radiologically**, but a small percentage of patients are left with a clinically irrelevant residual lesion.

10. **Ans. b. Hematogenous spread from a distant site**

    Hematogenous spread is most common among the given options.

11. **Ans. a. Amebic liver abscess**

12. **Ans. b. Ascending infection through biliary tract**

13. **Ans. a. Single and large abscess, d. Systemic complications fever and jaundice common** *(Ref: Sabiston 19/e p1443)*

Clinical Features	Amebic Liver Abscess	Pyogenic Liver Abscess
Age (yr)	**20-40**Q	>50Q
Male-to-female ratio	**≥10:1**Q	1.5:1
Solitary vs. multiple	**Solitary 80%**Q	**Solitary 50%**Q
Location	Usually **right liver**Q	Usually **right liver**Q
Travel in endemic area	**Yes**Q	No
Diabetes	Uncommon (~2%)	**More common**Q (~27%)
Alcohol use	Common	Common
Jaundice	Uncommon	**Common**Q
Elevated bilirubin	Uncommon	**Common**Q
Elevated alkaline phosphatase	Common	Common
Positive blood culture	No	**Common**Q
Positive amebic serology	**Yes**Q	No

14. **Ans. b. Most common in right lobe liver, c. Can rupture into pleural cavity**

15. **Ans. b. Left lobe, d. >10 cms size**

16. **Ans. c. Mostly treated conservatively**

17. **Ans. c. Surgical drainage is always indicated**

18. **Ans. a. Diloxanide furoate** *(Ref: KDT 5/e p753)*

Diloxanide Furoate

- **Diloxanide furoate** is **highly effective luminal amebicide**Q but has **no systemic anti-amebic activity**Q, because furoate ester is hydrolysed in the intestine and the released diloxanide is absorbed.
- Diloxanide is a weaker amebicide than its furoate ester and no systemic antiamebic activity is seen despite its absorption.

19. **Ans. c. Larvae are seen** *(Ref: Bailey and Love 25/e p1095, 24/e p1077, Schwartz 10/e p1285, 9/e p1116, 8/e p1164)*

    Larvae are not seen in amoebic liver abscess.

20. **Ans. c. Usually a large and single abscess is seen in cases of direct spread**

21. **Ans. b. USG weekly for 1 month followed by monthly USG till 1 year** *(Ref: Sabiston 19/e p1445-1447; Schwartz 9/e p1115-1116; Bailey 25/e p1095; Blumgart 5/e p1016-1024; Shackelford 7/e p1471-1478)*

    In **uncomplicated cases of amebic liver abscess, follow-up is done with ultrasound.**

    Role of ultrasound in the diagnosis and treatment follow-up of amoebic liver abscess, by K. Shamsi, A. De Schepper, F. Deckers, E. de Bergeyck, J. Van den Ende

    "**Serological** and **clinical data in combination with** these **non-specific sonographic features** are **sufficient for the management of ALA, obviating the need for expensive** and **invasive techniques in majority of the cases**."- http://link.springer.com/article/10.1007%2FBF00221420?LI=true

22. **Ans. c. Antiamebics/antibiotics alone**

- Presence of a **solitary homogeneous, hypoechoic lesion** in the **right lobe** of the liver in a **young patient** with **fever** and **right upper quadrant pain** suggests a diagnosis of **amebic liver abscess**.
- The **initial treatment of choice** for amebic liver abscess is **metronidazole alone**.
- **Multiple aspirations** and/ or **catheter drainage** or **hepatectomy** have **no role** in the "**initial" management** of **amebic liver abscess**.

HYDATID CYST

23. Ans. d. Ruptured hydatid cyst *(Ref: Sabiston 19/e p1447-1449; Schwartz 10/e p1285-1286, 9/e p1116; Bailey 26/e p1081, 25/e p1095-1096; Blumgart 5/e p1035- 1048; Shackelford 7/e p1459-1462)*

Hydatid Disease

- Hydatid disease is a **zoonosis**, occurs primarily in **sheep-grazing areas**Q of the world
- **Endemic** in **Mediterranean countries**, **Middle East, Far East, South America, Australia, New Zealand**, and **East Africa.**

> - **Humans** contract the **disease from dogs**, and there is **no human-to-human transmission**Q.
> - Hydatid cyst is caused by **Echinococcus granulosus**Q.
> - Other species affecting human beings: E. **multilocularis,** E. **vogelli,** E. **oligarthus**Q

Life-cycle

- **Dogs** are the **definitive host**Q of E. granulosus
- Eggs are passed (up to thousands of ova daily) and deposited with the dog's feces.

> - **Sheep**: Usual **intermediate host**Q
> - **Human: Accidental dead end intermediate host**Q without human to human transmission

- In the **human duodenum**, parasitic embryo releases an **oncosphere**, that **penetrate mucosa**, allowing access to **bloodstream**Q.
- In the blood, **oncosphere** reaches **liver** (**MC**)Q or **lungs**, develops its **larval stage**, **hydatid cyst**.
- Organs most commonly involved are: **Liver >Lungs >Spleen >Kidney >Brain >Bone**Q**.**

> **Hydatid Cyst**
>
> - Three weeks after infection, a visible hydatid cyst develops
> - The cyst wall has two layers:
>   - **Ectocyst**: outer **gelatinous** membraneQ
>   - **Endocyst**: inner **germinal** membraneQ
> - **Pericyst**: Fibrous capsule **derived from host tissues**, develops around the hydatid cyst.

- **Scoleces develop** into an **adult tapeworm** in **definitive host**Q
- Scoleces **differentiate into** a **new hydatid cyst** in **intermediate host**Q
- **Hydatid sand**: **Freed brood capsules** and **scoleces** in the hydatid fluid

Clinical Features

- **Equally common** in males and females, age of **45 years**.
- **Most** (75%) are **singular,** located in **right liver** (VII and VIII)Q.
- **Mostly asymptomatic**Q until complications occur

> - **MC presenting symptoms**: Abdominal pain, dyspepsia and vomiting.
> - **MC sign**: **Hepatomegaly**Q

- **Complications**: Rupture of the cyst into the **biliary tree (MC)** Q or **bronchial tree**, or free rupture into **peritoneal, pleural**, or **pericardial cavities**.
- **Intrabiliary rupture** is **MC complication** of **hydatid liver cysts**Q
- Free ruptures can result in disseminated echinococcosis and a potentially fatal anaphylactic reaction.

Diagnosis

- **USG** and **CT** are the **main diagnostic modalities**Q
  - **Daughter cyst** within the **large cyst** (**rosette appearance**) and **calcification** of the **wall** are **highly suggestive** of **hydatid cyst**Q**.**

> - **Diagnosis** is **confirmed** by **serological tests**Q (**ELISA, Immunoblot, Arc-5, IHA**) for antibodies.

- In cases of **suspected biliary involvement** (**Jaundice**), **ERCP (gold standard)** Q or PTC is necessary.

Treatment

- **Most cysts** are **treated surgically**Q
- **Conservative management** is appropriate in **elderly** patients with **small, asymptomatic, densely calcified cysts**Q.
- **Treatment options**: PAIR, pericystectomy, marsupialization, leaving the cyst open, drainage of the cyst, omentoplasty, or partial hepatectomy to encompass the cyst.
- Currently, **PAIR** is the **preferred method** of **treatment**Q for anatomically and surgically appropriate lesions

> **Surgery remains the treatment of choice for cysts where**
>
> - **PAIR** is **not possible** or **cysts are refractory to PAIR**Q
> - For **complicated cysts** (communicating with biliary tract)Q

- **Radical (resection)** and **conservative (drainage** and **evacuation)** surgical approaches appear to be **equally effective** at controlling disease.
- **Pericystectomy** is the **preferred surgical approach**Q (complete cyst with surrounding fibrous tissue are removed)
- If surgical **cystectomy** is **not** technically **feasible**, then formal **liver resection** can be done.

Chemotherapy in Hydatid Disease
• Chemotherapy with **albendazole** or **mebendazole** is effective at **shrinking** the **cysts** • **Cyst disappearance** occurs in **fewer than 50%** of patientsQ. • **Preoperative treatment** may **decrease the risk for spillage**Q and is a reasonable and safe practice. • **Chemotherapy without definitive resection** or drainage is only considered **for:** – **Widely disseminated disease**Q – Patients with **poor surgical risk**Q

Treatment of E. multilocularis	
• E. multilocularis cyst is **always multiloculated**Q.	• Treatment is **surgical resection**Q.

24. **Ans. d. Drooping lily sign** *(Ref: Wolfgang 2/e p309)*

- **Drooping lily sign** is seen in **neuroblastoma** and **duplication of ureter**Q.
- Duplication of ureter: **Drooping lily sign**Q **on IVP** (Non visualized upper pole of a duplex system displaces the lower pole down, looking like a drooped down lily flower on IVP)

Characteristic Signs of Pulmonary Hydatidosis	
• Meniscus signQ • Double arc signQ • Moon signQ	• Water lily signQ • Crescent signQ

WHO Classification of Hydatid Cyst	
CL Type	• Well-circumscribed liquid image with a **clearly defined wall**
CE 1	• Concentric hyperechogenic halo around the cyst which may contain free-floating hyperechogenic foci called **hydatid sand**Q
CE 2	• Multivesicular cyst with the daughter and grand-daughter cysts identified by **honeycomb, rosette, spoke wheel** or **cluster images**Q
CE 3	• Partial or total detachment of the laminated layer with floating undulated hyperechogenic membranes showing the dual wall, **water lilly** and **water snake signs**Q**.**
CE 4	• **Cystic** and **solid components**Q together without visible daughter cysts.
CE 5	• Matrix or amorphous mass with a **solid** or **semisolid appearance**; limited amount of calcification; **least common** type.

- Only **completely calcified cyst** (**eggshell appearance**) is accepted as a **dead cyst**.
- CL, CE 1, and CE 2 are active fertile cysts; CE **3** is a **transitional cyst** with degeneration started; CE 4 is a degenerated cyst; CE 5 is a calcified cyst; CE **4** and CE **5** is **inactive cyst**.

Gharbi Classification of Hydatid Cyst	
Type I	Pure (clear) **fluid collection**Q
Type II	Fluid collection with a **split wall** (Floating membrane)Q
Type III	Fluid collection with septa (**Honeycomb** image)Q
Type IV	Heterogeneous complex massQ
Type V	Calcified mass (eggshell)Q

25. **Ans. a. Hepatic resection is never done**
26. **Ans. b. Multiloculated, c. Cyst in lung, d. Recurrence after surgery, e. Perforated cyst**
27. **Ans. c. Hydatid cyst:** *(Ref: Blumgart 5/e p1045)*

Methods of management of the residual cavity after Cyst evacuation		
• External tube drainage • Capsulorrhaphy • **Capitonnage**Q • Myoplasty	• OmentoplastyQ • Internal collapseQ • **Introflexion**Q • MarsupializationQ	• Introflexion plus omentoplasty • Cystojejunostomy or Cystogastrostomy

28. **Ans. a. Caused by e. granulosus, b. In 80% cases, cyst in single**

29. **Ans. a. Lung cyst, e. Inaccessible location** *(Ref: Sabiston 19/e p1449; Bailey 26/e p1081, 25/e p1095; Blumgart 5/e p1047-1048; Shackelford 7/e p1461)*

PAIR (Puncture, Aspiration of cyst content, Injection of scolicidal agent, and Reaspiration)

- Currently, **PAIR** is the **preferred method** of **treatment**[Q] for anatomically and surgically appropriate lesions
- The **efficacy of PAIR** in managing hydatid cysts is **>75%.**
- During PAIR, patient is given prophylactic coverage of albendazole

Scolicidal Agents

- **Hypertonic (20%) saline**[Q]: 100% scolicidal with contact time of 6 minutes
- 0.5% **cetrimide** with 0.05% **chlorhexidine**[Q]
- **Absolute alcohol**[Q]
- **10% povidone iodine**[Q]

Contraindications of PAIR

- Superficially located cysts[Q]
- **Inaccessible** or **hazardous location**[Q] of cyst
- Cysts with **multiple internal septal**[Q] **divisions** (**honeycombing** pattern)
- **Dead** or **inactive cysts**[Q]
- Cysts **communicating with biliary tree**[Q]
- **Lung** or **brain cysts**[Q]

30. **Ans. b. Pre-op albendazole ollowed by surgery is the treatment of choice, c. 20% saline is scolicidal, d. Puncture, aspiration, injection, and respiration (PAIR) done in hepatic hydatids**

31. **Ans. d. Serum examination**
32. **Ans. c. Hydatid cyst of liver**
33. **Ans. c. Cirrhosis**
34. **Ans. b. Formalin**
35. **Ans. c. Aspiration is safe** *(Ref: Bailey and Love 25/e p1095, 24/e p167)*

Aspiration is safe in Hydatid cyst of liver.

36. **Ans. b. Percutaneous drainage**
37. **Ans. b. ELISA**
38. **Ans. d. Multiple peritoneal cyst, c. Moribund patients** *(Ref: Sabiston 19/e p1449)*

Chemotherapy in Hydatid Disease

- Chemotherapy with **albendazole** or **mebendazole** is effective at **shrinking** the **cysts**
- **Cyst disappearance** occurs in **fewer than 50%** of patients[Q].
- **Preoperative treatment** may **decrease the risk for spillage**[Q] and is a reasonable and safe practice.
- **Chemotherapy without definitive resection** or drainage is only considered **for:**
  - **Widely disseminated disease**[Q]
  - Patients with **poor surgical risk**[Q]

39. **Ans. b. 60%**

The sensitivity of Casoni's test varies from 55-65%[Q]**.**

	Most Common		
	Symptom	Sign	Laboratory abnormality
Pyogenic abscess	**Fever**[Q]	RUQ **tenderness**[Q]	Raised **ALP**[Q]
Amebic abscess	Abdominal **pain**[Q]	**Hepatomegaly**[Q]	Raised **PT**[Q]
Hydatid cysts	No symptom or Abdominal pain[Q]	RUQ **mass**[Q]	Eosinophilia

HEPATIC ADENOMA

40. **Ans. c. Hepatic architecture is maintained** *(Ref: Sabiston 19/e p1451; Schwartz 10/e p1290-1291, 9/e p1120; Bailey 26/e p1083, 25/e p1097; Blumgart 5/e p1258-1262; Shackelford 7/e p1564-1565)*

Hepatic Adenoma

- **Benign** proliferative disorder of hepatocytes
- Predominantly found in **young women** (**20-40** years), associated with **OCPs**[Q]
- Usually **single**[Q] (multiple lesions in 12-30%)

Pathology

- Composed of **cords** of **benign hepatocytes** containing **increased glycogen** and **fat, without bile ductules, fibrous septa, portal tracts** or **central vein**[Q]**.**

- **Bile ductules** are **not seen**, only few or **no Kupffer cells** are seen[Q].
- **Normal architecture** of the liver is **not present**[Q] in these lesions.

- Contain large plates of hepatocytes separated by **dilated sinusoids** which are **perfused solely** by **peripheral arterial feeding vessels (lack portal venous supply)**, under **arterial pressure**[Q].
- **Hemorrhage** and **necrosis**[Q] are commonly seen

Clinical Features

- Symptomatic (upper **abdominal pain**) in **50-75%**[Q], related to hemorrhage or local compressive symptoms.
- Tumor markers (**AFP**) are **normal**[Q].

- Two major risks: **Rupture** (with potentially life-threatening **intraperitoneal hemorrhage**) and **malignant transformation**[Q].
- Risk for **rupture** is **30-50%, related to size**[Q].
- **Risk for transformation** into **HCC** is **low**[Q].

Diagnosis

- **MRI**: Well-demarcated heterogeneous mass containing **fat** or **hemorrhage**.

CT Findings in Hepatic Adenoma

- **Hypervascular** and **heterogeneous** on the **arterial phase** and become isodense or hypodense on the portal phase as a result of **arteriovenous shunting**
- Distinctive findings from FNH: **Smooth surface** (95%), presence of **necrosis and hemorrhage** (25%), and **tumor capsule** (25%)[Q].

- **Angiography**: **Hypervascular** well circumscribed tumor **supplied by peripheral arteries**[Q].
- Radiological imaging can accurately identify most of these tumors.
- **Resection** may be necessary to **secure a diagnosis** in **difficult cases**[Q].

Treatment

- **Acute hemorrhage**: **Hepatic artery embolization**[Q], after stabilization, resection of the mass.
- **Resection** for **symptomatic masses**[Q]
- **Resection before a planned pregnancy**, as behavior during pregnancy has been unpredictable

41. **Ans. a. Normal liver architecture**
42. **Ans. b. Normal liver architecture**
43. **Ans. a. Hepatic adenoma**
44. **Ans. b. Liver cell adenoma**
45. **Ans. a. Usually multiple**
46. **Ans. b. Hepatic adenoma** *(Ref: Bailey 24/e p1079; Taber's Medical Dictionary 19/e p1600)*

Hepatic adenoma always merits surgery. As **no characteristic radiological features** to **differentiate** these lesions **from malignant tumor**. These tumors are thought **to have malignant potential** and **resection** is therefore the **treatment of choice**[Q].

FOCAL NODULAR HYPERPLASIA

47. **Ans. a. FNH** *(Ref: Sabiston 19/e p1451-1452; Schwartz 10/e p1291, 9/e p1120; Bailey 26/e p1083, 25/e p1097; Blumgart 5/e p1255-1258; Shackelford 7/e p1563-1564)*

Focal Nodular Hyperplasia

- FNH is **second MC benign tumor**[Q] of the liver.
- Usually a **small (<5 cm) nodular mass** arising in a normal liver, involves right and left liver equally.
- Mainly seen in **young women,** associated with **OCPs use**[Q]

Pathology

- **Central fibrous scar**[Q] with **radiating septa** in the mass
- Microscopically: Cords of benign-appearing hepatocytes divided by multiple fibrous septa originating from a central scar.
- **Typical hepatic vascularity** is **not seen** with **atypical biliary epithelium**[Q]

- **Central scar** contains a **large artery** that branches out into multiple smaller arteries in a **spoke-wheel pattern**[Q] **(on angiography)**

Clinical Features

- **Incidental finding** at laparotomy or more commonly on imaging studies in most patients,.
- **Vague abdominal pain** in symptomatic cases
- **AFP** levels are **normal.**

Diagnosis

- Most cases of FNH can be diagnosed radiologically, on **CECT** or **MRI**
- **Homogeneous mass** with a **central scar**[Q] that rapidly enhances during the arterial phase of contrast administration.
- Histologic confirmation and resection for definitive diagnosis if radiologic diagnosis is difficult

Treatment

- **No treatment**[Q] in asymptomatic patients with typical radiologic features
- **Resection** in cases of **diagnostic uncertainty**, for **histologic confirmation**[Q].

48. **Ans. b. Surgical resection is required due to risk of malignancy**
49. **Ans. a. More common in young women, b. Associated with OCP use, c. May present with abdominal pain, d. Excision biopsy may aid in diagnosis**
50. **Ans. a. Hemoperitoneum is common**
51. **Ans. c. Focal Nodular Hyperplasia**

HEMANGIOMA

52. **Ans. a. CHF is very common** *(Ref: Sabiston 19/e p1452-1453; Schwartz 10/e p1289-1290, 9/e p119; Bailey 26/e p1083, 25/e p1097; Blumgart 5/e p1250-1255; Shackelford 7/e p1560-1563)*

Liver Hemangioma

- **MC benign tumor** of the **liver**[Q].
- Mainly seen in **women** of **45 years**[Q].
- Small capillary hemangiomas (no clinical significance), larger cavernous hemangiomas
- **Usually single** and **<5 cm** in diameter, occur **equally in right and left liver**[Q].
- **Giant hemangioma**: Lesions **>5 cm**

Pathology

- Microscopically: Endothelium-lined, blood-filled spaces that are separated by thin, fibrous septa.
- **Enlargement** of hemangiomas are **by ectasia**[Q] rather than neoplasia.

Clinical Features

- Most commonly **asymptomatic** and **incidentally found**[Q] on imaging studies.
- **Large compressive masses** may cause **vague upper abdominal symptoms**[Q].
- **Kasabach-Merritt syndrome**[Q]**:** Syndrome of thrombocytopenia and consumptive coagulopathy, rarely seen
- **LFTs** and **tumor markers** are **normal**[Q]

Diagnosis

- Diagnosis is made radiologically.
- **CT** and **MRI** are diagnostic if a **typical peripheral nodular enhancement**[Q] pattern is seen.
- Percutaneous **biopsy** is potentially **dangerous** and **inaccurate**, **not recommended**[Q].

Treatment

- **Observation** for **asymptomatic** cases[Q]
- **Enucleation** with inflow control is **TOC** for **symptomatic cases**[Q]

53. **Ans. a. Hemangioma**
54. **Ans. c. Hemangioma**
55. **Ans. c. Hemangioma**
56. **Ans. b. Hemangioma** *(Ref: Sabiston 19/e p1451-1453; Schwartz 10/e p1288-1289, 9/e p119-1120; Bailey 26/e p1083, 25/e p1097; Blumgart 5/e p1250-1262)*

Hemangioma	Hepatic Adenoma	Focal Nodular Hyperplasia	Peliosis Hepatis
• MC hepatic neoplasm[Q] • **Benign** in nature • CT scan showing characteristic appearance of **slow contrast enhancement** due to **small vessel uptake**[Q] in the hemangioma • Little malignant potential, hemangioma is **not an indication** for **surgery**[Q]	• Rare benign liver tumors • **No** characteristic **radiological features** to **differentiate** these lesions **from malignant tumors**[Q] • These tumors are thought to have **malignant potential** and **resection** is the **treatment of choice**[Q]	• **Benign condition**[Q] of unknown etiology • **Focal overgrowth**[Q] of functioning liver tissue supported by fibrous stroma • Patients are **middle aged females**[Q], no association with underlying liver disease • **Sulphur colloid scan** of liver is useful for diagnosis. **FNH contain** both **hepatocytes** and **Kupffer cells**[Q]**.** The **latter take up** the **colloid**, **differentiating FNH** from either a benign **adenoma** or a **primary** or **metastatic cancer, none of which contains** a significant number **of Kupffer cells**[Q]**.**	• **Multiple cystic blood filled spaces**[Q] in the liver associated with **dilatation of the sinusoids**[Q]**.** • Leads to **hepatic enlargement** and **pain**[Q] • Associated with use of **OCPs, anabolic steroids** and **Bartonella**[Q] • If due to **infection**, treatment requires **parenteral doxycycline**[Q] (surgery is not required in every case)

HEPATIC CYST

57. Ans. d. Simple cyst: *(Ref: Sabiston 19/e p1464; Schwartz 10/e p1288-1289, 9/e p1119; Blumgart 5/e p1052-1054; Shackelford 7/e p1453-1457)*

Simple Hepatic Cyst

- Contain **serous fluid**, **do not communicate** with the biliary tree, and **do not have septations**[Q]
- **Single** in 50% cases[Q]

Treatment

- Nonsurgical treatment: **Aspiration** and **injection** of a **sclerosing agent** (most frequently **ethanol**) [Q]
- Surgical therapy: **Fenestration** or **unroofing** the **extrahepatic** portion of cyst[Q].

Complication

- **MC complication**: **Intracystic bleeding**[Q].

58. Ans. c. Intracystic bleeding is common and deroofing is mandatory

POLYCYSTIC LIVER DISEASE

59. Ans. a. Deroofing of the cyst *(Ref: Sabiston 19/e p1464; Schwartz 10/e p1288-1289, 9/e p1119, 8/e p1159; Blumgart 5/e p1054-1062; Shackelford 7/e p1457-1458; Maingot 11/e p776)*

Treatment of **symptomatic polycystic liver disease** is **deroofing** of the **cyst.**

Polycystic Liver Disease

- **Autosomal dominant**[Q] disorder, often found is association with polycystic renal disease
- **MC extra-renal manifestation of ADPKD**[Q]
- Liver cysts are **always preceded by kidney cysts**[Q].
  - **Renal function** and **hepatic cyst load** are **correlated**[Q].
  - Associated condition**: Berry aneurysm** and **mitral valve prolapse**[Q].

Types

- **Type I:** Few large cysts (>7-10 cm)
- **Type II:** Multiple medium cysts (5-7 cm)
- **Type III:** Diffue small to medium cysts (<5 cm)

Treatment

- **Laparoscopic unroofing**[Q] for small number of large cysts
- A combination of **cyst unroofing** + **liver resection**[Q] for reducing liver volume.
- **MC complication** specific to **surgery**: **Ascites**

Complications

- The **main complication** is **bacterial infection**[Q] of a cyst.
- Other complications: Intracystic bleeding, cholestasis, portal hypertension
- **Liver failure** has **not** been **observed** in these patients.

HEPATOCELLULAR CARCINOMA: RISK FACTORS

60. Ans. d. IBS *(Ref: Sabiston 19/e p1453-1454; Schwartz 10/e p1291, 1294-1296, 9/e p1121; Bailey 26/e p1085, 25/e p1099; Blumgart 5/e p1284; Shackelford 7/e p1565-1568)*

Conditions Associated with Hepatocellular Carcinoma					
1. Cirrhosis		**2. Metabolic diseases**		**3. Environmental**	
Condition	**Risk**	**Condition**	**Risk**	**Condition**	**Risk**
• HBV[Q]	**High**	• Hereditary **hemochromatosis**[Q]	**High**	• **Thorotrast**	Moderate
• HCV[Q]	**High**	• Hereditary **tyrosinemia**[Q]	**High**	• Androgenic **steroids**[Q]	Moderate
• **Alcohol**[Q]	**High**	• **Alpha-1 antitrypsin deficiency**	Moderate		
• Autoimmune chronic active hepatitis	**High**	• **Ataxia telangiectasia**[Q]	Moderate	• Cigarette **smoking**[Q]	Low to moderate
		• Types 1 and 3 glycogen storage disease	Moderate		
		• **Galactosemia**[Q]	Moderate	• Aflatoxin[Q]	Moderate
• Cryptogenic cirrhosis	Moderate	• **Citrullinemia**	Moderate		

• Cirrhosis due to **NAFLD**[Q] • **Primary biliary cirrhosis**[Q]	Moderate **Low**	• Hereditary hemorrhagic telangiectasia • **Porphyria cutanea tarda** • **Wilson's disease**[Q] • Orotic aciduria • **Alagille's syndrome**[Q] (congenital cholestatic syndrome)	Moderate Moderate **Low** Moderate Moderate		

61. **Ans. a. HBV**

62. **Ans. a. Non alcoholic steatohepatitis is a risk factor** *(Ref: Shackelford 7/e p1567)*
    - **Cirrhosis due to NAFLD (Non-alcoholic fatty liver disease)** mainly **caused by obesity** is a **risk factor for HCC**.

63. **Ans. a. Associated with HBV and HCV, b. Cirrhosis is predisposing factor, c. Fibrolamellar variety is not associated with cirrhosis**

64. **Ans. c. Cirrhosis**

HEPATOCELLULAR CARCINOMA

65. **Ans. a. AFP** *(Ref: Sabiston 19/e p1453-1459; Schwartz 10/e p1294-1296, 9/e p1121; Bailey 26/e p1085-1086, 25/e p1099-1100; Blumgart 5/e p1283-1289; Shackelford 7/e p1567-1576)*

Hepatocellular Carcinoma

- **MC primary liver malignancy** is **HCC**[Q]
- **HCC** represents **MC solid organ cancers**[Q].
- HCC: MC **cause** of **death** in patients with **cirrhosis**[Q].

> - More prevalent in **Asia** and **sub Saharan Africa**[Q] (high frequency of **chronic infection** with **HBV** and **HCV**[Q])
> - **100 folds increase** in risk in individuals with **HBV infection**[Q]

- More common in **males**, **60-90%** arise in **cirrhotic liver**[Q]
- **Post necrotic cirrhosis** has **highest risk**[Q] of developing into HCC
- **Alcoholic cirrhosis** and Primary biliary cirrhosis has **lower risk**[Q]

> - **Strong propensity** for **invasion of vascular channels**[Q]

Pathology

- **Gross Morphology: Hanging**, **pushing** and **invasive** tumors[Q].
- **Histologic patterns:** Trabecular, pseudoglandular or acinar, compact pattern and scirrhous pattern

Clinical Features

- **MC symptom** is **abdominal pain >weight loss**[Q]
- Usually presents at **late stage**[Q], symptoms at advanced stage are **vague**
- Non-specific symptoms (anorexia, weight loss) and **Hepatomegaly**[Q]

> **Paraneoplastic Syndromes in HCC**
> - **Hypercholesterolemia (MC)**[Q] **>hypoglycemia**[Q], erythrocytosis, hypercalcemia

- **Vascular bruit (25%)**, GI bleed (10%), tumor rupture (2-5%), jaundice due to biliary obstruction (10%), paraneoplastic syndrome (<5%).

Tumor Markers

- Protein induced by Vitamin K Absence (**PIVKA**; Des-gamma-Carboxy Prothrombin); **glypican-3**; **AFP** fractions[Q]

> - Lectin fraction-3 of AFP (**AFP-L3**) is **highly specific to HCC** and also an indicator of **poorly-differentiated** histology and **unfavorable prognosis**[Q]
> - Serum **AFP** level is elevated above **20 ng/mL** in **>70%** of patients with HCC.

- The monoclonal antibody **HepPar-1 (hepatocyte paraffin-1)** identifies a unique antigen on **hepatocyte mitochondria** and is used to identify hepatocytes or HCC.

Diagnosis

> **Non-invasive Diagnostic Criteria for HCC**
> - **Focal lesion 1-2 cm: Two** imaging **techniques** with **arterial hypervascularization** and **venous washout**[Q].
> - **Focal lesion >2cm: One** imaging **technique** with **arterial hypervascularization** and **venous washout**[Q].
> - Techniques to be considered: dynamic CT and MRI.

- **Screening** is based on regular **ultrasound scanning** in **high risk population**[Q]
- **Biopsy** proof of HCC is **not required**[Q]

Treatment

- **Complete excision**[Q] by **partial hepatectomy** or by **total hepatectomy** and **transplant** is the only treatment modality with **curative** potential[Q].

Remember: **Only 15-20% of HCC is resectable, because of**
• Multicentricity, Bilobar involvement[Q] • Portal vein invasion, Lymphatic metastasis[Q]

66. **Ans. a. USG**
67. **Ans. a. Not return to normal after hepatic resection**
68. **Ans. a. HCC, b. Hepatoblastoma**
69. **Ans. d. AFP** *(Ref: Sabiston 19/e p1455-1456; Blumgart 5/e p1286-1287; Shackelford 7/e p1567-1576)*

Okuda Staging System for HCC (BATA)[Q]		
Clinical parameter	Cut-off value	Points
Serum **B**ilrubin	<3 >3	0 1
Serum **A**lbumin	>3 <3	0 1
Tumor size	<50% >50%	0 1
Ascites	Absent Present	0 1

Stage I = 0 points; **Stage II** = 1–2 points; **Stage III** = 3–4 points

Cancer of the Liver Italian Program (CLIP)

- Components: **PACT** (**P**ortal vein thrombosis, **A**FP levels, **C**hild-Pugh stage, **T**umor extension)[Q]
- The CLIP system is applicable to **Hepatitis C-related** HCC cases[Q]

Chinese University Prognostic Index

- Components: **BA$_3$TS** (**Bilirubin; A$_3$**: **A**scites, **A**FP, **A**LP; **T**NM stage; **Symptoms**)[Q]
- Applicable to **HBV** related HCC in **China**[Q].

Barcelona Clinic Liver Cancer Staging System

- It was developed to allow for the **indication** of the **best therapy** for **each stage of HCC**[Q] and is **best suited** for **treatment guidance** and to **select early-stage patients** who could benefit from **curative therapies**.
- It divides patients into four major groups (early, intermediate, advanced and end stage)
- It considers variables related to **tumor stage, liver functional status, physical status** and **cancer related symptoms**[Q].

70. **Ans. c. Hemoperitoneum in 7% patients**

Clinical Features of HCC

- **Vascular bruit (25%)**[Q], GI bleed (**10%**), tumor rupture (**2-5%**)[Q], jaundice due to biliary obstruction (10%), paraneoplastic syndrome (<5%).

71. **Ans. a. Hypoglycemia** *(Ref: Sabiston 19/e p1454)*

Paraneoplastic Syndromes in HCC

- **Hypercholesterolemia (MC)**[Q] >**hypoglycemia**[Q], erythrocytosis, hypercalcemia

72. **Ans. a. MELD**
73. **Ans. c. Over 80% of tumors are surgically resectable**
74. **Ans. d. Jaundice**
75. **Ans. a. AFP increased in 70% cases, b. Resection possible in few cases only**
76. **Ans. c. AFP is increased in 70% cases**
77. **Ans. a. Hepatoma**
78. **Ans. a. AFP**
79. **Ans. b. Alpha-2 macroglobulin**
80. **Ans. c. HBV predisposes**
81. **Ans. d. Nd-YAG laser ablation** *(Ref: Sabiston 19/e p1456-1459; Schwartz 10/e p1291, 1294-1296, 9/e p1121; Bailey 25/e p1099-1100; Blumgart 5/e p1287-1288; Shackelford 7/e p1571-1577)*

Treatment of HCC

- **Hepatic resection** as the **first-line treatment** for cirrhotic patients with small HCC and **preserved liver function** and reserve salvage **transplantation** for **recurrence** or **deterioration of liver function** after hepatic resection[Q]
- Only patients with **normal bilirubin** concentration and **absence of portal hypertension** should be considered for **resection[Q].**
- If not candidate for surgery offer **percutaneous ablation**; patients with more advanced disease (**large** or **multifocal HCC**) **without portal vein invasion** are candidates for **transarterial chemoembolization** if liver function is preserved (the sole palliative approach that has been shown to have a **positive impact** in **survival** is transarterial chemoembolization)[Q].
  - For **patients without cirrhosis** who develop **HCC**, **resection is the treatment of choice**[Q].
  - For those patients with **Child's class A cirrhosis** with **preserved liver function** and **no portal hypertension, resection also is considered**[Q].
  - If **resection** is **not possible** because of **poor liver function** and the **HCC meets** the **Milan criteria** (**one nodule <5 cm**, or **two or three nodules all <3 cm**, **no gross vascular invasion** or **extrahepatic spread**), **liver transplantation** is the **treatment of choice**[Q].

Milan criteria (Mazzafero)		
• **One nodule <5 cm**	• **Two or three nodules all <3 cm**	• **No gross vascular invasion** or **extrahepatic spread**

Treatment Options for Hepatocellular Carcinoma	
1. Surgical: • Resection • Orthotopic liver transplantation	**4. Transarterial:** • Embolization • Chemoembolization • Radiotherapy
2. Ablative: • Ethanol injection • Acetic acid injection • Thermal ablation (**cryotherapy**, **radiofrequency ablation**, **microwave**)	**5. Systemic:** • Chemotherapy • Hormonal • Immunotherapy
3. Combination Transarterial and Ablative	**6. External-beam Radiation Therapy**

82. Ans. b. Hepatocellular carcinoma *(Ref: Sabiston 19/e p1456; Schwartz 10/e p1291-1294-1296, 9/e p1121; Blumgart 5/e p1344; Shackelford 7/e p1573-1574)*

Hepatocellular Carcinoma

- **HCC derive its blood supply** from the **hepatic artery**[Q].
- **HCC** is characterized by being **hyperdense** on the **arterial phase** of contrast imaging, meaning that they have **more arterial perfusion[Q].**
- The **arterial perfusion of HCC** also allows for **treatment** of the **lesions via embolization** of the **feeding artery[Q].**
- **Characteristic of HCC**: **Propensity to invade** the **portal vein**[Q].
- **The risk of portal vein invasion** appears to **correlate with tumor size** and **differentiation**[Q].
- The **outcome** of patients with **portal venous invasion** is **worse** than that of patients whose tumor does not invade the portal vein.

83. Ans. b. Hepatocellular carcinoma

This is a **typical case of HCC**, remember **AFP is raised** in about **75% of Africans** and only **30% of patients in US** and **Europe**.

84. Ans. e. All

85. Ans. a. PUO *(Ref: Sabiston 19/e p1454; Schwartz 10/e p1291, 1294-1296, 9/e p1121)*

Rare Presentations of HCC

- On **rare occasions**, HCC can present as a **rupture** with the sudden onset of abdominal pain followed by **hypovolemic shock** secondary to **intraperitoneal bleeding**.
- Other rare presentations include **hepatic vein occlusion** (**Budd-Chiari syndrome**), **obstructive jaundice, hemobilia**, or **fever of unknown origin (PUO)**[Q].

86. Ans. b. HCC

87. Ans. c. CA 19-9

88. Ans. a. Sorafenib *(Ref: Sabiston 19/e p1458; Blumgart 5/e p1289; Shackelford 7/e p1568)*

Sorafenib

- **Sorafenib inhibits serine/threonine kinase** Raf-1, **vascular endothelial growth factor receptor** 1, 2,3; **platelet-derived growth factor receptor** -β; and **tumorigenic receptor tyrosine kinases** (RTKs; RET, Flt-3, and c-Kit)[Q].
- **Sorafenib** is **approved** as a standard therapy **for unresectable HCC**[Q].

FIBROLAMELLAR HCC

89. Ans. d. Well demarcated and encapsulated *(Ref: Sabiston 19/e p1458; Blumgart 5/e p1227-1228)*

Fibrolamellar HCC

- Occurs in **young adults without underlying cirrhosis**[Q]
- **Non-encapsulated** but well circumscribed, so **high resectability rate**[Q]
- **Grows slowly** and and has **better prognosis**[Q]

Pathology

- **Well demarcated** and **non-encapsulated** and may have a **central fibrotic area**[Q].
- The central scar can make distinguishing this tumor from FNH difficult.
- Composed of **large polygonal tumor cells** embedded in a **fibrous stroma** forming **lamellar structures**

> - **Calcification**[Q] differentiates FHCC from FNH in **35-55%** of **FHCC**; **heterogeneous enhancement**[Q] is also an important imaging finding.

Clinical Features

- Occurs in **younger patients**[Q] without a history of cirrhosis.

> - FHCC **doesn't produce AFP**[Q]
> - Associated with **elevated neurotensin**[Q] and **Vitamin B_{12} binding globulin levels**[Q]

Treatment

- **Better prognosis** than HCC due to **high resectability rates**, **lack of chronic liver disease**, and a more **indolent course**[Q].
- **Long-term survival** can be expected in about **50-75%** of patients **after complete resection**[Q]
- **Recurrence** is **common** and occurs in at least **80%** of patients[Q].
- The presence of **lymph node metastases** predicts a **worse outcome**[Q].

90. Ans. a. Young adults, children

91. Ans. a. Associated with cirrhosis *(Ref: Sabiston 19/e p1458)*

Characteristic Feature	HCC	Fibrolamellar HCC
Male-to-female ratio	2:1-8:1	**1 : 1**[Q]
Median **age** (year)	**55**	25[Q]
Tumor	**Invasive**	**Well circumscribed**[Q]
Resectability	**<25%**	**50-75%**[Q]
Cirrhosis	**90%**[Q]	5%
Raised AFP	**80%**[Q]	5%
HBV positive	**65%**[Q]	5%

92. Ans. c. AFP level always >1000 pg/ml

LIVER SECONDARIES

93. Ans. a. Ultrasonic waves *(Ref: Sabiston 19/e p1459-1464; Schwartz 10/e p1123; Bailey 26/e p1084-1085, 25/e p1098-1099; Blumgart 5/e p1290-1305; Shackelford 7/e p1585-1591)*

Ultrasonic waves are not described as a method of local ablative therapy for liver secondaries.

Local Ablative therapy for liver secondaries				
Mechanism	**Technique**	**Zone of Necrosis**	**Advantages**	**Disadvantages**
Freezing	**Cryotherapy**	**3-5** cm	**Large zone** of necrosis Easily followed by ultrasound	Requires laparotomy Large size probe size
Hyperthermic coagulative necrosis	**Radiofrequency or microwave ablation**	2 cm	**Percutaneous** technique	Small size of necrosis
Local injection therapy	**Ethanol**, **acetic acid**, **chemotherapy**, **hot saline**	3 cm	Simple, inexpensive	Inhomogenous distribution

94. Ans. c. Gallbladder

CA GB leads to **multiple secondaries to liver** in **advanced stage**, and is the most common cause among the given option.

95. Ans. b. Metachronous lesions *(Ref: Sabiston 19/e p1459-1464; Schwartz 10/e p1293-1294, 9/e p1123; Bailey 26/e p1084-1085, 25/e p1098-1099; Blumgart 5/e p1290-1305; Shackelford 7/e p1585-1589)*

Colorectal Liver Metastasis

- About **20%** of these patients are candidates for a potentially **curative liver resection** with a **5-year survival rates** range from **25-58%**Q.
- About **two-third** of cases **recur**, but in high-risk situations (**four** or **more** tumors, **extrahepatic** disease), recurrence rates are generally **80%** or higherQ.
  - About **half** of the **recurrences** are isolated to the **liver** and a small number of these patients (**5%**) are candidates for a **second liver resection** and can expect further **5-year survival** rates of **30-40%**.
- Resections of **extrahepatic metastases** that appear to be associated with the **best outcome** are **limited lung metastases**, **locoregional recurrences** of the primary tumor, and **portal lymph nodes.**

Factors most influential on outcome of Colorectal liver metastasis		
• Size **>5 cm**Q	• Disease free interval **<1 year**Q	• **More than one** tumorQ
• **Lymph node-positive** primary lesionQ	• CEA **>200** ng/mLQ	

- **Synchronous liver metastasis** is associated with poor prognosis

96. Ans. a. Adenocarcinoma of the colon *(Ref: www.learningradiology.com)*

Calcified Hepatic Metastases

- **Calcified hepatic metastases** are most frequently associated with **mucin-producing neoplasms** such as **colon carcinoma**Q or less likely **ovarian carcinoma.**

97. Ans. a. Breast cancer *(Ref: Focal Liver Lesions (Springer) 2006/266)*

Hepatic Metastases

- **Metastases** from **breast cancer** are typically **hypoechoic (echopoor)**Q on **ultrasonography.**
- **Metastases** from **carcinoma colon** and **RCC** are typically **hyperechoic (echogenic)**Q**.**
- **Metastases** from **mucinous adenocarcinoma** of **colon** are typically **calcified**Q**.**

Sonographic Pattern of Hepatic Metastases

Echogenic	Echopoor
• **Colonic carcinoma**Q	• **Breast cancer**Q
• **Neuroendocrine tumors**	• Lung cancer
• **RCC**Q	• Lymphoma
• Choriocarcinoma	• Carcinoma pancreas
• Multifocal HCC	

HEPATOBLASTOMA

98. Ans. c. Prognosis is very poor with pulmonary metastasis *(Ref: Sabiston 19/e p1459; Schwartz 10/e p1641-1642, 9/e p1450-1451; Blumgart 5/e p1328-1334; Shackelford 7/e p2037-2038)*

Hepatoblastoma

- **MC primary hepatic tumor** of **childhood**, more common in **males**Q**.**
- **Low birth weight** may represent a **risk factor**Q.
- **Most cases** are **sporadic**, also associated with **Beckwith-Wiedemann syndrome** and **FAP**Q
- **No** evidence of **association** with **HBV** or **HCV infection** or any other **chronic viral hepatitis**Q.
- These patients usually do **not have cirrhosis** or **inborn errors of metabolism**Q**.**

Pathology

- Five histologic subtypes: Fetal, embryonal, mixed mesenchymal, macrotubular, and anaplastic or small cell.

Clinical Features

- **Median age** of presentation is **18 months**, and almost **all cases occur** before **3 years**[Q].
- The **MC presenting sign** is an **asymptomatic abdominal mass**[Q].
- Mild **anemia** and **thrombocytosis**[Q] are commonly found at presentation.

> - Serum **AFP levels** are **elevated in 85-90%** of patients and can serve as a useful **marker for therapeutic response**[Q].

Diagnosis

- **CT scan** reveals a **vascular mass** that is often (50%) **speckled with calcification**[Q].

Treatment

- To **confirm the diagnosis**, an **initial biopsy**[Q] is required.

> - **For unresectable tumors**, the initial surgical procedure should include a **diagnostic biopsy** and **placement of a vascular access device for chemotherapy**[Q].
> - A **second laparotomy** is performed after **four cycles of chemotherapy**, if imaging studies show a good response, and the tumor appears resectable.

- **Neoadjuvant chemotherapy** (cisplatin, 5-fluorouracil, vincristine) followed by **resection**[Q]
- 50% of patients with **pulmonary metastases** can be **cured with resection**[Q] of the hepatic tumor and **chemotherapy** or resection of the pulmonary metastases[Q].

Prognosis

- Survival appears to be **dependent** on **complete resection**[Q].
- Long-term survival rates of **60-70%** can be expected with **complete resection**[Q].

99. Ans. b. Common in cirrhosis of liver due to HBV

100. Ans. b. 90% of hepatoblastoma

HEMANGIOENDOTHELIOMA

101. Ans. a. Adult variant is benign *(Ref: Sabiston 19/e p1459; Blumgart 5/e p1246)*

- **Infantile variety** is **benign**, **adult** one is **malignant** and **highly aggressive**[Q].

Epitheloid Hemangioendothelioma

- Malignant soft tissue tumor of **endothelial origin**[Q].
- **Infantile variety** is **benign**, **adult** one is **malignant** and **highly aggressive**[Q].
- **Female predominance** is related to **vinyl chloride** exposure and **OCPs**[Q].
- In approximately one **half of cases**, **cutaneous hemangiomas** are also present (45%)[Q].

Pathology

- **Factor VIII staining**[Q] differentiates it from other nonvascular tumors.
- Liver **parenchymal architecture** is **preserved**[Q].

Diagnosis

- Percutaneous **biopsy**[Q] is performed for diagnosis.
- CT scan: Irregular hypodense lesions that may have **hypervascular enhancement**[Q] in the periphery following injection of intravenous contrast.

Treatment

- **Total hiepatectomy** and **liver transplantation**[Q] (disease is diffuse and multifocal).

102. Ans. a. Most common in males

Epitheloid hemangioendothelioma is **more common in females.**

CYSTADENOMA AND CYSTADENOCARCINOMA

103. Ans. a. More common in females due to OCP use *(Ref: Sabiston 19/e p1464; Schwartz 10/e p1409-1413, 9/e p1119; Blumgart 5/e p1268-1276; Shackelford 7/e p1459)*

Cystadenoma

- Mostly **intrahepatic**Q **(83%)**, may occur within the **extrahepatic bile ducts** (13%) or **GB** (0.02%).
- Located in the **right lobe (50%)**Q
- Cystadenoma with **mesenchymal stroma** occurs exclusively in **young** and **middle-aged women**Q

Pathology

- Cyst has a globular external surface with **multiple protruding cysts** and **locules** of various sizes.
- **Fluid** content is **mucinous**.
- Lined with **columnar epithelium** and have **papillary infoldings.**

Clinical Features

- Usually presents as a **large cystic mass**Q (10-20 cm).
- Mainly affects **women**Q older than 40 years.
- **Majority of patients** present with a **history of abdominal pain** or **mass**

Diagnosis

- **Ultrasound: Cystic structure** with varying wall thickness, **nodularity, septations**, and fluid-filled locules.
- **CECT: Enhancement** of the **cyst wall** and **septa**Q
- **ERCP:** Displacement of the intrahepatic bile ducts by the tumor and **no communication** between the **biliary tree** and **cystadenoma.**

Treatment

- **Enucleation** for neoplastic cysts with **no** signs of **malignancy**Q
- **Formal hepatic resection** for neoplastic cysts with signs of **malignancy**Q

104. Ans. a. CT scan is used for diagnosis, b. CA 19-9 is elevated, c. Intrahepatic location *(Ref: Sabiston 19/e p1464; Blumgart 5/e p1277-1280; Shackelford 7/e p1459*

Biliary Cystadenocarcinoma

- **Rare malignancy, typically intrahepatic**Q in location.
- **May arise from** preexisting **biliary cystadenomas**.
- **Female**Q to male ratio is 2 : 1; **CA 19-9** is **raised**Q

Pathology

- The presence of an **associated ovarian-like stroma**Q in **female** patients appears to signify a **favorable prognosis**
- Tends to be **multilocular,** fluid from the cyst can be blood stained, clear, or bile tinged.
- **Preoperative cyst aspiration** is **not recommended** because there is a risk for **peritoneal tumor seeding**Q

Clinical Features

- Cystadenocarcinoma tends to be **larger than cystadenoma**, but clinical features are similar

Diagnosis

- **Radiologic findings**: **Thick or irregular wall**, **peripheral enhancement**, associated **mass,** or **papillary tumor projections**Q into the cyst cavity.

Treatment

- The only **potentially curative treatment** is **complete removal**, by a **major liver resection with clear margins**Q**.**
- **Survival rates** for this disease have been reported in the range of **25% to 100**% at 5 years.

105. Ans. a. Age > 40 years and asymptomatic

Majority of patients of biliary cystadenoma present with a **history of abdominal pain** or **mass**Q.

LIVER TRANSPLANTATION

106. Ans. a. Biliary atresia *(Ref: Sabiston 19/e p655-657; Schwartz 10/e p1277, 9/e p295; Bailey 26/e p1427-1429, 25/e p1426-1427; Blumgart 5/e p1662-1663; Shackelford 7/e p1519-1520)*

Indications of Liver Transplantation

- **MC indication** for LT: Cirrhosis from Hepatitis C (**HCV**)Q
- **2nd MC indication** for LT: **Alcoholic liver disease**Q
- MC indication for LT in **children**: **Biliary atresia**Q
- MC **metabolic disorder** requiring LT: **Alpha-1 antitrypsin deficiency**Q

- MC indication for LT following **acute liver failure**: **Acetaminophen toxicity**Q

> - **Sepsis** and **sepsis-induced multiple organ failure** are the **MC causes** of **death** in **liver transplantation**Q.

107. Ans. c. Colorado *(Ref: Sabiston 19/e p655-664; Schwartz 10/e p1277, 9/e p295; Bailey 26/e p1427, 25/e p1408; Blumgart 5/e p1662; Shackelford 7/e p1519)*

History of Liver Transplantation

- **First liver transplantation** was done by **Starzl**[Q] in 1963, in Denver, University of **Colorado**[Q].
- First **auxiliary liver transplantation** was done by **Absolon**, in 1964.
- First **successful auxiliary liver transplantation** was done by **Fortner**, in 1970.
- First **split liver transplantation** was done by **Pichlmayr**[Q], in 1988.
- **Pichlmayr** did first **ex-situ tumor resection** of liver and then **autotransplantation** back into the liver.
- First **LDLT** to an **adult** was performed in Kyoto, by **Tanaka,** using a left hepatic lobe in 1991.

108. Ans. c. Hepatitis A *(Ref: Harrison 18/e p2607-2608)*

Indications for Liver Transplantation	
Children	**Adults**
• **Biliary atresia**[Q] • Neonatal hepatitis • Congenital hepatic fibrosis • **Alagille's syndrome**[Q] • **Byler's disease**[Q] • **Alpha-1 Antitrypsin deficiency**[Q]	• **Primary biliary cirrhosis**[Q] • **Secondary biliary cirrhosis**[Q] • **Primary sclerosing cholangitis**[Q] • Autoimmune hepatitis • **Caroli's disease**[Q] • Cryptogenic cirrhosis
Inherited Disorders of Metabolism • **Wilson's disease**[Q] • **Tyrosinemia**[Q] • Glycogen storage diseases • Lysosomal storage diseases • Protoporphyria • **Crigler-Najjar disease type I**[Q] • Familial hypercholesterolemia • Primary hyperoxaluria type I • Hemophilia	• Chronic hepatitis with cirrhosis • Hepatic vein thrombosis • **Fulminant hepatitis**[Q] • **Alcoholic cirrhosis**[Q] • **Chronic viral hepatitis**[Q] • Primary hepatocellular malignancies • **Hepatic adenomas** • Nonalcoholic steatohepatitis • **Familial amyloid polyneuropathy**[Q]

- **Alagille's syndrome**: **Arteriohepatic dysplasia**, with **paucity of bile ducts**, and congenital malformations, including **pulmonary stenosis**[Q].
- **Byler's disease**: **Intrahepatic cholestasis**, progressive **liver failure**, **mental** and **growth retardation**[Q].

Contraindications to Liver Transplantation	
Absolute	**Relative**
• Uncontrolled extrahepatobiliary infection[Q] • Active, untreated sepsis[Q] • Uncorrectable, life-limiting **congenital anomalies**[Q] • Active substance or **alcohol abuse**[Q] • Advanced cardiopulmonary disease • Extrahepatobiliary malignancy (**not including nonmelanoma skin cancer**)[Q] • **Metastatic malignancy** to the liver[Q] • Cholangiocarcinoma[Q] • AIDS[Q] • Life-threatening systemic diseases	• Age **>70** years[Q] • Prior **extensive hepatobiliary surgery**[Q] • Portal vein thrombosis[Q] • **Renal failure** not attributable to liver disease • **Previous extrahepatic malignancy** (not including nonmelanoma skin cancer)[Q] • Severe obesity • Severe malnutrition/wasting • Medical noncompliance • **HIV seropositivity** with failure to control HIV viremia or CD4 <100/μL[Q] • Intrahepatic sepsis • **Severe hypoxemia** secondary to right-to-left intrapulmonary shunts (PO_2**<50 mmHg**)[Q] • **Severe pulmonary hypertension** (mean pulmonary artery pressure **>35 mmHg**)[Q] • Uncontrolled psychiatric disorder

109. Ans. a. > d. Metabolic liver disease >Acute fulminant liver failure for any cause *(Ref: Blumgart 5/e p1689-1693)*

APOLT is **used in acute fulminant liver failure** mainly **caused by metabolic liver diseases**, not in liver failure from any cause.

Types of Liver Transplantation	
Orthotopic LT	• Donor liver implanted in **normal anatomic position** after recipient hepatectomy[Q]
Heterotopic LT	• Donor liver implanted in **alternative site** rather than normal anatomic position[Q]

Auxiliary LT	• **Native liver** remains **in situ** and whole or partial **transplant added**[Q]
Piggyback LT	• Orthotopic transplant that **preserves recipient IVC**[Q]
Split LT	• Cadaveric donor liver divided with a portion transplanted to each of **two recipients**[Q]
Reduced size LT	• Liver can be **reduced to a functional unit** of **appropriate size** for the recipient[Q] • It can overcome the donor-recipient size discrepancy, but it does not increase the absolute number of grafts
Auxiliary partial orthotopic LT (APOLT)	• **Left lobe** of recipient liver **excised** and **donor liver occupies vacated space**[Q].
Auxiliary heterotopic LT	• **Whole liver** or **lobe placed in subhepatic space** or other nonadjacent area[Q].

Indications of Auxiliary Partial Orthotopic Liver Transplantation (APOLT)

1. Reversible fulminant hepatic failure[Q]
4. **Non-cirrhotic metabolic liver disease**[Q]
2. **Small-for-size grafts**[Q]
3. **ABO-incompatibility**[Q]

Auxiliary Partial Orthotopic Liver Transplantation (APOLT)

- **In fulminant hepatic failure, APOLT** provides **temporary support** until the **native liver** recovers and then immunosuppression can be withdrawn.
- **APOLT** can **compensate** for **enzyme deficiency** in **non-cirrhotic metabolic liver disease** (**most commonly Criggler-Najjar syndrome**) without complete removal of native liver.
- Transplants of **ABO-incompatible grafts** are often unavoidable due to **limited number of potential donor** candidates. A **high incidence** of **early graft failure** with a high rate of **biliary** and **vascular complications** in ABO-incompatible liver transplantation is reported. The **remnant liver** could **sustain a patient's life** if the anticipated **graft failure** occurred in an ABO-incompatible case.
- In **small-for-size graft**, the **remnant liver** is expected to **support** the function of **implanted graft** during the **early post-op period**. The graft liver expands its function in proportion to volume growth. After the graft liver has grown sufficiently, it can be expected to meet the hepatic functional demands of the recipient.

110. Ans. a. (Donor bile with recipient bile duct or Roux en choledochojejunostomy *(Ref: Blumgart 5/e p1727-1728)*

The **preferred method biliary drainage** during **orthotropic liver transplantation** is **direct end-to-end anastomosis** between **donor common bile duct** and **recipient common bile duct.**

Bile duct anastomosis in orthotropic liver transplantation

Choledochocholedochostomy (CDCD)	Choledochojejunostomy (CDJ)
• This is **end-to-end anastomosis** between **donor common bile duct** and **recipient common bile duct** • This is **preferred bile duct anastomosis** and is **used** when the **recipient bile duct not diseased.**	• This is an **Roux-en-Y configuration anastomosis** between the end of the common bile duct and the side of a loop of jejunum • This is an **alternative bile duct anastomosis** and is **performed when CDCD anastomosis** is **not feasible**. This may be the case when the **recipient extrahepatic bile duct is diseased** or **small** or when there is **significant recipient donor duct size mismatch.**

Five sequential anastomosis of OLT (SIPH-B)		
1. **S**uprahepatic IVC	2. **I**nfrahepatic IVC	3. **P**ortal vein
4. **H**epatic artery	5. **B**ile duct	

111. Ans. d. Part of liver segment transplanted into recipient depending upon requirement

HEPATIC RESECTION

112. Ans. d. Jaundice from extrinsic ductal obstruction *(Ref: Sabiston 19/e p1465-1467; Blumgart 5/e p1462;)*

Jaundice from extrinsic ductal obstruction is not a contraindication to major hepatic resection.

113. Ans. b. 20% *(Ref: Blumgart 5/e p1462; Shackelford 7/e p1494)*

- Up to **70% to 75%** of the **hepatic volume** may be **resected with good recovery in patients with relatively normal hepatic parenchyma**[Q] (without active hepatitis, cirrhosis, or metabolic defects), as long as the remnant liver has adequate portal venous and hepatic arterial inflow, adequate hepatic venous outflow, and adequate biliary drainage.

114. Ans. b. Not useful in primary hepatoma, c. Can cure secondary carcinoma *(Ref: Sabiston 19/e p1465-1467; Blumgart 5/e p1344)*

Hepatic Artery Ligation

- Used in **management of hemobilia**, **hepatic artery aneurysm** and **pseudoaneurysm**
- **Hepatic artery ligation** or embolization is a **method of ablation** for **HCC** and liver **secondaries**, as these tumors are **exclusively supplied by hepatic artery** but it **does not cure** the **malignancy**Q.
- In each case **massive antibiotic therapy** should be given **post-operatively**Q.

115. Ans. d. The Pringle maneuver *(Ref: Sabiston 19/e p1465-1467; Blumgart 5/e p1547; Shackelford 7/e p1450-1451)*

Pringle Maneuver (Total Inflow Occlusion)

- **Total clamping** of the **hepatic pedicle**, by placing an **atraumatic clamp** across the **foramen of Winslow**Q.
- **Appropriate-sized vascular clamp** or **loop snare** easily **controls hemorrhage** from either the **portal vein** or the **hepatic arteries**Q.
- Inflow occlusion durations of up to **30 minutes** can be **tolerated safely** in **cirrhotic livers** and possibly up to **60 minutes** in **early disease**.
- If prolonged occlusion is required, intermittent clamping can be used with **repeated clampings** of **10-20 minutes** duration, each followed by **5 minutes declamping**.

116. Ans. d. Liver Laceration

117. Ans. a. Segment II III IV V VIII *(Ref: Blumgart 5/e p1512-1513; Shackelford 7/e p1501-1503)*

Trisegmentectomy

- **Right trisegmentectomy** or **extended right hepatectomy:** Complete resection of **segment IV** with the **right liver** (removal of segment **IV, V, VI, VII, VIII**) Q.
- **Left trisegmentectomy** or **extended left hepatectomy:** Complete resection of **segments V** and **VIII** with the **left liver** (removal of segment **II, III, IV, V, VIII**) Q.

HEPATIC REGENERATION

118. Ans. c. 4-6 months

Liver Regeneration

- Following **resection of 2/3rd of the liver**, **regeneration** is **complete within 5-6 months**.

LIVER TRAUMA

119. Ans. a. Conservative management *(Ref: Sabiston 19/e p459-461; Schwartz 10/e p173-174, 1642, 9/e p175; Bailey 26/e p1072-1074, 25/e p1086-1088; Blumgart 5/e p1806-1814; Shackelford 7/e p1479-1487)*

In stable patients, conservative management is preferred option.

Hepatic Injury

- **MC organ injured** in **blunt abdominal trauma**: **Spleen > liver**Q
- **Mechanisms** of blunt hepatic trauma: **Compression** with **direct parenchymal damage** and shearing forces, which tear hepatic tissue and disrupt vascular and ligamentous attachments.
- In **penetrating abdominal injuries**, the liver is the third most common injured organ (28%); after the **small bowel** (**38%**); and the colon (31%)Q.
- **Most liver injuries** (>85%) involve segments **6, 7** and **8** of the liverQ.
- **Most liver injury bleeding** is **venous** Q; and therefore low pressure, tamponade is readily performed

Diagnosis

- Liver injuries are often **first diagnosed** on **entering the abdomen** in the **unstable patient** explored for the finding of **free fluid on FAST examination**Q.

  - **Stable patients** with suspected hepatic trauma should undergo **CECT abdomen**Q.
  - Current **CT modalities** are **excellent** at providing **significant anatomic detail** that allows highly **accurate characterization of injuries**.

- **Contrast extravasation** visualized as a **high-density blush** is identified **indicating** the presence of a **pseudoaneurysm** or **active bleeding** external to the liver capsuleQ.
- Liver **injury grading** involves the **extent of parenchymal involvement** and presence of **vascular injury**Q

Management

- **Unstable patients**: **Immediate laparotomy**[Q]
  Conservative criteria for **non-operative management** require
  - **Hemodynamically stable patient**[Q]
  - **No peritoneal signs** on examination[Q]
  - Absence of other major injuries[Q]
- **Most treatment failures** occur **within** the **first 24 hours** of **admission**[Q].
- **Failure of non-operative management** is defined as the development of **hemodynamic instability** or of liver-related **multiple transfusions** despite angiographic embolization, signs of **peritonitis,** or **abdominal compartment syndrome**[Q].

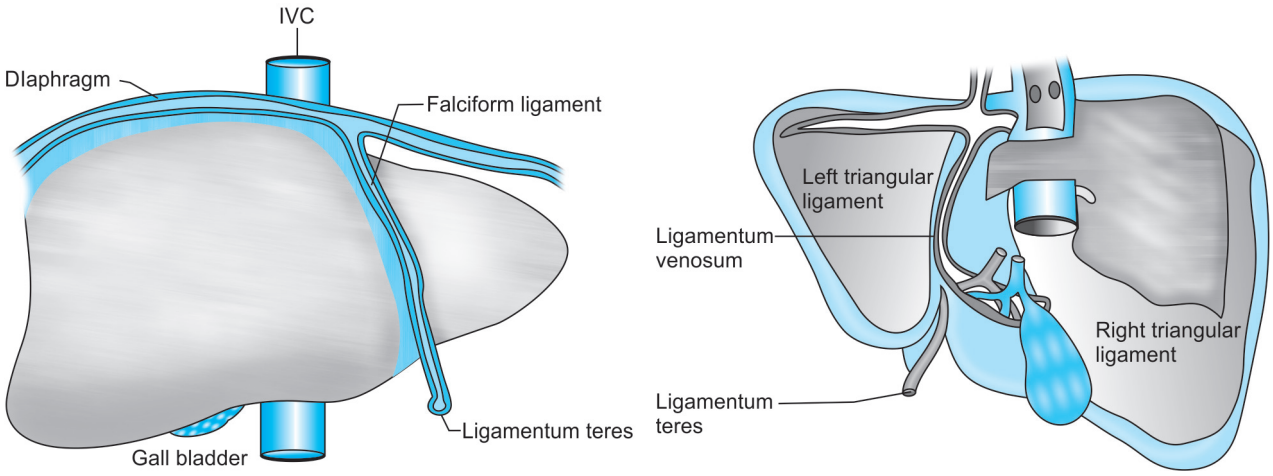
Deep Liver Laceration	• **Opening the liver wound** and **directly approaching** the **bleeding vessel**, a procedure known as **tractotomy**[Q].
Penetrating Liver Tracts	• **Tractotomy** or **tamponade** using a balloon catheter[Q]
Injuries in the **vicinity of retrohepatic IVC**	• **Packing alone**, without operative exploration [Q]
Retrohepatic IVC Injury	• **Atriocaval shunt** (**Shrock shunt**)[Q]

- **Liver parenchymal necrosis** is the **MC complication** of severe liver injury in patients who **undergo operation**[Q].
- **Rebleeding** is the **MC complication** of **non-operative management**[Q].

Classification of Liver Injury (Moore)		
Grade	**Type**	**Operative or CT Scan findings**
I	Hematoma Laceration	Subcapsular, **<10%** of surface area Capsular tear, **<1 cm** in parenchymal depth
II	Hematoma Laceration	Subcapsular, **10%-50%** of surface area Intraparenchymal, **<10 cm** in diameter **1-3 cm** in parenchymal depth, **<10 cm** in length
III	Hematoma Laceration	Subcapsular, >50% of surface area or expanding; ruptured subcapsular or parenchymal hematoma Intraparenchymal, hematoma **>10 cm** or **expanding >3 cm** in parenchymal depth
IV	Laceration	Parenchymal disruption involving **25-75%** of the hepatic lobe or **1-3 Couinauds segments** in a single lobe
V	Laceration Vascular	Parenchymal disruption involving **>75%** of the hepatic lobe or **>3 Couinauds segments** within a single lobe **Juxtahepatic venous injuries** i.e. retrohepatic **vena cava**/ central **major hepatic veins**
VI	Vascular	**Hepatic avulsion**

LIVER ANATOMY

120. Ans. c. Segment II only *(Ref: Sabiston 19/e p1413-1417; Schwartz 10/e p1264-1269, 9/e p1095; Bailey 26/e p1065-1067, 25/e p1080-1082; Blumgart 5/e p31-37; Shackelford 7/e p1426-1430)*



Lobar Anatomy of the Liver

- The liver is divided into **two lobes by** the **main portal fissure** (scissura), known as **Cantlie's line**[Q].

> - **Cantlie's line** describes a **75⁰ angle** with a **horizontal plane**[Q]
> - It extends from the **gallbladder fossa** to the **left side** of the **IVC**[Q].

- **Right** and **left halves** of the liver is **delineated by a plane** through the **MHV** and **IVC**[Q].
- **Right portal fissure** divides the right lobe into an **anteromedial** and **posterolateral sector. RHV** courses **along this fissure**[Q].
- **Right portal fissure** describe an **angle of 40⁰** with the **transverse plane**[Q].
- **Left portal fissure** divides the **left lobe** into an **anterior** and **posterior sector**, **LHV** courses **along this fissure**[Q].

> - In the right lobe:
> - **Anteromedial sector**: Segment **V anteriorly** and segment **VIII posteriorly**[Q]
> - **Posterolateral sector**: Segment **VI anteriorly** and segment **VII posteriorly**[Q]
> - In the left lobe:
> - **Anterior sector** is divided by the umbilical fissure into **segment IV** and **segment III**[Q]
> - **Posterior sector** is comprised of **only one segment**, **segment II**[Q]

- **Umbilical fissure** is **not a scissura**[Q], does not contain a hepatic vein, but **contains** the **left portal triad**.
- **Left scissura** runs **posterior** to the **ligamentum teres** and contains the **LHV**; the left liver is split into an **anterior** (segments **III** and **IV**)[Q] and **posterior (segment II-** the **only sector** composed of a **single segment)**[Q] sector by the left scissura.

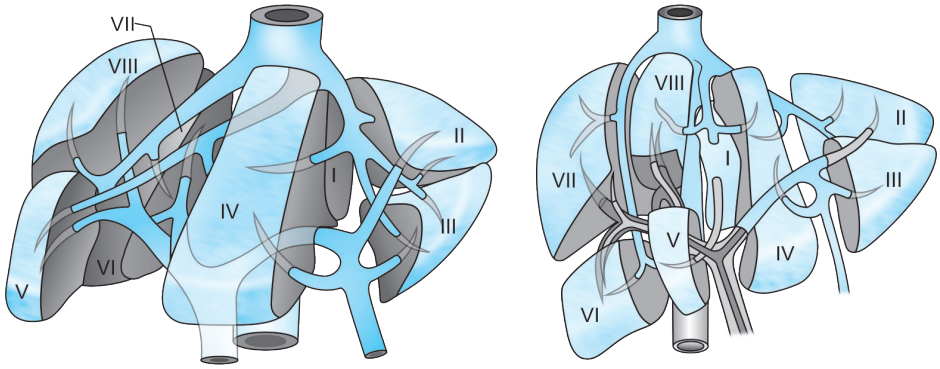
121. Ans. c. Venous drainage is mainly by left and middle hepatic vein *(Ref: Sabiston 19/e p1413-1419; Schwartz 10/e p1267, 9/e p1095; Bailey 26/e p1066-1067, 25/e p1081-1082; Blumgart 5/e p36; Shackelford 7/e p1431)*

Caudate Lobe

- **Caudate lobe** (**segment I**), **lies between** the **left portal vein** and the **IVC** and extends to the hepatic venous confluence[Q].

> **Caudate lobe is unique**
> - It receives **blood supply** from **both** the **right** and **left portal pedicles**[Q]
> - **Bile drain** into **both right** and **left hepatic duct**[Q]
> - **Venous drainage** is **directly into IVC**[Q]

122. Ans. a. III, IV



- **Left medial sector** contains segment **III and IV**
- **Left lateral sector** contains **only one segment, II.**

123. Ans. a. Segment I

124. Ans. d. Hepatic vein

Portal Triad Relations

- **CBD laterally**[Q]
- **Portal vein posteriorly**[Q]
- **Hepatic artery medially**[Q]

> **Mickey Mouse View:** The **ultrasound image** of **hepatic artery, bile duct** and **portal vein** is in a **configuration,** referred as **Mickey Mouse View**[Q].

125. Ans. d. Phagocytosis *(Ref: Sabiston 19/e p1423; Schwartz 9/e p1110)*

Kupffer Cells

- Kupffer cells, **derived from** the **macrophage-monocyte system**Q
- Are **irregular stellate-shaped cells** that also **line the sinusoids**, insinuating between endothelial cells.
- **Phagocytic**, play a **major role** in the **trapping of foreign substances**Q and initiating an inflammatory response.
- **MHC-II antigens** are **expressed on Kupffer cells** but do not confer efficient antigen presentation compared with macrophages elsewhere in the body.

Hepatic Stellate Cells

- **Hepatic stellate cells** (also known as **Ito cells** or **lipocytes**) are cells **high** in **lipid content** (accounting for their phenotypic identification)Q
- Found **in** the **space of Disse**Q
- Have **dendritic processes** that contact hepatocyte microvilli and also wrap around endothelial cells.
- **Major function**: **Vitamin A storage** and **synthesis** of **extracellular collagen**Q**.**

126. Ans. d. Ascends behind the 2nd part of duodenum *(Ref: BDC 4th/vol-II/55-57)*

Portal vein ascends behind the **1st part, not the 2nd part of duodenum**.

Portal Vein		
Part	**Position**	**Structure**
Infraduodenal Part	Anterior Posterior	Neck of pancreas **IVC**
Retroduodenal Part	Anterior Posterior	Duodenum (first part)Q Common Bile ductQ Gastroduodenal arteryQ IVC
Supraduodenal Part	Anterior **Posterior**	Hepatic arteryQ Bile ductQ **IVC**Q (separated by **epiploic foramen**)

127. Ans. c. Segment 2 and 3 *(Ref: Sabiston 19/e p1413; Schwartz 10/e p1264-1265, 9/e p1094; Bailey 26/e p1065, 25/e p1080)*

Falciform Ligament

- Falciform ligament is the **most obvious external landmark** on the **liver surface**.
- The plane passing through the falciform ligament **passes through** the left lobe
- It **divides** the **left lobe** into a **medial segment** (segment **IV**) and **lateral segment** (segment **II** and **III**)Q

128. Ans. b. Caudate lobe drains only left hepatic duct *(Ref: Blumgart 5/e p36)*

Caudate Lobe

- In approx. **80%** of the individuals, the **caudate lobe drains** into **both** the **right** and **left** hepatic ductsQ
- In **15%**, the caudate lobe drains **only** into the **left** hepatic duct
- In **5%**, the caudate is drained **exclusively by** the **right** hepatic duct.

129. Ans. b. Hepatic vein, d. Portal vein

Couinaud's Classification of Liver Segments

- Branching of the **portal vein** and the **hepatic veins defines** these **segments**Q**.**
- **Segment I: Caudate lobe**Q**; Segment IV: Quadrate lobe**Q

Segmental Nomenclature			
I	Caudate lobeQ	**V**	Right **anterior inferior** segment
II	Left **lateral superior** segment	**VI**	Right **posterior inferior** segment
III	Left **lateral inferior** segment	**VII**	Right **posterior superior** segment
IV	Left medial segment or **Quadrate lobe**Q	**VIII**	Right **anterior superior** segment

130. Ans. b. Quadrate lobe **131. Ans. b. Gallbladder bed to IVC** **132. Ans. b. 20%**

Liver

- Weight: **1800 gm** in **men** and **1400 gm** in **women**[Q]
- Total blood flow: **1.5 L/min**[Q]
- **Free pressure** in a **hepatic vein: 1-2 mm Hg**[Q]
- Liver can **store** up to maximum of **65 gm** of **glycogen/kg** of liver tissue[Q].
- Account for **4%** of **body weight**, consumes about **28%** of **total body blood flow** and **20%** of the **total oxygen** consumed by the body[Q].
- Expends **20%** of the **total kilocalories** used by the whole body.

Hepatic Vascular Supply	
Hepatic artery	**Portal vein**
• **Hepatic artery** supplies about **30 mL/min per 100 gm** of liver tissue[Q] • Approx. **25%** of the total blood flow to the liver[Q] • Provide **30-50%** of the **oxygen requirement**[Q]. • The **intrahepatic bile ducts** are **exclusively perfused by** the **hepatic arterial blood** via the **peribiliary plexus**[Q].	• **Portal vein** carries **90 mL/min per 100 gm** liver tissue[Q] • It carries about **75%** of the **total blood flow** to the liver[Q] • It may provide **50% to 70%** of the **oxygen requirement**[Q]. • Normal portal pressure is **5-10 mm Hg**[Q].

Relationship between Hepatic Artery and Portal vein Blood Flow

- There is an **increase in hepatic arterial blood flow** after **portal flow reduction** but the converse is not observed[Q].

133. Ans. a. Segment I

134. Ans. a. Hepatic veins and portal vein

135. Ans. a. Groove for ligamentum teres and gallbladder

Quadrate lobe of liver is present **between groove** for **ligamentum teres** and **gallbladder**.

136. Ans. a. Kidney *(Ref: BDC 4th/vol-II/234)*

Boundary of Morrison's pouch is formed by kidney.

Boundaries of Morrison's pouch (Hepatorenal pouch)			
Anteriorly	**Posteriorly**	**Superiorly**	**Inferiorly**
• **Inferior surface** of **right lobe** of the liver • **Gall bladder**	• **Right suprarenal** gland • Upper part of **right kidney** • **2nd part** of **duodenum** • **Hepatic flexure** of colon • Transverse **mesocolon** • Part of **head** of pancreas	• **Inferior layer** of **coronary ligament**	• Opens into general peritoneal cavity

137. Ans. a. V, VI, VII and VIII

Couinaud's classification

- **Caudate lobe**: I[Q]
- **Left lobe**: II, III, IV[Q]
- **Right lobe**: V, VI, VII, VIII[Q]

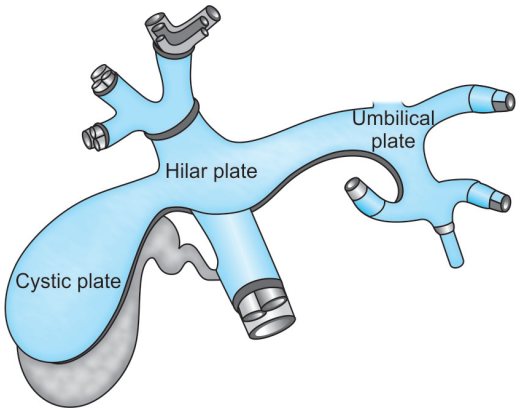
138. Ans. a. Right hepatic vein

- Right hepatic vein is not a component of portal triad
- Liver is not divided into two halves by right hepatic vein.

139. Ans. a. Portal plate *(Ref: Sabiston 19/e p1416; Bailey 26/e p1065, 25/e p1080; Blumgart 5/e p41; Shackelford 7/e p1430)*

Fascial plates of Liver Hilus

- The **fascial plates** of the liver hilus, represents a fusion of **endoabdominal fascia** around the **portal structures**
- The **fascial plate** is formed by: **cystic**, **hilar** and **umbilical** plate[Q]
- **Hepatic veins lack endoabdominal fascial investment**[Q].



Fascial plates of liver hilus

140. Ans. b. Segment III **141. Ans. d. 8**

LIVER FUNCTION TESTS AND JAUNDICE

142. Ans. b. Peritoneal deposits *(Ref: Sabiston 19/e p1481; Schwartz 9/e p1140; Bailey 25/e p1113-1114; Blumgart 5/e p223; Schackelford 7/e p1303)*

Peritoneal deposits are **not detected by ultrasound**. Even **CECT can miss** the **peritoneal deposits**.

Best investigation for diagnosis of peritoneal deposits is **Diagnostic laparoscopy.**

143. Ans. c. It responds well to phenobarbitone *(Ref: Harrison 18/e p2534)*

Crigler-Najjar Syndromes		
Feature	**Type I**	**Type II**
Total **serum bilirubin** (mg/dL)	18-45 (usually **>20**)Q	6-25 (usually **20**Q)
Routine liver tests	NormalQ	Normal
Response to Phenobarbital	**None**Q	**Decreases bilirubin by >25%**Q
Kernicterus	UsualQ	RareQ
Hepatic histology	NormalQ	NormalQ
Bile characteristics		
Color	Pale or colorless	Pigmented
Bilirubin fractions	**>90% unconjugated**Q	Largest fraction (mean: 57%) **monoconjugates**Q
Bilirubin **UDP-glucuronosyl transferase activity**	Typically **absent**Q; traces in some patients	Markedly **reduced**: 0-10% of normal
Inheritance (all autosomal)	**Recessive**Q	**Predominantly recessive (AR>AD)**Q

144. Ans. a. Dubin-Johnson syndrome *(Ref: Harrison 17/e p1927)*

Causes of Hyperbilirubinemia	
Indirect (unconjugated) Hyperbilirubinemia	**Direct (conjugated) Hyperbilirubinemia**
Hemolytic disorders **Inherited**: • Spherocytosis Q • Elliptocytosis • **G-6-PD** and pyruvate kinase deficiencies Q • Sickle cell anemia Q **Acquired**: • Microangiopathic hemolytic anemia • **PNH** Q • Immune hemolysis • Ineffective erythropoesis in cases of vitamin B and iron deficiencies • **Drugs**: **Rifampicin, ribavarin** Q, probenicid	**Inherited Conditions:** **1. Dubin-Johnson syndrome** Q **2. Rotor's syndrome** Q
Inherited conditions: • **Criggler-Najjar and Gilbert's syndrome** Q	

145. Ans. d. CBD Stones

MOST COMMON SURGICAL CAUSE OF OBSTRUCTIVE JAUNDICE IS CBD STONES Q

146. Ans. a. Autosomal dominant, c. Child may alive to adolescence, d. Cause unconjugated hyperbilirubinemia

147. Ans. c. Pruritus, d. Pale stools, e. Icterus *(Ref: Harrison 18/e p2530)*

Obstructive Jaundice

- **MC surgical cause** of obstructive jaundice is **CBD stones**[Q]
- Characterized by **dark urine, clay colored stools, icterus** and **pruritus**[Q].
- Presence of **urobilinogen** in **urine rules out obstructive jaundice**[Q].
- **USG** is the **best test** to **differentiate medical** from **surgical jaundice.**

Parameter	Hemolytic	Hepatocellular	Obstructive
Blood			
Hemoglobin (12-18 gm/dl)	**Decreased**	**N**	**N**
Unconjugated bilirubin (0.2-0.7 mg/dl)	↑	**N** or	**N**
Conjugated bilirubin (0.1-0.3 mg/dl)	**N**		
ALP (3-13 KAU; 30-120 IU/L)	**N**	**N** or	↑
Aminotransferases	**N**	↑	**N**
Cholesterol	**N**	**N**	↑
Stool			
Colour of stool	**N**	**N**	**Pale**
Fecal urobilinogen	**Increased**	**Decreased**	**Trace to absent**
Urine			
Bilirubin	**Nil**		
Urobilinogen	↑	↑	↓

148. Ans. d. Infective hepatitis

149. Ans. d. Ultrasound

150. Ans. a. Jaundice *(Ref: Bailey 26/e p1108, 25/e p1149)*

Courvoisier's Law

- In **obstruction** of the **common bile duct due to** a **stone, distention of gall bladder seldom occurs;** the **organ** usually **is shriveled**[Q].
- If there is no disease in the gall bladder and the **obstruction is due to cancer of ampulla, pancreas or bile duct**, then **gall bladder will be distended**[Q].

Exceptions to Courvoisier's Law

- **Double impaction of stones**[Q] i.e. one in the **cystic duct** and other in **CBD**.
- Oriental cholangiohepatitis[Q]
- **Pancreatic calculus obstructing** the **ampulla** of **Vater**[Q]
- **Mucocele** due to **stone** in the **cystic duct**[Q]

151. Ans. d. Glutamate dehydrogenase *(Ref: Harrison 18/e p2529)*

Enzymes Elevated in Cholestasis

- **ALP**[Q]
- **5′-Nucleotidase**[Q]
- **Gamma glutamyl transpeptidase**[Q]

152. Ans. d. Raised Urinary urobilinogen

153. Ans. a. Vitamin K

154. Ans. a. Jaundice due to choledocholithiasis *(Ref: Sabiston 19/e p1432-1440; Schwartz 9/e p1113; Bailey 25/e p1088-1091; Blumgart 5/e p1129-1146; Schackelford 7/e p1599-1604; Harrison 18/e p2598)*

MISCELLANEOUS

155. Ans. a. Lung *(Ref: Shackelford 7/e p1491-1492)*

Liver biopsy is done through **8th ICS** in **midaxillary line** to **avoid Lung.**

Liver Biopsy

- **Needle biopsy** has proved to be **most useful**[Q] technique to obtain representative liver tissue for analysis.
- For accurate and reliable grading and staging of **chronic viral hepatitis**; a biopsy specimen of **2 cm**[Q] **in length** or longer containing **at least 11 complete portal tracts**[Q] is needed.
- **Liver biopsy** is done through **8th ICS** in **midaxillary line** to **avoid Lung**[Q].

156. Ans. c. Hydatid liver disease

- **Crumbled egg appearance** in liver is seen in **hydatid disease**[Q].

157. Ans. c. Actinomycosis *(Ref: Harrison 18/e p1328)*

Actinomycosis of Liver

- Most commonly, Actinomyces **reaches liver through portal vein**Q.
- **Liver** is gradually replaced by **multiple abscesses**, typical **honey comb liver**Q

Diagnosis

- Needle aspiration: **Actinomyces in pus**Q

Treatment

- Antibiotic **(Penicillin)** is the **DOC**Q.

158. Ans. b. Peliosis hepatic *(Ref: Shackelford 7/e p1556-1557)*

Peliosis Hepatitis

- It is an uncommon disorder characterized by **multiple, small, blood-filled sinuses**Q
- Commonly occurs in **immunocompromised** posttransplant patients, **AIDS** patients, and patients taking long term **steroids**Q.

Etiology

- Drugs causing it are **androgens, azathioprine, tamoxifen, estrogen** and **vitamin A**Q.

Diagnosis

- Radiographically these lesions present as **diffuse hypodense areas** spread **throughout the liver**Q
- CT and MRI show enhancement on early images, which may progress from central to peripheral on delayed imaging.

Treatment

- The **treatment** for bleeding lesion has been **angiographic embolization**Q.

159. Ans. a. Dilatation of thoracoepigastric veins

- **IVC obstruction** can lead to **dilatation of thoracoepigastric veins**.

160. Ans. b. Hemochromatosis *(Ref: Harrison 18/e p3164)*

Manifestation of Hemochromatosis

- **Liver:** Hepatomegaly, cirrhosis, HCCQ
- **Pancreas: Diabetes mellitus**Q
- **Heart: CHF,** cardiomyopathyQ
- **Skin: Hyperpigmentation**Q (bronzing of skin)
- **Joints:** ArthropathyQ
- **Hypogonadism**Q

161. Ans. a. Wilson's disease *(Ref: Harrison 18/e p3188)*

Wilson's Disease

- Wilson's disease is an **autosomal recessive**Q inherited disorder of copper metabolism.
- Characterized by **excessive deposition** of **copper** in the **liver**, **brain**, and other tissuesQ.
- **Major physiologic aberration**: **Excessive absorption** of **copper** from the **small intestine** and **decreased excretion** of copper by the **liver**Q.
- Defect on chromosome **13q (ATP7B gene)**Q

Pathology

- Kayser-Fleischer rings consist of **electron-dense granules** rich in **copper** and **sulfur**.
- The rings form **bilaterally, initially** appearing at the **superior pole**Q of the cornea, then the inferior pole, and, ultimately, circumferentially.

Clinical Features

- Patients with Wilson's disease usually present with **liver disease** during the **first decade** of life or with **neuropsychiatric illness** during the **third decade**Q.
  - Any young patient with **unexplained chronic** or **fulminant liver disease** should be investigated for Wilson's diseaseQ.
  - **Kayser-Fleischer rings** are formed by the **deposition of copper** in the **Descemet's membrane** in the limbus of the cornea. The color may range from **greenish gold** to **brown**Q
  - When well developed, rings may be **readily visible** to the **naked eye** or with an ophthalmoscope
  - When not visible to the unaided eye, the rings may be identified using **slit-lamp** examination or **gonioscopy**.
- **Kayser-Fleischer rings** are observed in up to **90%** of individuals with **symptomatic** Wilson's disease and are **almost invariably present** in those with **neurologic manifestations**Q.

Diagnosis

- Approximately 90% of patients have **ceruloplasmin levels** of **<20 mg/d**Q (reference range, 20-40 mg/dL).
  - The **urinary copper excretion rate** is **>100 mg/d**Q (reference range, <40 mg/d) in most patients with symptomatic Wilson's disease.
  - **Hepatic copper concentration** is regarded as the criterion **standard for diagnosis** of Wilson's disease.
- A liver biopsy with sufficient tissue reveals levels of **>250 μg/g of dry weight**Q even in asymptomatic patients.

Treatment

- **Zinc**Q is the **treatment of choice** for **maintenance therapy** in **Wilson's disease.**

162. Ans. c. Vinyl chloride

- **Vinyl chloride** is a **risk factor** for **hepatic angiosarcoma**.

163. Ans. a. MRI *(Ref: Shackelford 7/e p1560, 1571)*

MRI in Liver Lesions

- **MRI** gas emerged as the **best imaging test** for **liver lesion detection** and **characterization**Q
- MRI provides **high lesion-to-liver contrast** and **does not use radiation**Q.
- **Liver-specific contrast media**, such as **mangofodipir trisodium**Q (taken up by **hepatocytes**) and **ferrumoxides** (taken up by **Kupffer cells**)Q demonstrate **selective uptake** in the **liver** and are primarily **used for lesion detection**.
- These two **contrast agents** are also **useful in characterizing specific liver tumors**, such as **FNH, hepatic adenoma** and **HCC**Q.

CHAPTER 5

Portal Hypertension

MULTIPLE CHOICE QUESTIONS

PORTAL HYPERTENSION

1. Which of the following is not associated with left sided portal hypertension? *(COMEDK 2006)*
a. Secondary to pancreatic inflammation or neoplasm
b. Normal superior mesenteric and portal venous pressure
c. Easily reversed by splenectomy
d. Isolated esophageal varices present

2. Normal portal vein pressure is: *(COMEDK 2008)*
a. <3 mm Hg
b. 3-5 mm Hg
c. 5-10 mm Hg
d. 10-12 mm of Hg

3. Which of the following causes minimal porto-hepatic compromise? *(JIPMER GIS 2011)*
a. Non-selective shunts
b. TIPSS
c. Distal splenorenal shunt
d. Sclerotherapy

4. Most common metabolic disturbance of cirrhosis is: *(ILBS 2012, JIPMER GIS 2011)*
a. Metabolic acidosis
b. Metabolic alkalosis
c. Respiratory acidosis
d. Respiratory alkalosis

5. In portocaval anastomosis even if no palpable obstruction is present the criteria to diagnose anastomosis failure is portocaval pressure gradient of more than: *(MHSSMCET 2008)*
a. 50 cm H_2O
b. 60 cm H_2O
c. 70 cm H_2O
d. 80 cm H_2O

6. All are true about hepatopulmonary syndrome except: *(JIPMER GIS 2011)*
a. Frequency in ESLD is between 8-29%
b. Characterized by hypoxemia and anatomical shunting of blood
c. Only established treatment at present is OLT
d. A pre-operative oxygen tension of <30 mmHg alone is a predictor of disease

7. Metabolic complication of cirrhosis are all except: *(AIIMS GIS Dec 2006)*
a. Hypokalemia
b. Hyponatremia
c. Hypoglycemia
d. Hypoammonemia

8. In a patient with compensated liver cirrhosis presented with history of variceal bleed. The treatment of choice in this patient is: *(AIIMS June 2002)*
a. Propranolol
b. Liver transplantation
c. TIPS (Transjugular intrahepatic portal shunt)
d. Endoscopic sclerotherapy

9. Left sided portal hypertension is best treated by: *(AIIMS June 2001)*
a. Splenectomy
b. Portocaval shunt
c. Lieno-renal shunt
d. Spleno-renal shunt

10. Portal hypertension following portal vein thrombosis are guided by: *(PGI Dec 2003)*
a. ↑ in splenic pulp pressure
b. ↑ in portal vein pressure
c. ↑ in hepatic vein pressure
d. Portal vein Doppler study

11. Child criteria include all except: *(PGI May 2011)*
a. Nutritional status
b. S. Bilirubin
c. S. Creatinine
d. Acid phosphate
e. Ascites

12. Child criteria include all except: *(PGI Dec 2007, Dec 2006)*
a. Nutrition
b. Bilirubin
c. Albumin
d. Encephalopathy
e. Ascites

13. Child-Pugh criteria does not include: *(Punjab 2010)*
a. Encephalopathy
b. ALT
c. Ascites
d. Albumin

14. According to Child-Pugh staging, child's B is:
a. 5-6
b. 7-9 *(JIPMER GIS 2011)*
c. 10-11
d. 9-12

15. According to Pugh's classification moderate to severe hepatic insufficiency is managed by: *(AIIMS Nov 2000)*
a. Sclerotherapy
b. Conservative
c. Orthotopic liver transplantation
d. Shunt surgery

16. Child-Pugh's criteria does not include: *(PGI June 2004)*
a. Encephalopathy
b. Ascites
c. Albumin
d. Creatinine
e. ALT

17. The Sengstaken tube must maintain a pressure of... to stop bleeding from varices: *(JIPMER 87)*
a. 20 mm Hg
b. 25 mm Hg
c. 35 mm Hg
d. 45 mm Hg

18. Drug induced portal hypertension is seen with: *(PGI 78, AIIMS 79)*
a. Vitamin A toxicity
b. Methotrexate
c. Aldomet
d. Hydatid cyst

19. In Child's criteria partial encephalopathy, bilirubin 2.5 mg/dl albumin 3 gm/dl, controlled ascites indicates: *(PGI 96)*
a. Grade A
b. Grade B
c. Grade C
d. More information needed

20. Which one of the following is not a treatment of gastroesophageal variceal hemorrhage? *(UPSC 2001)*
a. Sclerotherapy
b. Sengstaken tube
c. Transjugular intrahepatic portacaval shunt
d. Gastric freezing

21. In portal hypertension the sites of portosystemic anastomosis includes: *(DPG 2010)*
a. Lower end of esophagus
b. Around umbilicus
c. Lower third of rectum and anal canal
d. All of the above

22. A 50-years old male presented with history of hematemesis-500 ml of blood and on examination shows BP-90/60, PR-110/min and splenomegaly 5cm below lower costal margin. Most probable diagnosis is: *(All India 2012, AIIMS Nov 2006)*
a. Mallory Weiss tear b. Duodenal ulcer
c. Gastritis d. Portal hypertension

23. MELD score doesn't include: *(AIIMS GIS Dec 2011, Dec 2006)*
a. INR b. S. bilirubin
c. S. creatinine d. Blood urea

24. A 40-years old male presents with hepatemesis. On examination his BP was 90/60 mm Hg and heart rate was 120/min. Splenomegaly was also present. The most propable cause of his bleeding is: *(AIIMS May 2012)*
a. Portal hypertension b. Gastric ulcer
c. Duodenal ulcer d. Drug induced GI injury

25. Child's Criteria is used in: *(DNB 2005, 2001, 2000)*
a. Pancreatitis b. Cirrhosis
c. Multiple myeloma d. AIDS

ESOPHAGEAL VARICES

26. Worm-like filling defect is seen in: *(COMEDK 2005)*
a. Erosive gastritis b. Esophageal varices
c. CA esophagus d. Schatzki's ring

27. Which one of the following treatment modalities is not used for management of acute blood loss due to ruptured esophageal varices? *(UPSC 2004)*
a. Endoscopic sclerotherapy b. Endoscopic band ligation
c. Octreotide d. Propranolol

28. On barium swallow the grade IV esophageal varices appear as: *(AIIMS June 2001)*
a. Mucosal folds above the carina
b. Mucosal folds below the carina
c. Mucosal folds at the carina
d. A thick band

29. Best test for esophageal varices is: *(UPPG 2009)*
a. CT- scan b. Gastro- esophagoscopy
c. Tomography d. Ultrasound

30. The balloons of Sengstaken-Blakemore tube should be temporarily deflated after how many hours to prevent pre-necrosis of the oesophagus? *(MHSSMCET 2011)*
a. 12 hours b. 24 hours
c. 36 hours d. 48 hours

31. To stop variceal bleeding pressure in Sengstaken B lackmore tube should be: *(MHSSMCET 2007)*
a. 40 mm b. 50 mm
c. 60 mm d. 70 mm

32. Treatment of choice for bleeding esophageal and gastric varices: *(MHSSMCET 2007)*
a. Injection sclerotherapy b. Banding (Endoscopic)
c. Shunt surgery d. Devascularization

33. Variceal banding was invented by: *(MHSSMCET 2006)*
a. Borema and Crile b. Stiegmann and Goff
c. Sugiura and Futagawa d. Crafoord and Frenckner

34. Which of the following agents is recommended for medical treatment of variceal bleed? *(All India 2011)*
a. Octreotide b. Desmopressin
c. Vasopressin d. Nitroglycerine

35. Sclerotherapy failure is defined as: *(JIPMER GIS 2011)*
a. Unresponsiveness to consecutive 2 energy sclerotherapies
b. Unresponsiveness to consecutive 3 energy sclerotherapies
c. Remnant bleeding even after sclerotherapy for successive 2 hospital admissions
d. Failure to heal after a single treatment

GASTRIC VARICES

36. Most common cause of gastric varices is: *(AIIMS GIS Dec 2011)*
a. Splenic vein thrombosis b. Splenectomy
c. Cirrhosis d. Mesenteric thrombosis

37. Isolated gastric varices: *(AIIMS GIS May 2011)*
a. Profuse bleeding
b. Most commonly due to splenic vein thrombosis
c. EUS is better than endoscopy
d. Single treatment can lead to eradication

38. Veins involve in stomach varices are: *(PGI Dec 2008)*
a. Coronary vein b. Short gastric vein
c. Right gastroepiploic vein d. Left gastroepiploic vein
e. Left gastric vein

TIPSS

39. Contraindications of TIPS: *(ILBS 2012)*
a. HPS b. HRS
c. VOD d. BCS

40. False about TIPSS: *(AIIMS GIS May 2008)*
a. Shunt thrombosis is more common than stenosis
b. Encephalopathy is more common
c. Improves ascites and hydrothorax
d. Much better control of bleeding than variceal ligation

41. TIPSS means creating anastomosis between which of the following? *(MHSSMCET 2009, Karnataka 2006)*
a. Portal vein and hepatic artery
b. Portal vein and IVC
c. Portal vein and hepatic vein
d. Hepatic vein and hepatic artery

42. TIPSS is a type of: *(JIPMER GIS 2011)*
a. Non-selective shunt
b. Selective shunt
c. Both selective and non-selective shunt
d. Systemic shunt

43. True about TIPS: *(PGI June 98)*
a. It is a type of portocaval shunt
b. It is intrahepatic shunt
c. Performed by passing endoscopes
d. Most suitable for patient going for liver transplant

44. TIPS is used in all except: *(AIIMS GIS Dec 2011)*
a. Refractory ascites
b. BCS
c. Hepatopulmonary syndrome
d. Refractory hepatic hydrothorax

SURGICAL SHUNTS

45. Coronary-Caval fistula is : *(ILBS 2011)*
a. Inokuchi b. Warren's
c. Eck's fistula d. Shamik

46. Mesocaval shunt what incision approach is used? *(MHSSMCET 2009)*
a. Midline b. Paramedian
c. Subcoastal d. Chevron

47. Which is a non-selective shunt? *(AIIMS GIS May 2008)*
a. DSRS
b. Inokuchi shunt
c. 12 mm interposition shunt
d. 8 mm interposition shunt

48. For bleeding varices of the esophagus, the common operation operations is/are: *(AIIMS 81, DNB 89)*
a. Portocaval shunt
b. Gastrectomy
c. Splenectomy
d. All of the above

49. Prognosis of portocaval shunt depends on all except: *(AIIMS Sept 96)*
a. Serum bilirubin
b. Serum albumin
c. Refractory ascitis
d. Type of shunt

50. Contraindications of portal systemic shunting include:
a. Serum albumin less than 3 mg% *(PGI 88)*
b. Massive ascites
c. Significant jaundice
d. All of the above

51. Denver shunt is used in: *(DNB 2012)*
a. Ascites
b. Dialysis
c. Raised ICT
d. Raised IOP

52. The Le-Veen shunt in ascites is done between peritoneum and: *(AIIMS November 2014)*
a. Cisterna chyli
b. Renal pelvis
c. Superior vena cava
d. Gall bladder

53. The operation that precipitates portosystemic encephalopathy is: *(MAHE 2005)*
a. Splenorenal shunt
b. Suguira operation
c. Talmal-marison operation
d. Portacaval anastomosis

EXTRA-HEPATIC PORTAL VENOUS OBSTRUCTION

54. A 20-years old male has presented with repeated episodes of hematemesis. There is no history of jaundice or liver decompensation. on examination the significant findings include splenomegaly (8 cms below costal margin), and presence of esophageal varices. There is no ascites or peptic ulceration. The liver function tests are normal. the most likely diagnosis is: *(AIIMS Nov 2004)*
a. Extrahepatic portal venous obstruction
b. Non cirrhotic portal fibrosis
c. Cirrhosis
d. Hepatic venous outflow tract obstruction

55. A 12-years old boy presents with hematemesis, melena and mild splenomegaly. There is no obvious jaundice or ascitis. The most likely diagnosis is: *(All India 2011)*
a. EHPVO
b. NCPF
c. Cirrhosis
d. Malaria with DIC

56. Treatment of choice for extrahepatic portal thrombosis? *(MHSSMCET 2009)*
a. Mesocaval shunt
b. Porto caval shunt
c. Mesorenal shunt
d. Splenorenal shunt

NON-CIRRHOTIC PORTAL FIBROSIS

57. Which of the following is the most common presenting symptom of non-cirrhotic portal hypertension?
a. Chronic liver disease *(All India 2006)*
b. Ascites
c. Upper gastrointestinal bleeding
d. Encephalopathy

58. NCPF is due to: *(AIIMS GIS Dec 2010)*
a. Extrahepatic obstruction
b. Intrahepatic pre-sinusoidal obstruction
c. Intrahepatic sinusoidal obstruction
d. Intrahepatic post-sinusoidal obstruction

BUDD-CHIARI SYNDROME

59. True about Budd-Chiari syndrome is the following except: *(MHPGMET 2005)*
a. Can occur due to web in IVC
b. Thrombosis of hepatic veins
c. Causes prehepatic portal hypertension
d. Intractable ascites

60. Budd-Chiari syndrome involves: *(MHSSMCET 2005, Rajasthan 98)*
a. Superior vena cava
b. Portal vein
c. Hepatic veins
d. Hepatic artery

61. Budd-Chiari syndrome is due to thrombosis of:
a. Infra renal IVC *(Orissa 2011)*
b. Renal part of IVC
c. Superior mesenteric vein thrombosis
d. Hepatic veins

62. In Budd-Chiari syndrome, the occlusion is at the: *(DPG 2010)*
a. IVC
b. Renal vein
c. Hepatic vein
d. Splenic vein

VENO-OCCLUSIVE DISEASE

63. Veno-occlusive disease in hepatic vein is characterized by:
a. Central venous congestion *(PGI Dec 2007)*
b. Hepatomegaly
c. Portal vein obstruction
d. Budd Chiari syndrome
e. Hepatic fibrosis

64. Veno-occlusive disease is seen in all except:
a. Bone marrow transplant *(AIIMS GIS Dec 2011)*
b. Bush teas
c. Mushroom poisoning
d. Cytosine arabinoside

EXPLANATIONS

PORTAL HYPERTENSION

1. **Ans. d. Isolated esophageal varices present** *(Ref: Sabiston 19/e p1432; Schwartz 10/e p1281, 9/e p1112; Blumgart 5/e p1079-1091; Shackelford 7/e p1597; Harrison 18/e p2598)*

Etiology of Portal Hypertension		
Presinusoidal	**Sinusoidal**	**Postsinusoidal**
Extrahepatic or sinistral: • Splenic vein thrombosis[Q] • Splenomegaly[Q] • Splenic arteriovenous fistula[Q]	**Intrahepatic: Cirrhosis** due to- • **HBV, HCV, Alcohol**[Q] • Metabolic abnormality • Autoimmune hepatitis • Primary biliary cirrhosis and **PSC**	**Intrahepatic:** • Veno-occlusive disease[Q]
Intrahepatic: • **Schistosomiasis**[Q] • Congenital hepatic fibrosis • Nodular regenerative hyperplasia • Idiopathic portal fibrosis • **Myeloproliferative disorder**[Q] • **Sarcoid** and **GVHD**		**Posthepatic** • **Budd-Chiari syndrome**[Q] • **Congestive heart failure** • IVC web[Q] • **Constrictive pericarditis**[Q]

- **MC cause** of **intrahepatic presinusoidal** portal hypertension: **Schistosomiasis**[Q]
- **MC cause** of **sinusoidal** portal hypertension: **Cirrhosis**[Q]

Left Sided Portal Hypertension

- Portal hypertension **due to isolated splenic vein thrombosis**[Q] is known as left sided portal hypertension or **sinistral hypertension**[Q].
- **Pressure** in **portal vein** and **SMV** are **normal**[Q]
- There is **gastrosplenic venous hypertension** leading to **formation of gastric varices**[Q]

Causes

- **Pancreatitis** (**MC**)[Q] leading to splenic vein thrombosis
- Neoplasm
- Trauma

Treatment

- **Splenectomy** is the **treatment of choice**[Q].

2. **Ans. c. 5-10 mm Hg** *(Ref: Sabiston 19/e p1431-1433; Schwartz 10/e p1280-1281, 9/e p1111; Bailey 26/e p1074-1076, 25/e p1088; Blumgart 5/e p1128-1138; Shackelford 7/e p1596; Harrison 18/e p2597)*

Portal Pressure

- Normal portal vein pressure: **5-10 mm Hg**[Q]
- Normal portal vein pressure: **10-15 cm saline**[Q]
- **Variceal formation** occurs when portal pressure is **>10 mm Hg**[Q].
- **Variceal bleeding** occurs when portal pressure is **>12 mm Hg**[Q].

Portal Hypertension

- **Definition: Portal pressure >10 mm Hg**[Q]
- **MC cause** of portal hypertension in **United States**: **Cirrhosis**[Q].
- Consequence of **both increased portal vascular resistance** and **increased portal flow**[Q].
- Portal hypertension results in **splenomegaly** with enlarged, tortuous, and even aneurysmal splenic vessels.
  - **Cruveilhier-Baumgarten murmur**[Q]: Audible **venous hum** in **caput medusa**
- **Hyperdynamic portal venous circulation** seems to be **related to** the **severity of** the **liver failure**[Q].
- **Upper G.I. bleeding** is caused by the **portal hypertension** in about **90%** of instances.
- Most bleeding episodes occur during the **first 1 to 2 years** after **identification of varices**[Q].
- **Colour Doppler** is the **investigation of choice** for evaluation of **PHT.**

- About **one third** of **deaths** in patients with known esophageal varices are due to **upper GI bleed**[Q]
- A **larger proportion** dies as a result of **liver failure**[Q].

- **MC causes** of **death** in **cirrhosis** patients: **Hepatic failure**[Q]
- **2nd MC causes** of **death** in **cirrhosis** patients**: variceal hemorrhage**[Q]

3. **Ans. d. Sclerotherapy**

4. **Ans. b. Metabolic alkalosis** *(Ref: Sabiston 19/e p1432; Harrison 18/e p2598)*

Electrolyte Abnormalities in Cirrhosis

- **Hyponatremia, hypokalemia** and **metabolic alkalosis**[Q] **(↓PNH)**

Laboratory Abnormalities in Cirrhosis

- Cirrhosis is often accompanied by **anemia, leukopenia**, and **thrombocytopenia**[Q]**.**
- The **degree of thrombocytopenia** has been found to be a quite **accurate predictor** of the **presence of esophageal varices**[Q].
- **Hypoalbuminemia** and a **prolonged INR** are reliable indices of **chronic** rather than acute liver disease[Q].
- **ALT/AST >2** is **highly suggestive** of **alcohol** as the cause of liver disease[Q].
- Common serum **electrolyte abnormalities** in **cirrhosis** are **hyponatremia, hypokalemia**, and **metabolic alkalosis**[Q].

5. **Ans. a. 50 cm H_2O**

6. **Ans. d. A pre-operative oxygen tension of <30 mm Hg alone is predictor of severity of disease** *(Ref: Shackelford 7/e p1606-1608; www.medicalcriteria.com; Sabiston 19/e p585)*

- **Severity in HPS** depends upon **liver disease, oxygenation defect** and **pulmonary vascular dilatation**[Q].

Hepatopulmonary Syndrome

- Patients with long-standing cirrhosis and portal hypertension are prone to develop HPS.
- Incidence is 4-29% in ESLD
- It is defined as a **triad of** signs: **Liver disease**[Q] + increased alveolar-arterial gradients (**hypoxemia**[Q]) + evidence of intrapulmonary vascular resistance (**intra-pulmonary vascular dilatation**)[Q].
- **Severity** depends upon **liver disease, oxygenation defect** and **pulmonary vascular dilatation**[Q]

Clinical Features

- Clinical features are **orthodeoxia, platypnea**[Q], and insidious and slow progression of dyspnea, clubbing, distal cyanosis and spider angiomas.

Diagnosis

- **Contrast echocardiography** is the **study of choice** to diagnose **HPS** by demonstrating the presence of **intra-pulmonary vascular dilatations**[Q].

Treatment

- HPS is rare after hepatic resection.
- **Liver transplant reverses HPS** in **most** of the **patients**[Q].

Portopulmonary Hypertension

- PPH is **pulmonary artery hypertension** in **portal hypertension**[Q].
- Portopulmonary Hypertension (**PPH**) occurs when there is **pulmonary vasoconstriction** and **increased pulmonary artery pressure**[Q].

Clinical Features

- Asymptomatic PPH **predisposes** to **intra-operative cardiac arrhythmias** and **arrest**[Q].

Diagnosis

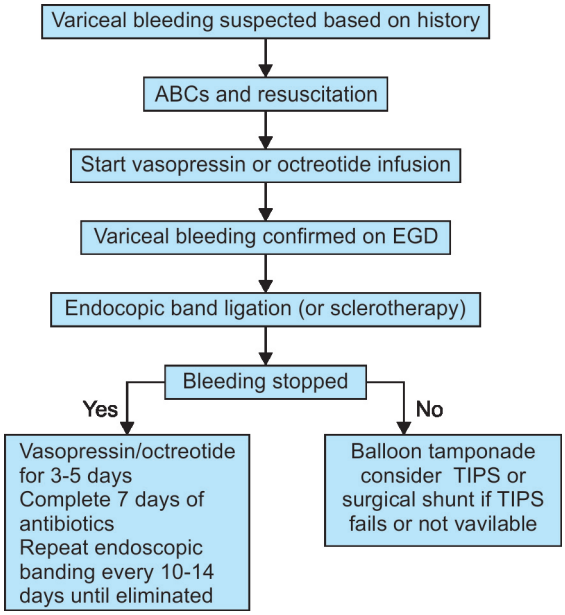
- Patients with pulmonary artery pressure gradient (**PAPG**) **>25 mm Hg** should undergo **right heart catheterization** for further assessment[Q].
- With **right heart catheterization**, a mean **pulmonary artery pressure** of **>25 mm Hg** with a **capillary wedge pressure <15 mm Hg confirm** the **diagnosis**[Q].

- **PAPG >25 mm Hg, pulmonary capillary wedge pressure <15 mm Hg** and **pulmonary vascular resistance >240 dynes.S.cm-5** occurring in setting of portal hypertension is **diagnostic of PPH**[Q].

Treatment

- **Best treatment**: combination of **medical therapy** and **liver transplantation**[Q].
- Moderate to severe PPH (PAP >50 mm Hg) is a contraindication for liver transplantation; first consider prostanid therapy (**epoprostenol**) to **reduce pulmonary hypertension**[Q].

7. **Ans. d. Hypoammonemia**
   - In cirrhosis, there is hyperammonemia.
8. **Ans. d. Endoscopic sclerotherapy** *(Ref: Sabiston 19/e p1113; Blumgart 5/e p1129-1134; Shackelford 7/e p1597, 1599-1601; Harrison 18/e p2598)*



Management of Variceal Bleeding

Variceal Bleeding

- In addition to pharmacologic therapy **endoscopy** should be carried out **as soon as possible**
- If varices are found they are treated with either **endoscopic variceal ligation** or **sclerotherapy**[Q].
- **EVL** is the **treatment of choice** for **variceal bleeding**[Q].

9. **Ans. a. Splenectomy**
10. **Ans. a. ↑ in splenic pulp pressure, b. ↑ in portal vein pressure, d. Portal vein Doppler study**
    - **Splenic pulp pressure** gives a **measure of** the **portal vein pressure**; it can be measured by **inserting a needle percutaneously**[Q].
    - **Portal vein Doppler study** is the **most useful non-invasive investigation** for assessing **thrombosis** of the **main portal vein branches**[Q].
11. **Ans. a. Nutritional status, c. S. Creatinine, d. Acid phosphate** *(Ref: Sabiston 19/e p1431; Schwartz 10/e p1280, 9/e p1111; Blumgart 5/e p59; Harrison 18/e p2526)*

Child-Turcotte-Pugh (CTP) Scoring System

- **CTP score** is a measure to **assess hepatic function**[Q] in many liver diseases.
- It was **initially devised to classify patients** into **risk groups** prior to **undergoing porto-systemic shunt surgeries**[Q].
- It is used to **assess prognosis in cirrhosis**[Q] and many liver diseases.

Child-Turcotte-Pugh (CTP) Score			
Variable	**1 Point**	**2 Points**	**3 Points**
Serum albumin (g/dL)	>3.5	**2.8-3.5**[Q]	<2.8
Bilirubin (mg/dL)	<2	2-3[Q]	>3
Prothrombin time (sec above normal) or **INR**	<4 <1.7	**4-6**[Q] **1.7-2.3**[Q]	>6 >2.3
Ascites	None	**Controlled**[Q]	Uncontrolled
Encephalopathy	None	**Controlled**[Q]	Uncontrolled

Class A	**5-6** points[Q]
Class B	**7-9** points[Q]
Class C	**10-15** points[Q]

- **Major surgeries** can be done **only in Class A**[Q]
- **Only minor surgical procedures** can be performed in **Class B**[Q]
- **No surgical intervention** should be done in **Class C** (**Best treatment** is **liver transplantation**)[Q].

12. **Ans. a. Nutrition** 13. **Ans. b. ALT** 14. **Ans. b. 7-9**

15. **Ans. c. Orthotopic liver transplantation**

- Patient of cirrhosis with variceal bleeding or ascites can be controlled by shunt surgery only if he falls in CTP class A or B.
- **Moderate to severe grade liver insufficiency** can only be **managed by liver transplantation**[Q].

16. **Ans. d. Creatinine, e. ALT**

17. **Ans. c. 35 mm Hg** *(Ref: Sabiston 19/e p1433; Schwartz 9/e p1113; Blumgart 5/e p1136-1137; Shackelford 7/e p1600; Harrison 18/e p2598; Bailey 25/e p1089)*

- If bleeding does not stop promptly, the **gastric balloon** may be inflated to at least a volume of **300 mL**, or the **esophageal balloon** may be inflated to a pressure of **40 mm Hg**[Q].

Balloon Tamponade

- Sengstaken and Blakemore designed a **triple-lumen**[Q] (esophageal balloon, gastric balloon, and gastric aspiration) tube.

Modifications
• Addition of a **fourth port** above the esophageal balloon for aspiration of oral and esophageal secretions (more effective for bleeding esophageal varices)[Q]
• Development of a **single balloon Linton-Nachlas tube** (for **gastric varices**)[Q].

- The airway should be protected by placement of an **endotracheal tube**[Q].
- The use of **water** or **oily contrast** media to inflate the balloon is **contraindicated**[Q].
- In the case of Sengstaken–Blakemore tube, the **gastric balloon** is inflated with **50 mL** of **air**[Q] and **after proper positioning**, the gastric balloon inflated with **250 ml** of air and plugged snug against the GE junction.

> - If bleeding does not stop promptly, the **gastric balloon** may be inflated to at least a volume of **300 mL**, or the **esophageal balloon** may be inflated to a pressure of **40 mm Hg**[Q].

- The **Linton-Nachlas tube** is inflated with **400-700 mL** of **air**[Q].

Complication

- **MC complication** of balloon tamponade is **aspiration**[Q] pneumonia.

18. **Ans. a. Vitamin A toxicity** *(Ref: livertox.nlm.nih.gov)*

Vitamin A Induced Hepatotoxicity

- **Normal doses** of vitamin A are **not associated with liver injury** or liver test abnormalities, but **higher doses can be toxic**[Q].

Mechanism of Injury
• **Excess vitamin A** is **stored in stellate cells**[Q] in the liver and accumulation can lead to their **activation** and **hypertrophy**, **excess collagen production**, **fibrosis**[Q] and liver injury.

- **Serum bilirubin** is typically only **mildly elevated**[Q].
- **Liver biopsy** is **diagnostic**[Q]

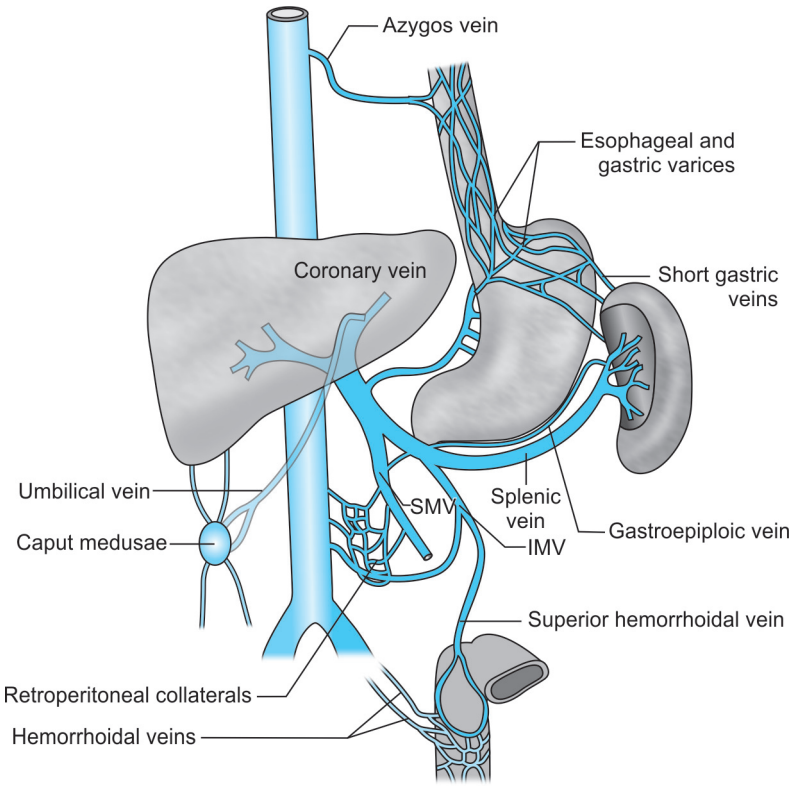
19. **Ans. d. More information needed, b. Grade B** 20. **Ans. d. Gastric freezing**

21. **Ans. d. All of the above** *(Ref: Snell's Clinical Anatomy 7/e p134, 234, 263, 424)*

In portal hypertension the sites of portosystemic anastomosis includes lower end of esophagus, around umbilicus, lower third of rectum and anal canal, posterior abdominal wall, bare area of liver.

Porto-Systemic Anastomosis		
Location	**Portal Component**	**Systemic Component**
Esophagus (lower end) **Esophageal varices**	**Left gastric vein**[Q]	**Azygous vein**[Q] and accessory hemiazygous vein

Rectum and anal Canal Hemorrhoids	**Superior rectal vein**[Q]	**Middle** and **inferior rectal vein**[Q]
Umbilicus Caput medusa	**Left branch** of **portal vein** (paraumblical branches)	**Superficial (superior and inferior) epigastric veins**[Q]
Posterior abdominal wall	**Colic** and **omental veins**[Q]	**Retroperitoneal veins**[Q] of abdominal wall, renal capsule, splenic and hepatic flexure
Bare area of liver	**Hepatic venules**[Q] Right branch of portal vein	Phrenic and intercostal veins Retroperitoneal veins draining into lumbar, azygous and hemiazygous veins
Liver (rarely)	**Patent ductus venosus**[Q] Left branch of portal vein	Inferior vena cava



Portosystemic collateral pathways in portal hypertension

22. Ans. d. Portal hypertension *(Ref: Sabiston 19/e p1164)*

Common Causes of Upper Gastrointestinal Hemorrhage			
Non-variceal Bleeding	**(80%)**[Q]	**Portal Hypertensive Bleeding**	**(20%)**[Q]
Peptic ulcer disease (MC)[Q]	30-50%[Q]	**Gastroesophageal varices**[Q]	>90%[Q]
Mallory-Weiss tears	15-20%	Hypertensive portal gastropathy	<5%
Gastritis or **duodenitis**	10-15%	Isolated gastric varices	Rare
Esophagitis	5-10%		
Arteriovenous malformations	5%		
Tumors	2%		
Other	5%		

- **Splenomegaly** and **massive bleeding** leading to **hypotension** are in favor of **portal hypertension**[Q].

23. Ans. d. Blood urea *(Ref: Sabiston 19/e p658; Schwartz 10/e p1280, 9/e p297, 1111; Blumgart 5/e p1667; Shackelford 7/e p1525; Harrison 18/e p2526)*

Model for End-Stage Liver disease (MELD) Score

- **MELD score** is used to **assess** the **severity of chronic liver disease**Q
- It was **initially developed** to **predict death within 3 months** of surgery in patients that had **undergone TIPS.**Q
- It is calculated by using **3 variables** (**CBI**): S. **C**reatinine, S. **B**ilirubin, **I**NRQ

> - MELD score is **currently used** by United Network for Organ sharing (**UNOS**) for **prioritizing allocation of liver transplant**Q**.**

- It is 6–40 point scale
- The relative risk of mortality in creases by 14% for each 1 point increase in need sure MELD sore = 3.8 log(e) (S. bilirubin mg/dL) + 11.2 Log(e) (INR) + 9.6 Log(e) (S. creatinine mg/dL)

Pediatric End-Stage Liver disease (PELD) Score

- **PELD score** utilizes following variables (**NABIA**)Q:

1. **N**utritional statusQ **2.** **A**geQ **3.** **B**ilirubinQ **4.** **I**NRQ **5.** **A**lbuminQ

MELD score (CBI)	**C**reatinine, **B**ilirubin, **I**NRQ
PELD score (NABIA)	**N**utritional status, **A**ge, **B**ilirubin, **I**NR, **A**lbuminQ

24. Ans. a. Portal hypertension **25. Ans. b. Cirrhosis**

ESOPHAGEAL VARICES

26. Ans. b. Esophageal varices *(Ref: Wolfgang Radiology 2nd/509)*

Esophageal Varices

- **On USG:**
  - **Thickened sinus, interrupted mucosal folds (earliest sign)**Q
  - Tortuous radiolucencies of variable size
  - The "**worm-eaten**" smooth **lobulated filling defects**Q

27. Ans. d. Propranolol *(Ref: Sabiston 19/e p1432-1440; Schwartz 9/e p1113; Bailey 26/e p1074-1076, 25/e p1088-1091; Blumgart 5/e p1129-1146; Shackelford 7/e p1599-1604; Harrison 18/e p2598)*

Esophageal Varices

- **Most significant clinical finding** associated with **PHT** is development of **GE varices**Q.
- **Major blood supply** to GE varices is **anterior branch** of **left gastric** or **coronary vein**Q**.**
- **Variceal bleeding** is **leading cause** of **morbidity** and **mortality** associated with PHTQ

> - Approximately **30%** of patients with **compensated cirrhosis** and **60%** of patients with **decompensated cirrhosis** have **esophageal varices**Q.
> - **One third** of all patients with **varices** experience **variceal bleeding**Q.
> - **Each episode** of **bleeding** is associated with a **20-30% risk** of **mortality**Q.

- Seventy percent of **patients who survive** the initial bleed will experience **recurrent variceal hemorrhage within 1 year,** if left **untreated**Q**.**

Prevention of Variceal Bleeding

- Current measures aimed at preventing variceal bleeding include:
  - Improvement of liver function (**abstention from alcohol**)Q
  - **Avoidance** of **aspirin** and **NSAIDs**Q
  - Administration of **propranolol** or **nadolol** (**nonselective beta blockers**)Q

> - **Beta blockers reduce** the **index variceal bleed** by **45%** and reduce **bleeding mortality** by **50%**Q.
> - **20%** of patients **do not respond** to **beta blockers** and **20% cannot tolerate beta blockers** due to medication **side effects**Q.

- **Prophylactic endoscopic variceal ligation (EVL)** is associated with a **lower incidence** of **first variceal bleed**Q.
- **EVL** is recommended for **medium to large varices**, performed **every 1 to 2 weeks**Q until obliteration, followed by endoscopy 1 to 3 months later and surveillance endoscopy every 6 months to monitor for recurrence of varices.

Management of Acute Variceal Bleeding

- Patients should be **admitted to** an **ICU** for **resuscitation** and management[Q].
- **Blood resuscitation** should be performed to a **hemoglobin** level of **8 g/dL[Q].**
- **Over-replacement** of packed **red blood cells** and the overzealous administration of **saline** can lead to both **rebleeding** and **increased mortality**[Q].
- Administration of **FFP** and **platelets** in patients with **severe coagulopathy**[Q].

- **Cirrhotic patients** with variceal bleeding have a **high risk** of developing **bacterial infections**[Q]
- **Bacterial infections** are **associated with rebleeding** and a **higher mortality rate**[Q].
- Use of **short-term prophylactic antibiotics** has been shown both to **decrease** the **rate of bacterial infections** and to **increase survival**[Q].
- **Ceftriaxone 1 g/day IV** is often given[Q].

Pharmacologic therapy for Variceal Hemorrhage

- Pharmacologic therapy can be initiated as soon as the diagnosis of variceal bleeding is made.
- **Vasopressin**, administered IV at a dose of **0.2-0.8 units/min**, is the **most potent vasoconstrictor**, its use is **limited by** its large number of **side effects**, and it should be administered for **only a short period** to prevent ischemic complications[Q].
- **Somatostatin** and **octreotide** (initial bolus of **50µg IV** followed by continuous infusion of **50µg/h**) also cause **splanchnic vasoconstriction**[Q].
- **Octreotide** is the **preferred pharmacologic agent** for **initial management** of acute variceal bleeding[Q].

- In addition to pharmacologic therapy **endoscopy** should be carried out **as soon as possible** and **EVL** should be performed.
- Combination of **pharmacologic and EVL therapy improve** initial **control of bleeding** and **increase the 5-day hemostasis rate**[Q].
- Even when aggressive pharmacologic and endoscopic therapies are initiated and these treatment options are maximized, **10-20%** of patients with variceal bleeding will **continue to bleed**.
- **Shunt therapy** (**surgical shunts** or **TIPS**) has been shown to **control refractory variceal bleeding** in **>90%** of treated individuals[Q].
- **Shunt surgery** is considered only in patients with **preserved hepatic function** (**CTP** class **A**)[Q]
- **TIPS** is used in patients with **decompensated liver disease** (**CTP** class **B** or **C**)[Q].

Sengstaken-Blakemore Tube

- Balloon tamponade using will **control refractory variceal bleeding** in **>80%** of patients[Q].
- Its **application** is **limited** due to complications (**aspiration** and **esophageal perforation**)[Q]
- Use of a Sengstaken-Blakemore tube should be **limited** to **short-term therapy (<24 hours**) in those patients awaiting definitive care[Q].

28. Ans. b. Mucosal fold below carina *(Ref:Surgical Diseases in Tropical countries/130)*

- **Esophageal varices** presents as **serpiginous filling defects**[Q] (arrows) in the esophagus **below** the level of the **carina**[Q].

Radiological Grading of Varices	
Grade I	**Straight varices** seen only on **inspiration**
Grade II	Straight varices seen in **all phases of respiration**
Grade III	**Tortuous varices** in **lower half** of esophagus
Grade IV	Tortuous varices in **entire esophagus**

29. Ans. b. Gastro-esophagoscopy

30. Ans. a. 12 hours *(Ref: Bailey 26/e p1074-1075, 25/e p1089)*

- The **balloons** should be **temporarily deflated after 12 hours**[Q] to **prevent pressure necrosis** of the esophagus.

SENGSTAKEN-BLAKEMORE TUBE

- If the **rate of blood loss prohibits endoscopic evaluation**, a **Sengstaken–Blakemore tube** may be **inserted** to **provide temporary hemostasis**[Q].
- Once inserted, the **gastric balloon** is inflated with **300 ml** of **air**[Q] and retracted to the gastric fundus, where the varices at the esophagogastric junction are tamponaded by the subsequent inflation of the **esophageal balloon** to a pressure of **40 mmHg**[Q].
- The **two remaining channels** allow **gastric** and **esophageal aspiration**[Q].
- A **radiograph** is used to **confirm the position of the tube**[Q].
- The **balloons** should be **temporarily deflated after 12 hours** to **prevent pressure necrosis** of the esophagus[Q].

31. Ans. a. 40 mm

32. Ans. b. Banding endoscopic *(Ref: Sabiston 19/e p1434; Schwartz 9/e p1113; Bailey 26/e p1075, 25/e p1089; Blumgart 5/e p1135-1138; Shackelford 7/e p1600-1601; Harrison 18/e p2598)*

Injection Sclerotherapy	Endoscopic Variceal Ligation
• Tetradecyl sodium **(1-3%)**, sodium morrhuate (5%), ethanolamine oleate **(5%)** and **3% phenol** are most common sclerosing agents[Q]. • A **combined para** and **intravariceal technique** is used for the management of **acute variceal bleeding** and a predominantly intravariceal technique for long term management[Q]. • **Variceal eradication** is considered the **end point of EST**[Q] • **Variceal obliteration** can be achieved in **80-95%** patients with a mean of **4-6.8 sessions**[Q]. • **Esophageal stricture**[Q] is a common **complication**	• For control of **acute variceal bleeding EVL** has been found to be **as effective as EST**[Q] • Technically **more difficult than EST**[Q] in presence of massive bleeding due to reduction in field of view • **Variceal recurrence** rate is **higher** in **EVL** since, **paraoesophageal varices**[Q] **(perforating veins)** are **not obliterated**. • **Not suitable** for **small varices** (grade I, II) • **EVL** is associated with **lesser complications** and **rebleeding**[Q] • Variceal eradication in **fewer sessions** but **higher recurrence** of varices[Q].

33. Ans. b. Stiegmann and Goff *(Ref: Bailey 24th/1071)*

Van Steigmann and Goff	**Endoscopic esophageal variceal ligation**[Q]
Crile and Borema	**Transesophageal ligation** of bleeding esophageal varices[Q]
Suguira and Futagawa	**Esophageal transections** with **paraesophago-gastric devascularization** in the treatment of esophageal varices[Q]
Crafoord and Freckner	**Endoscopic sclerotherapy**[Q]

34. Ans. a. Octreotide *(Ref: Harrison 18/e p2598, 17/e p1977)*

- **Somatostatin** and/or its analog **octreotide** are the **agents of choice** for **medical management** of **variceal bleed**[Q].
- **Octreotide** and **Somatostatin** have been found to be effective in **achieving hemostasis** and **preventing early rebleeding**[Q].
- **Terlipressin** is released in sustained and slow manner. It does not share several systemic side effects of vasopressin and **may be used** to **control variceal bleeding**[Q].

Drugs used in Portal Hypertension

Drugs Decreasing portal blood flow	Drugs decreasing intrahepatic resistance
• Non-selective beta blockers • Vasopressin and **Terlipressin** • Somatostatin and **Octreotide (DOC)**[Q]	• Nitrates • Alpha1-blockers (Prazosin) • Angiotensin receptor blockers

35. Ans. a. Unresponsiveness to consecutive 2 energy sclerotherapies

- **Failure of endoscopic treatment** is declared when **two sessions fail to control hemorrhage**[Q].

GASTRIC VARICES

36. Ans. c. Cirrhosis *(Ref: Sabiston 19/e p1222-1223; Schwartz 10/e p1088, 9/e p1113; Blumgart 5/e p1137; Shackelford 7/e p653-654)*

- **MC cause** of **gastric varices**: **Cirrhosis**[Q]
- **MC cause** of **isolated gastric varices**: **Splenic vein thrombosis**[Q]

Gastric varices

- Classified by **Sarin** into two types:
  1. **Gastroesophageal varices**
  2. **Isolated gastric varices**.
     - **Type 1**: Varices located in the **fundus** of the stomach[Q]
     - **Type 2**: Isolated **ectopic varices** located **anywhere** in the stomach[Q].

Pathophysiology

- Gastric varices can develop **secondary to portal hypertension**, in conjunction with esophageal varices, or **secondary to sinistral hypertension** from **splenic vein thrombosis**Q.
- **Isolated gastric varices** tend to occur **secondary to splenic vein thrombosis**Q.

Clinical Features

- The **incidence of bleeding** from gastric varices is **<10%**Q**.**

Diagnosis

- **USG** to **document splenic vein thrombosis** before surgical intervention because gastric varices are most often associated with generalized portal hypertension.
- Gastric varices may be **difficult to recognize endoscopically** even in non-bleeding patients.

> - **Endoscopic ultrasound** is a **more sensitive diagnostic test** than endoscopy alone **for detection** of **gastric varices**Q**.**

Treatment

- Gastric varices in **splenic vein thrombosis**: **Splenectomy**Q.
- Gastric varices in the setting of **portal hypertension** should be managed like **esophageal varices**Q.

> - As gastric varices arise in the **submucosa**, a common complication associated with gastric variceal **sclerotherapy** is **ulceration**Q.

37. **Ans. b. Most commonly due to splenic vein thrombosis**

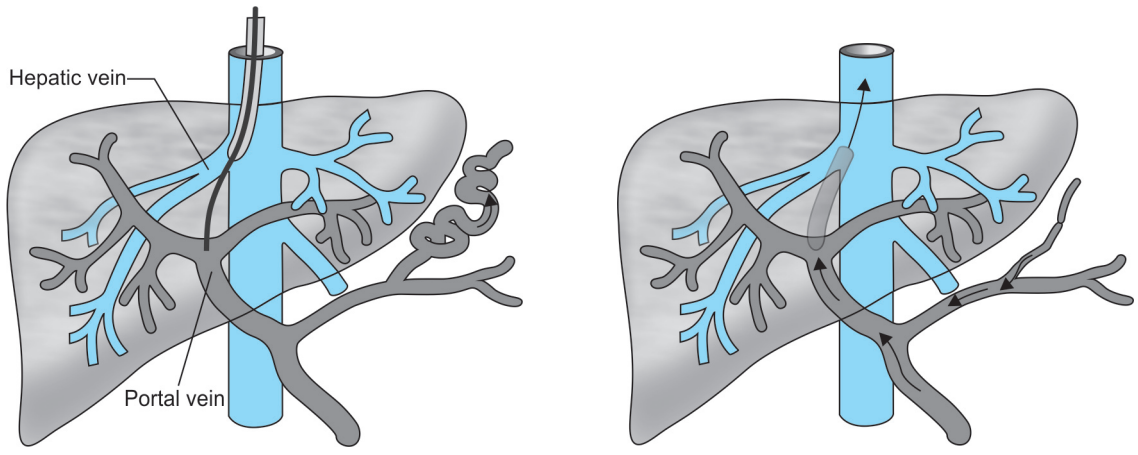
38. **Ans. All** *(Ref: Sabiston 19/e p1222-1223)*

GASTRIC VARICES

- Gastric varices can develop **secondary to portal hypertension**, in conjunction **with esophageal varices**Q, or secondary to **sinistral hypertension** from **splenic vein thrombosis**Q.
- In generalized portal hypertension, the **increased portal pressure** is **transmitted by** the **left gastric vein**Q to **esophageal varices** and by the **short** and **posterior gastric veins**Q to the **fundic plexus** and **cardia veins**.
- **Isolated gastric varices** tend to occur secondary to **splenic vein thrombosis**.
- **Splenic blood flows** retrograde through the **short** and **posterior gastric veins** into the **varices,** then **hepatopetally through** the **coronary vein**Q into the **portal vein**.
- **Left-to-right retrograde flow** through the **gastroepiploic vein**Q to the **superior mesenteric vein** can explain the development of **ectopic varices** in the stomach.

TIPSS

39. **Ans. a. HPS** *(Ref: Sabiston 19/e p1437-1440; Schwartz 10/e p347, 9/e p1114; Bailey 26/e p1075-1076, 25/e p1089-1090; Blumgart 5/e p1180-1188; Shackelford 7/e p1602-1603; Harrison 18/e p2599)*



TIPS (Transjugular intrahepatic portosystemic shunt

Transjugular Intrahepatic Portal-Systemic Shunt (TIPSS)

- TIPSS is a **non-selective shunt**, created between **portal** and **hepatic vein**[Q]
- TIPSS is **portahepatic** or **intrahepatic shunt**[Q]
- **TIPS** in the **acute situations** should be **avoided** in patients requiring **ventilation** and with evidence of **sepsis** and **renal failure**[Q].

Technique of Placement

- Initial venous access is through the **right internal jugular vein** because this is the **shortest** and **most direct path** to catheterize the hepatic veins[Q].
- The **right hepatic vein** is **MC used** because it is the **largest hepatic vein** and usually has the **most favourable orientation**[Q].
- Portal vein is cannulated by **Rosch needle**.
- Portal vein is **localized** by **carbon dioxide wedge hepatic venography**[Q].
- **Portal venogram** before dilating parenchymal tract is **crucial**, provides **confirmation** that **portal vein** has been **accessed**.

Stent

- The **VIATORR** is a **stent-graft**[Q] specifically designed for TIPSS.
- The device has a **2 cm** long bare stent segment that sits in the portal vein; the **covered portion** consists of **three PTFE layers**[Q], one of which is an impermeable film **to prevent bile leak** into the shunt.

Indications of TIPSS	
1. Prevention of rebleeding from varices (**MC**)[Q]	**5.** Refractory hepatic hydrothorax[Q]
2. Acute variceal Bleeding[Q]	**6.** Budd-Chiari syndrome[Q]
3. Refractory ascites[Q]	**7.** Hepatic veno-occlusive disease[Q]
4. Hepatorenal syndrome[Q]	**8.** Portal hypertensive gastropathy[Q]

Contraindications of TIPSS	
Absolute	**Relative**
1. Right-sided heart failure[Q]	**1.** Portal vein thrombosis[Q]
2. Polycystic liver disease[Q]	**2.** Hypervascular liver tumors[Q]
3. Pulmonary hypertension[Q]	**3.** Encephalopathy[Q]
4. Hepatopulmonary syndrome[Q]	

Complications

- **Encephalopathy** (10-20%)[Q]:
  - Usually occurs **within 1 month** of the procedure
  - Relatively easy to manage with **protein restriction** and **lactulose**[Q]
  - **Declines after** the **first 3 months** as the stent develops spontaneous closure
- **Stenosis** or **thrombosis** (5-15%)[Q]:
  - **Half** of the **stenoses** occur in the **hepatic vein**, and half are due to **intimal hyperplasia** in the parenchymal segment[Q].
  - **Shunt stenosis** is usually secondary to **neointimal hyperplasia** and is **more common than thrombosis**[Q].
  - **Shunt thrombosis** occur in **<30 days**, whereas **stenosis after 30 days**[Q].
  - **Embolization** of the stent to the pulmonary artery
  - Inadvertent puncture of the gallbladder or laceration of the liver capsule
  - Hemobilia, bacteremia with septic shock, intravascular hemolysis
  - Contrast induced oligouric renal failure, worsening hepatic function, right heart failure.

Surveillance

- **Doppler duplex ultrasonography** at 24 hours, 1 month, 3 months, and 6 months after the initial TIPS procedure.

40. Ans. a. Shunt thrombosis is more common than stenosis

- **Shunt stenosis** is usually secondary to **neointimal hyperplasia** and is **more common than thrombosis**[Q].

41. Ans. c. Portal vein and hepatic vein **42. Ans. a. Non-selective shunt**

- TIPSS is a **non-selective shunt**, created between **portal** and **hepatic vein**[Q]
- TIPSS is **portahepatic** or **intrahepatic shunt**[Q]

43. Ans. b. It is intrahepatic shunt, d. Most suitable for patient going for liver transplant

44. Ans. c. Hepatopulmonary syndrome

SURGICAL SHUNTS

45. Ans. a. Inokuchi *(Ref: Sabiston 19/e p1434-1438; Bailey 25/e p1090-1091; Blumgart 5/e p1146-1159; Shackelford 7/e p1603-1604)*

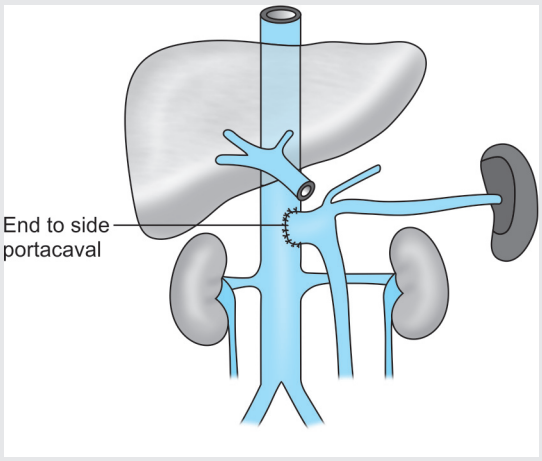
Inokuchi Shunt

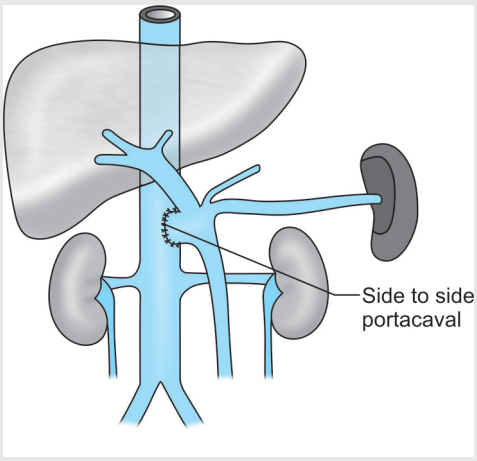
- Interposition of a **vein graft** between the **left gastric** (Coronary) vein and the **IVC**[Q].
- Also known as **coronary-caval fistula**[Q]

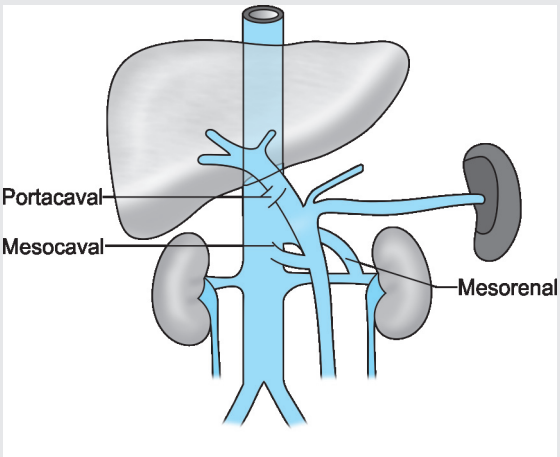
Portosystemic Shunts

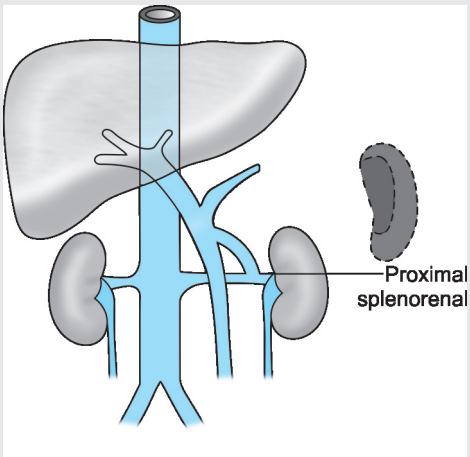
- **Portosystemic shunts** are the **most effective** means of **preventing recurrent hemorrhage**[Q] in patients with portal hypertension.

Types of Portosystemic Shunts		
Non selective	**Selective**	**Partial**
1. **Eck fistula**[Q] 2. Side-to-side PCS **(SSPCS)**[Q] 3. Interposition graft **(portacaval, mesocaval, mesorenal)**[Q] 4. Proximal splenorenal shunt[Q]	1. **Distal** splenorenal shunt **(Warren shunt**[Q]**)** 2. **Inokuchi shunt**[Q]	1. Diameter of shunt **<10 mm**[Q]









Non-selective shunts

- In the current era, indications for a **nonselective shunt** would include an **emergency shunt** for **variceal hemorrhage**, an **elective shunt** in the presence of **significant ascites** and treatment of **Budd-Chiari syndrome**[Q].
- Patients in whom a **future liver transplant** is required should be treated with a **shunt** in which **dissection** is **performed outside** of the **porta hepatis.**

- Choice (TIPS or shunt) is based on the predicted time to transplantation:
  - **TIPS** if **transplant** is **delayed <1 year**[Q]
  - **Portosystemic shunt** if **transplant** is **delayed >1 year**[Q].
- Patients who live in **remote locations** and those who **fail endoscopic** and **drug therapy** receive a **selective shunt**.

Types of Portosystemic Shunts		
Non selective	**Selective**	**Partial**
• **Divert all portal flow** away from the liver[Q] • **End-to-side** or **side-to-side** anastomosis **>11 mm**[Q] • **Side-to-side shunts** decompress **varices** and decompress the obstructed sinusoids, **alleviate ascites**[Q].	• **Only decompresses** the **gastro-esophageal** and **splenic segments**[Q] • Distal splenorenal shunt (**Warren shunt**)[Q] • **Inokuchi shunt** consists of interposition of a **vein graft** between the **left gastric** or **coronary** vein and **IVC**[Q]	• Only **diverts part** of **portal venous flow**[Q] • Side-to-side anastomosis **<10 mm**[Q] diameter

- **MC causes** of **death in:**
  - **Medically treated** patients: **Rebleeding**[Q]
  - **Shunted** patients: **Accelerated hepatic failure**[Q]
- **Rex shunt** is an **internal jugular vein graft (mesenteric-left portal vein bypass)**[Q] used in **EHPVO**[Q].
- **Eck's Fistula** is an **end-to-side portacaval shunt**[Q].

46. Ans. a. Midline *(Ref: Mastery of Surgery 2007/1352; Atlas of GI Surgery by John L. Cameron 2007/194)*

Mesocaval Shunt

- A **mesocaval shunt** can be performed through either a **bilateral subcostal** or **midline incision**.
- **Midline incision** is **preferred**[Q].

47. Ans. c. 12 mm interposition shunt

48. Ans. a. Portocaval shunt

49. Ans. d. Type of shunt

- **Prognosis** of **portacaval shunt** depend on **Childs criteria (Bilirubin, albumin, ascites, PT, encephalopathy)**[Q].

50. Ans. d. All of the above

Porto-systemic shunting is avoided in CTP class C. All the options belong to Class C.

51. Ans. a. Ascites *(Ref: Textbook of Hepatology by Erwin Kuntz/317)*

52. Ans. c. Superior vena cava *(Ref: Bailey 26/e p1077; Textbook of Hepatology by Erwin Kuntz/317)*

The Le-Veen shunt in ascites is done between peritoneum and superior vena cava.

- *"The* Le-Veen shunt *is designed for the* relief of ascites due to chronic liver disease. One end of the silastic tube is inserted into the ascites within the peritoneal cavity *and the* other end is tunneled subcutaneously to the neck, *where it is* inserted under direct vision into the internal jugular vein *and* fed into the SVC.*"- Bailey 26/e p1077*

Peritoneovenous Shunt
• The **Le-Veen shunt** is designed for the **relief of ascites due to chronic liver disease**[Q]. • **One end of the silastic tube is inserted into the ascites within the peritoneal cavity** and the **other end is tunneled subcutaneously to the neck**, where it is **inserted under direct vision into the internal jugular vein** and **fed into the SVC**[Q].
Mechanism of Action: • **Owing to a one-way valve within the tubing**, **peritoneal fluid is drawn from the abdomen and drained to the circulation due to the lower pressure in the SVC** in comparison with the abdomen during the respiratory cycle[Q].
Complications: • **Occlusion, displacement and infection**[Q]. • In an attempt to prevent the high occlusion rate, a further development was the **insertion of a chamber placed over the costal margin to allow digital pressure and evacuation of any debris within the peritoneovenous shunt (Denver shunt)**[Q].

53. Ans. d. Portacaval anastomosis *(Ref: Blumgart 5/e p1110; Harrison 18/e p2601)*

Encephalopathy

- Cerebral toxins include ammonia, mercaptans and GABA. **Severity** of encephalopathy **doesn't correlate** with blood **ammonia** levels.
  - **MC cause** is **azotemia**[Q]; most episodes are **acute**[Q]
  - **MC setting** for the development of encephalopathy is in patients with **cirrhosis** who undergo a **procedural shunt**[Q].
- **Only drugs with proven effectiveness:**
  - **Neomycin**[Q]**:** A poorly absorbed antibiotic that **suppresses urease containing bacteria**
  - **Lactulose**[Q]: A nonabsorbable disaccharide that **acidifies colonic contents** and also has **cathartic effects**
- **Unproven therapies** include the enteral or parenteral administration of **branch chain amino acids** and the drug **flumazenil**, a selective antagonist of benzodiazepine receptor.

Factors Precipitating Hepatic Encephalopathy	
Nitrogenous causes	**Non-nitrogenous causes**
• Uremia/**Azotemia (MC)**[Q] • GI **bleeding**[Q] • Dehydration • Metabolic **alkalosis**[Q] • **Hypokalemia**[Q] • **Constipation**[Q] • Excessive dietary **protein**[Q] • **Infection**[Q]	• **Sedative**, benzodiazepines • **Barbiturates**[Q] • **Hypoxia**[Q] • **Hypoglycemia**[Q] • Hypothyroidism • Anemia

EXTRA-HEPATIC PORTAL VENOUS OBSTRUCTION

54. Ans. b. Non-cirrhotic portal fibrosis *(Ref: Blumgart 5/e p1099-1105)*

Non Cirrhotic Portal Hypertension

- **Non cirrhotic portal hypertension** encompasses two distinct pathological condition that present with similar clinical features.
  - **Non cirrhotic portal fibrosis (NCPF)**
  - **Extra-Hepatic Portal Venous Obstruction (EHPV**[Q]**)**
- Distinction between the two conditions should ideally be made by further investigations as the similarly in presentation makes clinical criteria unreliable.

NCPF	EHPVO
• NCPF presents in **young adults**[Q] • Most commonly during the **2nd and 3rd decade**[Q]	• EHPVO may present in two age groups: – **Children: 1st and 2nd** decade due to congenital malformations[Q] – **Adults: 4th and 5th** decade due to thrombotic event[Q]
Clinical Presentation: • Gradual onset of symptoms • **Splenomegaly** is about **4 times more common** in **NCPF** than EHPV[Q]	**Clinical Presentation:** • **Gradual onset** in **children**, where the cause is **congenital malformation**[Q] • **Acute onset** in adults where the cause is a **thrombotic event**[Q] • Splenomegaly is 4 times less common in patients with EHPV[Q]

55. Ans. a. EHPVO *(Ref: Blumgart 5/e p1099-1105)*

Extra-Hepatic Portal Venous Obstruction (EHPVO)

- EHPVO is a **vascular disorder** of the liver
- **Obstruction** of the **extra-hepatic portal vein**[Q] with or without involvement of the intra-hepatic portal veins or splenic or SMV.
  - **MC site** of **obstruction** is at the **confluence** of **splenic vein** and **SMV**[Q]
  - **Common cause** of **portal hypertension** in the **developing countries** (up to **30%** of all variceal bleeders) and is **second to cirrhosis** in the **West** (up to **5–10%**)[Q].
- EHPVO is **MC cause** of **upper gastrointestinal bleeding** in **children**[Q].
- Accounts for almost **70%** of **pediatric patients** with **portal hypertension**[Q].

Etiology

- **Children: Etiology is not clear** in **majority** (Evidence of **umbilical sepsis, umbilical catheterization** and **intra-abdominal sepsis** in a small percentage of patients)[Q]
- **Adults: Hypercoagulable** and **prothrombotic states**[Q]

Pathology

- Grossly, **original portal vein** is **difficult to identify** as it is **replaced by** a **cluster of variable-sized vessels arranged haphazardly** within a connective tissue support[Q].
- Histology: **Architectural pattern** of the **liver** is **preserved.**

Clinical Features

- EHPVO can present in two clinical forms:
  - **Recent EHPVO**: **Abdominal pain, ascites** or **fever**, may be asymptomatic.
  - **Chronic EHPVO: Repeated, well-tolerated bleeding episodes** from esophageal varices.

> - **Ectopic varices** are common (**duodenum, anorectal region, biliary tree** and **gallbladder**), manifest as **obscure GI bleed**, **bleeding per rectum** or **biliary obstruction**[Q]

- **Moderate splenomegaly**[Q] is universal, and may be a presenting feature.
- A proportion of children have **growth retardation**[Q].

Diagnosis

- **Liver biopsy** is necessary in a patient with EHPV[O] if the **liver functions** are **deranged**.
- **Doppler US, CT** or **MRI**: Demonstrates **portal vein obstruction**, presence of **intraluminal thrombus** in the portal vein and/or **portal vein cavernoma**[Q].
- **ERCP** is the **definitive method for diagnosis** of **portal biliopathy**[Q].

Treatment

Acute variceal bleeding	Endoscopic variceal ligation[Q]
Gastric varices	**Glue injection**[Q]
Ectopic varices	**Pharmacotherapy, shunts or TIPS**[Q]**.**
Hypercoagulable states	**Life-long oral anticoagulants** should be administered
Symptomatic hypersplenism	**Shunt surgery**[Q] **Splenectomy without a shunt is not recommended**[Q]

- **Surgery, shunt** or **non-shunt**, is indicated in patients with **variceal bleeding** who **fail endoscopic therapy**[Q].
- **Children with EHPV**[O]: **Rex shunt (mesenterico-left portal shunt)**[Q]

56. Ans. a. > d. Mesocaval shunt >Splenorenal shunt

- Since obstruction is in the portal vein, to bypass the obstruction the shunt should be preferably **Rex shunt** (**mesenterico-left portal shunt**)[Q] or a **mesocaval shunt.**
- Splenorenal shunt is also done in EHPVO but in **50%** of patients of **EHPVO, splenic vein is thrombosed**, not available for **splenorenal shunt**[Q]**.**

NON-CIRRHOTIC PORTAL FIBROSIS

57. Ans. c. Upper gastrointestinal bleeding *(Ref: Blumgart 5/e p1088)*

NON-CIRRHOTIC PORTAL FIBROSIS (NCPF)

- Condition of liver characterized by **widespread fibrosis of liver** (mainly **portal, subcapsular** and rarely perisinusoidal) causing **wide variation in normal architecture**[Q]
- There is **no true cirrhosis**[Q].

Etiology

- Chronic ingestion of **Arsenic (As), Copper (Cu)** and **Vinyl chloride**[Q] is incriminated in causing NCPF.

Pathology

- Characterized by **fibrous intimal thickening** of the **portal vein or its branches**[Q].

> - **Hallmark** of diseases is **thrombosis/sclerosis** of the **portal vein branches**[Q].
> - **Portal** and **periportal fibrosis** of varying extent **(No bridging fibrosis)**[Q]

- The **portal vein** is **dilated with sclerosis of the walls**[Q] and in autopsy thrombin in the medium or small portal vein branches with accompanying areas of ischemic necrosis.
- **Aberrant intrahepatic vessels** may be present in the **periportal area**, which correspond to dilated terminal portal vein branches or venules, termed as **megasinusoids** or **periportal angiomatosis**[Q].

Clinical Features

- **Young age patient** with features of **portal hypertension** with conspicuous **absence of liver cell failure**Q.
- Patients are usually in **2nd or 3rd decade**Q.
- Onset of symptoms is **gradual**Q
- **MC** presenting symptom is **GI bleed (90% cases)**Q.
- **Splenomegaly**Q
- **Jaundice, Hepatomegaly, ascites** and **stigmata** of **liver cell failure** are **uncommon**Q.

Diagnosis

- Site of block is smaller branches (**3rd** or **4th order branches**)Q

> - **Ultrasound** shows **normal splenoportal axis**. **Withered tree appearance** and **periportal fibrosis** is seen in **NCPF**Q.

58. **Ans. b. Intrahepatic pre-sinusoidal obstruction**

BUDD-CHIARI SYNDROME

59. **Ans. c. Causes prehepatic portal hypertension** *(Ref: Schwartz 10/e p1283-1284, 9/e p1114; Bailey 26/e p1078, 25/e p1092; Blumgart 5/e p1189-1198; Shackelford 7/e p1547-1548)*

Budd-Chiari Syndrome

- BCS is caused by **obstruction of hepatic venous outflow**Q producing intense congestion of the liver and the clinical manifestations of **ascites, hepatomegaly** and **abdominal pain**Q.

Etiology

- **Polycythemia rubra vera** is the **MC etiology**Q.
- In the **West**, **thrombosis of the major hepatic veins**Q is more common.
- In BCS, **all three major hepatic veins** usually are occluded.
- The small hepatic veins that joins the reterohepatic IVC, particularly **veins draining the caudate lobe**, often are **spared**Q.

> - **Membranous obstruction** of **IVC** is **MC cause** of BCS in **Japan, China, India** and **South Africa**Q.

- Infections causing BCS: Filariasis, **amebic liver abscess, aspergillosis, schistosomiasis**, syphilitic gumma and hydatid disease.
- **MC cancers** associated with BCS: **HCC, RCC, adrenal carcinoma** and **leiomyosarcoma** of the IVC.

Pathology

- **Centrilobular congestion**
- Centrilobular **hepatocyte loss** and **necrosis, fibrosis** and **cirrhosis**

Clinical Features

- Symptoms are abdominal **pain**, abdominal **distention**, weakness, anorexia and jaundiceQ
- Signs are **massive ascites**, **hepatomegaly** (with **hypertrophied caudate lobe**)Q, wasting, abdominal venous distention, **splenomegaly**, jaundice and edema of thighs, legs and feet.

> - **Jaundice** and **abdominal venous distention** is more common in **hepatic vein occlusion**Q.
> - **Edema** of thighs, legs and feet is seen only in **IVC occlusion**Q.

- **Striking** and **progressive weakness** occur as a manifestation in **acute form** but not in chronic forms of BCSQ.

Diagnosis

- Diagnostic study of greatest value in BCS is **angiographic examination** of the **IVC** and **hepatic veins** with **pressure measurements**Q.

> - **Patency of IVC** is a **pre-requisite** for side-to-side portacaval shunt (**SSPCS**)Q.

- Injection of dye in wedged position often shows a characteristic **spider-web pattern** of small hepatic venous **collaterals** connecting to portal or systemic veins.
- **Most**, but not all, **patients** with **thrombosis** of the **IVC** also have **occlusion** of the **hepatic veins**Q.

Hepatic Scintiscanning in BCS
• **Decreased** and **non-homogenous hepatic uptake** of radiocolloid
• **Increased uptake** of radiocolloid by **spleen** and **bone marrow**
• **Central hot spot** due to healthy and **hypertrophied caudate lobe** is **diagnostic**Q

Treatment

- **Thrombolysis** of the **hepatic vein** clot is largely **ineffective** because the **window** for **effective clot lysis** is only **2-3 weeks**, and most patients present after months of symptoms;
- **Side to Side Porto-Caval Shunt: SSPCS** is the **most effective therapy** for **BCS** caused by **thrombosis** of the **hepatic veins**Q.

Ideal circumstances for shunt surgery include in BCS
• **Absence** of **cirrhosis** or significant **fibrosis** on biopsyQ • **Absence** of a **significant gradient** between the suprahepatic and infrahepatic IVCQ • Relatively **short duration** of disease

- In cases of BCS caused by **thrombosis or occlusion** of the **IVC**, **combined SSPCS** and **CAS**Q (Cavoatrial Shunt) has replaced mesoatrial shunt as the **preferred treatment**Q.

Surgical Treatment of Membranous Obstruction of IVC in BCS
• **Percutaneous transluminal angioplasty** and **transcardiac membranotomy**Q (preferred one) when the membrane is **thin** • When a **long area of stenosis** is involved treatment consists of **direct excision** and **repair** of the involved area of IVC (endovenotomy) or **cavoatrial bypass graft**Q.

Indications of OLT in BCS
• **Cirrhosis with progressive liver failure (MC indication)**Q • **Failure of a portal-systemic shunt,** usually because of thrombosisQ • **Unshuntable portal hypertension** due to thrombosis of the portal vein, splenic vein or SMVQ • **Acute fulminant hepatic failure**; rarest indicationQ

60. **Ans. c. Hepatic veins**

61. **Ans. d. Hepatic veins**

62. **Ans. c. Hepatic vein**

VENO-OCCLUSIVE DISEASE

63. **Ans. b. Hepatomegaly, e. Hepatic fibrosis** *(Ref: Blumgart 5/e p1189-1198; Shackelford 7/e p1556)*

Veno-Occlusive Disease

- It is a group of disorders in which **hepatic venous outflow obstruction** is due to **subendothelial sclerosis** of the **sublobular hepatic veins** and **terminal hepatic venules**Q within the liver.

Risk Factors

- In the **western hemisphere, MC cause** of VOD is **bone marrow transplantation**Q.
- **Chemotherapy: Cytosine arabinoside**, Thioguanine, **Carmustine**, Gemtuzumab ozogamocinQ
- Long term immunosuppression with **azathioprine** in **renal** and **liver transplantation**Q
- Ingestion of **bush teas (pyrrolizidine alkaloids)**Q from plants of **Crotalaria** and **Scenacio** genera. These plants and plants of **Heliotropium genus**Q produce liver failure in herbivores.

Pathology

- Involves sinusoids, **central** and **sublobular hepatic vein**Q
- **Subendothelial sclerosis** of sublobular hepatic vein and sinusoids secondary to endothelial injury
- **Centrilobular necrosis,** ultimately leading to **diffuse fibrosis** and **cirrhosis**Q

Clinical Features

- The **hallmark** of **VOD: Hyperbilirubinemia, tender hepatomegaly** and **fluid retention**Q.
- The **onset** of VOD usually occurs **within 3 weeks** after bone marrow transplantation, with a **peak 12 days post-transplantation**Q.
- The **major cause** of **death** is **bleeding esophageal varices**Q.

Modified Seattle Criteria
Two or more of the following must be present prior to 20 days after stem cell transplantation for diagnosis of VOD: • **Bilirubin >2 mg/dL**Q • **Tender hepatomegaly**Q • **Ascites** and/or **unexplained weight gain** of **>2%** above reference rangeQ

Diagnosis

- **Percutaneous needle liver biopsy** is **diagnostic**Q, showing specific abnormality of extensive occlusion of small hepatic veins in liver.

- **Angiography: Major hepatic veins** and **IVC** are **normal**, but **WHVP** is **increased**[Q].
- LFT is abnormal with **elevated plasminogen activator inhibitor-1 (PAI-1)**[Q].

- **PAI-1** has been **implicated** in the **pathology of VOD** and is a **useful marker** in **distinguishing VOD** from the several **other causes** of post-transplant hepatic dysfunction.

Treatment

- Acute stages of VOD: **Withdrawal of causative agent** and **supportive treatment**[Q] to damaged liver.

Indications of SSPCS in VOD in acute phases
• Patients who **bleed from esophageal varices**[Q] • Patients who show **no signs of recovery** within **4-8 weeks**[Q] (e.g. Disappearance of ascites, improvement in LFT, improvement in lesion on percutaneous needle biopsy)

Defibrotide
• **Most promising agent** undergoing trial in the treatment of **severe VOD** is **defibrotide**[Q] • A polydeoxyribonucleotide with adenosine receptor activity which **modulates endothelial cell injury** and **protects sinusoidal endothelium**[Q].

64. Ans. c. Mushroom poisoning.

CHAPTER 6

Gallbladder

MULTIPLE CHOICE QUESTIONS

GALLSTONES: PATHOGENESIS

1. Strong risk factor for developing symptomatic gallstones: *(AIIMS GIS May 2008)*
a. Rapid weight loss
b. BMI >30 kg/m^2 with family history of gallstone
c. TPN
d. Fat, fertile female of fourty

2. All of the following are essential for formation of gallstones except: *(MHSSMCET 2008)*
a. Bile stasis b. Nucleation
c. Crystallization d. Lithogenic bile

3. All of the following are risk factors for gallstones except: *(JIPMER GIS 2011)*
a. Rapid weight loss b. Diabetes mellitus
c. Pima Indians d. TPN

4. All are true about pigmented stones except: *(AIIMS GIS Dec 2006)*
a. Seen in cholangiohepatitis b. Secondary CBD stones
c. Primary CBD stones d. More common in Asians

5. False about brown pigmented stones: *(AIIMS GIS May 2008)*
a. Associated with disorders of biliary motility and associated bacterial infection
b. More common in Caucasians
c. Soft and earthy in texture
d. High content of cholesterol and calcium palmitate

6. Lithogenic bile has the following properties: *(All India 96)*
a. ↑ Bile and cholesterol ratio
b. ↓ Bile and cholesterol ratio
c. Equal bile and cholesterol ratio
d. ↓ Cholesterol only

7. Stone formation in gallbladder is enhanced by all expect: *(All India 96)*
a. Clofibrate therapy b. Ileal resection
c. Cholestyramine therapy d. Vagal stimulation

8. Gallbladder stone formation is influenced by all except: *(All India 98)*
a. Clofibrate therapy b. Hyper alimentation
c. Primary biliary cirrhosis d. Hypercholesterolemia

9. Incidence of Gallstone is high in: *(AIIMS Nov 93)*
a. Partial hepatectomy b. Ileal resection
c. Jejunal resection d. Subtotal gastrectomy

10. True statement about gallstones are all except: *(AIIMS Nov 99)*
a. Lithogenic bile is required for stone formation
b. May be associated with carcinoma gallbladder
c. Associated with diabetes mellitus
d. More common in males between 30–40 years of age

11. Which among the following does not lead to pigment gallstones? *(PGI June 99)*
a. TPN b. Clonorchis sinensis
c. Hemolytic anemia d. Alcoholic cirrhosis

12. True about gallstones: *(PGI Dec 2002)*
a. More common in females
b. Gallstones, hiatus hernia, CBD stones form Saints triad
c. Limey bile precipitated
d. Lithotripsy always done

13. All are component of Saint's triad except: *(AIIMS Nov 95)*
a. Renal stones b. Hiatus hernia
c. Diverticulosis of colon d. Gallstones

14. Commonest type of Gallstone is: *(DNB 2011, Kerala 87)*
a. Cholesterol stone b. Pigment
c. Mixed d. All are equally common

15. Percentage of gallstones which are radio opaque: *(NEET 2013, JIPMER 86)*
a. 10% b. 20%
c. 30% d. 40%

16. A Gallstone gets impacted most commonly in which part of common bile duct? *(JIPMER 87)*
a. Supraduodenal
b. Retroduodenal
c. Ampulla of vater
d. Common hepatic duct

17. Incidence of Gallstone disease is increased in: *(All India 92)*
a. Truncal vagotomy b. Jejunal resection
c. Ileal resection d. Right hemicolectomy

18. Gallstones do not contain: *(JIPMER 81, AMU 86)*
a. Oxalate b. Cholesterol
c. Phosphate d. Carbonate

19. Cholesterol gallstones are due to: *(JIPMER 95)*
a. Decreased motility of gallbladder
b. Hyposecretion of bile salts
c. Hypercholesterolemia
d. All of the above

20. True color of cholesterol stone is: *(DNB 2012)*
a. Black b. Brown
c. Dark Yellow d. Pale Yellow

21. The predominant constituent of the pale yellow gallstones in the gallbladder is: *(COMEDK 2007)*
a. Mucin glycoprotein b. Calcium carbonate
c. Cholesterol d. Calcium phosphate

22. Most common type of gallstone in India is: *(MCI March 2009)*
a. Cholesterol b. Pigment
c. Mixed d. Both A and C

23. Calculous cholecystitis is associated with all of the following except: *(MCI March 2005)*
a. Oral contraceptives b. Estrogen
c. Obesity d. Diabetes

24. Which is true about gallstones? *(Punjab 2010)*
a. Pigment stones are most common
b. Bacterial nidus of infection may be seen
c. Even if asymptomatic gallbladder should be removed
d. They are mostly solitary

25. By definition pigment stone contain how much % of cholesterol? *(MHSSMCET 2005)*
a. <10 b. <20
c. <30 d. <60

GALLSTONES INVESTIGATIONS

26. Investigation of choice in acute cholecystitis: *(PGI Dec 2005)*
a. OCG b. HIDA scan
c. USG d. CT

27. Seagull sign is seen in: *(MHSSMCET 2006)*
a. Gallstones b. Renal stones
c. CBD stones d. Hydatid cyst

28. Which is not required for visualization of gallbladder in oral cholecystograph? *(AIIMS Nov 95, All India 97)*
a. Functioning liver
b. Motor mechanisms of gallbladder
c. Patency of cystic duct
d. Ability to absorb water

29. Best investigative modality for gallbladder: *(PGI 85)*
a. OCG
b. PTC
c. Ultrasound
d. Intravenous cholangiogram

30. Graham Cole test refers to: *(AIIMS 81, AP 89)*
a. Oral cholecystography
b. Intravenous cholangiography
c. Pre-operative cholangiography
d. Post-operative cholangiography
e. Tomography

31. Initial investigation of choice for biliary obstruction:
a. CT Abdomen b. ERCP *(JIPMER 2013)*
c. MRCP d. USG

32. The substance used in OCG is: *(PGI 87, Kerala 88)*
a. Iopanoic acid
b. Sodium diatrozite
c. Meglumine iodothalamate
d. Biligraffin
e. Dianosil

33. Dye used in IV cholangiography is: *(PGI 86)*
a. Diansoil b. Conray
c. Biligraffin d. Myodil

34. Investigation of choice in suspected gallbladder stone is: *(UPPG 2010, MCI March 2010)*
a. Ultrasound b. X-ray
c. Barium study d. Oral cholecystography

35. Investigation for assessing proper functioning of biliary system: *(MCI March 2007)*
a. USG b. CT scan
c. HIDA scan d. All of the above

36. Investigation of choice for acute cholecystitis:
a. Plain Radiography b. USG *(MCI March 2010)*
c. CT scan d. Barium studies

GALLSTONES COMPLICATIONS AND TREATMENT

37. Not a complication of gallstones: *(JIPMER 2010)*
a. Mucocele
b. Diverticulosis
c. Acute cholangitis
d. Empyema of the gallbladder

38. True about Gallstone disease: *(PGI SS Dec 2009)*
a. Acute cholecystitis presents with GB perforation
b. Acute cholecystitis presents with mucosal ulceration of GB
c. 80% cases of cholilithiasis are symptomatic
d. Mucocele of GB contains infected bile

39. Gallstones may be complicated by which of the following? *(PGI Dec 2001)*
a. Pancreatitis
b. Choledocholithiasis
c. Acute cholecystitis
d. Carcinoma stomach
e. Carcinoma pancreas

40. Ursodeoxycholic acid is a: *(PGI June 95)*
a. Urinary stone dissolving drug
b. Thrombolytic drug
c. Gallstone dissolving drug
d. Antifibrinolytic

41. In which condition, medical treatment of Gallstone is indicated? *(AIIMS Nov 96, All India 98)*
a. Stone is <15 mm size
b. Radio opaque stone
c. Calcium bilirubinate stone
d. Non functioning gallbladder

42. Which one of the following statements is incorrect regarding gallbladder stones?
a. Pigment stones are due to increased excretion of conjugated bilirubin
b. Are considered a risk factor for the development of gallbladder carcinoma
c. 10% gallstones are radio-opaque
d. A mucocele of the gallbladder is caused by a stone impacted in Hartmann's pouch

43. Gallstones: *(Orissa 98)*
a. Are about twice as common in men as in women
b. There is an increased incidence of stones in diabetics
c. About 80–90% of gallstones are radio-opaque
d. Are usually more than 50 mm in diameter

44. Regarding stones in gallbladder the following are true except: *(Kerala 2000)*
a. Mixed stones are common in the west
b. In Saint's triad diverticulosis of colon and hiatus hernia coexist
c. Is a risk factor in the development of GB carcinoma
d. 90% of GB stones are radioopaque
e. A mucocele of GB is caused by a stone impacted in the Hartmann's pouch

45. About gallstone, false is: *(DPG 2006)*
a. Intervention should be done if gallstones are present in the bile duct irrespective of the duct diameter
b. Operation should be done in most cases
c. Can be caused due to parasitic infestation
d. Can lead to cholecystitis

46. All of the following are associated with the gallstones except: *(MCI March 2005)*
a. Acute pancreatitis b. Acute cholecystitis
c. Acute appendicitis d. Acute cholangitis

47. Which of the following is a contraindication for medical management of gallstones? *(Karnataka 2012)*
a. Radio-opaque stones
b. Radioluscent stones
c. Normal functioning gallbladder
d. Small stones

GALLSTONE ILEUS

48. In Gallstone ileus, obstruction is seen at: *(AIIMS GIS Dec 2009)*
a. Jejunum b. Proximal ileum
c. Distal ileum d. Colon

49. All are true about Gallstone ileus except: *(AIIMS GIS 2003)*
a. May be diagnosed with abdominal X-ray
b. Most common fistula is to duodenum
c. Tumbling obstruction
d. Cholecystectomy should be done in same episode

50. False about Gallstone ileus: *(AIIMS GIS May 2008)*
a. 90% patients give history of biliary disease
b. Causes 1% of all SBO; around 25% cases in >70 years
c. Tumbling obstruction
d. Fistula is mostly formed between duodenum and gallbladder

51. Most common site of fistula in Gallstone ileus is between: *(AIIMS GIS Dec 2006)*
a. GB and duodenum b. GB and transverse colon
c. GB and stomach d. GB and ileum

52. Rigler's triad consists of: *(PGI May 2011, Nov 2009)*
a. Intestinal obstruction b. Gas in bile duct
c. Cholangitis d. Ectopic gallstone
e. Biliary stenosis

53. Most common site of Gallstone impaction is: *(All India 97)*
a. Duedenojejunal junction
b. Proximal to iliocaecal junction
c. Distal to iliocaecal junction
d. Colon

54. The most common site of intestinal obstruction in gallstone ileus is: *(AIIMS May 2005, All India 2004)*
a. Duodenum b. Jejunum
c. Ileum d. Sigmoid colon

55. The treatment of Gallstone ileus is: *(PGI June 99, UPSC 2008)*
a. Cholecystectomy alone
b. Removal of obstruction
c. Cholecystectomy, closure of fistula and removal of stone by enterotomy
d. Cholecystectomy with closure of fistula

MUCOCELE

56. The treatment of choice for a mucocele of gallbladder is: *(AIIMS June 2004)*
a. Aspiration of mucous
b. Cholecystectomy
c. Cholecystostomy
d. Antibiotics and observation

CHOLECYSTITIS AND CHOLECYSTECTOMY

57. Indications of prophylactic cholecystectomy are all except:
a. Diabetes b. Hemoglobinopathy
c. Gallstone size >3 cm d. Porcelain GB *(ILBS 2012)*

58. Which of the following is not an indication for cholecystectomy? *(ILBS 2011)*
a. GB polyp with stone
b. Asymptomatic polyp >1 cm
c. Multiple GB polyps
d. Symptomatic GB polyps

59. Not an indication for cholecystectomy for asymptomatic gallstones: *(AIIMS GIS May 2011)*
a. Diabetes
b. Sickle cell anemia
c. Porcelain GB
d. In high prevalence area of CA GB

60. The indications of cholecystectomy are:
a. Strawberry gallbladder *(PGI Dec 2007, Dec 2006)*
b. Mucocele of the gallbladder
c. Gall bladder polyp
d. Asymptomatic Gallstone disease
e. Symptomatic cholelithiasis

61. The technique of laparoscopic cholecystectomy was first described by? *(AIIMS May 2011)*
a. Erich Muhe b. Phillip Moure
c. Kurt Semm d. Eddie Reddick

62. All are indications for cholecystectomy except:
a. Emphysematous cholecystitis *(JIPMER GIS 2011)*
b. Biliary dyskinesia
c. Perforation of gallbladder
d. Adenomyomatosis

63. Prophylactic cholecystectomy is done in: *(AIIMS GIS 2003)*
a. Calcified GB
b. Diabetes
c. Asymptomatic gallstones
d. Family history of gallstones

64. After surgery, there was 50 ml bile output from abdominal drain on 1st post-operative day. Management is: *(JIPMER GIS 2011)*
a. Intrabiliary stent b. Immediate exploration
c. T-tube drainage d. Observation

65. Indication of cholecystectomy for gallstones disease is/are:
a. Asymptomatic gallstones with DM *(PGI Nov 2011)*
b. Porcelain gallbladder
c. Asymptomatic with history of single attack of acute pancreatitis
d. Asymptomatic Gallstone disease
e. Symptomatic cholecystitis

66. Which of the following is the absolute contraindication for laparoscopic cholecystec-tomy?
a. Clotting factor deficiency *(NEET 2013, MHSSMCET 2005)*
b. Perforation peritonitis
c. Empyema of the gallbladder
d. Adhesions

67. Contraindications of laparoscopic cholecystectomy is:
a. Coagulopathy *(DNB 2011)*
b. Obstructive pulmonary disease
c. End stage liver disease
d. All of the above

68. Which of the following is not an indication for cholecystectomy? *(AIIMS May 2005)*
a. 70-years old male with symptomatic gallstones
b. 20-years old male with sickle cell anemia and symptomatic gallstones
c. 65-years old female with a large gallbladder polyp
d. 55-years old with an asymptomatic gallstone

69. A 45-years old female presents with symptoms of acute cholecystitis. On USG there is a solitary gallstone of size 1.5 cm. Symptoms are controlled with medical management. Which of the following is the next most appropriate step in the management of this patient? *(All India 2008)*
a. Regular follow up
b. IV Antibiotics
c. Laparoscopic cholecystectomy immediately
d. Open cholecystectomy immediately

70. Antegrade cholecstectomy: *(PGI Dec 2000)*
a. Starts from fundus
b. Starts from cystic duct identification
c. Starts from hilar dissection
d. Considered unsafe

71. A 69-years old male patient having coronary artery disease was found to have gallbladder stones while undergoing a routine ultrasound of the abdomen. There was no history of biliary colic or jaundice at any time. What is the best treatment advice for such a patient for his gallbladder stones? *(AIIMS Nov 2003, All India 2003)*
a. Open cholecystectomy
b. Laparoscopic cholecystectomy
c. No surgery for gallbladder stones
d. ERCP and removal of gallbladder stones

72. The treatment of choice for silent gallbladder stones is: *(All India 97)*
a. Observation
b. Chenodeoxycholic acid
c. Cholecystectomy
d. Lithotripsy

73. Features of healthy gallbladder on laparotomy are: *(PGI Dec 2000)*
a. Typical "sea-green" colored
b. Wall is thin and elastic
c. Cannot be emptied
d. Not easily visible

74. Contra indication for laparoscopic cholecystec-tomy is all except: *(Kerala 95)*
a. Shrunken liver
b. Previous laparotomy
c. Emphysema
d. Obese individual

75. Most common malignancy after cholecystectomy is of: *(PGI SS Dec 2005)*
a. Colon
b. Stomach
c. Pancreas
d. Ileum

76. Laparoscopic cholecystectomy is largely preferred for all of the following reasons to conventional laparotomy except:
a. Decrease pain *(SGPGI 2004)*
b. Decreased incidence of bile duct injuries
c. Smaller scar
d. Decreased stay in hospital

77. A 50-years old with history of jaundice in the past has presented with right upper quadrant abdominal pain. Examination and investigations reveal chronic calculous cholecystitis. The liver functions tests are with in normal limits and on ultrasound examination, the common bile ducts is not dilated. Which of the following will be the procedure of choice in her? *(J and K 2005)*
a. Laparoscopic cholecystectomy
b. Open choledocholithotomy with CBD exploration
c. ERCP + choledocholithotomy followed by laparoscopic cholecystectomy
d. Laparoscopic cholecystectomy followed by ERCP + choledocholithotomy

78. A 88-year male patient presented with end stage renal disease with coronary artery block and metastasis in the lungs. Now presents with acute cholecystitis, patient's relatives need treatment to do something: *(UPPG 2008)*
a. Open cholecystectomy
b. Tube cholecystostomy
c. Laparoscopic cholecystectomy
d. Antibiotics then elective cholecystectomy

79. An otherwise normal female presents with symptoms of flatulent dyspepsia. She was started on proton pump inhibitors, which controlled her symptoms. The next step in management of this condition should be: *(All India 2008)*
a. Immediate laparoscopic cholecystectomy
b. Laparotomy after 1 or 2 months
c. Wait and watch
d. ERCP

80. In cholecystectomy, fresh plasma should be given: *(UPPG 2008)*
a. Just before operation
b. At the time of operation
c. 6 hours before operation
d. 12 hours after operation

ACALCULOUS CHOLECYSTITIS

81. All are true about acute acalculous cholecystitis except:
a. Distended GB is seen in scintigraphy
b. Vascular cause *(AIIMS GIS May 2011)*
c. Seen in bed ridden patients
d. Rapid course

82. Acalculous cholecystitis can be seen in all except:
a. Dengue hemorrhagic fever *(Punjab 2008, AIIMS Nov 2005)*
b. Malaria
c. Leptospirosis
d. Enteric fever

83. Acalculous cholecystitis are caused by: *(PGI Dec 2006, Dec 2001)*
a. DM
b. TPN
c. Leptospirosis
d. Estrogen therapy

84. Acalculous cholecystitis is caused by: *(PGI Dec 2001)*
a. Diabetes mellitus
b. Total parenteral nutrition
c. Tuberculosis
d. Anemia
e. Malignancy

85. Which of the following statements about acalculous cholecystitis is incorrect? *(DPG 2009 March)*
a. Manifestation of disturbed microcirculation in critically ill patient
b. Prolonged parenteral nutrition can be causative
c. It is life threatening condition
d. Cholecystectomy is not indicated

86. All of the following are cause of acalculous cholecystitis except: *(Recent Questions 2013)*
a. Bile duct stricture
b. Schistostoma
c. Prolonged TPN
d. Major operations

XANTHOGRANULOMATOUS CHOLECYSTITIS

87. All of the following statements about Xanthogranulomatous inflammation are true except: *(NEET Pattern)*
a. Foam cells are seen
b. Yellow nodules are seen
c. Multinucleated giant cells are seen
d. Associated with tuberculosis

EMPHYSEMATOUS CHOLECYSTITIS

88. Acute emphysematous cholecystitis is caused by:
a. **Pseudomonas aeuroginosa** *(JIPMER 2012, 2010)*
b. **Staphylococcus**
c. **Clostridium perfringens**
d. **Streptococcus pyogenes**

89. All of the following are correct regarding emphysematous cholecystitis except: *(NEET Pattern, DNB 2010)*
a. More common in males
b. More common in diabetics
c. In many cases the gallbladder does not contain stone
d. It is caused most commonly by Pseudomonas

MIRIZZI'S SYNDROME

90. Type II Mirizzi's syndrome:
a. Obstruction of common duct by external compression only (no erosion)
b. Erosion of one-third circumference of common duct
c. Erosion of up to two-third circumference of common duct
d. Total/near total circumferential destruction of common duct

91. Mirizzi syndrome is: *(DNB 2011)*
a. GB stone compressing common hepatic duct
b. GB carcinoma invading IVC
c. GB stone causing cholecystitis
d. Pancreatic carcinoma

STRAWBERRY GALLBLADDER

92. Cholesterosis is: *(Karnataka 94)*
a. Disease of defective metabolism of choline
b. Concerned with epithelial tumors of brain
c. Diffuse deposition of cholesterol in mucosa of gallbladder
d. Disease concerned with obstructive jaundice

GALLBLADDER POLYP AND ADENOMYOMATOSIS

93. Indications of cholecystectomy in GB polyp removal are all except: *(ILBS 2012)*
a. Size >1 cm
b. With stone
c. >3 in number
d. Locally invasive

94. Risk factors associated with malignancy in GB polyp are all except: *(JIPMER GIS 2011)*
a. Age > 60 years
b. Co-existence of gallstones
c. Size > 5 mm
d. Documented increase in size

95. Risk factors for malignant change in an asymptomatic patient with a gallbladder polyp on ultrasound include all of the following, except: *(AIIMS May 2011, All India 2009)*
a. Age > 60 years
b. Rapid increase in size of polyp
c. Size of polyp > 5 mm
d. Associated gallstones

96. False about GB polyps: *(AIIMS GIS May 2008)*
a. Adenomyomatosis < 1 cm, pedunculated
b. Cholesterol polyps are most common
c. Symptomatic polyps are indication for cholecystectomy
d. Polyp with stone is an increased risk of malignancy

97. On abdominal ultrasound gallbladder shows diffuse wall thickening with hyperechoic nodules at neck and comet tail artifacts. The most likely diagnosis will be:
a. Adenomyomatosis *(AIIMS May 2011)*
b. Adenocarcinoma of gallbladder
c. Xanthogranulomatous cholecystitis
d. Cholesterol crystals

98. All of the following are risk factors for CA GB except:
a. Gallstones *(JIPMER GIS 2011)*
b. Adenomyomatosis
c. Porcelain gallbladder
d. Choledochal cyst

CARCINOMA GALLBLADDER PREDISPOSING FACTORS

99. True about CA GB and gallstones: *(GB Pant 2011)*
a. 3% association
b. 30% association
c. 50% association
d. 90% association

100. Precancerous lesions of GB are all except: *(AIIMS GIS Dec 2010)*
a. Porcelain GB
b. Typhoid carrier
c. ABPDJ
d. Biliary ascariasis

101. Organism associated with fish consumption and also causes carcinoma gallbladder: *(AIIMS Nov 2012, AIIMS Nov 2010)*
a. **Gnathostoma**
b. **Anglostrongyloidosis cantonensis**
c. **Clonorchis sinensis**
d. **H. dimunata**

102. Risk factor for carcinoma gallbladder: *(PGI Nov 2011)*
a. Female sex
b. Choledochal cysts
c. Xanthogranulomatous cholecystitis
d. Calcification of gallbladder
E. Gallstone

103. All are risk factors for CA GB except: *(GB Pant 2011)*
a. Adenomyosis
b. ABPDJ
c. Gallstones
d. Adenomatous polyps

104. All of the following are risk factors for carcinoma gallbladder, except: *(AIIMS June 2004)*
a. Typhoid carriers
b. Adenomatous gallbladder polyps
c. Choledochal cyst
d. Oral contraceptives

105. Precancerous lesion of gallbladder is: *(AIIMS June 98)*
a. Porcelain gallbladder
b. Mirizzi's syndrome
c. Cholesterosis
d. Acalculous Cholecystitis

CARCINOMA GALLBLADDER

106. In a male after laparoscopic cholecystectomy, specimen is sent for histopathology which shows carcinoma gallbladder stage T1a. Appropriate management is: *(AIIMS May 2011)*
a. Conservative and follow up
b. Extended cholecystectomy
c. Excision of all port sites
d. Radiotherapy

107. After laparoscopic cholecystectomy, if biopsy reveals in-situ cancer of gallbladder (Stage-I), then the appropriate management is: *(Orissa 2011)*
a. Follow-up
b. Extended cholecystectomy
c. Excision of all port sites
d. Radiotherapy

108. Survival in unresectable GB carcinoma is? *(AIIMS May 2011)*
a. 4–6 months
b. 8–10 months
c. 1 year
d. 12–24 months

109. T2N1 of CA GB represents which stage? *(KGMC 2011)*
a. IA
b. IB
c. II
d. III

110. True about CA GB: *(ILBS 2012)*
a. T1a can be treated and cured by laparoscopic cholecystectomy
b. T1b needs radical operation in all cases
c. Port site metastasis is localized disease
d. Pre-operative diagnosis of CA GB has different survival according to stage

111. Most common gallbladder malignancy? *(MHSSMCET 2008)*
a. Adenocarcinoma
b. Squamous cell carcinoma
c. Mucinous cystadenocarcinoma
d. Serous cystadenocarcinoma

112. All are true about CA GB except: *(GB Pant 2011)*
a. Redo surgery is radical or extended cholecystectomy increases significant survival advantage
b. Inter-aortocaval node involvement potentially rule out cure
c. <25% 5-years survival for all stages
d. Pancreaticoduodenectomy has 5 year survival of 25%

113. True about CA GB: *(PGI SS Dec 2009)*
a. Most commonly presents with obstructive jaundice
b. 90% are associated with gallstones
c. 5-years survival is 35%
d. 30% are squamous cell carcinoma

114. Best prognosis in CA GB is seen in: *(PGI SS Dec 2009)*
a. Papillary b. Adenocarcinoma
c. Squamous d. Melanoma

115. False regarding CA GB: *(PGI SS Dec 2010)*
a. T1a: simple cholecystectomy
b. T1b: extended cholecystectomy
c. T1a: extended cholecystectomy if carcinoma in neck of gallbladder
d. Excision of port sites improves survival

116. Laparoscopic cholecystectomy was done, on histopathology, stage was T2. Next line of treatment: *(AIIMS GIS 2003)*
a. Observation b. Extended cholecystectomy
c. Port site excision d. Chemotherapy

117. Commonest type of carcinoma gallbladder with gallstones is: *(AIIMS Nov 95)*
a. Adenocarcinoma b. Anaplastic carcinoma
c. Squamous cell carcinoma d. Transitional cell carcinoma

118. Factors associated with gallbladder carcinoma: *(PGI June 2005)*
a. Chronic cholesterol stone
b. Hyperlipidemia
c. Chronic gallbladder disease
d. Hepatitis
e. Porcelain gallbladder

119. A 40-years old woman has undergone a cholecystectomy. The histopathology reveals that she has a 3 cm adenocarcinoma in the body of the gallbladder infiltrating up to the serosa. Which of the following further management would you advise her? *(AIIMS Nov 2004)*
a. Chemotherapy
b. Radiotherapy
c. Radical cholecystectomy
d. Follow up with regular ultrasound examinations

120. Regarding carcinoma gallbladder: *(PGI June 2002)*
a. Squamous cell carcinoma is the most common
b. Present with jaundice
c. Good prognosis
d. Gallstones predispose
e. 65% survival after surgery

121. Commonest association seen in carcinoma gallbladder: *(AIIMS 91)*
a. Peritoneal deposits b. Duodenal infiltration
c. Secondaries to liver d. Cystic node involvement

122. Most common type of cancer gallbladder in a patient with gallstone: *(APPG 2005)*
a. Adenocarcinoma b. Squamous carcinoma
c. Sarcoma d. None

123. In a male after laparoscopic cholecystectomy, specimen is sent for histopathology which shows carcinoma gallbladder stage IB. Appropriate management is: *(AIIMS Nov 2008)*
a. Conservative and follow up
b. Extended cholecystectomy
c. Excision of all port sites
d. Radiotherapy

124. All of the following are false for carcinoma gallbladder except: *(MCI March 2010)*
a. Carries a good prognosis
b. Gallstones may be a predisposing factor
c. Commonly squamous cell carcinoma
d. Jaundice is rare

GALLBLADDER ANATOMY AND PHYSIOLOGY

125. Bile is concentrated in the gallbladder to ……. times: *(PGI Dec 2006, Dec 2001)*
a. 5 b. 10
c. 20 d. 50

126. The gallbladder is capable of distending… ml: *(PGI 88)*
a. 10 b. 20
c. 40 d. 50

127. Sentinel node of gallbladder is: *(MAHE 2006)*
a. Virchow's nodes b. Iris nodes
c. Clouquet node d. Lymph node of Lund

MISCELLANEOUS

128. Sump syndrome occurs most commonly after:
a. Cholecystojejujunostomy *(COMEDK 2008)*
b. Choledochoduodenostomy
c. Mirizzi's syndrome
d. Choledochojejunostomy

129. True about cystic duct stump stone are all except:
a. Stone cause of postoperative pain *(PGI Nov 2009)*
b. Re-cholecystectomy is the definite treatment of choice
c. ERCP is the investigation of choice to diagnose
d. Basket extraction is the treatment of choice
e. Oral ursodeoxycholic acid relieves symptoms remarkably

130. Sphincter of Oddi consists of: *(AIIMS May 2011)*
a. 2 sphincters b. 3 sphincters
c. 4 sphincters d. 5 sphincter

131. Bleeding adjacent to the "Triangle of Calot" should be controlled by: *(MHPGMCET 2009)*
a. Pressing the artery manually
b. Blind clipping
c. Kocher's artery forceps
d. Stitching

132. "Limey bile" is: *(Karnataka 94)*
a. Present in the CBD
b. Thin and clear
c. Like toothpaste emulsion in the gallbladder
d. Bacteria rich

133. Pain at the tip of shoulder is due to all except: *(DNB 2008)*
a. Peptic ulcer b. Pancreatitis
c. Cholecystitis d. Appendicitis

134. A middle aged patients presents with the complained of right hypochondrial pain. On X-ray, elevated right hemidiaphragm was seen. All of the following are the possible diagnoses except? *(AIIMS Nov 2012)*
a. Subphrenic abscess
b. Acute cholecystitis
c. Pyogenic liver abscess
d. Amoebic liver abscess in right lobe

EXPLANATIONS

GALLSTONES PATHOGENESIS

1. **Ans. b. BMI >30 kg/m² with family history of Gallstone** *(Ref: Sabiston 19/e p1485-1486)*
   - Only **first-degree relatives**[Q] of patients with gallstones and **obesity**[Q] (defined as body mass index >30 Kg/m²) have been identified as **strong risk factors** for development of symptomatic gallstone disease.

2. **Ans. c. Crystallization** *(Ref: Sabiston 19/e p1485-1486; Schwartz 9/e p1144-1145, 10/e p1318-1319; Bailey 26/e p1106-1107, 25/e p1119-1120; Blumgart 5/e p483-487; Shackelford 7/e p1298-1299; Harrison 18/e p2617)*

Pathogenesis of Cholesterol Gallstones

- **Cholesterol** is **insoluble** in **water** (**water** is major constituent of bile, **85-95%**)[Q].
- **Bile acid** and **phospholipids** in bile keep cholesterol in solution by the formation of **micelles**[Q].
- An **excess of cholesterol** relative to bile acids and phospholipids allows cholesterol to form crystals and such bile is called **lithogenic** or **supersaturated bile**[Q].

Factors Responsible for Formation of Gallstones

Lithogenic bile	Nucleation	Stasis or GB hypomotility
• **Increased Biliary Cholesterol:** – **Obesity**[Q] – Cholesterol rich diet[Q] – **Clofibrate** therapy[Q]	• Cholesterol monohydrate crystal agglomerate to become macroscopic crystal by nucleation • **Pro-nucleating Factors**: – **Mucin**[Q] – Non-mucin glycoprotein[Q] – Infection[Q] • **Anti-nucleating Factors**: • Apolipoprotein **A-I** and **A-II**[Q] • **Excess of pro-nucleating factors** or **deficiency** of **anti-nucleating factors** results in formation of gallstones	• Prolonged **TPN**[Q] • Prolonged **fasting**[Q] • **Pregnancy**[Q] • **Octreotide**[Q] • **OCPs**[Q] • Massive **burns**[Q]
• **Decreased Bile Acids:** – Primary biliary cirrhosis – **OCPs**[Q] – Mutation of **CYP7A1** gene[Q] – **Impaired enterohepatic circulation** of bile acids: **Ileal disease** or **resection, cholestyramine** or **colestipol** (bile acid sequestrants)[Q]		
• **Decreased Biliary Lecithin**: – **MDR-3** gene **mutation**[Q] leads to defective lecithin secretion in bile		

- **Mutation** of **CYP7A1** resulting in **deficiency of** cholesterol **7-alpha hydroxylase**, results in **impaired** hepatic **conversion** of **cholesterol to bile acids**[Q].

3. **Ans. b. Diabetes mellitus** *(Ref: Sabiston 19/e p1485-1486; Maingot 11/e p848)*

Risk Factors for Gallstones

• **Obesity**[Q]	• **First-degree relatives**[Q]
• **Rapid weight loss**[Q]	• **Drugs**: Ceftriaxone[Q], postmenopausal estrogens[Q], **TPN**[Q]
• Childbearing	• **Ethnicity**: Native American (**Pima Indian**[Q]), **Scandinavian**
• Multiparity	• **Ileal disease, resection** or **bypass**[Q]
• Female sex[Q]	• Increasing age

- Patients with **diabetes have increased risk** of developing **gallstones** due to:
  - **Increased cholesterol level in bile**
  - **Reduced bile acid pool**
  - **Decreased GB motility**

4. **Ans. b. Secondary CBD stones** *(Ref: Sabiston 19/e p1485-1486; Schwartz 9/e p1145, 10/e p1318-1319; Bailey 26/e p1106-1107, 25/e p1120; Blumgart 5/e p483-487; Harrison 18/e p2618)*

Pigmented Stones

Black Stones	Brown Stones
• **Black stones** are composed of **insoluble bilirubin pigment polymer**[Q] mixed with **calcium phosphate** and calcium **bicarbonate**[Q]. • **Predisposing Factors:** - **Hemolytic disorders**[Q] (Hereditary spherocytosis, sickle cell anemia) - Mechanical **prosthetic heart valves**[Q] - **Cirrhosis** - **Gilbert's syndrome**[Q] - **Cystic fibrosis**[Q] - Ileal disease or resection	• **Brown pigment** stones contain **calcium bilirubinate**, calcium **palmitate** and calcium **stearate** as well as cholesterol[Q]. • Typically found in **Asia**[Q] • **Rare** in **GB**[Q] • **Formed** in **bile duct**[Q] • **Related** to the **bile stasis and infection:** - Gram negative bacteria (**E. coli** and **Klebsiella**)[Q] secretes **beta-glucuronidase**[Q], which **deconjugate** the soluble **conjugated bilirubin** - **Free unconjugated bilirubin precipitates** and combines **with calcium** and **bile** to form **brown pigment stones**. - Stones form whenever static foreign bodies are present in the bile duct (**stents** or parasites such as **Clonorchis sinensis** and **Ascaris lumbricoides**)[Q]

5. **Ans. b. More common in Caucasians**
   Brown pigment stones are common in **Asians**[Q]**, not the caucasians.**
6. **Ans. b.** (↓Bile and cholesterol ratio)
7. **Ans. d. Vagal stimulation** *(Ref: Sabiston 19/e p1485-1486; Bailey 26/e p1107, 25/e p1120; Harrison 18/e p2617)*

   - **Vagal stimulation increases GB motility and prevents Gallstone formation**[Q]**.**

8. **Ans. d. (Hypercholesterolemia)**

   - **Hyperalimentation decreases GB motility promotes stasis** and Gallstone formation.
   - **Primary biliary cirrhosis decreases bile salt secretion** in bile.
   - **Clofibrate** therapy **increases biliary cholesterol.**

9. **Ans. b. Ileal resection**
10. **Ans. d. More common in males between 30–40 years of age**
11. **Ans. a. TPN**
12. **Ans. a. More common in females**
13. **Ans. a. Renal stones**

Important Triads		
Triad	**Seen in**	**Components**
Virchow's Triad[Q]	**Thrombosis**	Hypercoagulability + Stasis + Endothelial injury[Q]
Galezia's Triad[Q]		**Dupuytren's contracture** + **Retroperitoneal fibrosis** + **Peyronie's disease** of penis[Q]
Cushing's Triad[Q]	**Intracranial hypertension**	**↑BP + Bradycardia + ↓ respiratory rate**
Hutchison's Triad[Q]	**Congenital syphilis**	**Hutchison's teeth** (notched upper incisors) + **Interstitial keratitis** + **Nerve deafness**[Q]
Trotter's Triad[Q]	**Nasopharyngeal Carcinoma**	**Conductive hearing loss** + **Immobility** of **homolateral soft palate** + **Trigeminal neuralgia**[Q]
Saints Triad		Hiatus hernia + Gallstones+ Colonic diverticulosis[Q]
Dieulafoy's Triad[Q]	**Acute appendicitis**	**Hypersensitiveness** of skin + Reflex **muscular contraction** + **tenderness** at Mac Burney's point[Q]
Quinck's Triad[Q]	**Hemobilia**	**GI hemorrhage** + **biliary colic** + **jaundice**[Q]
Borchardt's Triad[Q]	**Gastric Volvulus**	**Epigastric pain** + **Inability** to **vomit** + **Inability** to **pass** a **NG tube**[Q]
Tillaux's Triad[Q]	**Mesenteric cyst**	Soft **fluctuant swelling** in **umbilical region** + Freely **mobile perpendicular** to **mesentery** + Zone of **resonance** all around[Q]
Mackler's Triad[Q]	**Boerhaave's syndrome**	**Thoracic pain** + **vomiting** + **cervical subcutaneous emphysema**[Q]
Rigler's Triad[Q]	**Gallstone ileus**	**Small bowel obstruction** + **Pneumobilia** + **Ectopic gallstone**[Q]
Whipple's Triad[Q]	**Insulinoma**	**Symptoms** of **hypoglycemia** + S. **glucose <45 mg/dl** + **Symptomatic relief** on **glucose ingestion**[Q]

14. **Ans. c. Mixed** *(Ref: Bailey 25/e p1120)*

Mixed Gallstones

- **Most common gallstones**, account for **90% calculi**[Q]

15. **Ans. a. 10%**

- Most (90%) gallstones are radioluscent[Q].
- Most (90%) kidney stones are radiopaque[Q].

16. **Ans. c. Ampulla of vater** *(Ref: digestive.niddk.nih.gov)*

- **Most gallstones pass out of the body unnoticed**, but **some become lodged** in the **common bile duct**, causing **jaundice**[Q].
- A **frequent site of gallstone impaction** is the **ampulla of Vater**[Q], where the common channel meets the small intestine.
- **Blockage of the common channel** by a **gallstone** can induce **acute pancreatitis**[Q].

17. **Ans. c. > a. Ileal resection >Truncal vagotomy**
18. **Ans. a. Oxalate**
19. **Ans. d. All of the above**
20. **Ans. d. Pale yellow**
21. **Ans. c. Cholesterol**

- **Cholesterol stones** contain almost **entirely cholesterol** and are often **solitary, pale yellow** in **color**[Q].

22. **Ans. b. Pigment** *(Ref: Bailey 26/e p1106, 25/e p1120)*

- In the **USA** and **Europe**, **80%** are **cholesterol** or **mixed stones**, whereas in **Asia, 80%** are **pigment stones**[Q].

  - **MC gallstone**: **Mixed** (90%)[Q]
  - **MC gallstones** in **USA** and **Europe**: **Cholesterol stones**[Q] **(Mixed,** if given in the option)
  - **MC gallstones** in **India** (**Asia**): **Pigment stones** (80%)[Q]

GALLSTONES

- In the **USA** and **Europe**, **80%** are **cholesterol** or **mixed stones**, whereas in **Asia, 80%** are **pigment stones**[Q].
- **Cholesterol** or **mixed stones** contain **51–99% pure cholesterol** plus an admixture of **calcium salts, bile acids, bile pigments** and **phospholipids**[Q].
- **Pigment stone** is the name used for stones **containing <30% cholesterol**[Q].
- **Black stones** are largely composed of an **insoluble bilirubin pigment polymer** mixed with **calcium phosphate** and **calcium bicarbonate**[Q].
- **Brown pigment stones** contain **calcium bilirubinate**, **calcium palmitate** and **calcium stearate,** as well as **cholesterol**[Q].
- **Brown stones** are **rare in** the **gallbladder**. They **form in** the **bile duct** and are related to **bile stasis** and **infected bile**[Q].

23. **Ans. d. Diabetes**
24. **Ans. b. Bacterial nidus of infection may be seen** *(Ref: www.ncbi.nlm.nih.gov/pubmed/2213913)*

- Recently, **bacterial infection** has been shown to play the **role in pathogenesis of gallstone**, this adds to the growing pool of studies finding an **infectious nidus** in these **gallstones**[Q].

25. **Ans. c. <30** *(Ref: Bailey 26/e p1106, 25/e p1120)*

- **Pigment stone** is the name used for stones **containing <30% cholesterol**[Q].

Classification of Gallstones			
	Cholesterol	**Black pigment**	**Brown pigment**
Location	Gallbladder and bile duct	Gallbladder and bile duct	**Bile ducts**[Q]
Major constituent	Cholesterol	Bilirubin pigment **polymer**[Q]	**Calcium bilirubinate**[Q]
Consistency	Crystalline with nucleus	**Hard**[Q]	**Soft, friable**[Q]
% Radio-opaque	15%	**60%**[Q]	**0%**[Q]

GALLSTONES: INVESTIGATIONS

26. **Ans. c. USG** *(Ref: Sabiston 19/e p1487; Schwartz 9/e p1146; Bailey 26/e p1100-1101, 25/e p1113-1114; Shackelford 7/e p1303, 1306)*

- **IOC** for **acute cholecystitis: USG**[Q]
- **Gold standard** for **diagnosis** of **acute cholecystitis: HIDA scan**[Q]

  - **USG** is **IOC** for **acute calculous cholecystitis, chronic cholecystitis** and **cholelithiasis**[Q].

27. **Ans. a. Gallstones** *(Ref: Bailey 26/e p1099, 25/e p1112)*

Mercedes Benz sign or Seagull sign

- The **centre of Gallstone** may **contain radiolucent gas** in a **triradiate** or **biradiate fissure**, this gives rise to characteristic dark shapes on radiograph, the **Mercedes Benz sign** or **Seagull sign**[Q].

28. Ans. b. Motor mechanisms of gallbladder *(Ref: Schwartz 9/e p1141; Bailey 26/e p1100, 25/e p1113)*

- **Motor mechanism of GB** is a **requirement for medical treatment** of **gallstones**, not for oral cholecystography.

Oral Cholecystography (Graham Cole Test)

- Once considered the diagnostic test of choice for gallstones, oral cholecystography has been **replaced by ultrasonography**.
- It involves **oral administration** of a **radiopaque compound** that is **absorbed, excreted by** the **liver**, and **passed into** the **gallbladder**[Q].

Successful Visualization of GB in Oral Cholecystography depends on	
• **Blood flow** to the **liver**[Q] • **Ability** of the **liver cells** to **excrete dye** into the bile (**functioning liver**)[Q]	• **Patency**[Q] of hepatic and cystic duct system • **Ability of GB** to **concentrate** the excreted **dye**[Q] (by absorbing water)

- **Stones** are noted on a film as **filling defects** in a visualized, **opacified gallbladder**.

Oral cholecystography is of no value in patients with	
• Intestinal malabsorption[Q] • Vomiting[Q]	• Obstructive jaundice[Q] • Hepatic failure[Q]

29. Ans. c. Ultrasound *(Ref: Sabiston 19/e p1481; Schwartz 9/e p1140, 10/e p1314, 1319-1320; Bailey 26/e p1100, 25/e p1113-1114; Blumgart 5/e p223; Shackelford 7/e p1303)*

- **USG** is **IOC** for **acute calculous cholecystitis, chronic cholecystitis** and **cholilithiasis**.

Ultrasonography

- **Initial imaging modality of choice in obstructive jaundice**[Q]
- It is **operator dependent** and may be **suboptimal due to excessive body fat** and **intraluminal bowel gas**[Q].

USG can demonstrate	
• **Biliary calculi**[Q] • **Size** of **GB and CBD**[Q] • **Thickness** of GB wall[Q]	• Presence of **inflammation**[Q] around GB • Occasionally, **presence of stones within** the **biliary tree**[Q].

- It may even show a **carcinoma** of the **pancreas occluding** the **CBD**[Q].

USG in obstructive jaundice
• **Initial imaging modality** of **choice** in **obstructive jaundice**[Q] • It **can identify intra-** and **extrahepatic biliary dilatation**[Q] • Identify the **level of obstruction**[Q] • **Cause of the obstruction**[Q] may also be identified • (**gallstones** in the gallbladder, common hepatic or **CBD stones** or lesions in the wall of the duct suggestive of a **cholangiocarcinoma** or enlargement of the pancreatic head indicative of a **pancreatic carcinoma**)[Q]

30. Ans. a. Oral cholecystography

31. Ans. d. USG

32. Ans. a. Iopanoic acid

- **Iopanoic acid** is used in **oral cholecystography**[Q].
- **Biligraffin** is used in **IV cholangiography**[Q].

33. Ans. c. Biligraffin

34. Ans. a. Ultrasound

35. Ans. c. HIDA scan *(Ref: Sabiston 19/e p1482; Schwartz 9/e p1141; Bailey 26/e p1101, 25/e p1114; Blumgart 5/e p254-270; Shackelford 7/e p1306*

Radioisotope scanning

- **Technetium-99m labelled derivatives** of **iminodiacetic acid** (**HIDA**, IODIDA) are, when injected intravenously, **selectively taken up** by the **reticuloendothelial cells** of the liver and **excreted into bile**[Q].

HIDA Scan
• Allows **visualization** of the **biliary tree** and **gallbladder**[Q] • Presence of **inflammation**[Q] around GB • Occasionally, **presence of stones within** the **biliary tree**[Q]. • **GB** is **visualized within 30 min** of **isotope injection** in **90%** of normal individuals and within 1 hour in the remainder. • The **bowel** is usually **seen within 1 hour** in the majority of patients. • **Non-visualization** of the **GB** is suggestive of **acute cholecystitis**[Q]. • If the patient has **contracted gallbladder**, as often occurs in **chronic cholecystitis**, **GB visualization** may be **reduced** or **delayed**[Q].

- **Biliary scintigraphy** may also be **helpful in diagnosing bile leaks** and **iatrogenic biliary obstruction**[Q].
- **Scintigraphy can confirm** the **presence** and **quantify the leak**[Q].

36. Ans. b. USG

GALLSTONES COMPLICATIONS AND TREATMENT

37. Ans. b. Diverticulosis *(Ref: Sabiston 19/1486-1489; Bailey 26/1107, 25/1120; Blumgart 5/483-487)*

Effects and Complications of Gallstones		
In gallbladder	**In Bile duct**	**In Intestine**
• Silent stones • Acute cholecystitis • Chronic cholecystitis • Mucocele • Empyema • Perforation • Gangrene • Carcinoma	• Obstructive jaundice • Cholangitis • **Acute pancreatitis**	• **Gallstone ileus**

38. Ans. b. Acute cholecystitis presents with mucosal ulceration of GB *(Ref: Sabiston 19/e p1487-1488; Schwartz 9/e p1147, 10/e p1321; Bailey 26/e p1107, 25/e p1120; Blumgart 5/e p487-494; Shackelford 7/e p1315-1317*

Acute Cholecystitis

- Acute cholecystitis is **related to gallstones** in **90–95%**[Q] of cases.
- **Characteristic triad: RUQ pain + Fever + Leukocytosis**[Q]

Etiopathogenesis

- **Obstruction** of the **cystic duct** leading to **biliary colic** is the initial event in acute cholecystitis.
- An inflammatory process with a thickened and **reddish wall** with **subserosal hemorrhage**[Q].
- **Mostly** the **gallstone dislodges**, and the inflammation will gradually resolve.
- In the **most severe cases**, this process can lead to **ischemia** and **necrosis** of the GB wall (**5–10%**[Q]).

Clinical Features

- **RUQ pain** of **much longer duration** than biliary colic, is the **MC symptom**[Q]
- Other common symptoms: Fever, nausea, and vomiting.
- **Physical examination**: **RUQ tenderness** and **guarding** are usually present **inferior to** the **right costal margin**, distinguishing the episode from simple biliary colic.
- A **mass** (**gallbladder** and **adherent omentum**) is occasionally palpable[Q]
- **Murphy's sign**[Q]**: Inspiratory arrest** with **deep palpation** in the **RUQ** in acute cholecystitis (also known as **Naunyn's sign**)
- **Boa's sign**[Q]**: Hyperesthesia below right scapula** in acute cholecystitis

- A **mild leukocytosis** is **usually present** (12,000–14,000 cells/mm^3).
- Mild elevations in serum bilirubin (>4 mg/dL), ALP, transaminases, and amylase may be present.

Diagnosis

- **USG**: **IOC** for diagnosing **acute cholecystitis**[Q] (sensitivity 85%, specificity 95%).
- **HIDA scan**: **Gold standard**[Q] for diagnosing **acute cholecystitis**

- **USG findings**: Presence of **gallstones**, **thickening** of the GB wall **(>4 mm)**, pericholecystic fluid, GB distention, impacted stone, and a **sonographic Murphy's sign**[Q] (focal tenderness directly over the GB).

- **HIDA scan**: **No filling** of **GB** with the radiotracer (^{99m}Tc-HIDA) **after 4 hours** indicates an **obstructed cystic duct**[Q]
- A **normal** HIDA scan **excludes acute cholecystitis**[Q].

Treatment

- **IV fluids, antibiotics**, and **analgesia** should be initiated[Q].
- **Cholecystectomy** is the **definitive treatment**[Q] for patients with acute cholecystitis.

> - **Early cholecystectomy** performed **within 2 to 3 days (within 72 hours)**[Q] of presentation **is preferred over interval** or **delayed cholecystectomy** that is performed 6 to 10 weeks after initial medical therapy.
> - **Laparoscopic cholecystectomy** is the **preferred approach** to patients with **acute cholecystitis**[Q].

- The conversion rate to an open cholecystectomy is higher (4%–35%) in the setting of acute cholecystitis than with chronic cholecystitis.
- **Morbidity rate, hospital stay**, and **time to return to work** are **lower** in patients undergoing **laparoscopic cholecystectomy** than open cholecystectomy.

> - **Early laparoscopic cholecystectomy**, due to a **reduced length of hospital stay** and **readmissions,** is a **more cost-effective approach** than open cholecystectomy for acute cholecystitis.

39. Ans. a. Pancreatitis, b. Choledocholithiasis, c. Acute cholecystitis

40. Ans. c. Gallstone dissolving drug *(Ref: Sabiston 19/e p1486; Blumgart 5/e p512; Harrison 18/e p2621)*

Medical Therapy for Gallstones

- Medical therapy for gallstones utilizes bile acids: **Chenodeoxycholic acid** (CDCA) and **Ursodeoxycholic acid** (UDCA)[Q]

Mechanism of Action

- They **inhibit HMG-CoA reductase**[Q], the rate limiting enzyme for cholesterol synthesis, thus **decreases cholesterol saturation of bile**[Q]
- They cause **dispersion** of the **cholesterol from** the **stones** by **physico-chemical means**[Q]

Prerequisites for Medical Treatment	Drawbacks of Medical treatment
• **Radioluscent (cholesterol)** stones[Q]	• **Low rates** of **complete resolution**[Q]
• **Stones <10 mm** in diameter[Q]	• **High recurrence** rate[Q]
• **Functioning GB**[Q]	• **Not cost-effective** (expensive drug has to be taken for up to 2 years)[Q]
• **Non-acute symptoms**[Q]	• **Need** of **maintenance therapy** to prevent recurrence[Q]

41. Ans. a. Stone is <15 mm size

42. Ans. a. Pigment stones are due to increased excretion of conjugated bilirubin

43. Ans. b. There is an increased incidence of stones in diabetics

44. Ans. d. 90% of GB stones are radiopaque

45. Ans. b. Operation should be done in most cases

- **Operation** is not done in most cases of gallstones, done **in symptomatic cases**.

46. Ans. c. Acute appendicitis

47. Ans. a. Radio-opaque stones

GALLSTONE ILEUS

48. Ans. c. Distal ileum *(Ref: Sabiston 19/e p1500; Blumgart 5/e p649-655; Shackelford 7/e p865)*

Gallstone Ileus

- Passage of a **stone** through a **spontaneous biliary-enteric fistula** leading to a **mechanical bowel obstruction**[Q]
- **MC site** of fistula: Between the **gallbladder** and **duodenum**[Q]
- **2nd MC site**: Between **gallbladder** and **transverse colon**[Q].

Clinical Features

> - **Rigler's triad**[Q]**:** The classic plain abdominal film triad of **small bowel obstruction**, **pneumobilia**, and **ectopic gallstone** is considered pathognomonic[Q].

- **Most cholecystoduodenal fistula** does **not result** in **Gallstone ileus**[Q]. Rather, they are **asymptomatic**[Q] or occur in associated with usual digestive complaints consistent with gastric or biliary tract disease.
- Occurs **most commonly** in the **elderly (>70 years)**[Q].

- Accounts for **1%** of all cases of **small bowel obstruction** and occur in fewer than 1% of patients with gallstones

Bouveret's Syndrome
• **Duodenal obstruction** due to gallstones, usually in the **bulb** is known as **Bouveret's syndrome**Q.
• It is treated by **duodenostomy** or **pyloroplasty**Q.

- **Nausea, vomiting**, and **abdominal pain**, signs and symptoms of intestinal obstruction,
- A history of **gallstone-related symptoms** may be present in only **50%** of patients.
- **Pain** may be **episodic** and **recurrent** as the impacted stone temporarily obstructs the bowel lumen and then dislodges and moves distally, known as **tumbling obstruction**Q.
- The **MC site** of **obstruction** is the **ileum**Q (60%); followed by the **jejunum** (15%); **stomach** (15%); colon (5%, sigmoid colon); duodenum (5%).

Diagnosis

- **Abdominal X-ray**: Evidence of an **intestinal obstruction** with **pneumobilia** or a **calcified stone**Q distant from the gallbladder.
- **MC site of obstruction** is the **terminal ileum**Q because of its narrow lumen.

Treatment

- It is a **surgical emergency**Q without a period of waiting in the hope that stone will pass
- In case of **obstruction in the ileum calculus** can be **manipulated proximally** to a **healthy jejunum**Q where a **safe enterotomy** and stone removal may be executed.
- **Stable patients**: **Takedown** of the **biliary-enteric fistula** and **cholecystectomy**Q during the same procedure is warranted because recurrent cholecystitis and cholangitis are common.

> • **Unstable patients** or a **significant inflammation** in RUQ: **Unstable to withstand a prolonged operative procedure**, the fistula can be addressed at a second laparotomyQ.

49. Ans. d. Cholecystectomy should be done in same episode

> • Most patients in Gallstone ileus are **unstable to withstand a prolonged operative procedure**, so **cholecystectomy should not be done** in **same episode.**
> • **Fistula** can be **addressed** at a **second laparotomy**Q

50. Ans. a. 90% patients give history of biliary disease

51. Ans. a. GB and duodenum

52. Ans. a. Intestinal obstruction, b. Gas in bile duct, d. Ectopic gallstone

53. Ans. b. Proximal to iliocecal junction

54. Ans. c. Ileum

55. Ans. b. Removal of obstruction

MUCOCELE

56. Ans. b. Cholecystectomy *(Ref: Bailey 26/e p1107-1108, 25/e p1120, 1122; Harrison 18/e p2622)*

Mucocele (Hydrops)

- **Hydrops** or **mucocele** result from **prolonged obstruction** of the **cystic duct**, usually by a **large solitary calculus**Q.
- **Obstructed GB lumen** is progressively **distended** by **mucus** (mucocele) or by a **clear transudate** (**hydrops**) produced by mucosal epithelial cellsQ.

Clinical Features

- A **visible, easily palpable, nontender gallbladder**Q sometimes extending from the RUQ into the right iliac fossa may be found on physical examination.
- The patient with hydrops of the gallbladder **frequently remains asymptomatic**Q, although chronic RUQ pain may also occur.

Treatment

- **Early cholecystectomy**Q, because empyema, perforation, or gangrene may complicate the condition.

Gallbladder Empyema

- GB empyema results from **progression of acute cholecystitis** with **persistent cystic duct obstruction** to **superinfection**Q of the stagnant bile with a pus-forming bacterial organism.

Clinical Features

- Clinical picture resembles that of **cholangitis** with **high fever**; **severe RUQ pain**; marked **leukocytosis**; and often, prostrationQ.
- Empyema carries a **high risk of gram-negative sepsis** and/or **perforation**Q.

Treatment

- **Emergency surgical intervention** with **antibiotic coverage** is required as soon as the diagnosis is suspected.

CHOLECYSTITIS AND CHOLECYSTECTOMY

57. Ans. a. Diabetes *(Ref: Blumgart 5/e p486, 513; Shackelford 7/e p1316)*

Diabetes Mellitus (Blumgart 5/e p486)

- Patients with diabetes may have a **higher incidence of gallstones**[Q] from the **indirect effects** of the **metabolic syndrome, obesity,** and a **family history of gallstones**[Q].
- **No data show worse evolution** of **asymptomatic cholelithiasis in diabetics**[Q], and **prophylactic cholecystectomy** in **asymptomatic gallstones carriers with diabetes** is **not recommended**[Q]

Indications of Prophylactic Cholecystectomy	
• **Cardiac transplant** recipients[Q]	• **Family history** of **GB cancer** and asymptomatic stones[Q]
• **Lung transplant** recipients[Q]	• Cholelithiasis encountered during **elective abdominal procedures**[Q]
• Chronic **TPN** requirement[Q]	• **Non-functioning** GB[Q]
• Recipients of **biliopancreatic diversion**[Q] (bariatric patient)	• **Typhoid carrier** with positive bile culture[Q]
• Children with **hemoglobinopathy**[Q] (sickle cell, thalassemia and spherocytosis)	• **Trauma** to GB[Q]
• Asymptomatic gallstone **≥3 cm**[Q]	• **Porcelain GB**
• **Stone** associated with the **polyp**	

- Many **heart/lung transplant** recipients use **cyclosporine** as maintenance immunotherapy; **chronic cyclosporine use**[Q] (>2 years) has been associated with the prevalence of **gallstones**.

58. Ans. c. Multiple GB polyps *(Ref: Sabiston 19/e p1505; Bailey 26/e p1109, 25/e p1122; Blumgart 5/e p751; Shackelford 7/e p1364)*

59. Ans. a. Diabetes

60. Ans. b. Mucocele of the gallbladder, e. Symptomatic cholelithiasis

61. Ans. a. Erich Muhe *(Ref: Blumgart 5/e p512)*

History of Laparoscopic Cholecystectomy

- Dr. **Kurt Semm**, the **father of "pelviscopy,"** performed the **first laparoscopic appendectomy** in **1980**[Q].
- **Eric Muhe**[Q] performed the **first laparoscopic cholecystectomy** in **1982**. He used a **modified operating laparoscope** placed at the umbilicus after establishing pneumoperitoneum.
- In 1987, **Phillipe Mouret** performed the **first video laparoscopic cholecystectomy** by using a **camera attached to the laparoscope**[Q].

62. Ans. d. Adenomyomatosis

- **Cholecystectomy** is indicated in **symptomatic adenomyomatosis** or when **cholelithiasis** is present[Q].

63. Ans. a. Calcified GB

64. Ans. d. Observation *(Ref: Blumgart 5/e p524-525)*

- "A **small amount of biliary drainage** following cholecystectomy should cause **no alarm** because it **usually disappears within 1 or 2 days**[Q]. However, **excessive biliary drainage** through the **wound** or **drain site, jaundice, sepsis** or a **combination of these events early in** the **post-operative period** should suggest a **bile duct injury**, as should **copious biliary drainage** for **more than few post-op days**[Q]."

65. Ans. b. Porcelain gallbladder, c. Asymptomatic with history of single attack of acute pancreatitis, e. Symptomatic cholecystitis

66. Ans. a. Clotting factor deficiency *(Ref: Blumgart 5/e p514)*

Contraindications to Laparoscopic Cholecystectomy

Absolute	Relative
• **Unable** to **tolerate general anesthesia**[Q]	• Previous **upper abdominal surgery**[Q]
• **Refractory coagulopathy**[Q]	• **Cholangitis**[Q]
• Suspicion of **carcinoma**[Q]	• **Diffuse peritonitis**[Q]
	• **Cirrhosis** or **portal hypertension**[Q]
	• Chronic obstructive pulmonary disease
	• **Cholecystenteric fistula**[Q]
	• **Morbid obesity**[Q]
	• **Pregnancy**[Q]

Indications of Open Cholecystectomy	
• Poor pulmonary or cardiac reserve[Q] • Cirrhosis and portal hypertension[Q] • Combined procedure	• Suspected or known gallbladder cancer[Q] • Third-trimester pregnancy[Q]

67. Ans. d. All of the above

68. Ans. d. 55-years old with an asymptomatic gallstone

Boundaries of Callot's Triangle	Boundaries of Hepatocystic Triangle
• Superiorly **cystic artery**[Q] • Medially, **common hepatic duct**[Q] • Laterally, **cystic duct**[Q]	• Superiorly, **inferior surface** of **liver**[Q] • Medially, **common hepatic duct**[Q] • Laterally, **cystic duct**[Q]

69. Ans. c. Laparoscopic cholecystectomy immediately *(Ref: Sabiston 19/e p1487-1488; Schwartz 9/e p1148, 10/e p1325; Bailey 25/e p1121; Blumgart 5/e p488-489; Shackelford 7/e p1316)*

Treatment of Acute Cholecystitis

- **Early cholecystectomy** performed **within 2 to 3 days (within 72 hours)** [Q] of presentation **is preferred over interval** or **delayed cholecystectomy** that is performed 6 to 10 weeks after initial medical therapy.
- **Laparoscopic cholecystectomy** is the **preferred approach** to patients with **acute cholecystitis**[Q].

70. Ans. a. Starts from fundus *(Ref: Mastery of Surgery 5/e p1128)*

Types of Cholecystectomy

Retrograde	Antegrade or Fundus-first or Top-down
• **Hilar structure dissection occurs first followed by** the **removal of gallbladder** in the triangle of Callot's[Q].	• **Separates GB from the liver before** the **cystic duct** and **artery** are **ligated**[Q] • Considered **safer** because it allows for the **progressive demonstration of the anatomy down to the infundibulocystic junction**[Q].

71. Ans. c. No surgery for gallbladder stones *(Ref: Blumgart 5/e p486)*

- "There was **no clear cost benefit** and **no life-years** were **gained from prophylactic cholecystectomy**, indicating **no clear-cut advantages** of **prophylactic cholecystectomy** in **asymptomatic cholelithiasis**. As a result, in patients with asymptomatic gallstones, **expectant management** is **recommended**[Q]."

72. Ans. a. Observation

73. Ans. a. Typical "sea-green" colored, b. Wall is thin and elastic

Healthy Gallbladder

- **Greenish blue** or **sea green color**[Q]
- **Thin** and **elastic wall**[Q]
- Can be **emptied by squeezing**[Q]

74. Ans. a. Shrunken liver

75. Ans. a. Colon *(Ref: Maingot 11/e p628)*

- **Bile acids** can induce **hyperproliferation** of the **intestinal mucosa**[Q] via a number of intracellular mechanisms.
- **Cholecystectomy**, which alters the enterohepatic cycle of bile acids, has been associated with a **moderately increased risk** of **proximal colon cancers**[Q].
- It cannot be ruled out, however, that it is less the effect of the cholecystectomy than the impact of other, not yet identified factors in the lithogenic bile of such patients.
- A number of **cofactors** have been identified that **may enhance** or **neutralize the carcinogenic effects of bile acids**, e.g. the amount of **dietary fat, fiber**, or **calcium**[Q].
- **Calcium**, in fact, **binds bile acids** and thus may **reduce their negative impact**[Q].

76. Ans. b. Decreased incidence of bile duct injuries

Bile Duct Injury

- **Most benign strictures** follow **iatrogenic bile duct injury**[Q]
- **Most commonly** during **laparoscopic cholecystectomy**[Q]
- **Incidence** of bile duct injury during **open** cholecystectomy is **0.1–0.2%**[Q]
- **Incidence** of bile duct injury during **laparoscopic** cholecystectomy is **0.3–0.85%**[Q]

- **Morbidity rate, hospital stay**, and **time to return to work** are **lower** in patients undergoing **laparoscopic cholecystectomy** than open cholecystectomy[Q].

77. Ans. a. Laparoscopic cholecystectomy

In the given question, there was an episode of jaundice, but **at present**, **LFT is normal** and **CBD is not dilated**. The best option is **laparoscopic cholecystectomy** only.

Management of CBD Stones Associated with GB Stones	
• Pre-operatively Detected Stones	• Unsuspected stones found at the time of Cholecystectomy
Experienced Laparoscopic Surgeon	**Experienced Laparoscopic Surgeon**
• **Cholecystectomy** and **choledochotomy** in **same sitting**[Q]	• **Laparoscopic CBD exploration** and **stone retrieval** through the **cystic duct**[Q] • **Laparoscopic choledochotomy** and **stone extraction**[Q]
Inexperienced Laparoscopic Surgeon	**Inexperienced Laparoscopic Surgeon**
• **Pre-op ERCP** with **stone removal** and **laparoscopic cholecystectomy** later[Q].	• **Convert** to **open procedure** and **remove CBD stone**[Q] • Complete the **cholecystectomy** and refer the patient for **ERCP**[Q] **Conversion** to an **open procedure** is **preferred over ERCP**[Q], because the **success rate** of **ERCP** is **not 100%**[Q].

78. Ans. b. Tube cholecystostomy

- If patients are **unfit for surgery**, **percutaneous, ultrasound guided,** or **CT guided cholecystostomy** is the **treatment of choice**[Q].

79. Ans. c. Wait and Watch

Flatulent Dyspepsia

- **Flatulent dyspepsia** is usually described as **symptom of Gallstone disease**[Q].
- However, **flatulent dyspepsia** (in an otherwise **normal female**), that **responds to PPI** is **more likely** to result **from reflux** or **peptic ulcer disease** (rather than Gallstone disease) and **does not require surgical management** or **invasive investigations**[Q] for gallbladder disease.
- Patients with these symptoms **should be observed** (**wait and watch**)[Q] or investigated by **endoscopy to exclude reflux** or **peptic ulcer disease**[Q].

80. Ans. a. Just before operation

The question is incomplete. It should be "A cirrhotic patient with abnormal coagulation needs cholecystectomy, FFP should be given:"

Fresh Frozen Plasma

- Transfusions with **FFP** are given to **replenish clotting factors**[Q].
- The **effectiveness** of the **transfusion** in maintaining hemostasis is **dependent on** the **quantity** of each factor delivered and its **half-life**.
- The **half-life** on the **most stable clotting factor**, factor **VII**, is **4 to 6 hours**[Q].
- A reasonable transfusion scheme would be to **give FFP on call** to the **operating room**.
- This way the **transfusion** is **complete prior** to the **incision**, with **circulating factors** to **cover** the **operative** and **immediate postoperative period**[Q].

ACALCULOUS CHOLECYSTITIS

81. Ans. a. Distended GB is seen in scintigraphy *(Ref: Sabiston 19/e p1501-1502; Schwartz 9/e p1154, 10/e p1327-1330; Bailey 26/e p1108, 25/e p1122; Blumgart 5/e p491-492; Shackelford 7/e p1315-1316)*

- **Cholescintigraphy** demonstrates **absent gallbladder filling** in **acalculous cholecystitis**[Q].

Acalculous Cholecystitis

- Acute **inflammation of gallbladder without stones**[Q]
- Accounts for 5-10% of all patients of acute cholecystitis
- **More fulminant course**[Q] than the acute calculous cholecystitis.
- **More commonly progresses** to **gangrene, empyema, or perforation**[Q].
- **Visceral ischemia** is common in acute acalculous cholecystitis and may explain the high incidence of GB gangrene.

Predisposing Factors

- **Elderly** and **critically ill patients** after **trauma**[Q]
- **Burns**[Q]

- **Long-term TPN**[Q]
- Major operations **(abdominal aneurysm repair** and **cardiopulmonary bypass**[Q]**)**

Etiopathogenesis

- Exact etiology is not clear

> - **GB stasis** and **ischemia**[Q] have been implicated as causative factors.

- **Stasis** (disturbed micro-circulation) is **common** in **critically ill patients** not being fed enterally and **may** lead to **colonization** of the **GB** with **bacteria**[Q].
- **Decreased arteriolar** and **capillary filling** is present in contrast with the dilatation of these vessels in acute calculous cholecystitis.

Clinical Features

- **Similar** to **acute calculous cholecystitis**[Q].
- Patients may present with only **unexplained fever, leucocytosis** and **hyperamylasemia and right upper quadrant tenderness**[Q].
- If untreated, **rapid progression to gangrene and perforation**[Q] may occur.

Diagnosis

- **Ultrasonography** is the **diagnostic test of choice**[Q], especially because it can be done at the bed side.
- **Cholescintigraphy** demonstrates **absent gallbladder filling**

Treatment

- **Emergency cholecystectomy**[Q] for **stable**[Q] **patients**
- Because of high incidence of gangrene, perforation and empyema, **open cholecystectomy**[Q] is often the **preferred approach**.

Percutaneous Cholecystostomy
• If patients are **unfit for surgery**, **percutaneous, ultrasound guided,** or **CT guided cholecystostomy** is the **treatment of choice**[Q]. • About **90% patients improve** with **percutaneous cholecystostomy**.

82. Ans. b. Malaria

- Both malaria and dengue are uncommon causes of acalculous cholecystitis.
- **Malaria**[Q] seems to be more common between the two.

83. Ans. a. DM, b. TPN, c. Leptospirosis *(Ref: Harrison 18/e p2622)*

Causes of Acalculous Cholecystitis	
Common Causes	**Uncommon Causes**
• **Elderly** and **critically ill patients** after **trauma**[Q] • **Burns**[Q] • **Longterm TPN**[Q] • Major operations (**abdominal aneurysm repair** and **cardiopulmonary bypass**[Q]) • **Diabetes mellitus**	• Vasculitis • Obstructing GB adenocarcinoma • GB torsion • Parasitic infestation • **Unusual bacterial infection:** • **Leptospira**[Q] • **Streptococcus** • **Salmonella** • **Vibrio cholera**

84. Ans. a. Diabetes mellitus, b. Total parenteral nutrition

85. Ans. d. Cholecystectomy is not indicated

86. Ans. b. Schistostoma

XANTHOGRANULOMATOUS CHOLECYSTITIS

87. Ans. d. Associated with tuberculosis *(Ref: www.medscape.com/viewarticle/449665)*

Xanthogranulomatous Cholecystitis

- **XGC:** Inflammatory disease characterized by a **focal or diffuse destructive inflammatory process** with **lipid-laden macrophages**[Q]

Pathology

- Inflammatory response to **extravasated bile**, possibly from **ruptured Rokitansky-Aschoff sinuses**[Q].
- Presence of **hypoechoic nodules** or **bands** in **thickened GB wall**[Q] together with calculi (cholesterol or mixed gallstones) in patient of chronic disease.
- There is **extension of yellow tissue** into **adjacent organs**, **fistulaes** from GB to **skin** or **duodenum** may develop, may be **mistaken for cancer**[Q].

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- There is **extension of yellow tissue** into **adjacent organs**, **fistulaes** from GB to **skin** or **duodenum** may develop, may be **mistaken for cancer**[Q].

Clinical Features

- Similar to acute cholecystitis

Diagnosis

- **Thickening** of **GB wall** is **most common radiological finding**, sometimes presence of **hypoattenuated bands**[Q].

Treatment

- Surgical treatment **(Laparoscopic cholecystectomy)** remains **the most** effective and **feasible option for XGC**

EMPHYSEMATOUS CHOLECYSTITIS

88. Ans. c. Clostridium perfringens *(Ref: Sabiston 19/e p1487; Blumgart 5/e p492)*

Emphysematous Cholecystitis

- Thought to begin with acute cholecystitis (calculous or acalculous), followed by ischemia or gangrene of GB wall and **infection** by **gas producing organisms**[Q].
- Occur most frequently in **elderly men** and patients with **diabetes mellitus**[Q].
- **Gallstones** are observed in **28–80% of patients with emphysematous cholecystitis**
- Emphysematous cholecystitis in the presence of acalculous cholecystitis is well established.

Causative organisms of Emphysematous Cholecystitis
• **Anaerobes**: **Cl. welchii** or **Cl. perfringens (MC)**[Q]
• **Aerobes: E. coli**[Q]

Clinical Features

- The clinical manifestations are essentially indistinguishable from those of non-gaseous cholecystitis.

Diagnosis

- The **diagnosis** is usually made on **abdominal X-ray**[Q]
- **Abdominal X-ray** findings: **Gas** within the **GB lumen**, dissecting within GB wall to form a **gaseous ring** or in **pericholecystic tissues**[Q].

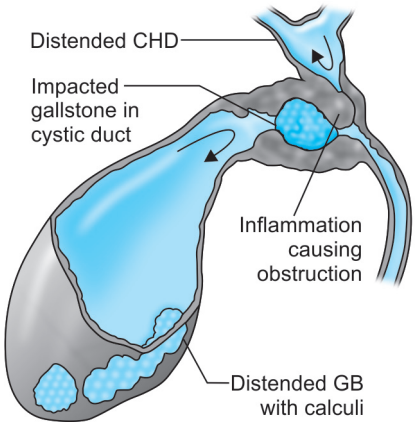
Treatment

- The morbidity and mortality rates with emphysematous cholecystitis are considerable.
- **Prompt surgical drainage** coupled with appropriate **antibiotics** is mandatory[Q].
- **Cholecystectomy** is **best treatment** of complicated acute cholecystitis[Q].
- **Unstable patients**: **Percutaneous cholecystostomy** under **LA**[Q] can be performed to drain GB.

89. Ans. d. It is caused most commonly by Pseudomonas

MIRIZZI'S SYNDROME

90. Ans. b. Erosion of one-third circumference of common duct *(Ref: Sabiston 19/e p1503; Schwartz 9/e p1147, 1156, 10/e p1320-1331; Blumgart 5/e p493; Shackelford 7/e p1370)*



Mirizzi's Syndrome (Functional Hepatic Syndrome)

- It is defined as **obstruction** of the **common hepatic duct** or **CBD** by **external compression** or by **erosion** of stone in the **Hartmann pouch** or **cystic duct**[Q].
- **External compression** has been classified as **type 1** whereas **erosion** as **type 2** Mirizzi syndrome by **McSherry**[Q].
- **Csendes** subclassified type 2 into three categories based on the percentage of the wall of CBD eroded by offending calculus.

Csendes Classification of Mirizzi's Syndrome	
Type I	**Obstruction** of common duct by **external compression only** (no erosion)[Q]
Type II	Erosion of **less than one-third** circumference of common duct[Q]
Type III	Erosion of **up to two-third** circumference of common duct[Q]
Type IV	**Total/near total** circumferential destruction of common duct[Q]
Type V	**Erosion of GB in common duct** with **cholecystoenteric fistula**

Treatment

Type I	**Partial cholecystectomy**[Q]
Type II and Type III	**Partial cholecystectomy** leaving behind a cuff of gallbladder for reconstruction of bile duct (**choledochoplasty**) with **T-tube drainage**[Q]
Type IV and V	Bilioenteric anastomosis[Q]

- **Stenosis** of the **biliary tree** often **resolves spontaneously** in the **post-operative period**, and **choledochotomy** is **seldom indicated**[Q].

91. Ans. a. GB stone compressing common hepatic duct

STRAWBERRY GALLBLADDER

92. c. Diffuse deposition of cholesterol in mucosa of gallbladder *(Ref: Bailey 26/e p1108, 25/1122)*

Strawberry Gallbladder (Cholesterolosis)

- It is an **acquired**[Q] histologic abnormality of the gallbladder epithelium that results in an **excessive accumulation** of lipid (**cholesterols esters** and **triglyceride**)[Q] within epithelial macrophage of the GB wall.
- **Cholesterol stones** are found in **half** of the **cases**[Q].

Pathology

- **Gross Appearance:** The mucosa has **pale**, **yellow streaks** running longitudinally giving rise to the term **strawberry gallbladder**[Q] (although the mucosa is usually bile stained rather than red).
- **Diffuse form** ("strawberry gallbladder"): **GB mucosa** is **brick red** and speckled with **bright yellow flecks** of lipid[Q].
- **Localized form: Solitary** or **multiple "cholesterol polyps"** studding the gallbladder wall[Q].

Treatment

- **Cholecystectomy** is indicated in **symptomatic cholesterolosis** or when **cholelithiasis** is present[Q].

GALLBLADDER POLYP AND ADENOMYOMATOSIS

93. Ans. c. >3 in number *(Ref: Sabiston 19/e p1505; Bailey 26/e p1109, 25/e p1122; Blumgart 5/e p751; Shackelford 7/e p1364)*

Polypoid Lesions of the Gallbladder	
• **Cholesterol polyps**	• **Adenomatous polyp**
• **Cholesterol polyps** are the **most common**[Q] • Usually **<10 mm** in size[Q] • Have a characteristic echogenic **pedunculated**[Q] appearance on USG • **Multiple** (**30%** of cases)[Q]	• Adenomatous polyp has **malignant potential**[Q]. • Adenoma may be **difficult to distinguish from adenocarcinoma** of GB • Main differentiating feature is a **lack of transmural invasion** on USG[Q] • **Risk factors** associated with **malignancy:** – **Age > 60 years**[Q] – Coexistence of **gallstones**[Q] – Documented **increase in size**[Q] – **Size > 10 mm**[Q]

94. Ans. c. Size >5 mm *(Ref: Sabiston 19/e p1505)*

95. Ans. c. Size of polyp > 5 mm

96. Ans. a. Adenomyomatosis < 1 cm, pedunculated

97. Ans. a. Adenomyomatosis *(Ref: Sabiston 19/e p1505; Bailey 26/e p1109, 25/e p751, 1122; Shackelford 7/e p1364)*

Gallbladder Adenomyomatosis

- **Adenomyomatosis** is a benign condition characterized by **hyperplastic changes**Q of unknown etiology involving the GB wall.
- It causes **overgrowth of mucosa**, **thickening of muscular wall**, and **formation of intramural diverticula** or **sinus tracts** termed as **Aschoff-Rokitansky sinuses**Q.
- These **sinuses** may contain **cholesterol crystals**Q.
- The disease can be **focal** or **diffuse**.
- It has **no malignant potential**Q.

Diagnosis

- **USG:** The presence of cholesterol crystals in these sinuses can result in "**diamond ring sign**"Q, "**V-shaped**"Q, or "**comet-tail" artifacts**Q on USG.

- **Adenomyomatosis** appears as a **sessile polyp** with characteristic **microcysts** on USG and is often **>10 mm**Q.
- **Cholecystography** is more specific for diagnosis.

Treatment

- **Cholecystectomy** is indicated in **symptomatic adenomyomatosis** or when **cholelithiasis** is presentQ.

98. Ans. b. Adenomyomatosis

GALL BLADDER CARCINOMA PREDISPOSING FACTORS

99. Ans. d. 90% association *(Ref: Blumgart 5/e p742)*

- **Cholelithiasis** is seen in **75–98%** of all patients with CA GBQ.
- The **incidence** of CA GB **in** a population of **patients with gallstones** is from **0.3–3%**Q.

100. Ans. d. Biliary ascariasis *(Ref: Blumgart 5/e p742)*

Risk Factors for Carcinoma Gallbladder	
• Gallstones **>3 cm**Q	• **Adenomatous** polypsQ
• **Porcelain gallbladder**Q	• **Primary sclerosing cholangitis**Q
• Anomalous pancreatobiliary junctionQ	• ObesityQ
• **Choledochal cysts**Q	• **Salmonella typhi infection**Q

101. Ans. c. Clonorchis sinensis *(Ref: www.ncbi.nlm.gov/pubmed/3993073)*

Clonorchis sinensis

- Clonorchis sinensis is a **liver fluke**, **acquired** by **ingestion of raw** or inadequately cooked **freshwater fishes**Q.
- In human body, it **lives within bile ducts** and causes **inflammatory reaction** leading to **cholangiohepatitis** and **biliary obstruction**Q.
- It is a well known **risk factor** for **cholangiocarcinoma**Q.
- It is a **rare**, but **mentioned risk factor** for **carcinoma gallbladder**Q.

102. Ans. b. Choledochal cysts, d. Calcification of gallbladder, e. Gallstone

103. Ans. a. Adenomyosis

104. Ans. d. Oral contraceptives

105. Ans. a. Porcelain gallbladder *(Ref: Sabiston 19/e p1481, 1506; Schwartz 9/e p1143, 10/e p1317-1318; Bailey 26/e p1116, 25/e p1122; Blumgart 5/e p742; Shackelford 7/e p1364)*

Porcelain Gallbladder

- Porcelain GB is characterized by **extensive calcium encrustation** of **GB wall**Q.
- The term porcelain gallbladder has been used to emphasize the **blue discoloration** and **brittle consistency** of GB wall at surgeryQ.

Pathology

- **Calcium salt deposition** within the wall of a **chronically inflamed gallbladder**Q

Clinical Features

- Most porcelain GB (**90%**) are **associated** with **gallstones**Q.
- Mean **age** of patients is **54 years** (38–70 years).
- Patients are usually **asymptomatic** and the condition is usually **found incidentally** on **plain abdominal radiographs,** sonograms or CT images.
- **High frequency** association (**10%**) is with **GB adenocarcinoma**Q.

- **Surgery** should not be delayed even if the patient is asymptomatic, because the occurrence of carcinoma is remarkably high.

Diagnosis

- In porcelain GB, **plain radiographic findings** are usually **straight forward**Q.
- **CT scan** is **diagnostic** in cases of **doubt**

Treatment

- **Cholecystectomy** in **all patients**Q with porcelain GB (high incidence of development carcinoma GB)

CARCINOMA GALLBLADDER

106. Ans. a. Conservative and follow up *(Ref: Sabiston 19/e p1505-1508; Schwartz 9/e p1160-1162, 10/e p1334-1335; Bailey 26/e p1116-1117, 25/e p1129; Blumgart 5/e p748-754; Shackelford 7/e p1364-1370)*

Carcinoma Gallbladder

- **Highest incidence** of CA GB in **India** and **Pakistan**Q
- More common in **women** of **6th** and **7th** decadeQ
- **Cholelithiasis** is seen in **75–98%** of all patients with CA GBQ.
- The **incidence** of CA GB **in** a population of **patients with gallstones** is from **0.3–3%**Q.
- CA GB is an **aggressive malignancy** with **poor prognosis**Q
- **Nevin classification**Q is used for **CA GB staging**.

  - **Calcified GB** is associated with cancer in **10–25%**Q of cases.
  - **Helicobacter pylori** and **H. bilis** demonstrated to **increase** the **risk of CA GB** by 6 foldQ.
  - **Increased risk** of **CA GB** in **FAP** and **HNPCC**Q.

- **MC gene mutation** in **CA GB**: **p53> K-ras>BRAF**Q
- **MC mode** of CA GB **spread: Direct invasion**Q into the adjacent organs.

Pathology

- **MC Site: Fundus (60%)**Q >Body (30%) >Neck (10%)
- **Histological types:**
  - Diffuse Infiltrative: MC typeQ
  - **Nodular** or **mass forming**
  - **Papillary:** Exhibits **polypoid** or cauliflower appearance and have **best prognosis**Q**.**
- **Adenocarcinoma**Q is the **MC histologic subtype** of CA GB.
- In CA GB: **Direct hepatic invasion** in **59%**Q , **LN metastasis** in **45%**, **perineural invasion** in **42%** cases

Clinical Features

- Most commonly presents with **RUQ pain** often **mimicking cholecystitis** and cholelithiasisQ.
- **Weight loss, jaundice**, and an **abdominal mass** are less common presenting symptoms.
- **Chronic cholecystitis** with a **recent change** in **quality** or **frequency** of the **painful episodes** in 40% patientsQ
- Malignant biliary obstruction with jaundice, weight loss, and RUQ pain

Diagnosis

- **USG** is **first diagnostic modality**Q used in evaluation of patients with **RUQ pain**.

  - **USG**: A **heterogeneous mass replacing** the **GB** lumen and an **irregular gallbladder wall**Q
  - **CT Scan: Mass replacing** the **gallbladder** (**MC finding**); focal or diffuse gallbladder **wall thickening**; and an **intraluminal polypoidal mass**Q

- **Typical cholangiographic finding: Long stricture** of the **common hepatic duct**Q.
- Triple phase CT is used to identify hepatic arterial or portal venous involvement.
- **Unresectable** or **incurable CA GB**: **Percutaneous biopsy** or FNAC for **confirmatory tissue diagnosis**Q

Tumor Markers

- **Best tumor marker** for CA GB is **CA19-9**Q (CA19-9 >20 U/ml-**75%** of sensitivity and specificity).
- **CEA >4 ng/ml** is associated with **93% specificity** but **50% sensitivity**.

7th AJCC: TNM Classification of Carcinoma Gallbladder	
T1a	**Lamina propria** invasionQ
T1b	Muscular invasionQ
T2	Invade the **perimuscular connective tissue**Q
T3	**Serosal perforation** and/or **direct invasion of the liver** (regardless of extent) and/or invasion of any other **single extrahepatic organ**Q.

T4	Tumor invades the main **portal vein, hepatic artery** or **two** or **more extrahepatic organ**[Q]
N1	Metastasis to **nodes** along **cystic duct, common bile duct, hepatic artery**, and/or **portal vein**[Q]
N2	Metastasis to **periaortic, pericaval, superior mesenteric artery,** and/or **celiac artery** LNs[Q]
M1	Distant metastasis

7th AJCC: TNM Staging of CA GB	
Stage I	**T1** N0 M0
Stage II	**T2** N0 M0
Stage IIIA	**T3** N0 M0
Stage IIIB	**T1-3 N1** M0
Stage IVA	**T4 N0-1** M0
Stage IVB	Tany **N2** M0 Tany Nany **M1**

Treatment of Carcinoma Gallbladder

- Gallbladder cancer: Incidental pathological finding after Laparoscopic cholecystectomy
- **T1a** with **negative cystic duct margin**: No further therapy[Q]
- **T1a** with **positive cystic duct margin**: **Re-resection** of **cystic duct** or **CBD** to negative margin[Q]
  - **T1b, T2, T3** tumor with no evidence of metastasis: Re-resection, **extended cholecystectomy** (possible CBD or extended hepatic resection)[Q]
- **T4**: **Extended cholecystectomy** with **extended right hepatectomy**[Q]
- **N2** or **M1** disease: **Clinical trial** (chemoradiation or chemotherapy) in good performance status[Q]
- Laparoscopic **trocar site scars** are **excised for staging purposes** to identify **M1** disease than for any potential therapeutic benefit[Q].

Pre-operatively diagnosed CA GB

- **T2, T3: Extended cholecystectomy**[Q]
- **T4 N0: Extended cholecystectomy** with **extended right hepatectomy**[Q]
- **N1** or **hilar invasion: Extended cholecystectomy** with **CBD resection**[Q]
- **N2 or M1: Clinical trial** (chemoradiation or chemotherapy) in good performance status, **palliative care** in poor performance status[Q]

Surgical Technique

- For patients suspected of having resectable gallbladder cancer, begin **surgical exploration with laparoscopy**, in the absence of disseminated disease, proceed with open laparotomy.
  - **Extended cholecystectomy** consists of **cholecystectomy with en bloc resection** of segments **IVB** and **V**; including **lymphadenectomy** of the **cystic duct, pericholedochal, periportal,** and **posterior pancreaticoduodenal** and **local interaortocaval** lymph nodes.
- During a **standard cholecystectomy** the **serosa** of the gallbladder is **typically opened** and the avascular subserosal layer is used as the surgical plane of dissection.
- In case of **suspected carcinoma** the **plane of dissection** is along the **cystic plate** of the liver to avoid violation of the gallbladder subserosa.
- Only **15%** of patients develop **loco-regional recurrence** while most (**85%**) had **recurrence** involving a **distant site**.

Gallbladder cancer with Obstructive Jaundice

- **Percutaneous external biliary drainage** offers a minimally invasive and effective means of palliation.

Indications for repeat operative intervention in CA GB diagnosed incidentally after laparoscopic cholecystectomy

- Pathologic analysis identifies **T2** or **greater** degree invasion[Q]
- Cystic duct **margins** are **positive**[Q]
- Presence of intra-operative **bile spillage**[Q]

Unresectable Carcinoma Gallbladder

- **Median survival** for patients presenting with unresectable disease is **2-4 months** with **1-year survival** is less than **5%**[Q].
- Goal of palliation is to relieve jaundice, pain, bowel obstruction and prolongation of life.
- **Percutaneous stents** are effective **for relieving jaundice** and should be used, as expected survival does not usually warrants a surgical bypass[Q].
- **Gemcitabine** plus **cisplatin (Reference regimen)** is used for **palliation** of **unresectable disease**[Q].

107. Ans. a. Follow-up **108. Ans. a. 4–6 months** **109. Ans. d. III**

110. Ans. a. T1a can be treated and cured by laparoscopic cholecystectomy

111. Ans. a. Adenocarcinoma

112. Ans. d. Pancreaticoduodenectomy has 5 year survival of 25%

113. Ans. b. 90% are associated with gallstones

114. Ans. a. Papillary

115. Ans. d. Excision of port sites improves survival

- **Port site excision** is done **for staging purposes** to identify **M1** disease[Q]
- Port site excision is **not having any potential therapeutic benefit**[Q].

116. Ans. b. Extended cholecystectomy *(Ref: Blumgart 5/e p754)*

- **T1b, T2, T3** tumor with no evidence of metastasis: Re-resection, **extended cholecystectomy** (possible CBD or extended hepatic resection)[Q]
  - **Extended cholecystectomy** consists of **cholecystectomy with en-bloc resection** of segments **IVB** and **V**; including **lymphadenectomy** of the **cystic duct, pericholedochal, periportal,** and **posterior pancreaticoduodenal** and **local interaortocaval** lymph nodes.

Port Site Recurrences (Blumgart 5th/754)

- There is a **theoretical risk** of **port site seeding after laparoscopic cholecystectomy** for what is eventually diagnosed as **gallbladder cancer**. This problem may be **exacerbated by spillage** of **bile** or **stones inside** the **peritoneal cavity**.
- One study looked at 409 patients who underwent laparoscopic cholecystectomy for presumed benign gallbladder disease but were diagnosed with gallbladder cancer on final pathology. Seventeen percent of patients at a median of 180 days were diagnosed with laparoscopic port site recurrences. As a result of this high percentage, **some surgeons recommend port site excision during reoperation for gallbladder cancer**.
- It is important to note, however, that it is **rare for port site recurrences** to **occur** as the **sole site** of **disease**.
- Given that it is **more a marker of aggressive disease than a single site of resectable disease, our general practice does not include empirically resecting prior port sites during reexploration for gallbladder cancer**.

117. Ans. a. Adenocarcinoma **118. Ans. a. Chronic cholesterol stone, c. Chronic gallbladder disease, e. Porcelain gallbladder**

119. Ans. c. Radical cholecystectomy **120. Ans. b. Present with jaundice, d. Gallstones predispose**

121. Ans. c. Secondaries to liver

Metastasis in Carcinoma Gallbladder

- **Direct hepatic invasion** in **59%**[Q], **LN metastasis** in **45%**, **perineural invasion** in **42%** cases.

122. Ans. a. Adenocarcinoma

123. Ans. b. Extended cholecystectomy

- **T1b, T2, T3** tumor with no evidence of metastasis: Re-resection, **extended cholecystectomy** (possible CBD or extended hepatic resection)[Q]

124. Ans. b. Gallstones may be a predisposing factor

GALLBLADDER ANATOMY AND PHYSIOLOGY

125. Ans. a. 5, b. 10 *(Ref: Sabiston 19/e p1476-1478; Schwartz 9/e p1136, 10/e p1309-1310; Bailey 26/e p1097-1098, 25/e p1111-1112; Blumgart 5/e p43; Shackelford 7/e p1288-1290)*

Gallbladder: Anatomy and Physiology

- It is lined by a single, highly-folded, **tall columnar epithelium**
- The **mucus** originates in the **tubuloalveolar glands**[Q] found in the mucosa lining the infundibulum and **neck**, but are **absent** from the **body** and **fundus**.
- It is **covered by** the **serosa** except where it is embedded in the liver
  - GB **lacks a muscularis mucosa and submucosa**[Q].
- Normal capacity of the gallbladder is **30–50 mL**[Q].
- Mucosa contain **crypt of Luschka**[Q].

Cystic Duct
• The **cystic duct** usually measures **2–4 cm** in length and contains prominent **concentric folds** known as the **spiral valves of Heister**[Q].
• The cystic duct frequently exhibits a **tortuous** or **serpentine course**[Q].
• Diameter of the cystic duct ranges from **1–5 mm**.
• Mucosa of the cystic duct is arranged in spiral folds known as **valves of Heister**[Q] surrounded by a sphincteric structure called **sphincter of Lutkans**[Q].

- **Cystic artery** is nearly **found within** the **Hepatocystic triangle**[Q], the area bound by the cystic duct, common hepatic duct and the liver margin.
- GB mucosa has the **greatest absorptive capacity**[Q] per unit of any structure in the body
- **Hartmann's pouch** is an **acquired diverticulum**[Q] of the infundibulum or **neck** of the gallbladder.

Functions of Gallbladder
• Reservoir of bile
• **Concentration of bile 5-10 times**[Q]
• Secretion of **mucus, 20 mL/per day** by **tubuloalveolar glands**
• **Acidification of bile**

GALLBLADDER ANATOMY AND PHYSIOLOGY

126. Ans. d. 50

127. Ans. d. Lymph node of Lund

Important Lymph Nodes	
• **Rotter's** nodes[Q]	• **Interpectoral** nodes (**CA breast**)[Q]
• **Rouvier** nodes[Q]	• **Retropharyngeal** nodes (**CA Nasopharynx**)[Q]
• **Delphian** nodes[Q]	• **Pre-cricoid** lymph nodes[Q]
• **Irish** nodes[Q]	• Nodes in **left axilla** (**CA stomach**)[Q]
• **Sister Mary Joseph** nodes[Q]	• **Periumbilical metastatic cutaneous** nodules
• **Virchow** nodes[Q]	• **Left supraclavicular** node[Q]
• **Cloquet** node[Q]	• **Femoral canal** node[Q]
• LN of **Lund**[Q]	• **Cystic** lymph node[Q]
• Krause LN[Q]	• **Jugular fossa** LN[Q]

MISCELLANEOUS

128. Ans. b. Choledochoduodenostomy *(Ref: Blumgart 5/e p632; Shackelford 7/e p1355)*

Sump Syndrome

- **Sump syndrome**: **Particulate matter, stones,** and **food debris accumulate** and **stagnate** in the **distal, "blind" end of the common duct**[Q]
- **Sump syndrome** occurs after **choledochoduodenostomy**[Q]
- Occasional cause of **recurrent cholangitis** that can result in anastomotic stricture

Management

- Endoscopic management, consisting of **sphincterotomy** with or without **balloon dilation** of the **anastomosis**[Q]
- **End-to-side hepaticojejunostomy, Roux-en-Y,** to prevent persistent regurgitation of intestinal contents and to **remove the "sump" permanently,** is **preferred surgical procedure**[Q].

129. Ans. b. Re-cholecystectomy is the definite treatment of choice, e. Oral ursodeoxycholic acid relieves symptoms remarkably *(Ref:Sabiston 19/e p1499)*

Postcholecystectomy Syndrome

- The **remnant of** the **cystic duct** or **gallbladder** (in subtotal cholecystectomy) has historically been implicated as the **source of pain, nausea,** and **vomiting** in postcholecystectomy patients[Q]
- An **increase in choledochal pressure** resulting in **cystic stump distension, inflammation** or **stone obstruction** within the **remnant of the cystic duct** or **gallbladder**[Q], and an increase in the sphincter of Oddi pressure have all served as causes of postcholecystectomy problems

- However, various studies have confirmed that **symptomatic improvement** only occurs when **a stone is present in the CBD** or cystic duct and is **subsequently removed endoscopically** or **via operative reintervention**[Q].

- In general, **persistent symptoms following a cholecystectomy** in which no cholangiogram was performed warrants analysis of the **liver function profile** and/or **noninvasive imaging** with either **ultrasound** or **MRCP** to **assess for retained stone**
- If **CBD stone** are **present**, **therapeutic ERCP** is suggested[Q].

130. Ans. c. 4 sphincters *(Ref: Shackelford 7/e p1290; Bailey 26/e p1120)*

- The **entire sphincter mechanism** is **actually composed of four sphincters**[Q] containing **both circular** and **longitudinal smooth muscle fibers**.

Sphincter of Oddi

- The **entire sphincteric system** of the **distal bile duct** and the **pancreatic duct** is commonly referred to as the **sphincter of Oddi**.
- The sphincter mechanism functions **independently from** the surrounding **duodenal musculature** and has **separate sphincters** for the **distal bile duct,** the **pancreatic duct**, and the **ampulla**.
- In **more than 90%** of the population, the **common channel**, where the biliary and pancreatic ducts join, is **<1.0 cm** in **length** and lies within the ampulla.

The four sphincters are	
1. Superior sphincter choledochus[Q]	3. Sphincter pancreaticus[Q]
2. Inferior sphincter choledochus[Q]	4. Sphincter of the ampulla[Q]

131. Ans. a. Pressing the artery manually *(Ref: Blumgart 5/e p525)*

Golden Rules to be followed in case of Difficult Cholecystectomy

- When the **anatomy of Callot's triangle** is **not clear**, **blind dissection should not be done**[Q]
- **Bleeding adjacent to** the **Callot's triangle** should be **controlled by pressure** and not by clipping or clamping[Q]
- When there is **doubt about** the **anatomy**, a **fundus first cholecystectomy** dissecting on gallbladder wall down to the cystic duct can be helpful[Q].
- If the **cystic duct** is **densely adherent to CBD** and there is possibility of **Mirizzi's syndrome**, the **infundibulum** of the GB should be **opened**, the **stone removed** and **infundibulum oversewn**[Q]**.**

132. Ans. c. Like toothpaste emulsion in the gallbladder *(Ref: Harrison 18/e p2622)*

Limey Bile

- **Calcium salts** in the lumen of the GB in sufficient concentration may produce **calcium precipitation** and **diffuse, hazy opacification of bile** or a **layering effect** on plain abdominal X-ray[Q].
- Filled with a mixture of **calcium carbonate** and **calcium phosphate** usually, the consistency of toothpaste[Q]
- Caused by **gradual obstruction** of the **cystic duct** or **CBD** by chronic pancreatitis or carcinoma pancreas[Q].
- **Organisms** are **rarely grown** from emulsion.

Diagnosis

- Best revealed on **plain radiography**[Q]

Treatment

- **Limey bile**, or **milk of calcium bile**, is usually **clinically innocuous**[Q]
- **Cholecystectomy** is recommended when it occurs in a **hydropic gallbladder**[Q].

133. Ans. d. Appendicitis *(Ref: Examination of Shoulder by Tae Kyun Kim/4)*

Referred Shoulder Pain

Right Shoulder	Left Shoulder
• **Peptic ulcer**	• **Ruptured spleen**
• **Myocardial ischemia**	• **Myocardial ischemia**
• **Acute cholecystitis**	• **Pancreatic diseases**
• **Liver disease** (Abscess, cirrhosis, hepatitis)	• **Ruptured ectopic**
• Pulmonary (Pleurisy, pneumothorax, Pancoast tumor)	• Pulmonary (Pleurisy, pneumothorax, Pancoast tumor)
• Kidney diseases	• Kidney diseases
	• Postoperative laparoscopy

134. Ans. b. Acute cholecystitis *(Ref: Sabiston 19/e p1440-1447, 1487-1488; Schwartz 9/e p1115-1116; http://radiopaedia.org/articles/elevated-hemidiaphragm)*

Causes of Elevated Hemidiaphragm

Above the diaphragm	Diaphragm	Below the Diaphragm
Decreased lung volume: • **Atelectasis** / collapse • **Lobectomy** / pneumonectomy • **Pulmonary hypoplasia**	• **Phrenic nerve palsy** • Diaphragmatic eventration • Contralateral CVA: usually **MCA distribution**	• Abdominal tumour • **Subphrenic abscess** • **Liver abscess** (**Amebic** and **pyogenic**)

Important Topics

Composition of Bile		
Characteristic	**Hepatic Bile**	**GB Bile**
Na^+	160.0	270.0
K^+	5	10
Cl^-	**90**	**15**
$HCO3^-$	**45**	**10**
Ca^{2+}	4	25
Mg^{2+}	**2**	**—**
Bilirubin	1.5	15
Protein	**150**	**—**
Bile acids	50	150
Phospholipids	8	40
Cholesterol	4	18
Total solids	**—**	**125**
pH	7.8	7.2

- The **inorganic solute** has a **concentration in bile** that is **similar to plasma** and account for the bile **osmolality** of **300 mOsm/kg.**

Courvoisier's sign

- A **palpable, non-tender gallbladder**[Q]
- Usually results from a **distal common duct obstruction** secondary to a **peripancreatic malignancy**[Q]

Phrygian cap

- This **anomaly** is the **most common** of the gallbladder[Q]
- Created by an **infolding** of a **septum** between the **body** and the **fundus**[Q]
- GB functions normally, and this anomaly is **not an indication** for **cholecystectomy**[Q].

Moynihan's Hump (Caterpillar's Turn)

- **Most dangerous anomaly** (for cholecystectomy)
- **Right hepatic artery** takes a **tortuous turn**

CHAPTER 7

Bile Duct

MULTIPLE CHOICE QUESTIONS

CHOLEDOCHAL CYST

1. Choledochal cyst in intrahepatic biliary tree: *(AIIMS GIS Dec 2006)*

a. I b. II
c. IVa d. IVb

2. Caroli's disease is: *(AIIMS GIS Dec 2006)*

a. Type I choledochal cyst b. Type III choledochal cyst
c. Type IV choledochal cyst d. Type V choledochal cyst

3. According to to Alonso-Lej classification, type IVb is: *(JIPMER GIS 2011)*

a. Both extra and intra-hepatic duct dilatation
b. Extra-hepatic duct dilatation
c. Intra-hepatic duct dilatation
d. Sub-hepatic duct dilatation

4. Central dot sign is seen in: *(ILBS 2012)*

a. Caroli's disease b. FNH
c. Hemangioma d. Hepatic adenoma

5. True about Todani's modification of Alonso-Lej classification include the following except? *(MHSSMCET 2008)*

a. Type I = saccular dilation of common bile duct
b. Type II = diverticulum of supraduodenal bile duct
c. Type IVa = choledochocele
d. Type IVb = multiple saccular dilatations of extrahepatic ducts only

6. Most commonly seen choledochal cyst: *(PGI May 2011)*

a. Type I b. Type II
c. Type III d. Type IVa
e. Type V

7. Saccular diverticulum of extrahepatic bile duct in choledochal cyst is classified as: *(COMEDK 2009)*

a. Type I b. Type II
c. Type III d. Type IV

8. What is the treatment of choice for choledochal cyst? *(MHSSMCET 2005)*

a. Excision of cyst b. Cystojejunostomy
c. Choledochocystectomy d. Cystoduodenostomy

9. Reconstructive surgery for choledochal cyst is not done in: *(MHSSMCET 2009)*

a. Type I b. Type II
c. Type III d. Type IV

10. Choledochal cyst: *(AIIMS GIS 2003)*

a. Resection decreases the incidence of malignancy but risk persists
b. 80% cases have stones
c. Treated by Roux-en-Y cystojejunostomy
d. Type IV is most common

11. Treatment of choice in choledochal cyst: *(AIIMS GIS 2003)*

a. Roux-en-Y hepaticojejunostomy
b. Cystojejunostomy
c. Choledochoduodenostomy
d. Choledochojejunostomy

12. A 10 years female presents with pain in the right hypochondrium, fever, jaundice and a palpable mass in the right hypochondrium the probable diagnosis is: *(COMEDK 2011)*

a. Hepatitis b. Hepatoma
c. Choledochal cyst d. Mucocele gallbladder

13. Central dot sign is seen in: *(AIIMS May 2011, Nov 2008)*

a. Primary sclerosing cholangitis
b. Liver Hamartoma
c. Caroli's disease
d. Polycystic liver disease

14. True about choledochal cyst is: *(AIIMS Sep 96)*

a. Always extrahepatic
b. Treatment is cystojejunostomy
c. Excision is ideal treatment
d. Drainage is treatment of choice

15. Not true regarding choledochal cyst: *(AIIMS Nov 95)*

a. Epigastric mass
b. Jaundice
c. Pain in abdomen
d. Cystojejunostomy is treatment of choice

16. In case of choledochal cyst, bile diversion into the small intestine is not done because of the risk of:

a. Malignancy b. Pancreatitis
c. Recurrent cholangitis d. Gallstones

17. Clinical features of choledochal cyst in adult are:

a. Pain, lump and intermittent jaundice *(UPSC 2004)*
b. Pain, fever and intermittent jaundice
c. Pain, lump and progressive jaundice
d. Pain, fever and progressive jaundice

18. Choledochal cyst develops due to: *(DNB 2006)*

a. Stenosis of sphincter
b. Dysfunction of long circular fibre
c. Congenital
d. Iatrogenic

19. Choledochal cyst: *(DPG 2006)*

a. Mostly presents in adulthood
b. Excision is infrequently done
c. Presents as slowly progressive jaundice
d. Can lead to carcinoma

20. Not true about choledochal cyst is: *(AIIMS May 2009)*

a. Associated with anomalous junction of the pancreatic and biliary duct
b. Type II is most common
c. Surgical removal is the treatment of choice
d. If ruptures can cause biliary peritonitis

21. Multiple intrahepatic bile duct dilation with bile lakes and concurrent sepsis is suggestive of: *(MHSSMCET 2006)*

a. Caroli's disease
b. Watson Algali syndrome
c. Primary sclerosing cholangitis
d. Klatskin tumor

CHOLIDOCHOLITHIASIS AND CHOLANGITIS

22. The procedure of choice for elective removal of CBD stones for most patients is: *(COMEDK 2006)*
a. Open choledocholithotomy
b. Endoscopic papillotomy
c. Laparoscopic choledocholithotomy
d. Percutaneous choledocholithotomy

23. The Reynold's pentad of fever, jaundice, right upper quadrant pain, septic shock and mental status change is typical of: *(COMEDK 2008)*
a. Cholangitis b. Hepatitis
c. Cholecystitis d. Pancreatitis

24. Association of choledocholithiasis in cholilithiasis:
a. <5% b. 15% *(GB Pant 2011)*
c. 20–35% d. 50%

25. All are true about CBD stones except: *(AIIMS GIS 2003)*
a. Associated with GB stones in 10% cases
b. Primary stones are usually brown
c. Laboratory values may be normal in one third cases of choledocholithiasis
d. Retained stones are discovered after 2 years of cholecystectomy

26. Recurrent stone of 2.5 cm in CBD presented with cholangitis. Treatment: *(KGMC 2011)*
a. ESWL
b. Lithotripsy
c. Supraduodenal choledochotomy
d. Duodenostomy

27. Which of the following calculi are rare in gallbladder, but common in common bile duct? *(MHPGMCET 2008)*
a. Cholesterol stone b. Brown stone
c. Black stone d. None

28. What is the treatment of choice for recurrent CBD stones with multiple strictures in common bile duct?
a. Hepaticojejunostomy
b. Cutaneous hepaticojejunostomy
c. Cholecystectomy
d. ERCP and sphincterotomy

29. Treatment of CBD stone includes: *(PGI May 2010)*
a. Endoscopic papillotomy b. ERCP
c. Ursodeoxycholic acid d. Hepaticojejunostomy
e. Choledochotomy

30. Charcot's triad: *(JIPMER 2010, All India 96, 95)*
a. Fever, abdominal pain, jaundice
b. Fever, vomiting, jaundice
c. Fever, jaundice, abdominal distension
d. Fever, diarrhea, jaundice

31. Sphincteotomy of sphincter of Oddi is performed at: *(DNB 2006)*
a. 3'O clock position b. 6'O clock position
c. 9'O clock position d. 11'O clock position

32. CBD stone may present with: *(PGI Dec 2002)*
a. Increased bilirubin b. ↑WBC count
c. ↑liver enzymes d. Fever with rigors
e. Hepatomegaly

33. Most common cause of cholangitis: *(AIIMS June 94)*
a. Viral infection b. CBD stone
c. Surgery d. Amebic infection

34. A patient of post-cholecystectomy biliary stricture has undergone an ERCP three days ago. Following this, she has developed acute cholangitis. The most likely organism is: *(All India 2006)*
a. Escherichia coli b. Bacillus fragilis
c. Streptococcus viridians d. Pseudomonas aeruginosa

35. Which of the following statements is true regarding cholangitis? *(PGI Dec 2001)*
a. Increased leucocyte count
b. Increased transaminases
c. Increased alkaline phosphatase
d. Association with fever and chills

36. Not a feature of CBD stone: *(AIIMS June 98)*
a. Pain b. Fever
c. Jaundice d. Septic shock

37. A 50-years old woman presented with history of recurrent episodes of right upper abdominal pain for the last one year. She presented to casualty with history of jaundice and fever for 4 days. On examination, the patient appeared toxic and a blood pressure of 90/60 mmHg. She was started on intravenous antibiotics. Ultrasound of the abdomen showed presence of stones in the common bile duct. What would be the best treatment option for her? *(AIIMS Nov 2003)*
a. ERCP and bile duct stone extraction
b. Laparoscopic cholecystectomy
c. Open surgery and bile duct stone extraction
d. Lithotripsy

38. What is more appropriate for diagnosis of CBD stones? *(PGI June 97)*
a. Ultrasonography b. ERCP
c. OCG d. IV cholangiography

39. A patient having multiple gallstones and shows 8 mm dilation and 4 stones in CBD. Best treatment modalities are:
a. Cholecystectomy with choledocholithotomy at same setting *(PGI Dec 2002)*
b. ESWL
c. Cholecystectomy and wait for ERCP
d. Sphincterotomy and then cholecystectomy
e. Cholecystectomy and after 14 days sphincterotomy done

40. Best treatment modality for common bile duct stone is:
a. Endoscopic sphincterotomy *(AIIMS Nov 94)*
b. Observation
c. Chenodeoxycholic acid
d. Percutaneous removal

41. The treatment of choice for an 8 mm retained common bile duct (CBD) stone is: *(DNB 2011, AIIMS May 2005, Nov 2003)*
a. Laparoscopic CBD exploration
b. Percutaneous stone extraction
c. Endoscopic stone extraction
d. Extracorporeal shock wave lithotripsy

42. A patient presented 1 year after cholecystectomy with a CBD stone of 2.5 cm in size. Treatment of choice is: *(AIIMS Nov 97, All India 99)*
a. Supraduodenal choledochotomy with exploration
b. Transduodenal choledochojejunostomy
c. Transduodenal sphincterotomy
d. Endoscopic sphincterotomy with stone extraction

43. Which one of the following statement is incorrect regarding stone in the common bile duct? *(All India 2006)*
a. Can present with Charcot's triad
b. Are suggested by a bile duct diameter >6 mm of ultrasound
c. ERCP, sphincterotomy and balloon clearance is now the standard treatment.
d. When removed by exploration of the common bile duct the T-tube can be removed after 3 days

44. Treatment for common bile duct stone is by: *(PGI Dec 2001)*
a. ESWL
b. Exploration of bile duct and recovery of stones
c. Bile duct stenting
d. Nasobiliary drainage
e. Percutaneous drainage

45. Absolute indication for choledochotomy: *(PGI June 2006)*
a. Gallstone ileus
b. Gallstone pancreatitis
c. Fever
d. Jaundice
e. Palpable CBD stone

46. Ramu presents with recurrent attacks of cholelithiasis, USG examination shows a dilated CBD of 1 cm. The next line of management is: *(AIIMS June 2001)*
a. ERCP
b. PTC
c. Cholecystostomy
d. Intravenous cholangiogram

47. Most common surgical cause of obstructive jaundice: *(AIIMS Nov 94, AIIMS Nov 96, All India 98, 2000)*
a. Periampullary carcinoma
b. Carcinoma gallbladder
c. Carcinoma head of pancreas
d. CBD stones

48. What is more appropriate for diagnosis of CBD stones?
a. Ultrasonography
b. ERCP *(PGI 97)*
c. OCG
d. IV cholangiography

49. In cholangiography CBD stone appears as:
a. Meniscus sign *(AIIMS June 98)*
b. Cut off sign
c. Slight flow of dye from the sides
d. Ability to absorb water

50. Common bile duct stones will manifest all except: *(MCI March 2008, All India 89)*
a. Distended gallbladder
b. Jaundice
c. Itching
d. Clay colored stools

51. In cholangitis, the organism mostly responsible is: *(PGI 88)*
a. E. coli
b. Streptococcus
c. E. histolytica
d. Clostridium

52. An ultrasound examination shows dilated intrahepatic biliary channels with a small gallbladder. The most likely possibility is: *(DPG 2010, Karnataka 94)*
a. Gallbladder stone
b. Pancreatic calculus
c. Common bile duct stone
d. Carcinoma of the head of the pancreas

53. The most common cause of suppurative cholangitis is:
a. Stone in common bile duct *(UPPG 97)*
b. Cancer of the ampulla of vater
c. Choledochal cyst
d. Empyema of gallbladder

54. The procedure of choice for elective removal of CBD stones for most patients is: *(Karnataka 2006)*
a. Open choledocholithotomy
b. Endoscopic choledocholithotomy
c. Laparoscopic choledocholithotomy
d. Percutaneous choledocholithotomy

55. Which of the following is not a component of Reynolds' Pentad in toxic cholangitis? *(DPG 2009 March)*
a. Right upper quadrant pain
b. Confusion
c. Septic shock
d. Markedly elevated transaminases

56. Best treatment of acute suppurative cholangitis is:
a. Laparoscopic cholecystectomy *(DPG 2006)*
b. Open cholecystectomy
c. Endoscopic papillotomy
d. Choledochotomy

57. Leucine aminopeptidase is elevated in obstruction of:
a. Ureter
b. Urethra *(BHU 88)*
c. Common bile duct
d. Spermatic cord

58. All of the following are seen with bile duct stone except:
a. Obstructive jaundice *(MCI March 2008)*
b. Distended and palpable gallbladder
c. Pruritus
d. Clay colored stools

59. Management of stone in CBD includes following except:
a. Observation *(PGI Nov 2011)*
b. Laparoscopic CBD exploration
c. Medical dissolution of stone
d. Endosphincteric removal

CHOLEDOCHOTOMY AND CBD EXPLORATION

60. A surgeon with less experience of laparoscopic cholecystectomy while doing laparoscopic surgery found some stone in CBD. What should he ideally do? *(AIIMS Nov 2011, AIIMS GIS Dec 2010)*
a. Open cholecystectomy with choledochoduodeno-stomy
b. Lap CBD exploration and stone removal
c. Lap CBD exteraction through the cystic duct
d. Convert to open cholecystectomy and CBD stone removal

61. Choledochotomy is indicated in all of the following except in patients with: *(COMEDK 2010)*
a. Palpable CBD stones
b. History of jaundice or cholangitis
c. Abnormal alkaline phosphatase
d. Abnormal gamma glutamyl transferase

62. Best suture for common bile duct is: *(JIPMER 95)*
a. Synthetic absorbable
b. Synthetic non-absorbable
c. Non-synthetic absorbable
d. Non-synthetic non-absorbable

63. After exploration of common bile duct, the T-tube is removed on which of the following days: *(Karnataka 96)*
a. 3rd postoperative day
b. 4th postoperative day
c. 12th postoperative day
d. 6th postoperative day

64. Cholangiography via T-tube done after how many days of cholecystectomy: *(TN 99)*
a. 1–5 days
b. 5–9 days
c. 10–14 days
d. 15–20 days

65. After cholecystectomy a 2.5 cm calculus was found in CBD, treatment for this should be: *(MHSSMCET 2006)*
a. Supraduodenal choledochotomy
b. Transduodenal choledochotomy
c. Dormia basket removal
d. Choledochotomy and T tube

66. A retained stone impacted in distal common bile duct is seen on T- tube cholangiogram. What is the best management of stone? *(UPSC 2004)*
a. Dissolution therapy
b. Operative removal
c. Endoscopic sphincterotomy and stone extraction
d. No active treatment is required

67. Most common complication of common bile duct exploration: *(DPG 2008)*
a. Retained stone
b. Pancreatitis
c. Stricture of common bile duct
d. T-tube displacement

68. Endoscopic sphincterotomy is not successful in the following except? *(MHSSMCET 2008)*
a. Multiple duodenal diverticuli
b. Choledocholithiasis
c. Billroth type II Gastrostomy
d. None

69. ERCP failure occurs in following except? *(MHSSMCET 2008)*
a. Smaller stone in CHD
b. Stenosis of papilla
c. High stricture
d. Malignant obstruction

BILE DUCT INJURY AND BILIARY STRICTURES

70. All are true about bile duct injury except: *(AIIMS GIS 2003)*
a. Incidence is equal in laparoscopic and open cholecystectomy
b. After experience of 20 cases, bile duct injury rate decreases
c. Errors leading to laparoscopic bile duct injuries stem from misperception, not errors of skill, knowledge or judgment
d. Primary cause of error in most of the cases is visual perceptual illusion

71. False about CBD injury: *(AIIMS GIS May 2008)*
a. Incidence in open cholecystectomy is 0.1-0.2%
b. Incidence in laparoscopic cholecystectomy is 0.5-0.8%
c. After 20 cases of laparoscopic cholecystectomy incidence of bile duct injury decreases
d. Most common reason for bile duct injury is lack of techniques and errors of judgment

72. Biliary stricture developing after laparoscopic cholecystectomy usually occurs at which part of common bile duct? *(Punjab 2008, All India 2006)*
a. Upper
b. Middle
c. Lower
d. All with equal frequency

73. According to Strasberg classification, lateral CBD injuries are classified as: *(JIPMER GIS 2011)*
a. Type B
b. Type C
c. Type D
d. Type E

74. According to Strasberg classification, transection of aberrant right hepatic duct without ligation is:
a. Type A
b. Type B
c. Type C
d. Type D

75. According to Bismuth Strasberg classification of bile duct injury, causing occlusion of a branch of biliary tree would be which type? *(MHSSMCET 2010)*
a. Type A
b. Type B
c. Type C
d. Type D

76. Strasburg's class 'B' bile injury means: *(MHSSMCET 2010)*
a. Bile leak from a minor duct
b. Occlusion of a branch of biliary tree
c. Injury of bile duct not in communication with CBD
d. Circumferential injury to major bile ducts

77. In Strasberg Classification of bile duct injury, type C is? *(MHSSMCET 2008)*
a. Bile leak form a minor duct still in continuity with CBD
b. Injury form bile duct not in communication with CBD
c. Sectoral duct injury with consequent leak
d. Circumferential injury to major bile ducts

78. Bile duct strictures are seen in: *(PGI Dec 2008)*
a. CBD stone
b. Cholangiocarcinoma
c. Chronic pancreatitis
d. Trauma
e. Acute pancreatitis

79. According to the Bismuth/Strasberg classification, cystic blow out is classified as:
a. Type A
b. Type B
c. Type C
d. Type D

80. A 40-years old patient has undergone an open cholecystectomy. The procedure was reported as uneventful by the operating surgeon. She has 100 ml of bile output from the drain kept in the gallbladder bed on the first post operative day. On examination she is afebrile and anicteric. The abdomen is soft and bowel sounds are normally heard. As an attending physician, what should be your best possible advice: *(AIIMS Nov 2003)*
a. Order an urgent endoscopic retrograde cholangiography and biliary stenting
b. Urgent laparotomy
c. Order an urgent hepatic imino diacetic acid scintigraphy (HIDA)
d. Clinical observation

81. On 7th postoperative day after laparoscopic cholecystectomy, patient developed right upper abdominal pain and 10 cm × 8 cm collection. Treatment consists of: *(PGI Dec 2003)*
a. Immediate laparotomy
b. Percutaneous drainage
c. Laparotomy and surgical exploration of bile duct and T-tube insertion
d. Laparoscopic cystic duct ligation and percutaneous drainage
e. Roux-en-Y loop hepaticojejunostomy

82. On 5th postoperative day after laparoscopic cholecystectomy, a 50 years old lady presented with right upper quadrant pain with fever and 12 cm subhepatic collection on CT and ERCP shows cystic duct leak. The best management is:
a. Immediate laparotomy *(PGI June 2003)*
b. Percutaneous drainage of fluid
c. Laparotomy and surgical exploration of bile duct and T-tube insertion
d. Laparoscopic cystic duct ligation and percutaneous drainage
e. Roux-en-Y loop hepaticojejunostomy

83. 5 days after CBD surgery there is a small leak. What will be the best treatment? *(AIIMS June 98)*
a. Ultrasound guided aspiration
b. ERCP and stenting
c. Re-exploration and hepaticojejunostomy
d. Re-exploration and primary repair

84. The initial investigation of choice for a post cholecystectomy biliary stricture is: *(AIIMS May 2005)*
a. Ultrasound scan of the abdomen
b. Endoscopic cholangiography
c. Computed tomography
d. Magnetic resonance cholangiography

85. Regarding bile duct injuries following cholecystectomy which of the following statement is false? *(AIIMS Nov 2005)*
a. The incidences following open cholecystectomy is in the range of 0.2 to 0.3%
b. The incidence rate following laparoscopic cholecystectomy is three times higher than the rates following open cholecystectomy
c. Untreated cases may develop secondary biliary cirrhosis
d. Routine use of 'open' technique of laparoscopic port insertion has resulted in a decline in the incidence of post laparoscopic cholecystectomy bile duct injuries

86. Common bile duct injuries are most commonly seen in:
a. Radical gastrectomy *(UPSC 2008)*
b. Penetrating injuries of abdomen
c. ERCP and sphincterotomy
d. Laparoscopic cholecystectomy operation

87. Most common cause of biliary stricture is: *(AIIMS June 94)*
a. CBD stone
b. Trauma
c. Asiatic cholangitis
d. Congenital

BILIARY FISTULA

88. Most common cause of gallbladder fistula is: *(DPG 2008)*
a. Liver abscess aspiration
b. Laparoscopic surgery
c. Gallstones
d. Trauma

89. Which does not contribute to enterobiliary fistula? *(Punjab 2008)*
a. Gastric ulcer
b. Duodenal ulcer
c. Carcinoma gallbladder
d. Gallstones

SPHINCTER OF ODDI DYSKINESIA

90. The ideal treatment of stenosis of sphincter of Oddi is:
a. Transduodenal sphincteroplasty *(SGPGI 2004)*
b. Endoscopic sphincteroplasty
c. Choledochojejunostomy
d. Choledochoduodenostomy

BILIARY TRACT DISEASES

91. Vanishing bile duct syndrome is seen in: *(PGI June 2003)*
a. Chronic viral hepatitis
b. Sarcoidosis
c. Lymphoma
d. Non-cirrhotic portal fibrosis
e. Alcoholism

92. Bile ductopenia seen in: *(PGI Dec 2003)*
a. GHVD
b. Alcoholic hepatitis
c. Autoimmune hepatitis
d. Cirrhosis
e. Sclerosing cholangitis

BILIARY ATRESIA

93. Which of the following are histopathological features of Extra hepatic biliary atresia? *(PGI June 2001)*
a. Bile lakes
b. Hepatocyte ballooning degeneration
c. Marked bile duct degeneration
d. Fibrosis of hepatic duct
e. Parenchymal cholestasis

94. The gold standard for the definitive diagnosis of the extrahepatic biliary atresia is: *(AIIMS Nov 2002)*
a. Per-operative cholangiography
b. Hepatobiliary scintigraphy
c. Alkaline phosphatase level
d. Liver biopsy

95. Better prognostic factor for operation of biliary duct obstruction in newborn are: *(PGI June 2001)*
a. No passage of bile
b. Size of ductule >200 micron
c. Weight of baby >3 kg
d. Preterm baby
e. Age of 8 weeks

96. Kasai's procedure is the treatment of choice for: *(NEET 2013 Orissa 2011)*
a. Congenital hypertrophic pyloric stenosis
b. Duodenal atresia
c. Biliary atresia
d. Hirschprung's disease

PRIMARY SCLEROSING CHOLANGITIS

97. Association of PSC with all except: *(ILBS 2012)*
a. UC
b. ITP
c. Sarcoidosis
d. Retroperitoneal fibrosis

98. False about PSC: *(AIIMS GIS May 2008)*
a. PSC in UC, the association is 30%
b. Low incidence of cholangitis
c. Increased incidence of colonic carcinoma in PSC + UC
d. Despite the presence of diffuse disease, hepatic duct bifurcation is most severely strictured segment

99. A 50-years old male presents with pain upper abdomen, pruritus, jaundice and weight loss, elevated ANA, the likely diagnosis is: *(COMEDK 2011)*
a. Primary sclerosing cholangitis
b. Klatskin tumor
c. Secondary sclerosing cholangitis
d. Choledocholithiasis

100. Primary sclerosing cholangitis is likely to be associated with: *(JIPMER 2012, 2011)*
a. Adenocarcinoma of pancreas
b. Cholangiocarcinoma
c. Hepatocellular carcinoma
d. Adenocarcinoma of gallbladder

101. "Onion skin" fibrosis of bile duct is seen in: *(COMEDK 2009)*
a. Primary biliary cirrhosis
b. Primary sclerosing cholangitis
c. Extrahepatic biliary fibrosis
d. Congenital hepatic fibrosis

102. Regarding PSC, all are true except: *(AIIMS GIS Dec 2010)*
a. Cholangiocarcinoma is always intrahepatic
b. Management of PSC/UC does not alter the course of either disease
c. Patients with PSC or UC have pancolitis on majority
d. Patients with PSC or UC have more chances of CRC than UC alone

103. All are true about PSC except: *(AIIMS GIS May 2011)*
a. Commonly affect 40-45 years of age
b. More common in males
c. Most patients presents with advanced disease
d. Survival after diagnosis is 10–15 years

104. True about primary sclerosing cholangitis are all except:
a. Fibrosing cholestasis of bile duct *(PGI June 2005)*
b. Periductal onion skin fibrosis
c. Cirrhosis never occurs
d. Jaundice is seen
e. Associated with UC

105. All of the following are true for patients of ulcerative colitis associated with primary sclerosing cholangitis, except:
a. They may develop biliary cirrhosis *(All India 2005)*
b. May have raised alkaline phosphatase
c. Increased risk of hilar cholangiocarcinoma
d. PSC reverts after a total colectomy

106. A patient presenting with history of diarrhea for several years with recent onset pruritus and raised alkaline phosphatase, normal SGOT/PT and USG shows no gallstones and biliary tract abnormality, the diagnosis is: *(PGI June 2004)*
a. Hodgkin's Lymphoma
b. Sclerosing cholangitis
c. Autoimmune Hepatitis
d. Viral Hepatitis

107. True regarding primary sclerosing cholangitis associated with ulcerative colitis are all of the following except: *(MCI March 2007)*
a. Biliary cirrhosis is a known complication
b. Increased risk of hilar cholangiocarcinoma
c. May have raised levels of alkaline phoshphatase
d. Primary sclerosing cholangitis resolves after total colectomy

PRIMARY BILIARY CIRRHOSIS

108. Pruritus precedes jaundice in: *(ILBS 2011)*
a. Primary biliary cirrhosis
b. Secondary biliary cirrhosis
c. Primary sclerosing cholangitis
d. CBD stone

109. The earliest symptom in primary biliary cirrhosis is: *(COMEDK 2008, 2007)*
a. Jaundice b. Pruritus
c. Melanosis d. Vomiting

110. Two most important clinical features of primary biliary cirrhosis: *(PGI June 2003)*
a. Generalized pruritus b. Jaundice
c. Fatigue d. Clubbing
e. Hematemesis

111. Which is not true about PBC? *(APPG 2008)*
a. No increase in risk of hepatocellular carcinoma
b. Often asymptomatic
c. Elevated IgM
d. Positive anti-mitochondrial antibody

112. Commonest presentation of primary biliary cirrhosis:
a. Pruritus b. Pain *(All India 98)*
c. Jaundice d. Fever

RECURRENT PYOGENIC CHOLANGITIS

113. All of the following are true regarding RPC except: *(AIIMS GIS Dec 2010)*
a. Equal incidence in males and females
b. More common in left lobe of liver
c. All are pigmented stones
d. GB stones are present in >50% cases

CHOLANGIOCARCINOMA PREDISPOSING FACTORS

114. Which of the following is not a risk factor for cholangiocarcinoma? *(AIIMS GIS Dec 2011)*
a. Thorotrast b. Radon
c. Dioxin d. Aflatoxin

115. Not a predisposing factor for cholangiocarcinoma:
a. Asiatic cholangio-hepatitis *(Punjab 2007)*
b. Cholelithiasis
c. Ulcerative colitis
d. Choledochal cyst

116. APBDJ is associated with: *(AIIMS GIS 2003)*
a. Cholangiocarcinoma b. CA GB
c. Choledochal cyst d. All of the above

117. Predisposing factor for cholangiocarcinoma? *(MHSSMCET 2009)*
a. PSC b. Gallstones
c. Ankylostomiasis d. All of the above

118. Cholangiocarcinoma has been associated with infection by: *(COMEDK 2004)*
a. Paragonimus westermani
b. Clonorchis sinensis
c. Loa Loa
d. Schistosoma haematobium

119. Which of the following does not predispose to cholangiocarcinoma? *(All India 96, AIIMS Feb 97)*
a. Ulcerative colitis b. Clonorchis sinensis
c. Choledochal cyst d. Chronic pancreatitis

120. All of the following are known predisposing factors for cholangiocarcinoma except? *(All India 97)*
a. CBD stones
b. Clonorchis sinensis
c. Ulcerative colitis
d. Primary sclerosing cholangitis

121. An increased incidence of cholangiocarcinoma is seen in all of the following except? *(All India 03)*
a. Hydatid cyst of liver b. Polycystic disease of liver
c. Sclerosing cholangitis d. Liver flukes
e. None

122. All the following increase risk for cholangio-carcinoma except: *(DPG 2010)*
a. Ulcerative colitis b. Gallstones in CBD
c. Sclerosing cholangitis d. Clonorchis

CHOLANGIOCARCINOMA

123. Non-resectability criteria in hilar cholangio-carcinoma are all except: *(ILBS 2012)*
a. Involvement of secondary biliary radicals bilaterally
b. Metastasis to celiac nodes
c. Involvement of right branch of portal vein
d. Contralateral involvement of bile duct

124. Type II cholangiocarcinoma involve: *(DNB 2011)*
a. Division of both ducts and not extending outside
b. Common hepatic duct only
c. Secondary hepatic duct
d. Extending beyond hilum

125. All are true about prognosis of cholangio-carcinoma except: *(AIIMS GIS 2003)*
a. Scirrhous type has better prognosis than papillary
b. Major prognostic factors are margin status and tumor stage
c. Bile duct resection alone is associated with high chances of recurrence
d. Curative resection includes hepatic resection + bile duct resection + lymphadenectomy

126. Klatskin tumor is: *(JIPMER 2010)*
a. Merkel cell carcinoma of skin
b. Primitive neuroectodermal tumor of chest wall
c. Common hepatic duct tumor
d. Adenocarcinoma of anal canal

127. Most common site of cholangiocarcinoma: *(AIIMS Nov 2011, May 2011, Nov 2008)*
a. Distal biliary duct b. Hilum
c. Intrahepatic duct d. Multifocal

128. True regarding cholangiocarcinoma: *(PGI SS Dec 2010)*
a. Sclerosing variety is most common
b. Multifocal in 40%
c. Jaundice typically precedes pruritus
d. Adjuvant therapy improves survival

129. Cholangiocarcinoma histologically resembles: *(AIIMS 79, DPG 79, 92)*
a. Squamous cell type
b. Colloid cell type
c. Schirrhous type
d. Columnar cell type

130. All are criteria of non-resectability in patients with hilar cholangiocarcinoma except: *(JIPMER GIS 2011)*
a. Hepatic duct involvement upto secondary radicals bilaterally
b. Encasement or occlusion of main portal vein proximal to its bifurcation
c. Atrophy of one lobe with encasement of contralateral portal vein branch
d. Atrophy of one lobe with ipsilateral involvement of secondary biliary radicals

131. Contraindication of resection in cholangio-carcinoma are all except: *(ILBS 2011)*
a. Involvement of main trunk of portal vein
b. Hepatic atrophy with contralateral bile duct encasement
c. Hepatic atrophy with contralateral portal vein encasement
d. Hepatic atrophy with ipsilateral bile duct involvement

132. ERCP is indicated for the following except: *(Recent Questions 2013)*
a. Distal CBD tumor
b. Hepatic porta tumor
c. Proximal cholangiocarcinoma
d. Gallstone pancreatitis

HEMOBILIA

133. Most common cause of hemobilia: *(DNB 2005, 2000, AIIMS GIS 2003)*
a. Trauma
b. Iatrogenic
c. Parasites
d. Tumors

134. Not true of hemobilia: *(DNB 2010, Punjab 2009, ComedK 2007)*
a. GI bleeding
b. Fever
c. Jaundice
d. Colicky RUQ pain

135. A patient presents with abdominal pain, jaundice and melena. The Diagnosis is: *(All India 2000)*
a. Hemobilia
b. Acute cholangitis
c. Carcinoma gallbladder
d. Acute pancreatitis

136. Cause of hemobilia are all except: *(AIIMS June 2000)*
a. Trauma to abdomen
b. Malignancy
c. Rupture of hepatic artery aneurysm
d. Hepatitis

137. Triad of hemobilia includes all, except: *(NEET Pattern, AIIMS June 93)*
a. Pain
b. Fever
c. G.I. bleeding
d. Jaundice

138. True regarding hemobilia: *(DPG 2007)*
a. Triad of jaundice, pain, melena
b. MC cause- rupture of portal vein into biliary system
c. MR angiography is the IOC
d. None of the above

BILHEMIA

139. Best investigation for bilhemia is: *(JIPMER GIS 2011)*
a. ERCP
b. MRCP
c. CT
d. EUS

140. All are true about bilhemia except: *(AIIMS GIS May 2008)*
a. Biliary pressure >portal pressure
b. Diagnosed by ERCP
c. Death due to embolism of bile in lungs
d. Patient has hyperbilirubinemia with raised enzymes

MISCELLANEOUS

141. False statement about common bile duct: *(PGI May 2011)*
a. Lies in free margin of lesser omentum
b. Anterior to first part of duodenum
c. Right to hepatic artery
d. Anterior to portal vein
e. Open in second part of duodenum

142. True regarding common bile duct is all except:
a. Opens 10 cm distal to the pylorus *(All India 2000)*
b. Lies anterior to I.V.C
c. Portal vein lies posterior to it
d. Usually opens into duodenum separate from the main pancreatic duct

143. Which of the following statement is true regarding the relation of bile duct? *(PGI Dec 2005)*
a. Posteriorly related to 1st part of duodenum
b. Related posteriorly to the tunnel of pancreatic head
c. Anteriorly related to 1st part of duodenum
d. Related to IVC posteriorly
e. It lies left to hepatic artery in the free border of lesser omentum

144. Predominant blood supply to the supraduodenal bile duct is derived from: *(All India 2012)*
a. Vessels that run upward along the bile duct from the duodenal end of the duct such as the retro-duodenal and gastroduodenal arteries
b. Vessels that run downward along the bile duct from the hepatic end of the duct such as the right hepatic artery
c. Vessels that arise from the hepatic artery proper run up along the CBD and supplies it with twigs in non-axial distribution
d. Vessels that arise from the cystic artery

145. All of the following conditions are associated with pneumobilia except:
a. Sphincterotomy
b. Rupture of hydatid cyst
c. Mirizzi's syndrome
d. Gallstone ileus

146. Pneumobilia is seen in: *(DNB 2001)*
a. Gallstone ileus
b. Mirizzi's syndrome
c. TPN
d. Volvulus

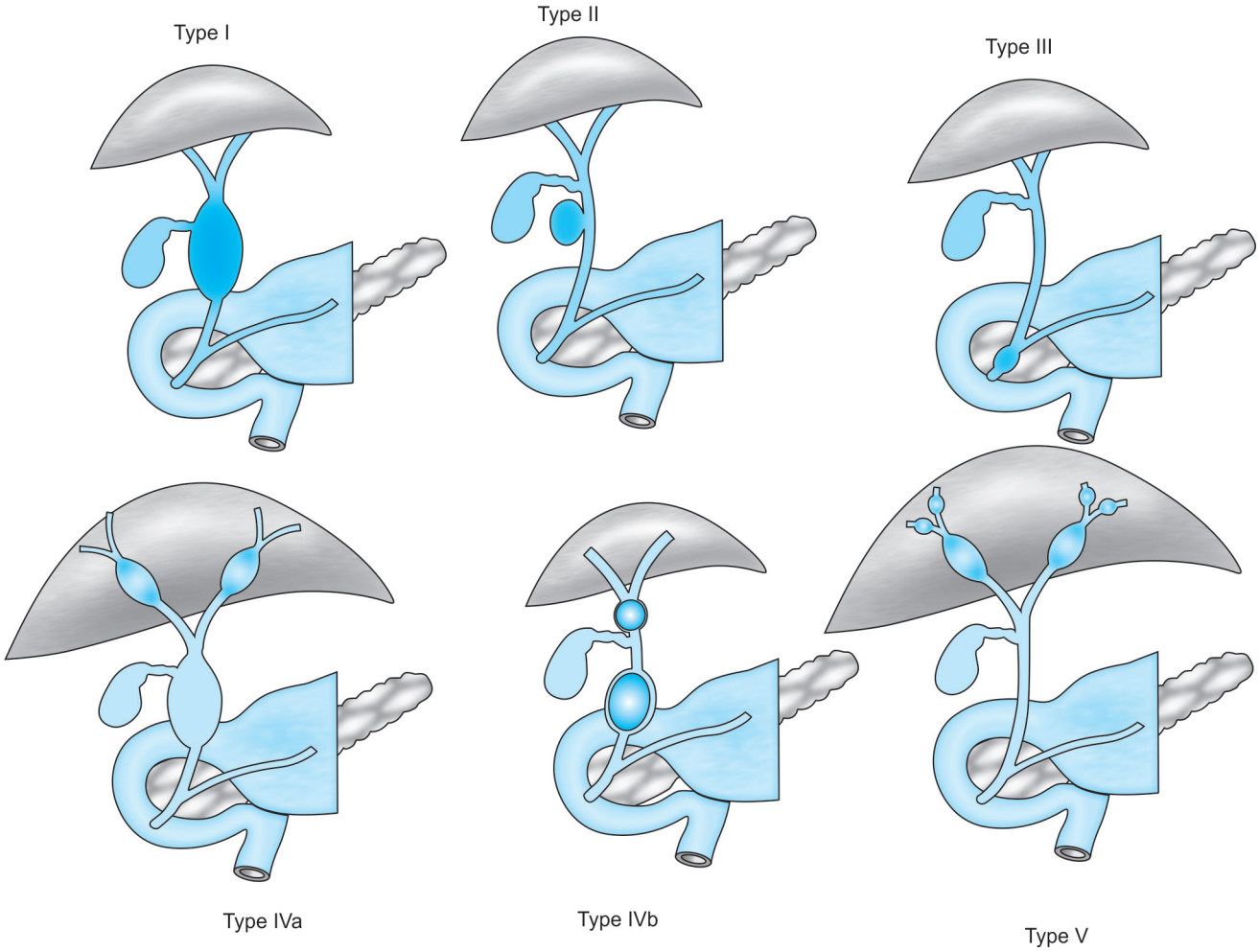
147. Normal length of CBD is: *(DNB 2001)*
a. 7 cm
b. 5 cm
c. 3 cm
d. 2 cm

148. Which of the following is true regarding the principle of use of MRCP? *(AIIMS Nov 2012)*
a. Intraluminal dye is used to create the three dimension view of the structures
b. Dye is instilled percutaneously first then MRI is used
c. Use of heavily T2-weighted image without contrast to create the three dimensional image of the biliary tree using MIP algorithm
d. Use of systemic Gadolinium as a contrast agent to create the three dimensional image of the biliary tree

EXPLANATIONS

CHOLEDOCHAL CYST

1. Ans. c. IVa *(Ref: Sabiston 19/e p1503-1505; Schwartz 9/e p1155, 10/e p1630; Bailey 26/e p1106, 25/e p1119; Blumgart 5/e p707-719; Shackelford 7/e p1397-1403)*



Todani Modification of ALONSO-LEJ Classification

Choledochal Cyst

- Cystic dilation of the biliary ducts, more common in **females**[Q]
- Association of choledochal cyst with biliary atresia is seen, with **type 1 biliary atresia**[Q] is present in most cases.
- It may be discovered on **antenatal ultrasound**[Q]

Etiology

- Most widely accepted hypothesis: **Abnormal pancreaticobiliary ductal junction (APBDJ)**[Q]
- **APBDJ** results in **reflux of pancreatic fluid** into the distal common hepatic duct and results in mucosal injury, chronic inflammation, and **weakening of the bile duct wall**[Q].

Classification

- Bile duct cysts are classified on the basis of site, extent, and shape of the cystic anomaly of the ductal system.
- MC choledochal cyst: **Type I** > Type **IV** > Type **III (143)**[Q]

Todani Modification of Alonso-Lej Classification[Q]	
Type I	• Dilation of the extrahepatic biliary tree • Type **Ia**: **cystic dilation**[Q] • Type **Ib**: **focal segmental dilation**[Q] • Type **Ic**: **fusiform dilation**[Q]
Type II	• **Diverticular dilation**[Q] of the extrahepatic biliary tree
Type III	• Cystic dilation of the intraduodenal portion of the common bile duct (**choledochocele**)[Q]
Type IVA	• Dilation of the **extrahepatic** and **intrahepatic biliary tree**[Q]
Type IVB	• Dilation of multiple sections of the **extrahepatic bile ducts**[Q]
Type V	• Dilation confined to the intrahepatic bile ducts (Caroli's disease[Q]

Clinical Features

- **Classic triad: Pain, jaundice (intermittent)** and abdominal **mass (10%)**[Q].

  - **MC symptom** in **Infants**: **Jaundice** (in 80%)[Q]
  - **MC symptom** in patients **>2 years** of age: **Abdominal pain**[Q]

- In **children**, the major clinical symptoms are recurrent **abdominal pain (81.8%),** nausea and vomiting (65.5%), mild jaundice (43.6%), an abdominal mass (29.0%), and fever (29.0%).
- **In adults**, **abdominal pain** (**87%**) and **jaundice** (**42%**) are present frequently. Less common clinical findings include nausea (29%), cholangitis (26%), pancreatitis (23%), and an **abdominal mass** (**13%**).

Diagnosis

- **IOC** for **choledochal cyst: MRCP** (non-invasive)
- ERCP: More useful in defining the distal ductal anatomy and the presence of APBDJ
- PTC: Useful in defining the proximal ductal anatomy and the presence of intrahepatic disease.

Treatment of Choledochal Cyst	
Type I	• **Roux-en-Y hepaticojejunostomy**[Q]
Type II	• **Excision** with **T-tube repair**[Q] • **Roux-en-Y hepaticojejunostomy**[Q]
Type III	• **Endoscopic sphincterotomy** and cyst unroofing[Q]
Type IVA	• **Hepatic resection** for **localized** disease[Q] • **Liver transplantation** for **diffuse** disease[Q]
Type IVB	• Transduodenal sphincteroplasty and **Roux-en-Y hepaticojejunostomy**[Q]
Type V	• **Hepatic resection** for **localized disease**[Q] • **Liver transplantation** for **diffuse disease**[Q]

Complications of Choledochal Cyst	
• **Recurrent cholangitis**[Q] • **Pancreatitis**[Q] • **Gallstones**[Q]	• Cirrhosis with portal hypertension • Portal vein thrombosis • **Malignancy**[Q]

Lilly technique

- **Lilly technique**: **Serosal surface** of the duct is **left adhering** to the **portal vein**, while the mucosa of the cyst wall is obliterated by curettage or cautery, when **cyst** is **densely adhered** to the **portal vein** secondary to long-standing inflammatory reaction[Q].
- In this situation, a complete, full-thickness excision of the cyst may not be possible.

2. **Ans. d. Type V choledochal cyst** *(Ref: Sabiston 19/e p1504-1505; Schwartz 9/e p1119, 10/e p1289, 1630; Bailey 26/e p1106, 25/e p1119; Blumgart 5/e p717; Shackelford 7/e p1402-1403)*

Caroli's disease (Type V Choledochal cyst)

- Congenital malformation, consists of multiple **sacular dilatations** limited to the **intrahepatic**[Q] bile ducts (segmental bile ducts).
- **About half** the cases are **associated with congenital hepatic fibrosis**[Q] (affect **interlobular** bile ducts).
- Cyst with congenital hepatic fibrosis is known as **Grumbach's disease**[Q].
- **Portal hypertension** is present in Caroli's disease associated **with congenital hepatic fibrosis**[Q].

Clinical Features

- Symptoms include **cholangitis (64%)**[Q], portal hypertension (22%), and abdominal pain (18%)
- More common in **males**
- Septa containing portal veins protrude into the lumen of the ectatic bile ducts (**central dot sign**)[Q].
- The main and often the only symptom of **bacterial cholangitis** secondary to **Caroli's** disease is **fever without abdominal pain** and **jaundice**.
- Frequent episodes of **cholangitis** indicates **poor prognosis**[Q].
- Most **stones** are **pigmented** in Caroli's disease.

Diagnosis

- **CT findings**: Portal vein radicals can be seen after enhancement within dilated intra-hepatic bile ducts (**central dot sign**)[Q].

Treatment

- **Hepatic resection** for **localized disease**[Q]
- **Liver transplantation** for **diffuse disease**[Q].

3. **Ans. b. Extra hepatic duct dilatation**
4. **Ans. a. Caroli's disease**
5. **Ans. c. Type IVa = choledochocele**
6. **Ans. a. Type I**
7. **Ans. b. Type II**
8. **Ans. a. Excision of cyst**
9. **Ans. c. Type III**
10. **Ans. a. Resection decreases the incidence of malignancy but risk persists** *(Ref: Sabiston 19/e p1505; Bailey 26/e p1106, 25/e p1119; Blumgart 5/e p713; Shackelford 7/e p1399)*

Carcinoma in Choledochal Cyst

- **More than half** tumors occur within the cyst itself (**intracystic**) and **may recur after cyst excision**[Q].
- **Risk** of **malignancy** is **decreased** after **cyst excision,** but **risk persist** even **after cyst excision** (**life long surveillance** is required)
- Type **I** and **IV** cysts have the **highest risk of cancer**.
- When malignancy is present it is most commonly found along the **posterior cyst wall**[Q].
- Incidence of **cyst malignancy** is **age related**[Q].

Increased risk of following cancers	
• Biliary tree (MC)[Q] • Gallbladder[Q] • Liver[Q]	• Pancreas[Q] • Duodenum[Q]

- **Cholangiocarcinoma** is the **MC malignancy**[Q] associated with bile duct cysts.

11. **Ans. a. Roux-en-Y hepaticojejunostomy**
12. **Ans. c. Choledochal cyst**
13. **Ans. c. Caroli's disease**
14. **Ans. c. Excision is ideal treatment**
15. **Ans. d. Cystojejunostomy is treatment of choice**
16. **Ans. c. Recurrent cholangitis**
17. **Ans. a. Pain, lump and intermittent jaundice**

Choledochal Cyst

- **Classic triad: Pain, jaundice (intermittent)** and abdominal **mass (10%)**[Q].

18. **Ans. c. Congenital**
19. **Ans. d. Can lead to carcinoma**
20. **Ans. b. Type II is most common**
21. **Ans. a. Caroli's disease**

CHOLEDOCHOLITHIASIS AND CHOLANGITIS

22. **Ans. b. Endoscopic papillotomy** *(Ref: Sabiston 19/e p1488-1491; Schwartz 9/e p1148, 10/e p1321-1322; Bailey 26/e p1111, 25/e p1125-1126; Blumgart 5/e p532-550; Shackelford 7/e p1326-1331)*

- **ERCP**: **Diagnostic** and **therapeutic test of choice** for patients with suspected **CBD stones**[Q].`

Choledocholithiasis

- **CBD stones** are classified by **point of origin**
- Found in **6–12%** of patients with GB stones[Q]
- **Retained stones** discovered **within 2 years** of cholecystectomy[Q]
- **Recurrent stones** detected **>2 years** following cholecystectomy[Q]

Primary CBD stone	Secondary CBD stone
• **Formed** within the **biliary tract**[Q] • Associated with biliary **Stasis and infection**[Q] • More commonly seen in **Asian**[Q] populations • **Soft, friable, light-brown stones** or **sludge** in the common duct[Q]	• **Formed** initially in the **GB**[Q] • **Migrate through** the **cystic duct** into CBD[Q] • Most common bile duct stones in **Western countries**[Q] • Usually **cholesterol stones**[Q]

Clinical Features

- CBD stones may be **silent** and are often **discovered incidentally**[Q]. In these patients, biliary obstruction is transient, and laboratory tests may be normal.
- Clinical features suspicious for **biliary obstruction** due to **CBD stones** include **biliary colic, jaundice, clay colored stools,** and **darkening** of the **urine**[Q].
- **Fever** and **chills** may be present in patients with choledocholithiasis and **cholangitis**.
- Serum **bilirubin** (>3.0 mg/dL), **aminotransferases**, and **ALP** are commonly elevated in patients with biliary obstruction but are **neither sensitive nor specific** for the presence of common duct stones.
- Among these, serum **bilirubin** has the **highest positive predictive value**[Q] (28%–50%) for the presence of **choledocholithiasis**.
- **Laboratory values** may be **normal** in **one third**[Q] of patients with choledocholithiasis.

Diagnosis

- **USG: First test**, can document **GB stones** and estimate the **CBD diameter**[Q]
- A **dilated bile duct** (**>8 mm** in diameter) in a patient with **gallstones, jaundice** and **biliary pain** is **highly suggestive** of choledocholithiasis.
- **MRCP:** Provides excellent anatomic detail, with **sensitivity** and **specificity** of **95%** and **98%**, respectively, for **CBD stones**[Q].

> • **ERCP: Diagnostic and therapeutic test of choice for patients with suspected CBD stones**[Q]**.**

Treatment

- Treatment options are **ERCP, laparoscopic** or **open CBD Exploration.**

23. Ans. a. Cholangitis *(Ref: Sabiston 19/e p1500-1501; Schwartz 9/e p1149, 10/e p1322-1323; Blumgart 5/e p670-680; Bailey 26/e p1111, 25/e p1125-1126; Shackelford 7/e p1347, 1450)*

Cholangitis

- **Ascending bacterial infection**[Q] of the biliary ductal system with obstruction
- **MC cause** of acute cholangitis is **choledocholithiasis**[Q]
- **MC organisms** present in the bile in patients with cholangitis: **E. coli**[Q]**, Klebsiella pneumoniae**[Q], Streptococcus faecalis, and Bacteroides fragilis.

Etiology

- **Choledocholithiasis (MC)**[Q]
- Biliary-enteric anastomotic strictures
- Benign strictures
- Cholangiocarcinoma and periampullary cancer

Clinical Features

- Characterized by **Charcot's triad**[Q]**: Abdominal pain + jaundice + fever**
- Cholangitis may be either **self-limited** or **toxic with severe illness**, including **jaundice, fever, abdominal pain, mental status changes,** and **hypotension (Reynold's pentad)**[Q].

> • **Fever** and **chills** are the **MC presentation** (due to **cholangiovenous** and **cholangiolymphatic reflux**)[Q]

- **Fever** is the **most consistent sign**, generally **intermittent**, **spiking** and associated **with shaking chills**[Q].

Diagnosis

- **Leukocytosis, hyperbilirubinemia**, and **raised ALP** and **transaminases**[Q]
- **Positive blood culture** is **more common** in **partial obstruction**[Q] than with complete obstruction

> • **Cholangiography** (If **ERCP** is not available, **PTC** should be performed) is **mandatory** as a **diagnostic** and **potentially therapeutic intervention**[Q].

Treatment

- **Initial treatment**: **IV antibiotics** and **aggressive hydration**[Q]
- **Septic shock** with **toxic cholangitis**: **ICU monitoring** and **vasopressors** to support blood pressure.
- **Most patients** will **respond** to **these measures** alone.
- **Urgent biliary decompression** will be necessary in 15% cases[Q].

- Biliary decompression may be performed endoscopically or by a percutaneous transhepatic route based on the level of the obstruction.

Methods of Biliary Decompression

ERCP with Sphincterotomy and Stone Extraction	Percutaneous Transhepatic Cholangiography (PTC)	Surgical Decompression
• Procedure of choice[Q] • Early endoscopy is **diagnostic and therapeutic**[Q] • Permits biliary decompression by **sphincterotomy** and **stone extraction**[Q] • If stone can't be removed, a **nasobiliary catheter** or stent is inserted to decompress biliary tract[Q]	**PTC is performed if:** • **ERCP** has **failed** or not **available**[Q] • **Proximal** or hilar obstruction[Q] • **Stricture** of **biliary enteric anastomosis**[Q]	• Surgical decompression is indicated when **neither ERCP nor PTC** is **possible**[Q]. • Consists of CBD **decompression** with a **T-tube**[Q]

Elective Definitive Treatment in Stabilized Patients
• **Cholecystectomy** with **choledochotomy** and **CBD exploration**[Q] • **T-tube** is left in place for **cholangiography** and **removal** of any **retained stone**[Q] • **T-tube cholangiogram** is done on **7th-10th day post-operatively**[Q] • **Remove** the T-tube if **cholangiogram** is **normal**[Q] • If **residual stone** is discovered **on** the post-operative **cholangiogram, T-tube** should be **left in place** for **4-6 weeks** for the **tract to mature**[Q]. • The **stones** are **removed percutaneously** through the **matured tract** by **Burhenne's technique**[Q].

24. Ans. b. 15% *(Ref: Sabiston 19/e p1488-1491; Schwartz 9/e p1148, 10/e p1321-1322; Bailey 26/e p1111, 25/e p1125-1126; Blumgart 5/e p535; Shackelford 7/e p1326)*

Choledocholithiasis

- Found in **6–12%** of patients with GB stones[Q]
- **Retained stones** discovered **within 2 years** of cholecystectomy[Q]
- **Recurrent stones** detected **> 2 years** following cholecystectomy[Q].

25. Ans. d. Retained stones are discovered after 2 years of cholecystectomy

26. Ans. c. Supraduodenal choledochotomy *(Ref: Blumgart 5/e p537-539; Shackelford 7/e p1326-1331)*

Most stones is the CBD can be removed by **supraduodenal choledochotomy** (especially when ERCP is contraindicated).

Contraindications of ERCP	
• **Stone >1.5 cm**[Q]	• **Impacted stones**[Q]
• **Multiple Gallstones**[Q]	• **Bile duct stricture**[Q]
• **Intrahepatic stones**[Q]	

Open CBD Exploration

- It should be performed **when a concomitant biliary drainage procedure** is **indicated**.
- Open CBD exploration is associated with low operative mortality (1%–2%) and operative morbidity (8%–16%).
- **Stones impacted** in the **ampulla** may be **difficult for both endoscopic ductal clearance** and **CBD exploration**[Q].
- In these cases, **transduodenal sphincteroplasty** and **stone extraction** should be **performed**; alternatively, if this is not successful, a **choledochoduodenostomy** or a **Roux-en-Y choledochojejunostomy** should be performed[Q].

Choledochoduodenostomy

- **Choledochoduodenostomy:** At least **1.2 cm diameter** of CBD is required for allowing creation of **stoma 2.5 cm**. A dilated duct, at least 1.2 cm and preferably >2 cm in diameter is sin qua non of choledochoduodenostomy.
- **Absolute Contraindication: Duct <1.2 cm** in **diameter**[Q] (others are duodenal ulcer and acute pancreatitis)

Indications of Choledochoduodenostomy	
• **Retained/recurrent calculi** in CBD or hepatic duct[Q]	• **Tubular stricture** of transpancreatic portion of CBD due to chronic pancreatitis
• **Cholangitis**[Q]	• Combination of one or more indications
• **Ampullary stenosis**[Q]	• **Low iatrogenic strictures**[Q]
• Presence of **primary choledochal calculi** or **bile stasis**[Q]	• **Malignant obstruction**[Q] in periampullary area

27. Ans. b. Brown stone

28. Ans. b. Cutaneous hepaticojejunostomy

This is a case of recurrent pyogenic cholangitis. Cutaneous hepaticojejunostomy is preferred treatment modality.

Treatment of Recurrent Pyogenic Cholangitis

- Treated with a **multidisciplinary approach** (endoscopy, interventional radiology, and surgery)
- The long-term goal of therapy is to **extract stones, remove debris**, and **relieve strictures**.
- **Roux-en-Y hepaticojejunostomy** with a **subcutaneous afferent limb (Hudson loop[Q])** is a safe and effective way to provide **access to** the **biliary tree** for **stone extractions[Q]**.

29. Ans. a. Endoscopic papillotomy, b. ERCP, e. Choledochotomy

30. Ans. a. Fever, abdominal pain, jaundice

- **Charcot's triad[Q]: Abdominal pain + jaundice + fever[Q]**
- **Reynold's pentad[Q]: Charcot's triad + altered mental status + shock (hypotension)[Q]**

31. Ans. d. 11'O clock position *(Ref: Sabiston 19/e p1494; Schwartz 9/e p1148, 10/e p1327)*

Transduodenal Sphincteroplasty

- This **cut is made superiorly** (at the **11 o'clock position**)[Q] for **4 to 5 mm**.
- The **sphincter** is **incised at** the **11–O'clock position** to **avoid injury to the pancreatic duct[Q]**.

32. Ans. a. Increased bilirubin, b. ↑WBC count, c. ↑liver enzymes, d. Fever with rigors

33. Ans. b. CBD stone

34. Ans. a. Escherichia coli

35. Ans. a. Increased leucocyte count, b. Increased transaminases, c. Increased alkaline phosphatase, d. Association with fever and chills

36. Ans. d. Septic shock

37. Ans. a. ERCP and bile duct stone extraction *(Ref: Sabiston 19/e p1483-1484; Schwartz 9/e p1141; Bailey 26/e p1101-1102, 25/e p1115-1116; Blumgart 5/e p331-344; Shackelford 7/e p1326-1329)*

ERCP

- Endoscopic clearance of CBD stones can **avoid** the **need for an open operation[Q]** if expertise in laparoscopic common bile duct exploration is not available.

Indications of preoperative ERCP	
• Patients with **worsening cholangitis[Q]**	• **Impacted stones[Q]**
• **Ampullary stone impaction[Q]**	• **Cirrhosis[Q]**
• **Biliary pancreatitis[Q]**	

- If clearance is not possible because of multiple stones, intrahepatic stones, impacted stones, difficulty with cannulation, duodenal diverticula, or biliary stricture, this information is known before surgery.
- **Endoscopic sphincterotomy** with **stone extraction** is **well tolerated** in most patients, with a **5–8%** complication rate[Q].
- **Complete clearance** is achieved in **71–75%** of patients at the **first procedure** and in **84–95%** of patients after **multiple endoscopic procedures[Q]**.
- **Prompt cholecystectomy** after endoscopic clearance of the CBD should be performed during the hospital admission if the **patient** is **fit for surgery[Q]**.
- Patients **> 70 years** should have their **ductal stones cleared endoscopically** as their **sole therapy**; only about **15% become symptomatic** from their Gallstones in their remaining lifetime, which can then be treated as symptoms arise[Q].

Contraindications of Endoscopic sphincterotomy
• CBD diameter **>2 cm[Q]**
• Long suprasphincteric **stricture, >15 mm[Q]**
• **Peri-vaterian diverticulum[Q]**
• **Duodenal wall** and **head** of the pancreas **severely inflamed[Q]**

38. Ans. b. ERCP

39. Ans. d. Sphincterotomy and then cholecystectomy

Cholecystectomy with **choledocholithotomy** at same setting **should not be done**, as **diameter** of CBD is **<1 cm**.

40. Ans. a. Endoscopic sphincterotomy

41. Ans. c. Endoscopic stone extraction

42. Ans. a. Supraduodenal choledochotomy with exploration

43. Ans. d. When removed by exploration of the common bile duct the T-tube can be removed after 3 days

44. Ans. a. ESWL, b. Exploration of bile duct and recovery of stones, c. Bile duct stenting, d. Nasobiliary drainage, e. Percutaneous drainage *(Ref: Shackelford 7/e p1326-1331)*

Choledocholithiasis: Treatment Options

- **ERCP stone extraction** is **successful 80–90%** of the time using the techniques of **sphincterotomy** and **balloon catheter** or **Dormia basket stone retrieval**. The addition of **mechanical, electrohydraulic, laser**, or **extracorporeal shockwave lithotripsy** for **large stones increases** the **success rate to over 95%**[Q].
- The placement of **pancreatic stents** has been found to **reduce the incidence of postbiliary sphincterotomy pancreatitis**[Q] in patient suspected of sphincter of Oddi dysfunction.
- In patients for whom ERCP is not available, not possible secondary to anatomic considerations, or not successful, an alternative method of cholangiography and nonsurgical therapy is **percutaneous transhepatic cholangiography** (PTC) followed **by transhepatic methods of stone rem**oval.

45. Ans. e. Palpable CBD stone *(Ref: Shackelford 7/e p1326-1331)*

Choledochotomy	
Absolute Indications (High suspicion of CBD calculi)	**Relative Indications (Low suspicion of CBD calculi)**
• **Palpable CBD stones**[Q] • **Jaundice with cholangitis**[Q] • Demonstration of **stone** on **intra-operative cholangiography**[Q] • CBD diameter **>12 mm**[Q]	• Jaundice without cholangitis • History of pancreatitis • Dilated CBD • White bile on aspiration • Dilated cystic duct

46. Ans. a. ERCP **47. Ans. d. CBD stones** **48. Ans. b. ERCP**

49. Ans. a. Meniscus sign *(Ref: Sutton 6/e p971)*

- **MR cholangiography:** Typical **"meniscus sign"** is seen when CBD stone[Q] is wedged at the level of the papilla.

50. Ans. a. Distended gallbladder **51. Ans. a. E. coli**

52. Ans. c. Common bile duct stone *(Ref: Bailey 26/e p1108, 25/e p1125, 24th/1109)*

- In **obstruction** of the **CBD** due to a **stone, distention of gallbladder seldom occurs;** the **organ** usually is **shriveled**[Q].

Courvoisier's Law

- **In obstruction of the common bile duct due to a stone, distention of gallbladder seldom occurs; the organ usually is shriveled**[Q].
- In obstruction from other causes, distention is common by compression
- If there is no disease in the gallbladder and the **obstruction is due to cancer of ampulla, pancreas or bile duct**, then **gallbladder will be distended**[Q].

Exceptions to Courvoisier's Law
• **Double impaction** of **stones**[Q] i.e. one in the cystic duct and other in CBD. • **Oriental cholangiohepatitis**[Q] • **Pancreatic calculus obstructing** the **ampulla of Vater**[Q] • **Mucocele** of gallbladder due to **stone** in the **cystic duct**[Q]

53. Ans. a. Stone in common bile duct **54. Ans. b. Endoscopic choledocholithotomy**

55. Ans. d. Markedly elevated transaminases **56. Ans. c. Endoscopic papillotomy**

57. Ans. c. Common bile duct *(Ref: American Journal of Gastroenterology; Dec 1963, Vol. 41 Issue 6, p620)*

Leucine Aminopeptidase

- **Increased Leucine aminopeptidase (LAP) activity** is seen in:
  - **Carcinoma of the pancreas, choledocholithiasis, acute pancreatitis**[Q]
  - **Viral hepatitis, cirrhosis, carcinoma** with **liver metastases**[Q]
- In **common bile duct obstruction**, whether due to **carcinoma pancreas** or **choledocholithiasis**, the **elevated serum LAP levels returned** to **normal following relief of the obstruction.** This is in agreement with the hypothesis that the increased serum LAP activity in these conditions is the result of bile duct obstruction.

58. **Ans. b. Distended and palpable gallbladder**

59. **Ans. a. Observation, c. Medical dissolution of stone** *(Ref: Bailey 26/e p1111, 25/e p1126; CSDT 11th /1163)*

- **Medical dissolution** is used **for Gallstones**, not the CBD stones.
- **CBD stones** are **rarely asymptomatic**, often **present with complications**. CBD stones should be treated, if diagnosed. Treatment options are **ERCP, laparoscopic** or **open CBD exploration.**

CHOLEDOCHOTOMY AND CBD EXPLORATION

60. **Ans. d. Convert to open cholecystectomy and CBD stone removal** *(Ref: Shackelford 7/e p1326-1331)*

Management of CBD Stones Associated with GB Stones	
Pre-operatively Detected Stones	**Unsuspected stones found at the time of Cholecystectomy**
Experienced Laparoscopic Surgeon	**Experienced Laparoscopic Surgeon**
• **Cholecystectomy and choledochotomy** in **same sitting**[Q]	• **Laparoscopic CBD exploration and stone retrieval** through the **cystic duct**[Q] • Laparoscopic **choledochotomy** and **stone extraction**[Q]
Inexperienced Laparoscopic Surgeon	**Inexperienced Laparoscopic Surgeon**
• **Pre-op ERCP** with **stone removal** and **laparoscopic cholecystectomy** later[Q].	• **Convert** to **open procedure** and **remove CBD stone**[Q] • Complete the **cholecystectomy** and refer the patient for **ERCP**[Q] • **Conversion** to an **open procedure** is **preferred over ERCP**[Q], because the **success rate** of **ERCP** is **not 100%**[Q].

61. **Ans. d. Abnormal gamma glutamyl transferase**

62. **Ans. a. Synthetic absorbable** *(Ref: Shackelford 7/e p2222-2224)*

- **Synthetic absorbable suture** such as **Vicryl** is **preferred for CBD**[Q].
- **Vicryl sutures** are used in **general soft tissue approximation** and **vessel ligation**[Q].
- **Non absorbable sutures** ordinarily **remain** where they are **buried within the tissues**. This can cause **late complications** such as the development of **Gallstones around non-absorbable sutures** in the **common bile duct** or **bladder stones** in the **urinary bladder**. **In these situations** it is **best to use absorbable materials**[Q].

63. **Ans. c. 12th postoperative day**

64. **Ans. b. 5–9 days**

65. **Ans. a. Supraduodenal choledochotomy**

66. **Ans. c. Endoscopic sphincterotomy and stone extraction**

67. **Ans. a. Retained stone** *(Ref: Sabiston 19/e p1489, 18th/1561)*

Most common complication of common bile duct exploration retained stone.

- **Clearance** of all **common bile duct stones** is achieved **in 75–95%** of patients with **laparoscopic CBD exploration**[Q].
- The rate of **retained CBD stone** is **<5%**.
- **MC complication** of **laparoscopic CBD exploration**[Q] is **retained stone.**

Laparoscopic CBD Exploration (LCBDE)

- An **intraoperative cholangiogram** at the time of cholecystectomy will also document the presence of **CBD stones**[Q].
- **LCBDE** through the **cystic duct** or with **formal choledochotomy** allows the stones to be retrieved during the same procedure.
- If the **expertise** and **instrumentation** for laparoscopic CBD exploration are **not available**, a **drain should be placed** and left adjacent next to the cystic duct and an endoscopic cholangiogram performed the following day.
- An **open CBD exploration** should be performed if endoscopic intervention is not available or not feasible because of anatomic restrictions or expertise.
- If a choledochotomy is performed, a T tube is left in place.
- The purpose of the **T tube** is to **provide access to the biliary system** for **postoperative radiologic stone extraction**[Q] and allow spasm or edema of sphincter to settle.
- The size of the tube is therefore of importance, in that **tubes <16 French do not allow for postoperative radiologic instrumentation** without dilation of the tract; a minimum of **4 to 6 weeks** should pass for the **tract to mature**[Q] before instrumentation.

68. **Ans. b. Choledocholithiasis**

69. **Ans. a. Smaller stone in CHD**

BILE DUCT INJURY AND BILIARY STRICTURES

70. **Ans. a. Incidence is equal in laparoscopic and open cholecystectomy** *(Ref: Sabiston 19/e p1494-1498; Schwartz 9/e p1158-1160; Bailey 26/e p1112, 25/e p1125-1127; Blumgart 5/e p615-644; Shackelford 7/e p1380-1388)*

Bile Duct Injury and Ligation

- **Most benign strictures** follow **iatrogenic bile duct injury**[Q]
- **Most commonly** during **laparoscopic cholecystectomy**[Q]
- **Incidence** of bile duct injury during **open** cholecystectomy is **0.1–0.2%**[Q]
- **Incidence** of bile duct injury during **laparoscopic** cholecystectomy is **0.3–0.85%**[Q]

Pathogenesis

Risk Factors for Bile Duct Injury	
• **Acute** or **chronic inflammation**[Q]	• **Anatomic variation**[Q]
• **Obesity**[Q]	• **Bleeding**[Q]

- **Bile duct injury** rate increased in **acute cholecystitis**, **pancreatitis**, **cholangitis**, and **obstructive jaundice**[Q].

> - As **surgeon experience** increases **beyond 20 cases**, the bile duct **injury rate decreases**[Q].
> - **Errors** leading to laparoscopic bile duct injuries stem from **'misperception'**[Q], not erorrs of skill, knowledge or judgment.
> - The **primary cause of error** in **97% cases** was a **'visual perceptual illusion'**[Q], whereas only **3% injuries** were due to **faults of technical skills**[Q].

- Surgical technique with **inadequate exposure** and **failure to identify** structures **before ligating** or **dividing** them are the most common cause of **significant biliary injury**[Q].
- The **routine** use of **intra-operative cholangiography** may **limit the extent** of **bile duct injury**, but does **not** seem to **prevent it**[Q].
- If a **bile duct injury** is **suspected** during cholecystectomy, a **cholangiogram must be obtained** to identify the anatomy[Q].
- **Classic Laparoscopic Injury:** A long length of the **common duct** is excised up to the **proximal common hepatic duct,** which is either occluded or left to drain bile into the peritoneal cavity.

Clinical Features

- About **25%** of **major ductal injuries** are **recognized intraoperatively**[Q] because of bile leakage, an abnormal cholangiogram, or late recognition of the anatomy.
- **MC presentation** of a **complete occlusion** of the common hepatic or bile duct is **jaundice** with or without **abdominal pain**[Q].
- Patients may also present **months or years after** prior surgery with **cholangitis** or **cirrhosis** secondary to a biliary tract injury.

Diagnosis

- **USG** or **CT** should be performed in patients with signs of **abdominal pain** or **peritonitis, sepsis**, or any other clinical suspicion of **biloma**[Q].
- Patients must be stabilized with **immediate parenteral antibiotics** and **image-guided percutaneous drainage** of any fluid collections[Q].
- **Cholangiography** should be performed to establish the **presence of ductal stricture**, identify the **level** of the stricture, and identify the **nature of the injury** when necessary[Q].
- **PTC** is the **imaging method of choice** for **most postoperative biliary strictures**[Q]

> - **ERCP** may be easier to obtain in a patient with a biliary stricture and cholangitis who **requires urgent cholangiography** and **biliary decompression**.
> - However, this is **only useful** in patients **with bile duct continuity**.
> - **Cystic duct leaks** or **small tangential injuries** can be treated with **endoscopic stenting**.
> - In situations in which the **biliary stricture** is **too tight** to pass with ERCP, **PTC** may be performed for proximal biliary decompression.

- **CT arteriography** should be considered in the **preoperative evaluation** of patients with benign biliary strictures.
- **Unrecognized injury** to the **hepatic artery** or a **portal vein branch** occurs with a frequency of **12–47%** concomitant with a bile duct injury.
- In patients presenting with **late strictures** with evidence of **liver dysfunction**, a **CT arteriogram** should be performed to evaluate for **evidence of portal hypertensio**n.

71. Ans. d. Most common reason for bile duct injury is lack of techniques and errors of judgment *(Ref: Sabiston 19/e p1495)*

- As **surgeon experience** increases **beyond 20 cases**, the bile duct **injury rate decreases**[Q].
- **Errors** leading to laparoscopic bile duct injuries stem from **'misperception'**[Q], not erorrs of skill, knowledge or judgment.
- The **primary cause of error** in **97% cases** was a **'visual perceptual illusion'**[Q], whereas only **3% injuries** were due to **faults of technical skills**[Q].

72. Ans. a. Upper *(Ref: Sabiston 19/e p1494-1496)*

- **Most common duct injuries** occur **during attempted dissection** of the **cystic duct** when the **CBD is mistaken for cystic duct**[Q].
- These injuries involve **transection** of the **upper part** of the **CBD**[Q] and excision of a variable portion of the CBD proximal to first transection, including cystic duct-common duct junction.

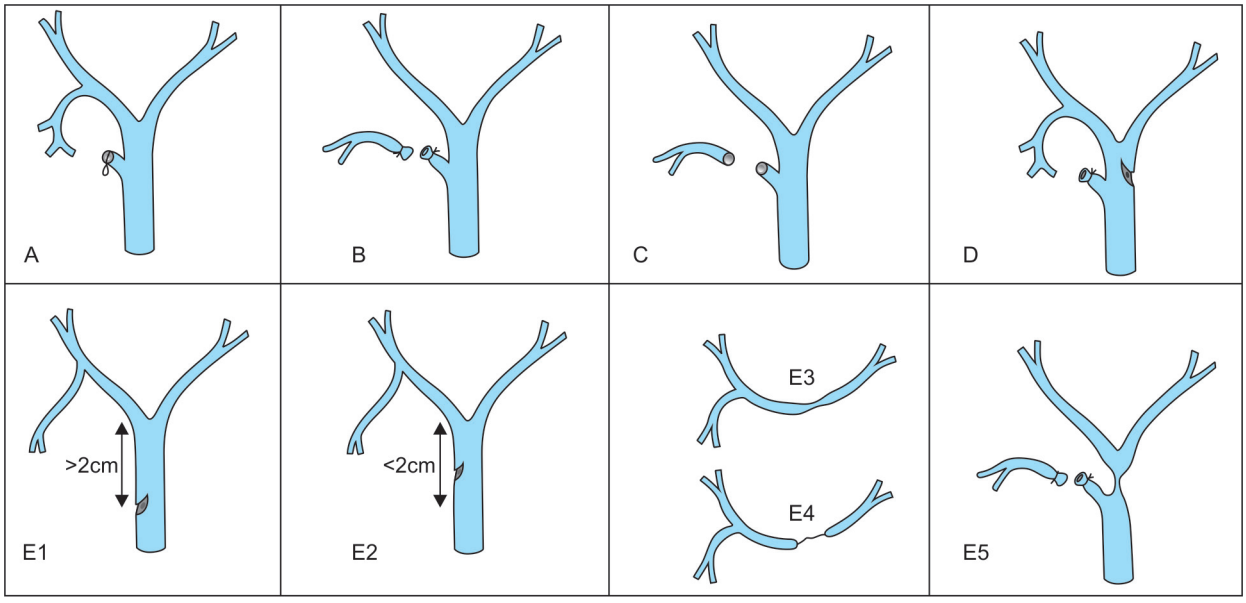
The Stewart-Way classification of Laparoscopic bile duct injury

- The **Stewart-Way classification** is based primarily on the **anatomic pattern** and **mechanism** of a particular injury and the presence of associated **vascular injury.**

The Stewart-Way classification of laparoscopic bile duct injury	
Class	**Criteria**
I.	**CBD mistaken** for **cystic duct** but **recognized**; cholangiogram incision of cystic duct extended into CBD
II.	**Lateral damage** to **common hepatic duct** from cautery or clips placed on duct; associated bleeding, poor visibility
III.	**CBD mistaken** for **cystic duct, not recognized**; CBD, CHD, RHD, LHD transected or resected
IV.	**RHD mistaken** for **cystic duct, RHA mistaken** for **cystic artery**, RHD and RHA transected; lateral damage to the RHD from cautery or clips placed on ducts

73. Ans. c. Type D *(Ref: Sabiston 19/e p1495; Shackelford 7/e p1381-1382)*

Bismuth Classification of Bile Duct Strictures	
Type 1	**Low** common hepatic duct stricture; hepatic duct **stump >2cm**[Q]
Type 2	Mid common hepatic duct **stump < 2 cm**[Q]
Type 3	**High** stricture **(hilar)**, no hepatic duct stump; **confluence intact**[Q]
Type 4	**Destruction of** the hilar **confluence**; right and left hepatic ducts separated[Q]
Type 5	Involvement of **aberrant right sectoral hepatic duct** alone **with or without** a concomitant **hepatic duct stricture**[Q]



Strasberg classficiation of postoperative bile duct strictures

- The **shortcomings** in **Bismuths classification** were that firstly it did not stipulate the **length** of the stricture, and secondly, and more importantly it did not take into account the presence of **biliary leaks**, which are more common after laparoscopic cholecystectomy.
- This, **latter fact** has been incorporated **in Strasberg's classification**; also patients with limited strictures, isolated right hepatic duct strictures or cystic duct leaks cannot be classified.

Strasberg Classification of Laparoscopic Biliary Injuries	
Type A	• **Bile leaks** from **minor ducts** still in continuity with the CBD[Q] • Includes **leakage from cystic duct** stump and from a **subvesical duct of Luschka**[Q] • **MC causes of biliary leaks** seen after laparoscopic cholecystectomy[Q]

Type B	• **Occlusion** of a part of the biliary tree, almost always an **aberrant right sectoral duct**[Q]
Type C	• **Transection without ligation** of an aberrant right sectoral duct[Q]
Type D	• A **lateral injury** to an **extrahepatic duct**[Q]
Type E	• Includes biliary strictures, divided into **E1 to E5** as classified by **Bismuth**

Other Classification System for Bile Duct Injuries

- Amsterdam Academic Medical Center's classification
- **Neuhaus' classification**
- **Csendes' classification**
- **Stewart-Way's** classification of laparoscopic bile duct injuries
- **Chinese University** of Hong Kong (CUHK) classification

74. **Ans. c. Type C**
75. **Ans. b. Type B**
76. **Ans. b. Occlusion of a branch of biliary tree**
77. **Ans. c. Sectoral duct injury with consequent leak**
78. **Ans. a. CBD stone, b. Cholangiocarcinoma, c. Chronic pancreatitis, d. Trauma** *(Ref: Sabiston 19/e p1503)*

Causes of Biliary Strictures		
Benign		**Malignant**
• **Congenital:** – **Biliary atresia**[Q] • **Operative injury:** – **Cholecystectomy**[Q] – **Choledochotomy**[Q] – Gastrectomy – Hepatic resection – Transplantation	• **Inflammatory:** – **Stones**[Q] – **Cholangitis** – Parasitic – **Pancreatitis**[Q] – **Sclerosing cholangitis**[Q] – Radiotherapy • **Trauma** • **Idiopathic**	• **Cholangiocarcinoma**[Q] • CA head of pancreas • Ampullary carcinoma • Metastasis to liver or biliary tract

- **MC cause** of **benign biliary stricture** is **laparoscopic cholecystectomy**.

79. **Ans. a. Type A**
80. **Ans. d Clinical observation** *(Ref: Sabiston 19/e p1496; Schwartz 9/e p1159; Bailey 26/e p1111, 25/e p1125-1127; Shackelford 7/e p1385)*

- "A **small amount of biliary drainage** following cholecystectomy should cause **no alarm** because it **usually disappears within 1 or 2 days**[Q]. However, **excessive biliary drainage** through the **wound** or **drain site, jaundice, sepsis** or a **combination of these events early in** the **post-operative period** should suggest a **bile duct injury**, as should **copious biliary drainage** for **more than few post-op days**[Q]."

81. **Ans. b. Percutaneous drainage** *(Ref: Sabiston 19/e p1496-1498; Schwartz 9/e p1159; Bailey 26/e p1111, 25/e p1125-1127; Blumgart 5/e p630-631; Shackelford 7/e p1385-1388)*

Management of the Bile Duct Injury Recognized After Cholecystectomy

- Patients with a **bile leak** will **present early**[Q]
- Patients with **postoperative biliary strictures** alone often present with jaundice or cholangitis **months to years** after the initial injury[Q].

Intraoperative Considerations

- The management of postoperative biliary strictures following ductal injury depends on the degree **of injury**, the presence of **stricture-induced complications**, and the **operative risk** of the patient.

Planning of the following specific goals
• **Control** the **infection** (abscess or cholangitis)[Q]
• **Drain the biloma**[Q]
• Complete the **cholangiography**[Q]
• Provide definitive therapy with **controlled reconstruction** or **stenting**[Q]

- **Independent predictors of stricture recurrence after an initial operative repair:**
  - **Cholangitis** before the initial repair
  - **Incomplete cholangiography**
  - **Primary repair within 3 weeks** of the bile duct injury
- If **immediate repair** is to be attempted, consultation with **more experienced surgeons** should be made.
- In those cases in which **expertise** is **not available** at the time of a recognized injury, or **difficult circumstances** preclude elaborate reconstructive attempts, **external biliary drains** will allow patient recovery and **transfer** to a **center of excellence**[Q].

Successful repair of biliary strictures requires adherence to specific surgical principles
• Use of **proximal bile duct** with **minimal inflammation**[Q] • Creation of a **tension-free anastomosis** with the use of a **Roux-en-Y jejunal limb**[Q] • Direct **mucosa-to-mucosa anastomosis**[Q]

- **Direct operative biliary-enteric bypass** is the **gold standard procedure**[Q] for the long-term treatment of biliary strictures. These procedures have low operative mortality and acceptable morbidity.
- The **Hepp-Couinaud approach** to **bile duct reconstruction** is the **best option**[Q] in most circumstances. This technique requires dissection of the hilar plate to expose the left hepatic duct and allow for a side-to-side anastomosis of the left hepatic duct to the Roux-en-Y jejunal limb.

Interventional Radiologic and Endoscopic Techniques

- These techniques allow:
  - **Percutaneous drainage** of abdominal fluid collections
  - **Preoperative identification** of the **ductal anatomy** through PTC
  - **Stricture dilation** with or without placement of **palliative stents** for bile drainage in the patient whose overall physiologic status precludes a major operation.
- **Percutaneous transhepatic dilation** can be employed in patients with intrahepatic ductal disease and in patients in whom **ERCP is not possible**.

• Success rate of **percutaneous transhepatic dilation** is **50–70%**[Q]. • Patients with **anastomotic strictures** (including **biliary-enteric anastomotic strictures**) have the **highest success rates**[Q]. • Treatment of biliary strictures with **interventional radiologic methods**, requires **multiple sessions of dilations**, and **nonischemic strictures** (**anastomotic strictures**) **respond best**[Q].

- **Endoscopic stenting** and **drainage** is a **successful treatment** option for **cystic duct leak** or **small common bile duct leaks** following laparoscopic cholecystectomy.
- **Ischemic biliary strictures** will **not respond permanently to dilation**. **Early retreatment** (through **repeat dilation** or **biliary-enteric reconstruction**) of postdilation recurrent strictures is **essential** to prevent secondary biliary cirrhosis[Q].

82. Ans. b. Percutaneous drainage of fluid *(Ref: Sabiston 19/e p1496; Schwartz 9/e p1159-1160; Bailey 26/e p1111, 25/e p1125-1127; Blumgart 5/e p628-629; Shackelford 7/e p1385)*

Goals of Therapy in Iatrogenic Bile Duct Injury

- **Control of infection limiting inflammation:**
  - Parenteral antibiotics[Q]
  - **Percutaneous drainage** of **periportal fluid collection**[Q]
- **Clear and thorough delineation of entire biliary anatomy:**
  - MRCP/PTC[Q]
  - ERCP (especially if cystic duct stump leak suspected)[Q]
- **Re-establishment of biliary enteric continuity:**
  - Tension-free, mucosa-to-mucosa anastomosis[Q]
  - Roux-en-Y hepaticojejunostomy[Q]
  - Long-term transanastomotic stents if involving bifurcation or higher[Q]

83. Ans. a. Ultrasound guided aspiration *(Ref: Blumgart 5/e p627)*

- **Many bile leaks resolve with percutaneous drainage alone, and ERCP is probably unnecessary in the absence of radiographic or clinical evidence of ongoing bile drainage.**

84. Ans. c. Computed tomography *(Ref: Blumgart 5/e p627)*

CT is **probably the best initial study**, the results of which **help direct further investigations**.

Radiological Investigations in Post-Cholecystectomy Bile Duct Injury

Duplex ultrasonography

- Excellent, noninvasive means of **showing intrahepatic ductal dilation** and may reveal a **subhepatic fluid collection** or **evidence of vascular damage**.
- May provide **valuable information** regarding the **level of biliary injury**, it is of **little value** in **assessing the extent of a stricture** and is of **no value if** the **biliary tree** is **decompressed**.

Computed tomography

- **CT** is **probably the best initial study**[Q], the results of which **help direct further investigations**.
- A **good quality CT scan** shows a **dilated biliary tree** and helps **localize the level of ductal obstruction** in patients with strictures.
- **CT identifies fluid collections** or **ascites**, which may suggest the **possibility of vascular damage**, and it **reveals lobar atrophy**[Q].

Percutaneous transhepatic cholangiography

- **PTC** is much more likely than ERCP to provide this information, and PTC remains the **standard investigation in this setting**[Q].

Magnetic resonance cholangiopancreatography

- **MRCP** has emerged as a valuable tool in **evaluating proximal bile duct injuries**
- This noninvasive modality provides striking images of the biliary tree and yields anatomic information in a single study that was previously obtainable only with CT and PTC

ERCP

- ERCP is **seldom of value** in the **precise diagnosis** of **complete proximal bile duct strictures** because there is **often discontinuity** of the **CBD** preventing visualization of the intrahepatic ductal system[Q].
- ERCP may be **more helpful for incomplete strictures (stenoses)**[Q]
- ERCP also has a **role in the diagnosis** and **treatment of patients** with **bile leakage from the cystic duct stump** or **from** a **laceration** of the **common duct**[Q]

Isotopic scanning techniques

- **HIDA scanning** offers a **dynamic** and **quantitative assessment of liver function** and of the **clearance of bile across anastomosis** and **stenosis**.
- In patients with **hepatocellular disease**, **HIDA scanning** may be valuable in **distinguishing** the contribution of the **biliary obstruction from** that of the **intrinsic liver disease** to the overall biochemical of isotope from a portion of the liver.

Arteriography and delayed-phase portography

- Can be obtained **to confirm vascular injury** on the initial studies, a **suspicion of portal hypertension** from the history and physical examination, or a **history of excessive bleeding** at the **time of cholecystectomy**.

85. Ans. d. Routine use of 'open' technique of laparoscopic port insertion has resulted in a decline in the incidence of post laparoscopic cholecystectomy bile duct injuries *(Ref: Sabiston 19/e p1491-1492; Bailey 26/e p1109-1110, 25/e p1123)*

- **Pneumoperitoneum** is created by use of **Hasson's canula** in **open technique** of laparoscopic port insertion.
- **Open technique** has resulted in **reduction of trocar induced vascular** and **bowel injuries**, not the incidence of post laparoscopic cholecystectomy bile duct injuries.
- **Open cholecystectomy** is associated with **reduced incidence** of **post laparoscopic cholecystectomy bile duct injuries as compared to laparoscopic cholecystectomy**.

86. Ans. d. Laparoscopic cholecystectomy operation **87. Ans. b. Trauma**

- **MC cause** of **benign biliary stricture** is **laparoscopic cholecystectomy (operative trauma)**[Q].

BILIARY FISTULA

88. Ans. c. Gallstones *(Ref: Blumgart 5/e p645-669; Shackelford 7/e p1385)*

Biliary Fistula

- **Internal fistulas** are spontaneous, rare, and occur without a significant collection of bile.
- **External fistulas** are more common and are often caused by iatrogenic injury after operations, invasive procedures, or trauma involving the biliary tract.

External Biliary Fistula

- **External fistulas** are more common and are often caused by iatrogenic injury after operations, invasive procedures, or trauma involving the biliary tract.

Etiology

- **Bile leakage** from the **cystic duct remnant**[Q]
- **Difficult** cases of **open cholecystectomy**[Q]
- **Central hepatectomy** and **caudate resection**[Q]
- Hepatic **cryotherapy** or **harmonic** scalpel use[Q]

Treatment

- Patients with **leaks from** the **cystic duct,** duct of **Luschka**, and **T-tube tract** are optimal candidates for **endoscopic treatment**[Q].
- Patients treated with **stents alone** experience equally good outcomes as patients treated with a combination of **stents** and **sphincterotomy**[Q]

89. **Ans. a. Gastric ulcer** *(Ref: Blumgart 5/e p644-657)*

Internal Biliary Fistula

- **Internal fistulas** are spontaneous, rare, and occur without a significant collection of bile.
- **Cholecystoduodenal** fistulas (72–80%) are **MC** biliary-enteric fistulas followed by **cholecystocolic** fistulas (8-12%[Q])
- **Most cholecystoduodenal fistula** are **asymptomatic**[Q].
- The site of fistula most commonly located in the **vaterian segment** of the **CBD** in case of the **choledochoduodenal fistula**[Q].

Etiology

- **Calculous biliary tract disease** (90%)[Q]
- **Duodenal ulcer** (6%)
- **Neoplasm**, trauma, parasitic infestation, and congenital anomalies (4%)

Diagnosis

- Only **one-third** of biliary-enteric fistulas will present with **air** in the **biliary tree**[Q].
- A **negative upper gastrointestinal series** in the presence of **pneumobilia** is an indication for a **barium enema**, which discloses greater than **95%** of **cholecystocolic fistulae**[Q].

Management

- In the **absence of obstruction**, **residual stones**, or **symptoms**, **except** for **cholecystogastric** and **cholecystocolic** fistulas, **no operation** should be performed because most fistulas **close spontaneously**[Q].
- For **cholecystocolic fistula**, **choledochotomy** is recommended as a **first step**, followed by **cholecystectomy**, and **finally takedown** and **repair** of the **fistula** to reduce bacterial contamination[Q].
- In other cases, the usual approach is repair of the fistula, then cholecystectomy and closure of the bowel.

SPHINCTER OF ODDI DYSKINESIA

90. **Ans. a. Transduodenal sphincteroplasty** *(Ref: Sabiston 19/e p1491; Shackelford 7/e p1333-1336)*

Sphincter of Oddi Dysfunction

- Pain similar to **biliary colic** with **normal LFT** and episodes of **acute pancreatitis** have been attributed to a poorly defined syndrome known as **Sphincter of Oddi dysfunction**[Q].
- The **pathogenesis** is **unclear**
- Postulated theories include gallstone migration inducing fibrosis of the sphincter, trauma, pancreatitis, and congenital anomalies.
- **Modified Milwaukee classification** is used for Biliary **Sphincter of Oddi dysfunction**[Q]

Types

- **Sphincter of Oddi Stenosis:**
  - Also known as **papillitis**[Q]
  - **Benign intrinsic obstruction** of the **CBD outlet**[Q]
- **Sphincter of Oddi Dyskinesis:**
  - It is an **intermittent functional blockage** of the high-pressure zone of the sphincter[Q]
  - **Basal pressure** is **elevated**, but administration of smooth muscle relaxants (**nitrates**) causes **decrease of the basal sphincter pressure** in functional dyskinesis[Q]

Clinical Features

- Pain similar to **biliary colic** with **normal LFT** and episodes of **acute pancreatitis**[Q]

Diagnosis

- A **dilated CBD** (>12 mm diameter) or **increase in CBD diameter in response** to **CCK** is a **typical ultrasound finding**[Q].
- **Endoscopic manometry** is considered **gold standard Q** for diagnosis

- **Nardi Test**[Q]**:** The most widely used **pharmacologic test** to assess sphincter function is the **morphine-prostigmine provocation test**[Q]

Treatment

- Treatment of choice: **Transduodenal sphincteroplasty** with **transampullary septectomy**[Q]

BILIARY TRACT DISEASES

91. Ans. b. Sarcoidosis *(Ref: Harrison 18th/329)*

Vanishing Bile Duct Syndrome

- Rare condition characterized by **decreased number of bile ducts** seen in **liver biopsy specimens**[Q]

Causes of Vanishing Bile Duct Syndrome	
• **Chronic rejection**[Q] after liver transplantation • **Graft-versus-host disease**[Q] after BM transplantation	• **Sarcoidosis**[Q] • Drugs: **Chlorpromazine**[Q] • **Idiopathic**[Q]

92. Ans. a. GVHD

BILIARY ATRESIA

93. Ans. c. Marked bile duct degeneration, d. Fibrosis of hepatic duct, e. Parenchymal cholestasis *(Ref: Sabiston 19/e p1852-1853; Schwartz 9/e p1438-1440, 10/e p1628-1630; Bailey 26/e p1104-1105, 25/e p1118-1119; Blumgart 5/e p595-603; Shackelford 7/e p1390-1396)*

Biliary Atresia

- Characterized by **progressive obliteration** of the **extrahepatic** and **intrahepatic** bile ducts[Q].
- **Etiology** is **unknown; incidence 1 in 12,000** live births[Q].
- Presently, there is **no medical therapy** to **reverse** the **obliterative process**[Q]
  - Patients who are **not offered surgical treatment** uniformly develop biliary cirrhosis, portal hypertension, and **death** by **2 years of age**[Q].
- **MC indication** for **pediatric liver transplantation**[Q]

Pathology

- **Bile duct proliferation**, **severe cholestasis** with **plugging**, and **inflammatory cell infiltrate** are the **pathologic hallmarks** of this disease[Q].
- Over time, these changes **progress to fibrosis** with **end-stage cirrhosis**[Q].
- Positive for neural cell adhesion molecule (**CD56**) staining

Variants of biliary atresia
• Patency to the level of CBD • Patency to the level of common hepatic duct • Left and right hepatic duct at porta involved, **solid porta hepatis (90%)**

Clinical Features

- Infants with biliary atresia present with **jaundice at birth** or **shortly thereafter**[Q].
- Infants with biliary atresia characteristically have **acholic, pale gray stools**, secondary to obstructed bile flow.
- With passage of time, **progressive failure to thrive** and, if untreated, develop **stigmata of liver failure** and **portal hypertension** (splenomegaly and esophageal varices)
- **Associated malformations** in **25%**: **Polysplenia, malrotation**, **preduodenal portal vein**, and **intrahepatic vena cava**[Q].

Diagnosis

- USG of the liver and GB is important in the evaluation of the infant with cholestasis.
  - **USG**: **GB** is **shrunken** and **CBD** is **not visible**[Q]. A **triangle cord sign**[Q] found on ultrasound has a **predictive accuracy** of **95%**, the **gallbladder ghost triad**[Q] in which the **gallbladder** is **short** (<1.9 cm) and **irregular** and **lacks an echogenic inner lining** also got good sensitivity.
- **Next diagnostic step:** Percutaneous **liver biopsy**[Q] if the hepatic synthetic function is normal (diagnostic accuracy 90%).
- **Hepatobiliary scintigraphy**: In cases in which the **USG** and **biopsy findings** are **inconclusive** (**absent excretion into the intestine**)[Q]

Treatment

- **Exploratory laparotomy**: If the needle biopsy or abdominal ultrasound is consistent with BA
- **Intra-operative cholecystocholangiography: To confirm** the **diagnosis**, demonstration of the **fibrotic biliary remnant** and definition of **absent proximal** and **distal bile duct patency**[Q]

  - Treatment of choice: **Kasai hepatoportoenterostomy**[Q] (Roux-en-Y hepaticojejunostomy)

Postoperative Management

- **Ursodeoxycholic acid** (facilitate bile flow) + **Methylprednisolone** (anti-inflammatory agent) + **TMP-SMX** (antimicrobial prophylaxis)[Q]

  - **Cholangitis** is the **MC** post-operative **complication**[Q].

Prognosis

- About **30%** of infants undergoing hepatoportoenterostomy **before 60 days** of age will have a **long-term successful outcome** and **not require liver transplantation**[Q].
- **Liver transplantation** in the patients who develop **progressive hepatic fibrosis** with resultant **portal hypertension** and progressive cholestasis[Q].
- **Serum bilirubin** at **3 months** after surgery seems to be **strongly predictive** of **long-term survival**[Q].

94. Ans. d. Liver biopsy *(Ref: Sabiston 19/e p; Schwartz 9/e p1439, 10/e p1628-1630; Bailey 25/e p1118-1119; Blumgart 5/e p598; Shackelford 7/e p1392)*

Biliary Atresia

- Evaluation of biliary anatomy begins with ultrasound.
- Other imaging modalities such as HIDA scintigraphy, MRCP and ERCP have been used with varying success.
- Although there are useful adjuncts, **liver biopsy is gold-standard for the diagnosis of biliary atresia** and can safely be done percutaneously under local anesthesia.

95. Ans. e. Age of 8 weeks *(Ref: Blumgart 5/e p600; Shackelford 7/e p1394)*

Major factors in successful outcome after Portoentreostomy	
• **Age** in days at diagnosis and initial surgery (30–60 days)[Q]	• Degree and extent of **fibrotic changes** in the liver[Q]
• **Length of time jaundice** was present before surgery[Q]	• **Need for phototherapy** as a neonate[Q]
• **Successful** and **persistent bile flow** postoperatively[Q]	• Technical aspects of the portoenterostomy and anastomosis[Q]
• **Size** and nature of the microscopic ducts **(>150 µm)**[Q]	• Presence of bile in hepatic lobular zone 1

96. Ans. c. Biliary atresia

PRIMARY SCLEROSING CHOLANGITIS

97. Ans. b. ITP *(Ref: Sabiston 19/e p1502-1503; Schwartz 9/e p1156, 10/e p1331; Bailey 26/e p1112-1113, 25/e p1127; Blumgart 5/e p603-615; Shackelford 7/e p1405-1414)*

Diseases Associated with PSC		
• **Chronic ulcerative colitis**[Q]	• Hypereosinophilia	• Sarcoidosis[Q]
• **Crohn's disease**[Q]	• Riedel's thyroiditis[Q]	• Glomerulonephritis
• Autoimmune hepatitis	• Celiac disease	• Retroperitoneal fibrosis[Q]
• Chronic pancreatitis	• Autoimmune hemolytic anemia	• Systemic sclerosis
	• Sicca syndrome	

Primary Sclerosing Cholangitis

- PSC is a **cholestatic liver disease** characterized by **fibrotic strictures** involving the **intrahepatic** and **extrahepatic biliary tree**[Q] in the absence of a known precipitating cause.
- More common in HLA **B8/DR3**[Q]

  - The **incidence** of **UC** in **PSC** ranges from **75–80%**[Q].
  - **PSC** is **present** in **5.5%** of patients with **chronic UC**[Q].

- Patients with PSC are at **increased risk** for developing **cholangiocarcinoma**[Q].
- **Smoking** is **protective** in **UC** and **PSC**[Q].

Pathology

- **Cholangiocytes**[Q], epithelial cells that lines the bile duct are **target cell** of injury in PSC.
- Histologic finding of "**onion skin appearance**"[Q] is **pathognomic** of PSC, but seen in **<10%** cases.

> - Involvement of **large intrahepatic** and **extrahepatic duct**[Q] distinguishes PSC from PBC.
> - **Absence of the smallest intrahepatic ducts** leading to a **reduction in the branching** of the biliary tree (give rise to **pruned-tree appearance**[Q] on direct cholangiography).

- Histologic changes in the same liver can be **markedly varied** from **segment to segment**[Q] at any given time.

Clinical Features

- More common in **males**[Q], mean age at presentation is **40–45 years**[Q]
- About **75% of patients** are **symptomatic**[Q] at presentation with evidence of cholestatic liver disease such as **jaundice, pruritus**, and **fatigue**[Q].
- Symptoms of bacterial cholangitis are uncommon.
- The condition is characterized by **relapses** and **remissions**[Q], with quiescent periods.
- The median survival from the time of diagnosis ranges from 10 to 12 years.

Diagnosis

- **Asymptomatic elevation** of **GGT** is the **earliest finding**[Q], ALP and bile acids are also increased.
- **Normal ALP does not always rule out** diagnosis of **PSC**[Q].
- **Cholangiography confirms** the **diagnosis of PSC** with evidence of **diffuse multifocal strictures** found in both **intrahepatic** and **extrahepatic bile ducts**[Q].

ERCP Findings in PSC

- **ERCP** is the **gold standard**[Q] for diagnosis of PSC.
- Typical cholangiographic findings of PSC: **Multifocal stricturing** and **beading**[Q] throughout the biliary tree
- **Beaded** or **pruned tree appearance**[Q] is characteristic on cholangiography.
- On ERCP **pseudodiverticula**[Q] (tiny diverticulum like outpouchings) of the extrahepatic bile ducts are **nearly pathognomonic** of **PSC,** seen in **one fourth** of the cases.
- The **hepatic duct bifurcation** is the **most severely strictured**[Q] segment of the biliary tree.

Treatment

- Medical therapy for PSC include **high dose UDCA**[Q] (**25–30 mg**/kg/day).
- **Recurrent biliary sepsis**: Managed with **antibiotics** and surveillance
- **Biliary strictures**: **Dilated** or **stented** using either the percutaneous or endoscopic route.
- **Liver transplantation** has produced **excellent results** in **PSC** and **end-stage liver disease**[Q]
- **Cholestyramine**, **Phenobarbital**, **Ursodeoxycholic acid**, Hydroxyzine, Rifampin and Naltrexone are the drugs approved for the **treatment of pruritus**[Q].

> - **Colectomy** has **no effect on the course of PSC**[Q].

- **Smoking** is **protective** in: **PSC** and **UC**[Q]
- **PSC** and **Cholangiocarcinoma** is **more common** in **males**[Q].
- **PBC** is **more common** in **females**[Q].
- **Colectomy** has **no effect on the course of PSC**[Q].

98. Ans. a. PSC in UC, the association is 30%

99. Ans. a. Primary sclerosing cholangitis

100. Ans. b. Cholangiocarcinoma

101. Ans. b. Primary sclerosing cholangitis

102. Ans. a. Cholangiocarcinoma is always intrahepatic

103. Ans. c. Most patients presents with advanced disease

104. Ans. c. Cirrhosis never occurs

105. Ans. d. PSC reverts after a total colectomy

- Patients with **PSC** and **ulcerative colitis** typically have a **more quiescent disease course**[Q]
- The **risk for colon cancer** in these patients is **up to five times greater** than in patients with **ulcerative colitis alone**. These tumors are **more likely to arise proximal** to the **splenic flexure**.
- **PSC** is **progressive** and **ultimately fatal unless liver transplantation** is **undertaken**[Q]. **Colectomy** has **no effect on the course of PSC**[Q].

106. Ans. b. Sclerosing cholangitis

107. Ans. d. Primary sclerosing cholangitis resolves after total colectomy

PRIMARY BILIARY CIRRHOSIS

108. Ans. a. Primary biliary cirrhosis *(Ref: Sabiston 19/e p657; Bailey 26/e p1178-1079, 25/e p1093; Blumgart 5/e p1085-1086; Shackelford 7/e p1441)*

Primary Biliary Cirrhosis

- Believed to be an **autoimmune etiology**, leading to **progressive destruction** of **intrahepatic bile ducts**Q
- More common in **females**Q
- Associated with autoimmune disorders (**CREST**, **Sicca syndrome, Autoimmune thyroiditis, Renal tubular acidosis**)Q.

Pathology

- Florid duct lesion is characterized by **lymphocytic** or **granulomatous bile duct infiltration**Q.
- In the setting of **positive AMA**, the **florid duct lesion** is **essentially diagnostic**Q.

Clinical Features

- **Most patients** are **asymptomatic**, **pruritus** is the **commonest** and **earliest symptom**Q.
- **Pruritus precedes jaundice in PBC**Q
- **Jaundice**, **fatigue**, **melanosis**Q (gradual darkening of exposed areas of skin), deficiency of fat soluble vitamins due to malabsorption.
- **Xanthomas** and **xanthelesmas**Q due to protracted elevation of serum lipids.

Laboratory findings

- **Increased ALP**, **hyperlipidemia** and **positive antimitochondrial antibody**Q.

Treatment

- **Cholestyramine** is **mainstay** of treatment of **pruritus**Q.
- **Ursodeoxycholic acid** is associated with **significant delay** to time of transplantationQ.
- **Transplantation** in PBC may also be indicated for **intolerable lethargy** or **intractable pruritus**Q.

Prognosis

- **Serum bilirubin** is the **best guide** to **prognosis**Q.

109. Ans. b. Pruritus

110. Ans. a. Generalized pruritus, c. Fatigue

111. Ans. a. No increase in risk of hepatocellular carcinoma

112. Ans. a. Pruritus

RECURRENT PYOGENIC CHOLANGITIS

113. Ans. d. GB stones are present in >50% cases *(Ref: Sabiston 19/e p1501; Blumgart 5/e p680-697)*

GB stones are present in **<50%** cases**Q.**

Recurrent Pyogenic Cholangitis

- **Cholangiohepatitis** or **intrahepatic stones** are endemic in **East Asia**Q.
- **More common** in people with **poor economic status**Q and living standards.
- **Increases risk** for **cholangiocarcinoma**Q

Etiopathogenesis

- Infection is caused by **bacterial contamination**, usually **biliary pathogens**, and **biliary parasites**, such as **Clonorchis sinensis, Opisthorchis viverrini,** and **Ascaris lumbricoides**Q.
- **Partial obstruction** of **biliary tree** caused by **biliary sludge** and **dead bacterial cell bodies, which** form **brown pigment stones**Q

Clinical Features

- Patients present with frequent episodes of pain, fever, and jaundice.
- **Biliary strictures** and **repeated episodes of cholangitis**Q are the common, may lead to liver abscesses and cirrhosis.
- **GB stones** are present in **<50%** cases**Q**

Diagnosis

- **MRCP** and **PTC:**
  - **Primary imaging modalities** for monitoring of **disease progression**Q
  - Identifying **location** and **severity** of stones and **strictures**Q
  - **Allow decompression** of the biliary tree in a septic patient.

Treatment

- Treated with a **multidisciplinary approach** (endoscopy, interventional radiology, and surgery)
- The long-term goal of therapy is to **extract stones**, **remove debris**, and **relieve strictures**.
- **Roux-en-Y hepaticojejunostomy**Q with a subcutaneous afferent limb (**Hudson loop**Q) is a safe and effective way to provide **access to** the **biliary tree** for **stone extractions**Q.

CHOLANGIOCARCINOMA PREDISPOSING FACTORS

114. Ans. d. Aflatoxin *(Ref: Sabiston 19/e p1508-1509; Schwartz 10/e p1335-1338, 9/e p1162; Bailey 26/e p1114-1115, 25/e p1128-1129; Blumgart 5/e p; Shackelford 7/e p1370)*

Risk factors for Cholangiocarcinoma	
• **Choledochal cyst**[Q]	• RPC or **hepatolithiasis**[Q]
• **Primary sclerosing cholangitis**[Q]	• **Biliary enteric anastomosis**[Q]
• **Ulcerative colitis**[Q]	• **HBV, HIV, HCV**[Q]
• **Choledocholithiasis**[Q]	• **Radon**
• **Clonorchis sinensis and Opisthorchis viverrini**[Q]	• **A**sbestos, **N**itrosamines, **D**ioxin **(AND)**[Q]
• **Cirrhosis**[Q]	• **D**iabetes, **O**besity, **O**CPs, **S**moking, **T**horotrast, **I**soniazid **(DOSTI)**[Q]

115. Ans. b. Cholelithiasis

- **Choledocholithiasis, not the cholelithiasis** is a **risk factor** for **cholangiocarcinoma**[Q].

116. Ans. d. All of the above *(Ref: Sabiston 19/e p1504)*

Anomalous Pancreaticobiliary Duct Junction (APBDJ)

- An anomalous pancreaticobiliary union is considered to be present when the **common channel** is **longer than 15 mm.**

Three types of APBDJ
• **Bp Type or Type 2: Insertion of** the **bile duct** is **in** the **pancreatic duct**
• **Pb Type or Type 1: Pancreatic duct** appears to **join** the **common bile duct**
• **Y type: Long common channel**

- **Choledochal cyst** is the **MC associated abnormality**[Q].
- **APBDJ** is seen **gallbladder cancer**; **gallbladder adenomyomatosis**; **cholangiocarcinoma**; and **pancreatitis**[Q].

117. Ans. a. PSC

118. Ans. b. Clonorchis sinensis

119. Ans. d. Chronic pancreatitis

120. Ans. None

121. Ans. a. Hydatid cyst of liver

122. Ans. None

CHOLANGIOCARCINOMA

123. Ans. c. Involvement of right branch of portal vein *(Ref: Sabiston 19/e p1508-1512; Schwartz 10/e p1335-1338, 9/e p1162; Bailey 26/e p1114-1116, 25/e p1128-1129; Blumgart 5/e p771-788; Shackelford 7/e p1370-1378)*

Cholangiocarcinoma

- Tumors arising from bile duct epithelium
- **MC type** is **adenocarcinoma**[Q]
- Differentiated by anatomic site of origin: **Intrahepatic** (10%), **hilar (65%)**[Q] and **distal** (25%).
- Hilar cholangiocarcinoma is also known as **Klatskin tumor**[Q]
- **MC gene mutation**: **K-ras >p16 (KRAP-16)**[Q]

Pathology

- Based on **macroscopic growth pattern** divided into:

Sclerosing	Nodular	Papillary
• **MC type**[Q]	• Result in **mass lesion**[Q]	• **Rare**
• Causes **intense desmoplastic reaction**[Q]	• Usually **intrahepatic**[Q]	• **Low grade** adenocarcinoma
• Seen as **diffuse thickening** of the **ducts** without a defined mass[Q].		• Represented by **polypoidal mass filling the lumen** of bile duct[Q]
• This form is **most difficult to treat**[Q].		• **Minimal invasion** and **no desmoplastic reaction**[Q].
		• More common in **distal CBD**[Q]
		• Associated with **favorable outcome**[Q].

Clinical Features

- **Painless jaundice (70–90%)** is **MC symptom**[Q] of cholangiocarcinoma, followed by **pruritus** (66%), **abdominal pain**, **weight loss** (30–50%), **fever** (20%).

- **Distant metastasis** occurs in **one third**[Q] of patients.
- **MC site** of metastasis: **Lung** or **mediastinum**, liver and peritoneum.
- **Tumor markers: CA19-9**[Q]**, CEA,** MUC1, MUC5AC, CK19, and CK7.
- **Raised CA19-9** is a **poor prognostic factor**[Q] in cholangiocarcinoma.

Diagnosis

- **MRI/MRCP** is an **ideal imaging**[Q] modality for cholangiocarcinoma.
- **Duplex ultrasonography** and **MRCP** are the principal radiographic techniques used to image hilar cholangiocarcinoma.
- **MDCT** is the **first examination** in the pre-operative management of **hilar cholangiocarcinoma**[Q]

Radiological Features of Cholangiocarcinoma
• **Concentric stricturing**[Q], which sometimes appears **shouldered**, polypoid appearance is rare
• Mucin producing cholangiocarcinoma can produce **strand-like filling defects**[Q] caused by mucin
• Length of stricture is **at least 1 cm**
• **Golf-tree appearance** is seen in **papillary cancer**[Q] involving extra-hepatic bile duct

Treatment

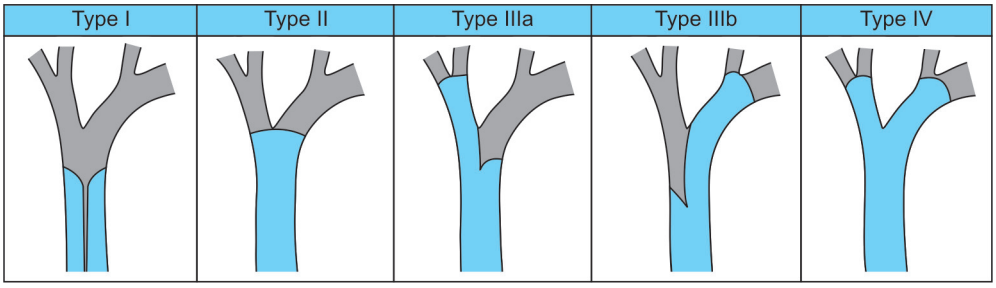
Perihilar cholangiocarcinoma	**CBD resection + Lymphadenectomy + Hepatic resection**[Q]
Intrahepatic cholangiocarcinoma	**Hepatic resection**[Q]
Distal cholangiocarcinoma	Pancreaticoduodenectomy **(Whipple's procedure)**[Q]

Prognosis

- **Predictors of improved survival are: well-differentiated** tumors; **negative-resection margin** and the performance of a **concomitant hepatic resection**[Q].
- **Pattern of failure after curative resection** includes peritoneal spread, hepatic metastasis, local extra-hepatic recurrence and distant metastasis (**most commonly lung**)[Q].
- **Surgery** is generally **not indicated** for **recurrent cholangiocarcinoma**[Q].

Palliation

- **Chemotherapy: Gemcitabine + Cisplatin**[Q] is the reference regimen



Bismuth-Corlette classification of tumor involvement.

Bismuth-Corelette Classification of Hilar Cholangiocarcinoma	
Type	**Criteria**
I	Tumor **confined to hepatic duct**, not involving the main biliary confluence[Q]
II	Tumor involving the **main biliary confluence** but not extending to the right or left ducts[Q]
IIIa	Tumor **extending upto** the **right secondary biliary confluence**[Q]
IIIb	Tumor extending upto the **left** secondary biliary confluence[Q]
IV	Tumor extending **bilaterally** to the secondary biliary confluence[Q]

Criteria of Un-resectability in Hilar Cholangiocarcinoma

- **Hepatic duct involvement** up to **secondary radicals bilaterally**[Q]
- **Encasement** or occlusion of the **main portal vein** proximal to its bifurcation[Q]
- **Atrophy** of one lobe with **encasement** of **contralateral portal vein** branch[Q]
- **Atrophy** of one lobe with **contralateral** involvement of **secondary biliary radicals**[Q]

- Histologically proven **metastasis to N2** lymph nodes[Q]
- **Liver, lung** or **peritoneal metastasis**
- In hilar cholangiocarcinoma, several **early branches of left hepatic duct drain the caudate lobe** and can be **involved early** with the tumor.
- Consideration for routine **caudate lobectomy** should be made in these cases.

Palliation in Cholangiocarcinoma

Surgical Bypass

- Unresectable disease at the time of open exploration- **surgical biliary bypass** offers **more durable palliation**[Q]
- **Segment 3** or **5 bypass** is used in patients with **advanced perihilar cholangiocarcinoma** with predominantly **right**-or-**left sided** disease respectively[Q].
- **Segment III bypass** yield **1-year patency rate** of **80%** and it is usually **far from** the **main tumor** and remains **patent for a long time** despite disease progression[Q].

Stenting

- **Hilar obstructions** are best approached through the **percutaneous transhepatic route**[Q]
- **Distal CBD obstruction** is **stented** through **endoscopy (ERCP**[Q]**)**
- **30%** of the **hepatic parenchyma drained** and functional to **alleviate jaundice and pruritus**[Q]

Indications for Biliary Decompression in Inoperable Cholangiocarcinoma

- **Intractable pruritus**
- **Cholangitis**[Q]
- The need of access for **intra-luminal radiotherapy**[Q]
- To allow **recovery of hepatic function** in patients receiving chemotherapeutic agents[Q]

Newer Treatment Modalities in Cholangiocarcinoma

- **Rebeccamycin**[Q] analogue, which is a novel antitumor antibiotic with both **topoisomerase I and II activity** as well as **DNA intercalating properties**, appeared to have promising activity, with median survival of 10 months in phase 2 study.
- **Photodynamic therapy**[Q] is a new approach used to treat **endoluminal lesions of lung** and **esophagus**. Tumors of biliary tract frequently encroach the lumen of the bile duct, and photodynamic therapy is **being evaluated** in **cholangiocarcinoma**, with preliminary evidence of activity in some patients.

124. Ans. a. Division of both ducts and not extending outside

125. Ans. a. Scirrhous type has better prognosis than papillary

126. Ans. c. Common hepatic duct tumor

- Hilar cholangiocarcinoma is also known as **Klatskin tumor**[Q]

127. Ans. b. Hilum

128. Ans. a. Sclerosing variety is most common

129. Ans. c. Schirrhous type

130. Ans. d. Atrophy of one lobe with ipsilateral involvement of secondary biliary radicals

131. Ans. d. Hepatic atrophy with ipsilateral bile duct involvement

132. Ans. c. Proximal cholangiocarcinoma

HEMOBILIA

133. Ans. b. Iatrogenic *(Ref: Sabiston 19/e p1567-1468; Blumgart 5/e p1832-1843; Shackelford 7/e p1487)*

Hemobilia

- Bleeding into the biliary tract from an **abnormal arterial source** to **intrahepatic biliary tract** fistula
- Portal venous bleeding into the biliary tree is rare, minor, and self-limited
- **Arterial hemobilia** is the **MC source**[Q]

Etiology

- **Trauma:**
  - **Iatrogenic trauma** (**PTC**) is the **MC cause**[Q]
  - **Blunt trauma** is more common cause than penetrating trauma

- Gallstones
- Vascular pathology: Aneurysm, angiodysplasia, hemangioma
- Uncommon causes: Malignancy, parasitic infestation, liver abscess, cholangitis

Clinical Features

- Characterized by **Quinck's triad**: **GI hemorrhage + biliary colic + jaundice**[Q].
- **Presentation**: **Melena (90%)**[Q], **hematemesis** (60%), **biliary colic** (70%), and **jaundice** (60%).
- Tendency for **delayed presentations** (up to weeks) and **recurrent brisk** but **limited bleeding** over months and even years[Q].

Diagnosis

- **Endoscopy: First investigation**[Q] to be done (visualize bleeding from the ampulla of Vater)
- **Angiography: Investigation of choice**[Q] (reveal the source of bleeding in 90%)
- **Transarterial embolization** is **curative** in **major hemobilia**[Q]

Treatment

- Treatment is focused on **stopping bleeding** and **relieving biliary obstruction**[Q].
- Most cases of **minor hemobilia** can be **managed conservatively**[Q] with correction of coagulopathy, adequate biliary drainage and close observation.

> - **First line therapy** for **major hemobilia**: **Transarterial embolization (TAE)**[Q]
> - **TAE** is **curative** in **major hemobilia** (success rates of 80-100%)[Q]
> - **Surgery**: When **conservative therapy** and **TAE** have **failed**.

- **Surgical approaches**: **Ligation of bleeding vessels**, **excision of aneurysm**, or nonselective ligation of a main hepatic artery[Q].

134. Ans. b. Fever **135. Ans. a. Hemobilia** **136. Ans. d. Hepatitis**

137. Ans. b. Fever **138. Ans. a. Triad of jaundice, pain, melena**

BILHEMIA

139. Ans. a. ERCP *(Ref: Sabiston 19/e p1469; Blumgart 5/e p1843-1844; Shackelford 7/e p1488)*

Bilhemia

- Bilhemia is an **extremely rare condition**
- **Bile flows** into the **bloodstream** either through the **hepatic veins** or **portal vein branches**[Q]

Etiology

- **High intrabiliary pressure**, exceeding that of the venous system (**CBD stone**)[Q]
- **Gallstones** eroding into the portal vein
- Accidental or iatrogenic **trauma**

Clinical Features

- **Rapidly increasing jaundice**, **marked direct hyperbilirubinemia** (without elevation of hepatocellular enzymes) and **septicemia**[Q].
- The condition **can be fatal** secondary to **embolization** of large amounts of **bile into** the **lungs**[Q].
- Most often, **bile flow is low**, and the **fistula spontaneously closes**[Q].

Diagnosis

- **ERCP** is **investigation of choice** (**diagnostic** and **therapeutic**)[Q]

Treatment

- Treatment is directed at **lowering intrabiliary pressures** either through **stents** or **sphincterotomy**[Q]

140. Ans. d. Patient has hyperbilirubinemia with raised enzymes.

MISCELLANEOUS

141. Ans. b. Anterior to first part of duodenum *(Ref: BDC 4th/vol-II/275-276; Snell's 8th/250; Sabiston 19/e p1476-1480; Schwartz 10/e p1268, 1310-1311, 9/e p1137-1138; Bailey 26/e p1097, 25/e p1111; Blumgart 5/e p43-47; Shackelford 7/e p1290-1293)*

Bile Duct: Anatomy and Physiology

Anatomy

- It lies in front of the portal vein and to the **right of** the **hepatic artery**[Q].
- The common hepatic duct is **1–4 cm** in **length** and has a **diameter** of approx. **4 mm**[Q].

- The **CBD** is about **7–11 cm** in length and **5–10 mm** in diameter[Q].
- A **fibroareolar tissue** containing **scant smooth muscle** surround the mucosa (a **distinct muscle layer** is **absent**)[Q].
- The most important **arteries** to the supraduodenal bile duct run parallel to the duct at the **3** and **9 o' clock**[Q] positions.
  - Approximately **60%** of the blood supply to the supraduodenal bile duct originates **inferiorly** from the **pancreaticoduodenal** and **retroduodenal arteries**[Q].
  - Whereas **38%** of the blood supply originate **superiorly** from the **right hepatic artery** and **cystic duct artery**[Q].
- The epithelial surface of the duct is generally flat except for **tiny pits** in the mucosa known as **sacculi of Beale**[Q], which are luminal openings for the intramural mucous glands.

Physiology

- The **wall** of the CBD contain only **thin, longitudinally oriented** layers of **smooth muscle** of which major tissue component seems to be **elastic fibers**[Q].
  - The human **CBD** does **not have** a primary **propulsive function**, the **elastic fibers** and the **longitudinally oriented smooth muscle** provides a **tonic pressure** which help to overcome the tonic resistance of the sphincter of Oddi[Q].
- After the ingestion of a meal, bile flow across the sphincter of Oddi is promoted by inhibition or reduction in the amplitude of the phasic contraction and a decrease in the sphincter of Oddi basal pressure.
- The phasic contractions propel small volumes of bile into the duodenum but the **main function** is to **prevent reflux** of **duodenal contents** into either the **bile** or the **pancreatic ducts** and to maintain the ducts **free** of **small debris**[Q].

- **Ultrasound** measurement records the **nondistended lumen**, whereas at **ERCP**, contrast material produces **distension**, **intraoperative measurements** include **wall thickness**[Q].
- In general, the normal diameter of the common bile duct as determined by **ultrasound** is **<6 mm**, by **ERCP <10 mm**, and by **intraoperative** extraluminal measurements **<12 mm**[Q].

142. Ans. d. Usually opens into duodenum separate from the main pancreatic duct

143. Ans. c. Anteriorly related to 1st part of duodenum *(Ref: BDC 4th/vol-II/275-276; Snell's 8th/250; Sabiston 19/e p1476-1480)*

Common Bile Duct

- The **common bile** or **hepatic duct runs** along the **right side of the hepatoduodenal ligament** (**free edge of the lesser omentum**) to the **right of the hepatic artery** and **anterior to the portal vein**[Q].
- The common bile duct **continues inferiorly** (usually **10–15 cm**[Q] in **length** and **6 mm**[Q] **in diameter**) **behind** the **first portion of the duodenum** and **into** the **head** of the **pancreas** in an inferior and slightly rightward direction.
- **The intrapancreatic distal CBD** then **joins with** the **main pancreatic duct** (of **Wirsung**), with or without a common channel, and **enters** the **2nd portion** of the **duodenum** through the major papilla of Vater.
- At the choledochoduodenal junction, a complex muscular complex known as the **sphincter of Oddi regulates bile flow** and **prevents reflux of duodenal contents** into the **biliary tree**[Q].

144. Ans. a. Vessels that run upward along the bile duct from the duodenal end of the duct such as the retroduodenal and gastroduodenal arteries *(Ref: BDC 4th/vol-II/275-276; Snell's 8th/250; Sabiston 19/e p1476-1480)*

Vascular Supply of Biliary Tract

- The **supraduodenal** and **infrahilar bile duct** are predominantly **supplied by two axial vessels** that run in a **3-** and **9-o'clock position**[Q].
  - These vessels are **derived from** the **superior pancreaticoduodenal, right hepatic, cystic, gastroduodenal,** and **retroduodenal arteries**[Q].
- It has been estimated that **only 2%** of the **arterial supply** to this portion of the bile duct is **segmental** and **arises directly** off of the **proper hepatic artery**.
- The **bile duct** and its **bifurcation** in the hilum **derive their arterial supply** from a rich network of **multiple small branches** from surrounding vessels.
- **Retropancreatic bile duct** derives its **arterial supply from** the **retroduodenal artery**.
- **Venous drainage** of the **bile duct parallels** the **arterial supply** and **drains into** the **portal venous system**.
  - The **venous drainage** of the **gallbladder empties into** the **veins** that **drain the bile duct** and **does not flow directly** to the **portal vein**[Q].

145. Ans. b. Rupture of hydatid cyst *(Ref: Sabiston 18th/1570; Bailey 25/e p1190)*

Causes of Pneumobilia	
• Previous surgery (Papillotomy, choledochojejunostomy, ERCP with sphincterotomy) • Gallstone ileus • Emphysematous cholecystitis	• Choledochoduodenal or cholecystocolic fistula • Tracheobiliary fistula • Suppurative cholangitis • Mirizzi's syndrome (due to cholecystoenteric fistula)

146. Ans. a. Gallstone ileus > b. Mirizzi's syndrome

147. Ans. a. 7 cm (*Ref: Grays 39/e p1228)*

148. Ans. c. Use of heavily T2-weighted image without contrast to create the three dimensional image of the biliary tree using MIP algorithm *(Ref: Blumgart Surgery of Liver, Biliary Tract and Pancreas 5/e p315-315)*

MRI cholangiography and **MRI cholangiopancreatography** (**MRCP**) are imaging techniques used to **evaluate** the **biliary system**.
Heavily T2-weighted images are used to **provide an overview of the biliary system** and **pancreatic duct**.
Excellent diagnostic-quality images are obtainable, with **high sensitivity and specificity** for evaluation of **biliary duct dilation, strictures, and intraductal abnormalities**.

Magnetic Resonance Cholangiopancreatography

- The **basic principle of MRCP** is to use **T2-weighted images**, in which **stationary or slowly moving fluid, including bile**, is **high in signal intensity**; **all the surrounding tissues**, including **retroperitoneal fat** and the **solid visceral organs**, are **lower in signal**.
- MR-specific techniques for obtaining cholangiographic images include two-dimensional and three-dimensional sequences, breath-hold or non–breath-hold techniques, and respiratory gated techniques.
- **MRCP** plays an **important role in imaging benign disorders of the biliary and pancreatic system**, and it is **part of a comprehensive imaging evaluation of malignancies of the biliary system**.
- **MRCP** is **noninvasive, eliminating the morbidity associated with ERCP or PTC**.
- An **additional advantage of MRCP** includes **visualization of the extrabiliary anatomy, allowing for exclusion** or **inclusion of alternative diagnoses.**
- **Surgical clips** may **create an artifact** known as susceptibility, which may obscure the region of interest by producing areas of signal void. **This artifact may mimic a stone**, so caution must be used in evaluating MRCP images in postoperative patients to avoid a false-positive diagnosis.

MIP (Maximum Intensity Projection) Algorithm

- CE FAST (Fourier-acquired steady state) or FSE (Fat spinal echo) require **image processing** with a **maximum intensity projection** (MIP) algorithm, allowing **rotation of summed image** and **display of the cholangiogram to best advantage**.

CHAPTER 8

Pancreas

MULTIPLE CHOICE QUESTIONS

ACUTE PANCREATITIS: ETIOLOGY AND RISK FACTORS

1. Which of the following is the most common non-alcoholic cause of acute pancreatitis? *(COMEDK 2008, 2007)*
a. Thiazides b. Hypercalcemia
c. Hyperlipidemia d. Gallstones

2. The commonest cause of acute pancreatitis is: *(COMEDK 2008)*
a. Biliary calculi b. Alcohol abuse
c. Infective d. Idiopathic

3. Acute pancreatitis is caused by: *(PGI June 2002)*
a. Gallstone b. Alcohol
c. Starvation d. Hypercalcemia
e. Hypertriglyceridemia

4. Pancreatitis may be produced by following drug: *(PGI Dec 96)*
a. Colchicine b. L-Asperaginase
c. Ciprofloxacin d. Nalidixic acid

5. Common cause (s) of acute pancreatitis is/are: *(PGI Dec 2000)*
a. Alcohol b. Gallstone
c. Primary biliary cirrhosis d. L- Asperaginase

6. Pancreatitis caused by: *(PGI Dec 2002)*
a. Ascending cholangitis b. ↑ed PTH
c. CBD stone d. Alcohol
e. Starvation

7. Most common complication after ERCP is: *(AIIMS May 2007)*
a. Acute pancreatitis b. Acute cholangitis
c. Acute cholecystitis d. Duodenal perforation

8. Post-operative pancreatitis is seen in which type of surgery? *(MHSSMCET 2005)*
a. Billroth type I b. Splenectomy
c. Nephrectomy d. Cardiopulmonary Bypass

9. Which of the investigation can itself leads to acute pancreatitis? *(MCI March 2005)*
a. USG b. CT scan
c. ERCP d. MRI scan

10. Which of the following is not an etiological factor for pancreatitis? *(AIIMS May 2014)*
a. Abdominal trauma
b. Hyperlipidemia
c. Islet cell hyperplasia
d. Germline mutations in the cationic trypsinogen gene

ACUTE PANCREATITIS: CLINICAL FEATURES, DIAGNOSIS AND TREATMENT

11. Which of the following does not cause an increase in serum amylase? *(COMEDK 2008)*
a. Pancreatitis b. Carcinoma lung
c. Renal failure d. Cardiac failure

12. Poor prognostic factor in a patient with acute pancreatitis: *(NEET Pattern, JIPMER 2011)*
a. Leucocytosis >20,000/μL b. ↓ serum amylase
c. ↓ serum lipase d. Diastolic BP >90 mmHg

13. A lady presents with three day history of epigastric pain radiating to back serum amylase levels were observed to be normal while USG abdomen reveals gallbladder stones and an enlarged pancreas. CT scan was done which clinched the diagnosis. Which of the following is the most likely diagnosis? *(All India 2011)*
a. Acute cholecystitis b. Acute pancreatitis
c. Acute appendicitis d. Acute peritonitis

14. Medical treatment of acute pancreatitis includes:
a. Calcium b. Glucagon *(PGI Nov 2011)*
c. Aprotinin d. Cholestyramine
e. Antibiotics

15. Which of the following criteria is/are not included in Ranson's scoring? *(PGI Nov 2011)*
a. WBC>16,000/μl b. Serum amylase >350 IU
c. Age >55 years d. Serum LDH >700 IU
e. Serum AST >250 U/dL

16. Hyperamylasemia is seen in all except: *(PGI May 2011)*
a. Peritonitis
b. Acute pancreatitis
c. Carcinoma esophagus
d. Ruptured ectopic pregnancy
e. Perforated peptic ulcer

17. Ranson's scoring for acute pancreatitis includes: *(PGI May 2011)*
a. Age >55 years b. WBC >16,000/μL
c. Sequestration of fluid >6L d. BUN >10 mg/dl
e. LDH >700 IU

18. Which of the following is most diagnostic investigation for acute pancreatitis? *(MHPGMCET 2003)*
a. Serum amylase b. Serum lipase
c. Serum P-isoamylase d. Serum LDH

19. Which of the following is not a feature of acute pancreatitis? *(DNB 2011, Orissa 2011)*
a. Hyperbilirubinemia b. Hypercalcemia
c. Hyperglycemia d. Increased serum LDH level

20. Which of the following types of pancreatitis has the best prognosis? *(APPG 2005, All India 2004)*
a. Alcoholic pancreatitis
b. Gallstone induced pancreatitis
c. Post operative pancreatitis
d. Idiopathic pancreatitis

21. Which one is not the bad prognostic sign for pancreatitis? *(AIIMS June 2000)*
a. TLC >16,000/μL
b. Calcium <8 mmol/L
c. Glucose >200 mg%
d. Prothrombin >2 times the control

22. Which one is not poor prognostic factor for acute pancreatitis? *(AIIMS Nov 99)*
a. Hyperglycemia b. Hypocalcemia
c. Raised LDH level in blood d. Hyperamylasemia

23. Poor prognostic factor in acute pancreatitis is: *(PGI Dec 96)*
a. Increased serum amylase b. Decreased calcium
c. Decreased blood sugar d. Decreased PaO_2

24. Which of the following is associated with poor prognosis in acute pancreatitis? *(PGI June 95)*
a. Hypocalcemia b. Hypercalcemia
c. Hypernatremia d. Hyperglycemia

25. All the following can be used to predict severe acute pancreatitis except:
a. Glasgow score ≥ 3 b. APACHE II score ≥ 8
c. CT severity score ≥ 6 d. C-reactive protein <100

26. Monu, a 30-years old male, a chronic alcoholic presents with sudden onset of epigastric pain that radiates to the back. All are seen except: *(AIIMS June 2001)*
a. Low serum lipase b. Increased LDH
c. Hypocalcemia d. Increased serum amylase

27. True about acute pancreatitis: *(PGI June 2004)*
a. Alcohol is the MC cause
b. 20–25% needs surgical treatment
c. CECT is preferred over USG for diagnosis
d. Serum Amylase is diagnostic
e. Grey Turner sign seen around the umbilicus

28. True about acute pancreatitis are all except: *(PGI Dec 2000)*
a. Gallstones and alcohol are common
b. S. amylase levels increase after 72 hours of attack
c. Can cause secondary pleural effusion
d. Can present with shock

29. A 21-years old patient attended a party the previous night and gives the following symptoms, pain in abdomen radiating to back, pulse 100/min, BP 100/76; Temp 39°C and vomiting before coming. Most probable diagnosis is: *(AIIMS Nov 99)*
a. Acute appendicitis b. Acute cholecystitis
c. Acute diverticulitis d. Acute pancreatitis

30. Which of the following is true about acute pancreatitis?
a. Pain last for several hours *(PGI 88)*
b. Serum amylase levels correlates with severity of attack
c. Common in alcoholics
d. Low serum calcium levels indicate good prognosis

31. The following conditions are indications of surgery in acute pancreatitis, except: *(UPSC 2004)*
a. Acute fluid collection
b. Persistent pseudocyst pancreas
c. Pancreatic abscess
d. Infective pancreatic necrosis

32. All of the following patients presenting with abdominal pain and shock need immediate laparotomy except:
a. Ruptured ectopic pregnancy *(DPG 2009 March)*
b. Hemorrhagic pancreatitis
c. Rupture abdominal aortic aneurysm
d. Ruptured liver hemangioma

33. Acute pancreatitis is associated with all except: *(DPG 2005)*
a. Steatorrhoea b. Epigastric tenderness
c. Upper abdominal pain d. Cullen's sign

34. A patient is admitted with severe pain in the abdomen, nausea, vomiting and fever. The most likely diagnosis is: *(UPSC 97)*
a. Perforated peptic ulcer b. Intestinal obstruction
c. Acute pancreatitis d. Acute cholecystitis

35. A 40-years old male was brought to the hospital with acute pain in the upper abdomen. Patient was in shock with feeble pulse and tachycardia. There was tenderness present in the epigastrium. There is no blood in the gastric aspirate and the patient felt better after aspiration. X-ray abdomen showed no free gas under the diaphragm. Investigations revealed TLC 13500 serum bilirubin 2.0 mg and serum amylase 800 I.U. The most likely diagnosis is: *(UPSC 88)*
a. Acute cholecystitis b. Acute pancreatitis
c. Acute appendicitis d. Acute hepatitis

36. Gasless abdomen in X-ray is a sign of: *(AIIMS 91)*
a. Acute pancreatitis b. Necrotizing enterocolitis
c. Ulcerative colitis d. Intussusception

37. Acute pancreatitis causes all of the following except: *(MCI March 2005)*
a. Hypercalcemia b. Increased amylase level
c. Subcutaneous fat necrosis d. Hyperlipidemia

38. Which of the following is not a component of APACHE score? *(DNB 2012)*
a. Serum potassium b. Serum sodium
c. Serum calcium d. Creatinine

39. Investigation of choice for acute pancreatitis: *(MCI Sept 2005 and 2006)*
a. X-ray abdomen b. CT scan
c. USG d. ERCP

40. Acute pancreatitis causes all except: *(DNB 2007)*
a. Pleural effusion b. Pseudocyst
c. Gallbladder stone d. Pancreatic necrosis

41. Serum amylase level is increased in all of the following except: *(MCI March 2005)*
a. Intestinal obstruction b. Perforated ulcer
c. Acute pancreatitis d. Acute appendicitis

42. Most common causes of death due to acute pancreatitis:
a. Shock b. Infection *(DNB 2001)*
c. Hypocalcemia d. Diabetes

43. Which of the following does not correlate with severity of acute pancreatitis? *(AIIMS Nov 2011, GB Pant 2010)*
a. Serum glucose b. Serum amylase
c. Serum calcium d. AST

44. Which of following is not associated with Pancreatitis? *(JIPMER 2014, 2011)*
a. Raised serum amylase b. Raised serum lipase
c. Hypocalcemia d. Hypoglycemia

45. CT severity index is a measure for: *(Recent Questions 2013)*
a. Hepatitis b. Pancreatitis
c. Cerebral trauma d. Meningitis

46. Balthazar scoring system is used for? *(DNB 2014)*
a. Acute pancreatitis b. Acute appendicitis
c. Acute cholecystitis d. Cholangitis

ACUTE PANCREATITIS: COMPLICATIONS

47. Grey Turner's sign (flank discoloration) is seen in: *(COMEDK 2008)*
a. Acute pyelonephritis b. Acute cholecystitis
c. Acute pancreatitis d. Acute peritonitis

48. Management of pancreatic abscess is: *(UPSC 2008, AIIMS Nov 93)*
a. Needle aspiration b. Cystogastrostomy
c. External drainage d. Cystojejunostomy

49. Which is not a feature of pancreatic ascites? *(PGI June 99)*
a. Low protein
b. Somatostatin is the drug of choice
c. Communication with pancreatic duct in 80%
d. Raised amylase levels

50. Cullen's sign: *(UPPG 2007)*
a. Bluish discoloration of the flanks
b. Bluish discoloration around umbilicus
c. Migratory thrombophlebitis
d. Subcutaneous fat necrosis

51. Vascular complications of acute pancreatitis include the following except: *(UPSC 2007)*
a. Splenic vein thrombosis
b. Splenic artery aneurysm
c. Gastroduodenal artery aneurysm
d. Middle colic artery thrombosis

52. Cullen's sign is seen in: *(Kerala 94)*
a. Acute cholecystitis
b. Acute pancreatitis
c. Acute hemorrhagic pancreatitis
d. Blunt injury abdomen

53. Grey Turner's sign is seen in: *(MCI March 2005)*
a. Acute appendicitis b. Acute pancreatitis
c. Acute cholecystitis d. Acute hepatitis

54. Management of infected pancreatic necrosis include all of the following except: *(MCI March 2010)*
a. Percutaneous drainage
b. Pancreatic necrosectomy
c. Manage conservatively with antibiotics alone
d. Nutritional support

55. All are true about pancreatic ascites except:
a. Initial treatment is usually non-operative
b. Somatostatin helps in decreasing secretion
c. Repeated paracentesis is helpful *(JIPMER GIS 2011)*
d. All patients respond to repeated treatment

56. All are true about pancreatic fistula except:
a. Occasionally results in resolution of pseudocyst
b. Fistula may be associated with severe bleeding
c. Management depends upon GI organ involved
d. They will never erode into duodenum *(JIPMER GIS 2011)*

57. All are true about acute fluid collection except:
a. Not associated with fibrous wall *(AIIMS GIS May 2008)*
b. Most are extra-pancreatic
c. Commonly associated with hemosuccus pancreaticus
d. Most resolve spontaneously

58. Most common metabolic complication of acute pancreatitis: *(AIIMS GIS May 2008)*
a. Hyperglycemia b. Hypocalcemia
c. Hypomagnesemia d. Hyponatremia

59. Hemorrhagic pancreatitis, bluish discoloration of flank: *(Recent Questions 2013)*
a. Grey turner sign b. Cullen sign
c. Trosseue sign d. None

CHRONIC PANCREATITIS: ETIOLOGY, CLINICAL FEATURES AND DIAGNOSIS

60. Hereditary chronic pancreatitis is caused by mutation of:
a. Cationic trypsinogen or PRSS1 *(GB PANT 2010)*
b. CFTR
c. PTSI
d. SPINK1

61. All are true about chronic pancreatitis except:
a. Characterized by irregularities of pancreatic ducts, duct strictures and areas of dilatation *(JIPMER GIS 2011)*
b. 60–80% will give history of acute episodes
c. CT scan showing pancreatic calcification is diagnostic of chronic pancreatitis
d. Serum amylase is always raised

62. Most common symptom of chronic pancreatitis is: *(JIPMER GIS 2011)*
a. Abdominal pain b. Cachexia
c. Weight loss d. Steatorrhea

63. All are seen in chronic calcific pancreatitis except: *(Kerala 96)*
a. Diabetes mellitus b. Fat malabsorption
c. Hypercalcemia d. Recurrent abdominal pain
e. Increased incidence of pancreatic carcinoma

64. Causes of chronic tropical pancreatitis is:
a. Parasitic infection b. Cassava ingestion
c. Idiopathic d. Genetic

65. "Chain of lakes" appearance seen in: *(UPPG 2007, 2005)*
a. Acute pancreatitis b. Chronic pancreatitis
c. Carcinoma pancreas d. Strawberry gallbladder

66. Chronic calcific pancreatitis is associated with all of the following except: *(MCI Sept 2005)*
a. Hypercalcemia
b. Diabetes mellitus
c. Malabsorption of fat
d. Diabetes associated complications are uncommon

67. Chronic pancreatitis seen in all except: *(PGI Dec 2011)*
a. Chronic renal failure
b. Intraductal mucinous carcinoma
c. Alcohol
d. Gallstones
e. Pancreatic divisum

68. Feature of chronic pancreatitis w.r.t. pancreatic cancer:
a. Smooth pancreatic duct dilation with an abrupt interruption *(PGI May 2011)*
b. Calcification
c. Duct penetrating sign
d. Duct/gland width ration <0.5
e. Dilation of bile and pancreatic duct

69. TIGAR-O classification is for: *(MHSSMCET 2008)*
a. Acute pancreatitis b. Chronic pancreatitis
c. Pancreatic cancer d. Pancreatic injuries

70. Gold standard investigation for chronic pancreatitis?
a. MRI *(DNB 2014)*
b. ERCP
c. Pancreatic function tests
d. Fecal fat estimation

CHRONIC PANCREATITIS: TREATMENT AND COMPLICATIONS

71. All are true about pancreatic fistula in chronic pancreatitis except: *(AIIMS GIS May 2008)*
a. Most cases resolve spontaneously by conservative treatment
b. Somatostatin is effective in fistula closure
c. In prevention of fistula, adherence to standardized and meticulous technique is more important than the pancreatic texture or the type of anastomosis used
d. Early intervention is required if associated with hemorrhage or sepsis

72. Beger's procedure: *(AIIMS GIS May 2008)*
a. DPPHR
b. LRLPJ
c. Caudal pancreaticojejunostomy
d. Longitudinal pancreaticojejunostomy

73. Duval procedure in case of chronic pancreatitis involves:
a. Distal resection of tail of pancreas with end to end pancreaticojejunostomy *(AIIMS GIS Dec 2009)*
b. Distal resection of tail of pancreas with longitudinal opening of duct and pancreaticojejunostomy
c. Duodenum preserving pancreatic head resection
d. Local section of pancreatic head with longitudinal pancreaticojejunostomy

74. A 50-years old lady presents with two years history of recurrent abdominal pain with radiation to her back. Pain is severe in intensity, and refractory to simple analgesics. Ultrasound and contrast enhanced CT scan (CECT) confirmed the diagnosis and showed a dilated pancreatic duct. Which of the following is the likely recommended surgical procedure of choice? *(All India 2011)*
a. Vagotomy with Antrectomy
b. Vagotomy with Gastrojejunostomy
c. Whipple's Procedure
d. Longitudinal Pancreaticojejunostomy

75. A chronic alcoholic presents with abdominal pain radiating to the back that responds to analgesics. At evaluation the pancreatic duct was found to be dilated and stones were noted in the tail of pancreas. The most appropriate management is: *(All India 2008)*
a. Pancreatic tail resection
b. Pancreaticojejunostomy
c. Percutaneous removal of stone
d. Medical management

76. Patient with chronic pancreatitis gives chain of lakes appearance in ERCP examination. Management is:
a. Total pancreatectomy *(AIIMS Nov 2000)*
b. Sphincteroplasty
c. Side to side pancreaticojejunostomy
d. Resecting the tail of pancreas and performing a pancreatojejunostomy

77. Pain relief in chronic pancreatitis can be obtained by destruction of: *(UPSC 87,88)*
a. Celiac ganglia
b. Vagus nerve
c. Anterolateral column of spinal cord
d. None of the above

78. A chronic alcoholic presents with abdominal pain radiating to the back that responds to analgesics. At evaluation the pancreatic duct was found to be dilated and stones were noted in the tail of pancreas. The most appropriate management is:
a. Pancreatic tail resection
b. Pancreatico jejunostomy
c. Percutaneous removal of stone
d. Medical management

79. In a patient with chronic pancreatitis limited to tail and body with MPD diameter 4 mm, ideal treatment would be? *(MHSSMCET 2007)*
a. Stenting
b. Puestow's operation
c. Frey's operation
d. Distal pancreatectomy

80. Operation for chromic pancreatitis are the following except:
a. Beger's procedure *(MHSSMCET 2009)*
b. Longitudinal pancreatojejunostomy
c. Frey procedure
d. None

81. Complication of chronic pancreatitis include all except: *(Recent Questions 2013)*
a. Renal artery stenosis
b. Pseudocyst
c. Splenic vein stenosis
d. Fistulae

82. True about Chronic pancreatitis is: *(DNB 2014)*
a. Damage to exocrine part with damage to endocrine part
b. Can leads to malignancy
c. Whipple's procedure can be done
d. Gallbladder stone is the most common cause

PSEUDOPANCREATIC CYST

83. True about pseudocyst pancreas: *(PGI SS Dec 2009)*
a. Cyst wall is lined by squamous epithelium
b. Endoscopic treatment may be curative
c. Always found in lesser sac
d. Always occur due to alcoholic pancreatitis

84. Most common complication of pseudocyst: *(DNB 2003, PGI SS Dec 2009)*
a. Infection
b. Rupture
c. Hemorrhage
d. Compression

85. Major complication of cysto-gastrostomy for pseudopancreatic cyst is: *(DPG 2011, COMEDK 2005)*
a. Infection
b. Obstruction
c. Fistula
d. Hemorrhage

86. Most common cause of pancreatic pseudocyst: *(JIPMER 2010)*
a. Blunt abdominal trauma
b. Pancreatic carcinoma
c. Pancreatitis
d. Post pancreatic surgery

87. Most common artery involved in pancreatic pseudoaneurysm:
a. Gastroduodenal artery *(PGI Nov 2009)*
b. Inferior pancreatico-duodenal artery
c. Gastric artery
d. Splenic artery
e. Hepatic artery

88. Pseudocyst of pancreas is: *(MHPGMCET 2003)*
a. Post traumatic cyst
b. Post inflammatory cyst
c. Congenital cyst
d. Neoplastic cyst

89. Most common cause of pseudopancreatic cyst in children is: *(All India 99)*
a. Choledochal cyst
b. Annular pancreas
c. Drug induced pancreatitis
d. Traumatic pancreatitis

90. After 3 weeks of duration pancreatic pseudocyst 5 cm in size should be managed by which method? *(AIIMS Nov 2000)*
a. Cystogastrostomy
b. Needle aspiration
c. External drainage
d. USG and follow up

91. Which one is not true regarding pseudocyst of pancreas?
a. Epigastric mass *(AIIMS Nov 95)*
b. Increase level of amylase
c. Cystogastrostomy is the ideal treatment
d. Percutaneous aspiration is the treatment

92. All of the following statements about pseudopan-creatic cysts are true except: *(All India 97)*
a. Percutaneous aspiration is treatment of choice
b. Cystojejunostomy is treatment of choice
c. Serum amylase levels are increased
d. Presents as an epigastric mass

93. All of the following are true about pseudopancreatic cyst of pancreas except: *(All India 98)*
a. Common after acute pancreatitis
b. Presents as an abdominal mass
c. Serum amylase is increased
d. Most common site is in head of pancreas

94. True about pseudocyst of pancreas: *(PGI June 2001)*
a. Is a true cyst
b. Common with penetrating trauma abdomen
c. Treated with cystogastrostomy, if size >2 cm
d. Can present from mediastinum to pubis
e. Contains a wall of fibrous granulation tissue

95. Treatment of choice for asymptomatic pseudocyst pancreas is: *(DNB 2010)*
a. Marsupialization b. Conservative
c. Drainage d. Cystogastrostomy

96. Treatment of pseudopancreatic cyst is: *(PGI June 97)*
a. Endoscopic drainage
b. Percutaneous drainage
c. Internal drainage (surgical)
d. Pancreatectomy

97. Treatment of pseudocyst of pancreas include: *(JIPMER 87)*
a. Cystogastrostomy b. Cystojejunostomy
c. Cystocolostomy d. Excision of the cyst
e. All of the above

98. The complication least likely to occur in a pseudocyst of the pancreas is: *(Kerala 90)*
a. Hemorrhage b. Torsion
c. Infection d. Carcinomatous change

99. All are features of pseudopancreatic cyst, except:
a. Follows acute pancreatitis *(All India 97)*
b. Lined by false epithelium
c. May regress spontaneously
d. Treatment of choice is percutaneous aspiration

100. Serious complication in pancreatic pseudocyst include all of the following except: *(UPSC 97)*
a. Intra-cystic hemorrhage
b. Secondary infection
c. Calcification in the cyst wall
d. Rupture of the cyst

101. Commonest complication of pseudocyst of the pancreas is:
a. Commonest into peritoneum *(DPG 2009 Feb)*
b. Rupture into colon
c. Hemorrhage
d. Infection

102. Which of the following is not a complication of pseudopancreatic cyst? *(MCI March 2005)*
a. Malignancy b. Rupture
c. Hemorrhage into cyst d. Infection

103. A 20-years old football player received a hard kick in the epigastrium. A large cystic swelling appeared in the epigastrium two weeks later. The most likely diagnosis is:
a. Hydatid cyst of liver *(UPSC 96)*
b. Amoebic liver abscess
c. Pseudopancreatic cyst
d. Hematoma of rectus sheath

CYSTIC NEOPLASMS OF PANCREAS

104. Increased amylase, mucin and CEA is seen in: *(ILBS 2012)*
a. IPMN
b. Mucinous cystadenoma
c. Serous cystadenoma
d. Solid pseudopaillary tumor

105. Not true about mucinous cystadenoma pancreas:
a. Microcystic adenoma *(AIIMS May 2011)*
b. Lined by columnar epithelium
c. Premalignant
d. Focus of ovarian stroma in it

106. A 60-years old female present with history of recurrent abdominal pain. Imaging shows multiple small cystic lesions like bunch of grapes in the head of pancreas with a grossly dilated main pancreatic duct. The most likely diagnosis is:
a. SCN b. MCN *(All India 2012)*
c. IPMN d. Pancreatic pseudocyst

107. Regarding IPMN, all are true except: *(AIIMS GIS May 2011)*
a. Treatment is enucleation
b. Can involve either main or branch duct
c. Mostly involve pancreatic head
d. Men and women are equally affected

108. Serous cystadenoma, all are true except:
a. 30% are associated with malignancy
b. Mainly microcystic *(AIIMS GIS May 2008)*
c. More commonly located in the head
d. Glycogen rich cells on cytologic examination with central calcified stellate scar

109. All are true about IPMN except: *(AIIMS GIS May 2008)*
a. Seen in both small and large ducts
b. Equal incidence in males and females
c. Most common in head
d. Usually diagnosed by octreotide scan

110. Not true about mucinous cystadenoma:
a. Lining is columnar *(AIIMS GIS May 2008)*
b. Ovarian stroma is found
c. Early surgery is indicated
d. 90% patients survive >10 years after surgery

111. All are true about pancreatic serous cystadenoma except:
a. Increased CEA *(AIIMS GIS Dec 2010)*
b. Honey comb appearance
c. Lined by single layer of low cuboidal epithelium
d. Malignancy is rare

112. All are true about IPMN except: *(JIPMER GIS 2011)*
a. Always involves main pancreatic duct
b. Involvement of head is most common form
c. Men and women are equally affected
d. Patients can experience acute pancreatitis

CARCINOMA PANCREAS: ETIOLOGY AND RISK FACTORS

113. Earliest genetic change in carcinoma pancreas: *(ILBS 2012)*
a. Her-2-neu b. p53
c. p16 d. DCC

114. Not a risk factor for carcinoma pancreas: *(ILBS 2012)*
a. Acute pancreatitis b. Diabetes
c. Smoking d. Obesity

115. Most common mutation in pancreatic adenocarcinoma:
a. K-ras b. p16 *(GB PANT 2010)*
c. p53 d. BRAF

116. Which of the following does not predispose to CA pancreas?
a. Familial breast cancer *(AIIMS GIS May 2008)*
b. HNPCC
c. PJS
d. Cronkhite-Canada syndrome

117. Hereditary pancreatic carcinoma is associated with all except: *(AIIMS GIS Dec 2009)*
a. Ataxia Telengiectasia b. Peutz-Jegher's syndrome
c. Hereditary pancreatitis d. FAP

118. Most common oncogene involved in pancreatic carcinoma is: *(AIIMS GIS Dec 2009)*
a. p53 b. K-ras
c. APC d. DCC

119. Risk factors for carcinoma of pancreas include the following except: *(MHSSMCET 2006)*
a. Obesity
b. Alcohol abuse
c. Peutz-Jegher's syndrome
d. History of partial gastrectomy

120. What will be your advice to a 60 years moderately obese patient with history of 4–6 cup of coffee per day, 4–6 glass of wine/day with 20 cigarettes per day. He is engaged as a salesman in a computer company. His brother died of pancreatic carcinoma: *(PGI June 2004)*
a. Urgent weight reduction
b. Strict vegetarian diet
c. Stop alcohol
d. Stop coffee
e. Stop cigarette smoking

121. False about pancreatic cancer association: *(AIIMS GIS May 2008)*
a. p53 inactivated
b. K-ras activated
c. BRCA activated
d. EGF overexpression

122. Most common oncogene mutated in CA head of pancreas:
a. K-ras
b. p53 *(AIIMS GIS 2003)*
c. C-myc
d. BRCA 2

123. Which is not autosomal dominant? *(AIIMS GIS May 2011)*
a. HNPCC
b. FAMMM
c. PJS
d. Ataxia-Telengiectasia

CA PANCREAS: CLINICAL FEATURES AND DIAGNOSIS

124. Most common symptom of CA head of pancreas: *(ILBS 2012, AIIMS GIS Dec 2011, Dec 2006)*
a. Weight loss
b. Pain
c. Jaundice
d. Anorexia

125. Diagnostic investigation in carcinoma pancreas: *(ILBS 2012)*
a. MDCT
b. PET scan
c. ERCP
d. MRCP

126. Not true about pancreatic ductal adeno-carcinoma:
a. Most common site is body and tail
b. Associated with desmoplastic changes with scattering of neoplastic glands *(AIIMS GIS May 2008)*
c. Body tumors are larger
d. Perineural invasion is characteristic feature

127. Scrambled egg appearance is seen in: *(COMEDK 2007)*
a. Carcinoma stomach
b. Carcinoma gallbladder
c. Pancreatic carcinoma
d. Renal carcinoma

128. The most likely cause of fluctuating jaundice in a middle aged or elderly man is: *(COMEDK 2010)*
a. Periampullary carcinoma
b. Liver fluke infestation
c. Choledochal cyst
d. Carcinoma head of pancreas

129. Migratory thrombophlebitis seen in: *(PGI Dec 2006)*
a. Pancreatic cancer
b. Bladder cancer
c. Stomach cancer
d. Breast cancer
e. Liver cancer

130. Which of the following is the most common site for the carcinoma of pancreas? *(PGI June 2000)*
a. Head
b. Ampulla
c. Body
d. Tail

131. True about pancreatic CA: *(PGI Dec 2002)*
a. MC symptom is pain
b. CA head of pancreas causes obstruction of both pancreatic and biliary duct
c. Smoking predisposes
d. Family history of familial adenomatous polyposis syndrome

132. True about pancreatic carcinoma: *(PGI Dec 2000)*
a. Head is the most common site
b. Pain is the most common symptom
c. Obstruction of bile and pancreatic secretion is common
d. 80% cases respond well to resection

133. Investigation to diagnose carcinoma head of pancreas are/is: *(PGI Dec 2000, PGI Dec 2003)*
a. Hypotonic duodenogram
b. X-ray abdomen
c. USG
d. Endoscopy
e. CT Scan

134. A 55-years old male presents with features of obstructive jaundice. He also reports a weight loss of seven kilograms in last two months. On CT scan, the CBD is dilated till the lower end and the main pancreatic duct is also dilated. Pancreas is normal. The most likely diagnosis is: *(AIIMS Nov 2004)*
a. Choledocholithiasis
b. Carcinoma gallbladder
c. Hilar cholangiocarcinoma
d. Periampullary carcinoma

135. Inverted "3" sign seen in: *(PGI Dec 97)*
a. Ampullary carcinoma
b. Insulinoma
c. CA head pancreas
d. CA stomach

136. Most common tumor of pancreas is: *(UPPG 2007)*
a. Adenocarcinoma
b. Squamous cell carcinoma
c. Adeno-squamous cell carcinoma
d. Ductal adenocarcinoma

137. The commonest pancreatic tumor is: *(TN 89)*
a. Ductal adenocarcinoma
b. Cystadenoma
c. Insulinoma
d. Non islet cell tumor

138. Most sensitive investigation of pancreatic carcinoma is: *(PGI 88)*
a. Angiography
b. ERCP
c. Ultrasound
d. CT scan

139. Carcinoma of pancreas is associated with: *(UPPG 2008)*
a. Hypoglycemia
b. Syndrome of inappropriate secretion of ADH
c. Erythropoeisis is due to erythropoietin
d. Hypercalcemia

140. Elderly male with icterus having large painless gallbladder lump, diagnosis is: *(UPPG 2010)*
a. Acute hepatitis
b. Carcinoma head of pancreas
c. CBD stone
d. Cholelithiasis
e. Hepatocellular carcinoma

141. Reversed "3" sign on barium studies is seen in which condition: *(MCI Sept 2009)*
a. Ampullary carcinoma
b. Carcinoma stomach
c. Carcinoma head of pancreas
d. Insulinoma

142. Most common site for carcinoma pancreas is: *(Recent Questions 2013)*
a. Head
b. Body
c. Tail
d. Neck

CARCINOMA PANCREAS: TREATMENT AND PROGNOSIS

143. Most important predictor of post-operative survival in CA pancreas: *(AIIMS GIS May 2008)*
a. R0 resection
b. DNA content
c. Tumor size
d. LN status

144. Most common primary leading to secondaries in pancreas: *(AIIMS GIS May 2008)*
a. Lung b. Breast
c. Colon d. Stomach

145. Most common complication of Whipple's procedure is: *(AIIMS GIS Dec 2010)*
a. Delayed gastric emptying b. Bleeding
c. Exocrine insufficiency d. Anastomotic leak

146. A patient with obstructive jaundice due to pancreatic cancer might have all of the following clinical findings except:
a. A palpable gallbladder *(COMEDK 2004)*
b. Pain is early in the course of the disease
c. Pulmonary metastasis
d. Thrombocytopenia

147. Which of the following drugs has been found to increase the survival in locally advanced pancreatic cancer? *(COMEDK 2006)*
a. Doxorubicin b. Streptozocin
c. Gemcitabine d. Paclitaxel

148. Middle segment pancreatectomy avoided in: *(PGI Nov 2009)*
a. Cystadenoma b. Tumors of head pancreas
c. Tumors of tail of pancreas d. Tumor of neck of pancreas

149. Which of the following statements is not true about pancreatic carcinoma? *(AIIMS May 2011, All India 2009)*
a. Mutation in p53 gene is associated in 75% of cases
b. Hereditary Pancreatitis significantly increase the risk
c. Median survival in locally advanced (stage III) disease is 3-6 months
d. Five year survival after curative pancreaticoduodenectomy is 20%

150. Components of Whipple's operation are following except? *(MHSSMCET 2009)*
a. Gastrojejunostomy b. Duodenojejunostomy
c. Choledochojejunostomy d. Pancreaticoduodenostomy

151. All are resected in Whipples operation except: *(AIIMS Nov 98, AIIMS Feb 97, All India 96)*
a. Duodenum b. Head of pancreas
c. Portal vein d. Common bile duct

152. The preferred bypass procedure in case of non resectable carcinoma of head of pancreas is: *(MAHE 2005)*
a. Cholecystojejunostomy b. Cholecystogastrostomy
c. Choledochoduodenostomy d. Choledochojejunostomy

153. Best prognosis for carcinoma of pancreas is in the region of:
a. Head b. Tail *(UPPG 2007)*
c. Body d. Periampullary

154. What is the most common surgical complication following Whipple's procedure? *(UPSC 2007)*
a. Disruption of pancreatic anastomosis
b. Biliary peritonitis
c. Disruption of gastric anastomosis
d. GI bleeding

155. Treatment in periampullary carcinoma is by: *(DPG 2008)*
a. Endoscopic stent b. Ampullectomy
c. Pancreaticoduodenectomy d. Cholecystojejunostomy

156. Kocher's maneuver means: *(JIPMER 81)*
a. Mobilization of gallbladder during cholecystectomy
b. Mobilization of 2nd part of duodenum
c. Mobilization of pancreas during pancreatectomy
d. Mobilization of ascending colon

157. Pancreaticoduodenectomy is the treatment of choice for: *(TN 99)*
a. Duodenal carcinoma b. Pancreatic carcinoma
c. Gallbladder carcinoma d. Gastric carcinoma

158. 5-FU is the chemotherapeutic agent of choice for all except:
a. CA breast b. CA stomach *(PGI 93)*
c. CA pancreas d. CA colon

159. All are true about pancreatic carcinoma except:
a. Ductal adenocarcinoma is the most common type
b. K-ras mutation and Her-2-neu overexpression are the earliest change *(JIPMER GIS 2011)*
c. Good prognosis
d. Most cases present late

160. False about CA pancreas: *(KGMC 2011)*
a. Most common site is head and uncinate process
b. Pain suggests unresectability
c. Two third patients present with diabetes
d. Acute pancreatitis never occurs in CA pancreas

161. Best tumor marker for CA head of pancreas:
a. CA 19-9 b. CEA *(AIIMS GIS 2003)*
c. CA 125 d. AFP

162. Best prognosis after Whipples is seen in: *(AIIMS GIS Dec 2006)*
a. Cholangiocarcinoma b. CA duodenum
c. CA pancreas d. Ampullary carcinoma

163. Most important margin for pancreaticoduo-denectomy: *(PGI SS June 2001)*
a. Retroperitoneal margin b. CBD
c. Pancreatic duct d. Intestinal margin

164. Most common cause of death after Whipple's procedure:
a. Pancreatic anastomotic leak *(PGI SS 2004)*
b. Biliary anastomotic leak
c. Cardiopulmonary complications
d. Gastric leak

165. Asymptomatic, solid 4 cm tumor of distal pancreas. Treatment: *(PGI SS Dec 2010)*
a. Observation
b. Distal pancreatectomy with splenectomy
c. Near total pancreatectomy with splenectomy
d. Distal pancreatectomy alone

PSEUDOPAPILLARY TUMOR

166. All are true about pseudopapillary tumors of pancreas except:
a. Most commonly occurs in young women
b. Both benign and malignant varieties are seen
c. These are small tumors *(JIPMER GIS 2011)*
d. Local resection is usually curative

167. All are true about Frantz tumor except:
a. Seen in young females *(AIIMS GIS Dec 2011)*
b. Vimentin and CD 56 is positive
c. Indolent tumor with <15% incidence of metastasis
d. Chromagranin is positive

INSULINOMA

168. Best method of localization of insulinoma: *(ILBS 2011)*
a. EUS with intra-operative palpation
b. MRI with dynamic CT
c. SRS
d. CECT

169. Localization in insulinoma is best with: *(COMEDK 2011)*
a. Contrast CT
b. Magnetic Resonance Imaging
c. Somatostatin Receptor Scintigraphy
d. Selective arteriography

170. A 55-years old male presents with tachycardia, sweating, palpitation, giddiness. Most probable diagnosis: *(JIPMER 2011)*
a. Insulinoma
b. Zollinger-Ellison syndrome
c. Carcinoma pancreas
d. Carcinoid

171. All are true about insulinoma except: *(PGI Nov 2009)*
a. Usually asymptomatic and need no treatment
b. Usually small and multiple
c. Diazoxide and octreotide reduce insulin synthesis
d. Most common site is pancreas
e. 90% tumors are benign

172. True about insulinoma is all except: *(MHPGMCET 2003)*
a. Common equally in the pancreatic head, body and tail
b. Hypoglycemic attacks occur
c. Weight loss is important feature
d. Attacks respond to glucose infusion

173. Gold standard test for insulinoma: *(AIIMS May 2011)*
a. 72-hours fasting test
b. Plasma insulin levels
c. C-peptide levels
d. Low glucose levels < 30 mg/dl

174. Which of the following tests is not used in the diagnosis of insulinoma? *(All India 2011)*
a. Fasting blood glucose
b. Xylose test
c. C-peptide levels
d. Insulin/Glucose Ratio

175. Best modality for diagnosis of insulinoma: *(PGI SS June 2007)*
a. Intra-operative USG
b. Scintigraphy
c. Arteriography
d. Venous sampling

176. A lady presented with recurrent attacks of giddiness and abdominal pain since three months. Endoscopy was normal. Her fasting blood glucose was 40 mg% and insulin levels were elevated. CT abdomen showed a well defined 8 mm enhancing lesion in the head of pancreas, with no other abnormal findings. What should be the treatment plan for this patient? *(All India 2010)*
a. Whipple's operation
b. Enucleation
c. Enucleation with radiotherapy
d. Administration of streptozocin

177. Which of the following is the most common endocrine tumor of pancreas? *(AIIMS June 2004, PGI June 2006)*
a. Insulinoma
b. Gastrinoma
c. VIPoma
d. Glucagonoma

178. Insulinoma is most commonly located in which part of the pancreas? *(AIIMS June 2002)*
a. Head
b. Body
c. Tail
d. Equally distributed

179. Whipples triad is seen in: *(APPG 2015, WBPG 2012, DNB 2011, AIIMS Feb 97)*
a. Insulinoma
b. Somatostatinoma
c. Glucagonoma
d. CA pancreas

180. Gold standard test in insulinoma: *(PGI June 2000)*
a. CT scan
b. Ultrasound
c. MRI
d. Arteriography

181. Which is not true regarding insulinoma? *(AIIMS Nov 95)*
a. Hypoglycemic attacks
b. Weight loss
c. Usually solitary tumor
d. Mostly benign tumor

ZOLLINGER-ELLISON SYNDROME

182. MC site of gastrinoma: *(GB Pant 2011)*
a. Duodenum
b. Pancreas
c. Stomach
d. Colon

183. All are true about gastrinoma except: *(GB PANT 2011)*
a. Abnormal peptic ulcer location
b. Diarrhea
c. Decreased BAO and MAO
d. Best treatment is omeprazole

184. Localization of gastrinoma is best done by: *(GB PANT 2011)*
a. USG
b. CT
c. MRI
d. SRS

185. All are true about gastrinoma except: *(AIIMS GIS Dec 2006)*
a. Mostly found in gastrinoma triangle
b. Increases acid production
c. Most common site is pancreas
d. Lymphadenectomy is not required as there is no improvement in survival

186. Least common site of gastrinoma: *(AIIMS GIS May 2008)*
a. 1st part of duodenum
b. 2nd part of duodenum
c. 3rd part of duodenum
d. 4th part of duodenum

187. All are true about Zollinger-Ellison syndrome except: *(DNB 2007, AIIMS GIS Dec 2011)*
a. Recurrent ulceration after acid reducing surgery
b. Raised gastrin levels in all cases
c. Decreased BAO/MAO
d. Diarrhea

188. All are true about gastrinoma except: *(AIIMS GIS May 2011)*
a. 50% are associated with adrenal malignancy
b. Duodenum is the most common site
c. Diarrhea can be prevented by NG aspiration
d. Total gastrectomy should be avoided

189. All of the following are features of Zollinger-Ellison syndrome except: *(AIIMS Nov 2005)*
a. Intractable peptic ulcers
b. Severe diarrhea
c. Beta cell tumors of the pancreas
d. Very high acid output

190. Treatment of Zollinger-Ellison syndrome: *(DNB 2004, All India 88)*
a. Total gastrectomy with removal of tumor
b. Partial gastrectomy
c. Excision of tumor alone
d. H_2 receptor antagonist

191. The investigation of choice to detect gastrinoma <5mm size is: *(COMEDK 2014)*
a. Endoscopic vctrasound
b. Octreotide scan
c. CT scan
d. Portal venous sampling

192. Not a boundary of gastrinoma triangle: *(DNB 2011, DPG 2007)*
a. Junction of 2nd and 3rd part of duodenum
b. Junction of 3rd and 4th part of duodenum
c. Junction of head with body of pancreas
d. Junction of cystic duct with common bile duct

193. Which of the following organs is the most common site of origin of the tumor associated with the Zollinger-Ellison syndrome? *(COMEDK 2011 2008, 2007)*
a. Duodenum
b. Lymph nodes
c. Spleen
d. Pancreas

194. True about gastrinoma are all except: *(PGI Nov 2009)*
a. Located mostly in pancreas
b. Unusual located ulcer
c. 90% benign
d. Hypersecretion of gastric acid

195. All are true about Zollinger-Ellison syndrome except: *(PGI June 2008)*
a. Surgery is done
b. Exocrine tumour
c. Endocrine disorder
d. Secretary diarrhea seen
e. Metastasis seen

196. A 45-years old gentleman has undergone truncal vagotomy and pyloroplasty for bleeding duodenal ulcer seven years ago. Now he has intractable recurrent symptoms of peptic ulcer. All of the following suggest the diagnosis of Zollinger Ellison syndrome, except: *(AIIMS May 2006)*
a. Basal acid output of 15 meq/hour
b. Serum gastrin value of 500 pg/ml
c. Ulcers in proximal jejunum and lower end of esophagus
d. Serum gastrin value of 200 pg/ml with secretin stimulation

197. Zollinger-Ellison syndrome is characterized by all of the following except: *(All India 94)*
a. Post bulbar ulcer
b. Recurrent duodenal ulcer
c. Severe diarrhea
d. Massive HCl secretion in response to histamine injection

198. True about ZES (gastrinoma): *(PGI June 2001)*
a. Gastrin levels >1000 pg/mL
b. BAO (Basal acid output) >15 meq/hr
c. Somatostatin is inhibitor of HCL secretion
d. Omeprazole is helpful
e. Secretin increases gastrin secretion in Zollinger-Ellison syndrome

199. About ZES true is: *(PGI Dec 2005)*
a. MC site is duodenal loop
b. It is an exocrine disease
c. It is an endocrine disease
d. 50% are malignant
e. Surgical excision is done

200. Zollinger-Ellison syndrome, all are true except: *(PGI June 2008)*
a. Surgery is to be done
b. Exocrine tumor
c. Endocrine disorder
d. Secretary diarrhea seen
e. Metastasis seen

201. Which of the following is not true for Zollinger-Ellison syndrome? *(DNB 2002, MCI Sept 2008)*
a. Recurrence after operation
b. Reduced BAO: MAO ratio
c. Gastrin producing tumour
d. Diarrhea may be a presenting features

202. Diarrhoea with non healing Gastric ulcer with PPI is due to? *(DNB 2014)*
a. MEN 1 syndrome
b. Zollinger-Ellison syndrome
c. H. pylori infection
d. VIPom

ENDOCRINE TUMORS OF PANCREAS

203. Metastatic glucagonoma is best detected by:
a. SRS
b. CT *(AIIMS GIS 2003)*
c. MRI
d. USG

204. Most common endocrine tumor of pancreas is: *(AIIMS GIS Dec 2006)*
a. Insulinoma
b. Gastrinoma
c. Somatostatinoma
d. VIPoma

205. Best investigation for neuroendocrine tumors of pancreas: *(AIIMS GIS Dec 2006)*
a. Portal venous sampling
b. CECT
c. EUS
d. SRS

206. Migratory skin necrosis in a diabetic patient is due to: *(AIIMS GIS Dec 2006)*
a. Somatostatinoma
b. Glucagonoma
c. Insulinoma
d. VIPoma

207. Which is not true about non-functioning NET of pancreas?
a. Most PPomas are benign *(AIIMS GIS May 2008)*
b. Slow growing tumors
c. Constitute 30% of all pancreatic NET
d. Prognosis is better than other exocrine tumors

208. In VIPoma, not seen: *(AIIMS GIS May 2008)*
a. Watery diarrhea
b. Hypokalemia
c. Hypercalcemia and hyperglycemia
d. Increased acid secretion

209. Gallstones are associated with which NET: *(AIIMS GIS Dec 2010)*
a. Insulinoma
b. VIPoma
c. Somatostatinoma
d. Glucagonoma

210. Necrolytic migratory erythema is seen in: *(AIIMS GIS May 2011)*
a. Glucagonoma
b. Somatostatinoma
c. VIPoma
d. Insulinoma

211. The triad of diabetes, gallstones and steatorrhoea is associated with which one of the following tumors? *(COMEDK 2014, 2009, 2007)*
a. Gastrinomas
b. Somaststationomas
c. VIPomas
d. Glucagonomas

212. Neurotensinoma causes: *(COMEDK 2010)*
a. Cyanosis
b. Hypertension
c. Hyperkalemia
d. Weight gain

213. Most cases of neuroendocrine tumors are diagnosed by: *(AIIMS GIS May 2008)*
a. SRS
b. Portal venous sampling
c. Arteriography
d. CT

214. All are true about neuroendocrine tumor of pancreas:
a. Insulinoma is MC *(PGI May 2011)*
b. VIP cause diarrhea
c. Diarrhea is MC symptom of gastrinoma
d. Somatostatinoma cause gall stone formation
e. Gastrinoma has high chance of malignancy

PANCREAS DIVISUM

215. Pancreas divisum: *(AIIMS GIS May 2008)*
a. Most common congenital anomaly
b. Most are symptomatic
c. Failure of fusion of dorsal and ventral pancreas
d. Dorsal duct dilation at lesser papilla is curative

ANNULAR PANCREAS

216. All are true for annular pancreas except: *(PGI Nov 2009)*
a. Upper GI series is IOC
b. Duodenal obstruction present
c. ERCP is done
d. Non-rotation of gut
e. Treatment is division of ring

217. Treatment of choice for annular pancreas: *(NEET Pattern, MHSSMCET 2006)*
a. Duodenojejunostomy b. Distal Pancreatectomy
c. Proximal pancreatectomy d. Duodenoduodenostomy

218. Annular pancreas, true is: *(PGI Dec 2002)*
a. Complete or partial rotation failure
b. Congenital
c. Normal histology
d. Interstromal cell proliferation
e. Surgical correction should be done

219. Treatment of choice for annular pancreas is: *(All India 2010)*
a. Division of pancreas
b. Duodenoduodenostomy
c. Doudenojejunostomy
d. Roux-en-Y loop

PANCREATIC TRAUMA

220. True about pancreatic trauma: *(AIIMS GIS 2003)*
a. Hyperamylasemia is not specific
b. Most common is type III and IV
c. Type II is MPD disruption
d. ERCP should be done in all patients

221. Regarding injury to pancreas, which is not true?
a. Majority of postoperative complications are due to missed duct injury *(AIIMS Nov 94)*
b. Fracture is common at the junction of head and body
c. Commonly associated with vascular injury
d. Peritoneal lavage is good for making the diagnosis

222. True in pancreatic trauma: *(PGI June 2006)*
a. Solitary involvement common
b. Blunt injury usual cause
c. Always surgery needed
d. Amylase increases in 90% cases
e. HRCT is investigation of choice

PANCREATIC TRANSPLANTATION

223. The advantage of bladder drainage over enteric drainage after pancreatic transplantation is better monitoring of: *(All India 2009)*
a. HBA IC levels b. Amylase levels
c. Glucose levels d. Electrolyte levels

MISCELLANEOUS

224. Treatment of congenital cyst of head of pancreas:
a. Total excision *(PGI 83, AMC 86)*
b. Partial excision
c. Marsupialization
d. Observe and medical treatment

225. In mucoviscidosis of the pancreas the commonest defect is in the: *(JIPMER 80, AIIMS 89)*
a. Jejunum b. Ileum
c. Ascending colon d. Descending colon

226. Leukocytic infiltration in islet cells of pancreas is characteristically seen in some cases of: *(PGI 81, AMU 87)*
a. Juvenile diabetes
b. Diabetic ketosis
c. Systemic mucoviscidosis
d. Hemorrhagic pancreatic necrosis

227. Ectopic pancreatic tissue is present in all except: *(ILBS 2012)*
a. Stomach b. Meckel's diverticulum
c. Mesentery d. Umbilicus

228. The neck of pancreas is related on its posterior surface to: *(AIIMS May 2005)*
a. Gastroduodenal artery b. Superior mesenteric vein
c. Inferior vena cava d. Bile duct

229. Increased amylase levels in pleural fluid are seen in: *(Bihar 2003)*
a. Malignancy b. Pancreatitis
c. Esophageal rupture d. All

230. True increase in islet cell: *(PGI Dec 2002)*
a. Nesidioblastoma b. Type II DM
c. Insulinoma d. None

231. All of the following statements about Nesidioblastosis are true, except: *(All India 2011)*
a. Hypoglycemic episodes may be seen
b. Occurs in adults more than children
c. Histopathology shows hyperplasia of islet cells
d. Diazoxide may be used for treatment

232. All of the following are true about diazoxide except:
a. K+ channel opener *(AIIMS May 2011)*
b. Can be used as antihypertensive agent
c. Causes severe hypoglycemia
d. Used in insulinoma

233. Open sphincteroplasty is done at: *(MHSSMCET 2009)*
a 12 O' clock position b. 11 O' clock position
c. 6 O' clock position d. 2 O' clock position

234. Ectopic pancreatic tissue with islet cells are seen in: *(AIIMS GIS May 2008)*
a. Stomach b. Meckel's diverticulum
c. Omentum d. Appendix

235. Which of the following is not true about polycystic disease of pancreas? *(AIIMS GIS May 2008)*
a. Associated with liver and renal cyst
b. 50% associated with VHL syndrome
c. Surgical intervention is required in most because of features of chronic pancreatitis
d. Lining of cyst wall is cuboidal

236. Which of the following types of islet cells secrete amylin? *(All India 2012)*
a. Alpha cells b. Beta cells
c. Delta cells d. F cells

237. Investigation of choice to visualise pancreas is: *(DNB 2006)*
a. MRI b. CT Scan
c. USG abdomen d. ERCP

EXPLANATIONS

ACUTE PANCREATITIS: ETIOLOGY AND RISK FACTORS

1. **Ans. d. Gallstones** *(Ref: Sabiston 19/e p1520-1521; Schwartz 10/e p1351-1360, 9/e p1178; Bailey 26/e p1127, 25/e p1139; Blumgart 5/e p836-845; Shackelford 7/e p1123; Harrison 18/e p2635)*

Causes of Acute Pancreatitis	
Common Causes	**Uncommon Causes**
• **Gallstones** including microlithiasis (**MC**)[Q] • **Alcohol** (**2nd MC**)[Q] • **Hypertriglyceridemia**[Q] • **ERCP**[Q] • Blunt abdominal trauma • Postoperative • Drugs • Sphincter of Oddi dysfunction	• Vascular causes and vasculitis (ischemic-hypoperfusion states after cardiac surgery) • Connective tissue disorders • **TTP**[Q] • **CA pancreas**[Q] • **Hypercalcemia (Hyperparathyroidism)**[Q] • Periampullary diverticulum • **Pancreas divisum**[Q] • Hereditary pancreatitis • **Cystic fibrosis**[Q] • Renal failure
Rare Causes: • Infections (**CMV, Coxsackie, Mumps,** echovirus, parasites)[Q] • Autoimmune (Sjogren syndrome)	

Causes in Recurrent Bouts of Acute Pancreatitis without an Obvious Etiology	
• Occult disease of the biliary tree or pancreatic ducts, especially **microlithiasis, sludge**[Q] • **Drugs** • **Hypertriglyceridemia**[Q]	• **Pancreas divisum**[Q] • **Pancreatic cancer**[Q] • **Sphincter of Oddi dysfunction**[Q] • **Cystic fibrosis**[Q] • Idiopathic

2. **Ans. a. Biliary calculi**
3. **Ans. a. Gallstones, b. Alcohol**
4. **Ans. b. L-Asparaginase** *(Ref: Sabiston 19/e p1521; Schwartz 10/e p1351-1360, 9/e p1179; Bailey 26/e p1127, 25/e p1139; Blumgart 5/e p839)*

Drugs Associated With Pancreatitis		
Definite Cause		**Probable Cause**
• **5-Aminosalicylate**[Q] • **6-Mercaptopurine**[Q] • **Azathioprine**[Q] • Cytosine arabinoside • Dideoxyinosine • Diuretics (**Furosemide, Thiazide**)[Q]	• **Metronidazole**[Q] • **Pentamidine**[Q] • **Tetracycline** • **Valproic acid**[Q] • **Trimethoprim sulfamethoxazole**[Q] • **Estrogens**[Q]	• **Acetaminophen** • Alpha-Methyl-dopa • Isoniazid • **L-Asparaginase** • Phenformin • Procainamide • Sulindac

5. **Ans. a. Alcohol, b. Gallstone**
6. **Ans. b. ↑ed PTH c. CBD stone, d. Alcohol**
7. **Ans. a. Acute pancreatitis** *(Ref: Sabiston 19/e p1521; Bailey 26/e p1127, 25/e p1139; Blumgart 5/e p840; Shackelford 7/e p1123)*

COMPLICATIONS OF ERCP

- **Complications**: **Pancreatitis, hemorrhage, cholangitis** and **perforation.**
- **MC complication** is **acute pancreatitis (5%)**[Q]
- **Hemorrhage** requires **surgical intervention most commonly**, **sphincterotomy** usually is **converted into** formal surgical **sphincteroplasty,** which includes the bleeding artery[Q].
- **Cholangitis** is confined to patients in whom **CBD clearance** has **not** been **achieved**, and measures should be directed at providing **adequate bile drainage** and administering **parenteral antibiotics**. **Emergency surgery** for cholangitis carries high risk, but is indicated in **patients** who do **not improve within 24 hours**[Q].
- **Perforation** may be **asymptomatic** and noticed only as **retroperitoneal gas** or **extravasation of** radiographic **contrast** material, but **even in symptomatic patient**, **conservative treatment** is often effective with spontaneous resolution and avoidance of potentially difficult surgery[Q].

8. **Ans. b. Splenectomy, d. Cardiopulmonary bypass** *(Ref: Schwartz 10/e p1352, 9/e p1179)*

Iatrogenic Pancreatitis

- Acute pancreatitis can be associated with a number of surgical procedures, most commonly those performed on or close to the pancreas, such as **pancreatic biopsy**, **biliary duct exploration**, **distal gastrectomy**, and **splenectomy.**
- Acute pancreatitis is associated postoperatively with **Billroth II gastrectomy** and **jejunostomy**, in which increased intraduodenal pressure can cause backflow of activated enzymes into the pancreas.
- **Pancreatitis** also can occur in association with surgery that **uses low systemic perfusion**, such as **cardiopulmonary bypass** and **cardiac transplantation**.

9. **Ans. c. ERCP**

10. **Ans. c. Islet cell hyperplasia**

ACUTE PANCREATITIS CLINICAL FEATURES, DIAGNOSIS AND TREATMENT

11. **Ans. d. Cardiac failure** *(Ref: Sabiston 19/e p1519-1526; Schwartz 10/e p1351-1360, 9/e p1179-1185; Bailey 26/e p1127-1129, 25/e p1139-1144; Blumgart 5/e p841-851; Shackelford 7/e p1123-1130)*

Non-Pancreatic causes of Hyperamylasemia		
• Burns • Pregnancy • Cholecystitis[Q] • **Aortic aneurysm**[Q] • **Ruptured ectopic** • **Diabetic ketoacidosis**	• **Renal transplantation**[Q] • Perforated Ulcer • **Chronic liver disease**[Q] • Intestinal obstruction[Q] • Renal failure[Q] • Drugs: **Morphine**[Q]	• **Salivary Gland Disorders:** Mumps, Calculus, Maxillofacial surgery[Q] • **Tumors:** Carcinoma of the **Lung, Esophagus, Breast, Ovary (LEBO)**[Q]

Acute Pancreatitis

- **AP** is **mild** and **self-limited** in most patients[Q]
- **Rapidly progressive inflammatory response** associated with prolonged length of hospital stay and significant morbidity and mortality occur in **10-20%**[Q] of patients
- **Mortality rate: Mild** pancreatitis **<1%; Severe** pancreatitis **10-30%**[Q].
  - **MC cause of death** in this group of patients is **multiorgan dysfunction syndrome**[Q].
  - **First sign of Multi-system organ failure** in AP commonly is **impaired lung function** caused by **ARDS**[Q].
- Mortality in the **first 2 weeks** (**early phase**): Due to **multiorgan dysfunction**[Q]
- Mortality **after 2 weeks** (**late period**): Caused by **septic complications**[Q]

Pathophysiology

- AP is the final result of **abnormal pancreatic enzyme activation** inside acinar cells[Q].
- **Colocalization hypothesis**: **Cathepsin B-mediated intra-acinar cell activation** of the **digestive enzymes** leads to acinar cell injury and triggers an inflammatory response.
  - **Intra-acinar pancreatic enzyme activation** induces **autodigestion** of normal pancreatic parenchyma.
  - Acinar cells release **proinflammatory cytokines**, which propagate the response locally and systemically.
- The **local inflammatory response** further **aggravates** the **pancreatitis** because it increases the permeability and damages the microcirculation of the pancreas.
- In **severe cases**, the inflammatory response causes **local hemorrhage** and **pancreatic necrosis**[Q].
- **Inflammatory cascade** is **self-limited** in **80-90%** of patients[Q].
- The **mortality** seen in the **early phase** of pancreatitis is the result of **persistent inflammatory response.**

Risk factors

- **Gallstones** (**MC**) and **ethanol abuse** (**2nd MC**) account for **70-80%** of AP cases[Q].
- In **pediatric patients**, **abdominal blunt trauma** and **systemic diseases**[Q] are the two most common conditions that lead to pancreatitis.

Clinical Features

- **Cardinal symptom**: **Epigastric** and/or periumbilical **pain** that **radiates to the back**, **relieved by sitting** and **leaning forward**[Q].
- Up to **90%** of patients have **nausea** and/or **vomiting** that typically does not relieve the pain.
- The nature of the **pain** is **constant**[Q].
- Dehydration, poor skin turgor, tachycardia, hypotension, and dry mucous membranes are commonly seen in patients with AP.
- **Mild pancreatitis**: Abdomen may be normal or reveal only **mild epigastric tenderness**.
- **Severe pancreatitis**: Significant abdominal distention, associated with generalized rebound tenderness and abdominal rigidity

- **Flank (Grey Turner)**[Q], **periumbilical (Cullen's sign)**[Q] and **inguinal ecchymosis (Fox sign)**[Q] are indicative of **retroperitoneal bleeding** associated with **severe pancreatitis**.

- Dullness to percussion and decreased breathing sounds in the **left** or, less commonly, in the right hemithorax suggest **pleural effusion**[Q] secondary to AP.

Diagnosis

- Cornerstone of the diagnosis of AP: **Clinical findings** + **elevation** of **pancreatic enzyme levels** in the plasma[Q].

Pancreatic Enzymes
• A **threefold or higher** elevation of **amylase** and **lipase** levels **confirms** the **diagnosis**[Q]**.**
• **Amylase's** serum **half-life** is **shorter** as compared with lipase.
• **Lipase** is also a **more specific marker of AP**[Q] because serum amylase levels can be elevated in a number of conditions, such as peptic ulcer disease, mesenteric ischemia, salpingitis, and macroamylasemia.
• Patients with AP are typically **hyperglycemic**; they can also have **leukocytosis** and **abnormal elevation of liver enzyme** levels.
• **Elevation of ALT** levels in the serum in the context of AP has a **positive predictive value** of **95%** in the diagnosis of **acute biliary pancreatitis**[Q]**.**

- **X-ray Abdomen**: **Localized ileus** of **duodenum** and **proximal jejunum** (**sentinel loop**)[Q] or that of **transverse colon** up to **its mid point** (**colon cut off sign**)[Q].
- **IOC for acute pancreatitis: CECT**

Treatment

- **Cornerstone of the treatment**: **Aggressive fluid resuscitation**[Q] using isotonic crystalloid solution with **supplementary oxygen**
- **Narcotics** are usually preferred, especially **Buprenorpine >morphine**[Q] as analgesics.

In Acute Pancreatitis	
NSAIDs of choice	**Metamizole**[Q]
Opiate of choice	**Buprenorphine**[Q]

- **Nutritional support**: **Enteral nutrition**[Q] is associated with less infectious complications and reduces the need for pancreatic surgery as compared to TPN.

- **ERCP**: Beneficial for patients with **severe acute biliary pancreatitis** and **cholangitis**[Q]
- **Laparoscopic cholecystectomy**: Indicated for **all patients** with **mild acute biliary pancreatitis**[Q] with the **exception** of **older** patients and those with **poor performance status**[Q]

Complications of Acute Pancreatitis	
• Sterile and Infected peripancreatic fluid collections	• Pancreatic ascites
• Pancreatic necrosis and Infected Necrosis	• Pancreaticopleural fistulas
• Pancreatic pseudocysts	• Vascular complications
	• Pancreatocutaneous fistula

12. Ans. a. Leucocytosis >20,000/μL *(Ref: Sabiston 19/e p1522; Schwartz 10/e p1351-1360, 9/e p1183; Bailey 26/e p1129, 25/e p1140; Blumgart 5/e p841-844; Shackelford 7/e p1124)*

Assessment of Severity of Acute Pancreatitis

- **Severe pancreatitis** is diagnosed if **three or more**[Q] of the **Ranson's criteria** are fulfilled.
- The main disadvantage is that it does not predict the severity of disease at the time of the admission because six parameters are only assessed after 48 hours of admission.
- An **APACHE II score** of **≥8**[Q] defines **severe pancreatitis**. The main advantage is that it can be used on admission and repeated at any time.
- A **CRP level ≥130 mg/mL**[Q] defines **severe pancreatitis**.

Ranson's Prognostic Criteria for Gallstone Pancreatitis	
At Admission	**During Initial 48 Hours**
• Age **>70** years	• Hematocrit fall >10 percentage points
• WBC **>18,000** cells/mm	• BUN elevation **>2** mg/ dL
• Glucose **>220** mg/ dL	• Serum calcium fall to <8 mg/ dL
• Serum LDH **>400** IU/L	• Base deficit **>5** mEq/L
• AST >250 U/L	• Arterial PO_2 <60 mm Hg
	• Estimated fluid sequestration **>4 Litres**

- Patients with **one or two** criteria have a predicted mortality of less than **1%**, with **three** criteria (**10%**) or **four** criteria (**15%**); with more than **seven** criteria **50%**

13. **Ans. b. Acute Pancreatitis**

14. **Ans. a. Calcium, e. Antibiotics** *(Ref: Harrison 18/e p2640)*

Medical Treatment of Acute Pancreatitis
• **Analgesics** (**Buprenorphine, meperidine**)Q
• **IV fluid** and **colloids**Q
• No oral alimentation
• **Treatment of hypocalcemia**Q, if symptomatic
• **Antibiotics**Q

Treatment of unproven value in acute pancreatitis
• **Peritoneal dialysis, nasogastric decompression**Q, thoracic duct drainage,
• **Plasmapheresis,** anti-platelet activation factor
• Reduce gastrointestinal or pancreatic secretion (**H_2 blockers**, **PPI**, **antacids**, **atropine, somatostatin, glucagon**, and **calcitonin**)Q
• **Anti-inflammatory agents** (Steroids, prostaglandins and indomethacin)
• Inhibit activated proteolytic enzymes (**Aprotinin**, **Gabexate mesylate**)Q
• Others include procainamide, **heparin, dextran, vasopressin**Q

15. **Ans. b. Serum amylase >350 IU, d. Serum LDH >700 IU**

16. **Ans. None**

17. **Ans. a. Age >55 years, b. WBC >16000/μL, c. Sequestration of fluid >6L**

18. **Ans. b. Serum lipase**

19. **Ans. b. Hypercalcemia**

20. **Ans. b. Gallstone induced pancreatitis** *(Ref: Oxford textbook of surgery 2/e p1766)*
    - The **prognosis is best** in patients where **pancreatitis** is caused by a **remediable cause** such as **cholelithiasis**Q.
    - **Eradication** of **gall stones prevents further attacks** of **pancreatitis**Q.

21. **Ans. d. Prothrombin >2 times the control**

22. **Ans. d. Hyperamylasemia**

23. **Ans. b. Decreased calcium, d. Decreased PaO_2**

24. **Ans. a. Hypocalcaemia, d. Hyperglycemia**

25. **Ans. d. C-reactive protein <100** *(Ref: Sabiston 19/e p1522-1523; Bailey 26/e p1128-1129; Blumgart 5/e p841-844; Shackelford 7/e p1124)*

Tools for Predicting Severity in Acute Pancreatitis Ready for Clinical Use		
On Admission	**At 24 Hours**	**At 48 Hours**
APACHE-II Score **≥8**Q **IL-6** **Urea >60 mmol/L**	Polymorphonuclear **elastase** Urinary **trypsinogen 2** Urinary **trypsinogen** activation peptide	Ranson/Glasgow score **≥ 3**Q **CRP ≥130**Q mg/mL

Modified Glasgow Criteria

- This system comprises eight factors. The presence of any **3 or more** within 48 hours of admission defines the patient as having **severe disease**.

Criteria During initial 48 Hours	
• Age **>55** years	• Blood glucose **>180** mg/dL
• WBC count **>15,000** cell/mm	• Serum LDH **>600** IU/L
• Blood urea nitrogen **>45** mg/dL	• Serum calcium **<8** mg/dL
• Arterial PO2 **<60** mm Hg	• Serum albumin **<3.3** g/dL

Acute physiology and chronic health evaluation (APACHE)-II Scoring System

- **APACHE-II scoring system** incorporates **12**Q physiological and laboratory parameters as well as age and comorbid conditions to estimate severity of any disease process.

The 12 physiologic variables are BT ↑ HR at CWG SHOPS		
1. Mean arterial **Blood pressure**Q	5. **Creatinine**	9. **Hematocrit**
2. **Temperature**	6. **WBC count**Q	10. **Oxygenation**
3. **Heart rate**	7. **Glasgow Coma Scale**Q	11. Arterial **pH**Q
4. **Respiratory rate**	8. **Sodium**	12. **S**erum **potassium**

- **Score ≥8** signifies **severe, acute pancreatitis**Q
- It can be determined on a **daily basis**Q.
- Recently modification of the APACHE-II scoring system with **addition of obesity** has been proposed.
- The **APACHE-O** scale, which adds one point for **body mass index** (BMI) between 25 and 30, and two points for BMI larger than 30.

Balthazar Grading System for Acute Pancreatitis (CT scan based)	
Grade A	**Normal** pancreasQ
Grade B	**Focal** or **diffuse** pancreatic **enlargement**Q
Grade C	Intrinsic pancreatic alterations with **peripancreatic fat inflammatory** changesQ
Grade D	**Single fluid collection**/or **phlegmon**Q
Grade E	**Two** or **more** fluid collections or **gas**, in or adjacent to the pancreasQ

Computed Tomography Severity Index (CTSI) for Acute Pancreatitis

- **CTSI (CT severity index scoring system)** = Balthazar grade score + necrosis score
- **Highest attainable score = 10**Q

Pancreatic Inflammation		Pancreatic Necrosis	
• **Normal** pancreas	**0**	• None	**0**
• **Focal** or **diffuse** pancreatic **enlargement**	**1**	• **≤ 30%**	**2**
• Intrinsic pancreatic alterations with **peripancreatic fat inflammatory** changes	**2**	• **30%-50%**	**4**
• **Single fluid collection**/or **phlegmon**	**3**	• **>50%**	**6**
• **Two** or **more** fluid collections or **gas**, in or adjacent to the pancreas	**4**		

- **CTSI score:**
  - **0-3**: Mortality **3%**, morbidity **8%**
  - **4-6**: Mortality **6%**, morbidity **35%**
  - **7-10**: Mortality **17%**, morbidity **92%**

26. Ans. a. Low serum lipase

27. Ans. c. CECT is preferred over USG for diagnosis

- **First investigation** in acute pancreatitis: **USG**
- **Best investigation** in **acute pancreatitis**: **CECT**

28. Ans. b. S. amylase levels increase after 72 hours of attack

29. Ans. d. Acute pancreatitis

30. Ans. a. Pain last for several hours, c. Common in alcoholics

31. Ans. a. Acute fluid collection *(Ref: Sabiston 19/e p1523)*

Indications for Operative Treatment in Acute Pancreatitis

- **Failure of non-operative management** with at least 48 hours of **maximal ICU support**Q
- **Infected necrosis**Q
- Extravisceral **air**Q
- **Hemorrhage** uncontrolled by interventional technique**Q**
- **Colonic complications**Q
- Operation is indicated for **documented infection** or for **sterile pancreatic necrosis**Q with persistent systemic illness.

32. Ans. b. Hemorrhagic pancreatitis *(Ref: Bailey 25/e p1144, 24/e p945,1137,1210; Sabiston 18/e p2222; Maingot's 11/e p786,977)*

- All of the following patients presenting with abdominal pain and shock need immediate laparotomy except hemorrhagic pancreatitis.

Bailey says "In **peritonitis due to pancreatitis** or **salpingitis**, or in cases of **primary peritonitis** of **streptococcal** or **pneumococcal origin**, **non-operative treatment** is **preferred**Q (if diagnosis can be made with certainity)."

Sabiston says "**Ruptured ectopic** is a **surgical emergency**Q."

Definitive treatment of **ruptured aortic aneurysm** is **operation, not monitoring** and **rescuscitation**Q

Maingot's says regarding **liver hemangioma** "**Intra-abdominal hemorrhage** is extremely uncommon, but when does it occur, it should be **considered** as a **life threatening emergency** and **treated with** combination of **angiography with embolization and surgery**Q."

33. **Ans. a. Steatorrhoea**
    - **Steatorrhoea** is seen in **chronic pancreatitis**, not in acute pancreatitis.
34. **Ans. c. Acute pancreatitis**
35. **Ans. b. Acute pancreatitis**
36. **Ans. a. Acute pancreatitis** *(Ref: Sabiston 19/e p1521; Schwartz 10/e p1351-1360, 9/e p1183; Bailey 26/e p1128, 1135, 1138, 25/e p1141; Shackelford 7/e p1123, 1136-1137)*

Radiological Appearance		
Acute Pancreatitis	**Chronic Pancreatitis**	**CA Pancreas**
• **Renal halo** sign[Q] • **Gasless abdomen**[Q] • **Ground glass appearance**[Q] • **Colon cut off** sign[Q] • **Sentinel loop**[Q]	• **Chain** of **lakes appearance**[Q] • **String** of **pearl appearance**[Q] • **Beaded appearance**[Q] • Numerous **irregular calcifications**[Q] are pathognomonic (on X-ray)	• **Double contour** of medial border of duodenal C loop • **Double duct sign**[Q] • **Dilated / widening** of **duodenal C loop**[Q] • **Mucosal irregularity**[Q] • **Scrambled egg appearance** • **Inverted / reverse 3 sign** of **Frostberg**[Q] • **Rose thorning** of **medial wall** of **2nd** part of duodenum[Q]

37. **Ans. a. Hypercalcemia**
38. **Ans. c. Serum calcium**
39. **Ans. b. CT scan** *(Ref: Sabiston 19/e p1521; Schwartz 9/e p1183)*
40. **Ans. c. Gallbladder stone**
41. **Ans. d. Acute appendicitis**
42. **Ans. b. Infection**
43. **Ans. b. Serum amylase**
44. **Ans. d. Hypoglycemia**
45. **Ans. b. Pancreatitis**
46. **Ans. a. Acute pancreatitis**

ACUTE PANCREATITIS: COMPLICATIONS

47. **Ans. c. Acute pancreatitis**

Signs indicative of retroperitoneal bleeding in severe pancreatitis	
Flank ecchymosis	**Grey Turner** sign[Q]
Periumbilical ecchymosis	**Cullen's** sign[Q]
Inguinal ecchymosis	**Fox** sign[Q]

48. **Ans. a. Needle aspiration, c. External drainage** *(Ref: Sabiston 19/e p1524; Schwartz 10/e p150-151, 9/e p1185; Bailey 26/e p1132, 25/e p1142; Blumgart 5/e p858; Shackelford 7/e p1127-1128)*

Sterile and Infected Peripancreatic Fluid Collections (Pancreatic Abscess)

- The presence of **acute abdominal fluid** during an episode of **AP** has been described in **30-57%** of patients[Q].
- In contrast to pseudocysts and cystic neoplasias of the pancreas, **fluid collections are not surrounded** or **encased by epithelium** or **fibrotic capsule**[Q].
- **Treatment** is **supportive** because **most fluid collections** will be **spontaneously reabsorbed**[Q] by the peritoneum.
  - **Pancreatic Abscess**: The presence of **fever, elevated WBC count**, and **abdominal pain** suggest **infection** of this fluid and **percutaneous aspiration** is **confirmatory**[Q]
  - **Percutaneous drainage** and **IV administration** of **antibiotics** should be instituted if infection (**pancreatic abscess**)[Q] is present

49. **Ans. a. Low protein** *(Ref: Schwartz 9/e p1204; Bailey 26/e p1132, 25/e p1142; Shackelford 7/e p1128)*

Pancreatic Ascites: Management

- **Pancreatic ascites** occurs from a **pancreatic duct disruption** or from a **leaking pseudocyst**.
- **High amylase levels** are found in the **ascitic fluid**[Q].
- Initial treatment: **Non-operative** (**elimination of enteral feeding,** institution of **nasogastric drainage**, and administration of **somatostatin**)[Q]
- **Repeat paracentesis** may also be helpful.
- Roughly **50% to 60%** of patients can be **expected to respond** to this treatment with **resolution** of pancreatic ascites **within 2 to 3 weeks**[Q].

Persistent or recurrent ascites: endoscopic or surgical treatment
• **Endoscopic pancreatic sphincterotomy** with or without placement of a **transpapillary pancreatic duct stent**[Q]. • **Resection** (for **leaks in the pancreatic tail**) or **internal Roux-en-Y drainage** (for leaks in the **head and neck region**)[Q]

50. Ans. b. Bluish discoloration around umbilicus

51. Ans. d. Middle colic artery thrombosis *(Ref: Sabiston 19/e p1526; Schwartz 10/e p1351-1360, 9/e p1205; Bailey 26/e p1132-1133, 25/e p1144)*

Vascular Complications of Acute Pancreatitis

- Acute pancreatitis is **rarely associated with arterial vascular complications**.
- **MC vessel affected**: **Splenic artery**[Q]
- **Other vessels**: **Superior mesenteric**, **cystic**, and **gastroduodenal arteries**[Q]

Vascular Thrombosis

- Pancreatic inflammation can produce **vascular thrombosis**
- **MC affected vessel**: **Splenic vein**[Q]
- in severe cases, it can **extend into** the **portal venous system**
- Imaging demonstrates **splenomegaly, gastric varices**, and **splenic vein occlusion**
- **Thrombolytics** have been described in the **acute early phase**
- **Most patients** can be managed with **conservative treatment**
- **Recurrent episodes** of **upper gastrointestinal bleeding** caused by venous hypertension should be **treated with splenectomy**[Q]

Pathogenesis

- It has been proposed that **pancreatic elastase damages** the **vessels**, leading to **pseudoaneurysm formation**.

Clinical Features

- **Spontaneous rupture**[Q] results in massive bleeding.
- Clinical manifestations include sudden onset of **abdominal pain, tachycardia**, and **hypotension**.

Treatment

- If possible, **arterial embolization** should be attempted **to control the bleeding**[Q].
- **Refractory cases** require **ligation of** the **affected vessel**.
- The **mortality** ranges from **28-56%.**

- **MC affected vessel** in **acute pancreatitis**: **Splenic artery** (**pseudoaneusysm formation**)[Q]
- **MC affected vessel** leading to **vascular thrombosis** caused by acute pancreatitis: **Splenic vein**[Q]

52. Ans. c. Acute hemorrhagic pancreatitis

53. Ans. b. Acute pancreatitis

54. Ans. c. Manage conservatively with antibiotic alone *(Ref: Sabiston 19/e p1524; Schwartz 9/e p1185; Bailey 26/e p1131-1132, 25/e p1142-1143; Blumgart 5/e p851; Shackelford 7/e p1127-1128)*

- Another emerging concept related to the timing is the increasing use of percutaneous drainage with infected fluid collections and those with infected necrosis.

Pancreatic Necrosis

- Pancreatic necrosis is the presence of **nonviable pancreatic parenchyma** or **peripancreatic fat**
- **Up to 20%** of patients with AP develop pancreatic necrosis.
- **Most patients** who develop **multiorgan failure** have **necrotizing pancreatitis**[Q]
- Pancreatic necrosis has been documented in **up to 80%** of the **autopsies of patients** who **died after an episode of AP**[Q].

- **Main complication** of pancreatic necrosis is **infection**, **risk is directly related** to the **amount of necrosis**[Q]
- This complication is **associated with bacterial translocation** usually involving **enteric flora**, such as **Escherichia coli, Klebsiella**[Q], Pseudomonas spp and Enterococcus spp

Clinical Features

- **Infected pancreatic necrosis** should be suspected in patients with **prolonged fever, elevated WBC count**, or **progressive clinical deterioration**[Q].

Diagnosis

- **CECT** is **IOC** to **diagnose pancreatic necrosis**[Q].
- **CECT:** Typically seen as areas of **low attenuation** after the injection of IV contrast.

- **Evidence of air within** the **pancreatic necrosis** seen **on** a **CT** scan **confirms the diagnosis** of **infection**[Q]

- **If infected necrosis** is **suspected, FNAC** should be performed.
- A **positive Gram stain** and/or **culture establish the diagnosis**, **positive cultures** are **confirmatory**[Q].

Treatment

- Once infection has been demonstrated, **IV antibiotics** should be given.
- Because of their **penetration into** the **pancreas** and **spectrum coverage**, **carbapenems (imipenam and meropenam)**[Q] are the **first option** of treatment.

- **Definitive treatment** for **infected pancreatic necrosis** is **surgical débridement with necrosectomy, closed continuous irrigation**, and **open packaging**Q

Outcome

- The **overall mortality rate** after **open necrosectomy** is **25-30%.**

55. Ans. d. All patients respond to repeated treatment

56. Ans. d. They will never erode into duodenum *(Ref: Sabiston 19/e p1525; Schwartz 9/e p1204)*

Pancreaticoenteric Fistula

- **Pancreatic pseudocysts** or areas of **pancreatic necrosis** can **erode into** the **small intestine, duodenum, stomach, bile duct**, or **splenic flexure** of the colonQ.
- **Occasionally**, this results in **resolution of the pseudocyst**, and **no further treatment** is neededQ.
- **More often**, such an event is accompanied by **significant bleeding** or **signs of sepsis**, and **surgical intervention** is usually required.
- **Management** of these fistulas is **determined by** the **gastrointestinal organ involved**Q.

57. Ans. c. Commonly associated with hemosuccus pancreaticus

58. Ans. b. Hypocalcemia

- **Most common metabolic complication** of **acute pancreatitis** is **hypocalcemia**Q.

59. Ans. a. Grey turner sign

CHRONIC PANCREATITIS: ETIOLOGY, CLINICAL FEATURES AND DIAGNOSIS

60. Ans. a. Cationic trypsinogen or PRSS1 *(Ref: Sabiston 19/e p1527; Schwartz 9/e p1190; Bailey 26/e p1134, 25/e p1146; Blumgart 5/e p861; Shackelford 7/e p1134)*

Hereditary Pancreatitis

- **Autosomal dominant**Q disease
- Due to a **missense mutation** on **cationic trypsinogen**, or **PRSS1**Q (Protease, Serine 1) results in **premature, intrapancreatic activation** of **trypsinogen**.
- The incidence is **equal in both sexes**.

Clinical Features

- Characterized by **recurrent episodes** of **acute pancreatitis** or familial aggregation of chronic pancreatitisQ
- Typically, patients **first present in childhood** or **adolescence** with **abdominal pain** and are found to have **chronic calcific pancreatitis** on imaging studies.
- **Progressive pancreatic dysfunction** is common, and many patients present with symptoms due to **pancreatic duct obstruction**Q.
- The **risk of subsequent carcinoma formation**Q is upto 40%, **age of onset** for **carcinoma** is **>50** years old.

Clinical Pancreatic Syndromes and Associated Genetic Mutations	
Hereditary Pancreatitis	• **PRSS1**Q (Cationic trypsinogen) gene
Idiopathic chronic Pancreatitis	• **CFTR**Q
Tropical calcific Pancreatitis	• **SPINK1 (PTSI)**Q

61. Ans. d. Serum amylase is always raised *(Ref: Sabiston 19/e p1526-1531; Schwartz 10/e p1360-1390, 9/e p1186-1198; Bailey 26/e p1134-1137, 25/e p1146-1148; Blumgart 5/e p862-870; Shackelford 7/e p1132-1138)*

- **Amylase** and lipase levels are not **always elevated in chronic pancreatitis, making the diagnosis often clinical.**

Chronic Pancreatitis

- Characterized by the **persistent inflammation** and **irreversible fibrosis** associated with **atrophy** of the pancreatic parenchymaQ.
- Associated with **chronic pain** and **endocrine** and **exocrine insufficiency**Q
  - In most cases of chronic pancreatitis, **exocrine insufficiency precedes endocrine insufficiency** by **many years**Q
- **Exocrine insufficiency** is more **closely related with morphologic changes**Q.
- Approximately **90%** of **beta cell mass must be lost** before clinical **diabetes** develops.
- Classification of various causes of chronic pancreatitis based on the **TIGAR-O** systemQ (TIGAR-O consist of toxic-metabolic, idiopathic, genetic, autoimmune, recurrent severe, obstructive).

Etiology

- **Heavy alcohol consumption** is **MC cause** of CP (**70-80%**)[Q]
- **Smoking increases** the **risk**[Q] of alcohol-induced CP.
- **Other causes**: Chronic duct obstruction, trauma, pancreas divisum, cystic dystrophy of the duodenal wall, **hyperparathyroidism, hypertriglyceridemia, autoimmune pancreatitis, tropical pancreatitis**, and **hereditary pancreatitis** (account for <10% of all cases)[Q]

Pathology

- **Fibrosis: Pancreatic stellate cells** become activated and **proliferate** and transform into myofibroblast-like cells.
- **Stone Formation:** Pancreatic stones are composed largely of **calcium carbonate crystals**[Q]

Clinical Features

- **Classic triad**: **DM + Pancreatic calcification + Steatorrhea**
- **Abdominal pain** is the primary manifestation and **MC symptom** of CP[Q].
- **Intensity, frequency**, and **duration** of pain gradually **increase with worsening disease**[Q].
- Pancreatic **inflammation** and **fibrosis** decrease the number and function of acinar cells.
  - At least **90%** of the **gland** needs to be **dysfunctional** before **steatorrhea, diarrhea**, and other symptoms of **malabsorption** develop[Q]
  - **Exocrine insufficiency** occurs in **80-90%** of patients with **long-standing CP**[Q]
- **Diabetes** is developed in **40-80%** of patients, typically occurs **many years after** the onset of **abdominal pain** and **pancreatic exocrine insufficiency**[Q].

Diagnosis

- **X-ray abdomen: Diffuse pancreatic calcification** is seen in **30-40%** cases of CP[Q]
  - **CT scan**: **Dilated pancreatic duct** (68%), **parenchymal atrophy** (54%), and **pancreatic calcifications**[Q] (50%). Other findings include peripancreatic fluid, focal pancreatic enlargement, biliary duct dilation, and irregular pancreatic parenchyma contour
- **MRI:** Detect changes in the pancreatic parenchyma suggestive of chronic inflammation, such as changes in intensity, pancreatic atrophy, and irregularities in the contour.
- **MRCP** with **secretin injection**: To evaluate **intraductal strictures** and **pancreatic duct disruption**[Q].
  - **ERCP**: Considered the **gold standard** for the diagnosis of CP, the advent of **secretin MRCP** and **EUS** have **significantly decreased its role** as a **diagnostic test**[Q]
- **Indications of ERCP**: **Other diagnostic tests** are **contraindicated** or **have failed** to corroborate the diagnosis. ERCP should be considered a **therapeutic modalities** in patients who develop **pancreatic duct complications** amenable to endoscopic therapy, such as **stricture, stone, pseudocysts**, and **biliary stenosis.**
- **EUS**: **Most accurate technique** to diagnose CP in patients with **minimal-change disease** or in the **early stages**[Q].
  - **Rosemont criteria**[Q]: **Criteria on EUS** required **to diagnose chronic pancreatitis**
- Measurement of the **fecal elastase-1** level is the **preferred noninvasive study** to **diagnose pancreatic exocrine insufficiency**[Q].
- **Steatorrhea:** If the **stool fat** content **exceeds 7 gm/day**[Q]

Treatment

- Patients should be strongly encouraged to stop drinking and smoking.
- **NSAIDs** are the first line of treatment, patients with severe pain should be treated with potent long-acting **narcotics**[Q].
- **Pancreatic enzyme replacement**[Q] in patients with pancreatic exocrine insufficiency.
- **ERCP**: Primary modality for **treating symptomatic pancreatic duct obstruction** with **dilation** and **polyethylene stent placement**[Q].
- **Endoscopic stone extraction** should be considered for patients with **pain** and **pancreatic duct dilation secondary to stones**[Q].
  - Patients with a **dilated pancreatic duct** (diameter **>7 mm**) require a **decompressing procedure** and patients with **normal pancreatic duct** require a **resectional procedure**[Q]

Cambridge Criteria for Chronic Pancreatitis on ERCP	
Stage	**Typical Changes**
Normal	**Normal** appearance of side branches and main pancreatic duct
Equivocal	**Dilatation/obstruction** of **< 3 side branches**; normal main pancreatic duct
Mild	Dilatation/obstruction of **> 3** side branches; normal main pancreatic duct
Moderate	Additional **stenosis** and **dilatation of main pancreatic duct**
Severe	Additional **obstructions, cysts, stenosis** of main pancreatic duct; **calculi**

62. Ans. a. Abdominal pain

- **Abdominal pain** is the primary manifestation and **MC symptom** of chronic pancreatitis[Q].

63. Ans. c. Hypercalcemia *(Ref: Sabiston 19/e p1527; Schwartz 10/e p1360, 1366-1367, 9/e p1190; Bailey 26/e p1134, 25/e p1146; Blumgart 5/e p861; Shackelford 7/e p1133; Harrison 18/e p2644)*

Tropical (Nutritional) Pancreatitis

- Tropical chronic pancreatitis is **highly prevalent** among **adolescents** and **young adults** raised in **Indonesia, southern India**, and **tropical Africa**[Q].
- Associated with **mutations of PSTI** or **SPINK1 gene**[Q]
- It is subdivided into:
- **Tropical calcific pancreatitis**, characterized by **severe, recurrent, chronic** abdominal pain and **extensive** pancreatic **calcifications**[Q].
- **Fibrocalculous pancreatic diabetes**, which is characterized by **significant pancreatic endocrine insufficiency**[Q]

Etiopathogenesis

- **Protein-caloric malnutrition** and **toxic products** of some **indigenous foodstuffs**[Q] may contribute to the disease.

> - **Cassava root** contains **toxic glycosides**, increases susceptibility to **free radical injury** of the **pancreas**[Q]

Clinical Features

- **Abdominal pain** develops in **adolescence**, followed by the development of a **brittle form of pancreatogenic diabetes**[Q].
- **Parenchymal** and **intraductal calcifications** are seen, and the **pancreatic duct stones** may be **quite large**[Q].
- The **accelerated deterioration** of **endocrine and exocrine function**, the **chronic pain due to obstructive disease,** and the **recurrence of symptoms** despite decompressive procedures **characterize the course of disease**[Q].

64. Ans. b. Cassava ingestion **65. Ans. b. Chronic pancreatitis** **66. Ans. a. Hypercalcemia**

67. Ans. None *(Ref: Harrison 18/e p2643)*

- Chronic pancreatitis is seen in all the given conditions

Chronic Pancreatitis: Tigar-O Classification System		
Toxic-metabolic	**Idiopathic**	**Genetic**
• **Alcoholic**[Q] • **Tobacco smoking**[Q] • **Hypercalcemia**[Q] • **Hyperlipidemia**[Q] • **Chronic renal failure** • Medications: **phenacetin abuse**[Q] • Toxins	• Early onset • Late onset • **Tropical**[Q]	• **Hereditary pancreatitis**[Q] • Cationic trypsinogen[Q] • $PRSS_1$ • $PRSS_2$ • CFTR mutations[Q] • SPINK1 mutations[Q]
Autoimmune	**Recurrent and Severe Acute Pancreatitis**	**Obstructive**
• Isolated **autoimmune** chronic pancreatitis • Autoimmune chronic pancreatitis associated with Sjögren's syndrome • **Inflammatory bowel disease** • **Primary biliary cirrhosis**	• Postnecrotic (**severe acute pancreatitis**) • Recurrent acute pancreatitis • Vascular diseases/**ischemia** • **Postirradiation**	• **Pancreas divisum**[Q] • Sphincter of Oddi disorders (controversial) • Duct obstruction (e.g., tumor) • Preampullary duodenal wall cysts • Posttraumatic pancreatic duct scars

68. Ans. b. Calcification, c. Duct penetrating sign, e. Dilation of bile and pancreatic duct *(Ref: Bailey 25/e p1157; Sabiston 19/e p1528)*

- **Irregularity of the pancreatic duct**, **intraductal** or **parenchymal calcifications**, **diffuse pancreatic involvement**, and **normal** or **smoothly stenotic pancreatic duct penetrating through** the **mass** (**duct penetrating sign**)[Q] favor the **diagnosis of chronic pancreatitis** over cancer.

69. Ans. b. Chronic pancreatitis

70. Ans. b. ERCP

CHRONIC PANCREATITIS TREATMENT AND COMPLICATIONS

71. Ans. b. Somatostatin is effective in fistula closure *(Ref: Blumgart 5/e p965; Shackelford 7/e p1278-1280)*

- Trials have demonstrated the **benefit of prophylactic octreotide** in the **prevention of pancreatic fistula;** however the **role of octreotide**, **once fistula is established** remains **unclear**[Q]. In such situations, the octreotide administration is continued for upto 2 weeks, while in those who do not seem to respond, it is discontinued.

Pancreatic Fistula

- Output via an intra-operatively placed drain (or percutaneous drain) of any measurable volume or drain fluid on or after post-operative day 3, amylase >3 times of normal serum value.
- Pancreatic fistula classified into **low output** (**<200 mL/day**) and **high output** (**>200 mL/day**).

Factors known to influence the outcome of a Pancreatic Anastomosis	
• **Texture** of the **pancreatic remnant**[Q]	• **Caliber** of the **main** pancreatic **duct**[Q]
• **Exocrine** pancreatic juice **output**[Q]	• **Surgical technique** applied[Q]

- **Texture of Pancreatic Remnant:** Performing an **anastomosis** on a **soft pancreas** is **more difficult** than on a firm or hard pancreas. Thus, a **pancreatic anastomosis** in **chronic pancreatitis** has a **lower risk** of anastomotic failure compared to **pancreatic cancer**[Q].
- **Pancreatic Juice Output: Decreased juice output** is associated with a **lowered risk** of anastomotic failure[Q].
- **Surgical Technique:** An **end-to-side pancreaticojejunostomy** irrespective of the caliber of the main pancreatic duct and the texture of the pancreatic parenchyma.

Management

- **Most cases resolve spontaneously** by **conservative treatment**[Q]
- Benefit of **prophylactic octreotide** in the **prevention** of **pancreatic fistula**[Q]
- Role **of octreotide, once a fistula** is **established remains unclear**[Q].

72. Ans. a. DPPHR *(Ref: Sabiston 19/e p1529-1531; Schwartz 10/e p1360-1390, 9/e p1210; Blumgart 5/e p875-881; Shackelford 7/e p1138-1142)*

Resection Procedures in Chronic Pancreatitis

- It is believed that **inflammatory process** in the **pancreatic head** controls both the severity of symptoms and further progression of disease in remainder of the gland
- **Pancreatic head** is **pacemaker of chronic pancreatitis**[Q].
- Because of this **resection of pancreatic head** has been shown to **completely relieve** the **pain** of chronic pancreatitis in **70-80%**[Q] patients.
- **Distal pancreatectomy** is the ideal procedure for patients whose **chronic pancreatitis** is confined to **pancreatitis tail**[Q].
- Usually, **distal pancreatectomy** is combined **with splenectomy** for technical reasons, but spleen can be preserved if its vascular supply is secure.

Surgical Procedures in Chronic Pancreatitis

Drainage Procedure	Resection Procedure
• **Puestow Procedure**[Q] (Longitudinal Pancreaticojejunostomy): **Resection of** the **tail** followed by a longitudinal pancreaticojejunostomy[Q] • **Partington** and **Rochelle Modification** of **Puestow Procedure**: **Elimination** of the **resection** of the **pancreatic tail**[Q]. • **Duval Procedure:** Distal pancreatectomy with Roux-en-Y pancreaticojejunostomy (**caudal PJ**)[Q]	• **Beger's Procedure** (Duodenal Preserving Pancreatic Head Resection **DPPHR**[Q]) • **Warren's modification** of Beger's procedure • **Frey's Procedure** (Local Resection of the Head of the Pancreas Combined with Longitudinal Pancreaticojejunostomy **LR-LPJ**)[Q] • **Berne modification:** (Combines some aspects of **Beger's** and **Frey's**) • **Hamburg modification of Frey's**

Surgical Procedures in Chronic Pancreatitis

- **Ideal procedure: DPPHR**[Q] **(Beger's)**
- **In** presence of **portal vein thrombosis: Frey's**[Q]
- **Small duct disease: V-shaped excision**[Q]
- **Disease recurrence** in **body** and **tail** (after DPPHR, Whipples or Longmire-Traverso procedure): **V-shaped drainage**[Q]
- **Disease limited to tail**: Spleen-preserving **distal pancreatectomy**[Q]

73. Ans. a. Distal resection of tail of pancreas with end to end pancreaticojejunostomy

74. Ans. d. Longitudinal Pancreaticojejunostomy

- **Drainage procedure** in the form of **longitudinal pancreaticojejunostomy** is the surgical **treatment of choice** for **chronic pancreatitis with dilated ducts**[Q].

75. Ans. d. Medical management

- The patient has **non-disabling pain** that has **responded to analgesia**. Such patients should be best **managed by non-operative means**. **Medical management** is the best option.
- In the patients having **severe pain, not relieved by analgesics** with similar situation should be best **managed with longitudinal pancreaticojejunostomy**.

76. Ans. c. Side to side pancreaticojejunostomy

77. **Ans. a. Celiac ganglia** *(Ref: Sabiston 19/e p1529; Schwartz 9/e p1206; Bailey 26/e p1135, 25/e p1147; Blumgart 5/e p873; Shackelford 7/e p1137; Harrison 18/e p2646)*

Chronic Pancreatitis

- **Pain from** the **pancreas** is carried in **sympathetic fibers** that traverse the **celiac ganglia**, reach the sympathetic chain through the splanchnic nerves, and then ascend to the cortex
- **Celiac plexus nerve blocks**[Q] performed either **percutaneously** or **endoscopically** have been employed to **abolish this pain** with inconsistent results

78. **Ans. b. Pancreaticojejunostomy**

79. **Ans. d. Distal pancreatectomy**

80. **Ans. d. None**

81. **Ans. a. Renal artery stenosis**

82. **Ans. d. Gallbladder stone is the most common cause**

PSEUDOPANCREATIC CYST

83. **Ans. b. Endoscopic treatment may be curative** *(Ref: Sabiston 19/e p1524-1525, 1531; Schwartz 9/e p1200-1203; Bailey 26/e p1133-1134, 25/e p1144-1145; Shackelford 7/e p1144-1148)*

Pseudopancreatic cyst

- A chronic collection of pancreatic fluid surrounded by a **nonepithelialized wall of granulation tissue** and **fibrosis**[Q]
- Pseudocysts account **75%** of **cystic lesions**[Q] of the **pancreas.**
- **MC complication** of **chronic pancreatitis**[Q]

  - Located anywhere from the **mediastinum** to the **scrotum**[Q]
  - Found **most often** in the **lesser sac**[Q] or **anterior pararenal space**
  - **Traumatic pseudocysts** tend to occur **anterior to** the **body**[Q] of the gland
  - **Chronic pancreatitis pseudocysts** are commonly located **within the substance** of the gland

- **Incidence of Pseudocysts**:
  - **Acute pancreatitis-10-20%** of patients[Q]
  - **Chronic pancreatitis- 20-40%** of patients
- **Multiple** in **17%**[Q] cases
- **Alcohol** is the **MC cause** of **pancreatitis related pseudocysts**[Q].

Pathophysiology

- **Pancreatic duct leak** with extravasation of pancreatic juice results in a pancreatic fluid collection (PFC).
- **Acute pseudocyst**: Over a period of **3 to 4 weeks**[Q], the PFC is sealed by an inflammatory reaction that leads to development of a wall of acute granulation tissue without much fibrosis.
- Acute pseudocysts may **resolve spontaneously** in up to **50% of cases**, over a course of **6 weeks** or longer[Q].
- **Pseudocysts >6 cm resolve less frequently** than smaller ones but may regress over a period of weeks to months[Q].

Clinical Features

- Pseudocysts usually cause symptoms of pain, fullness, or early satiety.

  - **Abdominal pain** is **MC symptom**[Q], occurs in up to 90% of patients
  - Other common symptoms include **early satiety**, **nausea** and **vomiting** (50% to 70%), **weight loss** (20% to 50%), **jaundice** (10%), and low-grade fever (10%)[Q]

- **Physical examination**: **Upper abdominal tenderness** in the majority of patients, and **25-45%** will have a **palpable abdominal mass**[Q].
- The symptoms of early satiety, nausea, and vomiting may be secondary to gastroduodenal obstruction caused by a mass effect of the pseudocyst.

Diagnosis

- No definitive laboratory findings are available to establish a diagnosis of pancreatic pseudocyst.
- **Elevated serum amylase** and **lipase**[Q] concentrations may occur in **half** of these patients.
- **Persistently elevated amylase** after resolution of acute pancreatitis should prompt investigation for a pseudocyst.
- **CECT abdomen** is **investigation of choice**[Q] for diagnosis of a pancreatic pseudocyst.

Treatment

- Pseudocyst **5 cm** in diameter and **<6weeks** old should be **observed**[Q], as they tend to **resolve spontaneously**[Q].
- **Pseudocyst >5 cm** diameter is an indications for **drainage**[Q]

  - If **infection** is suspected, the pseudocyst should be **aspirated**[Q] (not drained) by CT- or US-guided FNA, and the contents examined for organisms by Gram's stain and culture
  - If **infection** is present, and the **contents** resemble **pus**, **external drainage** is employed, using either surgical or percutaneous techniques

- Pseudocysts **communicate with the pancreatic ductal system** in up to **80% of cases**, so external drainage creates a pathway for pancreatic duct leakage to and through the catheter exit site.
- **Methods of Internal drainage**:
  - **Percutaneous** catheter-based methods (transgastric puncture and stent placement to create a cystogastrostomy)
  - **Endoscopic** methods (**transgastric** or **transduodenal puncture** and **multiple stent placements**, with or without a nasocystic irrigation catheter)
  - **Surgical methods** (a true cystoenterostomy, biopsy of cyst wall, and evacuation of all debris and contents)
- **Surgical options**: **Cystogastrostomy**, **Roux-en-Y cystojejunostomy**, **cystoduodenostomy**.
- **Preferred modality**: **Internal drainage of cyst** by **cystojejunostomy**[Q]

Pseudocyst Complications	
• **Infection (MC)**[Q]	• Duodenal obstruction
• Pain due to expansion	• Rupture
• Hemorrhage	• Abscess

The D'EGIDIO classification of Pancreatic Pseudocyst				
	Context	**Pancreatic Duct**	**Duct-pseudocyst Communication**	**Treatment**
Type I	**Acute** post-necrotic pancreatitis	Normal	No	**Percutaneous drainage**
Type II	**Acute-on Chronic** pancreatitis	**Abnormal** (no stricture)	**50:50**	**Internal drainage** or **resection**
Type III	**Chronic** pancreatitis	Abnormal (**stricture**)	**Yes**	**Internal drainage** with **duct decompression**

- **Cystojejunostomy** has a **slightly lower recurrence rate**, but it is associated with significantly **more blood loss** and operative time

84. Ans. a. Infection

85. Ans. d. Hemorrhage *(Ref: CSDT 11/e p638)*

- **Serious post-op hemorrhage** from cyst occurs **from cystogastrostomy**[Q].

86. Ans. c. Pancreatitis

87. Ans. d. Splenic artery *(Ref: Maingot 11/e p977)*

Artery Involved in Pseudoaneurysm associated with Pancreatic Pseudocyst

- **Splenic artery** (**30-50%**): **Most common**[Q]
- Gastroduodenal artery (10-15%)
- Inferior and superior pancreaticoduodenal artery (10%)

88. Ans. b. Post inflammatory cyst

89. Ans. d. Traumatic pancreatitis

- Trauma is the most common cause of acute pancreatitis in children.

Pancreatic Trauma in Children

- **MC mechanism** in **children** is **abdominal blunt trauma**[Q].
- Direct compression of the epigastrium against the vertebral column and a blunt object (**handlebar**) is typically seen after **bicycle injuries**[Q].
- **MC segment** of the pancreas affected is the **body**[Q].

90. Ans. d. USG and follow up

91. Ans. d. Percutaneous aspiration is the treatment

92. Ans. a. Percutaneous aspiration is treatment of choice

93. Ans. d. Most common site is in head of pancreas

- **Most common site** of **pancreatic pseudocyst** is **lesser sac**[Q]

94. Ans. d. Can present from mediastinum to pubis, e. Contains a wall of fibrous granulation tissue

95. Ans. b. Conservative

96. Ans. a. Endoscopic drainage, b. Percutaneous drainage, c. Internal drainage (surgical), d. Pancreatectomy *(Ref: Sabiston 19/e p1524-1525; Bailey 26/e p1133-1134, 25/e p1145; Shackelford 7/e p1148)*

Management Options for Pancreatic Pseudocysts

- Observation
- **Percutaneous aspiration/drainage**[Q]
- **Endoscopic aspiration/drainage**[Q]
- **Transpapillary endoscopic drainage** or **stenting**[Q]
- **Operative approaches (open** or **laparoscopic)**[Q]
  - Internal drainage
  - External drainage
  - Resection

97. Ans. a. Cystogastrostomy, b. Cystojejunostomy, d. Excision of the cyst

98. Ans. d. Carcinomatous change

99. Ans. d. Treatment of choice is percutaneous aspiration

100. Ans. c. Calcification in the cyst wall

101. Ans. d. Infection

102. Ans. a. Malignancy

103. Ans. c. Pseudopancreatic cyst

CYSTIC NEOPLASMS OF PANCREAS

104. Ans. a. IPMN *(Ref: Sabiston 19/e p1533-1534; Schwartz 9/e p1234; Blumgart 5/e p903-905; Shackelford 7/e p1220-1222)*

Intraductal papillary Mucinous Neoplasm

- **IPMN** is also known as **mucin-secreting carcinoma**[Q], villous adenoma of the duct of Wirsung
- Seen in **6th** to **7th** decade of life
- More common in **head** and **uncinate process**[Q] of the pancreas
- **Equal sex distribution**[Q]

Types of IPMN

- **Side branch IPMN:** Involves dilation of the pancreatic duct side **branches**
- **Main duct IPMN:** Abnormal cystic dilation of the **main pancreatic duct**
- **Mixed-type IPMN: Side branch** IPMN that has extended to **involve** the **main pancreatic duct**

Pathology

- Occur within the **head** of the pancreas and arise **within** the **pancreatic ducts**[Q].
- **Ductal epithelium** forms a **papillary projection** into the duct
- **Mucin production** causes **intraluminal cystic dilation**[Q] of the pancreatic ducts
- **Careful histologic examination** of the **entire specimen** (**invasive component** in **35-40%**)[Q]

Clinical Features

- Patients are usually in their **6th** to **7th decade**
- Present with **abdominal pain** or **recurrent pancreatitis**, thought to be caused by obstruction of the pancreatic duct by **thick mucin**[Q].
- Some patients (5-10%) have **steatorrhea, diabetes**, and **weight loss** secondary to pancreatic insufficiency.

- **Predictors of malignancy: Jaundice**, **elevated** serum **ALP**, **mural nodules**, **diabetes**, and main pancreatic **duct diameter ≥ 7 mm**[Q]

Diagnosis

- **Endoscopy**: **Mucus extruding** through a large, **fish-mouth** like papillary orifice is **virtually diagnostic of IPMN**[Q]
- **CT scans**: **Dilated main pancreatic duct**, cysts of varying sizes, and possibly **mural nodules**[Q]
- **Aspirated fluid**: **Mucinous** content with **elevated CEA** and **amylase** level[Q]

Pre-operative localization is problematic in IPMN
• **Over production of mucous**, **dilation** can occur **proximal and distal** to the tumor[Q]
• **Propensity** of tumor **to spread microscopically** along the duct[Q]

Treatment

- **Partial pancreatectomy:** For **main duct**, **symptomatic**, and **large branch-type IPMNs (>3 cm)**, or IPMNs with an **invasive component**[Q]
- **Observation:** For **asymptomatic small** (<3 cm) **branch duct IPMNs** without **associated nodularity**.

Prognosis

- **Local anatomic resection** is essentially **curative** for **branch duct IPMN**
- **Recurrence** in the remnant gland is upto **10%** in **main duct IPMN**
- **IPMN with invasive carcinoma**: 5 and 10-year **survival** is 60% and 50% (**better than pancreatic adenocarcinoma**)

105. Ans. a. Microcystic adenoma *(Ref: Sabiston 19/e p1532-1533; Schwartz 10/e p 1410-1413, 9/e p1232; Blumgart 5/e p902-903; Shackelford 7/e p1218-1220)*

- **Mucinous cystadenoma** is **macrocystic,** not the microcystic adenoma.

Mucinous Cystadenoma of Pancreas

- **MCN**: **MC cystic neoplasm**Q of the pancreas
- Frequently seen in **young women**, mean age **5th decade**Q
- More common in the **body** and **tail** of the pancreas

Pathology

- MCNs contain **mucin-producing epithelium**Q, macrocystic
- Histology: Presence of **mucin-rich cells** and **ovarian-like stroma**Q
- **Estrogen** and **progesterone staining** are **positive** in **most cases**Q

Clinical Features

- Incidental MCN is becoming increasingly common
- Up to **50%** of patients present with **vague abdominal pain**.
- A **history of pancreatitis** may be found in up to **20%** of patients, which explains the common misdiagnosis of pseudocyst.

Diagnosis

- **CT scan**: Presence of a **solitary cyst** with **fine septations** and **rim of calcification**Q
- **Cross-sectional imaging** may **not** be **able to distinguish** between **benign** and **malignant MCNs**
  - Presence of **eggshell calcification**, **larger** tumor **size**, or a **mural nodule** on cross-sectional imaging is **suggestive of malignancy**Q
  - **Cyst fluid analyses**: **Mucin-rich** aspirate, **high CEA** and **low amylase** levelsQ
- These fluid analyses provide accurate diagnosis in up to 80% of cases

Treatment

- Exclusion of malignancy can't be obtained by biopsy alone, so **surgical excision is indicated** for **all mucinous cystic neoplams**Q, because extensive histological sampling is required for confirmation
- **Pancreatic resection** is the **standard treatment** for MCNsQ.
- In the absence of invasive malignancy, resection is curative and no further surveillance is required

106. Ans. c. Intraductal papillary mucinous neoplasm

107. Ans. a. Treatment is enucleation

108. Ans. a. 30% are associated with malignancy *(Ref: Sabiston 19/e p1533; Schwartz 10/e p 1409-1410, 9/e p1232; Blumgart 5/e p902; Shackelford 7/e p1217-1218)*

Serous Cystadenoma of Pancreas

- SCNs usually occur in the **head**Q of the pancreas
- Affect **women** almost **exclusively**Q
- Most are **benign** and have **no malignant potential**Q

Pathology

- SCNs are **large**Q, well-circumscribed masses (**microcystic**)
- Microscopic examination reveals **multiloculated**, **glycogen-rich** small cystsQ
- Typically have **small cyst**Q filled with clear fluid with **spongelike** or **honeycomb appearance**Q.

Clinical Features

- Most are **asymptomatic**Q
- Patients commonly present with **vague abdominal pain**Q and less frequently with weight loss and obstructive jaundice.

Diagnosis

- Aspiration from cyst yields **non-viscous fluid** with **low CEA** and **low amylase** levelsQ.
  - **Central calcification** gives rise to a characteristic **central sunburst**Q, **radial,** or **stellate scar pattern** on **CT scan**Q (10-20%)

Treatment

- SCN is benign, **resection** is indicated when **diagnosis** is **in doubt** or when they become **symptomatic**Q, size >4 cm

109. Ans. d. Usually diagnosed by octreotide scan

110. Ans. d. 90% patients survive >10 years after surgery

111. Ans. a. Increased CEA

112. Ans. a. Always involves main pancreatic duct *(Ref: Sabiston 19/e p1533; Blumgart 5/e p902-908; Shackelford 7/e p1228)*

Cystic Neoplasm of Pancreas			
Characteristics	**SCN**	**MCN**	**IPMN**
Gender	**F >> M**[Q] (4:1)	**F >>> M**[Q] (10:1)	**F = M**[Q]
Age (years)	60-70	50-60	60-70
Location	**Head**[Q]	**Body** and **tail**[Q]	**Head**[Q]
Appearance	Multiple **small cysts** (**microcyst**) separated by **internal septations** with **central sunburst calcifications**[Q]	Thick-walled, **septated macrocyst**[Q] with smooth contour; ± **solid** component, **egg-shell calcifications**[Q]	Poorly demarcated, lobulated, **polycystic mass** with **dilation** of main or branch **ducts**[Q]
Communication with ducts	No	No	**Yes**[Q]
Cytology	Scant **glycogen-rich cells**, with positive **Periodic Acid Schiff stain**[Q]	Sheets and clusters of columnar, mucin-containing cells	Tall, columnar mucin-containing cells
Mucin stain	Negative	**Positive**[Q]	**Positive**[Q]
Amylase	Low	Low	**High**[Q]
CEA	Low	**High**[Q]	**High**[Q]

CARCINOMA PANCREAS: ETIOLOGY AND RISK FACTORS

113. Ans. a. Her-2-neu *(Ref: Sabiston 19/e p1535-1536; Schwartz 9/e p1219-1220; Bailey 26/e p1137, 25/e p1148-1152; Blumgart 5/e p912-918; Shackelford 7/e p1187-1189)*

- **K-ras mutations** and **HER2/neu over expression** are the **earliest changes** to occur in **pancreatic carcinoma**[Q]

Risk Factors for Pancreatic Carcinoma

- There is **association** between risk of **pancreatic cancer**, **H. pylori** colonization, and **ABO** blood groups[Q].
- Older age, African American race, low socioeconomic status, Ashkenazic jewish heritage are associated with increased risk of pancreatic cancer.
- **Host etiologic factors** associated with increased risk of pancreatic cancer include history of **diabetes mellitus, chronic cirrhosis** and **pancreatitis**, a **high fat** or **cholesterol diet**, and **prior cholecystectomy**[Q].

Familial Pancreatic Cancer
• **Predisposing Conditions: H**ereditary pancreatitis, **H**NPCC, **H**ereditary Breast Cancer associated with the BRCA2 mutation, **A**taxia Telangiectasia, **F**AMMM, and **P**eutz-Jegher's syndrome. (**H3-AFP**)[Q]
• **BRCA-2 mutation** is the **MC germline mutation** in patients with **hereditary pancreatic cancer**[Q]
• **K-ras** is the **MC somatic mutation** in patients with **carcinoma pancreas**[Q]
• **Peutz-Jegher's syndrome** carries the **highest relative risk** of **pancreatic cancer**[Q]
• Patients with pancreatic cancer with **DNA mismatch repair mutations** have a **better prognosis**
• **K-ras mutations** and **HER2/neu over expression** are the **earliest changes** to occur

114. Ans. a. Acute pancreatitis *(Ref: Sabiston 19/e p1535-1536; Schwartz 9/e p1219-1220; Bailey 26/e p1137, 25/e p1149; Blumgart 5/e p912-918; Shackelford 7/e p1188)*

Risk Factors for Pancreatic Carcinoma	
Established	• **Tobacco**[Q] • **Inherited susceptibility**[Q]
Associated	• **Chronic pancreatitis**[Q] • **Diabetes mellitus** type 2[Q] • **Obesity**[Q]
Possible	• **Physical inactivity**[Q] • Certain pesticides • High carbohydrate/sugar intake

115. Ans. a. K-ras *(Ref: Sabiston 19/e p1537; Schwartz 9/e p1220; Bailey 26/e p1137, 25/e p1149; Blumgart 5/e p884; Shackelford 7/e p1188)*

Genetic Mutation in Pancreatic Cancer (KRAP-16: K-ras >p16))	
Gene	**Pancreatic Cancer %**
p16[Q]	**82**
k-ras[Q]	**95-100 (MC)**
p53[Q]	**75**
DPC4	55
BRCA2	7

116. Ans. d. Cronkhite-Canada syndrome

Predisposing Conditions for Familial Pancreatic Cancer (H-AFP)	
• **H**ereditary pancreatitis[Q]	• **A**taxia Telangiectasia[Q]
• **H**NPCC[Q]	• **F**AMMM (Familial atypical multiple mole melanoma) syndrome[Q]
• **H**ereditary Breast Cancer associated with the BRCA2 mutation[Q]	• **P**eutz-Jegher's syndrome[Q]

117. Ans. d. FAP **118. Ans. b. K-ras** **119. Ans. d. History of partial gastrectomy**

120. Ans. a. Urgent weight reduction, b. Strict vegetarian diet, c. Stop alcohol, e. Stop cigarette smoking

121. Ans. c. BRCA activated **122. Ans. a. K-ras**

123. Ans. d. Ataxia-Telengiectasia

Autosomal Dominant	Autosomal Recessive	X-Linked Disorders
– Familial hypercholesterolemia	– Deafness	– **Hemophilia A[Q] (recessive)**
– **HNPCC**	– **Albinism[Q]**	– **G6PD deficiency[Q] (recessive)**
– **FAP[Q]**	– **Wilson's disease[Q]**	– **Ducchene/Becker muscular dystrophy[Q] (recessive)**
– **BRCA1** and **BRCA2** breast cancer	– **Hemochromatosis[Q]**	– Fabry's disease
– Hereditary hemorrhagic telengiectasia	– **Sickle cell anemia[Q]**	– Ocular albinism
– **Marfan's syndrome[Q]**	– **beta thalassemia [Q]**	– Testicular feminization
– **Hereditary spherocytosis[Q]**	– **Cystic fibrosis[Q]**	– Chronic granulomatous disease
– **Adult polycystic kidney disease**	– **Hereditary emphysema (α_1 antitrypsin deficiency)**	– **Hypophosphatemic rickets[Q] (dominant)**
– **Huntington's chorea[Q]**	– **Homocystinuria[Q]**	– **Fragile-X syndrome[Q] (recessive)**
– **Acute intermittent porphyria[Q]**	– **Freidrich's ataxia[Q]**	– **Color blindness[Q]**
– **Osteogenesis imperfecta[Q]**	– **Phenylketonuria[Q]**	
– **von Willebrand's disease[Q]**	– **Fanconi's Syndrome**	
– **Myotonic dystrophy[Q]**	– **Gaucher's Disease**	
– Familial hypertrophic cardiomyopathy		
– **Neurofibromatosis[Q]**		
– **Tuberous sclerosis[Q]**		
– **Otospongiosis[Q]**		
– **Achondroplasia[Q]**		

CA PANCREAS CLINICAL FEATURES AND DIAGNOSIS

124. Ans. c. Jaundice *(Ref: Sabiston 19/e p1535-1544; Schwartz 10/e p 1394, 9/e p1220-1225; Bailey 26/e p1137, 25/e p1149-1152; Blumgart 5/e p919-925; Shackelford 7/e p1190-1196)*

Carcinoma Pancreas

- **MC type** is **pancreatic ductal adenocarcinoma (PDAC)** [Q]
- More common in **Men**, **African Americans**, mean age at diagnosis is **72 years**[Q]
- Overall, **<5%** of individuals will **survive 5 years** beyond their diagnosis.

  - **Association** between risk of **pancreatic cancer**, **H. pylori** colonization, and **ABO** blood groups
  - **Established risk factors**: **Smoking (Tobacco)** and **Inherited susceptibility**[Q]

- **Hereditary risk factors: H**ereditary pancreatitis, **H**NPCC, **H**ereditary Breast Cancer associated with the BRCA2 mutation, **A**taxia Telangiectasia, **F**AMMM, and **P**eutz-Jegher's syndrome. (**H3-AFP**)[Q]

  - **K-RAS2** oncogene is **activated** (by point mutation) in **>95%** of pancreatic cancers (**MC gene mutation**)[Q]

Pathology

- Macroscopically, ductal adenocarcinoma is a **scirrhous (scar forming)**[Q] **type** of carcinoma
- It is associated with **abundant desmoplastic stroma**[Q], in which the **neoplastic glands** are **widely scattered**[Q]
- **MC type** is **pancreatic ductal adenocarcinoma (PDAC)** [Q]
- More common in **Men**, **African Americans**, mean age at diagnosis is **72 years**[Q]
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Pathology

- Macroscopically, ductal adenocarcinoma is a **scirrhous (scar forming)**[Q] **type** of carcinoma
- It is associated with **abundant desmoplastic stroma**[Q], in which the **neoplastic glands** are **widely scattered**[Q]

Clinical Features

- **MC symptom** for patients with PDACs in the periampullary region is **jaundice**[Q].
- **Pain** typically arising in the epigastrium and radiating to the back.
- **Weight loss** affecting more than 50% of individuals.
- For tumors of the **body** and **tail** of the pancreas, **pain** and **weight loss** become more common at presentation.
- A **palpable distended gallbladder** in **1/3rd of patients** with periampullary PDAC (**Courvoisier Law**)[Q]
- With widespread disease, a left supraclavicular node (**Virchow's node**)[Q] may be palpable. Periumbilical lymphadenopathy may be palpable (**Sister Mary Joseph's node**)[Q].
- In cases of **peritoneal dissemination**, perirectal tumor involvement may be palpable via digital rectal examination, referred to as **Blumer's shelf**[Q].

Presenting Symptoms of Periampullary Tumors	
Jaundice (75%)[Q]	Pruritus (11%)
Weight loss (51%)[Q]	Fever (3%)
Abdominal pain (39%)	Gastrointestinal bleeding (1%)
Nausea/vomiting (13%)	

Diagnosis

- Tumor markers: **CA19-9** (**most sensitive**)[Q] and **CEA**.
  - Individuals with **blood Lewis antigen–negative status** (**10-15%**) do **not** develop **elevation of** the **CA19-9**
- **MDCT** is **investigation of choice** for the evaluation of **lesions arising** in the **pancreas**[Q].
- For suspected periampullary pathology, a **three-phase** (**noncontrast, arterial**, and **portal venous**) CT scan with 3-mm slices and coronal and three-dimensional reconstruction should be routine.
  - **ERCP**: Reserved for cases requiring **therapeutic** or **palliative intervention**[Q]
  - **Double duct sign** on **ERCP** is highly suggestive of **pancreatic head cancer**[Q]
- **EUS:** For identifying lesions **<2 cm**[Q] that do not appear on CT scans
- **Tissue diagnosis** is **not necessary prior to** routine **resection**[Q].
- A suspicious lesion by imaging should be treated with resection.

Treatment

- **Surgical resection** remains the **only potentially curative treatment** of pancreas cancer.

Tumors of **head** of the pancreas	**Pylorus preserving pancreaticoduodenectomy or Longmire-Traverso procedure** is preferred[Q]
Tumors of **body and tail** of the pancreas	**Distal pancreatectomy** and **en-bloc splenectomy**[Q]

- MC complication of pancreaticoduodenectomy is delayed gastric emptying[Q]
- **MC cause** of **death** following **pancreaticoduodenectomy** is **cardiopulmonary complications**[Q].
- **Most important predictor** of **post-operative survival** is **R0 resection.**
- **Most important margin** in **pancreaticoduodenectomy** is **retroperitoneal** or **uncinate margin**[Q].

Palliative Therapy for Pancreatic Cancer	
Biliary obstruction	• **ERCP** with **metal stent placement** (**Best**)[Q] • Roux-en-Y hepaticojejunostomy
Gastric outlet obstruction	• **Endoscopic stenting** (**Preferred**)[Q] • Double bypass (Roux-en-Y hepaticojejunostomy + gastrojejunostomy)
Pain	• **NSAIDs** or **opiates**[Q] • **Celiac nerve block**[Q]

Chemotherapy

- **Gemcitabine**[Q] is currently the standard of care for patients with **metastatic pancreatic cancer**.

Prognosis

- **Five year** survival **after curative resection** (pancreaticoduodenectomy) approaches **15-20%**[Q]
- Overall, 5 year survival rate **with pancreatic cancer** is **5%**[Q].

Median survival in Carcinoma Pancreas	
Resectable disease (stage **I** and **II**)	**15-20** months[Q]
Locally advanced disease (stage **III**)	**6-10** months[Q]
Metastatic disease (stage **IV**)	**3-6** months[Q]

- But in specific patients a **tissue diagnosis** may be **needed** such as in **patients entering** a **clinical trial**, **prior to neoadjuvant chemotherapy**, and **prior to chemotherapy** in **advanced tumors**. In these patients, an EUS is highly accurate.

Indications for Staging Laparoscopy (Routine use of laparoscopy is not warranted)	
1. **Tumor >3 cm** in diameter[Q]	3. **Equivocal findings** of metastasis on CT[Q]
2. **Body** or **tail tumors**[Q]	4. **CA19-9** levels **>100 U/mL**[Q]

7th AJCC TNM Classification of Pancreatic Cancer	
Tis	Carcinoma in situ (also PanIN 3)
T1	Tumor limited to pancreas **upto 2 cm** in greatest dimension
T2	Tumor limited to pancreas **>2 cm** in greatest dimension
T3	Tumor extends **beyond the pancreas**, but without involvement of the celiac axis or the superior mesenteric artery
T4	Tumor involves the **celiac axis** or the **superior mesenteric artery** (**unresectable primary tumor**)
N1	Regional LN metastasis
M1	Distant metastasis

7th AJCC TNM Staging of Pancreatic Cancer	
Stage **0**	**Tis** N0 M0
Stage **IA**	**T1** N0 M0
Stage **IB**	**T2** N0 M0
Stage **IIA**	**T3** N0 M0
Stage **IIB**	**T1-T3 N1** M0
Stage **III**	**T4** AnyN M0
Stage **IV**	Any T AnyN **M1**

125. Ans. a. MDCT

- **Diagnostic investigation** in **carcinoma pancreas** is **MDCT**[Q]
- **MDCT** is **investigation of choice** for the evaluation of **lesions arising** in the **pancreas**[Q]
- **IOC** for **diagnosis, staging** and **follow-up** in **CA pancreas: MDCT**[Q]

126. Ans. a. Most common site is body and tail

127. Ans. c. Pancreatic carcinoma *(Ref: Grainger 4/e p1356-64)*

128. Ans. a. Periampullary carcinoma

129. Ans. a. Pancreatic cancer *(Ref: Robbins 7/e p334-335)*

Malignancies associated with Migratory Thrombophlebitis	
• CA **pancreas (MC)**[Q]	• Prostate cancer[Q]
• CA **lung**[Q]	• **Ovarian** cancer[Q]
• GI malignancies[Q]	• **Lymphoma**[Q]

- **Trousseau's syndrome**: **Migratory thrombophlebitis**[Q]
- **Trousseau's sign: Carpopedal spasm** in **hypocalcemia**[Q]
- **Troisier's sign: Palpable left supraclavicular LN (Virchow's node)**[Q]

130. Ans. a. Head

131. Ans. b. CA head of pancreas causes obstruction of both pancreatic and biliary duct, c. Smoking predisposes

132. Ans. a. Head is the most common site, c. Obstruction of bile and pancreatic secretion is common

133. Ans. a. Hypotonic duodenogram, c. USG, d. Endoscopy, e. CT Scan

134. Ans. d. Periampullary carcinoma

135. Ans. a. Ampullary carcinoma

136. Ans. d. Ductal adenocarcinoma

137. Ans. a. Ductal adenocarcinoma

138. Ans. d. CT scan *(Ref: CSDT 11/e p645; Schwartz 9/e p1220-1225)*

- **Investigation of choice** for carcinoma pancreas: **MDCT**[Q]
- Currently **CT** is probably the single **most versatile** and **cost effective** tool **for diagnosis of pancreatic cancer**

139. Ans. b. Syndrome of inappropriate secretion of ADH *(Ref: Harrison 18/e p2908)*

Causes of Syndrome of Inappropriate Antidiuresis (SIADH)		
Neoplasms	**Infections**	**Neurologic**
• Lung[Q] • **Duodenum[Q], Pancreas[Q]** • **Ovary[Q], Bladder[Q], ureter[Q]** • **Thymoma[Q], Mesothelioma[Q]** • **Bronchial adenoma[Q]** • Carcinoid • Gangliocytoma, Ewing's sarcoma	• **Pneumonia[Q]**, bacterial or viral • **Abscess[Q]**, lung or brain • Cavitation (**aspergillosis**) • **Tuberculosis**, lung or brain • Meningitis, bacterial or viral • **Encephalitis[Q], AIDS[Q]**	• **Guillain-Barré syndrome[Q]** • **Multiple sclerosis[Q]** • **Delirium tremens[Q]** • **Amyotrophic lateral sclerosis[Q]** • Hydrocephalus, Psychosis • **Peripheral neuropathy[Q]**
Metabolic	**Vascular**	**Drugs**
• **Acute intermittent porphyria**	• **Cerebrovascular occlusions, hemorrhage** • **Cavernous sinus thrombosis[Q]**	• **Vasopressin[Q]** or desmopressin • **Chlorpropamide[Q]** • Oxytocin, high dose[Q] • **Vincristine, Carbamazepine[Q]** • **Nicotine, Phenothiazines[Q]** • **Cyclophosphamide[Q]** • **Tricyclic antidepressants[Q]** • Monoamine oxidase inhibitors[Q] • Serotonin reuptake inhibitors[Q]
Pulmonary		
• **Asthma, Pneumothorax[Q]** • Positive-pressure respiration	**Congenital malformations**	
Head trauma	• **Agenesis corpus callosum** • **Cleft lip/palate[Q]** • Other midline defects	
• **Closed** and **penetrating[Q]**		

140. Ans. b. Carcinoma head of pancreas **141. Ans. a. Ampullary carcinoma** **142. Ans. a. Head**

CARCINOMA PANCREAS: TREATMENT AND PROGNOSIS

143. Ans. a. R0 resection *(Ref: Sabiston 19/e p1541; Schwartz 10/e p1394, 9/e p1225-1226; Bailey 25/e p1150-1152; Blumgart 5/e p819-825; Shackelford 7/e p1192-1202)*

144. Ans. a. Lung *(Ref: Sabiston 19/e p1541; Blumgart 5/e p930-933)*

Metastatic Tumors to Pancreas
• **MC site of primary**: **RCC[Q]** > Malignannt melanoma
• On **autopsy**, MC site of primary: **CA lung[Q]**

145. Ans. a. Delayed gastric emptying *(Ref: Sabiston 19/e p1541; Schwartz 9/e p1125-1126; Blumgart 5/e p819-825; Shackelford 7/e p1200)*

Morbidity Following Pancreaticoduodenectomy	
• **Delayed gastric emptying (18%)[Q]**	• Cardiac events (3%)
• **Pancreas fistula (12%)**	• Bile leak (2%)
• **Wound infection (7%)**	• Overall reoperation (3%)
• Intra-abdominal abscess (6%)	

146. Ans. b. Pain is early in the course of the disease *(Ref: Sabiston 19/e p1537)*

Carcinoma Pancreas
• Symptoms include **unexplained episodes of pancreatitis[Q]**, **painless jaundice**, nausea, vomiting, steatorrhea, and **unexplained weight loss**
• With **further spread beyond the pancreas**, these patients may **note upper abdominal** or **back pain** when **peripancreatic nerve plexuses** are **involved** and **ascites** when **peritoneal carcinomatosis** or **portal vein occlusion** develops[Q]

147. Ans. c. Gemcitabine *(Ref: Bailey 26/e p1141; Blumgart 5/e p925; Shackelford 7/e p1202)*

- **Gemcitabine**[Q] is currently the standard of care for patients with **metastatic pancreatic cancer**.

148. Ans. b. Tumors of head pancreas *(Ref: Blumgart 5/e p959-960)*

Middle or Central or Segmental Pancreatectomy

- Middle pancreatectomy is a **safe, effective procedure** for **treatment of benign** and **low grade malignant neoplasms** of the **mid pancreas**[Q]

Advantages of Middle or Segmental Pancreatectomy
• **Preserves pancreatic parenchyma**
• **Reduces** the risk of **exocrine** and **endocrine insufficiency**
• Consists of a **limited resection** of the **mid portion** of the pancreas

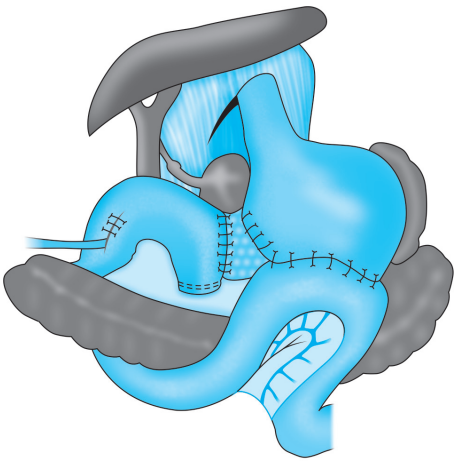
- Can be performed in selected patients affected by tumors of the **pancreatic neck**Q
- In experienced hands it is associated with **no mortality** but with **high morbidty**, even if the rate of "clinical" panareatic fistula is about 20%
- Middle pancreatectomy is **avoided in** patients affected by **main duct IPMN**.

Indications of Middle or Segmental Pancreatectomy
• **Benign** or **low grade** malignant tumor (**Neuroendocrine tumors, serous cystadenoma, branch duct IPMNs)** Q
• Location in the **neck**Q or its contiguous portion
• A **distal** pancreas **stump** of at least **5cm** in lengthQ

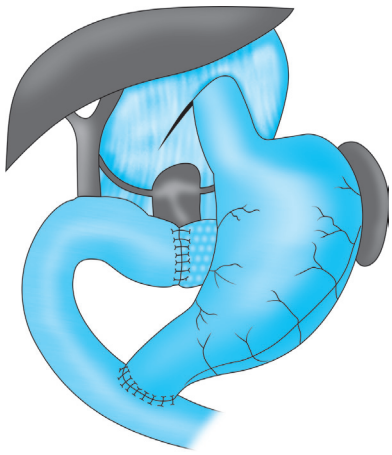
149. Ans. c. Median survival in locally advanced (stage III) disease is 3-6 months *(Ref: Sabiston 19/e p1541; Blumgart 5/e p922; Shackelford 7/e p1195-1196)*

150. Ans. b. Duodenojejunostomy *(Ref: Sabiston 19/e p1539; Bailey 26/e p1139-1140, 25/e p1150-1151; Shackelford 7/e p1196)*

- **Duodenojejunostomy** is done **in PPPD**, not in Whipple's procedure.
- **Gastrojejunostomy** is done **in Whipple's procedure**.



Whipple's procedure



Longmire-Traverso procedure

Whipple's Procedure (Pancreaticoduodenectomy)

- It consists of complete **removal of the pancreatic** and **hepatoduodenal ligament lymph nodes**, the **duodenum** with a **short segment of the proximal jejunum** and the **distal half to two-thirds of the stomach** with the **right half of the greater omentum**.

Whipple's Procedure involves resection of	
• Distal stomachQ	• DuodenumQ
• Gall bladderQ	• Proximal jejunumQ
• CBDQ	• Regional lymphatics
• Head of pancreasQ	

Restoration of GI continuity requires
• **Pancreaticojejunostomy**Q
• **Hepaticojejunostomy**Q
• **Gastrojejunostomy**Q

- **Pylorus Preserving Pancreaticoduodenectomy (PPPD)** or **Longmire-Traverso Procedure** is the **preferred surgery** for **carcinoma head** of **pancreas**Q.
- The **Whipple procedure** is now **reserved for situations** in which the **entire duodenum has to be removed** (e.g. **in FAP**) or where the **tumour encroaches** on the **1st part** of the **duodenum** or the **distal stomach** and a **PPPD would not achieve a clear resection margin**Q.

Pylorus Preserving Pancreaticoduodenectomy or Longmire Traverso Procedure

- To retain a functioning pylorus, the entire stomach and 2cm of the first part of duodenum and their neurovascular supply are preserved[Q].
- **Pylorus Preserving Pancreaticoduodenectomy (PPPD)** or **Longmire-Traverso Procedure** is the **preferred surgery** for **carcinoma head** of **pancreas[Q].**

151. Ans. c. Portal vein

152. Ans. d. Choledochojejunostomy *(Ref: Devita 9/e p979)*

Palliative Surgery in Advanced, Non-resectable Pancreatic Adenocarcinoma

- **Surgery** for **advanced, non-resectable pancreatic adenocarcinoma** can **palliate obstruction** of **CBD** or **duodenum**, as well as **control visceral pain**[Q]
- **Hepaticojejunostomy, choledochojejunostomy** or **choledochoduodenostomy** offers **durable drainage** of an obstructed bile duct.[Q]
- **Cholecystojejunostomy** is **less reliable** but can be employed when tumor bulk precludes common duct procedure
- **Gastrojejunostomy** (**antecolic** anastomosis) palliates gastric outlet obstruction[Q]
- **Antecolic anastomosis**[Q] is done to **avoid complications** from an **expanding lesser sac tumor**

153. Ans. d. Ampullary *(Ref: Shackelford 7/e p1187-1206)*

Periampullary Carcinoma
1. Adenocarcinoma of **head** of the pancreas (**40-60%**)[Q]
2. Adenocarcinoma of **ampulla** of vater (10-20%)
3. **Distal bile duct** adenocarcinoma (10%)
4. **Duodenal** adenocarcinoma (5-10%)

- Patients with **pancreas adenocarcinoma** involving the **body or tail** of the gland are more likely to have **weight loss** and **abdominal pain** as their **initial complaints**.
- These lesions can **grow to a larger size before producing symptoms** and are often **diagnosed at a later stage** with a **poorer prognosis**.
- Most **body** and **tail cancers** have **already metastasized to distant sites** or **extended locally to involve nodes, nerves**, or **major vessels** by the **time of diagnosis**.
- **Best prognosis**: **Duodenal** adenocarcinoma >**Ampullary** carcinoma >**Distal Bile duct** adenocarcinoma >**Head** of **pancreas** >**Body** and **tail** of Pancreas (**DAD Head Body** and **Tail**)[Q]

154. Ans. a. Disruption of pancreatic anastomosis

155. Ans. c. Pancreaticoduodenectomy

156. Ans. b. Mobilization of 2nd part of duodenum

- **Kocher** maneuver is a technique for **mobilization of the duodenum**[Q].

157. Ans. b. Pancreatic carcinoma

158. Ans. c. CA pancreas

GI Malignancy	Chemotherapy
• CA **Esophagus**	**ECF** (**E**pirubicin + **C**isplatin + 5-**F**U)[Q]
• CA **Stomach**	**ECF** (**E**pirubicin + **C**isplatin + 5-**F**U)[Q]
• CA **Pancreas**	**Gemcitabine**[Q]
• NET of pancreas	**Streptozocin + 5-FU**[Q]
• Cholangiocarcinoma	**Gemcitabine + Cisplatin**[Q]
• CA GB	**Gemcitabine + Cisplatin**[Q]
• **Small intestine** adenocarcinoma	**5-FU**[Q]
• Colorectal carcinoma	**FOLFOX-IV** (**5-FU + Leucovorin + Oxaliplatin**)[Q]
• CA anal canal	**Nigro Regimen: Chemoradiation** (**5-FU + Mitomycin C + Radiation**)[Q]

159. Ans. c. Good prognosis

160. Ans. d. Acute pancreatitis never occurs in CA pancreas *(Ref: Sabiston 19/e p1537)*

Clinical Features of Carcinoma Pancreas

- **MC site** is **head and uncinate process**Q
- Patients with lesions that occur near the bile duct, such as those near the **ampulla**, **head** of the pancreas, and **uncinate process**, are much more likely to have **obstructive jaundice**Q.
- Those with **lesions in the body or tail of the pancreas** are more likely to complain of **pain**.
- **Pain** suggests **unresectability**Q in carcinoma pancreas
- **Two third (65%)** patients present with **diabetes in carcinoma pancreas**Q
- Patients may also have **acute pancreatitis secondary to obstruction of the pancreatic duct**Q**.**
- **Elderly patients with acute pancreatitis** but **without a history of alcohol use** or **gallbladder stones** should be **screened for a neoplasm**Q**.**

161. Ans. a. CA 19-9

162. Ans. b. CA duodenum *(Ref: Shackelford 7/e p1201)*

- **Best prognosis**: **Duodenal** adenocarcinoma >**Ampullary** carcinoma >**Distal Bile duct** adenocarcinoma >**Head** of **pancreas** >**Body** and **tail** of Pancreas (**DAD Head Body** and **Tail**)

163. Ans. a. Retroperitoneal margin *(Ref: Shackelford 7/e p1196-1200)*

164. Ans. c. Cardiopulmonary complications

165. Ans. d. Distal pancreatectomy with splenectomy *(Ref: Sabiston 19/e p1540; Schwartz 9/e p1226; Bailey 26/e p1139; Shackelford 7/e p1198-199)*

Resectional Surgery for Pancreatic Body and Tail Tumors

- Most **body and tail cancers** have **already metastasized to distant sites** or extended locally to **involve nodes, nerves**, or **major vessels** by the time of diagnosis.
- **Splenic vein involvement** or **occlusion** is **not a sign of nonresectability**Q.
- Involvement of the **splenic and SMV confluence** generally **precludes resection**.
- **Resection** involves a **distal pancreatectomy** either **with** or **without concomitant splenectomy**Q**.**
- **Splenectomy** is usually **performed with distal pancreatectomy** in patients suspected of **having carcinoma** to obtain **better margins**, to **remove the lymph nodes** at the tip of the pancreas and the hilum of the spleen, and to avoid tedious dissection of the splenic artery and vein.

PSEUDOPAPILLARY TUMOR

166. Ans. c. These are small tumors *(Ref: Schwartz 9/e p1236; Blumgart 5/e p908-909; Shackelford 7/e p1268)*

Solid Pseudopapillary Tumor (Papillary cystic cancer or Frantz tumor)

- Approximately **90%** of solid pseudopapillary tumor harbor **APC/beta-catenin mutation**Q.
- Typically occur in **women** in the **second** or **third decade**Q of life
- Regarded as **low grade malignant potential**Q tumor.

Pathology

- Lesions may be **large, encapsulated, evenly distributed**Q throughout the pancreas.
- **Strongly positive** for **beta-catenin, progesterone receptors, vimentin, CD-10** and **CD-56**Q**.**
- It can mimic the histologic appearance of NET but **lacks** the **nuclear features** of **NET** and **lacks** the neuroendocerine markers such as **chromagranin and synaptophysin.**

Clinical Features

- **Non-specific** signs and symptoms related to size of the tumor at the time of presentation
- Typically occur in **women** in the **second** or **third decade**Q of life

Diagnosis

- **CT** scan: **Hypodense** areas representing **hemorrhage or necrosis**
- **Diagnosis is based on** presence of typical histological characteristics such as **foamy macrophages, cholesterol clefts, nuclear grooves**, and aggregate of **hyaline globules**Q**.**

Treatment

- **Complete resection** is associated with **long-term survival**Q even in presence of metastatic disease.
- **Incomplete removal** result in **local recurrence.**

167. Ans. d. Chromagranin is positive

INSULINOMA

168. Ans. a. EUS with intra-operative palpation *(Ref: Sabiston 19/e p951, 956, 957; Schwartz 10/e p1391, 9/e p1217; Bailey 26/e p787-789, 25/e p817-818; Blumgart 5/e p935-937; Shackelford 7/e p1206-1210)*

Localization of Insulinoma

- A small portion of insulinomas remain unlocalizable despite extensive studies and are therefore considered occult.
- When the **diagnosis is certain** based on the result of a **72-hour fast**, **surgical exploration** with careful inspection, **palpation**, and **intraoperative ultrasound** (**IOUS**) is **indicated**[Q].
- Studies have shown that the **combination of surgical exploration** with **IOUS identifies almost all insulinomas**[Q]**.**

Insulinoma

- Insulinoma is **MC functioning tumor** of the **endocrine pancreas**[Q]
- The average age at diagnosis is **45 years**.

Location of Insulinoma
• **97%** in **pancreas** (**equal distribution** in the head, body, and tail)[Q]
• **3%** in **duodenum, splenic hilum**, or **gastrocolic ligament**[Q]

- **Typically small**, with an average size of **1.0 to 1.5 cm**.
- **Diagnostic hallmark is Whipple's triad**: **Symptoms** of hypoglycemia + **Low blood glucose** levels (40-50 mg/dL) + **Relief of symptoms** after the administration of **glucose**[Q].

Clinical Features

- **Diagnostic hallmark is Whipple's triad**[Q]: Fasting-induced **neuroglyopenic symptoms** of hypoglycemia (diaphoresis, shaking, mental confusion, obtundation, and seizures), **low blood glucose** levels (40 to 50 mg/dL), and **relief of symptoms** after the administration of glucose.
- **Sympathetic overactivity**[Q] in response to hypoglycemia: Fatigue, weakness, fearfulness, hunger, tremor, diaphoresis, and tachycardia.
- **CNS disturbance**: Apathy, irritability, anxiety, confusion, excitement, loss of orientation, blurred vision, delirium, stupor, coma, and/or seizures.
- **Significant weight gain**: Patients eat frequently to prevent hypoglycemia.
- It is a **painless condition.**

Diagnosis

- **Gold standard test** for the **diagnosis** of insulinoma is the **72-hour fasting**[Q] test
- An **insulin-to-glucose** ratio **> 0.4** is consistent with insulinoma[Q]

- Provocative testing with **tolbutamide**, **glucagon**; or **intravenous calcium** is rarely required.
- **CECT** or **MRI**: **Hyperattenuating** as compared with surrounding pancreatic tissue because of **rich vascular supply**[Q]

Localization

- **Angiography** will detect approximately **70%** of **insulinomas >5 mm**, showing a characteristic **vascular blush**[Q]

- **Portal venous sampling** for insulin with or without **arterial stimulation** with **calcium** is the **best pre-operative method** of **localization**[Q]
- **EUS** with **intra-operative palpation** is **best localization technique** for **Insulinoma**[Q]

Treatment

- **Diazoxide** decreases beta cell release of insulin, used to prevent or attenuate symptoms of hypoglycemia prior to surgical intervention once the diagnosis is made[Q].
- Insulinomas are well suited for **laparoscopic resection** or **enucleations**[Q].

Insulinoma of **head** of pancreas	• **Enucleation** is **TOC**[Q]
Insulinoma of **body** or **tail** of pancreas	• **Distal pancreatectomy** is **TOC**[Q]

- **Streptozotocin,** with or without **5-fluorouracil**, is associated with **improved survival in metastatic pancreatic endocrine tumors**[Q]**.**

169. Ans. d. Selective arteriography

- **Portal venous sampling** for insulin with or without **arterial stimulation** with **calcium** is the **best pre-operative method** of **localization**[Q].
- **EUS** with **intra-operative palpation** is **best localization technique** for **Insulinoma**[Q]**.**

170. Ans. a. Insulinoma

171. Ans. a. Usually asymptomatic and need no treatment

172. Ans. c. Weight loss is important feature

173. Ans. a. 72-hours fasting test

174. Ans. b. Xylose test

175. Ans. a. Intra-operative USG

176. Ans. b. Enucleation

177. Ans. a. Insulinoma

NET of Pancreas

- **MC NET** of **Pancreas: Non-functional** (Mostly malignant) >**Insulinoma**Q
- **MC benign NET** of **Pancreas: Insulinoma**Q
- **MC malignant functional NET** of **Pancreas: Gastrinoma**Q

178. Ans. d. Equally distributed **179. Ans. a. Insulinoma** **180. Ans. d. Arteriography**

181. Ans. b. Weight loss

ZOLLINGER-ELLISON SYNDROME

182. Ans. a. Duodenum *(Ref: Sabiston 19/e p951, 956, 958; Schwartz 10/e p1071-1073, 9/e p1218; Bailey 26/e p789-790, 25/e p818-819; Blumgart 5/e p937-941; Shackelford 7/e p749-756)*

Zollinger-Ellison Syndrome

- Gastrinoma is **MC functioning malignant**Q pancreatic endocrine tumor.
- **More common** in **men**, mean age **50 years**Q
- **ZES** occur in **two forms: Sporadic (75%) and MEN-1** association **(25%)**Q
- Those associated with **MEN-1** are almost always **multiple, early onset,** more common in **duodenum**Q

  - **MC site** of Gastrinoma: **Duodenum > Pancreas**Q
  - **Duodenal primary** tends to spread to **local lymph nodes**Q
  - **Pancreatic primary** tends to spread to the **liver**

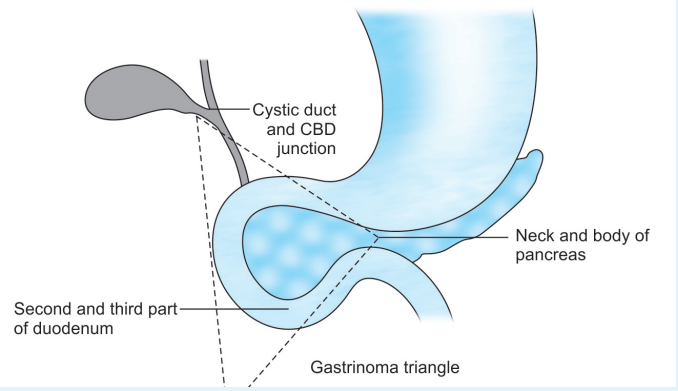
- Presence or absence of **lymph node metastasis** did **not affect survival**Q.
- **All gastrinomas** also produce **chromagranin A**Q

  - **Gastrinoma** → increased gastrin secretion → marked gastric **acid hypersecretion** → **Peptic ulcer**

Location

- **MC site** is **duodenum** (50-70%) followed by **Pancreas** (20-40%)Q
- In **Duodenum, MC in 1st part**Q (71%) >2nd part (21%) >3rd part (8%)
- About **70-90%** of gastrinomas are located **within** the **Passaro's triangle**Q.

Boundaries of Passaro's Triangle
• **Junction** of the **cystic** and **CBD**Q
• **Junction** of **2nd** and **3rd part** of **duodenum**Q
• **Junction** of **neck** and **body** of **pancreas**



Clinical Features

- The gastric acid hypersecretion causes **peptic ulcer disease** often **refractory** and **severe diarrhea**
- **MC presenting symptoms** are **abdominal pain**Q (70-100%), **diarrhea** (50-70%) and **GERD** (30-35%).
- **Causes of Diarrhea:** Inability of the intestinal tract to absorb the **large volumes** of **fluid secreted** by the **stomach, acid-induced injury** to the mucosa of the upper **small intestine,** precipitation of bile salts, inactivation of pancreatic lipase by low pH

  - **Unique characteristic** of acid-induced diarrhea: **Halted by nasogastric aspiration** of gastric secretionsQ

- Most patients have peptic ulcers (**MC** are **duodenal ulcers**)Q
- ZES must be excluded in all patients with intractable peptic ulcers, severe esophagitis, or persistent secretory diarrhea.
- **MC cause of death** in **ZES: Liver metastasis**Q

Diagnosis

- **Hypergastrinemia** with **increased secretion of gastric acid** confirms the diagnosis
- Elevated gastrin alone is not sufficient to diagnose ZES (**Basal gastric acid hypersecretion** must be demonstrated).

Zollinger-Ellison Syndrome
• 100% patients will have a fasting serum gastrin level >100 pg/mL
• **BAO >15 meq/hr** in most patients and **>5 mEq/hr** in patients with **prior surgery** to decrease gastric acid secretion
• Levels **>1000 pg/mL** are **diagnostic**Q

- **Elevated serum gastrin level** with a **pH <2** in the gastric aspirate is **almost diagnostic** of **ZES**[Q].

Provocative Test in Gastrinoma

- If the **diagnosis is in doubt**, the **provocative tests** are highly useful.
- Provocative diagnostic tests for ZES:
  - **Secretin stimulation test**
  - **Calcium stimulation test**
  - Secretin-plus-calcium stimulation test
  - **Bombesin test**
  - Protein meal test
- **Secretin provocation test** is **best.**
- **Secretin Provocation Test**: An increase of **>200 pg/mL** in the **gastrin value** after administration of secretin is **diagnostic**[Q]

Localization

- Somatostatin receptor scintigraphy (**SRS**) is **imaging test of choice** for **localizing** both **primary** and **metastatic gastrinomas**[Q].
- The radiolabeled somatostatin analogue has a high affinity for the **type 2 somatostatin receptor**, which is **expressed** in **most gastrinomas**.

Treatment

- **Acid secretion** is controlled by **PPIs**[Q]
- Pharmacologic control of acid secretion with PPIs has rendered **total gastrectomy** and other surgical acid-reducing procedures **unnecessary**[Q].

> - **ZES in MEN-1**: **Hyperparathyroidism** should be **treated first** because it can complicate the management of their gastrinoma, **neck exploration** should be performed **before resection** of **gastrinoma**[Q].

- **Distal pancreatectomy**: Gastrinoma involving **body** or **tail**[Q] of pancreas
- **Pancreaticoduodenectomy**: Gastrinoma involving **head**[Q] of pancreas

Prognosis

- **Best predictor** of survival for patients with gastrinoma is the **presence of liver metastases**[Q]
- **LN metastases** are **not predictive**[Q].
- More than 50% of patients with gastrinomas have metastatic disease at the time of diagnosis.
- **Resection** of all **gross disease** and **metastases** may provide **palliation** of symptoms and may **prolong survival**[Q].

183. Ans. c. Decreased BAO and MAO

- **Basal acid output** is **increased in Gastrinoma**[Q].

184. Ans. d. SRS

185. Ans. c. Most common site is pancreas

186. Ans. d. 4th part of duodenum

187. Ans. c. Decreased BAO/MAO

188. Ans. a. 50% are associated with adrenal malignancy

189. Ans. c. Beta cell tumors of the pancreas

190. Ans. d. H_2 receptor antagonist

191. Ans. a. Endoscopic ultrasound

192. Ans. b. Junction of 3rd and 4th part of duodenum

193. Ans. a. Duodenum

194. Ans. a. Located mostly in pancreas, c. 90% benign

195. Ans. b. Exocrine tumor

196. Ans. d. Serum gastrin value of 200 pg/ml with secretin stimulation

197. Ans. d. Massive HCl in response to histamine injection

198. Ans. a. Gastrin levels >1000 pg/mL, b. {BAO (Basal acid output) >15 meq/hr}, c. Somatostatin is inhibitor of HCL secretion, d. Omeprazole is helpful, e. Secretin increases gastrin secretion in Zollinger-Ellison syndrome

199. Ans. a. MC site is duodenal loop, c. It is an endocrine disease, d. Surgical excision is done, e. Surgical excision is done

200. Ans. b. Exocrine tumor **201. Ans. b. Reduced BAO: MAO ratio** **202. Ans. b. Zollinger-Ellison syndrome**

ENDOCRINE TUMORS OF PANCREAS

203. Ans. a. SRS *(Ref: Sabiston 19/e p954, 956, 960; Schwartz 10/e p1393, 9/e p1219; Bailey 26/e p788, 25/e p816; Blumgart 5/e p940-941; Shackelford 7/e p1211-1212)*

Glucagonoma (Hyperglycemic Cutaneous Syndrome)

- Compared with other pancreatic NET, they tend to be **larger**[Q], averaging **5-10 cm**[Q] in **size** at the time of diagnosis.
- More common in **females**; **70%** are **malignant**[Q].
- **MC site: Body** and **tail**[Q] of pancreas.
- Tumors are usually **>3 cm** in diameter and are **highly vascular** (**tumor blush**)[Q].
- The **diabetes** is **mild** and **not associated** with diabetic **ketoacidosis** because insulin secretion by beta cell is preserved[Q].

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- The **diabetes** is **mild** and **not associated** with diabetic **ketoacidosis** because insulin secretion by beta cell is preservedQ.

Clinical Features

- **Classic presentation** of the **4Ds**: **Diabetes, dermatitis, DVT**, and **depression**Q.
  - **Necrolytic erythema migrans** are **MC manifestations** of the disease, seen in **2/3rd** of **patients**Q.
  - **Necrolytic erythema migrans**: The characteristic rash occur in **areas of friction; rash is migratory**, **red**, and **scaling**, associated with **intense pruritus**Q
- **Parenteral administration** of **amino acids** was found to result in the **disappearance** of the **skin lesions**Q
- **Deep vein thrombosis** occurs in **30%**Q of patients.
- Neurologic manifestations include ataxia, dementia, scotomata, and proximal muscle weakness.

Diagnosis

- **Fasting glucagon** level **>50 pmol/L** is considered **diagnostic**Q.
- **VIPomas, glucagonomas**, and **somatostatinomas** are **usually larger** and **easily localized** by **CT**Q.
- **SRS** can be performed **if CT is not informative**.

Treatment

- **Resection** is the **treatment of choice** for **VIPomas, glucagonomas, somatostatinomas**, and **nonfunctional pancreatic NET** and remains the **only curative option**Q.
- **Dacarbazine** is **uniquely effective against glucagonoma**Q as compared with other pancreatic NET and complete remission has been reported in several cases.

204. Ans. a. Insulinoma

205. Ans. d. SRS *(Ref: Sabiston 19/e p954, 956, 960)*

Localization of NET of Pancreas

- **Somatostatin receptors** are present in **>90% of gastrinomas**; in contrast, pancreatic adenocarcinomas do not possess somatostatin receptors. They are **also present in** a significant portion of **glucagonomas** and **nonfunctioning endocrine tumors**Q.
- The **sensitivity for SRS** is **over 80%** for **all pancreatic NET excluding insulinomas**Q
- **SRS** has an **overall sensitivity** of **80% to 100%** and **specificity >90%** for **gastrinomas**Q.
- **SRS** is also **useful for detecting hepatic metastases** from **noninsulinoma endocrine tumors**

206. Ans. b. Glucagonoma

207. Ans. a. Most PPomas are benign *(Ref: Sabiston 19/e p955, 960; Schwartz 9/e p1219; Bailey 26/e p790-791, 25/e p819-820; Blumgart 5/e p942; Shackelford 7/e p1213-1214)*

PPomas/Non-functioning Pancreatic Endocrine Tumor

- Approximately **10-25%** of all neuroendocrine pancreatic tumors are **nonfunctional**Q.
- Tumors are **large** (**>5 cm**) and **almost all** (80%) are **malignant** and **metastatic**;
- Usually **solitary,** mostly in the **head**Q

Clinical Features

- Plasma elevation of PP is not associated with specific symptom.

Diagnosis

- Elevated plasma levels of **chromagranin A** and **B** are found in **69-100%**Q of patients; **neuron specific enolase** in 31%; **PP** in 50-75%; alpha-HCG in 40%; beta-HCG in 20%.
- **Atropine Suppression Test:** Atropine (1 mg intramuscularly) **does not suppress** the levels of **plasma PP with PETs** but did suppress the level by 50% or more in all patients without tumors.
- **Adenocarcinoma** can be **distinguished** from NETs **by** immunohistochemical staining with **chromagranin A**Q.

Treatment

- Mostly located in the **head** of the pancreas and require a **pancreaticoduodenectomy**.
- **Dopamine agonists decrease** circulating levels of **PP** and **chromogranin A** in patients with **large, unresectable** islet cell **tumors**Q.

208. Ans. d. Increased acid secretion *(Ref: Sabiston 19/e p954, 956, 960; Schwartz 10/e p1392-1393, 9/e p1219; Bailey 26/e p788; Blumgart 5/e p941; Shackelford 7/e p1211)*

VIPomas (Verner-Morrison Syndrome)

- Also known as WDHA syndrome (**w**atery **d**iarrhea, **h**ypokalemia, **a**chlorhydria) or **pancreatic cholera**Q
- Usually **solitary**; MC site is **tail of pancreas**Q
- **Two-thirds** are **malignant**Q.

Clinical Features

- **Diagnostic triad: Secretary diarrhea** + **High** levels of circulating **VIP** + **Pancreatic tumor**Q.
- **Profuse, watery, iso-osmotic secretary diarrhea** is **MC presenting symptom** and may exceed a volume of 3 to 5 liters/day.
- The **diarrhea persists despite fasting**, which qualifies it as a secretory diarrhea and, **despite nasogastric aspiration,** which differentiates it from the diarrhea of ZES.

> - Characterized by: **Hypokalemia, hypercalcemia**, **hypochlorhydria** and **hyperglycemia**Q**.**

- The **tetany** has been attributed to **hypomagnesemia** from chronic diarrhea.

Diagnosis

- **Constant features** are **diarrhea, hypovolemia**, **hypokalemia** and **acidosis**, variable features are **achlorhydria** or hypochlorhydria, **hyperglycemia** and **flushing with rash**Q**.**
- **VIPomas, glucagonomas**, and **somatostatinomas** are **usually larger** and **easily localized** by **CT**Q.

Treatment

- **Aggressive preoperative hydration** and **correction of electrolyte abnormalities** and acid-base disturbancesQ.
- **Octreotide** is commonly used preperatively **to reduce diarrhea volume** and facilitate fluid and electrolyte replacement.
- **Resection** is the **treatment of choice** for **VIPomas, glucagonomas, somatostatinomas**, and **nonfunctional pancreatic NET** and remains the **only curative option**Q.

209. Ans. c. Somatostatinoma *(Ref: Sabiston 19/e p954, 956, 960; Schwartz 10/e p1393, 9/e p1219; Bailey 26/e p788; Blumgart 5/e p941-942; Shackelford 7/e p1210-1211)*

Somatostatinoma

- **MC site** is **head** of the **pancreas**Q.
- Most somatostatinomas are **solitary** and located within the **pancreatic head** (**MC**)Q or duodenum
- **Equally common** in males and females, of about **50 years**.

Clinical Features

- Somatostatin excess causes **steatorrhea** (30-68%), **mild diabetes** (60%), **cholelithiasis** (70%), and **hypochlorhydria** (**86%**)Q.

Diagnosis

- **VIPomas, glucagonomas**, and **somatostatinomas** are **usually larger** and **easily localized** by **CT**Q.

Treatment

- **Resection** is the **treatment of choice** for **VIPomas, glucagonomas, somatostatinomas**, and **nonfunctional pancreatic NET** and remains the **only curative option**Q.
- In **75% cases**, somatostatinomas are **metastatic** and **>5 cm** at the time of diagnosis.
- **Whipple's procedure** in localized tumor is curative.
- In unresectable disease, **octreotide** and **interferon alfa** may improve symptoms.

210. Ans. a. Glucagonoma **211. Ans. b. Somaststationomas**

212. Ans. a. Cyanosis *(Ref: Sabiston 19/e p954-955)*

Neurotensinoma

- Neurotensinoma cause **hypokalemia**, weight loss, **hypotension**, **cyanosis**, flushing and **diabetes**Q.
- They are usually **malignant**Q.

GRFoma
• It occurs **most often in** the **lung** (**bronchus**)Q, then pancreas, jejunum, adrenal glands and retroperitoneum.
• Patient presents with **acromegaly** and a **pancreatic mass**Q.
• **Pancreatic GRFomas** are **large** (>6 cm).
• One third will have metastasized at the time of diagnosis.
• Approximately **50%** of patients with GRFomas also have **ZES** and **33%** have **MEN-1.**

213. Ans. a. SRS

214. Ans. a. Insulinoma is MC, b. VIP cause diarrhea, d. Somatostatinoma cause gall stone formation, e. Gastrinoma has high chance of malignancy

NET of Pancreas	
Tumor	**MC site**
Gastrinoma	• **Duodenum (1st part) >Pancreas**[Q]
Insulinoma	• **Equally distributed**[Q] in head, body and tail
Glucagonoma	• **Body and Tail**[Q]
Somatostatinoma and PPoma	• **Head**[Q]
VIPoma	• **Tail**[Q]

All pancreatic cancers and neoplastic cysts are most common in pancreatic head except:
• **Mucinous cystic neoplasm and Glucagonoma: MC** in **body** and **tail**[Q]
• **VIPoma: MC** in **Tail**[Q]
• **Insulinoma: Equally distributed**[Q] in head, body and tail

PANCREAS DIVISUM

215. Ans. a. Most common congenital anomaly *(Ref: Sabiston 19/e p1517; Schwartz 10/e p1365-1366, 9/e p1171; Bailey 26/e p1125, 25/e p1131; Blumgart 5/e p818-819; Shackelford 7/e p1134-1135)*

Pancreas Divisum

- **MC congenital anomaly** of the **pancreas**[Q]
- It occurs when the ductal systems of the **dorsal** and **ventral pancreatic duct fail to fuse**[Q] during the second month of gestation.

Types

- **Type 1** has two **completely separate pancreatic ducts**.
- **Type 2** has **only a dorsal duct**, with no evidence of a ventral duct of Wirsung.
- **Type 3** has a **dominant dorsal duct** with only a small, narrow filamentous connection between the dorsal and ventral ducts.
  - Common to all variants of pancreas divisum is that **all** or **most pancreatic secretion** flows **through** the **accessory papilla**[Q].

Treatment

- Operative **dorsal duct sphincterotomy**, **with or without sphincteroplasty**[Q], is the preferred surgical treatment.
- Patients with **pancreas divisum** and **acute recurrent pancreatitis** are **good candidates for endoscopic therapy**[Q] whereas patients with chronic pancreatitis or chronic pain alone (or both) do not appear to do as well.

ANNULAR PANCREAS

216. Ans. e. Treatment is division of ring *(Ref: Sabiston 19/e p1517; Bailey 26/e p1125, 25/e p1137; Blumgart 5/e p823-826; Shackelford 7/e p1179-1180)*

Annular Pancreas

- **Circumferential** or near-circumferential **band of pancreas tissue** surrounding the **2nd** part of the **duodenum**[Q]
- It is of **ventral pancreas origin** and is usually **proximal to the ampulla**[Q].
  - **Duodenal stenosis** or **atresia** is present at the site of the annulus in **40%**[Q]
  - **Down's syndrome**[Q] (trisomy 21) is present in **15-25%.**
- Intestinal malrotation, tracheoesophageal fistula, and congenital heart defects, Meckel's diverticulum and imperforate anus are also not uncommon.

Diagnosis

- **Definitive diagnosis** is made by **ERCP**.

Treatment

- Treatment of choice: **Duodenoduodenostomy**[Q] >Duodenojejunostomy.
- **Duodenoduodenostomy** has **replaced duodenojejunostomy** as the **treatment of choice** because it has a **lower incidence** of **postoperative complications**, particularly **obstruction** and **blind-loop syndromes**[Q].

217. Ans. d. Duodenoduodenostomy *(Ref: Blumgart 5/e p823-826)*

- Read the text from the latest edition of **Blumgart**, surgery of liver, biliary tract and pancreas. It clears that **duodenoduodenostomy** is the **treatment of choice** for **annular pancreas**, **not the duodenojejunostomy** given in Harrison or Maingot.
- **Duodenoduodenostomy** has **replaced duodenojejunostomy** as the **treatment of choice**[Q] because it has a **lower incidence** of **postoperative complications**, particularly **obstruction** and **blind-loop syndromes**[Q].

Treatment of Annular Pancreas

- A review of the **existing literature published in 1980** concluded that "**while there** is **no single operative procedure of choice, experience militates against any direct attack on the offending annulus**". This conclusion stands, and any attempt to divide the annulus itself risks the formation of a pancreatic fistula.
- **Early pediatric series established duodenal bypass as the treatment of choice**, although mortality rates remained high, likely related to the presence of other congenital malformations and the lack of supportive care.
- **Duodenoduodenostomy** has **replaced duodenojejunostomy** as the **treatment of choice** because it has a **lower incidence** of **postoperative complications**, particularly **obstruction** and **blind-loop syndromes**Q.

218. Ans. a. Complete or partial rotation failure, b. Congenital, c. Normal histology, e. Surgical correction should be done

219. Ans. b. Duodenoduodenostomy

PANCREATIC TRAUMA

220. Ans. a. Hyperamylasemia is not specific *(Ref: Sabiston 19/e p462-463, 1545; Schwartz 9/e p179; Bailey 26/e p1125-1126, 25/e p1137-1138; Shackelford 7/e p1234-1239)*

Pancreatic Trauma

- Pancreatic injuries are uncommon.
- **Penetrating injuries** into the abdomen are the **MC injuries** seen in **adults**Q.
- Isolated pancreatic injuries are not common.
- Up to 90% of patients present with associated hepatic, gastric, splenic, renal, colonic, or vascular lesions.
- **MC associated injury** is to a **hollow viscus** (38%)Q; followed by the liver (19%); and spleen (11%).

Pancreatic Trauma in Children
• **MC mechanism** in **children** is **abdominal blunt trauma**Q. • Direct compression of the epigastrium against the vertebral column and a blunt object (**handlebar**) is typically seen after **bicycle injuries**Q. • **MC segment** of the pancreas affected is the **body**Q.

Pancreatic Organ Injury Scale		
Grade		**Type of Injury**
I	Hematoma Laceration	**Minor contusion** without duct injury **Superficial laceration** without duct injury
II	Hematoma Laceration	**Major Contusion** without duct injury or tissue loss **Major Laceration** without duct injury or tissue loss
III	Laceration	**Distal transaction** or **parenchymal injury with duct injury**
IV	Laceration	**Proximal transaction** or parenchymal injury **involving ampulla**
V	Laceration	**Massive disruption** of pancreatic **head**

Diagnosis

- **CT scan**: **Investigation of choice** to evaluate patients with **abdominal trauma**Q.
- **CT Findings**: Peripancreatic hematomas, free fluid in the lesser sack, or abnormal thickening of Gerota's fascia suggest pancreatic injury.

• **ERCP**: **Most reliable test** to demonstrate **pancreatic duct integrity**Q

- **Isolated pancreatic amylase** level measurement is **not recommended** because up to 40% of patients with pancreatic duct transected have normal serum amylase levels. **Serial quantification levels**Q increase the sensitivity of the assay.

Treatment

- Definitive treatment is based on surgical findings.
- **Major pancreatic resections** in **stable patients** with **isolated pancreatic injury**Q.
- **Damage control surgery** is indicated for **complex injuries** or **unstable patients**Q.
- **Most** (up to 75%) of **deaths occur within** the **48 to 72 hours** after trauma, and most are related to **hypovolemic shock**Q.

Complication

- A **persistent drain output** or **pancreatic fistula** is the **MC complication** after **pancreatic trauma**Q.

Grading	Treatment of Pancreatic Injuries
Grade I	• **Observation alone**[Q]
Grade II	• **Debridement, drainage, possible repair**[Q]
Grade III	• **Distal resection, possible Roux-en-Y drainage**[Q]
Grade IV and V	• **Damage control**[Q], hemostasis/drainage • Resection and possible **Roux-en-Y drainage**[Q] • **Triple-tube decompression**[Q] • **Pyloric exclusion technique** • **Duodenal diverticularization**[Q] • Pancreaticoduodenectomy

221. Ans. b. Fracture is common at the junction of head and body, d. Peritoneal lavage is good for making the diagnosis

222. Ans. d. Amylase increases in 90% cases, e. HRCT is investigation of choice

PANCREATIC TRANSPLANTATION

223. Ans. b. Amylase levels *(Ref: Sabiston 19/e p675-679; Schwartz 10/e p340-344, 9/e p290-295; Bailey 26/e p1426-1427, 25/e p1425-1426; Blumgart 5/e p1796-1805; Shackelford 7/e p1251-1260)*

- Bailey 25/e p1425: **'Urinary drainage** of the pancreas has the **advantage** that **urinary amylase levels can be used to monitor graft rejection'**[Q]

Pancreatic Transplantation

- The **first** clinical vascularized **pancreas transplant** was performed in 1966, by **Kelly** and **Lillhei**[Q] at the University of Minnesota.
- Three types:
  - Simultaneous kidney and pancreas (**SPK**) grafts
  - Pancreas after kidney (**PAK**)
  - Pancreatic transplantation alone (**PTA**)

Donor Selection

- Organs from younger, leaner, and more hemodynamically stable deceased donors are preferred.
- Deceased donors with hemodynamic instability or that requires high doses of vasopressors are considered high risk.

> • **Pancreas** with **significant steatosis** is usually **avoided** because they are associated with a **greater chance of** postoperative complications, such as **pancreatitis, peripancreatic fat necrosis**, and **infection**[Q].

- In addition, **donors** must be **free from recent malignancy, diabetes,** and **pancreatitis**.
- During surgery, the donor pancreas is **evaluated for** signs of **intraparenchymal fat**, **hematoma**, and **calcification** or **scarring** that would **preclude use** of the organ for **transplantation**.
- Donor factors associated with **poor outcome** are **BMI >30** and **age >45** years[Q].

Surgical Procedure

- **Exocrine drainage** is performed via the **intestinal tract** or via the **urinary tract**; **most centers now perform enteric drainage** of the exocrine secretions[Q].
- The venous drainage of the graft is to the **systemic circulation** (via an iliac vein or IVC) or to the **portal circulation**[Q]
- Most pancreatic transplant centers now perform **systemic venous drainage**[Q].
- If possible the vessels are anastomosed to the **right iliac vessels** of the recipient which are **more superficial** compared with the left this **minimizes** the chances of **post-transplant thrombosis**.

> • In **pancreas transplantation**, **enteric drainage** and **systemic venous drainage** is **most commonly done**[Q].

- For **bladder drainage**, the graft should be oriented with **duodenum inferiorly**, whereas for **enteric drainage** duodenum can be **superior or inferior**.
- For **portal venous drainage**, pancreas is placed in **mid-abdomen** below transverse colon with the **duodenum** oriented **superiorly**. Portal vein is anastomosed to branch of **SMV** in end to side fashion. **Enteric drainage** must be used for exocrine secretions.
- The pancreas is most conveniently placed in the **right iliac fossa** with **head** directed **towards the pelvis**.

Complications

- **Pancreas graft thrombosis**:
  - **Pancreas graft thrombosis** (arterial or venous) is **more frequent** compared with other solid organ and reflects the relatively **low blood flow** through the organ.
  - Occurs within the **first week**[Q] after transplantation.
  - In most instances of thrombosis, **graft removal is necessary**[Q].
  - **MC non-immunologic cause** of pancreas **allograft failure** is **vascular thrombosis**[Q].
- **Early pancreatitis (10-20%)**

- **Leak:**
  - **Bladder drained transplant** with small **leak** are managed by **Foley catheter**Q drainage
  - **Enteric-drained transplants** with **leak** usually require **operative intervention.**

Outcome

- **Hyperglycemia** is a **late indicator of rejection**, and pancreas is often difficult to salvage when hyperglycemia has occurred.
- The total amount of **immunosuppression** pancreas recipients receive is among the **highest** of any solid organ transplant.
- The **1-year** and **5-year** pancreas graft **survivals** are **highest** for **SPK**Q**.**
- **Rejection** is the **primary cause of graft loss** in the **PTA** subset.

Islet Transplantation

- First **human islet auto transplantation** was performed by **Sutherland**Q at University of Minnesota, in 1977.

Indications of Islet Cell Transplantation

- **Recurrent, severe hypoglycemia,** particularly if decreased awareness of hypoglycemia is present.
- **Severe labile diabetes**, with wide swings in blood glucose throughout the day.

Principle of Procedure

- Current transplantation requires life-long immunosuppression and is limited to the most severe forms of diabetes.
- The **Edmonton regimen**Q avoids steroids and used a unique combination of induction therapy with an **anti IL-2 receptor antibody** (**daclizumab**) and maintenance therapy with **sirolimus** and **tacrolimus**.
- The crucial factor in the success of the Edmonton protocol was that the **larger numbers of islets** were **transplanted** by **repeated islet infusions**.
- Around 10% of the total islet mass can maintain normoglycemia after partial pancreatectomy.
- Total islet mass is 1-2 million. Ideal islet mass required are 200,000 islets and **actual required** are **600,000 to 700,000 islet.**
- **Insulin independence** occurs when a threshold of **8000 to 10,000 islets per Kg** of recipient body weight has been **transferred**.

Complications

- The most feared potential complications include **bleeding** (20%) and **portal vein thrombosis** (<1%).

Four characteristics associated with success

- Preservation of the donor pancreas for **less than 8 hours** before islet isolation
- Transplantation of at least **6000 islets per kilogram** of body weight
- Choice of the **liver** via the portal vein as the **transplant site**
- The use of **antilymphocyte** or **antithymocyte globulin** for induction immunosuppression

MISCELLANEOUS

224. Ans. d. Observe and medical treatment *(Ref: Blumgart 5/e p827; Bailey 26/e p1125, 25/e p1137)*

Pancreatic Cyst

- **Solitary** (**congenital,** duplication, or dermoid) **cysts** of the **pancreas** are **rare**Q**.**
- **Multiple pancreatic cysts**, lined with cuboidal epithelium, **are more common**Q.
- They are frequently **associated with polycystic disease** of the **liver** or **kidney**Q
- Can be seen in **up to half of patients** with **von Hippel-Lindau disease**Q.
- Pancreatic cysts **only rarely become symptomatic**, and **no treatment** is **indicated**Q**.**

225. Ans. b. Ileum

- Terminal ileum is filled with meconium in mucoviscidosis.

226. Ans. a. Juvenile diabetes

- **Type 1 diabetes** is a **T cell-mediated autoimmune disease**, characterized by **lymphocytic infiltration** of the pancreatic **islets**Q.

227. Ans. c. Mesentery *(Ref: Sabiston 19/e p1517; Bailey 26/e p1125, 25/e p1137; Blumgart 5/e p827)*

Ectopic Pancreas

- The most common sites are in the **walls of the stomach**Q, **duodenum**Q, or **ileum**, in a **Meckels diverticulum**Q, or at the **umbilicus**Q
- Less common sites include the colon, appendix, gallbladder, omentum, and mesentery.
- **Most ectopic pancreatic tissue** is **functional**Q**.**
- **Islet tissue** is frequently **present** when ectopic pancreas is located **in** the **stomach** and **duodenum.**
- Ectopic pancreatic tissue is a **submucosal, irregular nodule** of firm, yellow tissue that has a **central umbilication**Q; pancreatic secretions often exit through this umbilication.

228. Ans. b. Superior mesenteric vein *(Ref: BDC 4/e pvol-II/284-285)*

- The **posterior surface of neck** of **pancreas** is related to the **termination of superior mesenteric vein** and **beginning of portal vein**Q.

229. Ans. d. All

230. Ans. c. Insulinoma *(Ref: Nelson 18/e p1652)*

NESIDIOBLASTOSIS

- Also known as **persistent hyperinsulinemic hypoglycemia** of **infancy**Q
- Characterized by **diffuse hyperfunction** of pancreatic **beta cells** with **enlargement of** their **nuclei**Q
- **Neither** the **beta cell proliferation rate nor** the **overall beta cell mass** is **increased**Q.

Clinical Features

- **Early recognition** of congenital hyperinsulinism is critical because, if untreated, profound hypoglycemia may lead to brain damage.
- Babies may be described as **jittery, floppy, or lethargic**; **seizures** are commonQ

Diagnosis

- **Inappropriately elevated insulin** in the setting of **hypoglycemia**Q, along with the **need for continuous glucose infusion** (<15 mg/kg/min) to maintain normoglycemia confirms the diagnosis.
- **Pancreatic venous** sampling is used to make the **diagnosis**Q**.**

Treatment

- **Continuous glucose administration** with **suppression** of **insulin secretion** by **diazoxide** or **somatostatin**Q**.**
- Operation is necessary in more than two thirds of cases.
- Treatment consists of **near total (95-98%) pancreatectomy**Q.

231. Ans. b. Occurs in adults more than children

232. Ans. c. Causes severe hypoglycemia *(Ref: KDT 6/e p274, 548, 554)*

DIAZOXIDE

- **K^+ channel opener**, causes **arteriolar dilatation**Q
- Diazoxide **produces hyperglycemia** by **decreasing insulin**Q
- **Used in insulinoma**Q
- When used as **intravenous antihypertensive agent**Q, it causes excessive hypotension

233. Ans. b. 11 O′ clock position *(Ref: Sabiston 19/e p1494; Schwartz 10/e p1327, 9/e p1148)*

TRANSDUODENAL SPHINCTEROPLASTY

- This **cut is made superiorly** (at the **11′ O clock position**) Q for **4 to 5 mm**.
- The **sphincter** is **incised at** the **11′ O clock position** to **avoid injury to the pancreatic duct**Q.

234. Ans. a. Stomach

235. Ans. c. Surgical intervention is required in most because of features of chronic pancreatitis

236. Ans. b. Beta cells *(Ref: Sabiston 19/e p946)*

Islet Cells	Content
Alpha cells	Glucagon, **glicentin**Q**, pancreastatin**Q
Beta cells	Insulin, **amylin**Q**, pancreastatin**Q
D cells	Somatostatin
D_2 cells	VIP
G cells	Gastrin
PP cells	Pancreatic polypeptide

237. Ans. b. CT scan *(Ref: Sutton 7/e p796)*

- **CT is the mainstay of pancreatic imaging**, able to demonstrate **focal masses within the gland calcifications, duct dilatation, cysts, abscesses** and associated abnormalities in upper abdominal organs (hepatic metastases), lymph nodes and peri-pancreatic vascular structures.
- **CT** is a useful tool **for guiding percutaneous pancreatic biopsy** and **cyst aspiration** or **drainage.**

SECTION 3

GASTROINTESTINAL SURGERY

CHAPTERS

- Chapter 9 Esophagus
- Chapter 10 Stomach and Duodenum
- Chapter 11 Peritoneum
- Chapter 12 Intestinal Obstruction
- Chapter 13 Small Intestine
- Chapter 14 Large Intestine
- Chapter 15 Ileostomy and Colostomy
- Chapter 16 Inflammatory Bowel Disease
- Chapter 17 Vermiform Appendix
- Chapter 18 Rectum and Anal Canal
- Chapter 19 Hernia and Abdominal Wall
- Chapter 20 Spleen

CHAPTER 9

Esophagus

MULTIPLE CHOICE QUESTIONS

CONGENITAL DIAPHRAGMATIC HERNIA

1. Which of the following is the most important determinant of prognosis in neonatal congenital diaphragmatic hernia (CDH)? *(All India 2011)*
a. Pulmonary hypertension b. Delay in surgery
c. Size of defect d. Gestational age at diagnosis

2. Which of the following is the least important prognostic factor in congenital diaphragmatic hernia? *(All India 2011)*
a. Pulmonary Hypertension b. Delay in emergent surgery
c. Size of defect d. Gestational age at diagnosis

3. All are true about Bochdalek hernia except: *(GB Pant 2011)*
a. Posterolateral b. Left side
c. Present in second decade d. Congenital

4. Most common organ that herniates in Morgagni's hernia: *(MHSSMCET 2009)*
a. Spleen b. Liver
c. Stomach d. Transverse colon

5. Which of the following is contraindication for Bag and mask ventilation? *(AIIMS June 2000)*
a. Septicemia b. Tracheoesophageal fistula
c. Meconium aspiration d. Diaphragmatic hernia

6. What is not true regarding Bochdalek hernia?
a. Early respiratory distress leading to early diagnosis and treatment are good prognostic sign
b. Stomach and transverse colon are commonest content to herniate
c. Diagnosed prenatally by ultrasound
d. Common on left posterior side

7. False regarding Bochdalek hernia is: *(AIIMS Nov 93)*
a. Spleen and kidney can herniate
b. Occurs posterolaterally
c. Always occurs on right side
d. Hernia may or may not have sac

8. Not true about Bochdalek hernia: *(AIIMS Nov 97)*
a. Seen on right side
b. Associated with hypoplasia of lung
c. Associated with hiatus hernia
d. Pericardial cyst is a differential diagnosis

9. The diagnostic feature of congenital diaphrag-matic hernia on prenatal ultrasonography is: *(AIIMS June 2001)*
a. A cyst behind the left atrium
b. Mediastinal shift with normal heart axis
c. Peristalsis in the thoracic cavity
d. Absence of gas bubble under the diaphragm

10. Hernia through foramen of Bochdalek, true statement is: *(PGI Dec 98)*
a. Congenital hernia b. Is asymptomatic
c. Seen especially in males d. Least common

11. Most common site of Morgagni hernia: *(AIIMS Nov 2006)*
a. Right anterior b. Right posterior
c. Left anterior d. Left posterior

12. In congenital diaphragmatic hernia all are seen except:
a. Common on left side *(JIPMER 99)*
b. Abdominal distension
c. Can be detected antenatally
d. Heart beat shifted to right

13. Morgagni hernia: *(APPG 98)*
a. Hernia between the costal and sternal part of the diaphragm
b. Hernia through the pleuriperitoneal canal
c. Hernia through the lumbar triangle
d. Hernia through inguinal canal

14. A neonate with a scaphoid abdomen and respiratory distress has: *(All India 94)*
a. Congenital pyloric stenosis b. Diaphragmatic hernia
c. Volvulus d. Wilm's tumor

HIATUS HERNIA

15. True about hiatus hernia: *(PGI June 2008)*
a. Surgery is indicated in all symptomatic cases
b. Para-esophageal type is more complicated
c. Para-esophageal type is common type
d. Common in infants

16. The most common complication seen in hiatus hernia is: *(DNB, 2011, All India 2005)*
a. Esophagitis b. Aspiration pneumonitis
c. Volvulus d. Esophageal stricture

17. True about sliding esophageal hernia in all cases:
a. Esophagus always short *(PGI June 99)*
b. Cardia goes through hiatus
c. Cardia and fundus goes through hiatus
d. Peritoneal sac goes with paraesophageal hernia

18. Hiatus hernia is treated by: *(TN 89)*
a. Surgery when medical treatment has failed
b. Nissens' fundoplication
c. Medical treatment only
d. None of the above

19. A 55-years old male had retrosternal discomfort unrelated to physical exertion. Pain gets worse after lying down there is partial relief with antacids. The most likely diagnosis is: *(UPSC 96)*
a. Ischemic heart disease b. Carcinoma esophagus
c. Achalasia cardia d. Hiatus hernia

20. Most useful investigation in sliding hernia in female: *(UPPG 2008)*
a. Fluoroscopy b. Barium-meal
c. Palpation method d. Ultrasound

21. For hiatus hernia, investigation of choice is:
a. Barium meal follow through *(DPG 2006, DPG 2005)*
b. Barium meal upper GI
c. Barium meal upper GI in Trendelenberg position
d. Barium meal double contrast

22. Rosetti modification of Nissen's fundoplication means: *(MHSSMCET 2006)*
a. Excludes the stomach wall in the warp
b. Include only the posterior stomach wall in the wrap
c. Include only the anterior stomach wall in the wrap
d. Include both the anterior and the posterior stomach wall in the wrap

23. Fundoplication is used in treatment of: *(DNB 2012, MHPGMCET 2002)*
a. Hiatus hernia b. Achalasia cardia
c. CHPS d. CA esophagus

24. In Nissen's Fundoplication wrapping is done:
a. 1/3 b. 1/4 *(MHSSMCET 2009)*
c. 3/4 d. 1/2

25. Retrocardiac lucency with air fluid level is seen in: *(Recent Questions 2013)*
a. Hiatus hernia
b. Distal end esophageal obstruction
c. Eventration of diaphragm
d. None

REFLUX ESOPHAGITIS

26. LES pressure is decreased by all except: *(GB Pant 2011)*
a. Alcohol b. Protein
c. Fat d. Peppermint

27. The lower esophageal sphincter tone (pressure) is increased by: *(COMEDK 2005)*
a. Glucagon b. Gastrin
c. Emptying of the stomach d. Chocolate

28. The gold standard for diagnosis of gastroesopha-geal reflux disease (GERD) is: *(JIPMER 2014, Orissa 2011, COMEDK 2008, 2007, PGI June 1998)*
a. Barium swallow b. Endoscopy
c. 24-hours pH monitoring d. Esophageal manometry

29. A 35-years old lady presented with dysphagia, nocturnal asthma and weight loss for 6 years. The most probable diagnosis is: *(COMEDK 2010)*
a. Achalasia cardia
b. Lye stricture of esophagus
c. Gastroesophageal reflux disease
d. Cancer esophagus

30. Which of the following is the earliest indicator of pathological gastroesophageal reflux in infants (GERD)? *(All India 2011)*
a. Respiratory symptoms b. Postprandial regurgitation
c. Upper GI bleed d. Stricture esophagus

31. Best test to diagnose gastroesophageal reflux disease and quantify acid output is: *(AIIMS May 2011, Nov 2008)*
a. Esophagogram b. Endoscopy
c. Manometry d. 24-hours pH monitoring

32. Most important pathophysiological cause of GERD is:
a. Hiatus hernia *(AIIMS May 2012)*
b. Transient LES relaxation
c. LES hypotension
d. Inadequate esophageal clearance

33. In GERD, what demonstrates the best anatomical picture? *(MHSSMCET 2007)*
a. Barium swallow b. 24-hours pH-monitoring
c. Endoscopy d. Manometry

34. Most common complication after Nissen's fundoplication: *(AIIMS GIS Dec 2011, Dec 2006)*
a. Esophageal injuries b. Stomach injuries
c. Liver injuries d. Pneumothorax

35. All are true about antireflux surgeries except:
a. Nissen's is 360 degree complete wrap *(JIPMER GIS 2011)*
b. Watson is 90 degree posterior
c. Toupet is 270 degree posterior
d. Dor is a partial fundoplication

36. Reflux esophagitis is prevented by: *(PGI Dec 2001)*
a. Long intra-abdominal esophagus
b. Increased intra-abdominal pressure
c. Right crus of diaphragm
d. Increased intra-thoracic pressure

37. Which of the following mechanism can not prevent gastroesophageal reflux? *(AIIMS Nov 98)*
a. Looping fibers of right crus of diaphragm
b. Mucosal folds at gastroesophageal junction
c. Circular muscle fibres of GE sphincter
d. Angle made by the esophagus with stomach

38. LES sphincter is relaxed by: *(PGI Dec 2002)*
a. Nitrates b. H2 blockers
c. Morphine d. Atropine
e. Calcium channel blockers

39. Lower esophageal sphincter is relaxed by: *(PGI June 2003)*
a. Alcohol b. Caffeine/Tea
c. Diazepam d. Antacid

40. Which one of the following drugs exacerbate reflux esophagitis? *(COMEDK 2004)*
a. Chlorpropamide b. Metoclopramide
c. Theophylline d. Cisapride

41. The aim of preventing reflux esophagitis by repairing hiatus hernia is achieved by: *(AIIMS 79, Rohtak 87)*
a. Bringing the stomach inferior to diaphragm
b. Reconstitution of the angle of hill
c. Repair of defect in diaphragm
d. All of the above

42. Peptic esophagitis: *(UPSC 2000)*
a. Is effectively demonstrated by barium swallow
b. Is always associated with hiatus hernia
c. Can be readily confirmed by esophagoscopy
d. Is associated with the production of higher than normal amounts of gastric acid

43. Complications of "reflux esophagitis": *(MAHE 2005)*
a. Stricture b. Schatzki's ring
c. Barrett's esophagus d. All of above

44. Most common cause of esophagitis is: *(AIIMS May 2009)*
a. Alcohol b. Smoking
c. Spicy and hot food d. Esophageal reflux

ACHALASIA CARDIA

45. All are true about achalasia except: *(GB Pant 2011, JIPMER GIS 2011)*
a. It predisposes to malignancy
b. Body peristalsis is normal
c. LES pressure is increased
d. Dilatation of proximal segment

46. All are manometric features of achalasia except:
a. High LES pressure *(JIPMER GIS 2011)*
b. Decreased LES relaxation
c. Segmental body peristalsis
d. Manometry helps in diagnosis

47. A female patient has dysphagia, intermittent epigastric pain. On endoscopy, esophagus was dilated above and narrow at the bottum. Treatment is: *(AIIMS May 2012)*
a. PPI b. Esophagectomy
c. Dilatation d. Heller's cardiomyotomy

48. Amyl nitrate inhalation test is used to detect: *(COMEDK 2005)*
a. CA esophagus
b. Achalasia cardia
c. Esophageal diverticulum
d. Tracheo-esophageal fistula

49. Increasing difficulty in swallowing both for solids and liquids in a woman with bird's beak appearance in X-ray seen in: *(PGI June 2008)*
a. Achalasia cardia
b. Carcinoma
c. Reflux esophagitis
d. Barrett's esophagus
e. Esophagitis

50. A 30-years old women comes with dysphagia for both solid and liquids and barium swallow shows parrot beak appearance. On esophageal manometry, LES pressure is increased. Management includes: *(PGI June 2008)*
a. Nitrates
b. Ca2+ channel blockers
c. Botulinum toxin
d. Myotomy

51. Heller's operation is done for: *(DNB 2013, DNB 2012, MHPGMCET 2002)*
a. Achalasia cardia
b. Hiatus hernia
c. Diaphragmatic
d. Reflux esophagitis

52. Features of achalasia cardia are all of the following except:
a. Regurgitant vomiting *(MCI March 2009, UPSC 96)*
b. Elongated and dilated esophagus
c. Rat-tail deformity and filling defect on barium study
d. Increased difficulty in swallowing

53. True about achalasia cardia is: *(PGI June 2002)*
a. Dysphagia is a presenting symptom
b. The cause is absence of ganglion cells in Auerbach's plexus
c. Esophagectomy is the treatment
d. Motility-improving agents are used in treatment
e. Barium swallow shows irregular filling-defect in lower esophagus

54. The defect in achalasia cardia is present in: *(MAHE 2008)*
a. Myenterich plexus of Auerbach
b. Meissner's plexus
c. Kesselbach's plexus
d. Mesenteric plexus

55. In achalasia cardia true is: *(PGI June 2000)*
a. Pressure at distal end increased with no peristalsis
b. Low pressure at LES with no peristalsis
c. Pressure >50mm Hg with peristalsis
d. Pressure at the distal end increased with normal relaxation

56. A young patient presents with history of dysphagia more to liquid than solids. The first investigation you will do is: *(AIIMS June 2003)*
a. Barium swallow
b. Esophagoscopy
c. Ultrasound of the chest
d. CT scan of the chest

57. Treatment for achalasia associated with high rate of recurrence: *(All India 2002)*
a. Pneumatic dilatation
b. Laparoscopic myotomy
c. Open surgical myotomy
d. Botulinum toxin

58. About achalasia cardia all are correct except:
a. Mostly in women *(APPG 84, Kerala 86, JIPMER 98)*
b. Dilated esophagus narrowing to a point
c. Heller's operation treatment of choice
d. Not a premalignant condition

59. Which drug is used for achalasia cardia? *(PGI 88)*
a. Nifedipine
c. Propranolol
d. Atenolol
d. Bethanecol

60. All are true of achalasia cardia except: *(JIPMER 90)*
a. Dysphagia
b. Aspiration pneumonitis
c. Mecholyl test is hyposensitive
d. X-ray finding of dilated esophagus with a narrow end

61. Radiologic feature suggestive of achalasia cardia is:
a. Absence of gastric air bubble *(AIIMS 79, PGI 78)*
b. Air fluid level in mediastinum
c. Sigmoid esophagus
d. All of the above

62. Following are radiological evidence of Achalasia cardia except: *(Karnataka 98)*
a. Smooth narrowing of esophagus
b. Dilated tortuous esophagus
c. Absence of air in the fundus
d. Exaggerated peristalsis

63. Bird's beak is seen in: *(J and K 2001)*
a. Volvulus
b. Intussusception
c. Achalasia
d. Ulcerative colitis

64. Achalasia cardia is characterized by all except: *(UPPG 2009)*
a. Most common in women
b. Dysphagia is most common symptom
c. Premalignant condition
d. Parrot beak's appearance

65. Not used in treatment of achalasia cardia: *(PGI May 2011)*
a. Botulinum toxin
b. Fundoplication
c. Myotomy
d. Balloon dilation
e. Calcium channel blockers

66. True about achalasia cardia is all except: *(MHSSMCET 2009)*
a. On repeated Botox injection, recurrence rate increase
b. More common in young women
c. Surgery is treatment of choice
d. Not a premalignant condition

ESOPHAGEAL MOTILITY DISORDERS

67. Corkscrew esophagus is seen in which of the following conditions? *(NEET 2013, DNB 2008, 2005, 2001, All India 2002, PGI Dec 97, MHSSMCET 2005, PGI SS June 2005)*
a. Carcinoma esophagus
b. Scleroderma
c. Achalasia cardia
d. Diffuse esophageal spasm

68. Motility in the upper third of the esophagus is decreased in all except: *(DNB 89)*
a. Pseudo-bulbar palsy
b. Chagas disease
c. Myasthenia gravis
d. Scleroderma
e. Cricopharyngeal carcinoma

69. Most common motility disorder leading to dysphagia: *(JIPMER 2010)*
a. Nut cracker esophagus
b. Esophageal web
c. Diffuse esophageal spasm
d. Achalasia cardia

ZENKER'S DIVERTICULUM

70. Best investigation for Zenker's diverticulum is: *(AIIMS Nov 2011, AIIMS GIS Dec 2010)*
a. Barium swallow
b. Endoscopy
c. CECT
d. EUS

71. An elderly male present with history of dysphagia, regurgitation, foul breath and cough. Bilateral lung crepts are noted on examination. The most likely diagnosis is: *(All India 2012, AIIMS GIS Dec 2010)*
a. Schatzki's ring
b. Zenker's diverticulum
c. Corkscrew esophagus
d. Plummer-Vinson syndrome

72. True statement about Zenker's diverticulum:
a. Congenital *(NEET Pattern, GB Pant 2011)*
b. Feeling of obstruction in esophagus
c. Traction diverticulum
d. Not present with recurrent aspiration pneumonitis

73. All of the following statements about Zenker's diverticulum are true except: *(All India 2009)*
a. Acquired diverticulum
b. Lateral X-rays on barium swallow are often diagnostic
c. False diverticulum
d. Out pouching of the anterior pharyngeal wall just above the cricopharyngeus muscle

74. A 50-years old male, Raju presents with occasional dysphagia for solids, regurgitation of food and foul smelling breath. Probable diagnosis is: *(AIIMS June 99)*
a. Achalasia cardia
b. Zenker's diverticulum
c. CA esophagus
d. Diabetic gastroparesis

75. Which of the following is true about Zenker's diverticulum? *(PGI Dec 2007)*
a. It is asymptomatic
b. Occurs in the mid-esophagus
c. Treatment is simple excision
d. It occurs in children

76. Commonest complication of Zenker's diverticulum is: *(AIIMS Nov 96)*
a. Dysphonia
b. Gastroesophageal reflux
c. Lung abscess
d. Perforation

77. A male patient of age 60 years has foul breath. He regurgitates food that is eaten 3 days ago: Likely diagnosis is:
a. Zenker's diverticulum
b. Meckel's diverticulum
c. Scleroderma
d. Achalasia cardia

78. The pharyngeal diverticulum is a protrusion of mucosa between: *(UPSC 2000)*
a. The two parts of inferior constrictor muscle of the pharynx
b. The two parts of middle constrictor muscle of the pharynx
c. The two parts of the superior constrictor muscle of the pharynx
d. Cricopharyngeal and posterior part of suprahyoid membrane

79. Dohlman's procedure is used in: *(Recent Questions 2013)*
a. Rectal prolapsed
b. Esophageal achalasia
c. CA esophagus
d. Zenker's diverticulum

SCLERODERMA

80. Not a component of POEMS syndrome: *(JIPMER 2010)*
a. Polyneuropathy
b. Esophageal atresia
c. Endocrinopathy
d. Multiple myeloma

81. Acronym 'POEMS' stand for: *(PGI May 2011)*
a. Esophageal dysmotility
b. Polyneuropathy
c. Endocrinopathy
d. M-protein
e. Scleroderma

82. Which part of esophagus is mainly affected in scleroderma? *(MHPGMCET 2003)*
a. Upper third
b. Middle third
c. Lower third
d. All the above

83. Connective tissue disorder which is associated with gastroesophageal reflux is: *(PGI Dec 99)*
a. SLE
b. Scleroderma
c. Behcet's syndrome
d. Dermatomyositis

PLUMMER-VINSON SYNDROME

84. Patterson Brown Kelly syndrome is characterized by all except: *(PGI June 2000)*
a. Lower esophageal web
b. Iron deficiency anemia
c. Common in adult female
d. Premalignant

85. Dysphagia in Plummer-Vinson syndrome is due to:
a. Post cricoids region commonly involved in web formation
b. Web is common in lower region
c. It is due to abnormal vessels
d. Web is common in middle zone
e. Decreased motility of esophagus

86. Not true about Plummer-Vinson syndrome is: *(AIIMS 97)*
a. Occurs in elderly males
b. Post cricoids web
c. Predispose to hypopharynx malignancy
d. Koilonychia

87. Which of the following statement regarding Plummer-Vinson syndrome is not true? *(Kerala 2000)*
a. It is otherwise know as Patterson-Brown Kelly disease
b. Iron deficiency anaemia is probably the basic cause
c. It occurs exclusively in men
d. Prone to post cricoid cancer

88. In Plummer-Vinson syndrome, obstruction is due to: *(DPG 2006)*
a. Esophageal dysmotility
b. Esophageal stenosis
c. Post cricoid webs
d. None of the above

89. All are features of Plummer-Vinson syndrome except: *(COMEDK 2008)*
a. Esophageal web
b. Iron deficiency
c. Achalasia Cardia
d. Dysphagia

90. Not a feature of Plummer-Vinson syndrome: *(Punjab 2008)*
a. Web present in lower part of esophagus
b. Koilonychia
c. Premalignant
d. Common in edentulous females

BARRETT'S ESOPHAGUS

91. True about Barrett's esophagus: *(PGI Dec 2007)*
a. Long esophageal segment involved
b. Metaplasia
c. Peptic ulcer
d. Para esophageal hernia
e. Leads to adenocarcinoma

92. A chronic alcoholic presents with regurgitation and retrosternal pain. Endoscopic biopsy confirms. Barreti's esopagus. What is most appropriate management in this case?
a. Endoscopic biopsy every 2 years *(JIPMER 2013)*
b. PPI
c. H. pylori treatment
d. Balloon dilatation

93. Barrett's esophagus is: *(All India 2002, AIIMS June 93)*
a. Lower esophagus lined by columnar epithelium
b. Upper esophagus lined by columnar epithelium
c. Lower esophagus lined by ciliated epithelium
d. Lower esophagus lined by pseudo stratified epithelium

94. Barrett's esophagus is diagnosed by: *(AIIMS May 2012, Nov 2007, DNB 2008)*
a. Squamous metaplasia
b. Intestinal metaplasia
c. Squamous dysplasia
d. Intestinal dysplasia

95. Barrett's esophagus can lead to: *(AIIMS June 98)*
a. Stricture
b. Reflux esophagitis
c. Peptic ulcer
d. Achalasia

96. True about Barrett's esophagus: *(PGI June 2003)*
a. Sequence of prolonged GERD
b. It is premalignant
c. Lower esophageal mucosa is replaced by intestinal type of epithelium
d. Varicose veins are seen
e. Predisposes to squamous cell carcinoma of esophagus

97. True about Barrett's esophagus: *(PGI Dec 2003)*
a. Premalignant
b. Predispose to squamous cell carcinoma
c. Can be diagnosed by endoscopy
d. Biopsy is necessary to diagnose
e. Stricture may be present in high esophagus

98. True regarding Barrett's esophagus is: *(AIIMS Nov 95)*
a. Benign course
b. Premalignant condition
c. Squamous metaplasia of lower esophagus
d. Medical treatment is not useful

99. Features of Barrett's esophagus are: *(PGI June 2006)*
a. Metaplasia
b. Always gastric type of epithelium
c. Adenocarcinoma more common
d. Present as patchy or ring involvement

100. True about Barrett's esophagus: *(PGI Dec 2007)*
a. Long esophageal segment involved
b. Metaplasia
c. Peptic ulcer
d. Paraesophageal hernia
e. Leads to adenocarcinoma

101. Barrett's ulcer is due to: *(JIPMER 93)*
a. Ischemia
b. Ectopic gastric mucosa
c. Bile reflux
d. Reflux esophagitis

CARCINOMA ESOPHAGUS PREDISPOSING FACTORS

102. All are the predisposing factors for carcinoma esophagus are all except: *(COMEDK 2011)*
a. Achalasia
b. Paterson Brown Kelly Syndrome
c. Zenker's diverticulum
d. Ectodermal dysplasia

103. All are risk factors for epidermoid carcinoma except: *(ILBS 2011)*
a. Achalasia
b. Barrett's esophagus
c. Nitrosamines
d. Corrosives

104. Premalignant lesion of carcinoma esophagus includes: *(PGI Nov 2011, June 2007)*
a. Tylosis
b. Plummer-Vinson syndrome
c. Barrett's esophagus
d. Achalasia cardia
e. Scleroderma

105. Squamous cell carcinoma of esophagus is caused by: *(MHPGMCET 2009)*
a. Tobacco/Alcohol
b. Alkalies
c. GERD
d. All of the above

106. Which is not a predisposing factor for carcinoma esophagus? *(Orissa 2011)*
a. Esophageal diverticula
b. Plummer-Vinson syndrome
c. Mediastinal fibrosis
d. Caustic ingestion

107. The adenocarcinoma of esophagus develops in:
a. Barrett's esophagus *(COMEDK 2014, All India 2002, 98)*
b. Long standing achalasia
c. Corrosive stricture
d. Alcohol abuse

108. Esophageal carcinoma is not predisposed by: *(PGI June 99, PGI Dec 95)*
a. Achalasia
b. Scleroderma
c. Corrosive intake
d. Barrett's esophagus

109. In carcinoma esophagus predisposing factors: *(PGI Dec 2002, Dec 2000)*
a. Tylosis
b. Smoking
c. Lye stricture
d. Reflux esophagitis

110. Not a predisposing factor for carcinoma esophagus: *(AIIMS May 2009)*
a. Diverticula
b. Human papilloma virus
c. Mediastinal fibrosis
d. Caustic ingestion

111. All are pre-malignant lesions for CA esophagus except: *(PGI SS June 2005)*
a. Caustic injuries
b. Tylosis
c. Achalasia
d. Nutcrackers esophagus

112. Risk factors for carcinoma esophagus are all except: *(GB Pant 2011)*
a. H. pylori
b. Plummer vinson syndrome
c. Corrosives
d. Achalasia

113. Which is not a risk factor for squamous cell carcinoma of esophagus? *(AIIMS GIS Dec 2011, May 2008)*
a. H. pylori
b. Scleroderma
c. Smoking and alcohol
d. Lye strictures

114. Risk factor for adenocarcinoma of esophagus: *(KGMC 2011)*
a. Barrett's esophagus
b. Corrosive injury
c. Achalasia cardia
d. All of the above

CA ESOPHAGUS CLINICAL FEATURES, DIAGNOSIS AND TREATMENT

115. Which of the following is best indicator of survival in CA esophagus? *(AIIMS GIS May 2008)*
a. TNM stage
b. Resection margin
c. Histology and location
d. Size of tumor

116. Best prognosis in CA esophagus: *(AIIMS GIS Dec 2010)*
a. Polypoidal
b. Fungating
c. Ulcerative
d. Infiltrative

117. Sievert classification is for: *(KGMC 2011)*
a. Esophageal cancer
b. Stomach cancer
c. GE junction tumors
d. CA pancreas

118. Best result in esophageal carcinoma in-situ with:
a. Endoscopic mucosal resection *(AIIMS GIS Dec 2006)*
b. THE
c. TTE
d. PDT

119. Characteristic features of LN involvement on EUS in CA esophagus are all except: *(AIIMS GIS Dec 2011, May 2008)*
a. Round contour
b. Sharp border
c. Hyperechogenic
d. Size >1 cm

120. Most commonly used chemotherapy regimen used in CA esophagus: *(AIIMS GIS May 2008)*
a. 5-FU + Cisplatin
b. Cisplatin + Vinblastine
c. Cisplatin + Paclitaxel
d. Cisplatin + Epirubicin

121. Which is not used in palliation in CA esophagus? *(AIIMS GIS May 2008)*
a. EMR
b. Photodynamic therapy
c. Laser therapy
d. Self-expanding stents

122. T-staging of esophagus is best done by: *(AIIMS GIS Dec 2011, DNB 2002)*
a. EUS
b. CT
c. MRI
d. PET

123. Commonest site of esophagus carcinoma is: *(UPPG 2008)*
a. Upper 2/3rd
b. Middle 1/3rd
c. Lower 1/3rd
d. Crico-esophageal junction

124. Barium esophagogram findings in carcinoma esophagus are all except: *(UPPG 2009)*
a. Rat-tail deformity
b. Pencil tip appearance
c. Apple-core appearance
d. Filling defect

125. MC site of CA esophagus is: *(AIIMS Feb 2007)*
a. Middle 1/3rd
b. Upper 1/3rd
c. Lower 1/3rd
d. Lower end of esophagus

126. The commonest site of carcinoma esophagus in India is: *(AIIMS Nov 2003)*
a. Upper 1/3rd
b. Middle 1/3rd
c. Lower 1/3rd
d. GE junction

127. A patient presents with dysphagia of 4 weeks duration. Now he is able to swallow liquid food only. Which of the following is the one investigation to be done? *(DPG 2009 Feb)*
a. Barium studies
b. Upper GI endoscopy
c. CT Scan
d. Esophageal manometry

128. In CA esophagus: *(PGI SS Dec 2009)*
a. Adenocarcinoma is most common in middle 1/3rd
b. Barrett's esophagus leads to squamous cell carcinoma
c. 5 year survival is 30%
d. EUS can accurately stage the disease

129. Treatment of choice for CA esophagus: *(PGI SS Dec 2009)*
a. Esophagectomy
b. External radiotherapy
c. Internal radiotherapy
d. Chemotherapy

130. Stage of CA esophagus is best decided by: *(PGI SS June 2009)*
a. Depth of tumor
b. Size of tumor
c. Histopathological grade
d. Age of the patient

131. Esophageal carcinoma is adequately assessed by: *(PGI SS Dec 2009)*
a. Barium swallow
b. Barium swallow + endoscopy
c. Endoscopy
d. USG

132. Most common complication of placing stent in CA esophagus: *(AIIMS GIS May 2011)*
a. Migration
b. Chest pain
c. Perforation
d. Bleeding

133. Lymph node metastasis in CA esophagus is best detected by: *(AIIMS GIS May 2011)*
a. PET
b. EUS
c. CT
d. Thoracoscopy + laparoscopy

134. Best palliation in CA esophagus: *(GB Pant 2011)*
a. Surgical bypass
b. Surgical placement of MB tube
c. Endoprosthesis
d. Feeding jejunostomy

135. Most common site for squamous cell CA esophagus is: *(All India 2001)*
a. Upper third
b. Middle third
c. Lower third
d. Gastro-esophageal junction

136. True about CA esophagus: *(PGI Dec 2003)*
a. MC in middle 1/3rd
b. Adenocarcinoma is common variety
c. Carcinoma develops at the achalasia segment
d. Smoking is a risk factor
e. Endoscopy is the investigation of choice

137. Rat-tail appearance is seen in: *(UPPG 2009)*
a. Achalasia cardia
b. Carcinoma esophagus
c. Scleroderma
d. Reflux esophagitis

138. CA esophagus is characterized by following except:
a. Adenocarcinoma *(PGI June 98, PGI Dec 96)*
b. Middle 1/3rd affected
c. Dysphagia is characteristic
d. Pernicious anemia often present

139. Treatment of advanced esophageal cancer is: *(DNB 2006)*
a. Chemoradiation only
b. Curative en-bloc resection
c. Chemoradiation followed by curative en-bloc resection
d. Chemoradiation followed by palliative en-bloc resection

140. In esophageal carcinoma, which neoadjuvant chemotherapy is used?
a. Cisplatin
b. Cyclophosphamide
c. Doxorubicin
d. Methotrexate

141. True about esophageal carcinoma:
a. Adenocarcinoma is on the rise
b. Surgery is best treatment
c. Hoarseness of voice occurs in late cases
d. Presentation is early
e. Prognosis is good because of its site

142. Regarding esophagus malignancy-operation all are true except: *(MHSSMCET 2009)*
a. Thoracoscopic assisted surgery
b. Radiotherapy
c. Chemotherapy + surgery
d. Transhiatal esophagectomy

143. Transhiatal esophagectomy was planned for adenocarcinoma of lower end of esophagus. The approach would be in the following order: *(AIIMS Nov 2007)*
a. Abdomen-Neck
b. Abdomen-Thorax-Neck
c. Neck-Thorax-Abdomen
d. Abdomen-Thorax

144. True about carcinoma esophagus is: *(Kerala 94)*
a. Most common site is lower end
b. Both adeno and squamous cell carcinoma occur
c. Commonest histology is adenocarcinoma
d. More common in females

145. Which is the most reliable diagnostic method for staging the esophageal cancer? *(UPSC 2006)*
a. MRI
b. Endoscopic ultrasound
c. CT scan
d. Thoracoscopy

146. Early stage of carcinoma esophagus is diagnosed by: *(UPPG 2008)*
a. Barium meal
b. Trans-esophageal USG
c. MRI
d. Endoscopy

147. False statements about carcinoma esophagus are all of the following except: *(MCI March 2009)*
a. Most common in lower third
b. Histologically, adenocarcinoma only
c. Unrelated to tobacco chewing
d. It is more common in females

148. Which of the following should never be carried out as a treatment for carcinoma esophagus? *(MHPGMCET 2008)*
a. Gastrostomy for palliation
b. Radiotherapy alone
c. Radical esophagectomy
d. Radiotherapy and chemotherapy

149. Treatment of SCC of esophagus: *(GB PANT 2011)*
a. Cisplatin
b. Etoposide
c. Adriamycin
d. Bleomycin

ESOPHAGECTOMY

150. Conduit in gastric pull up is based on: *(AIIMS GIS Dec 2011, May 2008)*
a. Right gastric and right gastroepiploic artery
b. Right gastric and left gastroepiploic artery
c. Left gastric and right gastroepiploic artery
d. Left gastric and left gastroepiploic artery

151. Which is the best substitute for esophagus? *(MHSSMCET 2005, MP 99, All India 96, PGI Dec 95)*
a. Stomach b. Jejunum
c. Left sided colon d. Right sided colon

152. First successful esophagectomy was done by: *(AIIMS GIS Dec 2011)*
a. Miculikz b. Kaplan
c. Torek d. Orringer

153. Ivor Lewis operation is the treatment of choice for cancer involving _____ esophagus: *(MHSSMCET 2009)*
a. Upper 1/3rd b. Middle 1/3rd
c. Lower1/3rd d. Entire esophagus

154. Which of the following surgical approach was first described by Orringer for the management of carcinoma esophagus? *(J & K 2005)*
a. Transhiatal b. Thoracoscopic
c. Left thoracoabdominal d. Right thoracoabdominal

155. Best conduit for esophageal reconstruction: *(DPG 2007)*
a. Colon b. Stomach
c. Appendix d. Ileum

156. Commonest cause for mortality in Ivor Levis operations:
a. Pulmonary atelectasis *(AIIMS Nov 98)*
b. Anastomotic leak
c. Thoracic duct fistula
d. Sub diaphragmatic collection

157. Which of the following operations was first described by Orringer? *(COMEDK 2006)*
a. En-bloc esophagectomy
b. Transhiatal esophagectomy
c. Thoracoscopic esophagectomy
d. Transthoracic esophagectomy

158. The ideal replacement for the esophagus after esophagectomy is: *(COMEDK 2010)*
a. Stomach b. Jejunum
c. Colon d. Synthetic stent

159. After esophagectomy, stomach tube is based on supply form: *(MHSSMCET 2006)*
a. Right gastroepiploic artery
b. Right gastric artery
c. Left gastroepiploic artery
d. Left gastric artery

LEIOMYOMA

160. Commonest benign tumor of the esophagus: *(JIPMER 2014, DPG 2009 Feb)*
a. Leiomyoma b. Papilloma
c. Adenoma d. Hemangioma

161. Endoscopic treatment of leiomyoma of esophagus is contraindicated due to: *(JIPMER GIS 2011)*
a. Infection
b. Chances of dissemination
c. Perforation
d. Perforation and dissemination

DYSPHAGIA

162. Intermittent dysphagia is caused by: *(PGI June 2004)*
a. Stricture
b. Reflux esophagitis
c. Achalasia cardia
d. Pharyngeal diverticulum
e. Diffuse esophageal spasm

163. A 60-years old patient presenting with dysphagia of 6 weeks duration with solid foods, now can swallow only liquids. Investigation done for diagnosis: *(PGI Dec 2003)*
a. CXR b. Ba swallow
c. Endoscopy d. USG
e. CT Scan

164. Investigation of choice for dysphagia for solids:
a. Barium swallow b. Endoscopy *(PGI Dec 2000)*
c. X-ray chest d. C.T. Scan

165. A patient present with dysphagia of 4 weeks duration. Now he is able to swallow liquid food only. Which of the following is the one investigation to be done?
a. Barium studies are the best in this case *(PGI June 2000)*
b. Upper GI endoscopy is to be done
c. CT scan is needed
d. Esophageal manometry

166. Odynophagia occurs in: *(AIIMS GIS Dec 2011, PGI June 96)*
a. Achalasia b. Herpes esophagitis
c. Monilial esophagitis d. Barrett's esophagus

167. A 40-years old female patient presented with dysphagia to both liquids and solids and regurgitation for 3 months. The dysphagia was non-progressive. What is the most likely diagnosis? *(AIIMS May 2006)*
a. Carcinoma of the esophagus
b. Lower esophageal mucosal ring
c. Achalasia cardia
d. Reflux esophagitis with esophageal stricture

DYSPHAGIA LUSORIA

168. Dysphagia lusoria is caused by: *(Karnataka 2013, PGI SS June 2001)*
a. Abnormal elongation of arch of aorta
b. Aneurysm of arch of aorta
c. Esophageal web
d. Esophageal diverticula

169. Dysphagia lusoria is due to: *(AIIMS Nov 2003)*
a. Esophageal diverticulum
b. Aneurysm of aorta
c. Esophageal web
d. Compression by aberrant blood vessel

170. All are true about dysphagia lusoria except: *(DPG 2008)*
a. Right aortic arch
b. Vascular ring
c. Due to aberrant subclavian artery causing pressure on esophagus
d. Acquired in later life

ESOPHAGEAL PERFORATION AND INJURY

171. Mackler's triad includes: *(PGI Nov 2009)*
a. Vomiting
b. Subcutaneous emphysema
c. Lower thoracic pain
d. Peripheral cyanosis
e. Pleural effusion

172. True about Boerhaave's syndrome: *(PGI Nov 2009)*
a. MC at lower 1/3rd
b. Hematemesis is early symptoms
c. Acute chest pain
d. Surgically treated
e. Operation is done after 24 hours

173. True about esophageal injury: *(PGI June 2009)*
a. Barium swallow is diagnostic
b. Treatment is primary repair
c. MC after penetrating injury
d. Mortality increased if repair after 24 hours

174. Boerhaave's syndrome, true is: *(PGI May 2005)*
a. Iatrogenic
b. Silent manifestation
c. Present with acute chest pain
d. Treatment is surgical

175. Which is M.C. site for iatrogenic esophageal perforation: *(DNB 2013, DNB 2012, AIIMS Nov 97)*
a. Abdominal portion b. Cervical portion
c. Above arch of aorta d. Below arch of aorta

176. During esophagoscopy, the area in the esophagus mostly perforated is:
a. At aortic arch
b. Mid esophagus
c. At cicopharyngeus muscle
d. At esophagogastric junction

177. Commonest cause of esophageal perforation is:
a. Acid ingestion b. Hyperemesis
c. Instrumentation d. Carcinoma infiltrating

178. Esophageal perforation during endoscopy occurs at:
a. Upper esophageal sphincter *(PGI SS June 2009)*
b. Aortic arch
c. Right bronchus
d. GE junction

179. A 40 years old female presents with perforation of distal third of esophagus. Best form of management is:
a. Antibiotics and drainage *(JIPMER GIS 2011)*
b. Tubal drainage
c. Primary resection and anastomosis
d. Esophagectomy with bringing proximal end as fistula in neck

180. In majority of patient with esophageal leaks in thoracic cavity of less than 12 hours duration, the treatment of choice is: *(UPSC 97)*
a. Primary closure, drainage and antibiotics
b. Early esophagogastrostomy
c. Exclusion and diversion of continuity
d. Total esophagectomy and gastric pull up

181. Best flap for esophagus repair:
a. Colon b. Stomach
c. Jejunum d. Latissimus dorsi

182. In esophageal perforation all are seen except: *(UPPG 2000)*
a. Pain b. Bradycardia
c. Fever d. Hypotension

183. Boerhaave's syndrome is due to: *(DNB 2012, UPPG 2007)*
a. Drug induced esophagus perforation
b. Corrosive injury
c. Spontaneous perforation
d. Gastro-esophageal reflux disease

184. When a 'spontaneous perforation' of the esophagus occurs as a result of severe barotrauma while a person vomits against a closed glottis, the condition is known as: *(UPSC 2008)*
a. Mallory-Weiss syndrome
b. Plummer-Vinson syndrome
c. Kartagener syndrome
d. Boerhaave's syndrome

185. Longitudinal tear of esophagus is seen in: *(MHPGMCET 2002)*
a. Boerhaave's syndrome b. Mallory-Weiss syndrome
c. Nutcracker's esophagus d. Lye stricture

186. Most common site of perforation of esophagus during esophagoscopy is: *(MHSSMCET 2005)*
a. Cricopharynx b. Right atrial indentation
c. Bronchus indentation d. Gastro esophageal junction

187. In Boerhaave's syndrome, perforation of esophagus is seen at? *(MHSSMCET 2009)*
a. Upper anterior b. Lower posterior
c. Upper posterior d. Lower anterior

188. Most common site a spontaneous rupture of esophagus is:
a. Cricopharyngeal junction *(DNB 2009)*
b. Cardioesophageal junction
c. Mid esophagus
d. After the crossing of arch of aorta

189. Investigation of choice for esophageal rupture is? *(DNB 2014)*
a. Dynamic MRI
b. Rigid esophagoscopy
c. Barium contrast swallow
d. Water soluble low molecular weight contrast swallow

TRACHEOESOPHAGEAL FISTULA

190. Esophageal atresia is most commonly associated with:
a. Respiratory anomalies *(KGMC 2011)*
b. Anorectal malformations
c. Genitourinary
d. CVS

191. Most common type of TEF: *(COMEDK 2014, KGMC 2011)*
a. Esophageal atresia with fistula with distal segment
b. Esophageal atresia with fistula with proximal segment
c. H shaped TEF
d. Esophageal atresia only

192. The most common type of tracheoesophageal fistula is: *(MAHE 2008, 2007)*
a. Esophageal atresia without tracheoesophageal fistula
b. Esophageal atresia with proximal tracheoeso-phageal fistula
c. Esophageal atresia with distal tracheoesophageal fistula
d. Esophageal atresia with proximal and distal tracheoe-sophageal fistula

193. The commonest type of tracheoesophageal fistula is:
a. Proximal end blind, distal end communicating with trachea *(PGI June 99)*
b. Distal end blind, proximal end communicating with trachea
c. Both ends blind
d. Both ends open

194. Malignant tracheoesophageal fistula best treated with: *(PGI May 2005)*
a. Radiotherapy b. Chemotherapy
c. Stenting d. Tube
e. Surgical correction

195. Treatment of malignant trachea-esophageal fistula includes: *(PGI June 2007)*
a. Expandable metal stent b. Surgery with graft
c. Gastrostomy tube d. Radiotherapy
e. Chemotherapy

196. Most common type of tracheoesophageal fistula is: *(MHPGMCET 2001)*
a. H-type
b. Lower end connected to trachea
c. Upper end connected to trachea
d. Both ends blind

ESOPHAGEAL RINGS AND WEBS

197. Schatzki's rink is: *(PGI Dec 98)*
a. Mucosal ring at squamo-columnar junction
b. Muscular ring
c. Dysphagia is the symptom
d. Inflammatory stricture

198. Schatzki ring is seen at: *(UPPG 2009)*
a. Mid-esophagus
b. Lower-esophagus
c. Junction of lower esophagus
d. None

199. False about Schatzki Ring is: *(Punjab 2007)*
a. Occurs at lower part of esophagus
b. Involves mucosa and submucosa
c. Involves mucosa, submucosa and muscularis
d. Located at squamo-columnar junction

200. True about Schatzki's ring: *(PGI Nov 2010)*
a. Has skeletal muscle
b. Located at lower esophagus
c. Causes dysphagia
d. Contain all layers of esophagus

201. Schatzki ring: *(DNB 2007, MHSSMCET 2007)*
a. Can be treated by PPI alone
b. Occurs at GE junction
c. Type A ring
d. Type C ring

FOREIGN BODY

202. A foreign body usually gets arrested in which part of esophagus? *(DNB 2003)*
a. Cardiac part of the esophagus
b. In the middle third of the esophagus
c. Below the cricopharynx
d. Above the cricopharynx

ESOPHAGUS ANATOMY AND PHYSIOLOGY

203. Which of the following is true about esophageal anatomy? *(JIPMER GIS 2011)*
a. Cervical esophagus is posterior and little right to trachea
b. Thoracic esophagus is crossed by aortic arch posteriorly
c. Thoracic esophagus is crossed by left main bronchus posteriorly
d. Lower esophagus before entering the diaphragm is anterior and left sided

204. Non progressive contraction of esophagus are: *(AIIMS May 2011, All India 2009)*
a. Primary
b. Secondary
c. Tertiary
d. Quaternary

205. Which structure crosses the esophagus at 25 cm from the incisor teeth? *(PGI 88)*
a. Arch of aorta
b. Bifurcation of trachea
c. Left bronchus
d. Left subclavian artery

206. Distance between upper incisors and gastro esophageal junction is: *(DPG 97)*
a. 25 cm
b. 30 cm
c. 40 cm
d. 60 cm

207. Which figures are very important to the esophagoscopist? *(PGI 81, AIIMS 86)*
a. 10, 20 and 30
b. 15, 25 and 40
c. 20, 30 and 40
d. 25, 35 and 45
e. 25, 35 and 50

208. Third constriction of the esophagus is at the level of:
a. Left bronchus crossing the aorta *(CMC 98)*
b. Where it pierces the diaphragm
c. Junction of the esophagus and stomach
d. Cricopharynx

209. Structure not passing through the esophageal hiatus: *(AIIMS Nov 2011)*
a. Left phrenic nerve
b. Right vagus nerve
c. Left vagus nerve
d. Left gastric artery

210. The normal narrowing in the middle of the esophagus is caused by: *(COMEDK 2007)*
a. Azygos vein
b. Hemiazygos vein
c. Right main stem bronchus
d. Left main stem bronchus

211. False statement about esophagus: *(PGI Nov 2011)*
a. Thoracic esophagus is supplied directly by aorta
b. Bleeding from varices occurs from midesophagus
c. Cervical esophagus drains to deep cervical nodes
d. It has rich lymphatic network
e. Abdominal part of esophagus drains to left gastric

DIAPHRAGM

212. Fluoroscopy is used for diagnosis of: *(PGI June 98)*
a. LV function
b. Diaphragmatic palsy
c. Valvular calcification
d. Pericardial effusion

213. Diagnosis of traumatic rupture of diaphragm is made by:
a. Laparoscopy *(PGI June 2007)*
b. Chest X ray
c. Diagnostic peritoneal lavage
d. CT

214. Diaphragm develops from all of the following structures, except: *(All India 2011)*
a. Septum transversum
b. Pleuroperitoneal membrane
c. Cervical myotomes
d. Dorsal mesocardium

215. Which of the following incisions is taken for diaphragmatic surgery? *(AIIMS May 2014)*
a. Transverse
b. Circumferential
c. Vertical
d. Radial

MISCELLANEOUS

216. Pressure of esophagus is __mm below ambient:
a. 3
b. 5 *(PGI Dec 95)*
c. 12
d. 18

217. 'Pencil tip' deformity is seen in: *(PGI June 95)*
a. Carcinoma esophagus
b. Achalasia cardia
c. Barrett's esophagus
d. None of the above

218. Maximum dilatation of esophagus occurs in: *(Kerala 94)*
a. Carcinoma at gastro esophageal junction
b. Achalasia cardia
c. Stricture at lower end
d. CREST syndrome

219. Second swallowing in barium meal studies is found in: *(JIPMER 95)*

a. Pharyngeal pouch
b. Achalasia cardia
c. Scleroderma
d. Reflux esophagitis

220. Hamman's sign is seen with: *(MHPGMCET 2006)*

a. Acute pericarditis
b. Aortic dissection
c. Tracheal compression
d. Esophageal perforation

221. Stricture esophagus is dilated with___F dilator?

a. 30
b. 40 *(MHSSMCET 2009)*
c. 50
d. 60

222. Stricture esophagus may be treated by: *(MHSSMCET 2009)*

a. Metallic stent
b. Guide wire directed stent
c. Expandable stents
d. Esophagectomy

223. The Roux loop should be at least how long to avoid bile reflux esophagitis? *(MHSSMCET 2010)*

a. 30 cm
b. 40 cm
c. 50 cm
d. 60 cm

EXPLANATIONS

CONGENITAL DIAPHRAGMATIC HERNIA

1. **Ans. a. Pulmonary hypertension** *(Ref: Sabiston 19/e p1834-1836; Schwartz 10/e p1603-1605, 9/e p1416-1418; Bailey 26/e p119, 25/e p84-85; Shackelford 7/e p506; Nelson 18/e p748)*

Congenital Diaphragmatic Hernia (Bochdalek Hernia or Posterolateral Hernia)

- **CDH** term is used for **Bochdalek hernia**Q

> - The reported **incidence** is **1 in 2000 to 5000**Q live births.
> - **Most CDH defects** are on the **left side** (80%); up to **20%** on **right side**Q.

- Rarely bilateral
- The exact **survival rate for CDH** is in the range of **70% to 90%**Q**.**
- **Bag and Mask ventilation** is **contraindicated** in **CDH**Q**.**

Pathogenesis

- The cause is thought to result from **failure of normal closure** of the **pleuroperitoneal canal**Q in the developing embryo.
- As a result, **abdominal contents herniate** through the resultant defect in the **posterolateral diaphragm** and **compress** the **ipsilateral developing lung**Q.

> - The **posterolateral location** of this hernia is known as **Bochdalek hernia**Q and is distinguished from the congenital hernia of the **anteromedial, retrosternal** diaphragm, which is known as **Morgagni hernia**Q.

- **Compression** of the lung results in **pulmonary hypoplasia** involving both lungs, with the **ipsilateral lung** being the **most affected**Q**.**
- **Pulmonary vasculature** is distinctly **abnormal** in that the **medial muscular thickness** of the **arterioles** is **excessive** and **extremely sensitive** to the **multiple local** and **systemic factors** known to **trigger vasospasm**Q.

> - **Main factors** affecting morbidity and mortality: **Pulmonary hypoplasia** and **pulmonary hypertension**Q.

Clinical Features

> - Classic triad: **Respiratory distress** + **Dextrocardia** + **Scaphoid abdomen**Q

- The **MC** presentation is **respiratory distress** due to severe hypoxemia.
- The infant appears dyspneic, tachypneic, and cyanotic, with severe retractions.
- The **anteroposterior diameter** of the **chest** may be **large**, and the **abdomen** may be **scaphoid**Q**.**

Diagnosis

- The **diagnosis** is made at the time of a **prenatal ultrasound** during pregnancy.
- The **postnatal diagnosis** by a **plain chest radiograph** demonstrates the **gastric air bubble** or **loops of bowel** within the **chest**Q**.**
- There may also be a **mediastinal shift away** from the **side of the hernia** or **polyhydramnios**Q from the obstructed stomach.
- **Pneumothorax** always occurs on **contralateral** to the **side of CDH**Q.

Treatment

- **Physiologic stress** associated with **early repair** probably **adds more insult** and that **survival is not improved**Q when compared with delayed repair.
- A variable period of time (**24-72 hours**) to allow **for stabilization** before **surgical repair**Q.

> - The **viscera** are **reduced** into the abdominal cavity, and the **posterolateral defect** in the diaphragm is **closed** using **interrupted, nonabsorbable sutures**Q**.**

- In **most cases** (80%-90%), a **hernia sac** is **not present**. If **identified**, it is **excised** at the time of repairQ.
- The advantage of a **prosthetic patch** is that a **tension-free repair** can be frequently obtained in **large defects**Q**.**

2. **Ans. b. Delay in emergent surgery** *(Ref: Nelson 18/e p748; Fundamentals of Pediatric Surgery (Springer) 2011/535,536)*

Prognostic Factors in CDH

Primary Prognostic Factors	Secondary Prognostic Factors
• **Pulmonary hypoplasia (Most important[Q])**	**Antenatal**
Pulmonary hypoplasia is the **major determinant** of **survival**[Q]. **Degree** of **pulmonary hypoplasia** closely **correlates with degree** of **pulmonary hypertension**[Q].	• **Early gestational age**[Q] (<24 weeks) • Extradiaphragmatic anomalies[Q] • Stomach herniation • Small lung to head circumference ratio • Small fetal abdominal circumference • Polyhydramnios[Q] • Size of defect[Q]
• **Pulmonary hypertension (Important)**[Q]	**Postnatal**
The **combined effect** of **pulmonary hypoplasia** and **pulmonary hypertension** is believed to be **MC** cause of **mortality** in CDH[Q].	• **Early presentation**[Q] (within 6 hours) • PO_2 and PCO_2 unresponsive to ventilation • **Need for** extra-corporeal membrane oxygenation (**ECMO**)[Q]
	Side of Defect
	• **Right sided defects** have **poor prognosis**[Q]

3. **Ans. c. Present in second decade**

4. **Ans. d. Transverse colon** *(Ref: Sabiston 19/e p1834-1836; Schwartz 9/e p1416-1418; Bailey 26/e p119, 25/e p84-85; Shackelford 7/e p506)*

Morgagni hernias (Retrosternal hernias or Larrey's hernia[Q])

- **Congenital hernia** of **anteromedial, retrosternal diaphragm**
- Occur in the **triangular space** between the muscle fibers that make up the diaphragm
- They extend from the **xiphisternum** and the **costal margin** to the central tendon of the diaphragm.

> - **Ninety percent** are **right sided**[Q] because the pericardium itself prevents left-sided hernias
> - **Superior epigastric vessels** may **pass through Morgagni space**[Q]
> - The **most commonly involved viscus** is the **transverse colon**[Q]

Clinical Features

- Patients are **usually asymptomatic**[Q]

Diagnosis

- **Anterior mediastinal masses** are found incidentally on **chest radiographs**[Q].

Treatment

- **Prompt surgical repair** after diagnosis is prudent **to avoid incarceration** or **strangulation** of abdominal organs.
- A **transabdominal route**[Q] is the preferred choice.
- **Prosthetic mesh** is generally required **to repair the defect**[Q].

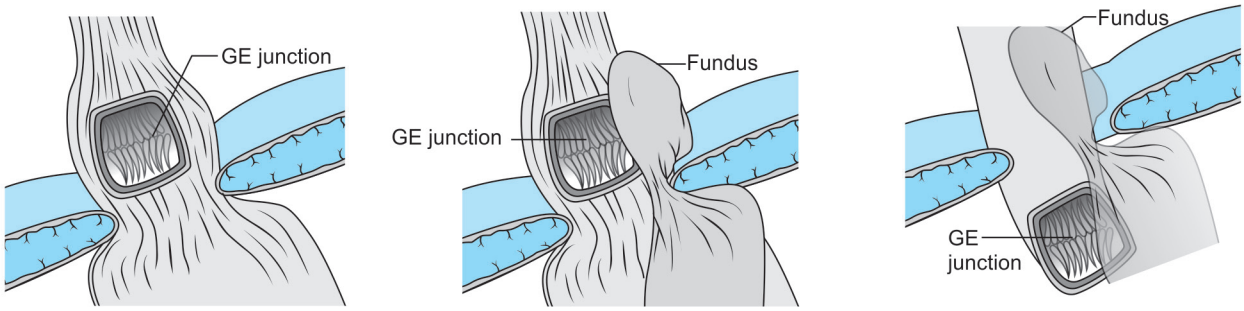
5. **Ans. d. Diaphragmatic hernia**
6. **Ans. a. Early respiratory distress leading to early diagnosis and treatment are good prognostic sign**
7. **Ans. c. Always occurs on right side**
8. **Ans. a. Seen on right side**
9. **Ans. c. Peristalsis in the thoracic cavity**
10. **Ans. a. Congenital hernia**
11. **Ans. a. Right anterior**
12. **Ans. b. Abdominal distension**
13. **Ans. a. Hernia between the costal and sternal part of the diaphragm**
14. **Ans. b. Diaphragmatic hernia**

HIATUS HERNIA

15. **Ans. a. Surgery is indicated in all symptomatic cases, b. Para-esophageal type is more complicated** *(Ref: Sabiston 19/e p1081-1083; Schwartz 10/e p980-984, 9/e p842-845; Bailey 26/e p1002-1003, 25/e p1024-1025; Shackelford 7/e p494-505)*

Types of Hiatal hernia	
Type I	**Sliding** hiatal hernia (**MC**)[Q]
Type II	**True** paraesophageal hernia[Q]
Type III	**Mixed** paraesophageal hernia (**I and II**)[Q]
Type IV	Paraesophageal hernia containing other **intraabdominal organs**[Q]

Types of Hiatal Hernia



Pathophysiology of Hiatus Hernia

Type I Hernia or sliding HH

- Characterized by **upward displacement** of the **GE junction** into the **posterior mediastinum**[Q].
- The **stomach** remains in its **usual longitudinal alignment**[Q].
- **A higher incidence of HH** has also been found in people with **inguinal hernias**[Q].
- **Majority** of patients with HH are **asymptomatic**[Q]
- The **prevalence** and **size** of the sliding HH **correlate with** increasing **severity of reflux disease**[Q].

Type II Hernia

- **True PEH**: Defined by a **normally positioned intraabdominal GE junction** with **upward herniation** of the **stomach**[Q] alongside it.
- A **PEH** develops when there is a **defect**, possibly **congenital**, in the **hiatus anterior** to the esophagus.
- **Persistent posterior fixation** of the **GE junction** is the essential difference between a PEH and a sliding HH.

Type III Hernia

- **Mixed hernia:** Characterized by **displacement** of **both** the **GE junction** and a **large portion** of the **stomach** cephalad into the posterior mediastinum[Q].
- **Starts** as a **sliding HH**, and over time as the **hiatus enlarges**, and more of **fundus** and **body** of the stomach **herniate** into the chest.

Type IV Hernia

- Esophageal hiatus has dilated to such an extent that the **hernia sac** also **contains** other organs such as the **spleen, colon**, or **small bowel**[Q].
- **Bowel obstruction** and **complications**[Q] due to altered anatomy.

16. **Ans. a. Esophagitis**
17. **Ans. b. Cardia goes through hiatus**
18. **Ans. a. Surgery when medical treatment has failed, b. Nissen's fundoplication** *(Ref: Sabiston 19/e p1081-1083; Schwartz 10/e p980-984, 9/e p842-845; Bailey 26/e p1002-1003, 25/e p1024-1025; Shackelford 7/e p494-505)*

Hiatus Hernia

- Greater than **95%** of HHs is **type I** or **sliding hernias**[Q]
- Of all **PEHs, type III** is the **most common**[Q]
- **PEHs** are **more common** in **females** and have an **autosomal dominant** mode of transmission.
- **MC structure** to herniate is the **fundus** of the stomach; other structures that may be located in the hernia sac include the **spleen, colon**, and **omentum**[Q]
- **Type IV** PEH has a higher incidence of **serious results**, with **50%** of patients presenting **emergently**.

Clinical Features

- **Most common** preoperative **symptom** and finding is the **typical heatburn**[Q]
- Others are **chest pain**, **epigastric pain**, **dysphagia**, postprandial fullness, **regurgitation**, vomiting, weight loss, anemia, and respiratory symptoms[Q].
- **Hematemesis** or **anemia** is evident in about a **third** of patients with PEH.

Diagnosis

- **Barium swallow** is the **most important diagnostic** test[Q].
- **Endoscopy** helps to identify **mucosal erosions** as a source of gastrointestinal blood loss.
- **Manometry** is needed to determine the **motor function** of the esophageal body.

Treatment

- Surgical approach: Transabdominal (laparoscopic or open) or transthoracic.
- **Transabdominal laparoscopic approach** for HH repair is **preferred**[Q]

Cameron Ulcer or Riding Ulcer
• Bleeding can be caused by **ischemia** of the gastric mucosa or by **riding ulcers** or **Cameron's ulcers**[Q]. • **Cameron's ulcers** are due to the **constant abrasive force** as the stomach rubs against or is pinched by the diaphragmatic hiatus. • The continuous movement of the stomach and esophagus as they travel up and down with respiration and swallowing compounds the problem. • **Anemia** from a **PEH resolves** in **92%** of patients after **surgical repair**[Q].

19. Ans. d. Hiatus hernia

20. Ans. b. Barium meal *(Ref: Bailey 26/e p1003, 25/e p1024, 24/e p1008)*

Diagnosis of Hiatus Hernia

- The **hernia** may be **visible on** a **plain radiograph** of the **chest** as a **gas bubble**, often with a **fluid level behind** the **heart**[Q].
- A **barium meal** is the **best method of diagnosis**[Q].
- The **endoscopic appearances** may be **confusing**, especially **in large hernias** when it is easy to become disorientated.

21. Ans. c. Barium meal upper GI in Trendelenburg position *(Ref: Bailey 26/e p1003, 25/e p1024, 24/e p1008; http://medical-dictionary.thefreedictionary.com/diaphragmatic+hernia)*

Barium Studies in Hiatal Hernia

- **To facilitate visualization** of the **hernia**, the **patient** may **be placed** in a **Trendelenburg position during** studies of **barium swallowing**[Q].

22. Ans. c. Include only the anterior stomach wall in the wrap *(Ref: www.ncbi.nlm.nih.gov/pubmed/8313128)*

Nissen's fundoplication	• **Left crus approach** to a **360-degree wrap** (**Nissen fundoplication**), which is the **procedure of choice** for **GERD**. • **Left crus approach: Direct** and **early view** of the **short gastric vessels** and **spleen**[Q].
Rosetti and **Hell modification** of Nissen's fundoplication	• Include **only anterior stomach wall in** the **wrap**[Q]. • The idea was to reduce dissection in the vicinity of vagus nerve.

23. Ans. a. Hiatus hernia

24. None: *(Ref: Sabiston 19/e p1074-1077; Schwartz 10/e p980-984, 9/e p836-839; Bailey 26/e p999, 25/e p1021; Shackelford 7/e p237-239)*

Type of Fundoplication	Degree of Wrap
Watson	• **90-degree anterior** fundoplication[Q]
Dor	• **180-degree anterior** fundoplication[Q]
Toupet	• 180-degree **posterior** fundoplication subsequently modified to a **270-degree wrap**[Q]
Belsey Mark IV	• **270-degree anterior** fundoplication[Q]
Nissen	• **360-degree** fundoplication[Q]

25 Ans. a. Hiatus hernia

REFLUX ESOPHAGITIS

26. Ans. b. Protein *(Ref: Shackelford 7/e p56)*

Lower Esophageal Sphincter (LES) Pressure

Decreased by	Increased by
• **P**rostaglandin E1 and E2, **P**rogesterone[Q]	• **B**ombesin, **A**ngiotensin II[Q]
• **M**orphine and **M**eperidine[Q]	• **P**P, **S**ubstance P, **M**otilin[Q]
• **T**heophylline[Q]	• **G**astrin[Q]
• **B**arbiturates, **D**iazepam[Q], **D**opamine	• Antacids[Q]
• **C**CB, **A**tropine, **N**itrates[Q]	• Cholinergics[Q]
• **C**hocolate, **C**offee[Q]	• Domeperidone
• **A**lcohol, **P**ippermint[Q]	• Metoclopramide[Q]
• **S**moking, **F**at[Q]	• Prostaglandin $F_{2\alpha}$

- **PMT BD CAN decrease LES pressure**: **P**rostaglandin E1 and E2, **P**rogesterone, **M**orphine and **M**eperidine, **T**heophylline, **B**arbiturates, **D**iazepam, **D**opamine, **C**CB, **A**tropine, **N**itrates
- **CAPS Fat decrease LES pressure**: **C**hocolate, **C**offee, **A**lcohol, **P**ippermint, **S**moking, **F**at.
- **PSM BAG increase LES pressure**: **P**P, **S**ubstance P, **M**otilin, **B**ombesin, **A**ngiotensin II, **G**astrin

27. Ans. b. Gastrin

28. Ans. c. 24-hours pH monitoring *(Ref: Sabiston 19/e p1067-1081; Schwartz 10/e p964-980, 9/e p827-841; Bailey 26/e p995-999, 25/e p1017-1024; Shackelford 7/e p174-180, 215-237)*

Gastro-Esophageal Reflux Disease (GERD)

- **Classical triad** of symptoms is **retrosternal burning pain**, **epigastric pain** and **regurgitation**[Q].
- **GERD** is associated with **complications** such as **esophageal ulcerations** (5%), **peptic strictures** (4-20%), and **Barrett's esophagus** (8-20%).

Pathophysiology

- LES has the **primary role** of **preventing reflux** into the esophagus.

Factors Contributing to the High-pressure Zone in the Lower Esophagus

- **Intrinsic musculature**[Q] of the distal esophagus which are in a state of tonic contraction
- **Sling fibers** of the **cardia**[Q] which are at the same anatomic depth of the circular muscle fibers of the esophagus but are oriented in a different direction
- **Diaphragm**[Q]: during inspiration the anteroposterior diameter of the **crural opening** is decreased, compressing the esophagus and increasing the measured pressure at the LES
- **Transmitted pressure**[Q] of the abdominal cavity

- **GERD** is **often associated with** a **hiatal hernia** (MC type is **type I** or **sliding** hernia[Q]).
  - A **hiatal hernia** is **neither necessary nor sufficient** to make the **diagnosis** of **GERD**, and the **presence** of such a **hernia does not constitute** an **indication for operative correction**[Q].
  - **Many patients** with **hiatal hernias do not have symptoms** and do **not require treatment**[Q].

Clinical Features

- **Classical triad** of symptoms is **retrosternal burning pain**, **epigastric pain** and **regurgitation**.
- **MC presentation** of GERD: **Long-standing history** of **heartburn** and a **shorter history of regurgitation**[Q].
  - **Symptoms of GERD: Heartburn** (80%)[Q], **Regurgitation** (54%), Abdominal pain (29%), **Cough** (27%), Dysphagia for solids (23%), Belching (15%), Bloating (15%), Aspiration (14%), Wheezing (7%).

Diagnosis

- **Endoscopy**: **Exclude other diseases**, especially a tumor, and to **document** the presence of **peptic esophageal injury**. An **essential step** in the **evaluation of GERD**, who are being **considered for operative intervention**[Q].
  - **Manometry:** For **information about** the **function of** the **esophageal body** and **LES**[Q]

24-hour pH Monitoring

- **Gold standard** for **diagnosing** and **quantifying acid reflux** is the **24-hour pH test**[Q].
- **Information from the study**: Total **number of reflux** episodes (pH<4), **longest episode** of reflux, number of episodes **lasting >5 minutes**, **extent of reflux** in the **upright** and **supine** position.
- **DeMeester score**[Q]: An overall score is obtained with the use of a formula that assigns a **weight to each item** according to its capacity **to cause esophageal injury.**
- **DeMeester score** needs to be **<14.7**[Q]**.**

- **Esophagogram:** For evaluation of **symptoms of GERD** when an **operation is contemplated** or when the **symptoms do not respond as expected**. **Presence** and **size** of a **hiatal hernia** may be **characterized**[Q].

Treatment

- **Lifestyle modifications**: **Cessation of smoking, decreased caffeine intake**, and **avoidance** of **large meals** before lying down[Q]
- **Medical Management**: **Double dose of PPI** is the **initial approach**[Q]
- Compared with H_2 blockers, **PPIs** are **more effective** at **healing** esophageal **ulceration** secondary to acid exposure.

Indications of Surgical Therapy

- **Severe esophageal injury** (**ulcer, stricture**, or **Barrett's mucosa**)[Q]
- **Incomplete resolution** of **symptoms** or **relapses** while on medical therapy
- **Long duration** of **symptoms**[Q]
- **Symptoms** persist **at** a **young age**[Q]

- **Antireflux surgery**: **Laparoscopic Nissen's fundoplication** is **gold standard** for **GERD**[Q].
- Patients who have **>10 years** of **life expectancy** and are **in need of lifelong therapy** due to a **mechanically defective sphincter**, **surgical therapy** may be considered the **treatment of choice**[Q].
- The principles of **modern Nissen fundoplication** include **secure crural closure** and creation of a **short (≤2 cm), 360-degree "floppy" fundoplication** designed to **most closely replicate** the **normal physiology of** the **gastroesophageal flap valve**[Q].

29. **Ans. c. Gastroesophageal reflux disease**

30. **Ans. a. Respiratory symptoms** *(Ref: Nelson 18/e p1547)*

Recurrent respiratory symptoms (**Wheezing, stridor, chronic cough, apnea, aspiration**) are the **earliest indicators** of pathological reflux **among the options provided**.

GERD in Infants

- **Most frequent complications** of **GERD** in **infants** are **failure to thrive** and **recurrent pulmonary symptoms**[Q]**.**
- **Regurgitation alone does not indicate pathological reflux**.
- Presence of **upper GI bleed** is an **uncommon marker** for pathological reflux or esophagitis.
- Presence of **stricture esophagus** is an **uncommon** and **late complication** of untreated pathological GERD.
- **Recurrent pulmonary symptoms** are **frequent** and **early indicators** of **pathological GERD**[Q]**.**

31. **Ans. d. 24-hours pH monitoring**

32. **Ans. b. Transient Les relaxation** *(Ref: Harrison 18/e p2433)*

- Harrison says "**Transient LES relaxations account for** at least **90%** of **reflux** in **normal subjects** or **GERD patients** without hiatus hernia[Q]."

33. **Ans. a. Barium swallow**

- **IOC** for **anatomical disorders** of **esophagus**: **Barium swallow**[Q]
- **IOC** for **motility disorders** of **esophagus**: **Manometry**[Q]

34. **Ans. d. Pneumothorax** *(Ref: Shackelford 7/e p234)*

Pneumothorax (1-5%) is usually **self-limited** but may cause immediate or delayed hemodynamic or respiratory consequences. It is **one of the most common complication** of Nissen's fundoplication.

Complications of Nissen's Fundoplications

Intraoperative	Postoperative
• **Pneumothorax (MC)**[Q]	• Slipped or misplaced fundoplication
• Esophageal perforation	• Dehiscence
• Splenic injury	• Transthoracic herniation
• Bleeding	• Tight fundoplication
• Missed visceral injury	

35. **Ans. b. Watson is 90 degree posterior**

36. **Ans. a. Long intra-abdominal esophagus, b. Increased intra-abdominal pressure, c. Right crus of diaphragm**

37. **Ans. None**
38. **Ans. a. Nitrates, c. Morphine, d. Atropine, e. Calcium channel blockers**
39. **Ans. a. Alcohol, b. Caffeine/Tea, c. Diazepam**
40. **Ans. c. Theophylline**
41. **Ans. d. All of the above**
42. **Ans. None**
43. **Ans. d. All of above**
44. **Ans. d. Esophageal reflux**

ACHALASIA CARDIA

45. **Ans. b. Body peristalsis is normal** *(Ref: Sabiston 19/e p1025-1028; Schwartz 10/e p990-992, 9/e p850-851, 857-860; Bailey 26/e p1014-1017, 25/e p1036-1038; Shackelford 7/e p349-352, 354-361)*

Achalasia Cardia

- **Achalasia** means "**failure to relax**[Q]," (**sphincter** remains in a **constant state of tone** with periods of relaxation)
- Both the **muscle** of the **esophagus** and **LES** are **affected**[Q].
- **Prevailing theory**: **Destruction** of the nerves to **LES** is **primary pathology** and **degeneration** of **neuromuscular function** of the **body of esophagus** is **secondary**[Q].
- **Premalignant condition** leading to **squamous cell carcinoma**

> - **Triple A-syndrome** or **Allgroves disease**[Q]: **Achalasia**, **Alacrima** and **ACTH-resistant Adrenal insufficiency**.

Pathogenesis

> - **Progressive inflammation** and **selective loss** of the **inhibitory myenteric neurons** in **Auerbach's plexus** of the esophagus that normally secrete VIP and nitric oxide[Q].

- This results in **failure of relaxation of the LES** and **aperistalsis** of the **esophageal body** with subsequent **functional obstruction** at the level of the **GE junction** and **gradual dilatation** of the esophagus[Q].

Clinical Features

- The **classic triad** of symptoms consists of **dysphagia**, **regurgitation**, and **weight loss**.
- Heartburn, postprandial choking, and nocturnal coughing are seen commonly.

> - **Men** and **women** are **equally affected**, with **no ethnic predisposition** to the disease[Q].

- **Regurgitation** of undigested, foul-smelling foods is common, and with **progressive disease**, **aspiration** can become life-threatening[Q].
- **Pneumonia**, **lung abscess**, and bronchiectasis often result from **long-standing achalasia**.
- **Dysphagia progresses slowly** over years[Q].

Diagnosis

- **Barium swallow**:

> - **Dilated esophagus** with a **distal narrowing**[Q]
> - **"Bird's beak" ,"Pencil-tip"** or **"Rat's tail" appearance**[Q]

  - **Sphincter spasm** and **delayed emptying** through the LES
  - A **lack of peristaltic waves** in the **body** and **failure of LES relaxation**[Q]
  - **Lack of a gastric air bubble**[Q] on the upright portion is a result of the tight LES not allowing air to pass easily into the stomach.
  - Massive esophageal dilation, tortuosity, and a **sigmoidal esophagus** (**megaesophagus**) in **advanced stage**[Q]

> - **Mecholyl test** is **positive** in **Achalasia**[Q]
> - **CCK test** is **positive** in **Achalasia**[Q]

- **Manometry** is **gold standard test** for diagnosis.
  - **Absence** of **body peristalsis** and **poor LES relaxation** is **mandatory**[Q] for diagnosis.

Manometry Findings of Typical Achalasia	
Abnormalities of LES	**Abnormalities of esophageal body**
• Incomplete or **absent LES relaxation**[Q] • Elevated LES pressure[Q]	• **Elevated intraesophageal pressure**[Q] (pressurization of the esophagus) from incomplete air evacuation • **Simultaneous mirrored contractions** with **no evidence** of **progressive peristalsis**[Q] • **Low-amplitude waveforms**[Q] indicating a lack of muscular tone

Treatment

- **Early stage**: Sublingual **nitroglycerin**, **nitrates,** or **calcium channel blockers**[Q] may offer hours of relief of chest pressure before or after a meal.
- **Bougie dilation**[Q] up to 54 French may offer several months of relief but requires repeated dilations to be sustainable.

- **Botulinum toxin:**
  - Injection of **botulinum toxin** (**Botox**) directly into the LES **blocks acetylcholine release**, preventing smooth muscle contraction, and effectively **relaxes** the **LES**Q.
  - With **repeated treatments**, Botox may offer **symptomatic relief** for years
  - **Symptoms recur** more than **50%** of the time **within 6 months**Q.
    - **Laparoscopic Heller myotomy** is now the **operation of choice**Q.
    - **Extent of Heller's myotomy: 2 cm above GE junction** to **1 cm below**Q, over stomach.
- **Partial antireflux procedure** (**Toupet** or **Dor fundoplication**)Q will restore a barrier to reflux and decrease postoperative symptoms.
- **Esophagectomy** is considered **megaesophagus**, **sigmoid esophagus**, **failure** of **more than one myotomy**, or an **undilatable reflux stricture**Q.

46. **Ans. c. Segmental body peristalsis**
47. **Ans. d. Heller's cardiomyotomy**
48. **Ans. b. Achalasia cardia**
49. **Ans. a. Achalasia cardia**
50. **Ans. a. Nitrates, b. Ca^{2+} channel blockers, c. Botulinum toxin, d. Myotomy**
51. **Ans. a. Achalasia cardia**
52. **Ans. c. Rat-tail deformity and filling defect on barium study** *(Ref: Sutton 7/e p552)*

- **Sutton 7/e p552: "Bird's beak"** or **"Rat's tail" appearance** is seen **in Achalasia** on **barium swallow**Q**.**
- **Various internet sites:** Irregular **"Rat-tail" filling defect** of the distal esophagus with **shouldered edge** is seen **in carcinoma esophagus** on **barium swallow**Q**.**

Achalasia	**"Bird's beak" , "Pencil-tip"** or **"Rat's tail" appearance**Q
Carcinoma esophagus	**"Rat-tail" filling defect**Q

53. **Ans. a. Dysphagia is a presenting symptom, d. Motility improving agents are used in treatment**
54. **Ans. a. Myenteric plexus of Auerbach**
55. **Ans. a. Pressure at distal end increased with no peristalsis**
56. **Ans. a. Barium swallow**
57. **Ans. d. Botulinum toxin**
58. **Ans. d. Not a premalignant condition**
59. **Ans. a. Nifedipine**
60. **Ans. c. Mecholyl test is hyposensitive** (www.hon.ch/OESO/free/Vol_4_Prim_Motility/.../ART295.HTML)

MECHOLYL TEST

- **Mecholyl test** has been used as a means to **demonstrate** the "**denervation supersensitivity**" **in** patients with **achalasia**Q**.**
- It has not been reported in patients with the hypertensive LES.

61. **Ans. d. All of the above**
62. **Ans. d. Exaggerated peristalsis**
63. **Ans. a. Volvulus, c. Achalasia**
64. **Ans. a. Most common in women**
65. **Ans. None**
66. **Ans. d. Not a premalignant condition**

ESOPHAGEAL MOTILITY DISORDERS

67. **Ans. d. Diffuse esophagus spasm** *(Ref: Sabiston 19/e p1028-1032; Schwartz 10/e p992, 9/e p851-853; Bailey 26/e p1017, 25/e p1039; Shackelford 7/e p142-143)*

DIFFUSE ESOPHAGEAL SPASM

- **Esophageal contractions** are **repetitive, simultaneous**, and of **high amplitude**Q.
- Basic pathology is related to a **motor abnormality** of the **esophageal body** that is most notable in the **lower two thirds** of the esophagus.
- More common in **women** and is often found in patients with multiple complaintsQ.

Clinical Features]

- Clinical presentation: **Chest pain** and **dysphagia**Q (may be related to eating or exertion and may mimic angina)
- Complain of a squeezing pressure in the chest that may radiate to the jaw, arms, and upper back.
- The **symptoms** are often pronounced during times of **heightened emotional stress**Q.

Diagnosis

- **Barium swallow**:
  - **Corkscrew** or **rosary-bead** esophagus, **segmental spasm** or **pseudodiverticulosis** appearanceQ
  - Due to presence of **tertiary contractions**Q
  - Indicative of **advanced disease**Q

- **Manometry** is **gold standard test** for diagnosis[Q].
  - Classic manometry findings: **Simultaneous**, **multipeaked contractions** of **high amplitude** (>120 mm Hg) or **long duration** (>2.5 sec).
  - These **erratic contractions** occur after **more than 20%** of **wet swallows**.

Treatment

- **Mainstay of treatment** for DES is **nonsurgical**, and **pharmacologic** (Nitrates, calcium channel blockers) or **endoscopic intervention** (Bougie dilation) is preferred[Q].
- **Indications of surgery** (**long esophagomyotomy**):
  - **Incapacitating chest pain** or **dysphagia** who have **failed medical** and **endoscopic therapy**[Q]
  - Presence of a **pulsion diverticulum** of the thoracic esophagus

Nutcracker Esophagus

- **Hypermotility disorder** also known as **supersqueeze esophagus**[Q].
- Esophagus with **hypertensive peristalsis** or **high-amplitude peristaltic contractions**.
- **Most common and most painful** esophageal **hypermotility disorder**[Q].
- Associated with **hypertrophic musculature** resulting in high-amplitude contractions of the esophagus

Clinical Features

- **Chest pain** and **dysphagia** are typical symptoms.

Diagnosis

- The **gold standard of diagnosis** is the subjective complaint of **chest pain** with simultaneous objective evidence of **peristaltic esophageal contractions 2 standard deviations above the normal**[Q] values on manometric tracings.
- On manometry, amplitude >180 mmHg and duration of contraction >6 seconds

Treatment

- The treatment of nutcracker esophagus is **medical** (**Calcium channel blockers**, **nitrates**, and **antispasmodics**)[Q]

Hypertensive LES

- The **LES pressure** is **above normal**, motility of esophageal body may be **hyperperistaltic** or **normal.**

Clinical Features

- Patients with **hypertensive LES** present with **chest pain** or **dysphagia**[Q].

Diagnosis

- Diagnosis is made by **manometry.**
  - **Elevated LES pressure** (>26 mm Hg) and **normal relaxation** of the LES.
  - Esophageal body may be **hyperperistaltic** or **normal.**

Treatment

- **Botox injections** alleviate symptoms temporarily, and **hydrostatic balloon dilation** may provide long-term symptomatic relief.
- **Surgery** in patients who **fail interventional treatments** and those with **significant symptoms**.
- A **laparoscopic modified Heller esophagomyotomy** is the **operation of choice**.

68. Ans. d. Scleroderma, e. Cricopharyngeal carcinoma *(Ref: Bailey 26/e p1017-1018, 25/e p1035; Sabiston 19/e p1025)*

Classification of Esophageal Motility Disorders	
Disorders of the **pharyngo-esophageal junction**	• **Neurological**: **Stroke**, **motor neuron disease**, **multiple sclerosis**, **Parkinson's disease** • **Myogenic**: **Myasthenia**, muscular dystrophy • Pharyngo-esophageal (**Zenker's**) diverticulum
Disorders of the **body** of the **esophagus**	• Diffuse esophageal spasm • Nutcracker esophagus
Autoimmune disorders-**Systemic sclerosis (CREST)**	• Reflux associated • Idiopathic
Allergic	• Eosinophilic esophagitis • Non-specific esophageal dysmotility
Disorders of the **lower esophageal sphincter**	• Achalasia • Incompetent lower sphincter (i.e. **GERD**)

69. Ans. d. Achalasia cardia

ZENKER'S DIVERTICULUM

70. Ans. a. Barium swallow *(Ref: Sabiston 19/e p1023-1024; Schwartz 10/e p989, 9/e p847-850; Bailey 26/e p1018, 25/e p1040-1041; Shackelford 7/e p336-346)*

Zenker's or Pharyngo-esophageal diverticula

- **Mucosal outpouching (pulsion diverticulum)** occurring **through** the triangular bare area (**Kilian's triangle**)Q, between the **upper oblique fibers (thyropharyngeus muscle)** and **lower horizontal fibers (cricopharyngeus muscle)** of the **inferior constrictor muscle**Q

  - **Increased intraluminal pressures** (secondary to **abnormal esophageal motility**)Q pushes **mucosa and submucosa** through a muscular defect in the wall of the esophagus creating a **pulsion diverticulum**Q
  - It is a **pseudodiverticula**Q
  - It **arises posteriorly** in the midline of the neck, **mouth is in midline** but **sac projects laterally**Q (usually left laterally)

- It is **not a true esophageal diverticula**Q, as it arises above the upper esophageal sphincter (the cricopharyngeus sphincter)
- MC esophageal diverticulaQ

Pathology

- **Neuromuscular incordination**Q in this region
- May be due to **different nerve supply** of the **two parts of inferior constrictor muscle**Q
  - The thyropharyngeus (oblique fibers) supplied by the pharyngeal plexus
  - Cricopharyngeus (horizontal fibers) by recurrent laryngeal nerve

Clinical features

- Usually seen in patients over **50 years**Q
- MC symptom is **dysphagia**Q
- **Undigested food** is **regurgitated into the mouth**, especially when the patient is in the **recumbent position**Q
- Swelling of the neck, gurgling noise after eating, halitosis, and a sour metallic taste in the mouth are common symptoms
- **Cervical webs** are seen **associated in 50%**Q of patients with Zenker's diverticula, can cause dysphagia post-operatively if not treated.

Diagnosis

- **Barium swallow** is **diagnostic**

Complications

- **Pneumonia** and **lung abscess** due to **aspiration**Q **(MC)**
- Perforation, Bleeding
- Carcinoma

Management

- Surgical therapy **(Cricopharyngeal myotomy + Diverticulopexy)** is **treatment of choice**Q

Treatment options for Zenker's diverticula

- **Cricopharyngeal myotomy**- a myotomy alone is sufficient for small diverticula
- **Myotomy with excision of sac**- done for large (>4 cm) diverticula
- **Diverticulopexy**
- **Diverticulo-esophagostomy** using a linear cutting staple gun
  - The septum between the esophagus and the diverticula is divided
  - Also known as **Dohlman procedure**Q

71. Ans. b. Zenker's diverticulum

72. Ans. b. Feeling of obstruction in esophagus

73. Ans. d. Out pouching of the anterior pharyngeal wall just above the cricopharyngeus muscle

74. Ans. b. Zenker's diverticulum

75. Ans. c. Treatment is simple excision

76. Ans. c. Lung abscess

77. Ans. a. Zenker's diverticulum

78. Ans. a. The two parts of inferior constrictor muscle of the pharynx

Midesophageal or Traction Diverticula

- **Inflammation** of the **lymph nodes** exerts **traction** on the wall of the esophagus leading to the formation of a **true diverticulum** in the midesophagus.

  - Caused by **inflamed mediastinal lymph nodes** from **tuberculosis**, **histoplasmosis**Q and resultant fibrosing mediastinitis.

- Typically present on the **right** owing to the overabundance of structures in the midthoracic region of the left chest and **wide mouthed.**

Clinical Features

- **Most patients** are **asymptomatic**, incidentally found during a workup for some other complaint.
- **Dysphagia**, **chest pain**, and **regurgitation** can be present and are usually indicative of an **underlying primary motility disorder.**

Diagnosis

- **Investigation of choice** is **barium swallow**Q (**lateral views** to determine side)
- **CT scan** is helpful to identify any **mediastinal lymphadenopathy** and may help to **lateralize the sac**.
- **Manometry** in **all patients**, symptomatic or not, **to identify** a **primary motor disorder**.

Treatment

- In **asymptomatic patients** who have inflamed mediastinal lymph nodes from **tuberculosis** or **histoplasmosis**: **ATT** or **antifungal agents**Q
- **Diverticulopexy** for **symptomatic** or **2 cm or larger** diverticulum
- **Esophagomyotomy** in **severe chest pain** or **dysphagia** and a documented **motor abnormality**Q

Epiphrenic Diverticula

- Epiphrenic diverticula are found **adjacent to diaphragm** in the **distal third** of the esophagus, within 10 cm of the GEJ.
- Most often related to **thickened distal esophageal musculature** or **increased intraluminal pressure**.
- **Pulsion** or **false diverticula**, often **associated with DES**, **achalasia,** and **most commonly NEM** (non-specific esophageal motility) **disorders.**
- In patients in whom a motility abnormality cannot be identified, a congenital (**Ehlers-Danlos syndrome**) or **traumatic cause** is considered.
- More common on the **right side** and tend to be **wide-mouthed**Q.

Clinical Features

- Most patients are **asymptomatic**.
- **Dysphagia** or **chest pain** indicative of a **motility disturbance**.
- The diagnosis is often made during the workup for a motility disorder, and the diverticulum is **found incidentally.**

Diagnosis

- **Investigation of choice** is **barium swallow** (**lateral views** to determine side)
- **Manometry** to identify a **primary motor disorder**.

Treatment

- **Diverticulopexy**
- **Long esophagomyotomy** in severe chest pain, dysphagia, or a **documented motor abnormality**

Killian-Jamieson Diverticula
• **Lateral cervical** esophageal diverticula
• Located **just below cricopharyngeus**
• Mostly **asymptomatic**

79. **Ans. d. Zenker's diverticulum**

SCLERODERMA

80. **Ans. b. Esophageal atresia** *(Ref: Harrison 18/e p943)*

Crow-Fukase Syndrome

- The features of this syndrome are highlighted by an acronym: POEMSQ
- **POEMS**Q: **P**olyneuropathy, **O**rganomegaly, **E**ndocrinopathy, **M**-protein, **S**kin changes.

81. **Ans. b. Polyneuropathy, c. Endocrinopathy, d. M-protein**

82. **Ans. c. Lower third** *(Ref: Harrison 18/e p2437; Schwartz 10/e p984-985, 9/e p846-847)*

Scleroderma

- Systemic disease accompanied by **esophageal abnormalities** in **80%** of patients.
- In most, the disease follows a **prolonged course**Q.
- **Renal involvement** occurs in a small percentage of patients and signals a **poor prognosis.**
- The onset of the disease is usually in the **third** or **fourth decade** of life
- Occurring twice as frequently in **women**Q as in men.

Pathophysiology

- In the **GI tract**, the predominant feature is **smooth muscle atrophy**[Q].

> **Smooth muscle atrophy** in **lower two third** of esophagus →**Incompetent LES** →**GERD** →**Stricture**[Q]

- **Normal peristalsis** in the **proximal striated esophagus**, with **absent peristalsis** in the **distal smooth muscle portion**[Q].
- The **LES pressure** is **progressively weakened** as the disease advances.
- **Gastroesophageal reflux** commonly occurs in patients with scleroderma, because they have both **hypotensive sphincters** and **poor esophageal clearance**.
- This combined defect can lead to **severe esophagitis** and **stricture formation**[Q].

Clinical Features

- **Dysphagia** and **GERD**
- **Postural dysphagia** for **liquids**: Dysphagia for liquids **in recumbent position**, not in upright position
- Dysphagia for solids is unrelated to posture

Diagnosis

- **Manometry**:
  - **Normal peristalsis** in the **proximal striated esophagus**, with **absent peristalsis** in the distal smooth muscle portion
  - **LES pressure** is **decreased** but **sphincter relaxation** to deglutition is **normal**

> - **Barium Swallow**: **Dilated**, barium-filled **esophagus, stomach,** and **duodenum**, or a **hiatal hernia** with **distal esophageal stricture** and **proximal dilatation**[Q].

Treatment

- PPIs, antacids, elevation of the head of the bed, and multiple dilations for strictures for reflux
- **Esophageal shortening** may require a **Collis gastroplasty** in combination with a **partial fundoplication**[Q].

> - **Surgery reduces esophageal acid exposure**, but **does not return it to normal** because of the **poor clearance function of** the **body** of the **esophagus**[Q].

83. Ans. b. Scleroderma

PLUMMER-VINSON SYNDROME

84. Ans. a. Lower esophageal web, c. Common in adult female *(Ref: Sabiston 19/e p802, 1051; Bailey 26/e p1021-1022, 25/e p737, 1043)*

Plummer-vinson Syndrome

- Also known as **Paterson-Brown Kelly** syndrome
- Occurs in **middle aged edentulous** (without teeth) **women**[Q].
- **Premalignant lesion**[Q] (Approximately 10% of patients develop **SCC** of **esophagus**, **oral cavity** or the **hypopharynx**)
- **Iron-deficiency anemia** is a common finding (known as **sideropenic dysphagia**[Q])

Plummer-vinson Syndrome is Characterized by
• **Dysphagia** due to **upper esophageal web**[Q]
• Chronic **iron deficiency anemia**[Q]
• **Atrophic oral mucosa** and **glossitis**[Q]
• **Brittle, spoon-shaped fingernails** (**Koilonychia**)[Q]
• **Splenomegaly**[Q]
• **Achlorhydria**[Q]

- Cause of **dysphagia** is usually a **cervical esophageal web**[Q] (**Post-cricoid web**) but abnormal pharyngeal and esophageal motility may play a role.

Treatment

- **Gentle dilatation**, **iron therapy** and **vitamins**
- **Esophageal web** in Plummer-vinson syndrome is found at **upper end** of esophagus[Q]
- **Schatzki's ring** is found at the **lower end** of esophagus[Q].

85. Ans. a. Post cricoids region commonly involved in web formation

86. Ans. a. Occurs in elderly males

87. Ans. c. It occurs exclusively in men

88. Ans. c. Post cricoid webs

89. Ans. c. Achalasia

90. Ans. a. Web present in lower part of esophagus

BARRETT'S ESOPHAGUS

91. Ans. a. Long esophageal segment involved, b. Metaplasia, c. Peptic ulcer, e. Leads to adenocarcinoma *(Ref: Sabiston 19/e p1033-1036; Schwartz 10/e p967,969,979, 9/e p831-832; Bailey 26/e p1000-1002, 25/e p1022-1024; Shackelford 7/e p285, 294)*

Barrett's Esophagus

- **Metaplasia** of esophageal **squamous epithelium into columnar** in **distal**[Q] esophagus
- It is consequence of **severe reflux esophagitis**[Q]
- **MC type** of columnar epithelium is **intestinal epithelium** (**Intestinal metaplasia**[Q])
- **Metaplasia** of esophageal **squamous epithelium into columnar** in **distal**[Q] esophagus
- It is consequence of **severe reflux esophagitis**[Q]
- **MC type** of columnar epithelium is **intestinal epithelium** (**Intestinal metaplasia**[Q])
- **Barrett's esophagus** requires **both endoscopically visible segment of columnar lining** of distal esophagus and **intestinal metaplasia** showing **goblet cells on biopsy**

Columnar Epithelium in Barrett's Esophagus
– **Intestinal type**[Q] : **MC type, most commonly** associated with **dysplasia** and **carcinoma** – **Junctional type** – **Fundic type**

- **Metaplasia** characteristically affects **distal esophagus**[Q]
- **More common** in **men**, **whites** and **with increasing age**[Q]
- **Premalignant condition** for **adenocarcinoma**[Q]

Complications of **Barrett's Esophagus**
– Can lead to **chronic peptic ulceration** of esophagus (**Barrett's ulcer**)[Q] – Can lead to **high** (**midesophageal**) and **long strictures**[Q].

92. Ans. a. Endoscopic biopsy every 2 years

93. Ans. a. Lower esophagus lined by columnar epithelium

94. Ans. b. Intestinal metaplasia

95. Ans. a. Stricture, c. Peptic ulcer

96. Ans. a. Sequence of prolonged GERD, b. It is premalignant, c. Lower esophageal mucosa is replaced by intestinal type of epithelium

97. Ans. a. Premalignant, c. Can be diagnosed by endoscopy, d. Biopsy is necessary to diagnose, e. Stricture may be present in high esophagus

98. Ans. b. Premalignant condition

99. Ans. a. Metaplasia, c. Adenocarcinoma more common, d. Present as patchy or ring involvement

100. Ans. a. Long esophageal segment involved, b. Metaplasia, c. Peptic ulcer, e. Leads to adenocarcinoma

101. Ans. d. Reflux esophagitis

CARCINOMA ESOPHAGUS PREDISPOSING FACTORS

102. Ans. d. Ectodermal dysplasia *(Ref: Sabiston 19/e p1049-1052; Schwartz 10/e p1003-1014, 9/e p862-863; Bailey 26/e p1005-1006, 25/e p1026-1027; Shackelford 7/e p375-380)*

Predisposing Factors for Carcinoma Esophagus	
Squamous Cell Carcinoma	**Adenocarcinoma**
• **Alcohol**[Q] • **Smoking**[Q] • **Ingested carcinogens**: **- Nitrates**[Q], nitrites, **nitrosamines**[Q] **- Smoked opiates**[Q] **- Fungal toxins** in pickled vegetables • **Mucosal damage**: - Chronic **Achalasia**[Q] **- Lye (caustic) ingestion** **- Long term ingestion** of **hot liquids** **- Radiation induced strictures**[Q] • **Plummer vinson syndrome**[Q] • **Tylosis palmaris et plantaris**[Q]: Congenital • **Hyperkeratosis**[Q] and **pitting** of **palms** and **soles**[Q] • **Human papilloma virus**[Q] • **Esophageal diverticula**[Q] • **Bulimia**[Q] • **Deficiency**: Vitamin **A, zinc, molybdenum**	• **GERD** (leading to **Barrett's esophagus**[Q]) • **Obesity**[Q] • **Scleroderma**[Q] **Scleroderma: Smooth muscle atrophy** in **lower 2/3rd** of esophagus →**Incompetent LES** →**GERD** →**Stricture** • Diet deficient in fruits and vegetables • Diet **high** in **animal protein** and **cholesterol**[Q]

103. Ans. b. Barrett's esophagus

104. Ans. a. Tylosis, b. Plummer-Vinson syndrome, c. Barrett's esophagus, d. Achalasia cardia, e. Scleroderma

105. Ans. a. Tobacco/Alcohol , b. Alkalies **106. Ans. c. Mediastinal fibrosis** **107. Ans. a. Barrett's esophagus**

108. Ans. None **109. Ans. a. Tylosis, b. Smoking, c. Lye stricture, d. Reflux esophagitis**

110. Ans. c. Mediastinal fibrosis **111. Ans. d. Nutcrackers esophagus** **112. Ans. a. H. pylori**

H. Pylori

- **CAG-A positive strain** is **protective for adenocarcinoma** esophagus but **can lead to SCC** of esophagus[Q].

113. Ans. b. Scleroderma **114. Ans. a. Barrett's esophagus**

CA ESOPHAGUS CLINICAL FEATURES, DIAGNOSIS AND TREATMENT

115. Ans. a. TNM stage *(Ref: Sabiston 19/e p1049-1064; Schwartz 10/e p1003-1014, 9/e p862-870; Bailey 26/e p1004-1013, 25/e p1026-1035; Shackelford 7/e p416-434)*

Long-term survival following esophagectomy depends on a number of factors such as the **depth of tumor invasion (T),** the **number** of **involved lymph nodes (N)**, and on the **location** of the tumor in the esophagus.

Carcinoma Esophagus

- **MC esophageal cancer worldwide**: **Squamous cell carcinoma**[Q]
- **MC esophageal cancer in United States** (Western countries): **Adenocarcinoma**[Q]
- More common in **males**[Q]
- **MC site** of **CA esophagus: Middle 1/3rd (Overall)**[Q]
- **Chemotherapy regimen: Epirubicin + Cisplatin**[Q] **+ 5-FU**

Squamous cell carcinoma	Adenocarcinoma
• Rarely seen before the age of 30 years • **Highest mortality rates** seen in **men** between **60-70 years**[Q] of age. • Predominantly affects **African American men**[Q] • **MC site**: **Middle 1/3rd**[Q] • Obesity is protective • **H. pylori** CAG-A strain is a **risk factor**[Q] • Usually appears as an **exophytic lesion** with a **large fungating mass**[Q] • More sensitive to **chemoradiotherapy**[Q] • Treated aggressively with **nonsurgical therapy**[Q]	• Seen infrequently before the age of 40 years • **Increases in incidence** with **age**[Q] • Disease affecting **white men**[Q] • **Barrett's esophagus: 40-fold**[Q] **increased risk** for adenocarcinoma • **MC site: Lower 1/3rd**[Q] • **Obesity** is a **risk factor** • **H. pylori CAG-A strain** is a **protective** • Polypoid (5-10%), flat (10-15%), fungating (20-25%), or **infiltrative** (**40-50%**)[Q] • **Not as sensitive to chemoradiotherapy** • Treated by a more **aggressive surgical approach**[Q].

Pathology

- Esophageal cancer asserts **aggressive biologic behavior**.
- With **only two layers** to the **esophageal wall,** tumors **rapidly infiltrate through** the **muscular wall into surrounding structures**[Q].
- The **rich vascular** and **lymphatic supply facilitates spread** to **regional lymph nodes**[Q].

Clinical Features

- **Early-stage cancers**: **Asymptomatic** or **mimic symptoms** of **GERD**.
  - **MC symptom**: **Dysphagia >Weight loss**[Q]
- **Most patients** with esophageal cancer **present with dysphagia** and **weight loss**, symptoms that usually indicate advanced disease.
- **Choking, coughing**, and **aspiration** from a **tracheoesophageal fistula** (In advanced cases)[Q]
- **Hoarseness** and **vocal cord paralysis** from **direct invasion** into the **recurrent laryngeal nerve** (In **advanced cases**)[Q]
- **MC site of metastasis: Liver**[Q] **>lung >bone**

Diagnosis

- **Barium swallow: First investigation done**[Q] in suspected case of **CA esophagus** (classic finding of an **apple core lesion**[Q])
  - **Endoscopy** with **biopsy: Investigation of choice** for **diagnosis** of **CA esophagus**[Q].
  - **Endoscopic Ultrasound**: **Investigation of choice** for **staging** of **CA esophagus, best** for **T staging** and **LN metastasis**[Q].
- **CECT (abdomen** and **chest):** Assess the length of the tumor, thickness of the esophagus and stomach, **regional LN status** and **metastasis to liver** and **lungs**[Q].

Treatment of CA Esophagus	
High grade dysplasia (Tis) or T1a	• Endoscopic Mucosal Resection[Q]
Localized Esophageal Cancer	• **T1**: Vagal sparing or transhiatal or **minimal invasive esophagectomy** with limited LN dissection[Q] • **T2** and **T3**: **Neo-adjuvant chemoradiation + Surgery**[Q] • **Cervical SCC** or **Non-ideal candidate** for resection: **Definitive chemoradiation**[Q]
Locally Advanced Cancer	• **Chemoradiation**[Q] (± Surgical resection in T4a)
Metastatic Disease	• **Definitive chemoradiation**[Q] (for involved distant LN or metastatic disease)
Malignant TEF	• **Coated SEMS**[Q] (self expanding metallic stents)

- **Post-operative chemoradiation** is **reserved** for **GE junction tumors**[Q]
- **Extent of Resection:** An in-situ **margin of 10 cm**[Q] should be the goal

Prognosis

Long-term Survival Following Esophagectomy Depends on
– **Depth** of **tumor invasion** (T)[Q] – **Number** of **involved lymph nodes** (N)[Q] – **Location**[Q] of the tumor in the esophagus

- **Prognosis is better** for **tumors of** the **cervical esophagus** and tumors **located at GE junction**[Q], in comparison to tumors located in the thoracic esophagus.

7th AJCC: TNM Classification of Carcinoma of the Esophagus	
Tis: High-grade dysplasia	**N1:** Metastasis in **1-2** regional LNs
T1a: Tumor invades **lamina propria, muscularis mucosa**	**N2:** Metastasis in **3-6** regional LNs
T1b: Tumor invades **submucosa**	**N3:** Metastasis in **7 or more** regional LNs
T2: Tumor invades **muscularis propria**	
T3: Tumor invades **adventitia**	**M1:** Distant metastasis
T4a: **Resectable** tumor invading **pleura, pericardium, or diaphragm**	
T4b: **Unresectable** tumor invading **VAT** (**vertebral body, aorta, trachea**)	

Stage Grouping Squamous Cell Carcinoma					
Stage	**T**	**N**	**M**	**Grade**	**Location**
0	**Tis (HGD)**	N0	M0	**1, X**	Any
IA	**T1**	N0	M0	**1, X**	Any
IB	**T1**	N0	M0	**2-3**	Any
	T2-3	N0	M0	**1, X**	**Lower, X**
IIA	**T2-3**	N0	M0	**1, X**	**Upper, middle**
	T2-3	N0	M0	**2-3**	**Lower, X**
IIB	**T2-3**	N0	M0	**2-3**	**Upper, middle**
	T1-2	**N1**	M0	Any	Any
IIIA	**T1-2**	**N2**	M0	Any	Any
	T3	**N1**	M0	Any	Any
	T4a	N0	M0	Any	Any
IIIB	**T3**	**N2**	M0	Any	Any
IIIC	**T4a**	**N1-2**	M0	Any	Any
	T4b	Any	M0	Any	Any
	Any	**N3**	M0	Any	Any
IV	Any	Any	**M1**	Any	Any

Stage Grouping				
Adenocarcinoma				
Stage	**T**	**N**	**M**	**Grade**
0	**Tis (HGD)**	N0	M0	**1, X**
IA	**T1**	N0	M0	**1-2, X**
IB	**T1**	N0	M0	**3**
	T2	N0	M0	**1-2, X**
IIA	**T2**	N0	M0	**3**
IIB	**T3**	N0	M0	Any
	T1-2	**N1**	M0	Any
IIIA	**T1-2**	**N2**	M0	Any
	T3	**N1**	M0	Any
	T4a	N0	M0	Any
IIIB	**T3**	**N2**	M0	Any
IIIC	**T4a**	**N1-2**	M0	Any
	T4b	Any	M0	Any
	Any	**N3**	M0	Any
IV	Any	Any	**M1**	Any

116. Ans. a. Polypoidal *(Ref: Sabiston 19/e p 1054)*

CARCINOMA ESOPHAGUS

- The **5-year survival rate** varies but can be as **good** as **70% with polypoid lesions** and as poor as 15% with advanced tumors.

117. Ans. c. GE junction tumors *(Ref: Shackelford 7/e p397)*

Siewert[Q] classification GE junction tumors	
Type I	Cancer associated with Barrett's esophagus or true esophageal carcinoma **growing down** to the **GE junction[Q]**
Type II	Tumor at the **true junction[Q]** (**within 2 cm** of the squamocolumnar junction)
Type III	Tumors of the **subcardial region[Q]**

118. Ans. a. Endoscopic mucosal resection *(Ref: Sabiston 19/e p1053, 1063)*

- **Treatment of choice** for **high grade dysplasia (carcinoma in-situ** or **Tis)** is **endoscopic mucosal resection[Q].**

119. Ans. c. Hyperechogenic *(Ref: Shackelford 7/e p420-421)*

Features of Malignant Lymph Nodes on EUS
• Echo-poor (**hypoechoic**)[Q] structure
• Sharply demarcated borders[Q]
• Rounded contour[Q]
• Size >1 cm[Q]

120. Ans. a. 5-FU + Cisplatin)

121. Ans. a. EMR *(Ref: Shackelford 7/e p438-448)*

Palliation Therapy in Carcinoma Esophagus	
• **Laser Therapy[Q]**	• **Radiation Therapy[Q]**
• **Photodynamic Therapy[Q]**	• **SEMS[Q]**

122. Ans. a. EUS

123. Ans. b. Middle 1/3rd *(Ref: Shackelford 7/e p417)*

- **MC site** of **SCC of esophagus**: **Middle 1/3rd[Q]**
- **MC site** of **adenocarcinoma of esophagus**: **Lower 1/3rd[Q]**
- **MC site** of **carcinoma esophagus**: **Middle 1/3rd (overall)[Q]**

124. Ans. b. Pencil tip deformity *(Ref: Surgical radiology Clinical Cases by Prabhakar Fajiah (2007)/113)*

Features of CA Esophagus on Barium Swallow	
• **Mucosal irregularity** and **shouldering**[Q] • **Narrowing**[Q] of the lumen • **Irregular "rat-tail" filling defect**[Q] of the distal esophagus with **shouldered edge**[Q]	• **Annular stricture**[Q] • **Sharp** and **clear cut edge** of **filling defect**[Q] • **Proximal dilatation**[Q] of the esophagus

- **"Bird's beak" , "Pencil-tip"** or **"Rat's tail" appearance** is seen **in Achalasia**[Q].

125. Ans. a. Middle 1/3rd

126. Ans. b. Middle 1/3rd

127. Ans. a. Barium studies *(Ref: Sabiston 19/e p1052-1053; Schwartz 10/e p1003-1014, 9/e p864-865; Bailey 26/e p1007-1008, 25/e p1028-1029; Shackelford 7/e p420)*

Carcinoma Esophagus

- **Barium swallow** is the **first investigation** for **an esophageal disease**[Q] **presenting with dysphagia** (it can show irregular filling defect with or without proximal dilatation, annular lesion appear as constricting bands)

Barium Swallow
• A **barium swallow** is **recommended for any patient** presenting **with dysphagia**. • The **esophagram gives** an **overview of anatomy** and **function**[Q]. • It is **able to differentiate intraluminal from intramural lesions** and to **discriminate between intrinsic** (from a mass protruding into the lumen) **and extrinsic** (from compression of a structures outside the esophagus) **compression**. • The **classic finding** of an **apple-core lesion** in patients with **esophageal cancer** is recognized easily[Q]

- **Endoscopy and biopsy** is the **investigation of choice** for **CA esophagus**[Q].
- For **adequate assessment, both barium swallow** and **endoscopy** are **required**[Q].

128. Ans. d. EUS can accurately stage the disease

129. Ans. a. Esophagectomy

130. Ans. a. Depth of tumor

131. Ans. b. Barium swallow + endoscopy

132. Ans. a. Migration *(Ref: Sabiston 19/e p1064; Schwartz 9/e p866; Bailey 26/e p1013, 25/e p1035; Shackelford 7/e p439-442)*

Self-Expanding Metallic Stents (SEMS) in Malignant Tracheo-Esophageal Fistula

- **SEMS** are relatively easy to insert under fluroscopic guidance with a technical **success rate** of **95%** and **efficacy** of **85-100%** in relieving dysphagia.
  - The **duration of response** is **5-6 months**[Q] and **complications** occur in **10-15%** patients, the **most common** being **stent migration** and **tumor ingrowth.**
  - The use of stents coated with **silicone or polyurethane** may prevent or delay tumor ingrowth and subsequent esophageal obstruction.
  - **Coated stents** have been used with good success (**>90%**) for the treatment of **tracheo-esophageal fistula**[Q].
- Tumor ingrowth may be addressed by insertion of **another stent** or by **tumor ablation**.
- Placement of stents through proximally located tumors, especially those near the **cricopharyngeus**, is often **not well tolerated.**
- Stents placed **across GE junction** have a greater tendency to **migrate** and may result in **symptomatic acid reflux**[Q].
- Fixed diameter **plastic endoluminal prostheses**, associated with **significant morbidity and mortality** and **low rate of dysphagia relief**, have largely been **abandoned**[Q].

133. Ans. b. EUS *(Ref: Sabiston 19/e p1052-1053; Schwartz 10/e p1003-1014, 9/e p865-866; Bailey 26/e p1007-1009, 25/e p1028-1031; Shackelford 7/e p420-421)*

Carcinoma Esophagus

- **Endoscopic ultrasound** (EUS) is the **best diagnostic tool** available to **assess the locoregional extent of disease (T** and **N Staging)**[Q]
- The **depth of tumor penetration** of the esophageal wall and the **presence of lymph node involvement** can be **assessed with an ultrasound probe** attached to the tip of a flexible endoscope[Q].
- **CT** is generally **considered** to be **less accurate in determining lymph node involvement than** other modalities such as **EUS**[Q].

134. Ans. c. Endoprosthesis

135. Ans. b. Middle third

136. Ans. a. MC in middle 1/3rd, b. Adenocarcinoma is common variety, c. Carcinoma develops at the achalasia segment, d. Smoking is a risk factor, e. Endoscopy is the investigation of choice

137. Ans. a. Achalasia cardia

138. Ans. d. Pernicious anemia often present

139. Ans. d. Chemoradiation followed by palliative en-bloc resection

140. Ans. a. Cisplatin

141. Ans. a. Adenocarcinoma is on the rise, b. Surgery is best treatment, c. Hoarseness of voice occurs in late cases

142. Ans. a. Thoracoscopic assisted surgery

143. Ans. a. Abdomen-Neck *(Ref: Sabiston 19/e p1062-1064; Schwartz 10/e p1009-1012, 1011-1012, 9/e p868; Bailey 25/e p1034; Shackelford 7/e p429-430)*

ORRINGER TRANSHIATAL ESOPHAGECTOMY

- **Double incision: Midline laparotomy** followed by **cervical incision**Q
- **Cervical anastomosis** is **done**Q
- **MC procedure done** for **carcinoma esophagus**Q

144. Ans. b. Both adeno and squamous cell carcinoma occur

145. Ans. b. Endoscopic ultrasound

146. Ans. b. Transesophageal USG

147. Ans. None

148. Ans. a. Gastrostomy for palliation

- A **gastric pull-up in** the **posterior mediastinal position** has the **best functional result,** and every effort is made to **preserve** and **use this successful combination**.

149. Ans. a. Cisplatin

ESOPHAGECTOMY

150. Ans. a. Right gastric and right gastroepiploic artery *(Ref: Sabiston 19/e p1062-1064; Schwartz 10/e p1009, 9/e p868-869; Bailey 26/e p1011-1012, 25/e p1032-1034; Shackelford 7/e p518-520)*

REPLACEMENT CONDUITS AFTER ESOPHAGECTOMY

- **Best conduit** after esophagectomy (overall): **Stomach**Q
- **Conduit of choice** after esophagectomy in **CA esophagus**: **Stomach**Q
- **Conduit of choice** after esophagectomy in **benign disorders (caustic injuries, acid-peptic disease), unhealthy stomach**: **Colon**Q
- **Conduit of choice** for **short segment replacement**: **Jejunum**Q

Routes of Replacement of Esophagus
• **Posterior mediastinum**Q through the bed of the resected esophagus
• **Anterior mediastinal** in the **retrosternal**Q position
• **Lateral traspleural** placement behind the lung rootQ
• Antethoracic or presternal **subcutaneous route**Q

- **Gastric conduit** is based on **right gastric** and **right gastroepiploic vessels**Q
- **Left colon** is based on **left colic artery** (Branch of **IMA**), placed in **isoperistaltic** direction.
- **Posterior mediastinal route** is **preferred (shortest route)** Q

151. Ans. a. Stomach

152. Ans. c. Torek *(Ref: Shackelford 7/e p416)*

- **First successful esophagectomy** was done **by Torek.**

153. Ans. b. Middle 1/3rd *(Ref: Sabiston 19/e p1062-1064; Schwartz 10/e p1009, 9/e p868-869; Bailey 26/e p1011-1012, 25/e p1032-1034; Shackelford 7/e p427-430)*

Types of Esophagectomy	
Ivor-Lewis	• Transthoracic esophagectomyQ • **Double incision: Midline laparotomy** followed by **right sided thoracotomy**Q • Done **for tumors** of **middle 1/3rd** of **esophagus**Q
Orringer	• Transhiatal esophagectomyQ • **Double incision: Midline laparotomy** followed by **Cervical incision**Q • **MC procedure done** for **carcinoma esophagus**Q
McKeon	• En-bloc esophagectomyQ • Three incisions: **Right sided thoracotomy,** followed by **midline**Q **laparotomy,** followed by **cervical incision**Q • Associated with **maximum morbidity** and **mortality**Q

Tumor Margin for Curative Excision

- In **GI malignancies** (**stomach**[Q], **small intestine**[Q], **colon**[Q] and **proximal rectum**[Q]), **tumor margin for curative excision** is **5cm**[Q] except:
  - Esophagus: 10 cm[Q]
  - **Distal rectum: 2 cm**[Q]

Lymphadenectomy in CA Esophagus	
One field lymphadenectomy	Removal of the **intra-abdominal nodes** (**draining** the **proximal stomach** and **distal esophagus**)[Q]
Two-field lymphadenectomy	Removal of the **intra-abdominal + Intrathoracic nodes**[Q]
Three-field lymphadenectomy	Removal of the **intra-abdominal + Intrathoracic + Cervical LN**[Q]

154. Ans. a. Transhiatal **155. Ans. b. Stomach**

156. Ans. b. Anastomotic leak *(Ref: Sabiston 19/e p1062-1064; Schwartz 10/e p1009, 9/e p869; Shackelford 7/e p538-545)*

Anastomotic leak following **Ivor Lewis esophagectomy** is a **feared complication** that in the past was associated with a **50% mortality rate**. The **anastomosis is intrathoracic**, leak cause **severe mediastinitis**.

Complications of Esophagectomy	
• **Anastomotic Leak (MC)**[Q]	• **Recurrent laryngeal nerve palsy**
• **Anastomotic stricture**	• Chylothorax
• **Pulmonary complications**	

Anastomotic Leak After Esophagectomy

- **Incidence of anastomotic leak** is **higher** following **cervical anastomosis** (**10-15%**) **than intrathoracic anastomosis** (**5-10%**).
- Although **leak** is **more common** following **cervical anastomosis**, it is **rarely life-threatening**[Q].
- **Anastomotic leak** following **Ivor Lewis esophagectomy** is a **feared complication** that in the past was associated with a **50% mortality rate**[Q].
- **Confirmation** is usually possible by **Gastrografin swallow**[Q] or **instillation of contrast** through the nasogastric tube.
- **Immediate intervention** is required, and attempts at **direct repair with muscle flap reinforcement** and **wide drainage** are often successful[Q].
- Patients who are **unstable** or **severely ill** should be **diverted with a spit fistula**, and either excluded at the hiatus, or have the conduit closed and returned to the abdomen[Q].
- **Pulmonary complications** are the **MC cause** of **postoperative morbidity** and **mortality** in **transhiatal esophagectomy**[Q]

157. Ans. b. Transhiatal esophagectomy

158. Ans. a. Stomach

159. Ans. a. Right gastroepiploic artery, b. Right gastric artery

LEIOMYOMA

160. Ans. a. Leiomyoma *(Ref: Sabiston 19/e p1047-1048; Schwartz 10/e p1216, 9/e p874; Bailey 26/e p1004, 25/e p1025; Shackelford 7/e p465-469)*

Leiomyoma

- Leiomyoma is **MC benign esophageal tumor**[Q].
- The average age **4th-5th** decades, more common in **males**[Q].
- Originate in **smooth muscle**, **90%** are located in **lower two thirds** of the esophagus.
- Usually **solitary** and typically **oval**.[Q]
- They remain **intramural**, having the **bulk** of their mass **protruding toward** the **outer wall**
- The **overlying mucosa** is **freely movable** and **normal** in appearance[Q].

Clinical Features

- Many leiomyomas are **asymptomatic. Dysphagia** and **pain** are **MC symptoms**[Q].
- Location and size tend not to correlate consistently with symptoms

Diagnosis

- **Barium swallow** is **IOC** for leiomyoma (**classical, smooth, contoured, punched-out defect**)[Q]
- **Endoscopy**: Freely movable mass, which bulges into the lumen,
- **Should not be biopsied** because of an **increased chance** of **mucosal perforation** at the time of surgical **enucleation**[Q].

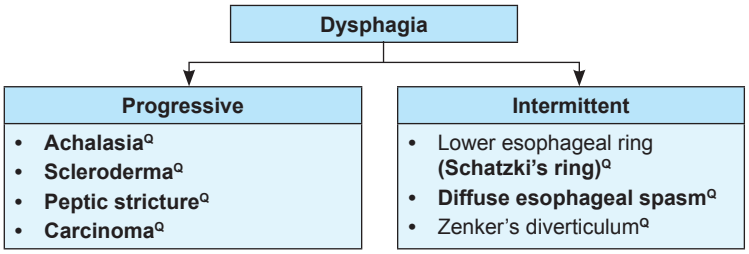
Treatment

- **Enucleation** is **TOC** for leiomyoma[Q].

161. Ans. c. Perforation

DYSPHAGIA

162. Ans. b. Reflux esophagitis, d. Pharyngeal diverticulum, e. Diffuse esophageal spasm *(Ref: Sabiston 19/e p344, 1069; Schwartz 10/e p625, 9/e p827, 863)*



163. Ans. a. CXR, b. Ba swallow, c. Endoscopy, d. USG, e. CT Scan

The clinical history is suggestive of carcinoma esophagus. All of the given investigations are used for the complete work-up.

164. Ans. b. Endoscopy

165. Ans. b. Upper GI endoscopy is to be done

166. Ans. b. Herpes esophagitis, c. Monilial esophagitis *(Ref: Harrison 18/e p2436; 16/e p218; Bailey 26/e p1041, 25/e p1041)*

If **odynophagia** is present, **candidial (monilial)** or **herpes esophagitis** or **pill induced esophagitis** should be suspected.

Odynophagia

- Odynophagia means **painful swallowing** seen in **inflammatory lesions** of food passage (i.e. **oral cavity, pharynx** and **esophagus**)
- **Causes:**
  - **Candidial (monilial)** esophagitis
  - **Herpes** esophagitis
  - **Pill induced** esophagitis

167. Ans. c. Achalasia cardia

Presence of dysphagia to both solids and liquids suggests the diagnosis of achalasia.

Functional grades of Dysphagia	
Grade	Definition
I	Eating **normally**
II	Requires **liquids with meals**
III	Able to take semisolids but **unable to take** any **solid foods**
IV	Able to take **liquids only**
V	**Unable to take liquids**, but able to **swallow saliva**
VI	Unable to swallow saliva

DYSPHAGIA LUSORIA

168. Ans. a. Abnormal elongation of arch of aorta *(Ref: Sabiston 19/e p1036-1037; Bailey 25/e p1043-1044)*

Causes of Dysphagia Lusoria	
• **Abnormal right subclavian artery (MC)** • **Right aortic arch** • **Double aortic arch** • **Abnormal innominate artery**	• **Vascular ring (constriction)** formed by a **PDA** or a **ligamentum arteriosum** and the **pulmonary artery** or **aortic arch**.

169. Ans. d. Compression by aberrant blood vessel *(Ref: Sabiston 19/e p1036-1037; Bailey 25/e p1043-1044)*

Dysphagia Lusoria

- It is a **disorder of swallowing** caused **due to vascular anomalies** (**congenital abnormalities**)
- **Vascular rings** and **pulmonary slings** occur as a result of **developmental abnormalities** of the great vessels that cause **compression of the esophagus**.
  - The **MC anomaly** is **right subclavian artery** arising from the **descending aorta** and **travels behind** the **esophagus** to complete its course to the right upper extremity, may cause **significant posterior compression** of the esophagus.
- **Anomalous right aortic arch** with a **left ligamentum arteriosum** and a resultant retroesophageal left subclavian artery will form a **complete ring** that will also cause **posterior esophageal compression**.

- **Pulmonary artery sling** (**left pulmonary artery arises from** the **right** pulmonary artery instead of from the main pulmonary artery trunk)[Q]

Clinical Features

- Both vascular rings and pulmonary artery slings cause **dysphagia**.
- **Recurrent respiratory infections** and **difficulty in breathing** are also common symptoms.

Diagnosis

- **Barium swallow**: **Extrinsic anterior** or **posterior compression** of the esophagus.
- **Angiography** or **HRCT**: Identify the **anomalous anatomy**[Q].

Treatment

- In **symptomatic patients**, both vascular rings and pulmonary artery slings are **repaired**.
- Results: **Dysphagia resolves** nearly **100% of the time**[Q].

Kommerell's Diverticulum

- An **aberrant right subclavian artery** originating from the proximal descending thoracic aorta can be associated with **aneurysmal change at** the **origin** of the artery, known as **Kommerell's deiverticulum**[Q].

170. Ans. d. Acquired in later life *(Ref: Sabiston 19/e p1036-1037)*

Dysphagia lusoria is a **disorder of swallowing** caused **due to vascular anomalies**[Q] (**developmental** or **congenital abnormalities**).

ESOPHAGEAL PERFORATION AND INJURY

171. Ans. a. Vomiting, b. Subcutaneous emphysema, c. Lower thoracic pain *(Ref: Sabiston 19/e p1043-1046; Schwartz 10/e p1018, 9/e p874-876; Bailey 26/e p992-993, 25/e p1014-1016; Shackelford 7/e p478-484)*

Boerhaave's Syndrome

- **Spontaneous rupture** usually occurs on the **left posterolateral side** of the **distal esophagus** into the **left pleural cavity** or just above the **gastroesophageal junction**.
- These patients are typically **male** (85%), **40 to 60 years** of age, who have a history of **recent emesis**[Q].

Clinical Features

- **Mackler's triad**[Q] of **thoracic pain**, **vomiting,** and **cervical subcutaneous emphysema** is seen in spontaneous esophageal perforation.

- Thoracic perforations cause **substernal** and **epigastric pain**[Q].
- **Mediastinal emphysema** and **pleural effusions** are common, but early cervical subcutaneous emphysema is noted in only 20% or less of patients.
- **Fever** and **sepsis** develop with increasing contamination and inflammation of the mediastinum and pleural cavities.
- Patients with an **abdominal perforation** have **epigastric abdominal pain** that is also often referred to the **back** and **left shoulder**[Q].

Diagnosis

- **Chest X-ray**: **Hydropneumothorax**[Q]
- The **diagnosis** is **confirmed with** a **contrast esophagogram**[Q]. This technique will demonstrate extravasation in 90% of patients.

- **Gastrografin (water soluble)** is **preferred**[Q] to prevent extravasation of barium into the mediastinum or pleura. **If no leak** is seen, a **barium study** should follow.

- **Chest CT**: **Mediastinal air** and **fluid** at the site of perforation.
- **Endoscopy**: If the **esophagogram** is **negative** or if **operative intervention** is planned.

Treatment

- Appropriate **resuscitation**, secured **airway**, **IV fluids** and **broad-spectrum antibiotics** are started immediately, and the patient is monitored in an ICU.

Within 24 Hours	After 24 Hours
• **Golden period** for **primary closure** of an esophageal perforation is within the **first 24 hours**[Q]. • Within 24 hours of perforation, **inflammation** is generally **minimal**, and **primary surgical repair** is recommended[Q]. • Mortality rate: **8-20%**	• **Débridement** of devitalized tissue + **Esophageal diversion** or **resection** + Creation of an **esophagostomy** + **Wide drainage** + **feeding jejunostomy**[Q] • Mortality rate: **>50%**[Q]

172. Ans. a. MC at lower 1/3rd, c. Acute chest pain, d. Surgically treated

173. Ans. a. Barium swallow is diagnostic, b. Treatment is primary repair, c. MC after penetrating injury, d. Mortality is increased if repaired after 24 hours

174. Ans. c. Present with acute chest pain, d. Treatment is surgical

175. Ans. b. Cervical portion *(Ref: Sabiston 19/e p1043-1046; Schwartz 9/e p874-876; Bailey 26/e p992-993, 25/e p1014-1016; Shackelford 7/e p478-479)*

Esophageal Perforation	
Iatrogenic	**Spontaneous**
• **Most common type**[Q] • Caused by **endoscopy**[Q] • **MC site** is **cervical esophagus (cricopharyngeal area)**[Q]	• Esophageal rupture after vomiting • **MC site**: **left posterolateral side** of the **distal esophagus**[Q]

176. Ans. c. At cricopharyngeus muscle *(Ref: Sabiston 19/e p1043; Schwartz 9/e p874; Bailey 25/e p1015; Shackelford 7/e p478)*

- **Esophageal instrumentation** accounts for the **large majority of iatrogenic perforations**, with the **cricopharyngeal area most commonly injured**[Q]

177. Ans. c. Instrumentation

178. Ans. a. Upper esophageal sphincter

179. Ans. d. Esophagectomy with bringing proximal end as fistula in neck

180. Ans. a. Primary closure, drainage and antibiotics

181. Ans. b. Stomach *(Ref: Shackelford 7/e p483)*

Operative Repair of Esophageal Perforation

- The principles of repair comprise a **clear exposure of** the **perforation** and **debridement** of devitalized tissue, followed by a **primary closure**.
- **Following debridement** of devitalized tissue, **primary mucosal repair** should then be **performed with interrupted, absorbable suture**, taking care to minimize esophageal stricturing while obtaining adequate suture purchase on vital tissue.
- The **muscular layer** is then reapproximated with an **interrupted** or **running suture**[Q].
  - **Subsequent coverage** with a **vascular pedicle**, such as an **intercostal muscle flap**, and **pleural, pericardial**, or **omental pedicle allows further buttressing** of a repair and is **recommended whenever feasible**[Q].
  - **Gastric fundus** may also be **suitable tissue reinforcement** especially **for** the distal **perforation**[Q].
- Depending on the site of perforation, any of the antireflux procedures (**Belsey Mark IV, Nissen, Dor, Toupet**) may be used to **buttress the repair**.

182. Ans. b. Bradycardia

183. Ans. c. Spontaneous perforation

184. Ans. d. Boerhaave's syndrome

185. Ans. a. Boerhaave's syndrome

186. Ans. a. Cricopharynx

187. Ans. b. Lower posterior

188. Ans. b. Cardioesophageal junction

189. Ans. d. Water soluble low molecular wight contrast swallow

TRACHEO-ESOPHAGEAL FISTULA

190. Ans. d. CVS *(Ref: Sabiston 19/e p1837-1839; Schwartz 10/e p608-609, 9/e p1420-1424; Bailey 26/e p118-119, 25/e p84; Shackelford 7/e p509-515)*

Tracheo-Esophageal Fistula

- **TEF** is an **abnormal communication** (fistula) between the **esophagus** and **trachea**[Q].
- **TEF** is usually **associated with esophageal atresia**, however it **may also exist without atresia**[Q].
- **Prevalence** of TEF is **2.6-3** per **10,000** births, with a **slight male predominance**[Q].
- **MC anomaly** associated with TEF is **CVS (VSD)**[Q].

Classification of TEF
– Atresia only (6%)
– Atresia with proximal TEF (2%)
– **Atresia with distal TEF (85%): Most common**[Q]
– Atresia with both proximal and distal TEF (rare)
– TEF only (1%)

Clinical Features

- The diagnosis of EA is entertained in an **infant with excessive salivation** along with **coughing** or **choking during** the **first oral feeding**.
- A **maternal history** of **polyhydramnios** is often present.
- The newborn baby with atresia **regurgitates all of its first** and **subsequent feeds**Q.
- **Saliva pours continuously** from its mouthQ.
- Repeated episodes of **coughing, choking** and **cyanosis**Q occur on feeding in TEF.

Associated Anomalies

- **MC anomaly** associated with TEF is **CVS (VSD)**.
- Esophageal atresia may occur as part of **VACTERL**Q group of anomalies:

V: Vertebral body segmentation defectsQ
A: Anal atresiaQ
C: **Cardiovascular** (PDA, **VSD**)Q
TE: Tracheo-esophageal fistulaQ
R: Renal (unilateral renal agenesis)Q
L: Limb anomalies (radial ray hypoplasia)Q

Diagnosis

- The **inability to pass** a **NG into** the **stomach** is a **cardinal feature** for the **diagnosis of EA**.
- **If gas is present** in the **GIT below** the **diaphragm**, an **associated TEF is confirmed**
- **Inability to pass** a **NG tube** with **absent radiographic evidence** for **gastrointestinal gas** is **virtually diagnostic** of an **isolated EA without TEF**.

Treatment

- **Surgical repair** with **tension free esophageal anastomosis**

Outcome

- The mortality in TEF is **directly related to the associated anomalies,** particularly **cardiac defects** and **chromosomal abnormalities**Q.

191. Ans. a. Esophageal atresia with fistula with distal segment

192. Ans. c. Esophageal atresia with distal tracheoesophageal fistula

193. Ans. a. Proximal end blind, distal end communicating with trachea

194. Ans. c. Stenting

195. Ans. a. Expandable metal stent, b. Surgery with graft, c. Gastrostomy tube *(Ref: CSDT 11/e p1314; Bailey 26/e p1013, 25/e p1035)*

Malignant Tracheoesophageal Fistula

- It is a **sign of incurable esophageal carcinoma**Q
- Some have advocated **surgical bypass** and **esophageal exclusion**, but this is a major procedure
- **Self expanding metallic stent** is the **best treatment**Q
- Semi-rigid **prosthetic tubings** may be used (**Gastrostomy tube**)Q

196. Ans. b. Lower end connected to trachea

ESOPHAGEAL RINGS AND WEBS

197. Ans. a. Mucosal ring at squamo-columnar junction, c. Dysphagia is the symptom *(Ref: Sabiston 19/e p1037-1038; Schwartz 10/e p984, 9/e p845-846; Bailey 26/e p1019, 25/e p1041; Shackelford 7/e p89-90)*

Schatzki's Rings

- Consists of a **concentric symmetric narrowing** representing an area of **restricted distensibility** of the **lower esophagus**Q.
  - **Lying** precisely at the **squamocolumnar mucosal GEJ,** involves **mucosa** and **submucosa**Q
- It consists of **esophageal mucosa above** and **gastric mucosa below**.
- It **does not have** a component of **true esophageal muscle**, **nor** is it **associated with esophagitis**.
- It is **often accompanied** by a **small hiatal hernia**

Clinical Features

- **Most patients** with Schatzki's rings present with **dysphagia**.
- The **dysphagia** is usually to **solid foods only** and comes on **abruptly** with nearly complete obstruction.
  - **Episodic aphagia: Intermittent obstruction** of the nondistensible ring by **large pieces of meat**Q.

Diagnosis

- Diagnosis of a Schatzki's ring is made with a **barium swallow**Q.
- **Schtazki's ring: Type 'B' ring is located at GE junction**Q

Treatment

- Asymptomatic patients **incidentally found** to have a Schatzki's ring **require no treatment**.
- Best form of treatment of a **symptomatic Schatzki's ring** without reflux: **Esophageal dilation** for relief of the obstructive symptoms.
- Ring with **proven reflux** and mechanically defective sphincter: **Antireflux procedure**
- **Surgical excision** is **not indicated**, can cause **devastating esophageal strictures**

198. Ans. b. Lower esophagus **199. Ans. c. Involves mucosa, submucosa and muscularis**

200. Ans. b. Located at lower esophagus, c. Causes dysphagia

201. Ans. b. Occurs at GE junction *(Ref: Gastroenterol Hepatol (NY); 2010 November 6 (11): 701-704)*

Types of Esophageal ring on Barium Examination	
Type A	Located **few cm proximal to GE junction**
Type B	**Schatzki's ring: MC esophageal ring** found on esophagogram, **at GE junction**Q
Type C	Located at **most distal portion of esophagus**, formed by diaphragmatic crural pressure

FOREIGN BODY

202. Ans. d. Above the cricopharynx *(Ref: Schwartz 9/e p2378; Dhingra 4/e p64)*

The first constriction where the esophagus commences is at the **cricopharyngeal sphincter**: this is the **narrowest portion of the esophagus** and is the **most common site of foreign body**.

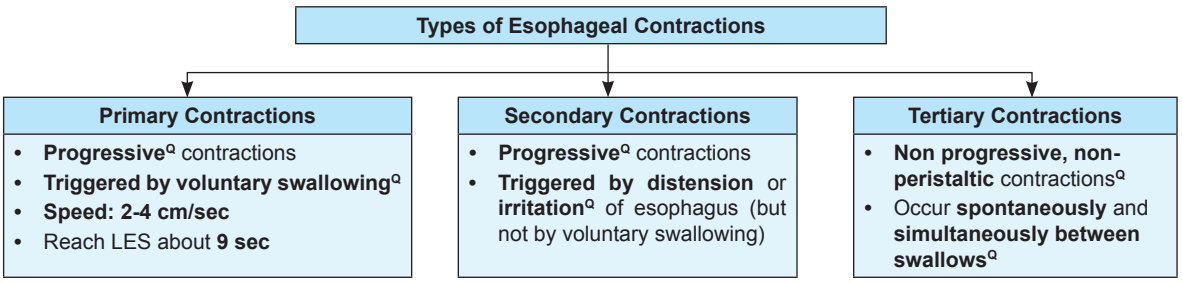
ESOPHAGUS: ANATOMY AND PHYSIOLOGY

203. Ans. d. Lower esophagus before entering the diaphragm is anterior and left sided *(Ref: Sabiston 19/e p1014-1016; Schwartz 10/e p941-947, 9/e p804-806; Shackelford 7/e p18-24)*

Anatomy of Esophagus

- Narrowest tube of GIT; Narrowest region of esophagus: Cricopharynx (15 mm diameter)
- **Extent**: **C6-T11**Q; **Length: 25-30** cmQ
- **Cervical esophagus** begins as a **midline structure** that **deviates slightly** to the **left**Q of the trachea as it passes through the neck into the thoracic inlet.
- At the level of the **carina**, it **deviates to the right** to accommodate the arch of the aorta.
- It then winds its way back under the left main-stem bronchus and **remains slightly deviated to** the **left** as it **enters the diaphragm** through the esophageal hiatusQ.
- **Immediately before entering** the **abdomen**, the **esophagus is pushed anteriorly** by the **descending thoracic aorta**Q.

204. Ans. c. Tertiary *(Ref: Sabiston 19/e p1019)*



Tertiary Contractions of Esophagus

- Tertiary contractions are **simultaneous, non progressive, non peristaltic waves** that can occur **throughout the esophagus**Q
- Tertiary contractions represent **uncoordinated contractions** of the **smooth muscles** that are **responsible for** the **'Cork Screw' appearance** of **esophageal spasm** on Barium swallow
- Tertiary contractions do not have a physiological function and may be **observed in** the **elderly** and in patients with **esophageal motility disorders**Q

205. Ans. a. Arch of aorta, c. Left bronchus *(Ref: Sabiston 19/e p1015; Schwartz 10/e p941-947, 9/e p806; Bailey 26/e p987, 25/e p1009)*

Esophageal Constrictions			
No.	**Distance from incisor teeth**	**Bony level**	**Anatomical Landmark**
1	**15 cm**Q	**C6**	**Pharyngoesophageal junction** (At beginning**Q**)
2	**25 cm**Q		**Aortic arch, left bronchus**Q
3	**40 cm**Q	**T10**	**Pierces diaphragm**Q

BALD: Beginning, Aortic arch, Left Bronchus, DiaphragmQ

Upper Esophageal Sphincter	Lower Esophageal Sphincter
• **Length: 4-5 cm**Q • **Pressure: 60 mm Hg**Q • Comprises **three skeletal muscle groups**: Distal portion of **inferior** pharyngeal **constrictor,** cricopharyngeus and circular muscle of **proximal esophagus**Q	• **Length: 5 cm**Q • **Abdominal length: 2 cm**Q • **Pressure: 6-26 mm Hg**Q

Esophagus Anatomy

- **Only Auerbach plexus** is present in **esophagus** (**Meissner's plexus** is **absent**)Q.
- **Lymphatic channels** in the **lamina propria** are the anatomic features **unique** to the esophagusQ.
- The **dense submucosal lymphatic plexus** facilitates **early dissemination** of esophageal **malignancies. In submucosa elastic fibers** and **collagen** combine to make this the **strongest esophageal layer**. **Submucosal glands** of **mixed type** are the **characteristic** of the esophagusQ.
- **Lacks** a **serosal layer**Q
- Strongest cayer: submucosa
- **Lining:** Lined by **stratified, non-keratinized squamous epithelium**
- **Muscles:**
  - **Upper cervical region-Stratified muscle**
  - **Middle-Gradual transition from stratified to smooth muscle**
  - **Lower- Smooth muscle**

206. Ans. c. 40 cm

207. Ans. b. 15, 25 and 40

208. Ans. b. Where it pierces the diaphragm

209. Ans. a. Left phrenic nerve

210. Ans. d. Left main stem bronchus

211. Ans. b. Bleeding from varices occurs from midesophagus

- **Bleeding from esophageal varices** most commonly occur in the **distal esophagus**Q.

DIAPHRAGM

212. Ans. b. Diaphragmatic palsy

- **Fluoroscopy** is used for **diagnosis of diaphragmatic palsy**Q.

213. Ans. a. Laparoscopy *(Ref: Sabiston 19/e p454-455; Schwartz 10/e p202-203, 9/e p175; Bailey 26/e p356-357, 25/e p344-345)*

Diaphragmatic Injury

- **Diaphragmatic injuries** are **often caused by penetrating injuries**Q.
- Patients **sustaining penetrating injuries below** the **nipples** and **above the costal margins** should be **investigated to rule out diaphragmatic injury**Q.

Etiology

- **Penetrating trauma** (knife, bullet, repair of hiatus hernia)
- **Blunt trauma** (motor vehicle accident, fall from height, bout of hyperemesis):
  - **Caused by compressive force applied to the pelvis and abdomen.**
  - Rupture is **usually large**, with herniation of abdominal content into chest

Clinical Features

- **Most diaphragmatic injuries** are **silent** and the presenting features are those of injury to the surrounding organsQ.
- **Late complication**: **Herniation of abdominal contents** in to the **chest**Q.
- **Herniation of organ: Stomach**Q **>Colon** >Small intestine >Omentum >Spleen >Kidney and pancreas.

Diagnosis

- There is **no single standard investigation** to diagnose **diaphragmatic injuries**Q.
- **Chest X-ray** after placement of a nasogastric tube may be helpful (as this may show the **stomach herniated into the chest)**
- **Contrast study** of upper or lower GIT, **CT scan** and **diagnostic peritoneal lavage** all **lack positive** or **negative predictive value.**

> - **Most accurate evaluation** is by **video assisted thracoscopy (VATS)** or **laparoscopy**Q, offering the **advantage of allowing** the **surgeon to proceed to repair** and **additional evaluation** of the **abdominal organs.**

Treatment

- **Operative repair**Q is recommended **in all cases.**
- **All penetrating diaphragmatic injury** must be **repaired via the abdomen** and not the chest, **to rule out penetrating hollow viscus injury.**

Bergvist Triad: **Rib fracture** + Fracture of **spine /pelvis** + **Traumatic rupture** of **diaphragm**

214. Ans. d. Dorsal mesocardium *(Ref: Langman 11/e p161)*

DEVELOPMENT OF DIAPHRAGM

- **Septum transversum** →**Central tendon**Q
- **Mesentery** of **esophagus** →**Crura**Q
- **Cervical myotomes** (muscular input)Q
- **Pleuroperitoneal membranes** →Small **intermediate muscular portion**Q
- **Body wall** →**Peripheral muscular diaphragm**Q

215. Ans. b. Circumferential *(Ref: Sabiston and Spencer's Surgery of Chest 8/e p chapter 7)*

Circumferential incision is generally taken for diaphragmatic surgery.

Diaphragmatic incisions

- **Diaphragmatic incisions** can be divided into three groups: **circumferential, central tendon**, and **radial.**
  1. **Circumferential incisions:**
     - **Circumferential incisions** in the periphery result in **little loss of function**.
     - Must be at least 5 cm lateral to the edge of the central tendon to avoid the posterolateral and anterolateral branches of the phrenic nerve.
     - **Difficult to correctly realign after a long operation.**
     - Placement of surgical clips on each side of the muscular incision can greatly facilitate the correct spatial orientation on closing.
  2. **Incisions in the central tendon:**
     - Do not interrupt any major branch of the nerve itself.
     - **Provide excellent visualization of the abdomen from the thorax**, and vice versa.
     - **Easy to open and to close.**
  3. **Transverse radial incision:**
     - Made from the midaxillary line centrally
     - **Relatively safe**
     - **May result in segmental diaphragmatic paralysis** if the incision transects the crural or posterolateral branches of the phrenic nerve.

MISCELLANEOUS

216. Ans. b. 5 **217. Ans. b. Achalasia cardia** **218. Ans. b. Achalasia cardia**

219. Ans. a. Pharyngeal pouch

- Second swallow is due to regurgitation of barium from pharyngeal pouch

220. Ans. d. Esophageal perforation *(Ref: Harrison 18/e p2182)*

HAMMAN'S SIGN OR HAMMAN'S CRUNCH

- A **crunching, rasping sound, synchronous with heartbeat, heard over the precordium** and sometimes at a distance from the chest in spontaneous mediastinal emphysemaQ.
- **Hamman's sign** may be present **in acute Mediastinitis** (as in **esophageal perforation**) Q.

221. Ans. c. 50 *(Ref: Shackelford 7/e p545)*

- To restore **normal swallowing, stricture** should be **dilated** to **at least 16 mm** diameter or **50 French.** Q
- **Guidewire directed dilatation** of esophageal strictures is **normal practice** in **most units**Q.

222. Ans. b. Guide wire directed stent

223. Ans. c. 50 cm *(Ref: Bailey 25/e p1072)*

- The **Roux loop** should be **at least 50 cm** long **to avoid bile reflux esophagitis**Q

CHAPTER 10

Stomach and Duodenum

MULTIPLE CHOICE QUESTIONS

H. PYLORI

1. H. pylori is/are associated with: *(PGI Nov 2011)*
a. Peptic ulcer
b. Adenocarcinoma
c. Atrophic gastritis
d. B cell lymphoma
e. Gastric leiomyoma

2. H. pylori has been implicated in all, except: *(Orissa 2011)*
a. Gastric ulcer
b. Gastric carcinoma
c. Gastric lymphoma
d. Gastric leiomyoma

3. Which of the following is a common gastric lesion associated with H. pylori and undergoes regression following eradication of the infection? *(MHPGMCET 2009)*
a. Inflammatory polyp
b. Metaplastic polyp
c. Fundic gland
d. True adenomas

4. Eradication of helicobacter pylori has been proved to be beneficial in which of the following disorders of the stomach? *(COMEDK 2006)*
a. Low grade MALT lymphoma
b. Erosive gastritis
c. Carcinoma stomach
d. Gastroesophageal disease

5. A patient of peptic ulcer disease. When investigated endoscopically showed chronic antral gastritis. Which of the following dye will be able to stain the specimen? *(AIIMS Nov 2000)*
a. PAS
b. Zeihl-Neilson stain
c. Gramstain
d. Warthin-Starry stain

6. H. pylori causes: *(TN 2001)*
a. Type A Gastritis
b. Type B gastritis
c. Autoimmune
d. Allergic Gastritis

7. H. pylori infection causes carcinoma by which mechanism: *(TN 2003)*
a. Production of nitrosamines
b. Gastric metaplasia
c. Increasing acid secretion
d. Causing mutation

8. H. pylori: *(PGI 2004)*
a. Gram negative non-flagellate spiral organism
b. Obligate parasite on gastric mucosa
c. Does not infect duodenal mucosa
d. Antibiotics not effective

9. Eradication of H. pylori has been proved to be beneficial in the following condition except: *(ICS 2005)*
a. Duodenal ulcer
b. Gastric ulcer
c. Low grade MALT lymphoma
d. Hypertrophic gastritis

10. Eradication of helicobacter pylori has been proved to be beneficial in which of the following disorder of the stomach?
a. Low grade MALT lymphoma
b. Erosive gastritis
c. Carcinoma stomach
d. Gastroesophageal disease

11. H. pylori infection is associated with development of which malignancy: *(DPG 2011)*
a. MALTomas
b. Atherosclerosis
c. Sarcoma
d. Gastrointestinal stromal tumor (GIST)

PEPTIC ULCER ETIOLOGY AND CLINICAL FEATURES

12. Peptic ulcer is associated with all except one: *(AIIMS Feb 97)*
a. Cirrhosis
b. Zollinger Ellison syndrome
c. Primary hyperparathyroidism
d. Pernicious anemia

13. Which one is not associated with peptic ulcer?
a. Smoking cigarette *(AIIMS Nov 95)*
b. Zollinger-Ellison's syndrome
c. Plummer-Vinson syndrome
d. Cirrhosis

14. Which of the following factors contribute to the development of duodenal ulcers? *(PGI June 2001)*
a. Lysolecithin
b. Gastric acid
c. Alcohol abuse
d. Prostaglandins
e. Smoking

15. Commonest site of peptic ulcer is: *(All India 99)*
a. 1st part of duodenum
b. 2nd part of duodenum
c. Distal 1/3rd of stomach
d. Pylorus of the stomach

16. The most common site of a benign (peptic) gastric ulcer is:
a. Upper third of lesser curvature *(AIIMS June 2004)*
b. Greater curvature
c. Pyloric antrum
d. Lesser curvature near incisura angularis

17. Commonest site of peptic ulcer perforation: *(UPSC 86, Kerala 86, All India 86)*
a. Anterior aspect of the 1st part of duodenum
b. Posterior aspect of the 1st part of duodenum
c. Greater curvature of the stomach
d. Lesser curvature of the stomach
e. Anterior aspect of 2nd part of duodenum

18. What is correct about duodenal ulcer? *(Kerala 2003)*
a. 25% will occur if H. pylori is not eradicated
b. Magnesium containing drugs may cause constipation
c. Bismuth is not used for long terms
d. None

19. With reference to duodenal ulcers, consider the following statements: *(UPSC 2007)*
1. They occur most often in the second part of duodenum
2. Infection with H. pylori and NSAID - induces injury account for majority of duodenal ulcer
3. Malignant duodenal ulcers are extremely rare
4. Eradication of H. pylori has greatly reduced the recurrence rates in duodenal ulcers

Which of the statements given above are correct?
a. 1, 2 and 3 only b. 2, 3 and 4 only
c. 1 and 4 only d. 1, 2, 3 and 4

20. Burning epigastric pain is due to: *(TN 90)*
a. Vomiting b. Reflux esophagitis
c. Duodenal ulcer d. Gastric ulcer

21. Increased gastric acid secretion occurs in: *(AIIMS GIS May 2011)*
a. Type I gastric ulcer b. Type III gastric ulcer
c. Type IV gastric ulcer d. All of the above

22. In gastric ulcer, increased acid production is associated with all except: *(AIIMS GIS Dec 2006)*
a. Type I b. Type II
c. Type III d. Both B and C

23. Prepyloric or channel ulcer in the stomach is termed as:
a. Type 1 b. Type 2 *(COMEDK 2008)*
c. Type 3 d. Type 4

24. A thirty years old male presents to the emergency department with symptoms of epigastric pain radiating to back that wakes him up at night and is relieved by consuming food. He gives history of similar pain in the past which was diagnosed as perforated duodenal ulcer and treated with omental patch surgery on two occasions. Pain before and after surgery has been controlled with proton pump inhibitors and analgesics. The likely diagnosis on this occasion is: *(All India 2011)*
a. Duodenal Ulcer b. Gastric Ulcer
c. Atrophic Gastritis d. Chronic Pancreatitis

PEPTIC ULCER COMPLICATIONS

25. A 30 years old male presented with massive hematemesis. A 2 × 2 cm ulcer was visualized on upper GI endoscopy on the posterior aspect of first part of duodenum. The bleeding vessel was visualized but bleeding could not be controlled endoscopically. Blood transfusion was done and patient was planned for surgery. His BP was 90/70 and PR=110/min with Hb=9 gm% at the time of surgery. Which of the following would be best surgical management? *(All India 2012)*
a. Antrectomy with ligation of left gastric artery
b. Duodenotomy with ligation of bleeding vessels with postoperative PPI
c. Duodenotomy with ligation of bleeding vessels, truncal vagotomy and pyloroplasty
d. Duodenotomy with ligation of bleeding vessels, highly selective vagotomy

26. Which of the following vessel is most commonly involved in hemorrhage from duodenal ulcer? *(All India 2012)*
a. IVC
b. Gastroduodenal artery
c. SMA
d. Inferior pancreatico duodenal artery

27. Most common complication of chronic gastric ulcer is:
a. Tea pot stomach *(AIIMS June 93)*
b. Scirrhous carcinoma (Adenocarcinoma)
c. Perforation
d. Massive hematemesis

28. In gastric outlet obstruction in a peptic ulcer patient, the site of obstruction is most likely to be: *(All India 2002, AIIMS June 93)*
a. Antrum b. Duodenum
c. Pylorus d. Pyloric canal

29. A Posteriorly perforating ulcer in the pyloric antrum of the stomach is most likely to produce initial localized peritonitis or abscess formation in the following:
a. Omental bursa (lesser sac) *(PGI June 2009, All India 2003)*
b. Greater sac
c. Right subphrenic space
d. Hepatorenal space (pouch of Morison)

30. A 60 years old male had a sudden fall in toilet. His BP was 90/50 mmHg and PR=100/min. His relatives reported that he is a known case of hypertension and CAD and was regularly taking aspirin, atenolol and sorbitrate. The most likely diagnosis: *(AIIMS May 2012)*
a. Gastric ulcer with bleeding
b. Acute MI with cardiogenic shock
c. Acute CVA
d. Pulmonary embolism

31. Treatment of perforated peptic ulcer includes:
a. IV fluids *(PGI Dec 2001)*
b. Drainage of paracolic gutter
c. Immediate surgery
d. Antacids
e. IV pantoprazole

32. Percentage of patients with perforated peptic ulcer who show free gas under the diaphragm: *(UPPG 2009)*
a. 100% b. 75%
c. 50% d. 90%

33. Commonest cause of death in peptic ulcer patients is:
a. Perforation b. Hemorrhage *(All India 90)*
c. Pyloric stenosis d. Malignancy

34. Investigation of choice in peptic ulcer perforation is: *(KERALA 94)*
a. USG b. X-ray abdomen
c. Paracentesis d. CT scan

35. About 6–8 hours after peptic ulcer perforation the disappearance of abdominal wall rigidity is due to:
a. Cessation of acid secretion in the stomach *(UPSC 95)*
b. Revival from initial shock
c. Dilution of acid in the peritoneal cavity
d. Fatigue of reflex arc

36. Posterior perforation of peptic ulcer drain into: *(DNB 2009)*
a. Omental bursa b. Greater sac
c. Foramen of Winslow d. Paracolic gutter

37. Prognosis in a case of duodenal perforation is determined by all except: *(PGI 96)*
a. Age of the patient b. Duration of history
c. Basal pneumonia d. Peritonitis

38. The vessel which needs to be ligated in a patient with a bleeding peptic ulcer is: *(APPG 2015)*
a. Gastroduodenal artery
b. Superior pancreatico-duodenal artery
c. Left gastric artery
d. Left gastroepiploic artery

PEPTIC ULCER DIAGNOSIS AND TREATMENT

39. PPI's for peptic ulcer disease should be taken: *(JIPMER 2011)*
a. Before breakfast b. After breakfast
c. After lunch d. After dinner

40. Which of the following acid reducing surgery doesn't require drainage procedure? *(PGI Dec 2007)*
a. Highly selective vagotomy b. Billroth-I operation
c. Antrectomy d. Gastric resection
e. Truncal vagotomy

41. Highly selective vagotomy preserves: *(MHPGMCET 2002)*
a. Nerves of Latarjet b. Nerve of Kuntz
c. Nerve of Mayo d. All

42. Stump of stomach and duodenum is present in: *(MHSSMCET 2006)*
a. Billroth-I operation b. Billroth-II operation
c. Whipple's operation d. Truncal vagotomy

43. Pyloroplasty of choice when the DU is fibrosed and contracted? *(MHSSMCET 2009)*
a. Finney's pyloroplasty b. Billroth type I surgery
c. Billroth type II surgery d. Ramsted's operation

44. H. pylori is associated with _____% of gastric ulcers:
a. 5 b. 20 *(JIPMER 2011)*
c. 40–60 d. 80

45. A patient who has undergone partial gastrectomy presents with neurological symptoms. Most probable diagnosis: *(JIPMER 2011)*
a. Folic acid deficiency
b. Thiamine deficiency
c. Vitamin B_{12} deficiency
d. Iron deficiency

46. Treatment of high lying ulcer near gastroesophageal junction is/are: *(PGI Nov 2009)*
a. Pouchet procedure
b. Kelling-Madlener operation
c. Csendes procedure
d. Total gastrectomy
e. Vagotomy and pyloroplasty

47. In a highly selective vagotomy, the vagal supply is severed to: *(COMEDK 2008)*
a. Proximal two-thirds of stomach
b. Antrum
c. Pylorus
d. Whole of stomach

48. Incorrect about gastric ulcer: *(PGI Nov 2009)*
a. Most common on lesser curvature
b. 70% H. pylori related
c. Type IV ulcer most common type
d. Treatment is primarily medical
e. 30% GU are associated with malignancy

49. True statement(s) regarding peptic ulcer disease:
a. Anterior ulcer bleeds more commonly *(PGI June 2009)*
b. Posteriorly perforated ulcer is always management conservatively
c. Anti-H. pylori drugs must be included in the treatment regime
d. H. pylori is known to increase incidence of gastric malignancies
e. Increase acid production in prerequisite for gastric ulcer

50. All of the following drugs are used in the management of peptic ulcer except: *(COMEDK 2005)*
a. Alginic acid b. Sucralfate
d. Misoprostol d. Ipratropium

51. The investigations for duodenal ulcer are: *(PGI Dec 2001)*
a. Hypotonic duodenography
b. Barium meal
c. Barium swallow
d. Upper GI endoscopy
e. Abdominal X-ray erect view

52. Surgery of choice for chronic duodenal ulcer is:
a. Vagotomy + antrectomy *(AIIMS June 93)*
b. Total gastrectomy
c. Truncal vagotomy + pyloroplasty
d. Highly selective vagotomy

53. Patient presents with recurrent duodenal ulcer of 2.5 cm size, procedure of choice: *(All India 2001)*
a. Truncal vagotomy and antrectomy
b. Truncal vagotomy and gastrojejunostomy
c. Highly selective vagotomy
d. Laparoscopic vagotomy and gastrojejunostomy

54. Lowest recurrence rate in duodenal ulcer treatment is seen with: *(AIIMS Nov 94, All India 2002)*
a. Highly selective vagotomy
b. Truncal vagotomy
c. Truncal vagotomy and antrectomy
d. Truncal vagotomy and pyloroplasty

55. Endoscopy is useful in diagnosis of peptic ulcer in following situations except: *(JIPMER 79, PGI 80)*
a. Post bulbar ulcer b. Stomal ulcers
c. Giant duodenal ulcer d. Duodenal erosion

56. All of the following are indications for surgery in a case of duodenal ulcer except: *(UPCS 96)*
a. Acute perforation of ulcer b. Pyloric stenosis
c. Massive hemorrhage d. Typical periodicity

57. Maximal reduction in gastric acidity is achieved by:
a. Truncal vagotomy and pyloroplasty *(UPCS 97)*
b. Truncal vagotomy and antrectomy
c. Partial gastrectomy
d. Highly selective vagotomy

58. Perforated peptic ulcer is treated by: *(SGPGI 2005)*
a. Vagotomy + Pyloroplasty
b. Vagotomy + Antrectomy
c. Vagotomy + repair of perforation
d. Graham's repair

59. Lesser curvature anterior seromyotomy is indicated in:
a. Gastric ulcer b. Gastric CA *(MAHE 2005)*
c. Duodenal blowout d. Duodenal ulcer

60. The most commonly practiced operative procedure for a perforated duodenal ulcer is: *(Karnataka 2005)*
a. Vagotomy and pyloroplasty
b. Vagotomy and antrectomy
c. Vagotomy and perforation closure
d. Graham's omentum patch repair

61. In a highly selective vagotomy, the vagal supply is severed to: *(COMEDK 2007)*
a. Proximal two-thirds of stomach
b. Antrum
c. Pylorus
d. Whole of stomach

62. Treatment of choice in type III gastric ulcer is: *(UPPG 2008)*
a. Vagotomy only
b. Vagotomy and antrectomy
c. Vagotomy and pyloroplasty
d. Highly selective vagotomy

63. In type IV gastric ulcer bleed with unstable patient, treatment: *(AIIMS GIS Dec 2009)*
a. Csendes procedure
b. Pouchet procedure
c. Kelling Madlener procedure
d. Vagotomy and antrectomy

64. All are true about HSV except: *(AIIMS GIS Dec 2006)*
a. Spares antral fibers b. Nerve of Grassi is resected
c. Pyloroplasty done d. Gastric tone altered

65. Treatment of of type II and type III gastric ulcer:
a. Vagotomy + antrectomy *(AIIMS GIS Dec 2006)*
b. HSV
c. Total gastrectomy
d. Truncal vagotomy and drainage

66. HSV is done in: *(AIIMS GIS Dec 2006)*
a. Menetrier's disease
b. Giant gastric ulcer
c. Gastric mucosal erosions
d. Megaesophagus treatment by esophageal mucosal resection

67. Gastric atony is least after: *(AIIMS GIS Dec 2011)*
a. Truncal vagotomy + GJ
b. Truncal vagotomy + Pyloroplasty
c. Truncal vagotomy + Antrectomy
d. HSV

GASTRECTOMY AND COMPLICATIONS

68. Most common metabolic complication of gastrectomy: *(AIIMS GIS Dec 2011)*
a. Iron deficiency anemia b. Megaloblastic anemia
c. Hypocalcemia d. Osteoporosis

69. Most common abnormality after gastric resection and Billroth-II: *(AIIMS GIS Dec 2009)*
a. Vitamin B_{12} deficiency b. Steatorrhea
c. Calcium deficiency d. Vitamin D deficiency

70. A patient of partial gastrectomy presents with neurological symptoms. Most probable diagnosis is: *(JIPMER 2011)*
a. Folic acid deficiency b. Thiamine deficiency
c. Vitamin B-12 deficiency d. Iron deficiency

71. Gastric atony occurs in all except: *(AIIMS GIS Dec 2006)*
a. Billroth-I
b. Billroth-II
c. HSV
d. Posterior selective vagotomy with anterior seromyotomy

72. Long-term effects of gastrectomy includes: *(PGI SS Dec 2009)*
a. Renal calculi b. Vitamin C deficiency
c. Hypothyroidism d. Osteomalacia

73. Dumping syndrome is due to: *(All India 99)*
a. Diarrhea
b. Presence of hypertonic content in small intestine
c. Vagotomy
d. Reduced gastric capacity

74. Which is not true about dumping syndrome? *(DNB 2014)*
a. Post vagotomy
b. Small frequent meals is beneficial
c. Starch is beneficial
d. Clinical features include diarrhea and bloating

75. All are true regarding early post-cibal syndrome, except:
a. Distension of abdomen *(All India 2000)*
b. Managed conservatively
c. Hypermotility of intestine is common
d. Surgery is usually indicated

76. Duodenal blow out following Billroth gastrectomy most commonly occurs on which day: *(AIIMS June 93)*
a. 2^{nd} day b. 4^{th} day
c. 6^{th} day d. 12^{th} day

77. In gastrectomy following occurs except: *(PGI Dec 97)*
a. Calcium deficiency b. Steatorrhea
c. Fe^{2+} Deficiency d. Fluid loss

78. The earliest manifestation seen after gastrectomy:
a. Incidence of infection *(PGI Dec 2005)*
b. Loss of storage capacity
c. Loss of HCI
d. Loss of intrinsic factor

79. The commonest earliest complication of TV and GJ is:
a. Stomal obstruction b. Paralytic ileus *(AIIMS 91)*
c. Gastric leak d. Anastomotic hemorrhage

80. Anemia is greater in which of the following gastric resection: *(PGI 81, AMU 85)*
a. Billroth-II
b. Billroth-I
c. Both of the above are equal
d. Neither of the above

81. A person who had undergone gastrojejunostomy suddenly develops severe diarrhea. Which should be suspected?
a. Gastric carcinoma *(TN 95)*
b. Tuberculosis of abdomen
c. Gastrojejunocolic fistula
d. Gastric amoebiasis

82. The operation where in the stump of the stomach is directly anastomosed to the stump of the duodenum is called: *(Karnataka 96)*
a. Polya gastrectomy b. Hoffmeister gastrectomy
c. Billroth-I gastrectomy d. Billroth-II gastrectomy

83. Gastrojejunostomy is an example of:
a. Clean contaminated wound *(DNB 2001, JIPMER 2008)*
b. Clean uncontaminated wound
c. Unclean uncontaminated wound
d. Unclean contaminated wound

84. Which is a clean surgery: *(Recent Questions 2013)*
a. Hernia surgery b. Gastric surgery
c. Cholecystectomy d. Rectal surgery

85. Duodenal blowout is: *(APPG 97)*
a. Perforation of duodenal ulcer
b. Iatrogenic
c. Complication of partial gastrectomy
d. Due to trauma

86. Postvagotomy diarrhea can be effectively managed by: *(UPSC 2002)*
a. Steroids b. Thyroxin
c. Somatostatin analogue d. Parathormone

87. The first gastrectomy was performed in 1881 by:
a. Miculikz b. Wolfer
c. Billroth d. Moynihan

88. All are true about gastric resection except:
a. Decreased protein absorption *(DPG 2008)*
b. Increased intestinal secretion
c. Calcium deficiency
d. Increased intestinal motility

89. Dumping syndrome is characterized by all of the following except: *(MCI March 2005)*
a. Colic
b. Tremors and giddiness
c. Hyperglycemia
d. Epigastric fullness

90. Which of the following plays a major role in the development of dumping syndrome? *(MCI March 2009)*
a. Vagolytic mechanism
b. Smaller stomach
c. Excessive food in the stomach
d. Large volume of hyperosmotic fluid in the intestine

UPPER GI BLEED

91. BLEED risk criteria include all except: *(AIIMS GIS Dec 2009)*
a. Ongoing bleeding b. Low urine output
c. BP < 100 mm Hg d. Altered mental status

92. In Forrest classification, high-risk of bleeding is associated with all except: *(KGMC 2011)*
a. Visible vessel
b. Visible pulsatile bleeding
c. Adherent clot
d. Visible oozing from vessel

93. In case of UGI bleeding, all are true about endoscopy except: *(AIIMS GIS Dec 2009)*
a. Decreases transfusion requirement
b. Leads to early discharge of the patient
c. Can detect causes in all cases
d. Best tool for localization of bleeding

94. Investigation of choice for UGI bleed: *(WBPG 2012, PGI SS 2004, June 97)*
a. Endoscopy
b. Angiography
c. CT
d. Barium studies

95. Most common cause of upper GI bleeding: *(MHPGMCET 2006)*
a. Gastric ulcer
b. Esophageal varices
c. Gastritis
d. Carcinoma stomach

96. Which of the following is the incorrect statement regarding GI bleeding? *(AIIMS Nov 2004)*
a. The sensitivity of angiography for detecting GI bleeding in about 10–20% as compared to nuclear imaging
b. Angiography can image bleeding at a rate of 0.05–0.1 ml/min or less
c. 99m Tc-RBC scan will image bleeding at rates as low as 0.05–0.1 ml/min
d. Angiography will detect bleeding only if extravasation is occurring during the injection of contrast

97. Causes of upper GI bleed include are all except: *(PGI Dec 96)*
a. Peptic ulcer
b. Erosive gastritis
c. Esophageal varices
d. CA stomach

98. True about upper GI bleeding: *(PGI DEC 2003)*
a. Melena is the only symptom
b. Bleeding occurs beyond the ampula of vater
c. Endoscopy can best diagnose it
d. Peptic ulcer is the MC cause
e. ↑ed BUN

99. A male executive, 50 years of age is seen in seen in casualty with hypotension and hematemesis. There is previous history suggestive of alcohol intake of 100 ml daily. The blood loss is around 2 litres. Most probable diagnosis is: *(AIIMS June 2001)*
a. Gastritis
b. Duodenal ulcer
c. Mallory-Weiss tear
d. Esophageal varices

100. A 42 years old company executive presents with sudden upper GI bleed (5 litres) of bright red blood, with no significant previous history. The diagnosis is: *(All India 2000)*
a. Esophageal varices
b. Duodenal ulcer
c. Gastritis
d. Gastric erosion

101. Which of the following management procedures of acute upper gastrointestinal bleed should possibly be avoided? *(AIIMS Nov 2003)*
a. Intravenous vasopressin
b. Intravenous beta-blockers
c. Endoscopic sclerotherapy
d. Balloon tamponade

102. Following resuscitation, a patient with bleeding esophageal varices should be treated initially with: *(AIIMS Nov 2004)*
a. Sclerotherapy
b. Sengstaken Blackmore tube
c. Propranolol
d. Surgery

103. During sclerotherapy (by endoscopy), following are complications except: *(PGI June 98)*
a. Hepatic encephalopathy
b. Perforation
c. Stenosis
d. Fibrosis

104. A patient presented to emergency ward with massive upper gastrointestinal bleed. On examination, he has mild splenomegaly. In the absence of any other information available, which of the following is the most appropriate therapeutic modality? *(AIIMS Nov 2005)*
a. Intravenous propranolol
b. Intravenous vasopressin
c. Intravenous pantoprazole
d. Intravenous somatostatin

105. A patient comes with hematemesis and melena. On the upper GI endoscopy there was no significant finding. 2 days later the patient rebleeds. Next line of investigation is:
a. Emergency angiography *(AIIMS May 2007)*
b. Repeat upper GI endoscopy
c. Enteroscopy
d. Laparotomy

106. All of the following are common causes of hematemsis except: *(AIIMS 82, DNB 88)*
a. Chronic peptic ulcer
b. Pernicious anemia
c. Esophageal varices
d. Carcinoma of stomach

107. Uncommon cause of upper GI bleed: *(PGI 96)*
a. Varices
b. Erosive gastritis
c. Peptic ulcer
d. Carcinoma stomach

108. The most sensitive test to detect GI bleeding is:
a. Selective angiography *(PGI 79, AIIMS 81)*
b. Radiolabelled erythrocyte scanning
c. I-131 fibrinogen studies
d. Stool for occult blood

109. In the Forrest classification for bleeding peptic ulcer with a visible vessel of pigmented protuberance is classified as:
a. FI
b. FII a *(COMEDK 2006)*
c. FII b
d. FII c

110. 45 years executive suddenly develops hematemesis at home. He is brought to the hospital 4 hours later, there he again has a bout of hematemesis. Total blood loss would be around 2 liters. Most likely diagnosis is: *(AIIMS 2001)*
a. Gastritis
b. Esophagitis
c. Esophageal varices
d. Duodenal ulcer

111. Most common cause of upper gastrointestinal tract bleeding is: *(Recent Questions 2013)*
a. Esophageal varices
b. Peptic ulcer
c. Gastritis
d. Mallory weiss tear

112. Among the following, the least common cause of acute upper GI bleeding is: *(APPG 2015)*
a. Vascular ectasia
b. Mallory Weiss tear
c. Ulcer
d. Varices

MALLORY-WEISS TEAR

113. False about Mallory-Weiss syndrome: *(ILBS 2011)*
a. Massive hemorrhage is MC manifestation
b. Alcohol is an associated etiology
c. Conservative treatment is effective in most of the cases
d. Anti-reflux procedure doesn't have added advantage

114. The site of mucosal tear in Mallory-Weiss syndrome is:
a. Stomach
b. Small *(COMEDK 2009)*
c. Colon
d. Esophagus

115. True about Mallory Weiss tear: *(PGI Nov 2009)*
a. Hamman mediastinum
b. Esophagus perforates at all layers
c. Auscultation - Crunching sound
d. Symptoms improves after conservative management
e. Longitudinal tear at junction of esophagus and stomach

116. An old man presenting to the emergency following a bout of prolonged vomiting with excessive hematemesis following alcohol ingestion is likely to suffer from: *(UPSC 2005)*
a. Mallory-Weiss syndrome b. Esophageal varices
c. Gastric cancer d. Bleeding disorder

117. About Mallory-Weiss syndrome true is: *(PGI Dec 99)*
a. Gastrointestinal reflux
b. Obesity
c. Tumour at gastrosophageal junction
d. Seen in alcoholics

118. Mallory-Weiss syndrome is partial thickness rupture occurs at:
a. Gastric cardia *(WBPG 2014, PGI Dec 97)*
b. Esophagus mucosa
c. Gastroesophageal junction
d. Gastroduodenal junction

119. Mallory-Weiss syndrome often occurs in: *(PGI 87)*
a. Patient who abuse analgesics
b. Children
c. Pregnant females
d. Patients with hiatus hernia

120. Violent vomiting after forceful retching present with sudden severe hematemesis diagnosis is: *(UPPG 2009)*
a. Haemangioma b. Carcinoma oesophagus
c. Mallory-Weiss syndrome d. Esophageal varices

DIEULAFOY'S LESION

121. ll are true about Dieulafoy's lesion except: *(AIIMS GIS Dec 2011)*
a. Angiographic embolization is the preferred treatment
b. Endoscopic treatment can be given
c. Pulsation of artery causes ulceration
d. Submucosal artery

122. All are true about Dieulafoy's lesion except:
a. Submucosal tortuous artery *(AIIMS GIS Dec 2006)*
b. Mucosal erosion by arterial pulsation
c. Amenable to endoscopic treatment
d. Angiographic embolization-preffered treatment

123. Dieulafoy's lesion: *(PGI SS June 2005)*
a. Within 6 cm of GE junction
b. In esophagus
c. In ileum
d. In rectum

124. Dieulafoy's lesion is: *(MHSSMCET 2006)*
a. Prolapse gastropathy
b. Gastric antral vascular ectasia
c. Gastric hemorrhagic telengectasias
d. Aberrant vessel in the mucosa that bleeds form a mucosal defect

GAVE

125. All are true about GAVE except: *(JIPMER GIS 2011)*
a. Dilated submucosal venous plexus
b. Bleeding is the most common presentation
c. Pain is most common clinical symptom
d. Argon laser treatment is established one

126. True regarding gastric antral vascular ectasia (GAVE):
a. Capillary lesion *(PGI Nov 2009)*
b. Arterial type
c. Difficult to manage because of multiplicity and size
d. Best treatment argon plasma coagulation
e. Associated with chronic renal failure and iron deficiency anaemia

127. 'Watermelon stomach' is: *(MHSSMCET 2008)*
a. Prolapse gastropathy
b. Gastric antral vascular ectasia
c. Gastric hemorrhagic telengectasias
d. Aberrant vessel in the mucosa that bleeds form a mucosal defect

MENETRIER'S DISEASE

128. Menetrier's disease is characterized by all except:
a. Excessive protein loss *(AIIMS GIS Dec 2011)*
b. Excessive mucus production
c. Diarrhea
d. Hyperchlorhydria

129. All are true about Menetrier's disease except:
a. Protein loss *(AIIMS GIS Dec 2006)*
b. Hyperchlorhydria
c. Cobblestone appearance of mucosa
d. Associated with CMV and H. pylori

130. All are true about Menetrier's disease except:
a. Excessive protein loss *(JIPMER GIS 2011)*
b. Decreased mucus production
c. Acquired, premalignant condition
d. H. pylori is a predisposing factor in adults

131. Thickened gastric folds are found in: *(PGI June 2003)*
a. Lymphoma b. Menetrier's disease
c. Carcinoma d. Eosinophilic gastritis
e. Giardiasis

132. Hypertrophic gastropathy is seen in: *(PGI Dec 2005)*
a. Seen in Menetrier's disease and ZES
b. It is association with malignancy
c. It shows cerebrifrom rugocity in stomach
d. More in fundus and body

133. Menetrier's disease is characterized by all of the following except: *(COMEDK 2006)*
a. Giant folds in the pyloric antrum
b. Foveolar hyperplasia
c. Hypoalbuminaemia
d. Hypochlorhydria

GASTRIC POLYPS

134. Most common benign tumour of the stomach is: *(PGI 93)*
a. Adenoma b. Lipoma
c. Hamartoma d. Leiomyoma

135. The commonest gastric polyp is: *(COMEDK 2008)*
a. Hyperplastic polyp b. Inflammatory polyp
c. Adenomatous polyp d. Part of familial polyposis

CARCINOMA STOMACH PREDISPOSING FACTORS

136. All of the following increases the risk of CA stomach except: *(PGI SS 2004)*
a. Benign ulcer
b. Atrophic gastritis
c. Previous gastric surgery
d. Blood group A

137. Due to popularity of refrigeration reducing the need to preserve food, which cancer's incidence has dramatically declined? *(AIIMS May 2013)*
a. Esophagus
b. Stomach
c. Colon
d. Oropharyngeal malignancies

138. `Gastric carcinoma is associated with blood group: *(PGI SS June 2001)*
a. A b. B
c. AB d. O

139. E-cadherin is more often mutated in: *(COMEDK 2010)*
a. Diffuse type of gastric cancer
b. Intestinal type of gastric cancer
c. Malignant ulcer of stomach
d. Erosive gastritis

140. Increased risk for gastric carcinoma is associated with:
a. Intestinal metaplasia
b. Polyp-hyperplastic or adenoma
c. Atrophic gastritis
d. Eosinophilic gastritis

141. Which of the following anemia is a risk factor for the development of gastric carcinoma? *(DNB 2011, COMEDK 2007)*
a. Pernicious anemia b. Megaloblastic anemia
c. Aplastic anemia d. Hemolytic anemia

142. Risk factor for development of gastric CA: *(All India 2002)*
a. Blood group 'O'
b. Duodenal ulcer
c. Intestinal hyperplasia
d. Intestinal metaplasia type III

143. Predisposing factor for CA stomach are all except:
a. Chronic gastric atrophy *(PGI Dec 97)*
b. Hyperplastic polyp
c. Metaplasia grade III intestine
d. Pernicious anemia

144. Risk factor for carcinoma stomach are all except:
a. Blood group A *(PGI June 2000)*
b. Post gastrectomy
c. Old peptic ulcer
d. Atrophic gastritis

145. Precancerous condition for carcinoma stomach is:
a. Peptic ulcer *(PGI June 97)*
b. Chronic gastric atrophy
c. Achalasia cardia
d. Curling's ulcer

146. Predisposing factors for stomach carcinoma: *(PGI June 2001)*
a. Gastric ulcer
b. Pernicious anemia and achlorhydria
c. Hiatus hernia
d. Atrophic gastritis

147. Predisposing factors for gastric carcinoma are: *(PGI June 2002)*
a. Atrophic gastritis b. Hyperplastic polyp
c. Adenomatous polyp d. Achlorhydria
e. Animal fat consumption

148. Which of the following is the most significant risk factor for development of gastric carcinoma? *(All India 2006)*
a. Paneth cell metaplasia b. Pyloric metaplasia
c. Intestinal metaplasia d. Ciliated metaplasia

149. All of the following predispose to gastric carcinoma except: *(All India 1990)*
a. Achlorhydria b. 'O' blood group
c. Pernicious anaemia d. Postgastrectomy

150. Precancerous condition of the stomach is: *(Kerala 91)*
a. Lipoma b. Linnitis plastic
c. Atrophic gastritis d. Hyperacidity

151. Malignant transformation is commonly seen in: *(AIIMS 91)*
a. Stomal ulcer b. Gastric ulcer
c. Chronic duodenal ulcer d. Postbulbar ulcer

152. All are true about gastric carcinoma except: *(DNB 2006)*
a. More in low socioeconomic group
b. Most common at fundus
c. H. pylori infection increases risks
d. Vitamin C protects

153. Gastric malignancy is predisposed with: *(Kerala 2004)*
a. Blood group O
b. Intestinal metaplasia
c. Gastric hyperplasia
d. Duodenal ulcer

CA STOMACH CLINICAL FEATURES AND TREATMENT

154. All are true about diffuse carcinoma of stomach except:
a. Occurs at distal end *(PGI SS June 2001)*
b. Occurs at cardia
c. Genetic rather than environmental cause
d. Occurs in younger patients

155. According to Borrman's classification, Linnitis plastica is: *(AIIMS GIS May 2011)*
a. Type I b. Type II
c. Type III d. Type IV

156. Not seen in intestinal type of gastric cancer: *(AIIMS GIS Dec 2011, Dec 2009)*
a. Decreased E-cadherin b. APC
c. Microsatellite instability d. p53

157. Not true in case of diffuse carcinoma stomach:
a. More common *(AIIMS GIS Dec 2009)*
b. Poorly differentiated with signet ring cells
c. Transmural or lymphatic spread
d. Decreased E-cadherin

158. Not seen in intestinal type of gastric cancer:
a. Decreased E-cadherin b. APC *(AIIMS GIS Dec 2009)*
c. p16 d. p53

159. All are true about diffuse gastric carcinoma (Lauren's) except: *(JIPMER GIS 2011)*
a. Blood group 'A' b. E-cadherin positive
c. Hematogenous spread d. Common in females

160. Carcinoma stomach which perforates serosa but doesn't involve nearby structures, the stage is: *(KGMC 2011)*
a. I b. II
c. IIIA d. IIIB

161. Diffuse and intestinal variant of CA stomach both have: *(AIIMS GIS Dec 2006)*
a. E-cadherin b. APC
c. p53 d. Microsatellite instability

162. Gastric lymph node station no 5: *(AIIMS GIS Dec 2009)*
a. Suprapyloric b. Splenic hilum
c. Lessar curvature d. Greater curvature

163. Level 9 lymph node includes: *(AIIMS GIS Dec 2010)*
a. Celiac nodes
b. Splenic hilum
c. Splenic artery
d. Hepatoduodenal ligament

164. Sister Joseph's nodule may indicated cancer of all the following except: *(COMEDK 2004)*
a. Somach b. Large bowel
c. Rectum d. Ovary

165. Which of the following statements about gastric carcinoma are true? *(All India 2011)*
a. Squamous cell carcinoma is the most common histological subtype
b. Often associated with hypochlorhydria/achlorhydria
c. Occult blood in stool is not seen
d. Highly radiosensitive tumor

166. Most common site of carcinoma of stomach is: *(JIPMER 2010)*
a. Proximal stomach b. Gastric antrum
c. Lesser curvature d. Greater curvature

167. An ulcero-proliferative lesion in the antrum of the stomach 6cm in diameter, invading the serosa, with 10 enlarged lymph nodes around and pylorus with no distant metastasis, the TNM staging is: *(COMEDK 2011)*
a. T2N1M0 b. T3N2M0
c. T4N1M0 d. T1N3M0

168. True about gastric stump carcinoma: *(PGI Nov 2009)*
a. Enterogastric reflex is the cause
b. Prognosis good after surgery
c. It is always adenocarcinoma in nature
d. Diffuse type is only variety

169. All are true about gastric CA except: *(PGI June 2009)*
a. H. pylori association is present
b. D2 gastrectomy include total gastrectomy
c. Surgical non curative lesion should not be resected
d. Patient under total gastrectomy should be given vitamin B_{12}
e. Hematemesis present in majority of patients

170. Troisier's sign is: *(MHPGMCET 2008, 2006, APPG 96)*
a. Metastatic left supraclavicular lymphadenopathy
b. Carpopedal spasm in hypocalcemia
c. Migratory thrombophlebitis
d. Any of the above

171. Independent risk factor for carcinoma stomach:
a. H. pylori *(MHPGMCET 2008)*
b. Gastrectomy with drainage procedure
c. Vagotomy with drainage procedure
d. All of the above

172. Troisier's sign is: *(Karnataka 2013, MHSSMCET 2006)*
a. Left supraclavicular lymphadenopathy
b. Right supraclavicular lymphadenopathy
c. Left deep neck lymphadenopathy
d. Right deep neck lymphadenopathy

173. True about carcinoma stomach include all the following except: *(MHSSMCET 2007)*
a. Smoky diet is risk factor
b. Incidence is now decreasing in Japan and China
c. Duodenal ulcers are not associated with gastric cancer
d. Gastric adenocarcinoma is a radioresistant tumor

174. When carcinoma of stomach develops secondarily to pernicious anemia, it is usually situated in the:
a. Pre-pyloric region b. Pylorus *(All India 2006)*
c. Body d. Fundus

175. The best prognosis in carcinoma stomach is with: *(UPSC 2008, All India 95)*
a. Superficial spreading type
b. Ulcerative type
c. Linnitis plastica type
d. Polypoidal type

176. All the following indicates early gastric cancer except: *(DNB 2006, All India 2002, AIIMS Feb 97)*
a. Involvement of mucosa
b. Involvement of mucosa and submucosa
c. Involvement of mucosa, submucosa and muscularis
d. Involvement of mucosa, submucosa and adjacent lymph nodes

177. For early diagnosis of CA stomach, which method is used?
a. Endoscopy *(AIIMS Feb 97)*
b. Staining with endoscopic biopsy
c. Physical examination
d. Ultrasound abdomen

178. True about gastric cancer are all except: *(PGI May 2005)*
a. Incidence increasing world wide
b. Incidence of upper gastric cancer increasing
c. Surgically correctable
d. Prognosis depends on the depth of the lesion than the size of the lesion.

179. True about stomach carcinoma: *(PGI Dec 2000)*
a. Weight loss is commonest feature
b. Secondaries are most commonly seen in peritoneum and omentum
c. Lymphatic and hematogenous spread are rare
d. Barium meal is diagnostic
e. Radioresistant

180. An adult presented with hematemesis and upper abdominal pain. Endoscopy revealed a growth at the pyloric antrum of the stomach. CT scan showed growth involving the pyloric antrum without infiltration or invasion into surrounding structures and no evidence of distant metastasis. At laparotomy neoplastic growth was observed to involve the posterior wall of stomach and the pancreas extending 6 cm up to tail of pancreas. What will be the most appropriate surgical management? *(All India 2010)*
a. Closure of the abdomen
b. Antrectomy and vagotomy
c. Partial gastrectomy + distal pancreatectomy
d. Partial gastrectomy + distal pancreatectomy + splenectomy

181. Kally, a 60 years old male diagnosed to have carcinoma stomach. CT scan of abdomen showed a mass measuring 4 × 4 cm in the antrum with involvement of celiac nodes and right gastric nodes. Management of choice is: *(AIIMS June 2001)*
a. Total gastrectomy b. Subtotal gastrectomy
c. Palliative d. Chemotherapy

182. True about early gastric carcinoma: *(PGI Dec 2002)*
a. Invasion of mucosa and submucosa with neighboring lymph node
b. Invasion of mucosa and submucosa irrespective to L.N. spread
c. Endoscopic removal of lesions
d. Conservative gastrectomy

183. Operability in carcinoma stomach is indicated by all except:
a. Involvement of omental nodes *(PGI 86)*
b. Involvement of lymph nodes at the celiac axis
c. Lymph node at porta hepatis
d. Solitary metastatic nodule in the liver
e. Krukenberg tumor

184. Linnitis plastica is commonly seen in: *(DNB 2005, 2001, 2000, All India 91)*
a. Carcinoma stomach b. Sarcoidosis
c. Lymphoma d. Leiomyosarcoma

185. All of the following may be features of a silent carcinoma of the body of the stomach except: *(JIPMER 80, AMU 89)*
a. Obstructive jaundice b. Ascites
c. Dysphagia d. Krukenberg tumours

186. Presenting symptom of carcinoma stomach is: *(AIIMS 81, APPG 90)*
a. Bleeding b. Obstruction
c. Perforation d. Weight loss

187. Gastric carcinoma involving the antrum with lymph node involvements. The pancreas, liver and peritoneal cavity are normal. Most appropriate surgery is:
a. Total radical gastrectomy b. Palliative gastrectomy
c. Gastrojejunostomy d. None of the above

188. Lymphatic drainage of CA stomach is mostly to: *(DPG 2005)*
a. Left gastric b. Pyloric
c. Celiac d. None of the above

189. Sister Mary Joseph nodule is most commonly seen with: *(AIIMS May 2009)*
a. Ovarian cancer b. Stomach cancer
c. Colon cancer d. Pancreatic cancer

190. Peritoneal dissemination of gastric cancer is best detected by: *(COMEDK 2014)*
a. USG b. Laparoscopy
c. CT d. MRI

191. Locally invasive gastric carcinoma. Investigation of choice to know depth of cancer invasion: *(Recent Questions 2013)*
a. CECT b. MRI
c. Barium d. EUS

192. Most common cause of Krukenberg's tumor is: *(DNB 2014)*
a. Ovary b. Liver
c. Stomach d. Kidney

GASTROINTESTINAL STROMAL TUMOR (GIST)

193. Cell of origin in GIST: *(GB Pant 2011)*
a. Mesenchymal b. Argentaffin
c. Smooth muscle d. Epithelial

194. False about GIST: *(KGMC 2011)*
a. Stomach is most common site
b. Can present with bleeding
c. Commonly metastasize to lymph nodes
d. Can present with peritoneal metastasis

195. Sunitinib is used in: *(KGMC 2011)*
a. GIST b. Rectal cancer
c. Colonic carcinoma d. Pancreatic carcinoma

196. Tyrosine kinase inhibitor imatinib is used for the treatment of:
a. Fibrosarcoma phylloides b. GIST *(JIPMER 2011)*
c. MALT d. Seminoma

197. A 50 years old male presents with obstructive symptoms. Biopsy of stomach reveals gastrointestinal stromal tumor (GIST). Most appropriate market for GIST is: *(AIIMS May 2011)*
a. CD-34 b. CD-117
c. CD-30 d. CD-10

198. Gold standard investigation for recurrent gastrointestinal stromal tumor is: *(AIIMS May 2011)*
a. MRI b. MIBG
c. USG d. PET-CT

199. True about GIST all except: *(AIIMS Nov 2010)*
a. Most common in duodenum
b. Necrosis and ulceration present
c. PET is used to assess response to therapy
d. Cell circumscribed

200. Carney triad consists of: *(PGI May 2011)*
a. Gastric carcinoma b. Paraganglioma
c. Pulmonary chordoma d. Carcinoma bronchus
e. Chondromatosis

201. GIST (Stromal tumors of GI tract) arise form: *(MHSSMCET 2008)*
a. Paneth cells b. Stave cells
c. Enterocytes d. Interstitial cells of Cajal

202. Commonest stomach tumour which bleeds: *(PGI 88)*
a. Adenocarcinoma b. Squamous carcinoma
c. Leiomyosarcoma d. Fibrosarcoma

203. Bleeding is seen maximally in which gastric tumors? *(Punjab 2008)*
a. Adenocarcinoma b. Squamous cell carcinoma
c. Leiomyosarcoma d. GIST

204. Which of the following is not true about Gastrointestinal Stromal Tumor (GIST)? *(AIIMS November 2014)*
a. Originates from interstitial cells of Cajal
b. Most common mesenchymal tumour of gastrointestinal tract
c. Prognosis depends on size
d. ALK gene mutation is seen in most of the cases

GASTRIC LYMPHOMA

205. All are true about stomach lymphoma except:
a. Most common type is NHL *(GB Pant 2011)*
b. Large B cell type
c. Chemosensitive
d. Most common site is fundus

206. The commonest site of lymphoma in the gastrointestinal system is: *(COMEDK 2007)*
a. Small bowel b. Stomach
c. Large intestine d. Oesophagus

207. Treatment of gastric lymphoma includes: *(PGI May 2011)*
a. Chemotherapy
b. Radiotherapy
c. Surgery
d. Anti-H. pylori treatment
e. Endoscopic resection

208. Indication of surgery in gastric lymphoma are all except:
a. Bleeding *(PGI May 2011, AIIMS Nov 2005, Nov 2002)*
b. Perforation
c. Residual disease after chemotherapy
d. Intractable pain

209. False about gastric lymphoma is: *(AIIMS May 2008)*
a. Stomach is the most common site
b. Associated with H. pylori infection
c. Total gastrectomy with adjuvant chemotherapy is treatment of choice
d. 5 years survival rate after treatment is 60%

210. All of the following are indications for surgery in gastric lymphomas except:
a. Bleeding
b. Perforation
c. Residual disease following chemotherapy
d. Intractable pain

211. The treatment of Hodgkin's disease of stomach is:
a. Gastric resection *(Karnataka 89)*
b. Gastric resection and chemotherapy
c. Purely medical
d. None of the above

DUODENAL ATRESIA

212. Anomaly associated with duodenal atresia is: *(DNB 2010)*
a. Down's syndrome b. Duodenal adenomas
c. Limb defects d. Autoimmune disorders

213. Antenatal double bubble appearance on ultrasound is due to: *(PGI June 97)*
a. Diaphragmatic hernia b. Duodenal atresia
c. Gastric volvulus d. Intussuception

214. Double Bubble sign is seen with: *(PGI Dec 2006, DNB 2007, 2003, AIIMS May 2009)*
a. Pyloric stenosis b. Duodenal atresia
c. Ileal atresia d. Esophageal atresia

215. Which is the treatment of choice for duodenal atresia? *(DNB, 2011, 2002 MHSSMCET 2005)*
a. Duodenoduodenostomy b. Duodenojejunostomy
c. Bishop-Koop Procedure d. Gastroduodenostomy

HYPERTROPHIC PYLORIC STENOSIS

216. Congenital hypertrophic pyloric stenosis is associated with: *(PGI May 2011)*
a. Hypokalemia
b. Hypochloremic metabolic alkalosis
c. Hypochloremic metabolic acidosis
d. Hyperchloremic metabolic acidosis
e. Hyperchloremic metabolic alkalosis

217. A 3 weeks old patient presenting with vomiting and failure to thrive is found to have pyloric stenosis. What should be the next step of management? *(AIIMS May 2011)*
a. Its emergency so do pyloromyotomy immediately
b. Fluid resuscitation may be delayed
c. Correction of electrolyte disturbances
d. Cardiopulmonary resuscitation

218. Investigation of choice to diagnose hypertrophic pyloric stenosis in infants is: *(COMEDK 2011)*
a. Contrast radiology b. Gastroscopy
c. Ultrasound abdomen d. CT abdomen

219. All are seen in hypertrophic pyloric stenosis except: *(NEET Pattern, AIIMS GIS 2003)*
a. Hyponatremia b. Hypokalemia
c. Metabolic acidosis d. Metabolic alkalosis

220. Hypertrophic pyloric stenosis presents as: *(GB Pant 2011)*
a. Mass in epigastrium
b. More common in girls
c. Congenital
d. Present at birth with bilious vomiting

221. Olive shaped mass on feeding is pathognomonic of:
a. Hypertrophic pyloric stenosis *(DNB 2005)*
b. Duodenal atresia
c. Jejunal atresia
d. Ileal stenosis

222. Ramsted's operation is performed for:
a. Hirschsprung's disease *(MHSSMCET 2005, Kerala 94)*
b. CHPS
c. Duodenal atresia
d. Anorectal malformation

223. All are false except one is case of hypertrophic pyloric stenosis: *(AIIMS June 2000)*
a. Symptomatic within one week
b. Lump is always clinically palpable
c. Treatment of choice is Finney's pyloroplasty
d. Ultrasonography is diagnostic test

224. What is the most characteristic of congenital hypertrophic pyloric stenosis? *(All India 2003)*
a. Affects the first born female child
b. The pyloric tumour is best felt during feeding
c. The patient is commonly marasmic
d. Loss of appetite occurs early

225. In a case of hypertrophic pyloric stenosis, the metabolic disturbance is: *(JIMER 2013 All India 2002)*
a. Respiratory alkalosis
b. Metabolic acidosis
c. Metabolic alkalosis with paradoxical aciduria
d. Metabolic alkalosis with alkaline urine

226. What is true regarding congenital hypertrophic pyloric stenosis? *(All India 2001)*
a. More common in girls
b. Hypocholremic alkalosis
c. Hellers myotomy is the procedure of choice
d. Most often manifests at birth

227. Clinical features of pyloric stenosis in infants are all except:
a. Abdominal lump b. Constipation *(All India 93)*
c. Weight loss d. Metabolic acidosis

228. Congenital pyloric stenosis causes: *(PGI Dec 2002)*
a. Bilious vomiting b. Non-bilious vomiting
c. Projectile vomiting d. Non-projectile vomiting
e. Forceful vomiting

229. Features of pyloric stenosis: *(PGI June 2006)*
a. Hypokalemic alkalosis
b. Peristalsis right to left
c. Commonly caused by carcinoma stomach
d. Retention vomiting present
e. Commonly females involved

230. Metabolic abnormalities associated with infantile pyloric stenosis in early phase include all except: *(DNB 2012)*
a. Hypokalemia b. Aciduria
c. Hypochloremia d. None of the above

231. Antral obstruction with vomiting is not characterized by: *(AIIMS June 98)*
a. Hypokalemia b. Hypochloremia
c. Acidosis d. Hyponatremia

232. Make the diagnosis of a 26-day-old infant presenting with recurrent non-bilious vomiting with constipation and loss of weight: *(AIIMS June 99)*
a. Esophageal atresia b. Choledochal cyst
c. Ileal atresia d. Pyloric stenosis

233. In congenital pyloric stenosis the defect usually lies in antral: *(AIIMS 78, PGI 83)*
a. Nerve fibers
b. Circular muscle fibers
c. Longitudinal muscle fibers
d. Mucosa

234. If the mucosa was accidentally opened at operation (Ramstedt) it is wise not to feed the child orally for:
a. 12 Hours b. 24 Hours *(AMU 90)*
c. 48 Hours d. 1 week

235. Which of the following is not a feature of ultrasound in CHPS?
a. 95% sensitivity by ultrasound *(AIIMS Nov 2011)*
b. Thickness of pylorus > 4 mm
c. Channel length > 16 mm
d. High gastric residue

236. The treatment of choice of hypertrophic pyloric stenosis of adult is: *(DPG 2011)*
a. Pyloromyotomy
b. Pyloroplasty
c. Billroth I gastrectomy
d. Highly selective vagotomy

237. Hypochloremia, hypokalemia and alkalosis are seen in: *(DNB 2012, AIIMS June 2003)*
a. Congenital hypertrophic pylori stenosis
b. Hirschsprung's disease
c. Esophageal atresia
d. Jejunal atresia

238. For a patient of gastric outlet obstruction, the OPD fluid management is: *(PGI June 2003)*
a. Normal saline
b. Hypertonic saline
c. Na^+ bicarbonate to counteract aciduria
d. Hypotonic saline without potassium
e. Normal saline with potassium

239. True about hypertrophic pyloric stenosis is all except:
a. Present at 4 weeks *(DNB 2007)*
b. First born male is commonly affected
c. Ramstedt operation is done
d. Visible peristalsis is always seen

GASTRIC OUTLET OBSTRUCTION

240. Persistent vomiting in G.O.O. causes: *(PGI Dec 2002)*
a. Hyponatremic hyperchloremia occur
b. Hypernatremia without hypochloremic alkalosis
c. Hypokalemic metabolic alkalosis
d. Paradoxical aciduria

241. When peptic ulcer leads to gastric outlet obstruction, the most likely site of obstruction is? *(Orissa 2011)*
a. Antrum
b. Pylorus
c. Lesser curvature
d. First part of duodenum

242. Patients with protracted vomiting can develop:
a. Hypokalemic hypochloremic alkalosis *(COMEDK 2006)*
b. Hyperkalemic hypochloremic acidosis
c. Hypokalemic hyperchloremic alkalosis
d. Hypokalemic hypochloremic acidosis

243. A patient complains of occasional vomiting of food particles eaten a few days age. His wife reports that his breath smells foul. The most likely diagnosis is: *(Kerala 89)*
a. Pyloric obstruction
b. Carcinoma stomach
c. Carcinoma esophagus
d. Achalasia cardia

244. The most common cause of gastric outlet obstruction in India is: *(All India 2006)*
a. Tuberculosis
b. Cancer of stomach
c. Duodenal lymphoma
d. Peptic ulcer disease

245. Regarding acute dilation of stomach which is incorrect:
a. Occurs with fracture femur *(PGI 88)*
b. Occurs with plaster
c. Resolves spontaneously without treatment
d. Hypophosphatemia is to be avoided

246. Commonest operation done for peptic ulcer with gastric outlet obstruction is: *(Kerala 89)*
a. Truncal vagotomy with pyloroplastry
b. Highly selective vagotomy with pyloroplastry
c. Truncal vagotomy with gastrojejunostomy
d. Gastrojejunostomy

247. A 35 years old male who had chronic duodenal ulcer for the last six years presents with worsening of symptoms loss of periodicity of symptoms, pain on rising in the morning sense of epigastric bloating and postprandial vomiting. The most likely cause of the worsening of his symptoms is the development of: *(DPG 2010, UPCS 96)*
a. Posterior penetration
b. Gastric outlet obstruction
c. Carcinoma
d. Pancreatitis

248. A patient with antral carcinoma repeatedly vomits. Not seen is: *(AIIMS 98)*
a. Acidosis
b. Hypokalemia
c. Hyponatremia
d. Hypochloremia

249. Most severe degree of alkalosis occurs in obstruction of:
a. Cardiac end
b. Pylorus *(MAHE 98)*
c. Ileocaecal region
d. Colon

250. All of the following are seen in chronic pyloric obstruction except: *(MCI March 2010)*
a. Alkaline urine
b. Acidic urine
c. Hypochloremia
d. Hypokalemia

251. Acute dilatation of stomach is not managed by:
a. N/G tube aspiration *(AIIMS June 97)*
b. Stop oral feeds
c. Surgery
d. Fluid and electrolyte balance

252. Which of the following is true about acute dilatation of stomach? *(PGI Dec 2005)*
a. Dilatation of stomach seen on X-ray
b. Presents with vomiting
c. Aspiration
d. Immediately open the abdomen
e. Atony of stomach

BEZOARS

253. Bezoar in the stomach present as: *(Punjab 2009)*
a. Melena
b. Perforation
c. GI obstruction
d. Diarrhea

254. The following are the complications of trichobezoars except: *(AIIMS 89, AMU 89)*
a. Hematemesis
b. Perforation and peritonitis
c. Obstruction
d. Malignancy

255. A female in her twenties presents with complaints of pain abdomen, abdominal distention and vomiting. On examination, she was found to have alopecia and a crepitus in the epigastrium. What is your diagnosis?
a. Trichobezoar *(AIIMS November 2014)*
b. Carcinoma pyloric antrum
c. Intestinal tuberculosis
d. Rectus sheath hematoma

256. True about trichobezoars are all except: *(MAHE 2006)*
a. It is caused by Trichuris
b. It is a psychiatric manifestation
c. Ball of hairs in the stomach
d. Pulling the hair and sucking of hair is usually seen

STRESS GASTRITIS

257. In case of upper GI bleed associated with stress gastritis all are true except: *(AIIMS GIS Dec 2009)*
a. Surgery should be done if transfusion requirements is > 6 units
b. Vagotomy may be added
c. Surgery involves anterior gastrotomy with ligation of bleeding ulcers and superficial erosions
d. Total gastrectomy is rarely indicated

258. In case of upper GI bleeding due to stress gastritis, all of the following decreases bleeding risk except: *(AIIMS GIS Dec 2009)*
a. Treatment of sepsis
b. Improvement of BP
c. Elective ventilation
d. Correction of coagulopathy

259. All are true about stress gastritis except: *(GB Pant 2011)*
a. Backflow H^+ uptake by mucosal cells
b. Decreased HCO_3 secretion
c. Decreased mucosal blood flow
d. Increased H. pylori infection

260. Stress-induced ulcers are most commonly found in the: *(COMEDK 2010)*
a. Fundus of stomach
b. Antrum of stomach
c. Pyloric channel
d. First part of duodenum

261. Common sites of for Cushing ulcers include all of the following except: *(All India 99)*
a. Esophagus
b. Stomach
c. 1st part of duodenum
d. Distal duodenum

262. Most common site of Curling's ulcer: *(AIIMS Nov 2008)*
a. Ileum
b. Stomach
c. Duodenum
d. Esophagus

263. Erosive gastritis commonly occurs at: *(JIPMER 93)*
a. Body
b. Fundus
c. Lesser curvature
d. Antrum

264. Curling's ulcer is seen in:
a. Burn patients *(NEET 2013, DNB 2008, All India 88)*
b. Patients with head injuries
c. Zollinger Ellison syndrome
d. Analgesic drug abuse

265. Which of the following is not true of Curling's ulcer?
a. Seen in burn patients *(Karnataka 96)*
b. Are solitary penetrating ulcer
c. Are shallow multiple erosions
d. Has also been described in children after head injury or craniotomy

266. Stress ulcers is caused by all of the following except?
a. Burns *(APPG 2006)*
b. Cortisol therapy
c. Penicillin therapy
d. Pulmonary insufficiency

267. In a burn patient, the doctor is looking for curling ulcer. Which part should be examined? *(AIIMS Nov 2013)*
a. 1st part of duodenum
b. 2nd part of duodenum
c. 3rd part of duodenum
d. Junction between 2nd and 3rd part of duodenum

GASTRIC VOLVULUS

268. All are true about organoaxial gastric volvulus except:
a. Borchardt's triad is present *(AIIMS GIS Dec 2006)*
b. Usually associated with diaphragmatic defect
c. Endoscopy usually derotate
d. Occurs in elderly

269. Borchardt's triad of acute epigastric pain violent retching and inability to pass a nasogastric tube is seen in patients with: *(J & K 2005)*
a. Achalasia cardia
b. Acute gastric volvulus
c. Jejunogastric intussusceptions
d. Hiatus hernia

270. Borchardt's triad is characterized by the following except:
a. Inability to pass Nasogastric tube *(MHSSMCET 2008)*
b. Vomiting
c. Shock
d. Diarrhea

STOMACH ANATOMY AND PHYSIOLOGY

271. Criminal nerve of Grassi: *(ILBS 2011)*
a. Anterior branch of vagus at pylorus
b. Anterior branch of vagus at cardia
c. Proximal branch of posterior vagus
d. Distal branch of posterior vagus

272. Electrical pacemaker of stomach is situated in:
a. Fundus *(Karnataka 2001)*
b. Body
c. Incisura Angularis
d. Gastroesophageal junction

273. Function of thick gastric mucosa is: *(All India 97)*
a. Protects epithelium
b. Neutralizes HCL
c. Traps foreign particles
d. None of the above

274. G-cells are present mostly in: *(TN 91)*
a. Fundus
b. Cardia
c. Pyloric antrum
d. Body

275. In which of the following organs submucosal glands are present? *(COMEDK 2004)*
a. Colon
b. Anal canal
c. Duodenum
d. Stomach

276. Ghrelin is responsible for: *(COMEDK 2008)*
a. Stimulation of appetite
b. Suppression of appetite
c. Stimulation of sleep
d. Suppression of sleep

277. Posterior gastric artery is a branch of: *(JIPMER 2011)*
a. Left gastric artery
b. Right gastric artery
c. Splenic artery
d. Hepatic artery

GASTRIC DIVERTICULUM

278. Deverticulum of the stomach: *(PGI 79, UPCS 86)*
a. Pain is the main symptom
b. Usually at cardiac end
c. Usually on posterior surface
d. Inversion is the satisfactory treatment
e. All of the above

279. The most frequent symptom of gastric diverticulum is: *(AIIMS 81, PGI 82)*
a. Epigastric lump
b. Hematemesis
c. Vomiting
d. Pain

MISCELLANEOUS

280. Duodenal stricture is caused by: *(PGI Dec 2002)*
a. Amebiasis
b. T.B.
c. CA pancreas
d. Crohn's disease
e. Giardiasis

281. Deficiency of the abdominal muscle is associated with: *(PGI June 99)*
a. Eagle-Barrett syndrome
b. Christopher syndrome
c. Megacystitis
d. Megaureter

282. Raised gastrin level without associated increase in acid secretion is seen in: *(AIIMS Nov 94)*
a. Carcinoma stomach
b. Gastrinoma
c. Pernicious anemia
d. G-cell hyperplasia

283. Hour glass stomach is seen in: *(AIIMS 92)*
a. Gastric carcinoma
b. Gastric ulcer
c. Gastric Lymphoma
d. Corrosive Strictures

284. Highest pickup for gastrojuejunocolic fistula is by:
a. Ba swallow
b. Ba meal *(J and K 2001)*
c. Ba enema
d. Ba meal follow through

285. Duodenal adenocarcinoma: *(PGI 2004)*
a. Most common small bowel carcinoma
b. Type of periampullary carcinoma
c. Jaundice and anemia - most common symptom
d. Local resection - curative

286. For gastric lavage in an adult the stomach tube should be passed up to: *(COMEDK 2004)*
a. Up to 20 cm
b. Up to 30 cm
c. Up to 40 cm
d. Up to 50 cm

287. Thickened gastric folds on barium meal are seen in: *(COMEDK 2010)*
a. Leiomyosarcoma
b. Scleroderma
c. Amyloidosis
d. Linnitis plastica

288. Duodenal diverticularization is indicated in: *(PGI Nov 2011)*
a. Duodenal Fistula
b. Duodenal polyp
c. Duodenal ulcer
d. Pancreatic injury
e. Duodenal injury

289. Characteristic features of type A gastritis are all except: *(MHPGMCET 2007)*
a. Gastric antrum is predominantly affected
b. Chronic hypergastrinemia occurs
c. Hypochlorhydria occurs
d. Hypertrophy of gastric enterochromaffin like cells

290. Finney's stricturoplasty is done when the length of bowel stricture is: *(MHSSMCET 2006)*
a. > 1 cm
b. > 10 cm
c. < 10 cm
d. < 2.5 cm

291. In Hunt Lawrence pouch reconstruction, the length of pouch is: *(MHSSMCET 2008)*
a. 10 cm
b. 15 cm
c. 20 cm
d. 25 cm

EXPLANATIONS

H. PYLORI

1. **Ans. a. Peptic ulcer; b. Adenocarcinoma; c. Atrophic gastritis; d. B cell lymphoma** *(Ref: Sabiston 19/e p1191-1194; Schwartz 10/e p293, 9/e p908-909; Bailey 26/e p1030-1031, 25/e p1051-1053; Shackelford 7/e p727-728; Harrison 18/e p1262-1264, 2441-2444)*

Helicobacter Pylori

- First successful culture of organism was done by **Marshall and Warren**Q, who named it Campylobacter pyloridis.
  - Around **90%** of **duodenal ulcers** and **75%** of **gastric ulcer** are associated with **H. pylori infection**Q.
  - **Gastric antrum** is **MC site of colonization**Q.
- It can live only in **gastric epithelium**, because only gastric epithelium expresses specific adherence receptors in vivo that can be recognized by organism.
  - Also found in **heterotopic gastric mucosa** in **proximal esophagus, Barrett's esophagus**, gastric metaplasia in the **duodenum**, **Meckel's diverticulum**, and heterotopic gastric mucosa in the **rectum**Q.
- After the person is infected, usually in **childhood,** it is probably for life because **spontaneous remission is rare**Q**.**
- There tends to be **inverse relationship** between **infection** and **socioeconomic status**Q**.**
- Mechanisms by which **H. pylori** promote ulcer formation include **stimulation** of **gastrin** release, **inhibition** of **somatostatin** release, interruption of inhibitory vagal reflexes and **inhibition** of gastroduodenal **bicarbonate** secretionQ.
- **After eradication** of the organism, ulcer **recurrence is rare**Q**.**

Characteristic Features

- **Spiral shaped, gram (-)ve rod, motile** with **lophotrichous flagella**Q
- The sole source is human gastric mucosa
  - Biochemical reactions: **Catalase, oxidase and urease positive**Q
- Grows well when incubated at **37°C in microaerophilic conditions**Q**.**
- Media used include **Skirrow's medium, chocolate medium**Q**.**

Pathogenesis

- Grows optimally at **pH 6.0-7.0**Q and would be killed at pH within the gastric lumen.
- But it survives as it is found deep in mucus layer near epithelial surface, without invading mucosa where physiologic pH is present. It produces **potent urease,** which **provides ammonia** to **buffer acid**Q**.**
- Major diseases associated H. pylori virulence factors are **vacuolating cytotoxin (Vac A)**Q**,** and group of genes called **CagPal**Q**.**
  - **H. pylori colonization decreases somatostatin** producing cells →↑ **Gastrin** →↑**Acid** → **Gastric metaplasia in duodenum** → **Ulceration**Q**.**

Clinical Manifestations

- **90% of duodenal ulcer** and **75% of gastric ulcer**Q are related to H. pylori
- **Increase risk of gastric adenocarcinoma, gastric MALT lymphoma**Q**.**
- Extra-gastrointestinal pathologies that are linked include **ischemic heart disease** and **cerebrovascular disease**Q**.**
  - **CAG-A positive strain** is **protective for adenocarcinoma** esophagus but **can lead to SCC** of esophagusQ.

Diagnosis

- **Histologic visualization** of H. pylori is the **gold standard** of **diagnostic test**Q (special stains used are **silver, Giemsa, Genta or Warthin starry stain)**Q**.**
  - The **method of choice to diagnose** if endoscope is employed is **rapid urease test**Q.
  - **Serology** is the test of choice for **initial diagnosis** when endoscopy is not required.
  - After treatment, **Urea breath test** is the method of choice but should be performed **after 4 weeks** of therapyQ.

Accuracy of Diagnostic Methods

- **Chronic inflammation** on a gastric mucosal **biopsy** specimen is **100% sensitive** testQ.
- **Rapid Urease test** on a gastric mucosal biopsy specimen is **100% specific** testQ.

Assessing success of Treatment/Eradication of H. pylori

- Assessment should be done at least 4 weeks after completion of anti H. pylori therapy[Q].
- In the assessment of treatment success non invasive tests are normally preferred.
- Test of choice for documentation of eradication: Urea breath test[Q]

Assessment of success of treatment	
Non invasive tests are preferred	***Invasive tests are not preferred***
• **Urea breath test: Test of choice** for **documenting eradication[Q].** • **Stool antigen test:** If **UBT is not available,** a stool antigen test should be considered for documenting eradication • **Serological testing:** Is **not useful for purpose of documentation of eradication[Q]** as antibody titres fall slowly and often do not become undetectable	• **Biopsy based tests:** (Biopsy urease test, Histology / Culture) are invasive tests based **on endoscopic biopsy[Q].** • These may be **used to document eradication[Q]** but are **not preferred** for this purpose.

Assessment of Success of Treatment

Non invasive tests are preferred	Invasive tests are not preferred
• **Urea breath test: Test of choice** for **documenting eradication[Q].** • **Stool antigen test:** If **UBT is not available,** a stool antigen test should be considered for documenting eradication • **Serological testing:** Is **not useful for purpose of documentation of eradication[Q]** as antibody titres fall slowly and often do not become undetectable	• **Biopsy based tests:** (Biopsy urease test, Histology / Culture) are invasive tests based **on endoscopic biopsy[Q].** • These may be **used to document eradication[Q]** but are **not preferred** for this purpose.

- There is association of **H. pylori infection** and **ABO blood group** with **pancreatic cancer[Q]**
- **H. pylori** and **H. bilis infection** increases the **risk of CA GB[Q].**

2. **Ans. d. Gastric leiomyoma** *(Ref: Harrison 18/e p2443)*

Diseases Associated with H. pylori		
Antral Predominant Gastritis	**Corpus Predominant Atrophic Gastritis**	**Non-atrophic Pangastritis (Chronic Superficial gastritis)**
• **Duodenal ulcer[Q]**	• **Gastric ulcer[Q]** • **Gastric adenocarcinoma[Q]**	• **MALT lymphoma[Q]**

3. **Ans. b. Metaplastic polyp**
4. **Ans. a. Low grade MALT lymphoma**
5. **Ans. d. Warthin-Starry stain**
6. **Ans. b. Type B gastritis** *(Ref: Bailey 26/e p1031, 25/e p1053; Harrison 18/e p2458)*

Chronic Gastritis	
Type A	**Type B**
• **Autoimmune** etiology[Q] • **Circulating antibodies** to the **parietal cell** results in the **atrophy** of the **parietal cell mass**, resulting in **hypochlorhydria** and ultimately **achlorhydria[Q].** • Associated with **pernicious anemia[Q]** • Primarily involves **body** and **fundus[Q]**	• Associated with **H. pylori infection[Q]** • Primarily involves **antrum[Q]**

- Type **A**: **A**utoimmune, **A**ntibodies, **A**trophy, **A**chlorhydria, **A**nemia
- Type **B**: **B**acteria

7. **Ans. b. Gastric metaplasia**
8. **Ans. b. Obligate parasite on gastric mucosa**
9. **Ans. d. Hypertrophic gastritis**
10. **Ans. a. Low grade MALT lymphoma**
11. **Ans. a. MALTomas**

PEPTIC ULCER ETIOLOGY AND CLINICAL FEATURES

12. **Ans. d. Pernicious anemia** *(Ref: Sabiston 19/ep1191-1201; Schwartz 10/e p1053-1073, 9/e p907-922; Bailey 26/e p1032-1036, 25/e p1054-1060; Shackelford 7/e p701-718)*

Gastric Ulcer	Duodenal Ulcer
• **Etiology:** – Atrophic gastritis – **H. pylori (75%)**[Q] – **Smoking, Alcohol**[Q] – **Lower socioeconomic status**[Q] – Altered mucosal barrier function (**NSAIDs**)[Q] – There is either **normochlorhydria** or **achlorhydria**[Q] – **Cirrhosis**[Q]	• **Etiology:** – **Stress, anxiety**: **'hurry, worry, curry'**[Q] – **H. pylori (90%)**[Q] – **NSAIDs, steroids**[Q] – Blood group **O+ve**[Q] – **Endocrine**: **Zollinger-Ellison syndrome**, **MEN-1, Cushing's syndrome, hyperparathyroidism**[Q] – **Alcohol, smoking, vitamin deficiency**[Q] – **Chronic pancreatitis, Cirrhosis**[Q]
• **MC Site:** – **Lesser curvature** along the **incisura angularis (Type 1)**[Q]	• **MC site:** – **1st part** of **duodenum** (**overall MC site** for **peptic ulcer**)[Q]
• Clinical features: – **Equal** in both sexes – **Pain in** the **epigastrium after** taking **food**[Q]; relieved by vomiting – Pain is uncommon during night – **Hematemesis** common – Appetite good, but **hesitant to eat** as eating leads to pain that results in **loss of weight**[Q]	• **Clinical features:** – More common in **males**[Q] – **Pain** in early morning, decreases after food (**hunger pain**[Q]) – Pain **common during night**[Q] – **Melena** common – **Appetite good**, eats more frequently and there is **weight gain**[Q]
• **Features on Barium meal:** – **Niche** on **lesser curve** with **notch** on **greater curve**[Q] – Regular/round margin of ulcer create **spoke wheel pattern**[Q] – **Overhanging mucosa** at the margins of a benign gastric ulcer projects inwards, towards the ulcer: **Hampton's line**[Q] – **Converging mucosal folds** at the **base of the ulcer**[Q]	• **Features on Barium meal:** – **Deformed** or **absent duodenal cap** (because of spasm)[Q] – Appearance of **trifoliate duodenum** due to **secondary duodenal diverticula**[Q]
• **Complications:** – **Perforation**: **MC complication** of **gastric ulcer** (Into **lesser sac**)[Q] – **Hour glass contracture:** Exclusively in women due to **cicatricial contracture** of **lesser curve ulcer**[Q] – **Tea pot stomach (hand bag stomach): Cicatrisation** and **shortening of the lesser curvature**[Q] – **Malignant transformation**[Q]	• **Complications:** – **Bleeding: MC complication,** on **posterior wall, gastro-duodenal artery**[Q] is most commonly involved – **Perforation**: More on **anterior wall,** if posterior, into pancreas – **Gastric outlet obstruction** due to **pyloric stenosis**-least common[Q] – Duodenal ulcers are **benign (No malignant transformation)**[Q]

Specific Chronic Disorders Associated with PUD	
With strong associations	**With possible associations**
• Systemic mastocytosis[Q] • Chronic pulmonary disease[Q] • Chronic renal failure[Q] • **Cirrhosis**[Q] • Nephrolithiasis[Q] • Alpha1-antitrypsin deficiency[Q]	• **Hyperparathyroidism**[Q] • Coronary artery disease • Polycythemia Vera • Chronic pancreatitis[Q]

13. Ans. c. Plummer-Vinson syndrome

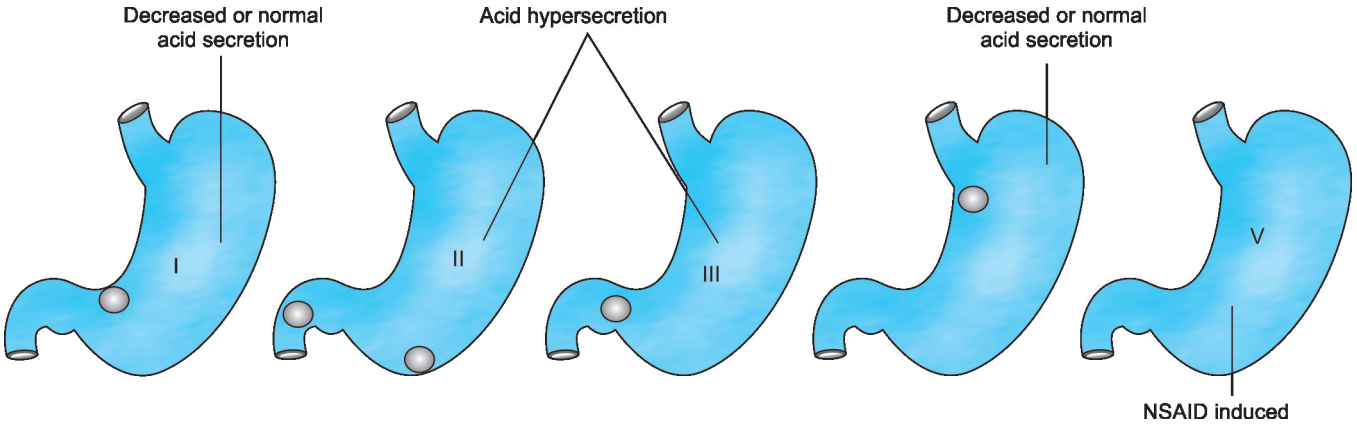
14. Ans. b. Gastric acid; c. Alcohol abuse; e. Smoking

Pathophysiologic Abnormalities in Peptic Ulcer

Duodenal Ulcer	Gastric Ulcer
• **Decreased duodenal HCO_3 secretion** (**MC**)[Q] • **Increased nocturnal acid secretion**[Q] • **Increased** duodenal **acid load**[Q] • Increased **day time acid secretion** • Increased pentagastrin-stimulated MAO • Increased gastric emptying • Decreased pH inhibition of Gastrin release	• **Increased** serum levels of **pepsinogen II**[Q] • **Increased duodenogastric reflux**[Q] • **Decreased** gastric **parietal cell mass** • Decreased maximal acid output

15. Ans. a. 1st part of duodenum

16. **Ans. d. Lesser curvature near incisura angularis** *(Ref: Sabiston 19/e p1199)*



Modified Johnson's Classification of Gastric Ulcer		
Type	**Location**	**Acid Secretion**
I	**Lesser curvature, near incisura angularis (MC)**Q	Low
II	Body of the **stomach** and **duodenum**Q	**High**Q
III	**Prepyloric**Q (within 2-3 cm of the pylorus)	**High**Q
IV	**High** on the **lesser curve**, near **GE junction**Q	Low
V	Anywhere, induced by medication (NSAIDs)	Low

Gastric ulcers

- **MC type: Type I gastric ulcer**, is located near **angularis incisura** on the lesser curvature.
- **NSAID ulcers (Type V)** typically occur in the **antrum** but may be located anywhere in the stomach and may be multiple in origin.
- Type **II** and **III**: **High acid secretion**Q
- Type **I** and **IV**: **Normal** or **low acid secretion**Q
- **Association:**
  - **Type I:** Blood group **'A'**Q
  - **Type II, III,** and **IV:** Blood group **'O'**Q

17. **Ans. a. Anterior aspect of the 1st part of duodenum**

18. **Ans. d. None** *(Ref: Harrison 18/e p2451-2452)*

- Documented **eradication of H. pylori** in patients with PUD is associated with a dramatic **decrease in ulcer recurrence** to **<10–20%** as compared to **59% in GU patients** and **67% in DU patients** when the **organism is not eliminated**Q.
- **Magnesium** containing drugs causes **diarrhea**Q
- **Aluminium**-containing drugs often cause **constipation**Q

19. **Ans. b. 2, 3 and 4 only**

20. **Ans. c. Duodenal ulcer; d. Gastric ulcer** *(Ref: Harrison 18/e p2445)*

Clinical Features of Peptic Ulcer

- **Epigastric pain** described as a **burning** or **gnawing discomfort** can be present in both **DU** and **GU**Q.
- The discomfort is also described as an ill-defined, aching sensation or as hunger pain.
  - The **typical pain pattern in DU** occurs **90 minutes** to **3 hours after** a **meal** and is **frequently relieved by antacids** or **food**Q.
  - **Pain** that **awakes** the **patient from sleep** (between **midnight** and **3 A.M.**) is the **most discriminating symptom,** with **two-thirds of DU patients** describing this complaintQ.
- The **pain pattern** in **GU patients** may be different from that in DU patients, where **discomfort** may actually be **precipitated by food**Q.
- **Nausea** and **weight loss** occur **more commonly in GU patients**.

21. **Ans. b. Type III gastric ulcer**

22. **Ans. a. Type I**

23. **Ans. c. Type 3**

24. **Ans. a. Duodenal ulcer**

PEPTIC ULCER COMPLICATIONS

25. Ans. c. Duodenotomy with ligation of bleeding vessels, truncal vagotomy and pyloroplasty *(Ref: Sabiston 19/e p1195-1196; Schwartz 9/e p917-918; Bailey 26/e p1040-1042, 25/e p1062-1063; Shackelford (2012) 7/e p711-713)*

Complications of Peptic Ulcer
• **Intractability** (Non-healing)
• **Bleeding: MC complication** of **peptic ulcer**Q
• **Perforation: MC complication** of **gastric ulcer**Q
• **Gastric outlet obstruction** (Rare)

Treatment of Bleeding Duodenal Ulcer {Shackelford (2012) 7/e p711-713}

- The **first priority** during emergency surgery for a **bleeding duodenal ulcer** is **control of** the **bleeding site**Q.
- **If endoscopy** has **failed to precisely identify** the **source** of hemorrhage, a **pyloroduodenotomy** may be **necessary to inspect** the **duodenal bulb** and **gastric antrum**Q.
- The **gastroduodenal artery** is the **usual source of bleeding**, which should be **controlled by placement of suture ligatures**Q.

> - Once the bleeding has been addressed, a **definitive acid-reducing operation** may be **performed**Q. With the identification of H. pylori, the utility of a vagotomy has been questioned. **The data,** however, **suggest that, even in the era of H. pylori** and our **ability to eradicate it, a TV perhaps should be performed** in those patients with a **bleeding duodenal ulcer.** There are several **reasons for this recommendation:**
> - **Only 40% to 70%** of patients with a **bleeding duodenal ulcer** are **positive for H. pylori**Q.
> - **H. pylori testing** in the setting of an **acute hemorrhage** is **less reliable**Q, with the CLO (Campylobacter-like organism) test having a false-negative rate of 18% versus 1% in those not actively bleeding
> - **If an acid-reducing procedure** is **not performed**, up to **50% of patients are at risk of recurrent bleeding**Q
> - **Conflicting evidence** that **H. pylori treatment changes** the **risk of recurrent bleeding**Q.

- **In contrast to other situations**, the **argument for performing** a **less aggressive operation** in the **face of massive bleeding exposes** the **patient to a high rebleeding risk post-surgery**Q.

> - Because it is simple to open the pylorus in a longitudinal fashion, **TV with pyloroplasty** is the **most frequently used operation** for **bleeding duodenal ulcer**Q.

- **The pyloric vein of Mayo** is virtually **always present on** the **anterior surface** of the **inferior pylorus**Q.

26. Ans. b. Gastroduodenal artery *(Ref: Sabiston 19/e p1195-1196; Schwartz 10/e p1053-1073, 9/e p917-918; Bailey 26/e p1042-1043, 25/e p1064; Shackelford 7/e p711-714)*

Bleeding Peptic Ulcer

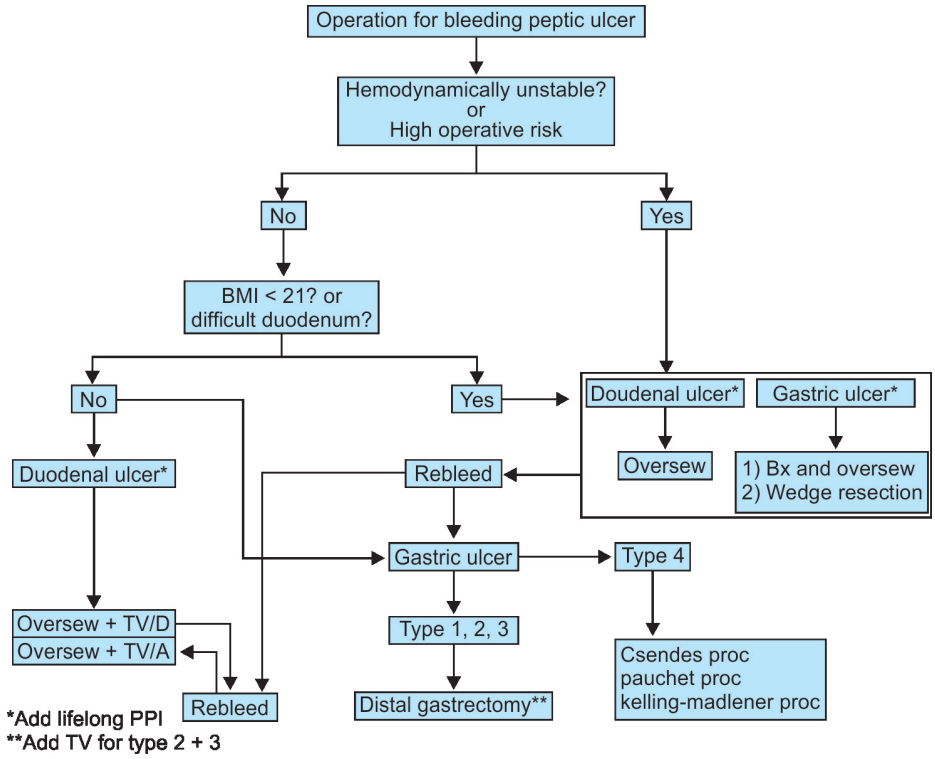
- **Bleeding: MC indication** for **operation** and **principal cause** of **death** in **PUD** patientsQ.

> - The most significant hemorrhage occurs when **duodenal** or **gastric ulcers** penetrate into branches of the **gastroduodenal artery** or **left gastric artery**, respectivelyQ.

- **Incidence** of peptic ulcer bleeding **decreased over past decade**, but **mortality** was **stable** for both gastric and duodenal ulcer bleeding, higher in patients of advanced age.
- **Cause of death**: **Multiple-system organ failure** (not the exsanguinating hemorrhage)

Treatment

- **Irrigation** with **room temperature saline** to lyse red cells in an effort to return clear fluid and to allow for the performance of endoscopy.
- **Figure-of-eight sutures to ligate** the **gastroduodenal artery**Q. A **'U' stitch** is placed in the ulcer base to **occlude pancreatic branches** of the gastroduodenal artery.
- **Truncal vagotomy** and **pyloroplasty** is the most frequently used operation for **bleeding duodenal ulcer**Q



27. **Ans. c. Perforation**

28. **Ans. b. Duodenum**

29. **Ans. a. Omental bursa (lesser sac)** *(Ref: Bailey 26/e p1040, 25/e p1062; Schwartz 9/e p921)*

- **Gastric ulcers perforate into** the **lesser sac**, which can be particularly **difficult to diagnose**Q.
- A **gastric ulcer perforates into** the **lesser sac**Q, then no generalized peritonitis can be seen but misleading symptoms may appear.

30. **Ans. a. Gastric ulcer with bleeding** *(Ref: Harrison 18/e p2444)*

- **Hypotension** in an **elderly patient** with history of **aspirin intake** and complaints of **black stool** suggests **GI bleeding** due to **drug induced gastritis**.
- **Bleeding peptic ulcer** due to **NSAIDs** is **more frequent in** individuals **>60 years** of age due to increased use of NSAIDs in this group.

31. **Ans. a. IV fluids; c. Immediate surgery; e. IV pantoprazole** *(Ref: Sabiston 19/e p1196; Schwartz 10/e p1068, 9/e p921; Bailey 26/e p1041-1042, 25/e p1062-1063; Shackelford 7/e p713-716)*

Management of Perforated Peptic Ulcer

- **Perforated peptic ulcer** usually presents as an **acute abdomen.**
- Initially, a **chemical peritonitis** develops from the **gastric** and/or **duodenal secretions**, but **within hours a bacterial peritonitis supervenes**.
- **Fluid sequestration** into the **third space** of the inflamed peritoneum can be impressive, and **fluid resuscitation is mandatory**Q.
- The patient is in **obvious distress**, and the abdominal examination shows **peritoneal signs**.
- Usually, **marked involuntary guarding** and **rebound tenderness** is evoked by a gentle examination.

Diagnosis

- **Upright chest x-ray** shows **free air** in about **80%**Q of patients.

Treatment

- **Nasogastric aspiration**, **analgesia** and **antibiotics**, **resuscitated with isotonic fluid, antisecretary agents (PPI,** H_2 receptor antagonist)

- **Surgery** is **almost always indicated**[Q].
- **Sometimes**, the **perforation has sealed spontaneously** by the time of presentation, and **surgery can be avoided** if the **patient is doing well**.
- **Non-operative management** in:
  - **Objective evidence** that the **leak has sealed** (i.e., **radiologic contrast study**)[Q]
  - **Absence of clinical peritonitis**[Q].

32. **Ans. b. 75%** *(Ref: Schwartz 9/e p2644)*
    - **Upright chest x-ray** shows **free air** in about **80%** of patients of perforated peptic ulcer.
33. **Ans. b. Hemorrhage**
34. **Ans. b. X-ray abdomen**
35. **Ans. c. Dilution of acid in the peritoneal cavity**
36. **Ans. a. Omental bursa**
37. **Ans. c. Basal pneumonia** *(Ref: Shackelford 7/e p714)*
38. **Ans. a. Gastroduodenal artery**

PEPTIC ULCER DIAGNOSIS AND TREATMENT

39. **Ans. a. Before breakfast** *(Ref: Sabiston 19/e p1194; Schwartz 10/e p971,972,979, 9/e p913; Bailey 26/e p1035, 25/e p1057)*
PPIs are taken before breakfast.

Proton Pump Inhibitors

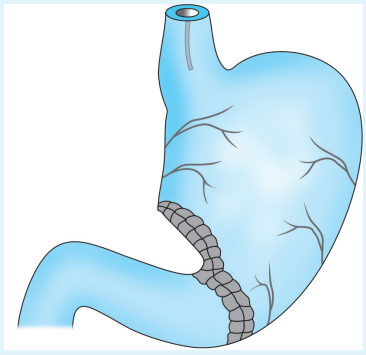
- **Most potent antisecretory agents**, **substituted benzimidazoles**, also known as the **proton pump inhibitors**[Q].
- **Covalently bind** to the **catalytic subunit** of the **proton pump** and **negate all types of acid secretion**[Q]
- PPIs provide **more complete inhibition of acid secretion than the H_2-receptor antagonists**[Q].
  - **Inhibition of acid secretion** is also **more prolonged** because of the **irreversible inhibition of the enzyme caused by** the **covalent bond to the proton pump**[Q].
  - **PPIs** are **more effective during the day**, generally **prescribed before breakfast**[Q].
- PPIs **require an acidic environment**[Q] within the gastric lumen in order to become activated and bind to the proton pump at the secretary canaliculus.
  - Utilization of **antacids** or **H_2-receptor antagonists in combination with PPIs** could have **deleterious effects** by **promoting** an **alkaline environment** and thereby **preventing activation** of the **PPI**[Q].
- Consequently, **antacids** and **H_2-receptor antagonists should not be used in combination with PPIs**[Q].

40. **Ans. a. Highly selective vagotomy** *(Ref: Sabiston 19/e p1197-1198; Schwartz 10/e p1093-1094, 9/e p913-917; Bailey 26/e p1037-1038, 25/e p1058-1059; Shackelford 7/e p720-729)*

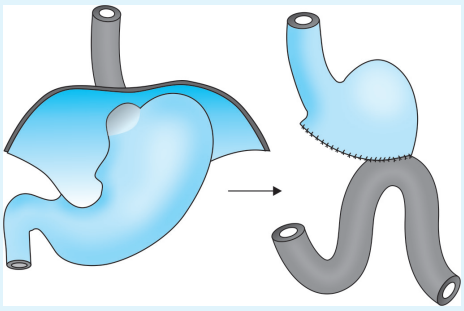
Types of Vagotomy		
Highly Selective Vagotomy	***Vagotomy and Drainage***	***Vagotomy and Antrectomy***
• **Procedure of choice** for **chronic** or **intractable** duodenal **ulcers**[Q] • **Nerves of Latarjet supplying** the **antrum** are **preserved**[Q] (and hence gastric motility)	• **TV** is performed by **division** of **left** and **right vagus nerves above** the **hepatic** and **celiac branches**[Q] just above the GE junction.	• **Procedure of choice** for **recurrent** duodenal **ulcers**[Q] • **Lowest recurrence** rate[Q]
• **Drainage procedure** is **not required**[Q] • **Lowest mortality rate** and **side effects**[Q] • **Minimal chances** of **dumping syndrome** and **gastric atony**[Q] • Relatively **high recurrence**[Q]	• **MC operation performed** for **duodenal ulcer**[Q] • **Intermediate morbidity** and **recurrence rate**[Q]	• **High mortality and morbidity**[Q]

41. **Ans. a. Nerves of Latarjet**
42. **Ans. a. Billroth I operation** *(Ref: Sabiston 19/e p1198-1199; Schwartz 10/e p1120, 9/e p916; Bailey 26/e p1036-1038, 25/e p1059-1060; Shackelford 7/e p733-737)*

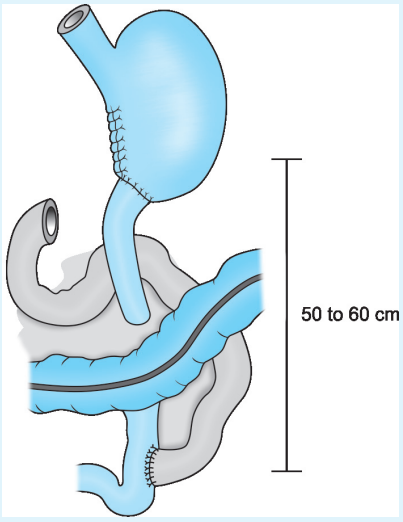
Operations for Gastric Ulcer	
Billroth-I Gastrectomy	***Billroth-II Gastrectomy***
• **Gastroduodenostomy**[Q] • Performed when there is a **sufficient portion** of the **upper duodenum remaining**[Q] • **Remaining portion of the stomach** is **reattached to the duodenum**[Q]	• **Loop gastrojejunostomy**[Q] • Performed if the **stomach cannot be reattached** to the **duodenum**[Q] • **Remaining portion of the duodenum** is **sealed off**, a **hole is cut into** the **jejunum** and the **stomach is reattached**[Q] at this hole.



Billroth I (Gastroduodenal) anastomosis



Billroth II Gastectomy (Loop Gastrojejunostomy)



Roux-en-Y Gastrojejunostomy

Polya Gastrectomy

- A type of **posterior gastroenterostomy** which is a **modification of Billroth II operation**.
- **Resection of 2/3** of the **stomach with blind closure** of the **duodenal stump** and **retrocolic anastomosis** of the **full circumference** of the **open stomach to jejunum**[Q].

43. Ans. a. Finney's Pyloroplasty *(Ref: Sabiston 19/e p1251-1252; Schwartz 9/e p916; Shackelford 7/e p895)*

Finney Pyloroplasty is performed in patients with a J-shaped stomach or extensive scarring and narrowing of a significant portion of the duodenal bulb.

Drainage Procedures in Peptic Ulcers

- **Heineke-Mikulicz Pyloroplasty: Most commonly performed** drainage procedure[Q].
- **Finney Pyloroplasty:** Performed in patients with a **J-shaped stomach** or **extensive scarring** and **narrowing of a significant portion** of the **duodenal bulb**[Q].
- **Jaboulay Gastroduodenostomy:** It involves an anastomosis of the **distal end** of the **stomach to the first** and **second portions of** the **duodenum**, done in **severely scarred** or **deformed pylorus** or **duodenal bulb**[Q].

44. Ans. d. 80 *(Ref: Sabiston 19/e p1191; Schwartz 9/e p908; Harrison 18/e p2442)*

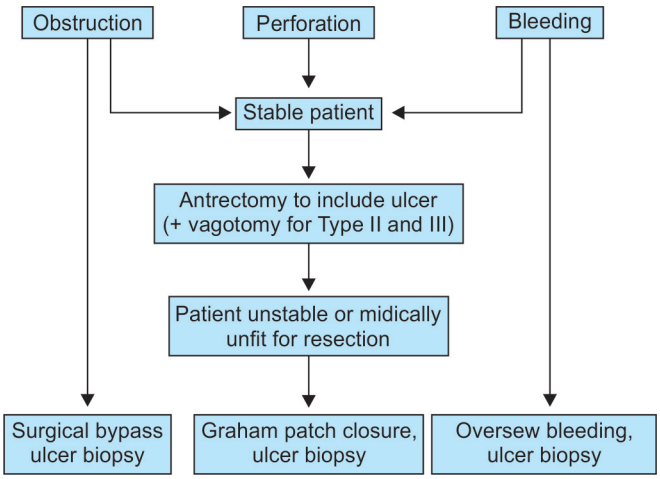
Association of H pylori with Peptic ulcer

- Harrison: **30-60% GUs** and 50-70% of DUs
- Sabiston: **75% GUs** and 90% DUs
- Schwartz: **70-90% GUs** and 90% DUs

45. Ans. c. Vitamin B12 deficiency

46. Ans. a. Pouchet procedure; b. Kelling-Madlener operation; c. Csendes procedure *(Ref: Sabiston 19/e p1200; Schwartz 9/e p913-916; Bailey 26/e p1036-1038, 25/e p1059-1060; Shackelford 7/e p708-710)*

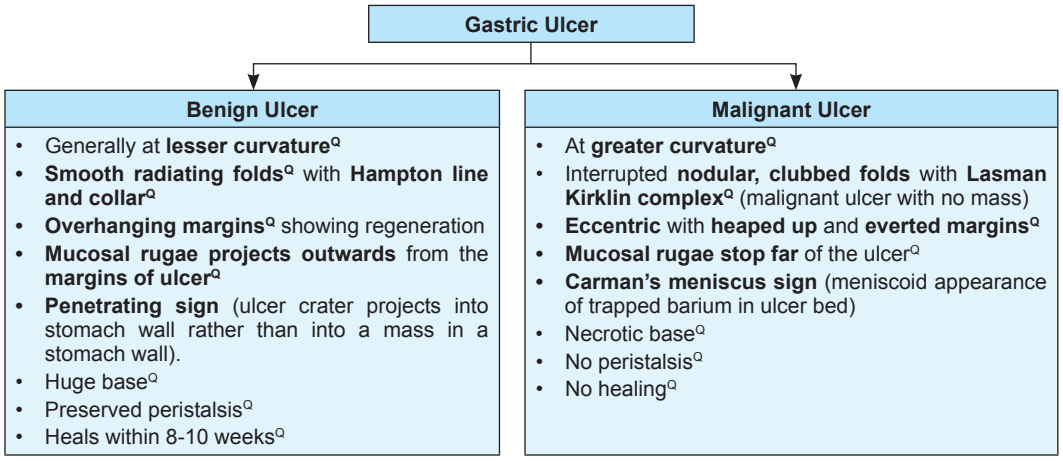
Elective Gastric Ulcer Operations	
Type	**Procedure**
Type I	• **Distal gastrectomy** with Billroth I or II reconstruction[Q]
Type II and **III**	• **Truncal vagotomy** plus **antrectomy**[Q]
Type IV	• **Schoemaker** procedure[Q] • **Pouchet** procedure[Q] • **Kelling-Madlener** procedure (For **unstable** patients[Q]) • **Csendes** procedure (For **stable** patients[Q])



47. Ans. a. Proximal two-thirds of stomach

48. Ans. c. Type IV ulcer most common type; e. 30% GU are associated with malignancy *(Ref: Harrison 18/e p2446; Chandrasoma Taylor 3rd/582, 597)*

- **MC type** of **gastric ulcer** is **Type I**, is located near **angularis incisura** on the **lesser curvature**[Q].
- **H. pylori colonization** is seen in **75-80%** of patients with **gastric ulcer**[Q].
- A **chronic duodenal ulcer never turns malignant**, while **less than 1% of chronic gastric ulcer** may **transform into carcinoma**.



Gastric Ulcer on Double Contrast upper GI series

Benign Ulcer:

- In benign gastric ulcer, **mucosal folds radiate from crater** in sponge like manner[Q].
- Typically **benign ulcer craters** extend **beyond** the **luminal margin** of the stomach and have **radiating gastric folds**, **ulcer mound** due to mucosal edema, **ulcer collar**[Q] (a lucent ring that seperates ulcer crater from gastric mucosa), **Hampton's line** and **Penetrating sign**[Q] (ulcer crater projects into stomach wall rather than into a mass in a stomach wall).

Malignant Ulcer:

- In **malignant ulcers**, **gastric folds** are **amputated** or **clubbed** and do **not reach** the **edge** of ulcer crater have **parallel gastric folds.**
- Malignant ulcers are characterized by **Carman's meniscus sign**[Q] (meniscoid appearance of trapped barium in ulcer bed), **intraluminal crater**[Q] (crater erodes into the mass within the gastric cavity) and **Kirklin complex**[Q] (heaped up margins touching bed causes lucent rim around ulcer on barium meal).

Remember:

- **Benign BPH:** (**B**enign ulcer- **P**enetrating sign and **H**ampton's hump)
- **Malignant CIK:** (**C**arman's meniscus sign, **I**ntraluminal crater, **K**irklin complex)

49. Ans. c. Anti-H. pylori drugs must be included in the treatment regime; d. H. pylori is known to increase incidence of gastric malignancies

50. Ans. d. Ipratropium *(Ref: Sabiston 19/e p1194; Schwartz 10/e p1041-1044, 9/e p913-915; Bailey 26/e p1035, 25/e p1057)*

Drugs that Reduce Gastric Acid Secretion

- Proton pump inhibitors[Q]
- Muscarinic-3 receptors antagonists[Q]
- Somatostatin[Q]
- Histamine-2 receptor antagonists[Q]
- Prostaglandin E-1 receptor agonists[Q] (**Misoprostol**)

- **Alginates**[Q] are **combined with antacids** for use in **reflux esophagitis** because they are believed to **increase adherence to esophageal mucosa**.

51. Ans. a. Hypotonic duodenography; b. Barium meal; d. Upper GI endoscopy *(Ref: Sabiston 19/e p1193-1194; Schwartz 10/e p207, 9/e p911)*

Duodenal Ulcers

- **Duodenal ulcers** are **best diagnosed by** upper GI **endoscopy**[Q].
- **Double contrast barium studies** also yield **good results**
- **Barium studies** done for duodenal ulcers:
  - Double contrast **barium meal**
  - Double contrast **hypotonic duodenography**

52. Ans. d. Highly selective vagotomy

53. Ans. a. Truncal vagotomy and antrectomy

54. Ans. c. Truncal vagotomy and antrectomy

55. Ans. d. Duodenal erosion *(Ref" Harrison 13th (1994) /1351)*

Endoscopy

- **Fiber endoscopy** is especially **useful** in visualizing **postbulbar ulcers**, **giant duodenal ulcers**, and **stomal ulceration after partial gastrectomy**, all of which can be missed by X-ray.

56. Ans. d. Typical periodicity

57. Ans. b. Truncal vagotomy and antrectomy

58. Ans. c. Vagotomy + repair of perforation *(Ref: Sabiston 19/e p1195-1196; Schwartz 9/e p916-922; Bailey 26/e p1033-1034, 25/e p1054-1055; Shackelford 7/e p701-708)*

Duodenal Ulcer	
Complications	***Treatment***
Intractable	Highly selective vagotomy[Q]
Bleeding	**Truncal vagotomy** with **pyloroplasty**[Q] and oversewing of bleeding vessel
Perforated	**Omental patch repair** (with **Truncal vagotomy** in **stable** patients[Q])
Obstruction	(Rule out malignancy) • **Truncal vagotomy** with **antrectomy** is **ideal procedure**[Q] • **Truncal vagotomy** with **gastrojejunostomy** in cases of **inflammation** and **scarring** of duodenal bulb[Q]
Intractable or Bleeding	**Type I: Distal gastrectomy**[Q] **Type II** or **III: Truncal vagotomy** with **antrectomy**[Q]

Complications	Treatment
Perforated	**Type I:** • **Distal gastrectomy** in stable patients[Q] • Biopsy and patch closure in unstable patients[Q] **Type II and III: Patch closure in unstable patients (Truncal vagotomy** with **antrectomy in stable patients)**[Q]
Obstruction	**Truncal vagotomy** with **antrectomy**[Q] (Rule out malignancy)

59. Ans. d. Duodenal ulcer *(Ref: Shackelford 7/e p704, 708; Schwartz 9/e p915)*

Operation for Peptic Ulcer

- **Hill and Baker procedure: Posterior truncal** vagotomy with **anterior HSV**[Q].
- **Taylor Procedure: Posterior truncal** vagotomy with **anterior lesser curve seromyotomy**[Q]. The technique is very suitable for a **laparoscopic** approach.

60. Ans. d. Graham's omentum patch repair
61. Ans. a. Proximal two-thirds of stomach
62. Ans. b. Vagotomy and antrectomy
63. Ans. c. Kelling Madlener procedure
64. Ans. c. Pyloroplasty done
65. Ans. a. Vagotomy + antrectomy
66. Ans. a. Megaesophagus treatment by esophageal mucosal resection

- **Ménétrier's disease** is associated with **hypochlorhydria (no use of HSV).**
- **Giant gastric ulcers** should be treated with **truncal vagotomy + antrectomy.**
- **Vagotomy**, irrespective if **truncal** or **highly selective**, only has a **temporary effect** in **stress ulceration**, consisting of multiple, punctate, superficial **erosions**, confined initially to the proximal **gastric mucosa**.

67. Ans. d. HSV

GASTRECTOMY AND COMPLICATIONS

68. Ans. a. Iron deficiency anemia *(Ref: Sabiston 19/e p1202-1204; Schwartz 10/e p1090-1094, 9/e p942-946; Bailey 26/e p1038-1040, 25/e p1060-1062; Shackelford 7/e p757-765)*

MC metabolic complication after gastrectomy is **iron deficiency anemia**.

Postgastrectomy/Vagotomy Syndrome

Secondary to Gastric Resection	Secondary to Gastric Reconstruction	Postvagotomy Syndrome
• **Dumping syndrome**[Q] • Metabolic disturbances[Q]	• **Afferent loop** syndrome[Q] • **Efferent loop** obstruction[Q] • **Alkaline reflux gastritis**[Q] • **Retained antrum**[Q] syndrome	• Postvagotomy **diarrhea**[Q] • Postvagotomy **gastric atony**[Q] • **Incomplete vagal transection**[Q]

69. Ans. a. Vitamin B_{12} deficiency *(Ref: Sabiston 19/e p1203; Schwartz 9/e p946; Bailey 26/e p1040, 25/e p1060-1062; Shackelford 7/e p759-760)*

Metabolic Complications after Gastrectomy

- **Metabolic complications** are **more common** and **serious after partial gastrectomy**[Q] than after vagotomy.
- **More common** in **Billroth II**[Q] >Billroth I procedure
- **Severity** is **directly related to** the **extent of gastric resection**[Q].
- **MC metabolic defect** appearing **after gastrectomy**: **Anemia**[Q]

Anemia

- **MC metabolic defect** appearing **after gastrectomy**: Anemia[Q]
- **Iron deficiency anemia (IDA)** is **more common than vitamin B_{12} deficiency anemia**[Q].

Iron deficiency anemia:

- **More than 30%** of **patients** undergoing gastrectomy **suffer from IDA**[Q]
- **Cause:** Combination of **decreased iron intake**, **impaired iron absorption**, and **chronic blood loss**[Q]

- Addition of **iron supplements** to the patient's diet **corrects IDA**[Q].

Megaloblastic anemia:

- **Megaloblastic anemia** can occur when **>50%**[Q] of the **stomach is removed** such as occurs during **subtotal gastrectomy**[Q].
- **Vitamin B_{12} deficiency** occur **secondary to poor absorption** of the substance owing to **lack of intrinsic factor secretion** in the gastric juice.
- **Treatment**: **Intramuscular injections** of **cyanocobalamin**[Q] every 3 to 4 months indefinitely because its administration orally is not a reliable route.

Folate deficiency:

- **Folate deficiency** is **rare** after gastric resection
- **May coexist with** either an iron or vitamin B_{12} deficiency.
- Usually be corrected by **dietary supplementation**.

Impaired Absorption
• Common metabolic disturbance after gastric resections is **impaired absorption of fat**. • **Steatorrhea** may occur as a result of **inadequate mixing of bile salts** and **pancreatic lipase** with ingested fat **because of** the **duodenal bypass**[Q]. • **Deficiency** in uptake **of fat-soluble vitamins** may also occur[Q]. • **Osteoporosis** and **osteomalacia** have also bee`n observed after gastric resection and appear to be **caused by deficiencies** in **calcium**[Q]. • If **fat absorption** is also present, the **calcium malabsorption** is further **aggravated** because **fatty acids bind calcium**[Q]. • **Treatment: Calcium** supplements with **vitamin D**[Q]

70. Ans. c. Vitamin B 12 deficiency **71. Ans. c. HSV** **72. Ans. d. Osteomalacia**

73. Ans. b. Presence of hypertonic content in small intestine *(Ref: Sabiston 19/e p1203; Schwartz 10/e p1090-1092, 9/e p942-944; Bailey 26/e p1039, 25/e p1060-1061; Shackelford 7/e p757-759)*

Dumping Syndrome

- Dumping syndrome refers to a constellation of **post-prandial symptoms** occurring due to **accelerated emptying** (dumping) of **hyperosmolar stomach contents** into the small bowel.
- It is usually seen in operation which destroys the pyloric sphincter (i.e **gastrectomy**, **antrectomy** and **drainage procedures**)[Q].
- It also affects a small percentage of patients with highly selective vagotomy due to loss of receptive relaxation of stomach.

Dumping Syndrome

Early Dumping	Late Dumping
• It occurs **immediately after meals** (after **15-30 minutes**)[Q] • Dumping of **hyperosmolar contents** into the **small bowel**[Q] results in rapid fluid influx from the circulation into the gastrointestinal tract. This leads to **acute intestinal distention** and peripheral and splanchnic vasodilatation[Q]. • This gives rise to **vasomotor** and **abdominal symptoms**: Epigastric fullness, sweating, light headedness, tachycardia, diarrhea. • Symptoms can be **ameliorated by lying down** and **saline infusion**[Q].	• It is seen **2-3 hrs after meal**[Q] • Occurs due to **reactive hypoglycemia**[Q]. • The carbohydrate load in the small bowel causes a rise in plasma glucose, which in turn, causes high insulin levels leading to hypoglycemia. • Symptoms are **relieved by administration of sugar**[Q].

Management

- **Dietary management**: Diet therapy is done to reduce jejunal osmolality.
  - **Multiple small meals**, food **low in carbohydrate** and **rich in fat** and **proteins** are taken[Q].
  - **Liquids during meals** should be **avoided**[Q].
- **Somatostatin analogues** (**octreotide**):
  - Diet therapy is usually successful but if it fails, the patient is started on octreotide.
- **Surgery:**
  - Surgery is **rarely required**[Q] as most of the patients improve with time, dietary management and Octreotide.
  - **Surgical procedures** used to treat dumping are:
    - ❖ Use of an **antiperistaltic loop of jejunum** between the **residual gastric pouch** and **intestine**
    - ❖ Conversion of **Billroth II to Billroth I** anastomosis
    - ❖ Conversion to **Roux-en-Y-anastomosis**.

74. **Ans. c. Starch is beneficial**

75. **Ans. d. Surgery is usually indicated**

- **Surgery** is **rarely required** in **dumping** or **post-cibal syndrome,** as **most of the patients improve with time, dietary management** and **octreotide**[Q].

76. **Ans. b. 4th day** *(Ref: Shackelford 7/e p930, 944)*

DUODENAL STUMP BLOWOUT

- Duodenal stump blowout is **massive leakage** from **duodenal stump** following **Billroth-II gastrectomy**[Q].

Clinical Features:

- It usually occurs on **4th to 7th** post-operative **day**[Q].
- Usually presents as sudden intense thoracoabdominal pain, sudden elvation in pulse and temperature or generalized deterioration of condition.

Treatment:

- **Adequate drainage** must be instituted **immediately,** which is done by putting a **catheter** through an incision **below the right costal margin**[Q].
- **TPN** should be instituted and attention should be directed towards **fluid and electrolyte therapy**[Q].
- **Fistula closure** can be anticipated **within 2-3 weeks**[Q].

77. **Ans. d. Fluid loss**

78. **Ans. b. Loss of storage capacity**

79. **Ans. d. Anastomotic hemorrhage**

80. **Ans. a. Billroth-II**

81. **Ans. c. Gastrojejunocolic fistula** *(Ref: Shackelford 6/e p1094, 1110; Bailey 26/e p1039, 25/e p1060)*

GASTROJEJUNOCOLIC FISTULA

- **Gastrojejunocolic fistula** may **form between** the **transverse colon** and the **upper jejunum after** a **Billroth II surgical procedure**[Q]. (The Billroth procedure attaches the jejunum to the remainder of the stomach).

Clinical Features:

- The **symptoms of GJF** are **diarrhea**, **epigastric pain** and discomfort, **gastrointestinal bleeding**, **feculent eructation**, **fecal vomiting**, **weight loss** and weakness[Q].
- **Anemia, leukocytosis**, **electrolyte disturbances** and **hypoalbuminemia** are common laboratory findings[Q].

Diagnosis:

- **Barium enema** is **diagnostic of GJC fistula**[Q].

- **Investigations used**: **Barium enema** and **endoscopy**[Q]
- The **success rate** of **barium enema in correctly diagnosing** the **fistula** is **95-100%**[Q]

Treatment:

- The **historical approach** was **2-3-staged operations** even involving a **preliminary diversion colostomy** in order to **ameliorate the nutritional status** of the patient and to **decrease mortality**[Q]
- Three staged operation: (1) colostomy (2) resection of the fistula (3) colostomy closure
- Today, because of the **parenteral** and **enteral support treatments** and the developments in intensive care conditions, **one-stage resection can be applied**[Q]

82. **Ans. c. Billroth-I gastrectomy**

83. **Ans. a. Clean contaminated wound** *(Ref: Sabiston 19/e p286; Schwartz 9/e p219)*

Surgical Wound Classification According to Degree of Contamination	
Wound Class	**Definition**
Clean	• An **uninfected operative wound** in which **no inflammation** is encountered and the **respiratory, alimentary, genital**, or **infected urinary tract** is **not entered**[Q]. • **Wounds** are **closed primarily**[Q] and, if necessary, drained with closed drainage. • **Surgical wounds after blunt trauma**[Q] should be included in this category if they meet the criteria
Clean-contaminated	• An operative wound in which the **respiratory, alimentary, genital,** or **urinary tract is entered**[Q] under **controlled conditions** and **without unusual contamination**[Q]

Contaminated	• **Open, fresh, accidental wounds**[Q] • In addition, **operations with major breaks** in **sterile technique** or **gross spillage from** the **gastrointestinal tract** and **incisions in** which **acute, nonpurulent inflammation is encountered**[Q] are included in this category
Dirty	• **Old traumatic wounds** with **retained devitalized tissue** and those that involve **existing clinical infection** or **perforated viscera**[Q]. • This definition suggests that the **organisms causing postoperative infection** were **present in** the **operative field before** the **operation**[Q]

84. Ans. a. Hernia surgery

85. Ans. c. Complication of partial gastrectomy

86. Ans. c. Somatostatin analogue *(Ref: Schwartz 9/e p943-944; Bailey 26/e p1039, 25/e p1061; Shackelford 7/e p760)*

Postvagotomy Diarrhea

- About **30%** or more of patients **suffer from diarrhea after gastric surgery**[Q].
- For most patients, it is **not severe** and **usually disappears within** the **first 3 to 4 months**[Q].
- **Vagotomy** is associated with **alterations in stool frequency**[Q].
- **Truncal vagotomy** results in **increased frequency** of **daily bowel movements** in **30-70%** of **patients**[Q].

Treatment:

- **Postvagotomy diarrhea resolves over time** in most of the patients[Q].
- **If symptoms fail to resolve**:
  - **Cholestyramine**[Q] (an anionic exchange resin that absorbs bile salts rendering them unabsorbable and inactive)
  - **Octreotide**[Q] can be used for **severe postvagotomy diarrhea**

87. Ans. c. Billroth *(Ref: Sabiston 19/e p1198; Schwartz 10/e p1120, 9/e p916; Bailey 26/e p1036-1038, 25/e p1057-1058; Shackelford 7/e p731-742)*

Gastrectomy

- The **first successful gastrectomy** was performed **by Theodor Billroth**[Q] in **1881** for **cancer** of the **stomach.**
- Historically, **gastrectomies were used to treat peptic ulcers**. These are **now usually treated with antibiotics,** as it was recognized that they are usually due to Helicobacter pylori.
- In the past a **gastrectomy** for peptic ulcer disease **was often accompanied by a vagotomy**, **to reduce acid production,** nowadays, **managed with PPIs.**
- Gastrectomies are performed **to treat cancer** and **perforations** of the stomach wall.
- In **severe duodenal ulcers** it may be necessary to **remove the pylorus** and the **upper portion** of the **duodenum**.

  - If there is a **sufficient portion** of the **upper duodenum remaining**, a **Billroth I procedure** is **performed**, where the **remaining portion of the stomach** is **reattached to the duodenum** before the bile duct and the duct of the pancreas (**Gastroduodenostomy**)[Q]

- If the **stomach cannot be reattached** to the **duodenum**, a **Billroth II** is performed, where the **remaining portion of the duodenum** is **sealed off**, a **hole is cut into** the **jejunum** and the **stomach is reattached** at this hole (**Loop gastrojejunostomy**).

88. Ans. b. Increased intestinal secretion

89. Ans. c. Hyperglycemia

90. Ans. d. Large volume of hyperosmotic fluid in the intestine

UPPER GI BLEED

91. Ans. b. Low urine output *(Ref: Sabiston 19/e p1161; Schwartz 9/e p912-915)*

BLEED risk Classification

- To **predict risk** of **rebleeding** and **mortality** in **upper GI bleed**
- Predicts **risk on initial presentation** based on **five criteria**:
  - Ongoing **bleeding**[Q]
  - **Low systolic blood pressure**[Q] (**< 100** mm Hg)
  - **Elevated PT**[Q] (**> 1.2 times** the control value)
  - **Altered mental status**[Q]
  - Presence of an **unstable comorbid disease**[Q] (any ongoing organ system abnormality that would require ICU admission e.x. myocardial ischemia, hepatic dysfunction).

To Predict Rebleeding and Mortality in Peptic Ulcer

Blatchford scale

- **The Blatchford scale** uses clinical parameters only and is calculated from patient's **hemoglobin**, blood **urea**, **systolic** blood pressure and **pulse** rate on admission and the presence or absence of **melena** or **syncope** as well as of evidence of **cardiac** or **hepatic failure**.
- (**HUSP** + **Melena/Syncope** + **Cardiac/Hepatic failure**)Q

Rockall and Baylor Score

- Consists of two components:
  - Pre-endoscopy scores
  - Post-endoscopy scores
- It consists of **comorbidity, age, shock, diagnosis** at time of endoscopy and **endoscopic stigmata** of recent hemorrhage. (**CASDE**)Q
- A **Pre-endoscopy score** based purely upon clinical factors of **co-morbidity, age** and **shock** gives a score of **0–7** with a step-wise increase in mortality.
- A **Post-endoscopy score** include the further **endoscopic** criteria of **diagnosis** and **stigmata of recent hemorrhage** and gives a total score of **0–11.**
- The initial (**pre-endoscopic**) **Rockall score** is **predictive of mortality**Q in patients with peptic ulcer bleeding.
- **Complete Rockall score** is **predictive of** peptic ulcer **rebleeding**Q.

Rockall and Baylor Score				
Variables	**0**	**1**	**2**	**3**
Age	**<60** years	**60-79** years	**> 80** years	
Shock	No shock	Tachycardia Systolic **BP > 100** **Pulse > 100**	Hypotension Systolic **BP < 100**	
Co-Morbidities	No	No	**Cardiac failure** **Ischemic heart disease**	**Renal failure** **Liver failure**
Diagnosis	No lesion identified Mallory-Weiss tear	All other	**Malignancy** of upper GI tract	
Major stigma of recent Hemorrhage	None or dark spot only	Blood in upper GI tract	**Adherent clot** or **visible spurting vessels**	

92. Ans. c. Adherent clot *(Ref: Sabiston 19/e p1165; Shackelford 7/e p711)*

The Forrest Classification (For Endoscopic Findings and Rebleeding Risk)		
Grade	Description	Rebleeding Risk
Ia	Active, **pulsatile** bleedingQ	**High**
Ib	**Oozing**Q, non-pulsatile bleeding	High
IIa	Non-bleeding **visible vessel**Q	**High**
IIb	Adherent **clot**Q	Intermediate
IIc	**Black dot**Q	Low
III	**Clean base**Q	Low

- **High rebleeding** risk: **I** and **IIa**Q
- **Intermediate risk**: **IIb**Q
- **Low risk**: **IIc** and **III**Q

93. Ans. c. Can detect causes in all cases *(Ref: Sabiston 19/e p1163; Schwartz 9/e p917; Bailey 26/e p1042, 25/e p1063-1064)*

Role of Endoscopy in Upper GI Bleed

- **Endoscopy**: **Foundation of diagnosis** and **management** of patients with **an upper GI bleed**Q

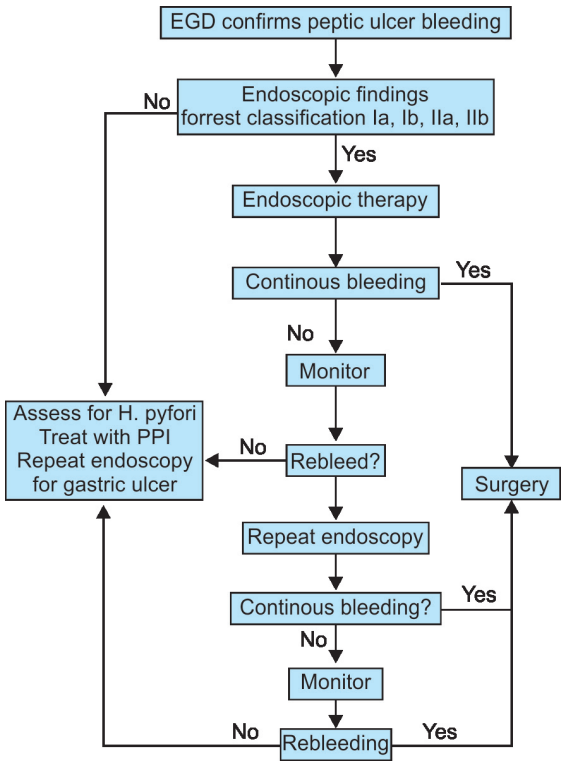
Early endoscopy (within 24 hours) results in

- **Reductions** in **blood transfusion requirements**Q
- **Decrease** in the **need for surgery**Q
- **Shorter length** of **hospital stay**Q

- In general, **20–35%** of patients undergoing endoscopy will **require a therapeutic endoscopic intervention**, and **5-10%** will eventually **require surgery**Q.

- **Best tool for localization** of the **bleeding source** is **endoscopy**[Q]
- In **1–2%** of **patients with upper GI hemorrhage,** the **source cannot be identified** because of **excessive blood impairing visualization** of the mucosal surface.
  - **Aggressive lavage** of the **stomach** with **room temperature normal saline solution before the procedure** can be helpful[Q].

94. Ans. a. Endoscopy



95. Ans. a. Gastric ulcer *(Ref: Sabiston 19/e p1164)*

Common Causes of Upper Gastrointestinal Hemorrhage			
Non-variceal Bleeding	(80%)[Q]	**Portal Hypertensive Bleeding**	(20%)[Q]
Peptic ulcer disease (MC)[Q]	**30–50%[Q]**	**Gastroesophageal varices[Q]**	**> 90%[Q]**
Mallory-Weiss tears	15–20%	Hypertensive portal gastropathy	< 5%
Gastritis or **duodenitis**	10–15%	Isolated gastric varices	Rare
Esophagitis	5–10%		
Arteriovenous malformations	5%		
Tumors	2%		
Other	5%		

96. Ans. b. Angiography can image bleeding at a rate of 0.05-0.1 ml/min or less *(Ref: Sabiston 19/e p1174)*

Selective angiography, using either the superior or inferior mesenteric arteries, **can detect hemorrhage** in the range of **0.5 to 1.0 mL/min.**

Mesenteric Angiography

- **Selective angiography**, using either the superior or inferior mesenteric arteries, **can detect hemorrhage** in the range of **0.5 to 1.0 mL/min**[Q].
- **Only employed** in the **diagnosis of ongoing hemorrhage**[Q].
  - **Particularly useful** in **identifying** the **vascular patterns of angiodysplasias**.
  - It may also be **used for localizing actively bleeding diverticula**[Q].

- **Catheter-directed vasopressin infusion** can provide **temporary control of bleeding**[Q], permitting hemodynamic stabilization, although as many as 50% of patients experience rebleeding when the medication is discontinued.
- It can also be **employed for embolization**[Q].
- **Complications**: Hematomas, arterial thrombosis, contrast reactions, and acute renal failure.

Radionuclide Scanning

- **Radionuclide scanning** with **technetium-99m** (^{99m}Tc)**-labeled RBCs** is the **most sensitive** but **least accurate method** for **localization of GI bleeding**Q.
- With this technique, the **patient's own RBCs** are **labeled** and **reinjected.**
- The **labeled blood** is **extravasated into** the **GI tract lumen**, creating a focus that can be **detected scintigraphically**Q.
- Initially, images are collected frequently and then at 4 hour intervals for up to 24 hours.
  - The **tagged RBC scan** can **detect bleeding** as slow as **0.1 mL/min** and is reported to be **more than 90% sensitive**Q.
- Unfortunately, the **spatial resolution is lacking**, and blood may move retrograde in the colon or distally in the small bowel.
- **Reported accuracy of localization** is **40-60%,** and it is particularly **inaccurate in distinguishing right- from left-sided colonic bleeding**Q.

97. Ans. d. CA stomach

98. Ans. c. Endoscopy can best diagnose it; d. Peptic ulcer is the MC cause; e. ↑ed BUN *(Ref: Sabiston 19/e p1161-1167; Schwartz 9/e p917; Bailey 26/e p1042-1043, 25/e p1063-1064; Shackelford 7/e p710-713)*

Management of Bleeding Ulcers

- **Actively bleeding ulcers** and ulcers with **non-bleeding visible vessels** (protrubent discoloration) warrant **endoscopic therapy**Q**.**
- The management of ulcers with **adherent clots** consists of **aggressive irrigation** followed by **endoscopic therapy** (injection of **epinephrine** combined with **thermal treatment**)Q.
- **Most frequent endoscopic characteristic** is clean base (**type III**).
- **NG aspirate** may be **negative in** the presence of **significant duodenal bleeding** and a **competent pylorus** preventing duodenogastric reflux. When **emergency surgery** for life threatening **lower GI hemorrhage** is being contemplated, **preoperative** or **intraoperative EGD** is appropriate, particularly relevant if blind subtotal colectomy for massive hemorrhage is being considered.
  - **Early EGD** (within 24 hours) results in **reductions** in **blood transfusion** requirement, a **decrease** in the need for **surgery**, and a **shorter** length of **hospital stay**Q**.**
- Around **20–35%** of patients undergoing EGD will **require** a **therapeutic endoscopic intervention,** and **5–10%** will eventually **require surgery**. In **1–2%** of patients with upper GI hemorrhage, the **source cannot be identified** because of excessive blood impairing visualization of the mucosal surface. **Lavage of the stomach** with **room temperature normal saline** solution can be helpful.
- When **surgery** for upper GI hemorrhage is **undertaken**, such operations are typically **confined to** the **eldest** and often the **sickest** patient.

Medical Management:

- **PPI** have been shown to **reduce the risk** for **rebleeding** and the need for **surgical intervention**. Only **60-70%** of patients with a bleeding ulcer test **positive for H.pylori**; **after** H.pylori **eradication** there is **no need** for **long-term acid suppression**Q

Endoscopic management:

- **Epinephrine** injection (**1:10,000**) to all **four quadrants** in large volume (**> 13 mL**); electrocoagulation for bleeding ulcers and **argon plasma coagulation** for **superficial lesion**; a **second attempt** at endoscopic control **before surgical intervention** is encouraged.
- Ulcers **> 2 cm**, **posterior duodenal** ulcers and **gastric** ulcers have a significantly **higher risk** for rebleeding.

99. Ans. b. Duodenal ulcer *(Ref: Sabiston 19/e p1164, 18/e p1524, 1529)*

- **Peptic ulcer** is the **most common cause** of **upper GI bleeding**, present in **one-half** to **two-third** of patients with upper GI bleeding. **Bleeding may be** the **initial presenting symptom** in up to 10% of patients with peptic ulcer. **Duodenal ulcer bleeding** is **more common than gastric ulcer bleeding.**
- Only **10–15%** of **'Heavy' drinkers develop alcoholic cirrhosis** (leading to **esophageal varices**).

100. Ans. b. Duodenal ulcer

101. Ans. b. Intravenous beta-blockers *(RefL Sabiston 19/e p1165-1167; Bailey 26/e p1043-1044, 25/e p1063-1065; Shackelford 7/e p710-713)*

- **Pharmacotherapy** in **variceal bleeding** consists of:
  - **Continuous IV infusion** of somatostatin analogue **octreotide**
  - Infusion of **vasopressin** or **vasopressin plus nitroglycerine**
- **Beta-blockers** are used in **secondary prevention** of **recurrent variceal bleed**.
- **Beta-blockers** have **no role in** the **management of acute upper GI bleeding**.

102. Ans. a. Sclerotherapy *(Ref: Sabiston 19/e p1170-1173; Blumgart 5th/1129-1134; Shackelford 7/e p1597, 1599-1601; Harrison 18/e p2598)*

Variceal Bleeding

- In addition to pharmacologic therapy **endoscopy** should be carried out **as soon as possible**
- If varices are found they are treated with either **endoscopic variceal ligation** or **sclerotherapy**[Q].
- **EVL** is the **treatment of choice** for **variceal bleeding**[Q].

103. Ans. a. Hepatic encephalopathy *(Ref: Sabiston 19/e p1434; Schwartz 10/e p1223, 9/e p1113; Blumgart 5th/1135-1138; Shackelford 7/e p1600-1601; Harrison 18/e p2598)*

Complications of Injection Sclerotherapy	
• **Esophageal ulcerations**[Q] (May **bleed** or **perforate**) • Mediastinitis[Q]	• Pleural effusion[Q] • Pulmonary edema • **Late strictures**[Q]

104. Ans. c. Intravenous pantoprazole *(Ref: Sabiston 19/e p1164-1167; Schwartz 9/e p917; Bailey 25/e p1063-1065)*

105. Ans. b. Repeat upper GI endoscopy *(Ref: Sabiston 19/e p1166, 18/e p1218)*

- Sabiston says that "The **cause of obscure-overt bleeding** is often a common lesion that is **missed on initial evaluation**. **Repeat upper** and **lower endoscopy** is a **valuable tool** in **identifying missed lesions** because **up to 35% patients** have the **bleeding source identified** on **second look endoscopy**."

106. Ans. b. Pernicious anemia

107. Ans. d. Carcinoma stomach

108. Ans. b. Radiolabelled erythrocyte scanning

- **Radionuclide scanning** with **technetium-99m** (^{99m}Tc)-**labeled RBCs** is the **most sensitive** but **least accurate method** for **localization of GI bleeding**[Q].

109. Ans. b. FII a

110. Ans. d. Duodenal ulcer

111. Ans. b. Peptic ulcer

112. Ans. a. Vascular ectasia

MALLORY-WEISS TEAR

113. Ans. a. Massive hemorrhage is MC manifestation *(Ref: Sabiston 19/e p1167, 1222; Schwartz 10/e p1018-1020, 9/e p875, 941; Bailey 26/e p994, 25/e p1065; Shackelford 7/e p768)*

Massive hemorrhage is **rare in Mallory-Weiss syndrome**.

Mallory Weiss Syndrome

- Mallory-Weiss tears are related to **forceful vomiting, retching, coughing**, or **straining**[Q]
- **Forceful contraction** of the **abdominal wall** against an **unrelaxed cardia**, resulting in **mucosal laceration** of the **proximal cardia**[Q] as a result of the increase in intragastric pressure.
  - Results in **disruption** of **gastric mucosa** high on the **lesser curve** at **cardia (just below GE junction)**[Q]
- Results in **disruption** of **gastric mucosa** high on the **lesser curve** at **cardia** (just below GE junction)
- Tear is **partial thickness**, extending through the **mucosa and submucosa**[Q]

Clinical Features:

- Classically, seen in **alcoholic patients**[Q] after a period of **intense retching** and **vomiting** after binge drinking.
- Cause of up to **15%** of all **severe upper GI bleeds**[Q]
  - **Arterial bleeding**, usually **painless** and are **rarely**[Q] associated with **massive bleeding**.
- The overall **mortality rate** is **3-4%**, with the **greatest risk** for massive hemorrhage in **alcoholic** patients with **preexisting portal hypertension**[Q].

Diagnosis:

- Usually diagnosed by **history**
- **Endoscopy** is used to **confirm the diagnosis**[Q].
- **Most tears** occur along the **lesser curvature**[Q].

Treatment:

- **Supportive therapy** is often all that is necessary because **90%** of **bleeding episodes** are **self-limited**, and the **mucosa** often **heals within 72 hours**[Q].

Persistent Bleeding in Mallory Weiss Syndrome is managed by
Endoscopic electrocoagulationQ or endoscopic therapy with injection **Angiographic embolization**Q Surgery consists of laparotomy and **high gastrotomy** with **oversewing of the linear tear**Q, if above maneuvers fails.

- **Recurrent bleeding** from a Mallory-Weiss tear is **uncommon**Q.

Remember: A **Sengstaken-Blakemore tube** will **not stop bleeding** in Mallory-Weiss syndrome, as the **bleeding is arterial** and the pressure in the balloon is not sufficient to overcome the arterial pressure and is **contraindicated**Q.

114. Ans. a. Stomach

115. Ans. d. Symptoms improves after conservative management), E (Longitudinal tear at junction of esophagus and stomach

116. Ans. a. Mallory-Weiss syndrome

117. Ans. d. Seen in alcoholics

118. Ans. a. Gastric cardia

119. Ans. a. Patient who abuse analgesics

120. Ans. c. Mallory-Weiss syndrome

DIEULAFOY'S LESION

121. Ans. a. Angiographic embolization is the preferred treatment *(Ref: Sabiston 19/e p1168, 1222; Schwartz 10/e p1089, 9/e p940; Bailey 26/e p1043, 25/e p1065; Shackelford 7/e p769)*

- **Initial attempts** at **endoscopic control** are **often successful**. **Application of thermal** or **sclerosant therapy** is **effective in 80-100% of cases**. **In cases that fail endoscopic therapy**, **angiographic coil embolization** can be **successful.**

Dieulafoy's Gastric Lesion

- Caused by an **abnormally large (1–3 mm)**Q, **tortuous artery** coursing through the **submucosa**
- Occurs **6–10 cm** from the **GE junction**, generally in the **'fundus'** near the **cardia** along the **lesser curvature**Q.
  - **Erosion** of the **superficial mucosa** overlying the artery occur **secondary to** the **pulsations** of the **large submucosal vessel**Q **arteriole**
- **Artery** is exposed to the **gastric contents**, leading to **further erosion** and **bleeding** occursQ.
- **Mucosal defect** is **2–5 mm** in size

Clinical Features:

- More common in **men** (2:1) with **peak incidence** in the **5th decade**Q.
- Associated with **sudden** onset of **massive, painless, recurrent hematemesis** with **hypotension**
- **Recurrent bleeding** with **spontaneous cessation** is commonQ.

Diagnosis:

- **Endoscopy** is the **diagnostic modality of choice**, correctly identifying the lesion in 80% of patients.
  - **Repeated endoscopies** may be needed to correctly identify the lesion because of **intermittent nature** of the **bleeding**Q
- **Angiography** showing a **tortous ectatic artery** in the distribution of the **left gastric artery** with accompanied **contrast extravasation** in the setting of acute bleeding.

Treatment:

- **Initial attempts** at **endoscopic control** are **often successful**Q.
- **Application of thermal** or **sclerosant therapy** is **effective in 80–100% of cases**.Q
- **In cases that fail endoscopic therapy**, **angiographic coil embolization** can be **successful**Q.
- **Gastric wedge resection** to include the offending vessel is reserved **when other modalities have failed**Q.

122. Ans. d. Angiographic embolization is the preferred treatment

123. Ans. a. Within 6 cm of GE junction

124. Ans. d. Aberrant vessel in the mucosa that bleeds form a mucosal defect

GASTRIC ANTRAL VASCULAR ECTASIA

125. Ans. c. Pain is most common clinical symptom *(Ref: Sabiston 19/e p1168; Schwartz 10/e p1088, 9/e p940; Shackelford 7/e p653-654, 768-769)*
Most common clinical symptom is bleeding, not the pain.

Watermelon Stomach (Gastric Antral Vascular Ectasia)

- A rare entity characterized by presence of both **inflammatory** and **vascular components** in **mucosa**Q.

> - **On endoscopy**: **Prominent longitudinal folds** with **parallel striking red stripes** atop the mucosal folds of the **distal stomach**, much like the **rind of a watermelon**Q.

Pathology:

- **Dilated mucosal blood vessels** in the lamina propria, often containing **thrombi,** with **no evidence of vascular malformation** on angiographic and morphologic examinationQ.
- **Mucosal fibromuscular hyperplasia** and **hyalinization** are often presentQ.
- Predominantly affects the **distal portion (Antrum)**Q of the stomach

Clinical Features:

- Patients are generally **elderly women** with **chronic bleeding**Q.
- Most have an **associated autoimmune connective tissue** disorders, and at least **25%** have **chronic liver disease**Q.
- Patients typically have **iron deficiency anemia** and **chronic blood loss** requiring transfusionsQ.

Diagnosis:

- The diagnosis is based on **typical endoscopic** and **biopsy appearance** of the mucosaQ.

> - Gross endoscopic examination reveals **prominent longitudinal folds** with **parallel striking red stripes** atop the mucosal folds of the **distal stomach**, much like the rind of a watermelonQ.

Treatment:

- The lesions are treated by **endoscopic cautery**Q**.**
- In patients with **portal hypertension**, **TIPS** should be considered firstQ.

126. Ans. a. Capillary lesion; d. Best treatment argon plasma coagulation; e. Associated with chronic renal failure and iron deficiency anemia

127. Ans. b. Gastric antral vascular ectasia

MÉNÉTRIER'S DISEASE

128. Ans. d. Hyperchlorhydria *(Ref: Sabiston 19/e p1222; Schwartz 10/e p1088, 9/e p940; Bailey 26/e p1032, 25/e p1054)*

Ménétrier's disease (Hypoproteinemic Hypertrophic Gastropathy)

- A rare, **acquired**Q, **premalignant**Q disease, of unknown cause
- Characterized by **massive gastric folds** in the **fundus**Q and **corpus** of the stomach, giving the mucosa a **cobblestone** or **cerebriform appearance**Q.

> - Associated with **CMV infection** in **children**Q and **H. pylori** infection in **adults**Q.

Pathology:

- **Foveolar hyperplasia** (expansion of surface mucous cells) with **absent parietal cells**Q.
- **Increased TGF-alpha** has been noted in the **gastric mucosa**Q

> - Associated with **protein loss** from the stomach, **excessive mucus production**, and **hypochlorhydria** or **achlorhydria**Q.

Clinical Features:

- Epigastric pain, vomiting, **weight loss**, **anorexia**, and peripheral **edema**Q.

Diagnosis:

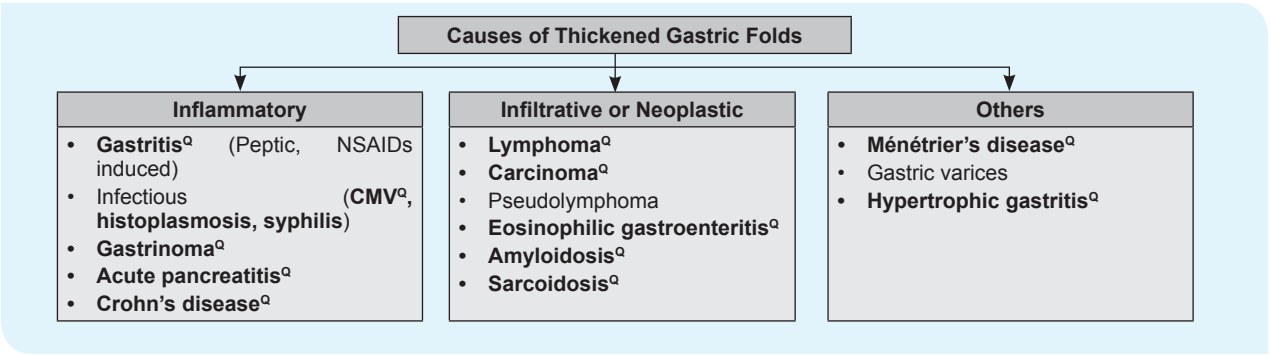
- **Typical gastric mucosal changes** can be detected by **radiographic** or **endoscopic** examination.
- **Biopsy** should be performed **to rule out gastric carcinoma** or **lymphoma**Q**.**
- **Twenty-four-hour pH monitoring** reveals **hypochlorhydria** or **achlorhydria**Q
- **Chromium-labeled albumin test** reveals **increased GI protein loss**Q.

Treatment:

- Medical treatment is limited to **albumin replacement** and maintenance of **adequate nutrition**, acid suppression, octreotide and H. pylori eradicationQ.
- **Total gastrectomy** for **bleeding, severe hypoproteinemia** or **cancer**Q.

129. Ans. b. Hyperchlorhydria **130. Ans. b. Decreased mucus production**

131. Ans. a. Lymphoma; b. Ménétrier's disease; c. Carcinoma; d. Eosinophilic gastritis *(Ref: Chapman 4th/234; Harrison 18/e p2459)*



132. Ans. a. Seen in Ménétrier's disease and ZES, c. It shows cerebrifrom rugocity in stomach, d. More in fundus and body

133. Ans. a Giant folds in the pyloric antrum

GASTRIC POLYPS

134. Ans. a. Adenoma *(Ref: Sabiston 19/e p1206; Schwartz 10/e p1076-1077, 9/e p938; Bailey 26/e p1045, 25/e p1066; Shackelford 7/e p769)*

Gastric Polyps

- There are five types of gastric epithelial polyps inflammatory, hamartomatous, heterotopic, hyperplastic and adenoma. The first three types have negligible malignant potential.
  - The **most common** gastric polyp is the **hyperplastic**[Q] or **regenerative polyp**, which frequently occurs in the setting of gastritis.
  - Polyps that are **symptomatic, > 2 cm** or **adenomatous** should be **removed**.
- Among patients with **FAP**, **gastric polyps** (**33–60%**) are **more common** as compared to **gastric adenomas** (**15%**).

Hyperplastic or Regenerative Polyp:

- **MC gastric polyp**[Q]
- Contains an overgrowth of **histologically normal** appearing gastric epithelium.
- **Size** of the polyp **does not appear** to be an **important factor**[Q].
  - Usually **single**; **incidence** is **high in** the **gastric remnant** after partial gastrectomy, mostly **asymptomatic** and **stationary**[Q].

Hamartomatous Polyps:

- Encountered **most commonly in** association with hereditary gastrointestinal **polyposis syndromes**; including generalized **juvenile polyposis** (15%); **Peutz-Jeghers syndrome** (25–50%); **FAP** and related **Gardner's syndrome**.

Inflammatory Polyp:

- A polyp made of inflammatory tissue can be called an **inflammatory pseudopolyp** because glandular tissue is either lost or absent.
- **Inflammatory fibroid polyp:** occurs **most commonly** in the **stomach**, mainly in the **distal region** and **pylorus**
- An inflammatory polyp with prominent cystic glands is called a **retention polyp** because of dilated glands that are filled with retained mucus.
- Polyps associated with **Cronkhite-canada syndrome** is of **retention** type.

Fundic gland Polyp

- Present as **multiple 2–3 mm sessile lesions** in the **body** and **fundus**, most commonly **in healthy gastric mucosa**
- Have **no malignant potential**
- Most cases are sporadic but can occur in **53%** of patients with **FAP** or **Gardner's syndrome**.

Adenomatous Polyp

- Most commonly **antral, sessile, solitary** and **eroded**.
- **Malignant transformation** in **10–20%**.
- Presence is a **marker** indicating an **increased risk for development of cancer** in **remainder gastric mucosa.**
- **Types: Flat** (**tubular**) and **papillary** (villous and tubulovillous)

Flat (tubular)	Papillary (villous and tubulovillous)
• **Most common**Q form of adenomas, especially in Japan. • **Two layer architecture** and **relative indolence of immature epithelial cells**Q are hallmarks of flat adenoma distinguishing from papillary adenoma.	• Papillary adenomas are sessile or broad-based nodular lesions with a **lobulated contour** and **deep crevices**Q. • **Papillary adenoma** has **velvety appearance** on **endoscopy** and **soap bubble**Q or **paint brush appearance** on **barium meal**Q.

- Gastric **flat adenomas** have a **lower incidence** of malignant changes, the **incidence increases** with the **grade** of dysplasia, the **papillary pattern** and **size** of the lesion.

135. Ans. a. Hyperplastic polyp

CARCINOMA STOMACH PREDISPOSING FACTORS

136. Ans. a. Benign ulcer *(Ref: Sabiston 19/e p1204-1206; Schwartz 10/e p1074-1086, 9/e p928; Bailey 26/e p1046, 25/e p1067; Shackelford 7/e p774)*

Factors Associated with Increased Risk of Developing Stomach Cancer	
Nutritional	**Medical**
• **Low fat** or **protein** consumptionQ • **Salted** meatQ • **High nitrate** consumptionQ • High **complex-carbohydrate** consumptionQ	• **Prior gastric surgery**Q • **H. pylori**Q infection • **Epstein-Barr** virusQ • **Gastric atrophy** and **gastritis**Q • **Adenomatous polyps**Q • **Male** genderQ
Social	**Occupational**
• **Low** social classQ	• Rubber workersQ • Coal workersQ
Environmental	**Genetic factors**
• Poor food preparation (**smoked, salted**)Q • **Lack of refrigeration**Q • Poor drinking water (**well water**)Q • **Smoking**Q	• Blood group '**A**'Q • **Pernicious anemia**Q • Family history • **Hereditary nonpolyposis colon cancer**Q • **Li-Fraumeni syndrome**Q

- **Decrease risk of carcinoma stomach: Aspirin**, Diet (high fresh fruit and vegetable intake), Vitamin A and C, calcium, selenium, zinc and ironQ.
- **Alcohol** is **not a risk factor** for **CA stomach**Q.

COX-2 Inhibitors are protective in	
• **Barrett's esophagus**Q • **SCC** and **adenocarcinoma** of esophagusQ	• **Carcinoma stomach**Q • **Desmoid tumors**Q • Small duodenal and rectal polyps in FAPQ

137. Ans. d. Hyperplastic polyps **138. Ans. a. A**

139. Ans. a. Diffuse type of gastric cancer *(Ref: Sabiston 19/e p1207; Schwartz 9/e p931; Shackelford 7/e p773; Bailey 25/e p1068)*

Lauren Classification System for Carcinoma Stomach

Intestinal	Diffuse
• **Environmental**Q • Gastric atrophy, intestinal metaplasia • **Men**Q> Women • Increasing incidence with age • **Gland formation**Q • **Hematogenous**Q spread • **Microsatellite instability**Q • **APC gene mutations**Q • p53, p16 inactivationQ • **Epidemic**Q • **Distal** part of the stomachQ	• **Familial**Q • Blood group '**A**'Q • **Women**Q > Men • **Younger age group**Q • **Poorly differentiated signet ring cells**Q • **Transmural/Lymphatic** spreadQ • **Decreased E-cadherin**Q • p53, p16 inactivationQ • **Endemic**Q • **Proximal** part of the stomachQ

140. **Ans. a. Intestinal metaplasia; b. Polyp-hyperplastic or adenoma; c. (Atrophic gastritis**
141. **Ans. a. Pernicious anemia**
142. **Ans. d. Intestinal metaplasia type III**
143. **Ans. b. Hyperplastic polyp**
144. **Ans. c. Old peptic ulcer**
145. **Ans. b. Chronic gastric atrophy**
146. **Ans. b. Pernicious anemia and achlorhydria; d. Atrophic gastritis**
147. **Ans. a. Atrophic gastritis; c. Adenomatous polyp; d. Achlorhydria**
148. **Ans. c. Intestinal metaplasia**
149. **Ans. b. 'O' blood group**
150. **Ans. c. Atrophic gastritis**
151. **Ans. None**
152. **Ans. b. Most common at fundus**
153. **Ans. b. Intestinal metaplasia** *(Ref: Shackelford 7/e p773-774; Schwartz 10/e p1074-1086, 9/e p928-929)*

Precursor lesions of Carcinoma Stomach	
• Adenomatous gastric polyps • **Chronic atrophic gastritis** • Dysplasia	• **Intestinal metaplasia** • **Ménétrier's disease**

Intestinal Metaplasia

- **Types: complete type I** and **incomplete types II** and **III**Q
- The **risk for progression to gastric cancer** is **higher in type III**Q metaplasia than in type I.
- The types differ based on the patterns of **mucin core protein** (MUC) **expression** as well as **cell type composition.**
  - **Type I**: Presence of **absorptive cells, paneth cells** and **goblet cells** secreting **sialomucins**
  - **Incomplete types:** Presence of **columnar** and **goblet cells** secreting **sialomucins**, **sulfomucins** or **both**.

CA STOMACH CLINICAL FEATURES AND TREATMENT

154. **Ans. a. Occurs at distal end** *(Sabiston 19/e p1204-1218; Schwartz 10/e p1074-1086, 9/e p926-935; Bailey 26/e p1045-1053, 25/e p1067-1074; Shackelford 7/e p774-778)*

Carcinoma Stomach

- Incidence of **gastric cancer**, especially **distal cancer** is **decreasing**Q
- Incidence of **GE junction tumors** are **increasing**Q
- Approximately **90%** of all tumors of the stomach are **malignant**, the vast majority of which are **gastric adenocarcinoma**Q.
  - **MC genetic abnormalities: p53** and **COX-2 gene**Q (**SPC**: **S**tomach, **p**53 and **C**OX-2 gene)
- **Tumor Markers: CEA, CA 19-9, CA-125, CA 72-4** and **beta-HCG**

Clinical Features

- **Abdominal pain** (**62-91%**)Q and **weight loss** (**22-61%**) are the **MC symptoms**.
- Typically, however, the pain is constant, nonradiating, and unrelieved by food ingestion.
- **Proximal tumors** involving the gastroesophageal junction often present with **dysphagia**, whereas **distal antral tumors** may present as **gastric outlet obstruction**Q.
  - **Diffuse mural involvement by tumor**, as occurs in **linnitis plastica**, leads to **decreased distensibility** of the stomach and complaints of **early satiety**Q.
- **Ascitis, jaundice** or **palpable mass** indicate **incurable disease**Q.
- The **transverse colon** is a potential site for **malignant fistulization** and **obstruction** from gastric primary tumor.
  - Patients may present with a palpable abdominal mass, a palpable **supraclavicular** (**Virchow's**) or **periumbilical** (**Sister Mary Joseph's**) lymph node, **left axilla** (**Irish nodes**) peritoneal metastasis palpable by rectal examination (**Blummer's shelf**), or a palpable ovarian mass (**Krukenberg's tumor**)Q.
- Paraneoplastic syndromes include thrombophlebitis (**Trousseau's syndrome**), neuropathies, nephrotic syndrome, and DIC.

Lymph Node Metastasis

- Relative risk of nodal metastases at a specific nodal location depends on both the **site of origin** of the primary tumor and **width** and **depth**Q of invasion of gastric wall.
- **Proximal stomach** and **GE junction tumors:** Higher propensity of spread to nodes in the **mediastinum** and **pericardial region**Q.

- Tumors in the **body of stomach**: Highest likelihood of spreading to **nodes along** the **greater** and **lesser curvature, near** the location of the **primary tumor** mass[Q].
- Tumors in the **distal stomach**: High likelihood of spread to the **periduodenal, peripancreatic,** and **porta hepatis** nodes[Q].

Diagnosis

- **Endoscopy with biopsy** is the **best method**[Q] to diagnose gastric cancer

Treatment of Carcinoma Stomach according to site	
Proximal-third	**Extended gastrectomy**, including the **distal esophagus**[Q]
Middle-third	**Total gastrectomy** and **D2** LN dissection[Q].
Distal-third	**Intestinal-type**: **Subtotal gastrectomy** with **D2** LN dissection[Q] **Diffuse-type: Total gastrectomy** with **D2** LN dissection[Q]

Recurrence:

- Overall **5-year survival rates after** the **diagnosis** of gastric cancer are **10–21%**.
- Patients who undergo a **potentially curative resection** have a **5-year survival rate** of **24–57%.**
- **Recurrence rates** after **gastrectomy** remain high, ranging from **40–80%**[Q].
- **Most recurrences** occur **within** the **first 3 years**[Q].
  - **Loco-regional failure rate** is **highest** at the **anastomosis** or **stump (25%)**[Q] > **stomach bed (21%)** > regional nodes.
- **MC site of metastasis: Liver**[Q] > **lung** > **bone**.

Surveillance

- Follow-up should include a **complete history** and **physical examination every 4 months** for **1** year, then **every 6 months** for **2** years, and then **annually** thereafter.
- Laboratory examinations, including complete blood counts and liver function tests, should be obtained as clinically indicated.
- **Yearly endoscopy** should be considered in patients who have undergone a **subtotal gastrectomy**

Prognosis:

- **Prognostic factors** for **CA stomach: Depth**[Q] of **invasion** and **LN status**[Q]

7th AJCC: TNM Classification of Carcinoma of the Stomach	
Tis: Carcinoma in situ: intraepithelial tumor without invasion of the lamina propria	**N1:** Metastasis in **1–2** regional LNs
T1a: Tumor invades **lamina propria, muscularis mucosa**	**N2:** Metastasis in **3–6** regional LNs
T1b: Tumor invades **submucosa**	**N3a:** Metastasis in **7–15** regional LNs
T2: Tumor invades **muscularis propria**	**N3b:** Metastasis in **16 or more** regional LNs
T3: Tumor penetrates **subserosal connective tissue** without invasion of visceral peritoneum or adjacent structures	
T4a: Tumor invades **serosa (visceral peritoneum)**	**M1:** Distant metastasis
T4b: Tumor invades **adjacent structures**	

Stage Grouping								
Stage	**IA**	**IB**	**IIA**	**IIB**	**IIIA**	**IIIB**	**IIIC**	**IV**
	T1N0	**T1N1** **T2**N0	**T1N2** **T2N1** **T3**N0	**T1N3** **T2N2** **T3N1** **T4a**N0	**T2N3** **T3N2** **T4aN1**	**T3N3** **T4aN2** **T4b**N0 **T4bN1**	**T4aN3** **T4bN2** **T4bN3**	Any T, Any N, **M1**

155. Ans. d. Type IV *(Ref: Sabiston 19/e p1207; Schwartz 9/e p931; Bailey 26/e p1049, 25/e p1059; Shackelford 7/e p773)*

Bormann Classification (Based on macroscopic appearance)	
Type I	**Polypoid** or **fungating**[Q] cancers
Type II	Fungating and ulcerated with surrounded by **elevated borders**[Q]
Type III	Ulcerated lesions **infiltrating** the **gastric wall**[Q]
Type IV	Infiltrates diffusely (**Linnitis plastica**)[Q]
Type V	Unable to be classified

156. Ans. a. Decreased E-cadherin **157. Ans. a. More common** **158. Ans. a. Decreased E-cadherin**

159. Ans. c. Hematogenous spread

160. Ans. b. II

- **T4a**: Tumor invades **serosa (visceral peritoneum)**
- **Stage IIB: T1N3, T2N2, T3N1, T4a**N0

161. Ans. c. p53

162. Ans. a. Suprapyloric *(Ref: Sabiston 19/e p1210; Bailey 26/e p1049-1050, 25/e p1073)*

Lymph Node Stations

1. Right cardiac; **2.** Left cardiac; **3.** Lesser curvature; **4.** Greater curvature; **5.** Suprapyloric; **6.** Infrapyloric **7.** Left gastric; **8.** Common hepatic; **9. Celiac**; **10.** Splenic hilus; **11. Splenic artery; 12. Hepatoduodenal ligament**; **13.** Retropancreatic; **14.** Mesenteric root; **15.** Transverse mesocolon; **16.** Paraaortic

163. Ans. a. Celiac

164. Ans. c. Rectum *(Ref: Sabiston 19/e p1207; Schwartz 9/e p932; Bailey 26/e p1050, 25/e p1070)*

Sister Mary Joseph nodule	
Gastrointestinal malignancies	**Gynecological malignancies**
• **Gastric cancer (MC)**[Q] • **Colonic cancer**[Q] • **Pancreatic cancer** (mostly **body** and **tail)**[Q]	• **Ovarian cancer**[Q] • **Uterine cancer**[Q]

Sister Mary Joseph nodule

- **Sister Mary Joseph nodule** or **node**, also called **Sister Mary Joseph sign**, refers to a **palpable nodule bulging into** the **umbilicus** as a result of **metastasis of a malignant cancer** in the **pelvis** or **abdomen**[Q].
  - **Gastrointestinal malignancies** account **for half** of underlying sources (**most commonly gastric cancer**, **colonic cancer** or **pancreatic cancer**, mostly of the **tail** and **body** of the pancreas), and **men are more likely** to have an **underlying cancer** of the **gastrointestinal tract**[Q].
- **Gynecological cancers** account for about 1 in 4 cases (**primarily ovarian cancer** and also **uterine cancer**)[Q].

Proposed mechanisms for the spread of cancer cells to the umbilicus	
• **Direct transperitoneal spread**[Q] • **Via lymphatics**[Q] which run alongside the obliterated umbilical vein • **Hematogenous spread**[Q]	• **Via remnant structures**: - **Falciform ligament**[Q] - **Median umbilical ligament**[Q] - **Remnant** of the **vitelline duct**[Q]

Prognosis:

- Sister Mary Joseph nodule is **associated** with **multiple peritoneal metastases** and **poor prognosis**[Q]**.**

165. Ans. b. Often associated with hypochlorhydria/achlorhydria

166. Ans. b. Gastric antrum

167. Ans. None

- **T4a**: Tumor invades **serosa (visceral peritoneum)**
- **Stage IIIC: T4aN3, T4bN2, T4bN3**
- **N3a:** Metastasis in **7-15** regional LNs

168. Ans. a. Enterogastric reflex is the cause *(Ref: Bailey 26/e p1053, 25/e p1061)*

Gastric stump carcinoma

- It is defined as **carcinoma** arising in the **gastric remnant > 5 years**[Q] following pervious gastric resection **for benign diseases** or **> 15 years**[Q] after curative surgery **for malignant disease.**

Etiology

- Thought to be related to **changes in the gastric mucosa** which arise as a result of the **change in the anatomical relationship** between the stomach and the small intestine following surgery.
  - **Enterogastric reflux**[Q] plays a very **significant role** in the pathogenesis.
- Other important etiological factors include: **Bacterial proliferation** and **hypochlorhydria**[Q] which increases the mucosal susceptibility to carcinogenesis by N-nitrosamines.

Pathology

- Most of the stump carcinomas are often **near the stoma** but many of these tumors are **quite large at presentation.**

- Equally divided between **intestinal** and **diffuse subtypes**[Q].
- **Histologically** they are classified as **Adenocarcinoma**[Q], **Adeno-squamous,** Squamous cell carcinoma, Small cell and undifferentiated carcinoma.

Clinical Features

- Usually present **late** and the disease is **advanced**.

Treatment

- **Surgical resection** remains the **only effective** modality of **treatment**.
- Overall average **survival** is **4–6 months**[Q].
- **Surgery** whether palliative, has **survival benefit.**

169. Ans. b. D2 gastrectomy include total gastrectomty; c. Surgical non curative lesion should not be resected; e. Hematemesis present in majority of patients *(Ref: Bailey 26/e p1050-1052, 25/e p1067, 1071, 1074)*

Carcinoma Stomach

- **H. pylori infection** increases **risk of gastric cancer** by causing **chronic gastritis**, **loss of gastric acidity** and **bacterial growth** in stomach.
- **Gastrectomy** can be **total** or **subtotal** in **D2 gastrectomy**.
- Patient with **incurable disease** are **not subjected to radical surgery**. Treatment is **palliative systemic chemotherapy.**
- After **gastrectomy**, there is **loss of parietal cell mass** leads to **vitamin B_{12} deficiency** and **replacement** should be given **routinely.**
- **MC symptom** of **carcinoma stomach** is **abdominal pain > weight loss.**
- **Hematemesis** is **very rare** in **carcinoma stomach**.

170. Ans. a. Metastatic left supraclavicular lymphadenopathy **171. Ans. d. All of the above**

172. Ans. a. Left supraclavicular lymphadenopathy

173. Ans. b. Incidence is now decreasing in Japan and China **174. Ans. d. Fundus**

175. Ans. a. Superficial spreading type

Most Common site of Gastric Malignancies	
CA stomach	**Antrum**[Q]
CA stomach in **pernicious anemia**	**Fundus**[Q]
Diifuse variety	**Fundus**[Q]
Gastric lymphoma	**Antrum**[Q]
Burkitt's lymphoma (by **EBV**)	**Cardia** or **body**[Q]

176. Ans. c. Involvement of mucosa, submucosa and muscularis *(Ref: Sabiston 19/e p1213; Schwartz 9/e p931; Bailey 26/e p1047, 25/e p1068; Shackelford 7/e p774-775)*

Early Gastric Cancer

- Adenocarcinoma **limited to** the **mucosa** and **submucosa** of the stomach, **regardless of LN status**[Q].
- Approx. **10%** of patients will have **LN metastasis**[Q].
- Cancer of the lesser curve is more common than cancer of the greater curvature.

Japanese classification system for early gastric cancer	
Type I	**Exophytic lesion** extending into the gastric lumen
Type IIA	**Elevated lesion** with a height no more than the thickness of the adjacent mucosa
Type IIB	**Flat lesions**[Q]
Type IIC	**Depressed lesions** with an eroded but not deeply ulcerated appearance
Type III	**Excavated lesions** that may extend into the muscularis propria without invasion of this layer by actual cancer cells.

- Adenocarcinoma **limited to** the **mucosa** and **submucosa** of the stomach, **regardless of LN status**[Q].
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Type IIB	**Flat lesions**[Q]
Type IIC	**Depressed lesions** with an eroded but not deeply ulcerated appearance
Type III	**Excavated lesions** that may extend into the muscularis propria without invasion of this layer by actual cancer cells.

Treatment:

- Treatment options: **Endoscopic mucosal resection**Q, limited surgical resection or gastrectomy
- **Overall curative rate** with **adequate gastric resection** and **lymphadenectomy** is **95%**Q
- **Best prognosis**Q

177. Ans. b. Staining with endoscopic biopsy *(Ref: Sabiston 19/e p1209-1212; Schwartz 9/e p932; Bailey 26/e p1027-1030, 25/e p1069-1070; Shackelford 7/e p774-775)*

Diagnosis of Carcinoma Stomach

- **Endoscopy** is the **best method** to **diagnose gastric cancer** as it visualizes the gastric mucosa and allows **biopsy** for a histological diagnosis.
  - **Chromoendoscopy** helps identification of mucosal abnormalities through **topical stains**Q.
  - **Magnification endoscopy** is used to magnify standard endoscopic field by **1.5-150** timesQ.
  - **Narrow band imaging** affords **increased visualization** of the **microvasculature**Q.
- **Confocal laser endomicroscopy** permits in vivo, **three-dimensional microscopy**Q including subsurface structures.
- **EUS** is a tool for **pre-operative staging** and **selection for neoadjuvant therapy**Q.

178. Ans. a. Incidence increasing worldwide **179. Ans. e. Radioresistant**

180. Ans. c. Partial gastrectomy + distal pancreatectomy *(Ref: Sabiston 19/e p1212-1218; Schwartz 9/e p933-935; Bailey 26/e p1050-1053, 25/e p1071-1074; Shackelford 7/e p775-778)*

Treatment of Carcinoma Stomach

- Maintain **a 5-cm margin proximally** and **distally** to the primary lesion.
- Because of the extensive lymphatic network of the stomach and the propensity for microscopic extension, the traditional surgical approach attempts to maintain **a 5-cm margin proximally** and **distally** to the primary lesion.
- When the general oncologic goal of an **R0 resection** can be achieved by gastric preserving approach in **mid and distal** gastric cancer, **partial gastrectomy** is **preferred** over total gastrectomy.

Treatment of Carcinoma Stomach according to site	
Proximal-third	• **Extended gastrectomy**, including the **distal esophagus**Q
Middle-third	• **Total gastrectomy** and **D2** LN dissectionQ.
Distal-third	• **Intestinal-type**: **Subtotal gastrectomy** with **D2** LN dissectionQ • **Diffuse-type: Total gastrectomy** with **D2** LN dissectionQ

- In **subtotal gastrectomy** the luminal extent of the resection comprises about **80%** of the stomach. At the lesser curvature the resection should reach up to about **2 cm below** the anatomic **cardia**. At the greater curvature the resection has to go **beyond** the **right** and **left gastroepiploic arteries**; the small remaining fundus is fed through the short gastric vessels from the splenic hilus.

Indications for Adjuvant Chemoradiation in Carcinoma Stomach
• **T3, T4** or **node positive** cancersQ
• Microscopically positive surgical marginsQ

- **Spleen preserving D2 resection** is the **recommended** surgical approach for patients with potentially **curable gastric cancer.**
  - **Splenectomy** should be performed only in cases with **intraoperative evidence** of **direct tumor extension** into the **spleen** or when the **primary tumor** is **located in** the **proximal stomach along** the **greater curvature** or **posterior wall of stomach**Q**.**
  - **Partial pancreatectomy** should be performed only in cases of **direct tumor extension** to the **pancreas**Q.

181. Ans. b. Subtotal gastrectomy

182. Ans. b. Invasion of mucosa and submucosa irrespective to L.N. spread; c. Endoscopic removal of lesions; d. Conservative gastrectomy

183. Ans. a. Involvement of omental nodes; e. Krukenberg tumor *(Ref: Schwartz 9/e p1068-1074; CSDT 11/e p1175)*

Carcinoma Stomach

- Bailey: "**Involvement of other organ per se does not imply incurability**, provided that **it can be removed**."
- Schwartz: "It should be strongly emphasized that **many patients with positive lymph nodes are cured by adequate surgery**. It should also be stressed that often lymph nodes that appear to be grossly involved with tumor turn out to be benign or reactive on pathologic examination. **More than 15 resected lymph nodes** are **required for adequate staging**. Therapeutic nihilism should be avoided and, in the low-risk patient, an aggressive attempt to resect all tumor should be made. The **primary tumor may be resected en bloc with adjacent involved organs** (e.g., **distal pancreas, transverse colon**, or **spleen**) during the course of curative gastrectomy."

- CSDT: "A **solitary metastatic nodule** in **liver** is also **no indication against curable resection.**"
- **Periumbilical node**, **Blumer's shelf**, and **Krukenberg's tumor** represent **incurable gastric cancer**.

184. Ans. a. Carcinoma stomach *(Ref: Robbins 8/e p786-787)*

LEATHER BOTTLE STOMACH (LINNITIS PLASTICA)

- **Pyloric antrum** is **MC site** affected in **localized variety**Q
- Stomach is **massively thickened** (feels like **leather**) Q

Pathology:

- Caused by **proliferation of fibrous tissue** mainly in **submucosa**Q
- Characterized by **Mother of pearl appearance**
- Mucosa appears normal

Clinical Features:

- **Early satiety** due to **reduced stomach capacity**Q
- **LN metastasis** is commonQ

Treatment:

- Treated by **radical gastrectomy**Q

Prognosis:

- Associated with **poor prognosis**Q

185. Ans. c. Dysphagia

186. Ans. d. Weight loss

Most Common Symptom	
CA Esophagus	• **Dysphagia** >weight lossQ
CA stomach	• **Abdominal pain** >weight lossQ
Periampullary carcinoma (including **CA head** of **pancreas**)	• **Jaundice**Q
HCC	• **Abdominal pain** >weight lossQ
Cholangiocarcinoma	• **Painless progressive jaundice**Q
CA Gallbladder	• **Biliary colic**Q
CA small bowel	• **Abdominal pain**Q
CA colon	• **Abdominal pain**Q
CA rectum	• **Bleeding PR**Q
CA anal canal	• **Bleeding PR**Q

187. Ans. d. None of the above

Subtotal gastrectomy should be done **for resectable carcinoma stomach** involving **antrum**.

188. Ans. c. Celiac

189. Ans. b. Stomach cancer

190. Ans. b. Laparoscopy

191. Ans. d. EUS *(Ref: Schwartz 9/e p932)*

- The best way to stage the tumor locally is via EUS, which gives fairly accurate (80%) information about the depth of tumor penetration into the gastric wall, and can usually show enlarged (> 5 mm) perigastric and celiac lymph nodes.

192. Ans. c. Stomach

GASTROINTESTINAL STROMAL TUMOR (GIST)

193. Ans. a Mesenchymal *(Ref: Sabiston 19/e p1220-1221; Schwartz 10/e p1481-1485, 9/e p937; Bailey 26/e p1054, 25/e p1075; Shackelford 7/e p1028-1034)*

GASTROINTESTINAL STROMAL TUMOR

- GISTs: **MC mesenchymal tumor** of the **GI tract**Q
- MC primary site for GIST: **Stomach** (60–70%) > **small bowel** (20–25%) > **colorectum and esophagus** (5% each)Q.

- **Most GISTs** are **positive for CD-117** (95%), **BCL-2** (80%), **CD-34** (70%)Q.

- **Types: Spindle cell** (70%) and **Epitheloid** (30%)Q

Pathology:

- Arise from the **muscularis propria** and most likely originate from the **cells of Cajal**Q
- Expression of the receptor tyrosine kinase **KIT (CD 117)**, **5%** express platelet derived growth factor receptor alpha (**PDGFRA**)Q.
- **PDGFRA mutations** in GIST appear to confer a **very favorable prognosis** with **low risk of recurrence**Q.
- **Spindle cell pattern** (**70%**) of GIST is more common than **epitheloid** or round cell pattern (**30%**)Q.
- New tumor markers of GIST: **DOG-1** (discovered on GIST-1) and **protein kinase C-theta**

Clinical features:

- Patients usually present after the fourth decade, with the mean age of **60 years** at diagnosis.
- **MC presentations** of gastric GISTs: **GI bleeding** and **pain** or dyspepsia.

Carney triad
• Association of **extra-adrenal paragangliomas, pulmonary chondromas** and **multifocal GIST**Q.

Gastrointestinal Stromal Tumor

Diagnosis:

- **CT**: **IOC** for evaluation of **primary tumor** and **accurate staging**Q
- **PET-CT: Gold standard** for **recurrent GIST**Q

- **Percutaneous** or **endoscopic biopsy** should only be **performed if the results would obviate the need for surgery**Q**.**

Treatment:

- **Bleeding** manifestation is the **MC indication** for **surgery**Q**.**
- GIST should be treated with **segmental resection**Q (margins of **1cm)**

- **LN metastasis** are **uncommon**, **regional lymphadenectomy** is **not recommended**Q
- **Intraoperative incisional biopsy** prior to resection should be **avoided**, because it risks **tumor spillage**Q

- **Imatinib**Q (selective inhibitor of **type 3** tyrosine kinase KIT), is approved for use in **CD117-positive unresectable** and **metastatic GISTs**.

- Functional imaging of GIST with **18FDG-PET** scanning represents a useful diagnostic modality for **early-response assessment** with **imatinib therapy**Q.
- **Sunitinib**Q is used in **imatinib-refractory disease**.

Prognosis:

- **Tumor size** is a **predominant factor for survival** in surgical series for primary GIST.
- **MC sites** of **disease failure** after complete resection: **Liver**Q**, omentum** or **peritoneal cavity**.

- **Half to two third primaries** will have disease **failure within the liver**Q and nearly 40% will have liver as the only site of failure. Generally **hepatic involvement** is **multifocal**.

- **Median time** to **recurrence after resection** of primary GIST is **2 years**Q.

194. Ans. c. Commonly metastasize to lymph nodes

195. Ans. a. GIST

196. Ans. b. GIST

197. Ans. b. CD-117

198. Ans. d. PET-CT

199. Ans. a. Most common in duodenum

200. Ans. a. Gastric carcinoma; b. Paraganglioma; c. Pulmonary Chordoma

Carney triad
• Association of **extra-adrenal paragangliomas, pulmonary chondromas** and **multifocal GIST**Q.

201. Ans. d. Interstitial cells of Cajal

202. Ans. c. Leiomyosarcoma *(Ref: www.ncbi.nlm.nih.gov/pubmed/3771120)*

Leiomyosarcomas that occur **in the digestive tract** can also cause **gastrointestinal blockage** or **bleeding,** which can manifest as blood in the stool.

- Gastrointestinal stromal tumours (**GISTs**) are the **MC mesenchymal tumours** of the **GIT**.
- Formerly **GISTs** were commonly classified histologically as leiomyosarcomas; however, they are now known to **arise from** the **interstitial cells of Cajal.**
- **Majority** of **GISTs overexpress KIT** and have characteristic mutations within the gene, which are the targets of **drug treatment with tyrosine kinase inhibitors**.

- **Leiomyosarcoma** is a **malignant tumour** of **smooth muscle differentiation** and falls into a **group of sarcomas** that show **complex karyotypic changes** with no consistent recurrent genetic abnormality.

- **Upper GI bleeding** is the **MC clinical manifestation** of **GISTs**[Q], manifesting as hematemesis or melena in **40-65%** of patients. Bleeding occurs because of an ulcer forming in the gastric mucosa overlying the tumor.
- **Bleeding** is **more commonly** seen **in GIST** as compared to **Leiomyosarcoma**[Q]**.**

Abdominal Leiomyosarcoma

- Leiomyosarcoma describes a **type of soft-tissue cancer** that **occurs within smooth muscle cells**.
- This kind of cancer can be **difficult to detect** as it often causes **no organ dysfunction until** the tumor has gotten to be **large in size**[Q]**.**
- **Most common locations**: **Uterus** and **stomach**[Q].

Clinical Features:

- **Asymptomatic** in **initial stage**[Q]
- **Earliest symptom**: **Noticeable lump** or **swelling** within the abdomen.
- Vague complaints, such as malaise, fatigue, and nonfocal abdominal pain, are often described.
- The **sign most often cited** is **bleeding**[Q]. These tumors sometimes **necrose** and **bleed into the bowel.**
- **Leiomyosarcomas** that occur **in the digestive tract** can also cause **gastrointestinal blockage** or **bleeding**[Q]**,** which can manifest as blood in the stool.
- **Uterine leiomyosarcomas** can cause **vaginal bleeding**[Q]

Diagnosis:

- **Endoscopy** can be **used to visualize the tumors**[Q].
- A **definitive diagnosis requires a biopsy**[Q]

Treatment:

- **First-line treatment: Surgical removal** of the cancerous tissue.
- **Uterine leiomyosarcoma: Total hysterectomy**[Q]
- **Gastric leiomyosarcoma: Total gastrectomy**[Q]

203. Ans. d. GIST

- **Upper GI bleeding** is the **most common clinical manifestation** of **GISTs**, manifesting as hematemesis or melena in **40-65%** of patients.
- **Bleeding occurs** because of an **ulcer forming** in the **gastric mucosa overlying** the **tumor**.

204. Ans. d. ALK gene mutation is seen in most of the cases *(Ref: Robbins 9/e p775-777, 8/e p789-790; Sabiston 19/e p1220-1221; Schwartz 9/e p937; Bailey 26/e 1054, 25/e p1075; Shackelford 7/e p1028-1034)*

ALK gene mutation is not seen in GIST.

Anaplastic Lymphoma Kinase (ALK)

- **Anaplastic lymphoma kinase** also known as **ALK tyrosine kinase receptor** or **CD246** (cluster of differentiation 246) is an enzyme that in humans is **encoded by the ALK gene.**
- The **2;5 chromosomal translocation** is associated with approximately **60% anaplastic large-cell lymphomas** (ALCLs). The translocation creates a fusion gene consisting of the ALK (anaplastic lymphoma kinase) gene and the nucleophosmin (NPM) gene: the 3′ half of ALK, derived from chromosome 2 and coding for the catalytic domain, is fused to the 5′ portion of NPM from chromosome 5.

- The **EML4-ALK fusion gene** is responsible for approximately 3–5% of **non-small-cell lung cancer** (NSCLC). Also related to **Neuroblastomas**[Q]**.**
- **Germline mutations in the anaplastic lymphoma kinase (ALK) gene** have recently been identified as a **major cause of familial predisposition to neuroblastoma**[Q]**.**

- "Features of GIST vary depending on tumor size and organ of origin. The diameter can range from a few millimeters to more than 30 cm. Larger tumors usually cause symptoms in contrast to those found incidentally which tend to be smaller and have better prognosis. Large tumors tend to exhibit malignant behavior but small GISTs may also demonstrate clinically aggressive behavior. The most common mutation seen in GIST is c-kit (CD-117) and CD-34 (which are normally expressed by Cajal Cells), seen in 95% of the cases. PDGFRA mutations are seen in rest of the cases. A new marker for GIST, even more sensitive then CD-117 is DOG-1 (Discovered on GIST), which is a monoclonal antibody that can also detect PDGFRA mutations."- Robbins 8/e p789-790

GASTRIC LYMPHOMA

205. Ans. d. Most common site is fundus *(Ref: Sabiston 19/e p1218-1219; Schwartz 10/e p1074, 1084, 9/e p935-937; Bailey 26/e p1054, 25/e p1075; Shackelford 7/e p1035-1042*

Most common site of gastric lymphoma is fundus is an incorrect statement.

Gastric Lymphoma

- **Stomach** is **MC site** for **lymphoma**[Q] in the **GIT**
- **MC site** of gastric lymphoma: **Antrum**[Q]
  - **MC gastric lymphoma** is **diffuse large B-cell lymphoma**[Q] **(55%)** > extranodal marginal cell lymphoma (**MALT**) (**40%**) > Burkitts lymphoma (3%) > mantle cell and follicular lymphomas.
  - DLBL is **MC type of NHL**, **extranodal lymphoma** and **GI lymphoma.**
- **Stomach,** which is devoid of organized lymphoid tissue, is the **MC site** of **MALT lymphoma**[Q].

Clinical Features:

- Lymphomas occur in **older patients** (**sixth** and **seventh** decades)
- More common in **men**
- Vague symptoms, namely **epigastric pain**[Q], early satiety, and fatigue.
- Constitutional **B symptoms** are **very rare**.
- Although overt bleeding is uncommon, **more than half** of patients present with **anemia**[Q].

Diagnosis:

- **Endoscopy**: **Nonspecific gastritis** or **gastric ulcerations**, with mass lesions being unusual.
- Evidence of distant disease should be sought through upper airway examination, bone marrow biopsy, and CT of the chest and abdomen to detect lymphadenopathy.
- Any **enlarged lymph nodes** should undergo **biopsy.**
- **H. pylori testing** should be performed by histology and, if negative, confirmed by serology.

Dawson's Criteria

(Requirements for the diagnosis of Primary GI lymphoma)

- **Absence** of **palpable lymphadenopathy**[Q]
- **Normal bone marrow biopsy** and **peripheral blood smear**[Q]
- **Absence** of **mediastinal lymphadenopathy**[Q] on chest radiographs
- **Disease** grossly **confined to** the affected **viscus**[Q]
- **Regional lymphadenopathy only**[Q]
- **Absence of hepatic** or **splenic involvement**[Q] unless via direct extension of the primary tumor.

Staging Systems for Primary Gastrointestinal Non-Hodgkin's Lymphoma			
Ann Arbor		**Description**	Relative incidence (%)
IE	**IE**	Tumor confined to **gastrointestinal tract**	26
IIE	**IIE**	Tumor with spread to **regional lymph nodes**	26
IIE	**IIE**	Tumor with nodal involvement **beyond regional lymph nodes** (para-aortic, iliac)	17
IIIE-IV	**IIIE-IV**	Tumor with spread to **other intra-abdominal organs** (liver, spleen) or **beyond abdomen** (chest, bone marrow)	**31**

206. Ans. b. Stomach

207. Ans. a. Chemotherapy; b. Radiotherapy; c. Surgery; d. Anti-H. pylori treatment *(Ref: Sabiston 19/e p1219; Schwartz 10/e p1074, 1084, 9/e p936-937; Bailey 26/e p1054, 25/e p1075; Shackelford 7/e p1042)*

Treatment of Gastric Lymphoma	
Low-grade MALT	**High-grade (aggressive)**
• **Confined to gastric wall** and **no t(11:18) translocation**: H.pylori **eradication therapy** and re-evaluate at 12 months	• **Stage I, II, III: Chemotherapy + RT**
• **Lymph node involvement** and **t(11:18) translocation**: H.pylori **eradication therapy** and re-evaluate at 3-6 months; if lymphoma persists: - **Stage I**: **XRT** - **Stage II**: **Chemotherapy + RT**	• **Stage IV: Chemotherapy + RT** • **Residual disease**: Further **chemotherapy** or **Surgery**
• **Stage III or IV:** H.pylori **eradication therapy** and **Chemotherapy +/- RT**	

- **External beam radiotherapy**: 30 Gy with 10 Gy boost
- **Chemotherapy regimens** cyclophosphamide, doxorobucin, vincristine, prednisone (CHOP) +/- rituximab
- **Rituximab** is chimeric monoclonal antibody **against CD-20**, preferred for **high grade MALT** or **DLBL**.

208. Ans. d. Intractable pain *(Ref: Sabiston 19/e p1219, 18/e p1270-1271; Bailey 26/e p1054, 25/e p1075; Oxford Surgery 5/e p174)*

Indications of Surgery in Gastric Lymphoma	
• **Failure** of **chemoradiation**Q	• **Obstruction**Q
• **Hemorrhage**Q	• **Perforation**Q

209. Ans. c. Total gastrectomy with adjuvant chemotherapy **210. Ans. d. Intractable pain**

211. Ans. b. Gastric resection and chemotherapy *(Ref: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2117016/)*

Primary Gastric Hodgkin's disease

- **Primary gastric Hodgkin's disease** is **extremely rare (<1%** of all gastric lymphomas)
- **Stomach** is the **MC site** of **primary extranodal lymphoma**Q in adults

Etiology:

- Association of **classic Hodgkin's disease** with **EBV**Q
- LMP1 (**Latent Membrane Protein 1**) an **essential EBV protein,** commonly expressed and **associated with** the **pathogenesis of Hodgkin's disease**Q

Diagnosis:

- **Endoscopy**: **Non-specific gastritis** or **peptic ulcers with mass lesions**Q
- A full panel of **immunohistochemical markers is essential** to make an **accurate diagnosis** of **gastric Hodgkin's disease.**

Treatment:

- **Hodgkin's disease** of the **stomach** has been **treated by surgery** while **post operative chemotherapy** has been employed **for systemic disease**Q.

Prognosis:

- Prognosis is **poor** with **45–60%** of patients **dying within** the **first year of diagnosis**

DUODENAL ATRESIA

212. Ans. a. Down's syndrome *(Ref: Sabiston 19/e p1841-1842; Schwartz 10/e p1612,1615-1616, 9/e p1427-1428; Bailey 26/e p120, 25/e p85; Shackelford 7/e p811-813)*

Duodenal Atresia

- Occurs as a **result of failure of vacuolization** of the **duodenum** from its solid cord stage.

Anatomic variants of Duodenal Atresia
• Duodenal **stenosis**
• **Mucosal web** with intact muscular wall (**windsock deformity**)
• Two ends separated by a **fibrous cord**
• **Complete separation with a gap** within the duodenum.

Associated Anomalies

- **Prematurity, Down syndrome, polyhydramnios**Q
- **Malrotation, annular pancreas, biliary atresia**Q
- Cardiac, renal, esophageal, and anorectal anomalies

Clinical Features:

- In most cases, the **duodenal obstruction** is **distal to the ampulla of Vater**, and infants present with **bilious emesis** in the **neonatal period**Q.

Diagnosis

- **X-ray abdomen**: **Double-bubble sign** (**air-filled stomach** and **duodenal bulb**Q).

  - **Diagnosis is confirmed,** if there is **no distal air**Q.
  - **If distal air** is **present**, an **upper GI contrast study** is **performed rapidly**, not only **to confirm the diagnosis** of **duodenal atresia** but also to **exclude midgut volvulus**Q.

Treatment:

- **Diamond-shaped duodenoduodenostomy** is the **treatment of choice**Q.

213. **Ans. b. Duodenal atresia** 214. **Ans. b.Duodenal atresia**

215. **Ans. a. Duodenoduodenostomy**

Single bubble sign	**Congenital Hypertrophic Pyloric Stenosis**Q
Double bubble sign	**Duodenal atresia**Q**, Annular pancreas**
Triple bubble sign	**Jejunal atresia**Q

INFANTILE HYPERTROPHIC PYLORIC STENOSIS

216. **Ans. a. Hypokalemia; b. Hypochloremic metabolic alkalosis** *(Ref: Sabiston 19/e p1841; Schwartz 10/e p1613-1614, 9/e p1425-1426; Bailey 26/e p113-114, 25/e p78-79; Shackelford 7/e p813-816)*

Infantile Hypertrophic Pyloric Stenosis

- In HPS, **hypertrophy** of the **circular muscle**Q of the **pylorus** results in constriction and obstruction of the gastric outlet.
- **Acquired condition**
- **Incidence** of **1 in 3000 to 4000**Q live births.
- This condition is **most common between** the ages of **3–6 weeks**Q.
- **Associated anomalies** in **6–20%** cases: Esophageal atresia, Hirschprung's disease, ARM and malrotation

Etiology

- **Ethnic origin** is important because the **highest incidence** is found among **whites of Scandinavian**Q decent and **lowest risk** among **African Americans** and **Chinese.**
  - **Males** outnumber females by a ratio of **4:1**Q
  - **First-born males**Q are frequently encountered.
- **Higher risk** for developing HPS in **offspring of parents**Q with **this condition**

Clinical Presentation:

- Infant is **normal at birth, symptomatic between** the ages of **3–6 weeks**Q
- Infants with HPS typically present with **projectile nonbilious vomiting**Q.
  - **Visible gastric peristalsis** may be seen as a wave of contraction **from the left upper quadrant** to the **epigastrium**Q.
- The infants usually **feed vigorously** between episodes of vomiting.
- Typical electrolyte abnormality: **Hypochloremic, hypokalemic, metabolic alkalosis** with **paradoxical aciduria**Q**.**

Diagnosis:

- **Palpation of the** pyloric tumor or **olive** in the epigastrium or right upper quadrant by a skilled examiner is **pathognomonic** for the diagnosis of HPSQ.
- If the olive is palpated, **no additional diagnostic testing** is necessaryQ.
  - When the olive **cannot be palpated**, the diagnosis of HPS can be made with an **ultrasound exam** or fluoroscopic UGI series.
  - Absence of radiation exposure and cost make the **ultrasound** the **usual preferred study**Q.
- **Diagnostic Sonographic measurements**:
  - **Pyloric wall thickness** of at least **4 mm**Q
  - **Channel length** of at least **17 mm**Q
- **Barium Meal**:
  - **String sign**Q: indicating a narrowed elongated pyloric canal that does not relax is seen
  - **Shoulder sign**Q: caused by the hypertrophied muscle indenting the antrum
  - **Double-track sign**Q: caused by the redundant mucosa

Treatment:

- Pyloric stenosis is **never a surgical emergency** although dehydration and electrolyte abnormalities may present a **medical emergency**Q
- **Fluid resuscitation** and **correction of electrolyte abnormalities**Q and metabolic alkalosis is essential before surgery.
  - It is important that the underlying metabolic alkalosis is **slowly corrected** with **normal saline**.
  - Treatment of HPS is by a **Ramstedt-Fredet pyloromyotomy** (**cutting across** the **abnormal pyloric musculature**Q while preserving the underlying mucosa).

Postoperative care:

- Postoperatively, infants are usually allowed to resume enteral feedings.
- **Vomiting** after surgery occurs frequently but is **usually self-limited**Q.
- **Complications**: Incomplete myotomy, **mucosal perforation** (usually at the duodenal end), and wound infection.
- If the **mucosa** is **inadvertently opened** then **feeding** is **delayed for 48 hours**Q**.**

217. Ans. c. Correction of electrolyte disturbances

218. Ans. c. Ultrasound abdomen

219. Ans. c. Metabolic acidosis

220. Ans. a. Mass in epigastrium

221. Ans. a. Hypertrophic pyloric stenosis

222. Ans. b. CHPS

223. Ans. d. Ultrasonography is diagnostic test

224. Ans. b. The pyloric tumour is best felt during feeding

225. Ans. c. Metabolic alkalosis with paradoxical aciduria

226. Ans. b. Hypocholremic alkalosis

227. Ans. d. Metabolic acidosis

228. Ans. b. Non-bilious vomiting; c. Projectile vomiting); d. Non-projectile vomiting; e. Forceful vomiting *(Ref: Nelson 18/e p1274-1275)*

- **Vomiting may** or **may not be projectile**, but it is **non-bilious**.
- In **10–15%** of infants, vomitus **may contain blood**. This bleeding is due to reflux **esophagitis**, a common association with hypertrophic pyloric stenosis.

229. Ans. a. Hypokalemic alkalosis

230. Ans. b. Aciduria

231. Ans. c. Acidosis

232. Ans. d. Pyloric stenosis

233. Ans. b. Circular muscle fibers

234. Ans. c. 48 hours

235. Ans. d. High gastric residue

236. Ans. a. Pyloromyotomy

Treatment of Infantile Hypertrophic Pyloric Stenosis

- **IHPS** is a **medical emergency**[Q].
- **Immediate treatment** requires **correction of fluid loss, electrolytes**, and **acid-base imbalance.**
- Once intravenous access is obtained, an **initial fluid bolus (20 mL/kg)** of **crystalloids** should be infused immediately if the infant is dehydrated.
- Infants should receive 15-2 times maintenance intravenous fluid: 5% dextrose in 0.25% or 0.33% sodium chloride with 2-4 mEq KCl per 100 mL replacement[Q].
- **Definitive treatment**: **Ramstedt pyloromyotomy**[Q]

237. Ans. a. Congenital hypertrophic pyloric stenosis

238. Ans. e. Normal saline with potassium *(Ref: Sabiston 19/e p1196-1197; Schwartz 9/e p921; Bailey 26/e p1044-1045, 25/e p1065-1066; Shackelford 7/e p716-717)*

Fluid resuscitation requires replacement of the chloride and potassium deficiencies.

Gastric Outlet Obstruction

- In cases of **prolonged vomiting**, patients may become **dehydrated** and develop a **hypochloremic hypokalemic metabolic alkalosis** secondary to **loss of gastric juice** rich in **hydrogen, chloride**, and **potassium ions**[Q].
- In this setting, **fluid resuscitation** requires **replacement of** the **chloride** and **potassium deficiencies** in addition to **nasogastric suction for relief of the obstructed stomach**[Q].

239. Ans. d. Visible peristalsis is always seen

GASTRIC OUTLET OBSTRUCTION

240. Ans. c. Hypokalemic metabolic alkalosis; d. Paradoxical aciduria *(Ref: Sabiston 19/e p1196-1197; Schwartz 9/e p921; Bailey 26/e p1056-1047, 25/e p1065-1066; Shackelford 7/e p716-717)*

Gastric Outlet Obstruction

- **MC cause** of **gastric outlet obstruction**: **CA stomach**[Q]
- **Site of stenosis** or **obstruction** in **peptic ulcer disease**: **1st part** of the **duodenum**[Q]
- **More common** with **duodenal ulcer** and **type III gastric ulcer** and requires that malignancy should be ruled out.

Clinical Features:

- Symptoms of gastric retention, including **early satiety**, **bloating**, indigestion, anorexia, nausea, **vomiting**, epigastric pain, and **weight loss**.
- Patients are frequently **malnourished** and **dehydrated** and have a **metabolic alkalosis**, factors that increase operative risk.

Diagnosis:

- A **saline load test** is helpful, it is performed by emptying the stomach with a nasogastric tube and instilling **750 mL** of saline, the patient is placed in **sitting position**, and **30 minutes** later the nasogastric tube is aspirated, normally **< 400 mL** should remain in the stomach, and 90% of subjects have a residue of less than 200 mL.
- The finding of **> 400 mL** residual saline is consistent with a **diagnosis** of **gastric outlet obstruction.**

Treatment:

- **Surgery** is generally indicated if the obstruction fails to resolve despite **48–72 hours** of adequate **IV fluid replenishment**, **antisecretary therapy** and **nasogastric decompression**Q.
  - **Truncal vagotomy** and **antrectomy**Q is the **ideal procedure**.
- The **inflammation** and **scarring** at **duodenal bulb** or **previous proximal duodenal surgeries** prevents safe performance of an antrectomy, in this setting **truncal vagotomy** with **drainage (Gastrojejunostomy)** is the preferred approachQ.

241. **Ans. d. First part of duodenum**

242. **Ans. a. Hypokalemic hypochloremic alkalosis**

243. **Ans. a. Pyloric obstruction**

244. **Ans. b. Cancer of stomach**

245. **Ans. c. Resolves spontaneously without treatment**

246. **Ans. c. Truncal vagotomy with gastrojejunostomy**

247. **Ans. b. Gastric outlet obstruction**

248. **Ans. a. Acidosis**

249. **Ans. b. Pylorus** *(Ref: http://www.anaesthesiamcq.com/AcidBaseBook/ab7_2.php)*

- **Gastric alkalosis** is **most marked with vomiting** due to **pyloric stenosis** or **obstruction** because the **vomitus is acidic gastric juice** onlyQ.
- **Vomiting in other conditions** may involve a **mixture of acid gastric loss** and **alkaline duodenal contents**Q and the acid-base situation that results is more variable.
- **Loss of alkaline small intestinal contents** can even **result in an acidosis** if **gastric acid secretion** is **suppressed**Q.

250. **Ans. a. Alkaline urine**

251. **Ans. c. Surgery** *(Ref: Bailey 26/e p1056, 25/e p1077)*

Acute Gastric Dilatation

- This condition usually occurs in **association with pyloroduodenal disorders** or **after surgery without nasogastric suction**Q.
- The **stomach**, which may also be **atonic, dilates enormously**Q.
- Often the **patient is** also **dehydrated** and has **electrolyte disturbances**.
- **Failure to treat** this condition can result in a **sudden massive vomit with aspiration** into the lungsQ.
- Treatment:
- **Nasogastric suction** with a large-bore tube, **fluid replacement** and **treatment of the underlying condition**Q.

252. **Ans. a. Dilatation of stomach seen on x-ray; b. Presents with vomiting; c. Aspiration; e. Atony of stomach**

BEZOARS

253. **Ans. c. GI obstruction** *(Ref: Sabiston 19/e p1224; Schwartz 10/e p1089, 9/e p941; Bailey 26/e p1056, 25/e p1077; Shackelford 7/e p805)*

Symptoms of Trichobezoar: **Pain** from **gastric ulceration** and fullness from **gastric outlet obstruction** with occasional **gastric perforation** and **small bowel obstruction**.

Bezoars

- Bezoars are **collections** of **nondigestible materials**, usually of vegetable origin (phytobezoar) but also of hair (trichobezoar).
- **Four types of Bezoar:** Phytobezoars, Trichobezoars, Pharmacobezoar and Lactobezoar

Phytobezoar:

- **Most common type**Q, a high concentration of tannin, exposed to gastric acid form a coagulum leading to bezoar formation
- **Most commonly** found in patients who have undergone **surgery** of the **stomach** and have **impaired gastric emptying**Q.
- **Diabetics** with **autonomic neuropathy**Q are also at risk.
  - **Symptoms: Early satiety**, nausea, **pain, vomiting**, and **weight loss** with palpable **large mass**Q
  - **Diagnosis** confirmed by a **barium examination** or **endoscopy**Q.
- **Enzymatic therapy** to attempt dissolution of the bezoar. **Papain** and **cellulase** have been used with some success.
- Generally, **enzymatic débridement** is followed by **aggressive Ewald tube lavage** or **endoscopic fragmentation**Q. Failure of these therapies would necessitate surgical removal.

Trichobezoar:

- Concretions of hair, generally found in **long-haired girls** or **women** who often deny eating their own hair (**trichophagy**)Q.
- Typically **black** regardless of the color of the hair ingested because of enzymatic oxidation of gastric acid
  - **Most common** type in **Children**Q
  - **Trichobezoars** are **most likely** to **require surgical management**Q
  - **Rapunzel Syndrome:** Gastric trichobezoars with a long **extension** of hairs that trails **into the duodenum.**

- **Symptoms**: **Pain** from **gastric ulceration** and fullness from **gastric outlet obstruction** with occasional **gastric perforation** and **small bowel obstruction**Q.
- Small trichobezoars may respond to endoscopic fragmentation, vigorous lavage, or enzymatic therapy.
- **Larger trichobezoars** require **surgical removal**Q.
- The trichophagy requires **psychiatric care**Q because recurrent bezoar formation is common.

Lactobezoar:

- Compact mass of **undigested milk concretions** and have been linked to nearly every **commercially available infant formula** and **breast** and **cow milk**
- Treated by **withholding oral feedings**
- Recurrence has never been reported after again feeding milk

254. Ans. d. Malignancy

255. Ans. a. Trichobezoar

256. Ans. a. It is caused by Trichuris

STRESS GASTRITIS

257. Ans. c. Surgery involves anterior gastrotomy with ligation of bleeding ulcers and superficial erosions *(Ref: Sabiston 19/e p1167-1168; Schwartz 10/e p1073-1074, 9/e p925; Bailey 25/e p1053; Shackelford 7/e p728)*

Stress Gastritis (Stress Ulcerations/ Stress Erosive Gastritis/ Hemorrhagic Gastritis)

- Characterized by **multiple, superficial** (nonulcerating) **erosions** that **begin in** the **proximal or acid-secreting portion** of the stomach and **progress distally**Q.
- **Almost always** seen in the **fundus**Q and **rarely** in the **distal stomach**.

  - **Cushing's ulcer**: Occur in the setting of central nervous system disease (**Head trauma**)Q
  - **Curling's ulcer**: as a result of **thermal burn injury** involving **> 35%** of BSAQ

- **Increased acid secretion** in **Cushing's ulcer** but **not in Curling's ulcer**Q

Pathophysiology:

- Multifactorial etiology

  - **Impaired mucosal defense** mechanisms against luminal acid such as a **reduction in blood flow**, **mucus**, and **bicarbonate secretion** by mucosal cells, or a **reduction in endogenous prostaglandins**Q.

- In stress (**hypoxia, sepsis,** or **organ failure**), **mucosal ischemia** is the **main factor** responsible for the **breakdown** of these **normal defense mechanisms**Q.

Risk factors or Predisposing clinical conditions		
• **ARDS**Q	• **Hepatic dysfunction**Q	• **Hypotension**Q
• **Multiple trauma**Q	• **Oliguric renal failure**Q	• **Prolonged** surgical procedures**Q**
• Major burn **> 35%** of BSAQ	• Large **transfusion**Q requirements	• **Sepsis**Q

Clinical Features:

- More than **50%** of patients develop their **stress gastritis within 1–2 days** after a traumatic event.
- The only clinical sign may be **painless upper GI bleeding** that may be delayed at onset.
- The **bleeding** is usually **slow** and **intermittent**Q
-

Diagnosis:

- **Endoscopy** is required to **confirm the diagnosis**Q and to differentiate stress gastritis from other sources of GI hemorrhage.

Treatment:

- **Definitive fluid resuscitation** with **correction** of any **coagulation abnormalities** and **treatment of the underlying sepsis**Q
- **Intraluminal gastric pH** should be maintained **>5.0** with **antisecretory agents**.
- **Most of** the **superficial erosions** are not actively bleeding and therefore **do not require ligature unless** a **blood vessel** is **seen** at its **base**Q.

  - The operation is completed by **closing the anterior gastrotomy** and performing a **truncal vagotomy** and **pyloroplasty**Q to reduce acid secretion.

Prophylaxis:

- **Complete neutralization** of **luminal acid** or **antisecretory therapy** precludes the development of experimental stress gastritisQ.
- **Sepsis control**, **ventilatory support**, adequate **nutrition** and correction of dyselectrolytemiaQ
- **Drugs** used are: Antacids, H_2-receptor antagonists and sucralfate

258. Ans. c. Elective ventilation

259. Ans. d. Increased H. pylori infection

260. Ans. a. Fundus of stomach

261. Ans. d. Distal duodenum

262. Ans. b. Stomach

263. Ans. b. Fundus

264. Ans. a. Burn patients

- **Cushing ulcer**: Stress gastritis due to **intracranial injury/increased ICP**Q
- **Curling ulcer**: **After burn injury** (**> 35%**); in the **body** and **fundus**Q; not in antrum and duodenum
- **Cameron ulcers** or **riding ulcers:** Linear gastric erosions **in hiatal hernias**Q

265. Ans. b. Are solitary penetrating ulcer; d. Has also been described in children after head injury or craniotomy

266. Ans. c. Penicillin therapy

267. Ans. a. 1st part of duodenum

GASTRIC VOLVULUS

268. Ans. c. Endoscopy usually derotate *(Ref: Sabiston 19/e p1223; Schwartz 10/e p1090, 9/e p941; Shackelford 7/e p876-878; Bailey 26/e p1055)*

Gastric Volvulus

- **Organoaxial** (**two thirds**): Torsion occurs along the stomach's **longitudinal axis**Q
- **Mesenteroaxial** (**one third**): Torsion occurs along the **vertical axis**Q

Primary Gastric Volvulus	Secondary Gastric Volvulus
• Seen in association with **congenital asplenia** and **wandering spleen**Q • Usually **mesenteroaxial**Q • **Partial** (<180 degree) and **recurrent**Q • Not associated with a diaphragmatic defect	• Occur secondary to some anatomic abnormality, (**Most commonly diaphragmatic hernia**)Q • Usually **organoaxial**Q • **Paraesophageal hiatal hernia** is the most common cause in **adults** and **congenital diaphragmatic hernia** (Bochdalek hernia) in **children**Q

Clinical Features:

- **Organoaxial gastric volvulus** occurs **acutely** and is associated with a diaphragmatic defect
- **Mesenteroaxial volvulus** is **partial** (< 180 degrees), **recurrent**, and not associated with a diaphragmatic defect.
- The major symptoms at presentation are **abdominal pain** that is acute in onset, distention, vomiting, and **upper GI hemorrhage**Q.
  - **Borchardt's triad:** (**Epigastric pain** + **Inability to vomit** + **Inability to pass a nasogastric tube**) is characteristic feature of gastric volvulusQ.

Diagnosis:

- **X-ray abdomen**: **Gas-filled viscus** in the **chest** or upper abdomenQ.
- The **diagnosis** can be **confirmed** by **barium** contrast study or **endoscopy**Q.

Treatment:

- **Acute volvulus:** It is a **surgical emergency**. **Stomach** is **reduced** and **uncoiled**. The **diaphragmatic defect** is **repaired** with consideration given to a fundoplication in the setting of a paraesophageal herniaQ.
- In **strangulation** (5–28%), the **compromised segment** of stomach is **resected**Q.
- **Spontaneous volvulus**, without an associated diaphragmatic defect, is treated by **detorsion** and **fixation** of the stomach by gastropexy or tube gastrostomyQ.

269. Ans. b. Acute gastric volvulus

270. Ans. b. Vomiting

STOMACH ANATOMY AND PHYSIOLOGY

271. Ans. c. Proximal branch of posterior vagus *(Ref: Sabiston 19/e p1183-1184; Schwartz 10/e p1035-1040, 9/e p892-894; Bailey 26/e p1023-1025, 25/e p1045-1047; Shackelford 7/e p845)*

Stomach Innervation

- The extrinsic innervation of the stomach is both **parasympathetic through the vagus** and **sympathetic through the celiac plexus**.
- The **vagus nerve originates** in the **vagal nucleus** in the **floor** of the **fourth ventricle** and **traverses** the **neck** in the **carotid sheath** to enter the **mediastinum**, where it **divides into several branches around** the **esophagus**. These branches coalesce above the esophageal hiatus to form the left and right vagus nerves.

- **At** the **GE junction**, the **left vagus** is **anterior**, and the **right vagus** is **posterior** (**LARP** mnemonic)[Q].

Left vagus	Right vagus
• **At** the **GE junction**, **left vagus** is **anterior**[Q] • **Left vagus** gives off the **hepatic branch to** the **liver**[Q] and then continues along the lesser curvature as the **anterior nerve of Latarjet**[Q].	• **At** the **GE junction**, **right vagus** is **posterior**[Q] • **Criminal nerve of Grassi**[Q] is the **first branch** of the **right** or **posterior vagus nerve** and is recognized as a **potential etiology of recurrent ulcers** when **left undivided**[Q]. • **Right vagus** also gives a branch off to the **celiac plexus**[Q] and then continues posteriorly along the lesser curvature.

Truncal vagotomy	• Performed **above** the **celiac** and **hepatic branches of** the **vagi**[Q]
Selective vagotomy	• Performed **below** the **celiac** and **hepatic branches of** the **vagi**[Q]
Highly selective vagotomy	• Performed by **dividing the crow's feet** to the **proximal stomach** while **preserving** the **innervation of** the **antral** and **pyloric parts** of **stomach**[Q].

272. Ans. b. Body *(Ref: Shackelford 7/e p781; 6/e p729)*

Shackelford "The **gastric pacemaker**, which is **located in** the **body along** the **greater curvature**, stimulates both the filling and mixing of food in the body and antrum."

Gastric Motility

- **Gastric pacemaker**: **Interstitial cells of Cajal** (ICCs)[Q]
- **Location**: In **body**[Q] **along** the **greater curvature**
- **ICCs** are **critical for the generation** of **sequential contractions**[Q]

273. Ans. a. Protects epithelium

274. Ans. c. Pyloric antrum *(Ref: Sabiston 19/e p1184)*

Location	Cells
Gastric Body	MCD PIE (Mucus cells, Chief cells, D cells, Parietal cells, Interneurons and ECL cells)[Q]
Gastric antrum	MD GI (Mucus cells, D cells, G cells and Interneurons)[Q]

- **Parietal cells** secrete **G**hrelin, **I**ntrinsic factor, **L**eptin and **A**cid. (**GILA**)[Q]
- **Chief cells** secrete **pepsin** and **leptin**[Q]

- **Stomach Histology (CMPE)**: **C**hief cells (44%) > **M**ucous cells (40%) > **P**arietal cells (13%) > **E**ndocrine cells (3%)[Q]

Gastric Morphology

- **Muscularis mucosa** is responsible for the **rugae**[Q] that greatly **increases surface area** and also **marks** the **microscopic boundary** for invasive and non-invasive gastric carcinoma.
- **Submucosa** is the **strongest layer**[Q] of the gastric wall.
- **Muscularis propria** consists of **three layers**[Q] of smooth muscle. The **middle layer** is circular and is the **only complete muscle layer** of the stomach wall, this layer becomes **progressively thicker** toward the **pylorus**, where it becomes as a true anatomic sphincter.

Embryology of Stomach

- The stomach arises as a **dilatation** in the **tubular embryonic foregut**[Q]
- Assumes its **normal asymmetric shape** and **position** by the end of the **7th week**[Q].
- During the **6th to 10th week** as the stomach enlarges it also **rotates 90 degrees** in a **clockwise direction**[Q].

275. Ans. c. Duodenum *(Ref: Sabiston 19/e p1229; Shackelford 7/e p826)*

- **Brunner's Gland: Submucosal gland** found in the **duodenum**[Q]

276. Ans. a. Stimulation of appetite *(Ref: Sabiston 19/e p1186; Schwartz 10/e p22,1045,1047,1348, 9/e p1176-1177; Shackelford 7/e p645-646)*

Ghrelin

- Secreted by **oxyntic cells** in the **fundus** of the stomach[Q]
- First gut peptide found to have **orexigenic** (**appetite stimulating**) properties[Q].
- **Circulating levels** of ghrelin are **inversely related to BMI, adipose tissue mass** and **plasma insulin** levels[Q].

Primary effects of Ghrelin	
• **Motilin like effects** on gastric motility[Q]	• **Stimulates release of growth hormone** from pituitary[Q]
• **Stimulates release** of **somatostatin** and **PP**[Q]	

277. **Ans. c. Splenic artery** *(Ref: Sabiston 19/e p1182; Bailey 25/e p1045)*

- **Posterior gastric artery** is a **branch of splenic artery**[Q].

GASTRIC DIVERTICULUM

278. **Ans. b. Usually at cardiac end; c. Usually on posterior surface** *(Ref: Schwartz 9/e p941)*

Gastric Diverticula

- Gastric diverticula are **usually solitary** and may be **congenital** or **acquired**[Q].
- **Congenital diverticula** are **true diverticula** and contain a full coat of muscularis propria, whereas **acquired diverticula** (perhaps caused by pulsion) usually have a **negligible outer muscle layer**[Q].
  - **Most gastric diverticula** occur in the **posterior cardia** or **fundus**[Q].
  - **Most** of the time **gastric diverticula** are **asymptomatic**[Q].
- However, they **can become inflamed** and may **produce pain** or **bleeding**[Q].
- **Perforation** is **rare**.

Treatment:

- **Asymptomatic diverticula do not require treatment**[Q]
- **Symptomatic lesions** should be **removed**. This can often be done **laparoscopically**[Q].

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279. **Ans. d. Pain**

MISCELLANEOUS

280. **Ans. b. T.B., c. CA pancreas, d. Crohn's disease: Gastrointestinal Radiology 2nd/84**

Causes of Duodenal Stricture	
• **Chronic peptic ulcer**[Q] disease	• **CA head of pancreas**[Q]
• **Crohn's disease**[Q]	• **Annular pancreas**[Q]
• **Tuberculosis**[Q]	• **Pancreatitis**[Q]
	• Cholecystitis

281. **Ans. a. Eagle-Barrett syndrome** *(Ref: Schwartz 10/e p1634, 9/e p1443-1444)*

Eagle-Barrett Syndrome or Prune-Belly Syndrome

- **Prune-belly syndrome** describes the **wrinkled appearance** of the **anterior abdominal wall** that **characterizes these patients**[Q].
- Also known as **Eagle-Barrett syndrome** and the **triad syndrome** because of its **three major manifestations**[Q].

Characterized by
• **Extremely lax lower abdominal musculature**[Q]
• **Dilated urinary tract** including the bladder[Q]
• **Bilateral undescended testes**[Q]

- The incidence is **significantly higher** in **males**[Q].
- **Most significant comorbidity**: **Pulmonary hypoplasia** (lead to **death in** the **most severe cases**)[Q]
- **Skeletal abnormalities** include **dislocation** or **dysplasia of** the **hip** and **pectus excavatum**[Q].

Genitourinary Manifestation
• **Major genitourinary manifestation: Ureteral dilatation**[Q]
• **Ureters** are **typically long** and **tortuous**, and become **more dilated distally**.
• **Ureteric obstruction** is **rarely present**[Q].
• The **dilatation is** thought to be **caused by decreased smooth muscle** and **increased collagen** in the ureters[Q].
• Approximately **80%** of affected individuals have **some degree of VUR**, which can **predispose to UTI**[Q].

- Most children have adequate renal parenchyma for growth and development[Q].

Treatment:

- **Ureteric surgery** has **no role unless** an area of **obstruction develops**.
- **Bilateral orchidopexy** can be performed in conjunction **with abdominal wall reconstruction** at **6-12 months** of **age**[Q].

282. Ans. c. Pernicious anemia *(Ref: Sabiston 19/e p1186)*

Causes of Hypergastrinemia

Ulcerogenic Causes	Non-ulcerogenic Causes
• **Antral G-cell hyperplasia** or **hyperfunction**[Q]	• Antisecretory agents (PPIs)[Q]
• **Retained excluded antrum**[Q]	• **Atrophic gastritis**[Q]
• **Zollinger-Ellison syndrome**[Q]	• **Pernicious anemia**[Q]
• **Gastric outlet obstruction**[Q]	• Acid-reducing procedure (vagotomy)
• **Short-gut syndrome**[Q]	• **H. pylori infection**[Q]
	• **Chronic renal failure**[Q]

283. Ans. b. Gastric ulcer

Hour-Glass Stomach

- Hour-glass stomach is caused by **cicatricial contraction** of a **saddle shaped ulcer** at the **lesser curvature**[Q]

Tea-Pot Stomach (Hand-bag Stomach)

- Tea-pot stomach is caused by **longitudinal shortening** of **gastric ulcer** at the **lesser curvature** of stomach (stomach looks like tea-pot)[Q]

284. Ans. c. Ba enema

285. Ans. a. Most common small bowel carcinoma; b. Type of periampullary carcinoma; c. Jaundice and anemia-most common symptom *(Ref: Sabiston 19/e p1263; Schwartz 9/e p999; Bailey 25/e p1076; Shackelford 7/e p779)*

Duodenal Adenocarcinoma

- **Duodenum** is **MC site** of **small intestinal adenocarcinoma**[Q]
- 15% in the proximal; 40% in the middle and **45%** in the **distal duodenum (MC)**[Q]
- **Resectability** and **prognosis** are **better** than other upper GI cancers.

Clinical Features

- Most often presents as **obstruction**, with **nausea, vomiting**, and **abdominal pain** as the most frequent symptoms.
- **Anemia** from bleeding and **biliary** or **pancreatic obstructive symptoms** can also be seen on initial presentation if the tumor is **located within** the **periampullary region**[Q].

Diagnosis

- **Endoscopy** is the **diagnostic test of choice** for **duodenal tumors**[Q], which allows for direct **visualization** and **biopsy** as needed.

Treatment

- For **1st** or **2nd** portion: **Whipple procedure**[Q]
- For **3rd** or **4th** portion: **Segmental duodenal resection**[Q]

286. Ans. d. Up to 50 cm *(Ref: Narayan Reddy 20/e p431)*

- In **adults, gastric lavage tube** should be passed upto **50 cm mark**Q.

287. Ans. c. Amyloidosis

288. Ans. d. Pancreatic injury; e. Duodenal injury *(Ref: Sabiston 19/e p462-463; Shackelford 7/e p688)*

Management of Grade IV and V pancreatic injuries

- Due to short of radical resection, other **options designed to divert gastric, pancreatic**, and **biliary secretions away from the duodenum** need to be considered for the management of patients with **grade IV** and **V pancreatic injuries**Q.
- These include **duodenal diverticularization, pyloric exclusion** or **gastrojejunostomy**, and **triple-tube decompression**Q.

> - **Duodenal diverticularization** is accomplished by performing **antrectomy** and **gastrojejunostomy** to achieve gastric diversion, **choledochostomy** to divert bile if the ampulla is injured, **tube duodenostomy** for decompression of the duodenum, **suture repair of any duodenal injuries**, and **extensive periduodenal** and **peripancreatic drainage**Q.

- When **pancreatic injuries** are associated with **major duodenal injuries**. **Drainage** or **resection of the pancreas** can be **combined with suturing** or **stapling** of the **pylorus** (**pyloric exclusion procedure**) to divert gastric flow from the duodenumQ.
- Gastrointestinal continuity is then accomplished by **gastrojejunostomy**.
- It is quite remarkable that gastroduodenal continuity is re-established 4 to 6 weeks after pyloric exclusion even when heavy non-absorbable sutures or staples are used.
- The **pyloric exclusion** procedure has **largely replaced** the **duodenal diverticularization** procedure, which entails antrectomy and gastrojejunostomy, as well as drainage and decompression of the duodenal injury and drainage of the pancreatic injury.

289. Ans. a. Gastric antrum is predominantly affected

- **Type A gastritis** primarily involves **body** and **fundus**Q

290. Ans. b. > 10 cm *(Ref: Shackelford 7/e p895Sabiston 19/e p1251)*

- **Finney stricturoplasty** is used for **strictures > 10–15 cm**Q.
- **Heineke-Mikulicz stricturoplasty** is appropriate strictures **< 10 cm**Q in length.

291. Ans. b. 15 cm *(Ref: Shackelford 7/e p810; www.surgery.usc.edu/foregut/demeesterpub/235. Ans.pdf)*

Hunt-Lawrence Pouch

- **Jejunal reservoir** (**Hunt-Lawrence pouch**) is used for the treatment of **microgastria**.
- **Length of pouch**: **12–15 cm**Q
- Length of **jejunal limb** used: **35–40 cm**Q

Important Topics

Gastrectomy	
Antrectomy or distal gastrectomy	• Removal of **distal 1/3rd** of stomachQ
Hemigastrectmy	• Removal of **half** of stomachQ
Subtotal gastrectomy	• Removal of **2/3rd** of stomachQ
Total gastrectomy	• Removal of **whole** stomachQ

- **No lymph node metastasis** in **GIST** and **Phyllodes tumor (No role of lymphadenectomy)**Q.
- **Lymph node metastasis** in **gastrinoma doesn't depend on size** or **location** of tumor and **doesn't affect survival**Q.

Hollander Test

- **Test for function** of the **vagus nerve** (as **after vagotomy for peptic ulcer**) in which **insulin is administered to induce hypoglycemia** and **gastric acidity tends to increase if innervation** by the vagus nerve **remains** and **decrease if severance is complete.**

CHAPTER 11

Peritoneum

MULTIPLE CHOICE QUESTIONS

RETROPERITONEAL FIBROSIS

1. Ormond's disease is: *(MHPGMCET 2009, 2007)*
a. Retractile testis
b. Idiopathic retroperitoneal lymphadenopathy
c. Idiopathic retroperitoneal fibrosis
d. Idiopathic mediastinitis

2. Ormond's disease is: *(Kerala 98)*
a. Idiopathic lymphadenopathy
b. Retractile testis
c. Idiopathic retroperitoneal fibrosis
d. Idiopathic mediastinitis

3. Retroperitoneal fibrosis most commonly presents with:
a. Pedal edema b. Ascites *(JIPMER 2011)*
c. Ureteric obstruction d. Back pain

4. Most common organ involved in retroperitoneal fibrosis is: *(AIIMS Nov 93)*
a. Aorta b. Ureter
c. Inferior vena cava d. Sympathetic nerve plexus

5. Localized idiopathic fibrosis is seen in all of the following except: *(UPSC 2001)*
a. Riedel's struma b. Hypertrophic scar
c. Sclerosing cholangitis d. Panniculitis

PERITONITIS

6. All are true about SBP except: *(ILBS 2012)*
a. In hospital mortality rate is 20%
b. Neutrascitic ascites has better prognosis
c. Norfloxacin is useful for prevention
d. Cefotaxime is used for treatment

7. Emergency operation done in cases of: *(PGI Nov 2010)*
a. Volvulus b. Obstructed hernia
c. Appendicular perforation with paralytic ileus
d. Toxic megacolon e. Colonic perforation

8. Investigation for acute abdomen includes: *(PGI May 2010)*
a. USG b. Multidetector CT
c. Contrast enhanced CT d. X-ray abdomen
e. Echocardiography

9. A post-op patient presents with peritonitis and massive contamination because of duodenal leak. Management of choice is: *(AIIMS June 2001)*
a. Four quadrant peritoneal lavage
b. Duodenostomy + Feeding jejunostomy + Peritoneal lavage
c. Total parenteral nutrition
d. Duodenojejunostomy

10. In which of the following condition, air under both sides of diaphragm is visualized? *(PGI Dec 2001, June 2001)*
a. Perforated Meckel's diverticulum
b. Uterine rupture following illegal abortion
c. Perforation of duodenal ulcer
d. Liver abscess
e. Appendicular perforation

11. Which of the following causes least irritation of the peritoneal cavity? *(All India 99)*
a. Bile b. Blood
c. Gastric enzyme d. Pancreatic enzyme

12. Most common cause of peritonitis in adult male is:
a. Duodenal ulcer perforation *(All India 93)*
b. Abdominal tuberculosis
c. Enteric perforation
d. Perforated appendix

13. Apart from Escherichia coli, the other most common organism implicated in acute suppurative bacterial peritonitis is: *(All India 2006)*
a. Bacteroides b. Klebsiella
c. Peptostreptococcus d. Pseudomonas

14. Primary peritonitis with pneumococcus is associated with: *(UPSC 86, JIPMER 88)*
a. Lymphomas b. Nephrotic syndrome
c. Carcinoids d. None of the above

15. Generalized diffuse peritonitis has been compared to second and third degree burns of: *(AIIMS 84)*
a. 13% b. 30%
c. 45% d. 60%

16. Early surgery is indicated in: *(PGI 86)*
a. Amoebiasis peritonitis b. Biliary peritonitis
c. Typhoid peritonitis d. All

17. Most common cause of generalized peritonitis in a 40-years old adult male is: *(AIIMS 92)*
a. Enteric perforation
b. Ruptured liver abscess
c. Duodenal ulcer perforation
d. Perforated CA stomach

18. The commonest organism seen in peritonitis is: *(TN 2001)*
a. Escherichia coli b. Clostridium welchii
c. Staphylococci d. Klebsiella

19. Which of the following complications is not seen with peritonitis? *(MAHE 2006)*
a. Renal failure b. Residual abscess
c. Endotoxic shock d. Bone marrow suppression

20. A 25-years old female presents with pyrexia for ten days, develops acute pain in periumblical region spreading all over the abdomen. What would be the most likely cause? *(UPSC 2007)*
a. Perforation peritonitis due to intestinal tuberculosis
B. Generalized peritonitis due to appendicular perforation
c. Typhoid enteric perforation and peritonitis
d. Acute salpingo-oophoritis with peritonitis

21. Spontaneous peritonitis in cirrhosis patients; the polymorphonuclear cells are: *(NEET 2013, UPPG 2008)*
a. More than 200 cells/cumm
b. More than 300 cells/cumm
c. More than 400 cells/cumm
d. More than 500 cells/cumm

22. Which of following is true regarding classical spontaneous bacterial peritonitis? *(NEET 2013, COMEDK 2010)*
a. Ascitic fluid neutrophil count is 250/cu.mm
b. Bowel perforation should be present
c. Multiple organisms are isolated from ascetic fluid
d. Board-like rigidity is present in abdomen

23. A 10-years old female who used to use the swimming pool regularly, comes with a three day history of vomiting, fever and abdominal pain. On examination, abdominal tenderness and guarding are present. The liver dullness is not obliterated. Likely diagnosis is: *(AIIMS 99)*
a. Gangrenous intussusceptions
b. Perforation
c. Spontaneous biliary peritonitis
d. Primary peritonitis

24. Sonu, a 15-years old girl, a regular swimmer presents with sudden onset of pain in abdomen, abdominal distension and fever of 39°C and obliteration of the liver dullness. Most probable diagnosis is: *(AIIMS June 2001, Nov 99)*
a. Ruptured typhoid ulcer
b. Primary bacterial peritonitis
c. Ruptured ectopic pregnancy
d. UTI with PID

25. All of the following regarding diagnosis of acute peritonitis are correct except: *(MCI March 2007)*
a. Raised WBC count in peritoneal aspirate
b. Moderately raised amylase levels are diagnostic of peritonitis
c. CT scan may aid in diagnosis
d. Upright films shows free air under the diaphragm

MESENTERIC CYST

26. Most common type of mesenteric cyst is? *(MHSSMCET 2005)*
a. Enterogenous b. Chylolymphatic
c. Urogenital d. Teratomatous

27. True about mesenteric cysts is : *(PGI Dec 97)*
a. Enterogenous cyst is commonest type
b. Recurrence is common after enucleation
c. Mesenteric cyst are usually multiple
d. Enucleation is the treatment of choice of chylolymphatic cyst

28. True about mesenteric cyst: *(PGI Dec 2005)*
a. Moves perpendicular to the line of attachment
b. Teratomatous is most common
c. Chylolymphatic cyst has separate blood supply
d. Surgical removal of bowel along cyst is treatment of choice in all the cyst

29. Mesenteric cyst whose removal entrails removals of part of gut: *(TN 95)*
a. Chylolymphatic cyst b. Enterogenous cyst
c. Dermoid d. All

30. All are mesenteric cyst except: *(DNB 2007)*
a. Dermoid cyst b. Chylolymphatic cyst
c. Gartner's cyst d. Enterogenous cyst

31. A part of adjacent intestine will be removed in: *(JIPMER 2012)*
a. Enterogenous b. Chylolymphatic cyst
c. Dermoid cyst d. Mesothelial cyst

ASCITES

32. Transudative ascites is/are associated with: *(PGI May 2011)*
a. Myxedema b. Budd Chiari syndrome
c. Acute pancreatitis d. Portal vein thrombosis
e. Congestive heart failure

33. Serum-ascites albumin gradient >1.1 g/dL is seen in:
a. Nephrosis b. Cirrhosis *(COMEDK 2005)*
c. Pancreatic ascites d. Neoplasm

34. Mucinous ascites is seen in: *(PGI June 2000)*
a. Stomach CA b. TB
c. Nephrotic syndrome d. Cirrhosis

35. The following are true regarding ascites except: *(Kerala 2000)*
a. Only when the amount of fluid present exceeds 1500 ml. It can be recognized clinically
b. Shifting dullness is absent when there is a very large accumulation of fluid
c. In cirrhosis there is obstruction to the venous outflow of the liver due to obliterative fibrosis of the intra hepatic venous bed
d. A transudate has a protein content of greater than 30 gms of protein per litre
e. In Meig's syndrome it is associated with pleural effusion and solid fibroma of ovary

36. Pseudochylous ascites occurs in: *(PGI 80, JIPMER 81)*
a. Cirrhosis b. Hyperlipidemia
c. Filariasis d. Malignant ascites

PSEUDOMYXOMA PERITONEI

37. In pseudomyxoma peritonei, mucinous cyst-adenocarcinoma of which following organ is involved: *(Orissa 2011)*
a. Pancreas b. Ovary
c. Kidney d. Abdominal testis

38. Pseudomyxoma peritonei arises from: *(PGI Dec 2008)*
a. Carcinoma ovary b. Ovarian cyst
c. Ovarian dermoid d. Adenocarcinoma colon
e. Mucocele of appendix

39. True about pseudomyxoma peritonei: *(PGI June 2004)*
a. Seen in male only
b. Cytoreductive surgery needed
c. Always appendectomy needed
d. Radiation therapy given
e. Locally malignant tumor

40. Commonest site from where pseudomyxoma peritonei arise: *(PGI June 2006)*
a. Ovary b. Appendix
c. Pancreas d. Stomach
e. Colon

41. All are true about pseudomyxoma peritonei except:
a. Common in male *(UPPG 2007)*
b. Associated with ovary tumors
c. Yellow jelly collection of fluid
d. Appendiceal adenocarcinoma

42. All are true about pseudomyxoma peritonei except:
a. Associated with ovarian tumors *(DPG 2008)*
b. Appendix is most common site of origin
c. Yellow jelly collection of fluid
d. Common in male

ABDOMINAL ABSCESS

43. Commonest site of intraperitoneal abscess is: *(Orissa 2011)*
a. Lesser sac b. Greater sac
c. Pelvis d. Paracolic gutter

44. The part of peritoneal cavity that is most dependent in supine position: *(MHSSMCET 2009)*
a. Right subphrenic space b. Lesser sac
c. Supra mesocolic space d. Right subhepatic space

45. Most common site of intra-abdominal abscess? *(MHPGMCET 2006)*
a. Pelvic
b. Subphrenic space
c. Mesenteric
d. Paracolic gutters

46. Most common cause of infection and collection of fluid in the left subhepatic space: *(MHPGMCET 2009)*
a. Perforation at the lesser curvature of stomach
b. Complicated acute pancreatitis
c. Ruptured abscess of the left lobe of the liver
d. Perforation of posterior duodenal wall ulcer

47. Posterior perforated ulcer on pyloric antrum cause abscess formation in: *(PGI June 2009)*
a. Greater sac
b. Lesser sac
c. Pouch of Morrison
d. Omental bursa
e. Right subphrenic

48. In a patient recovering from peritonitis, which of the following would be the most characteristic sign of pelvic abscess? *(MHPGMCET 2008)*
a. Fever and abdominal pain
b. Tachycardia
c. Mucus in the stool for first time
d. All of the above

49. Commonest sites of intra-abdominal abscess: *(PGI June 2006)*
a. Subphrenic
b. Paracolic
c. Pelvis
d. Retroperitoneal
e. Between loops

50. Commonest site of an intraperitoneal abscess is: *(JIPMER 86, 87)*
a. Subphrenic
b. Paracolic
c. Para appendix
d. Pelvic

51. Treatment of pouch of Douglas abscess is: *(UPSC 87, 88)*
a. Laparotomy
b. Posterior colpotomy
c. Antibiotics
d. Extraperitoneal drainage

52. Most common site for intra abdominal abscess following laparotomy is: *(AIIMS 92)*
a. Sub hepatic
b. Subphrenic
c. Pelvic
d. Paracolic

53. Correct about subphrenic abscess is: *(PGI 81, DPG 86)*
a. Rarely chest symptoms
b. Toxemia
c. Rarely toxaemia
d. No sign and symptoms

54. The most favored treatment for a pelvic abscess in cul-de-sac is: *(DPG 96)*
a. Laparotomy
b. Colpotomy
c. External I and D
d. Antibiotics

55. Colopotomy is done to treat: *(APPG 98)*
a. Ischeorectal abscess
b. Pelvic abscess
c. Appendicular abscess
d. Perianal abscess

56. Most pathognomic in pelvic abscess is: *(UPPG 2007)*
a. Constipation
b. Mucopurulent discharge
c. Loose stool
d. Bleeding

57. Most common site of intraperitoneal abscess is: *(DPG 2008)*
a. Right superior intraperitoneal space
b. Right inferior intraperitoneal space
c. Left superior intraperitoneal space
d. Left superior intraperitoneal space

58. Most common site of intra peritoneal abscess? *(APPG 2008)*
a. Morrison's pouch
b. Omental bursa
c. Pelvic region
d. Left subhepatic pouch

59. A posteriorly perforating ulcer in the pyloric antrum of the stomach is likely to produce initial localized peritonitis or abscess formation in the: *(AIIMS Nov 2004)*
a. Greater sac
b. Left subhepatic and hepatorenal spaces (Pouch of Morrison)
c. Right subphrenic space
d. Lesser sac

PNEUMOPERITONEUM

60. Treatment of pneumoperitoneum, as a result of colonoscopic perforation in a young patient is: *(PGI June 98)*
a. Temporary colostomy
b. Closure + lavage
c. Permanent colostomy
d. Symptomatic

61. Best investigation for air in peritoneal cavity is: *(CMC 98)*
a. USG
b. Laparotomy
c. Laparoscopy
d. X-ray abdomen-erect view

62. In pneumoperitoneum following are seen except: *(PGI 97)*
a. Hypertension
b. Bradycardia
c. Tachycardia
d. Hypercapnia

63. In which one of the following conditions is gas under diaphragm not seen? *(UPSC 2005)*
a. Perforated duodenal ulcer
b. Typhoid perforation
c. After laparotomy
d. Spontaneous rupture of esophagus

64. Rigler's sign is seen in: *(COMEDK 2008)*
a. Ulcerative colitis
b. Crohn's disease
c. Megacolon
d. Pneumoperitonium

65. The best view to visualized minimal pneumo-peritoneum:
a. AP view abdomen *(All India 2012)*
b. Erect view abdomen
c. Right lateral decubitus with horizontal beam
d. Left lateral decubitus with horizontal beam

66. Advantage of carbon dioxide in laparoscopy are all except: *(Rohtak 97)*
a. Non-irritant
b. Non-inflammable
c. Minimally absorbed
d. No tissue reaction
e. None

PERITONEUM ANATOMY

67. True about boundaries of lesser sac: *(PGI 2000)*
a. Posteriorly stomach
b. Crus of diaphragm
c. Spleen
d. Greater omentum

68. Lesser sac of stomach is bounded by: *(PGI 2000)*
a. Posterior wall of stomach
b. Visceral surface of spleen
c. Under surface of liver
d. Greater omentum

69. Lesser omentum has following contents except: *(PGI 97)*
a. Hepatic vein
b. Hepatic artery
c. Portal vein
d. Bile duct

70. True about relation of epipolic foramen is: *(AIIMS 97)*
a. Portal vein posteriorly
b. IVC inferiorly
c. Hepatic art superiorly
d. Bile duct anteriorly

71. Root of mesentery is crossed by: *(AIIMS May 2011)*
a. Horizontal part of duodenum
b. Left gonadal vessels
c. Left ureter
d. Superior mesenteric artery

WOUND DEHISCENCE

72. Burst abdomen most commonly occurs on the: *(JIPMER 86)*
a. 2nd day
b. 3rd day
c. 7th day
d. 9th day
e. 5th day

73. On 7th post operative day, abdominal wound shows pink serosanguinous discharge. It suggests: *(DNB 2001)*
a. Impending wound dehiscence
b. Infection in the abdomen
c. Stitch abscess
d. Healing wound

MESENTERIC LYMPHADENITIS

74. Acute mesenteric lymphadenitis is caused by: *(All India 94)*
a. E. coli
b. α-hemolytic streptococci
c. Hemophilus
d. Yersinia

75. The commonest cause of acute mesenteric adenitis is: *(JIPMER 81, AMU 87)*
a. Tuberculosis
b. Brucellosis
c. Pneumococcal infection
d. Idiopathic

76. Most common cause of acute mesenteric adenitis? *(MHSSMCET 2007)*
a. Yersenia enterocolytica
b. M. tuberculosis
c. Rotavirus
d. Drugs

MISCELLANEOUS

77. Which of the following is not characteristic of visceral pain? *(PGI 89)*
a. Poor localization
b. Diffuse in nature
c. High threshold
d. Very rapid adaptation

78. Odorless peritoneal fluid is noticed in: *(AMC 81, APPG 89)*
a. Perforated peptic ulcer
b. Perforated ileum
c. Perforated appendix
d. T.B. peritonitis

79. "Peritoneal mice" is: *(APPG 97)*
a. Pseudomyxoma peritonei
b. Appendices epiploicae
c. Peritoneal seedings of tumour
d. Endometriosis

80. Malignant change in lipoma is most common in: *(Rohtak 2000)*
a. Thigh
b. Nape of neck
c. Retroperitoneum
d. Back

81. Retractile mesenteris may be seen in: *(NIMHANS 86)*
a. Ormond's disease
b. Gardner' syndrome
c. Turner's syndrome
d. Down's syndrome

82. 'Gas' in the tissue should be differentiated with:
a. Pseudomyxoma peritonei *(UPPG 2007)*
b. Pseudomonas infection
c. Clostridium nouyi infection
d. Non clostridial infection

83. The mesentery of small intestine, along its attachment to the posterior abdominal wall, crosses all of the following structures except: *(AIIMS Nov 2004)*
a. Left gonadal vessels
b. Third part of duodenum
c. Aorta
d. Right ureter

84. Which is the baseline investigation in the case of an acute abdomen in this high-tech era? *(Kerala 2003)*
a. Abdomen CT
b. Abdomen X-ray
c. USG
d. Colonoscopy

85. Which of the following abdominal structure will be responsible for sharp pain while doing abdominal surgery? *(AIIMS Nov 2000)*
a. Parietal peritoneum
b. Liver parenchyma
c. Small intestine
d. Colon

86. 'Peritoneal mice' come from: *(MHPGMET 2005)*
a. Appendices epiploice
b. Pseudomyxoma peritonei
c. Metastases
d. All

87. Median survival in malignant peritoneal mesothelioma: *(MHPGMET 2005)*
a. 6–10 months
b. 4–12 months
c. 4–6 months
d. 12–20 months

EXPLANATIONS

RETROPERITONEAL FIBROSIS

1. **Ans. c. Idiopathic retroperitoneal fibrosis** *(Ref: Smith 17/e p570-571; Oxford Handbook of Urology 2/e p470-471; Campbell 10/e p1108-1112; Bailey 26/e p984, 25/e p1302)*

Retroperitoneal Fibrosis

- Uncommon inflammatory condition characterized by the **proliferation of fibrous tissue** in the **retroperitoneum**Q
- The fibrosis is usually confined to the **central and paravertebral spaces** between the **renal arteries and sacrum** and tends to **encase** the **aorta**, **IVC** and **ureters**Q**.**
- The process usually **begins at the level** of the **aortic bifurcation** and **spreads cephalad**Q upto renal artery generally.

Etiology

- Around **70% cases** are **primary** or **idiopathic** (**Ormond's disease**)Q

Causes of Secondary (30%)Q Retroperitoneal Fibrosis
• **Inflammatory conditions: CATH**Q **(Chronic pancreatitis, Actinomycosis, Tuberculosis, Histoplasmosis)**
• **Drugs: Methylsergide (Most important), methyldopa, hydralazine, entacapone, beta-blockers, bromocriptine, phenacetin, amphetamines**Q
• **Malignancies: CA prostate, NHL, CA stomach, sarcoma and carcinoid tumor**
• **Autoimmune disorders: SLE, PAN and ankylosing spondylitis**
• **Radiation**

Clinical Features

- More common in **males** of **40-60 years**Q.
- **Early symptoms** are **vague and non-specific**Q (**abdominal** or **flank pain**, weight loss, malaise, and hypertension)
- **Obstructive uropathy** (dysuria, frequency, fever due to secondary infection of hydroneprotic kidney) is the **earliest** and **MC specific symptom**Q.

• **Ureters** are **MC involved, MC site** is **lower third** of **ureter.**
• **Partial or complete obstruction** occurs in **75% patients**Q**.**

Diagnosis: In absence of uremia, diagnosis is made by IVP.

- **IVP or RGP**:
  - Hydronephrosis with dilated tortuous upper ureter,
  - **Medial pulling of ureters** or **pipestem ureters**Q
  - **Extrinsic ureteral compression**Q
- **CT scan** is **IOC** for retroperitoneal fibrosisQ.
- **MRI** is **IOC** in cases of **compromised renal function**, because contrast cannot be given.

Treatment

- **Primary, idiopathic** retroperitoneal fibrosis**: Ureteral stenting** and **immunosuppression** (**TAPS**: **T**amoxifen, **A**zathioprine, **P**enicillamine, **S**teroids)Q
- **Secondary retroperitoneal fibrosis**: **Midline transperitoneal ureterolysis** with **wrapping** the **ureter** with **omental flap** or **lateral retroperitoneal ureteral transposition**Q.

TAPS: Tamoxifen, Azathioprine, Penicillamine, Steroids are used in primary retroperitoneal fibrosisQ.

2. **Ans. c. Idiopathic retroperitoneal fibrosis** 3. **Ans. d. Back pain** 4. **Ans. b. Ureter**
5. **Ans. b. Hypertrophic scar** *(Ref: Bailey 25/e p598)*

Hypertrophic scar is not an idiopathic fibrosis, fibrosis occurs after incision.

PERITONITIS

6. **Ans. b. Neutrocytic ascites has better prognosis** *(Ref: Sabiston 19/e p1101; Schwartz 10/e p149-150, 9/e p1110; Bailey 26/e p971-972, 25/e p992; Schackelford 7/e p1605)*

Culture negative neutrocytic ascites carries a **similar prognosis to SBP** and is **managed similarly.**

Spontaneous Bacterial Peritonitis

- **SBP** is a common and severe complication of ascites characterized by **spontaneous infection of** the **ascitic fluid without an intra-abdominal source**Q.

- **Prevalence** of SBP is **10–30%**Q in patients of ascites, with **20%** in-hospital **mortality rate**Q.

> - **MC organism** in **adults: E. coli**Q **>Klebsiella**.
> - **MC organism** in **children**: **Group A streptococci**Q

Mechanism

- **Bacterial translocation** with **gut flora traversing** the **intestine into mesenteric lymph nodes**, leading to **bacteremia** and **seeding of the ascitic fluid**Q.
- **Predisposing Factors: Bowel preparation**, metabolic **alkalosis**, **dehydration** and **hypoproteinemia**Q
- It seen **more commonly in** patients presenting with **GI hemorrhage**Q.

Clinical Features

- Patients with ascites may present with **fever, altered mental status**, **elevated WBC count**Q, and **abdominal pain** or discomfort, or they may present without any of these features.
- **High degree of clinical suspicion** and **peritoneal taps** are important **for** making the **diagnosis.**

Diagnosis

- The presence of **>250**Q **polymorphonuclear cells** of ascitic fluid is consistent with SBP; with ascitic fluid **culture growing single organism**.
- If **more than two organisms** are identified, **secondary bacterial peritonitis** due to a **perforated viscus** should be considered**Q**.

> - **Culture negative neutrocytic ascites** is diagnosed, when an ascitic fluid **PMN count of >250** is **unaccompanied by** a **positive ascitic fluid culture**Q.
> - **Culture negative neutrocytic ascites** carries a **similar prognosis**Q **to SBP** and is **managed similarly.**

Treatment

- Treated with **cefotaxime** plus **albumin**Q
- **Norfloxacin decreases** the **incidence of SBP**Q in patients with variceal bleeding; patients with low-protein ascites and patients with a prior history of SBP.
- **Repeat diagnostic paracentesis** is indicated **after 48 hours** of appropriate antibiotic therapy only if there is a **lack of clinical improvement** or in cases of **secondary bacterial peritonitis**Q.

Prognosis

- **Occurrence of SBP** is an important **landmark in natural history** of cirrhosis with **1** and **2 year survival** rate of **30%** and **20%,** respectively**Q**.
- **Mortality rate** of **>20%**Q is seen in SBP despite of hospital treatment.

7. Ans. a. Volvulus, b. Obstructed hernia, c. Appendicular perforation with paralytic ileus, d. Toxic megacolon, e. Colonic perforation *(Ref: Sabiston 19/e p1242-1243; Schwartz 9/e p990)*

Indications of Immediate Surgery in Intestinal Obstruction	
• **Obstructed** or **strangulated hernia**Q • **Operative decompression**Q needed (in **Toxic megacolon**)	• **Volvulus**Q of gut • **Acute obstruction**Q • **Colonic perforation**Q

8. Ans. a. USG, b. Multidetector CT, c. Contrast enhanced CT, d. X-ray *(Ref: Sabiston 19/e p1148-1150; Schwartz 9/e p989-990)*

Investigations in Acute Abdomen

- **Plain X-ray**: Important role in imaging of patients with acute abdominal pain (useful for **intestinal obstruction** and **perforation**)Q.
- **USG**: Extremely accurate in detecting **gallstones** and **GB pathology**Q
- **CECT** and **MDCT**: Improvement in imaging techniques, especially MDCT has **revolutionized** the **diagnosis of acute abdomen**Q**.**

9. Ans. c. Total parenteral nutrition *(Ref: Schackelford 7/e p930, 944)*

This is a case of **duodenal stump blowout**. Best treatment is **adequate drainage immediately** by putting a **catheter** through an incision **below the right costal margin**Q. **TPN** should be instituted and attention should be directed towards **fluid and electrolyte therapy**Q.

Since drainage by putting a **catheter** through an incision **below the right costal margin**Q option is not there, best option will be TPN.

Duodenal Stump Blowout

- Duodenal stump blowout is **massive leakage** from **duodenal stump** following **Billroth-II gastrectomy**Q**.**

Clinical Features

- It usually occurs on **4th to 7th** post-operative **day**[Q].
- Usually presents as **sudden intense thoracoabdominal pain**, **sudden elevation in pulse** and **temperature** or **generalized deterioration** of condition.

Treatment

- **Adequate drainage** must be instituted **immediately,** which is done by putting a **catheter** through an incision **below the right costal margin**[Q].
- **TPN** should be instituted and attention should be directed towards **fluid and electrolyte therapy**[Q].
- **Fistula closure** can be anticipated **within 2–3 weeks**[Q].

10. Ans. a. Perforated Meckel's diverticulum, b. Uterine rupture following illegal abortion, c. Perforation of duodenal ulcer, e. Appendicular perforation *(Ref: Chapman 4/e p212)*

Causes of Pneumoperitoneum	
1. Perforation of GI Tract: • Peptic ulcer[Q] • Inflammation (**Diverticulitis, appendicitis, toxic megacolon, necrotizing enterocolitis**)[Q] • Infarction • Malignant neoplasm • Pneumatosis cystoides rupture[Q] • Iatrogenic (**Endoscopy**)[Q] **2. Penetrating abdominal injury**[Q]	**3. Iatrogenic:** • Surgery, peritoneal dialysis, • Drainage catheter, biopsy **4. Through female genital tract:** • Spontaneous • Iatrogenic (perforation, culdocentasis, tubal patency test)[Q] **5. Gas forming peritonitis**[Q] **6. Pneumothorax with pleuroperitoneal fistula**

11. Ans. b. Blood *(Ref: Harrison 18/e p2519)*

- **Gastric juice, pancreatic juice, bile, urine** and **meconium irritate peritoneal cavity** and lead to **aseptic** or **chemical peritonitis**[Q].
- **Chemical irritation** of the peritoneum **is greatest for acidic gastric juice** and **pancreatic enzymes**[Q]**.**

12. Ans. a. Duodenal ulcer perforation *(Ref: http://emedicine.medscape.com/article/372053-overview; Sabiston 19/e p1100, 1142)*

MC cause of peritonitis in **adult male**: **Peptic** ulcer **perforation**

PERITONITIS

- The **most common cause is** a **perforation of** the **abdominal viscus-most commonly, a perforated ulcer**[Q], may occur as a result of perforation of any part of the bowel; other causes include a benign ulcer, a tumor, or trauma.
- **MC cause of peritonitis** in **adult male**: **Peptic** ulcer **perforation**[Q]

13. Ans. a. Bacteroides *(Ref: Sabiston 19/e p1100-1102; Bailey 26/e p971-973, 25/e p992-993)*

SECONDARY (ACUTE SUPPURATIVE) BACTERIAL PERITONITIS

- When **bacteria contaminate** the peritoneum **as a result of spillage** from an intra-abdominal **viscus**[Q]**.**
- Infection in secondary bacterial peritonitis is **polymicrobial**[Q]
- **E. coli** and **Bacteroides** are **MC organisms**[Q].
- The species of organism isolated vary with the source of the initial process and the normal flora present at the site.

PERITONITIS ASSOCIATED WITH CHRONIC AMBULATORY PERITONEAL DIALYSIS (CAPD)

- **Peritonitis** is **one of** the **MC complications** of CAPD[Q], occurring with an incidence of approximately **one episode every 1 to 3 years**[Q].
- **Refractory** or **recurrent peritonitis** is **MC cause** of **technical failure of CAPD**[Q].
  - **MC organism**: **Staphylococcus epidermidis**[Q] (30–50%).

Clinical Features

- Patients present with **abdominal pain, fever**, and **cloudy peritoneal dialysate** containing **>100 WBC/mm³,** with **>50%** of the cells being **neutrophils**[Q]**.**
- **Gram staining detects organisms** only in **10–40%** of **cases**[Q].

Treatment

- CAPD associated peritonitis is treated by the **intraperitoneal administration of antibiotics**, usually a **first-generation cephalosporin**Q.
- Overall, **75% of infections** are **cured by culture-directed antibiotic therapy**Q.
- **Recurrent** or **persistent peritonitis** requires **removal of** the **dialysis catheter** and resumption of **hemodialysis**Q**.**

14. **Ans. b. Nephrotic syndrome** *(Ref: Bailey 26/e p975, 25/e p999)*

Pneumococcal Peritonitis

- **Primary pneumococcal peritonitis** may **complicate nephrotic syndrome** or **cirrhosis** in **children**Q.
- Otherwise **healthy children**, particularly **girls between 3–9 years** of age, **may also be affected**, and it is likely that the **route of infection** is sometimes **via the vagina** and **fallopian tubes**Q**.**
- At other times, and **always in males**, the **infection is blood-borne** and **secondary to respiratory tract** or **middle ear disease**Q.

Clinical Features

- **Onset** is **sudden, earliest symptom** is **pain localized to** the **lower half of** the **abdomen**.
- **Temperature** is raised to **39°C** or **more** and there is usually **frequent vomiting**Q.
- **After 24–48 hours, profuse diarrhea** is **characteristic** and **increased frequency of micturition** (caused by **severe pelvic peritonitis**)Q
- On examination, **abdominal rigidity** is **usually bilateral** but is **less than in most cases** of **acute appendicitis with peritonitis.**Q

Diagnosis

- **WBC count** ≥ **30 000**/μL with approximately **90% polymorphs** suggests **pneumococcal peritonitis** rather than appendicitisQ.

Treatment

- **Antibiotic therapy** + Correcting dehydration and electrolyte imbalance + **Early surgery**Q
- **Laparotomy** or **laparoscopy** may be used.

> - If the **exudate** be **odourless** and **sticky**, the **diagnosis of pneumococcal peritonitis** is **practically certain**Q

15. **Ans. c. 45%**
16. **Ans. b. Biliary peritonitis, c. Typhoid peritonitis**
17. **Ans. c. Duodenal ulcer perforation**
18. **Ans. a. Escherichia coli**
19. **Ans. None or d. Bone marrow suppression** *(Ref: Bailey 26/e p975, 25/e p995)*

Complications of Peritonitis	
Abdominal Complications	**Systemic Complications**
• **Adhesive small bowel obstruction**Q • **Paralytic ileus**Q • **Residual or recurrent abscess**Q • Portal pyemia (liver abscess)Q	• **Bacteraemic/endotoxic shock**Q • Bronchopneumonia/**respiratory failure**Q • **Renal failure**Q • **Bone marrow suppression**Q • **Multisystem failure**

20. **Ans. c. Typhoid enteric perforation and peritonitis** *(Ref: Sabiston 19/e p1254; Schwartz 9/e p1007; Bailey 26/e p91, 25/e p1174; Harrison 18/e p1276)*

Enteric Fever or Typhoid

- Enteric fever is a potentially life-threatening systemic disease characterized by **fever** and **abdominal pain**Q
- It is caused by **Salmonella typhi** or **paratyphi**Q
- **Typhoid** is the **MC cause of ileal perforation** in **tropical countries (India)**Q**.**

Pathology
• **Ulceration** and **necrosis** of **ileocecal Peyer's patches**Q • The **ulcer** is **parallel to the long axis** of the gut and is usually situated in the **lower ileum** (**longitudinal ulcers**)Q • **Perforation** of a **typhoid ulcer** usually occurs during the **third week**Q and is occasionally the first sign of the disease.

Clinical Features

- **Fever** and **abdominal pain** are **hallmark symptoms**Q
- Non-specific symptoms: Headache, cough, sweating, myalgia, arthralgia, fatigue
- **Paralytic ileus** is the **MC complication**Q of typhoid.
- **Intestinal hemorrhage (2nd MC)**Q may be the leading symptom.

Complications of Enteric Fever	
• **Paralytic ileus (MC)**[Q]	• Phlebitis
• Intestinal **hemorrhage (2nd MC)**[Q]	• Genitourinary inflammation
• **Perforation**[Q]	• Arthritis
• **Cholecystitis**[Q]	• Osteomyelitis

Characteristic Signs

- **Rose spots, splenomegaly, leucopenia** with **shift to left**[Q]
- **Lipopolysaccharide endotoxin** is responsible for **leucopenia** and **splenomegaly**[Q]
- **Relative bradycardia** despite of **high fever**[Q]

21. Ans. a. More than 200 cells/cumm

22. Ans. a. Ascitic fluid neutrophil count is 250/cu.mm

23. Ans. d. Primary peritonitis *(Ref: Sabiston 19/e p1146; Bailey 26/e p975, 25/e p993-994)*

Primary (Pneumococcal) peritonitis	• **Liver dullness** is **not obliterated**[Q]
Perforation (Secondary) peritonitis	• **Liver dullness** is **obliterated**[Q]

Liver Dullness

- Right mid-axillary line is percussed from above downwards. The percussion note will be resonant in the upper part of the mid-axillary line. At the **upper border of** the **liver**, the **resonant note** is **replaced by dull note**.
- If the **liver dullness** is **replaced by a resonant note**, it indicates **presence of free gas under diaphragm** as occurs in the **perforation of gastrointestinal tract**[Q].

24. Ans. a. Ruptured typhoid ulcer

25. Ans. b. Moderately raised amylase levels are diagnostic of peritonitis

MESENTERIC CYST

26. Ans. b. Chylolymphatic *(Ref: Sabiston 19/e p1104-1105; Schwartz 10/e p1459-1460, 9/e p1277; Bailey 26/e p983-984; Schackelford 7/e p1699)*

Mesenteric Cyst

- Mesenteric cyst is encountered **most frequently** in the **2nd decade of life**
- More common in **women**

Types of Mesenteric cysts	
• **Chylolymphatic (MC)**[Q]	• **Urogenital** remnant
• Simple (**mesothelial**)	• **Dermoid** (teratomatous cyst)
• **Enterogenous**	

Chylolymphatic Cyst	Enterogenous Cyst
• **MC type**, arises in **congenitally misplaced lymphatic tissue** that has **no efferent communication** with the **lymphatic system**[Q]	• **Derived** either **from a diverticulum of** the **mesenteric border** of the intestine or **from a duplication** of the intestine[Q].
• Arises most frequently in the **mesentery of** the **ileum**[Q].	• **Thicker wall** than a chylolymphatic cyst and it is **lined by mucous membrane**, sometimes ciliated[Q].
• **Thin wall** of the cyst, **filled with clear lymph** or chyle.	• **Content** is **mucinous** and is either **colorless** or **yellowish brown** as a result of past hemorrhage.
• Occasionally, the cyst attains a great size.	• **Muscle in** the **wall** of an **enteric duplication cyst** and **adjacent bowel** has a **common blood supply**[Q]
• **Mostly unilocular** and **solitary**[Q]	• **Removal of the cyst** always entails **resection** of the **related portion of intestine**[Q].
• Chylolymphatic cyst **blood supply** is **independent from** that of the **adjacent intestine**[Q]	
• **Enucleation** is possible without the need for resection of gut[Q].	

Clinical Features

- A **painless abdominal swelling**[Q]
- **Recurrent attacks** of **abdominal pain**[Q] with or without vomiting (temporary impaction of a food bolus in a segment of bowel narrowed by the cyst or possibly from torsion of the mesentery)
- **Acute abdominal pain** may arises as a result of: **Torsion, rupture, hemorrhage, infection**.

- **Tillaux triad: Fluctuant swelling near** the **umbilicus** + **moves freely** in a **plane perpendicular** to the **attachment of the mesentery** + **zone of resonance around the cyst**[Q].

Diagnosis

- **CT scan**: **Investigation of choice** for **diagnosis of mesenteric cyst**[Q]
- **USG:** Helpful in diagnosis

Treatment

- **Chylolymphatic cysts**: **Enucleation** is **treatment of choice**[Q]
- **Enterogenous cyst**: **Resection** and **anastomosis** is the **treatment of choice**[Q]
- **Aspiration alone** has a **high rate of cyst recurrence**[Q].

27. **Ans. d. Enucleation is the treatment of choice of chylolymphatic cyst**
28. **Ans. a. Moves perpendicular to the line of attachment, c. Chylolymphatic cyst has separate blood supply**
29. **Ans. b. Enterogenous cyst**
30. **Ans. c. Gartners cyst**
31. **Ans. a. Enterogenous cyst**

ASCITES

32. **Ans. a. Myxedema, b. Budd Chiari syndrome, d. Portal vein thrombosis, e. Congestive heart failure** *(Ref: Sabiston 19/e p1100)*

Classification of Ascites by Serum-Ascites Albumin gradient	
High Gradient (>1.1 g/dL) or Transudate	**Low Gradient (<1.1 g/dL) or Exudate**
• **Cirrhosis (MC)**[Q] • **Alcoholic hepatitis**[Q] • **Cardiac ascites**[Q] • Mixed ascites • Massive liver metastases • **Fulminant hepatic failure**[Q] • **Budd-Chiari syndrome**[Q]	• **Peritoneal carcinomatosis (MC)**[Q] • **Tubercular peritonitis**[Q] • Pancreatic ascites • **Bowel obstruction** or **infarction**[Q] • Biliary ascites • **Nephrotic syndrome**[Q] • Post-operative lymphatic leak
• **Portal vein thrombosis**[Q] • Sinusoidal obstruction syndrome • **Myxedema**[Q] • Fatty liver of pregnancy	• **Serositis** in connective tissue disease

- **MC cause** of **low-albumin gradient ascites: Peritoneal carcinomatosis**[Q]
- **MC cause** of **high-albumin gradient ascites: Cirrhosis**[Q]

33. **Ans. b. Cirrhosis**
34. **Ans. a. Stomach CA** *(Ref: Harrison 16th/245)*

Causes of Mucinous Ascites

- **Pseudomyxoma peritonei**[Q]
- **Colloid carcinoma** of **stomach**[Q] or **colon**[Q] with peritoneal implants

35. **Ans. a. Only when the amount of fluid present exceeds 1500 ml. It can be recognized clinically, d. A transudate has a protein content of greater than 30 gms of protein per litre** *(Ref: Bailey 26/e p979, 25/e p1001)*

Clinical Features of Ascites

- **Ascites** can be **recognized clinically** when the amount of **fluid exceeds 150 ml**[Q].
- **Abdomen** is **distended evenly with fullness of** the **flanks**, which are dull to percussion.
- Usually, **shifting dullness is present**[Q] but **when there is a very large accumulation of fluid this sign is absent**[Q]. In such cases, on flicking the abdominal wall, a characteristic fluid thrill is transmitted from one side to the other.
- In **cirrhosis**, there is **obstruction to** the **portal venous system**, which is caused by **obliterative fibrosis** of the **intrahepatic venous bed**[Q]. Lymph flow may be increased.
- **Meig's syndrome**: **Ascites** and **pleural effusion** are associated with **solid fibroma** of the **ovary**[Q]. The effusion disappear when the tumour is excised.

36. Ans. d. Malignant ascites *(Ref: www.ncbi.nlm.nih.gov › Proc R Soc Med › v.6(Med Sect; 1913; Bailey 26/e p980, 25/e p1002)*

Pseudochylous Ascites

- **Abnormal accumulation** in the peritoneal cavity **of a milky fluid that resembles chyle**.
- The **turbidity of the fluid** is **caused by cellular debris** in the fluid[Q].
- Pseudochylous ascites is **indicative of** an **abdominal tumor** or **infection[Q].**

Chylous Ascites

- In some patients the **ascitic fluid appears milky** because of an **excess of chylomicrons** (**triglycerides**) [Q].

Causes of Chylous Ascites	
• Malignancy (**Lymphomas-MC[Q]**)	• **Abdominal trauma** (including surgery)
• **Cirrhosis[Q]**	• **Constrictive pericarditis**
• **Tuberculosis**	• **Congenital lymphatic abnormality[Q]**
• **Filariasis[Q]**	
• **Nephrotic syndrome[Q]**	
• **Sarcoidosis**	

- The **prognosis is poor** unless the underlying condition can be cured.
- In addition to other measures used to treat ascites, patients should be placed on a **fat-free diet** with **medium-chain triglyceride[Q]** supplements.

PSEUDOMYXOMA PERITONEI

37. Ans. b. Ovary *(Ref: Sabiston 19/e p1102-1103; Schwartz 10/e p1258-1259, 9/e p1088-1089; Bailey 26/e p980-981, 25/e p1003)*

Pseudomyxoma Peritonei

- Pseudomyxoma peritonei describes **mucinous ascites** arising from a **ruptured appendiceal** or **ovarian adenocarcinoma[Q]**.
- **MC site** of **primary**: **Appendix[Q]**
- **Peritoneum** becomes **coated with a mucus-secreting tumor** that **fills the peritoneal cavity** with **tenacious semisolid mucus** and large, **loculated cystic masses[Q]**.
- Occurs **most commonly** in **40–50 years** of age
- Occurs with **equal frequency** in **men** and **women[Q]**.

Clinical Features

- Patients are **often asymptomatic[Q]** until late in the course of their disease.
- **On presentation, global deterioration in health** long before the diagnosis is made
- **Abdominal pain** and **distention** and **nonspecific complaints** are common.
- **Physical examination:** A new **hernia**, **ascites**, **distended abdomen** with **nonshifting dullness[Q]** and, occasionally, a palpable abdominal mass.

Diagnosis

- **CT** (**chest, abdomen** and **pelvis):** Information regarding the **diagnosis** and the **ability to resect the tumor completely** or **perform an adequate cytoreduction[Q]**.
-
- **Preoperative colonoscopy**: **Differentiate a mucinous neoplasm of** the **appendix from** that **arising from** the **colon[Q]**.
- Often, the **diagnosis** is **made at laparotomy** (peritoneal cavity containing **tenacious semisolid mucus** and **large, loculated cystic masses**)

Treatment

- **Cytoreduction** (Resection of as much of the tumor as possible) + **Intraperitoneal hyperthermic chemotherapy** (**IPHC**)[Q].

> - **Operative management**: **Omentectomy, stripping of** involved **peritoneum**, **resection of involved organs** and **appendectomy** with **right hemicolectomy[Q]**

Prognosis

- **Adenomucinosis** (Adenocarcinoma of appendix): **Best survival rate** (75% at 5 years)
- **Peritoneal mucinous carcinomatosis**: **Worst** (14% at 5 years)

38. Ans. a. Carcinoma ovary, d. Adenocarcinoma colon, e. Mucocele of appendix *(Ref: Recent Advances in Surgery, Irving Taylor/83)*

- "In addition to the **association of PMP** with **appendiceal** and **ovarian tumors**, there are cases reports suggesting occasional origin from other intra-abdominal organs such as the colon, rectum, stomach, GB, bile duct, small intestine, urinary bladder, lung, breast fallopian tube and pancreas. With the exception of **colorectal mucinous adenocarcinoma**, which **often simulate PMP**, these are rare and only account for less than 5% of total cases."

39. **Ans. b. Cytoreductive surgery needed, c. Always appendectomy needed, e. Locally malignant tumor**
40. **Ans. b. Appendix**
41. **Ans. a. Common in male**
42. **Ans. d. Common in male**

ABDOMINAL ABSCESS

43. **Ans. c. Pelvis** *(Ref: Maingot 11/e p179-184; Bailey 26/e p977-978, 25/e p996-997)*

Intra-Abdominal Abscess

- **MC site** of **intra-peritoneal abscess**: **Pelvis**Q
- **Right subhepatic space** (lies between inferior surface of liver and hepatic flexure and transverse mesocolon) is the **most dependent portion** of the **abdominal cavity** in the **recumbent position**Q.
- **Pelvic cavity** is the **most dependent area** of the **peritoneal cavity** in the **upright position**Q.

Clinical Features

- **High spiking fevers**, **chills**, **abdominal pain**, **anorexia,** and **delay of return of bowel function**Q in the postoperative patient are typical presenting signs and symptoms of intraperitoneal abscess.

Diagnosis

- **CT scan: Investigation of choice** for diagnosis of intra-**abdominal abscess**Q

Treatment

- **Preferred treatment: CT guided percutaneous drainage**Q
- **Operative drainage:** If percutaneous drainage is not possible or contraindicated

44. **Ans. d. Right subhepatic space**
45. **Ans. a. Pelvic**
46. **Ans. b. Complicated acute pancreatitis** *(Ref: Bailey 25/e p997)*

Left Subhepatic Space (Lesser Sac)

- The **commonest cause** of **infection** here is **complicated acute pancreatitis**Q.
- In practice, a **perforated gastric ulcer rarely causes a collection** here because the **potential space is obliterated by adhesions**.

47. **Ans. b. Lesser sac, d. Omental bursa** *(Ref: Bailey 26/e p978, 25/e p1062; Schwartz 9/e p921)*
    - **Gastric ulcers perforate into** the **lesser sac**, which can be particularly **difficult to diagnose**Q.
    - A **gastric ulcer perforates into** the **lesser sac**Q, then no generalized peritonitis can be seen but misleading symptoms may appear.
48. **Ans. d. All of the above** *(Ref: Bailey 26/e p977, 25/e p996)*

Pelvic Abscess

- **Pelvis** is the **commonest site of an intraperitoneal abscess** because the vermiform **appendix** is **often pelvic in position** and the **fallopian tubes** are **frequent sites of infection**Q.
- A **pelvic abscess** can also occur as a **sequel to** any case of **diffuse peritonitis** and is **common after anastomotic leakage**Q following colorectal surgery

Clinical Features

- The **most characteristic symptoms** are **diarrhea** and **passage of mucus** in the stools.Q
- **Rectal examination** reveals a **bulging** of the **anterior rectal wall**Q, which, when the abscess is ripe, becomes softly cystic.
- Left to nature, a proportion of these abscesses burst into the rectum, after which the patient nearly always recovers rapidly. If this does not occur, the abscess should be drained deliberately.

Diagnosis

- If any uncertainty exists, the **presence of pus** should be **confirmed by ultrasound** or **CT scanning with needle aspiration** if indicatedQ.

Treatment

- In women, **vaginal drainage through** the **posterior fornix (Posterior colpotomy)** is often chosenQ.
- **In other cases**, when the abscess is definitely pointing into the rectum, **rectal drainage** is employedQ.
- **Laparotomy** is **almost never necessary**Q.
- **Rectal drainage** of a **pelvic abscess** is far **preferable to suprapubic drainage**, which risks exposing the general peritoneal cavity to infectionQ.
- **Drainage tubes** can also be **inserted percutaneously** or **via the vagina** or **rectum** under ultrasound or CT guidanceQ.

49. Ans. c. Pelvis **50. Ans. d. Pelvic** **51. Ans. b. Posterior colpotomy**

52. Ans. c. Pelvic **53. Ans. b. Toxemia** **54. Ans. b. Colpotomy**

55. Ans. b. Pelvic abscess **56. Ans. b. Mucopurulent discharge**

57. Ans. b. Right inferior intraperitoneal space *(Ref: Bailey 25/e p996)*

Most common site of intra-peritoneal abscess is pelvis. Best option among the options provided is **inferior space,** right inferior intra-peritoneal space.

58. Ans. c. Pelvic region

59. Ans. d. Lesser sac

PNEUMOPERITONEUM

60. Ans. b. Closure + lavage *(Ref: Schackelford 7/e p1747-1748; Harrison 18/e p2409; Schwartz 10/e p1180, 9/e p1069)*

Risks Associated with Colonoscopy

- **Risks of colonoscopy: Perforation** and **hemorrhage**[Q]
  - **MC site** of **bleeding after colonoscopy**: **Stalk** after polypectomy.
  - **MC site** of **perforation** during colonoscopy: **Sigmoid colon**[Q]
- **Perforation** can be caused by **excessive air pressure**, **tearing** of the antimesenteric border of the colon **from excessive pressure** on colonic loops, and at the sites of **electrosurgical applications**[Q]

Management

- Patients with **perforation** but **no peritoneal signs** can be **safely managed with careful monitoring (Bowel rest + Broad spectrum antibiotics + Close observation**[Q]**)**
- A **large perforation** recognized during the procedure **requires surgical exploration**. Because the **bowel has almost always been prepared** prior to the colonoscopy, there is usually **little contamination** associated with these injuries and **most can be repaired primarily**[Q]**.**

61. Ans. d. X-ray abdomen-erect view *(Ref: Bailey 26/e p973, 25/e p994)*

- Bailey says "A **radiograph of** the **abdomen may confirm** the **presence of dilated gas-filled loops of bowel** (consistent with a paralytic ileus) or **show free gas**, although the **latter is best shown on an erect chest radiograph**. **If the patient is too ill for an 'erect' film** to demonstrate free air under the diaphragm, a **lateral decubitus film** is **just as useful, showing gas beneath** the **abdominal wall**."

62. Ans. b. Bradycardia **63. Ans. d. Spontaneous rupture of esophagus**

64. Ans. d. Pneumoperitoneum *(Ref: Sabiston 19/e p1148-1149; Bailey 26/e p190, 25/e p147)*

Pneumoperitoneum

- **Best projection** to demonstrate **pneumoperitoneum**: **Chest X-ray**[Q]
- **If** the **patient cannot get into** an **erect position** then **left lateral decubitus** projection is required[Q].
- Patient should be in that position for **10 min**[Q] at least for **air to rise up**.
- By careful technique even **1 ml of air can be detected**

Supine Film Signs of Pneumoperitoneum	
Football sign	Collection of **air in** the **centre of abdomen over a fluid collection**[Q]
Rigler's sign	Visualization of **both aspects of bowel** wall being **outlined by air** on either side[Q]
Cupola sign	**Large amount of gas under** the **diaphragm**[Q]
Triangle sign	Air between bowel loop[Q]

- **Chilladiti syndrome** or **interposition of colon between liver** and **diaphragm** can mimic pneumoperitoneum[Q]

65. Ans. d. Left lateral decubitus with horizontal beam **66. Ans. c. Minimally absorbed**

- **Carbon dioxide** has the **advantage of being noncombustible** and **rapidly absorbed from the peritoneal cavity**; however, it **may lead to hypercarbia in** patients with **significant cardiopulmonary disease**[Q]**.**

PERITONEUM ANATOMY

67. Ans. d. Greater omentum *(Ref: BDC 4/e pvol II/232, 240)*

Lesser Sac (Omental Bursa)

- A **large recess of peritoneal cavity behind stomach, lesser omentum** and **caudate lobe of liver**, which separates stomach bed from stomach.
- It is **closed all around** except in upper part of its right border where it **communicates with the greater sac through** the **epiploic foramen**[Q].
- **Level of epiploic foramen: T12 vertebra**[Q]

Boundaries of Lesser Sac	
Anterior	**Posterior**
• **Caudate lobe** of liver[Q] • **Stomach**[Q] • **Lesser omentum**[Q] • **Greater omentum**[Q] (anterior 2 layers)	• **Greater omentum**[Q] (posterior 2 layers) • **Structures forming stomach bed:** – **Diaphragm**[Q] – **Pancreas**[Q] – **Splenic flexure** of colon – Spleen (sometimes) – **Left kidney** and **suprarenal** gland – **Transverse mesocolon**[Q] – **Splenic artery**[Q]

68. Ans. a. Posterior wall of stomach, d. Greater omentum

69. Ans. a. Hepatic vein

70. Ans. d. Bile duct anteriorly

71. Ans. a. Horizontal part of duodenum *(Ref: BDC 4/e pvol II/227)*

Mesentery

- Mesentery is a **fan shaped fold** of peritoneum that **attaches** the **jejunum** and **ileum** to **posterior abdominal wall**[Q].
- **Root** of mesentery is **15 cm long**[Q].
- It is **directed obliquely downwards** and **to the right**, extending from:
  - **Duodenojejunal flexure on the left side of L2 vertebra**[Q]
  - **Upper part of right sacroiliac joint**[Q]

Root of Mesentery Crosses Following Structures in Order	
1. **4th** (ascending) and **3rd** (**horizontal**) **part of duodenum**[Q]	4. **Right ureter**[Q]
2. **Abdominal aorta**[Q]	5. **Right psoas major**[Q]
3. **IVC**[Q]	6. **Right testicular** or **ovarian vessels**[Q]

WOUND DEHISCENCE

72. Ans. c. 7th day *(Ref: CSDT 11/e p24; Bailey 26/e p279-280, 25/e p986)*

Wound Dehiscence (Burst Abdomen)

- **Serous** or **serosanguinous discharge** from the wound is the **first sign**[Q] of dehiscence
  - **Most commonly** observed between **6th** and **8th** post-operative **day**[Q] (may occur at any time following wound closure)
- Wound dehiscence is **partial** or **total disruption** of any or all layers of the operative wound.
- **Extrusion** of **abdominal viscera** after rupture of all layers is known as **evisceration**[Q].

Predisposing Factors for Wound Dehiscence	
Local Risk Factors	**Systemic Risk Factors**
• **Inadequate closure (Most important)**[Q] • **Increased** intra-abdominal **pressure** • **Deficient wound healing** due to: - **Infections**[Q] - **Hematoma**[Q] - **Seroma**[Q] - **Presence of drain**[Q]	• **Old age**[Q] • **Obesity**[Q] • **Immunosuppression**[Q] • **Systemic diseases:** - **Diabetes**[Q] - **Jaundice, Sepsis**[Q] - **Uremia**[Q] - **Cancer**[Q]

Management

- **Wound dehiscence** without evisceration: **Prompt elective closure**[Q] of the wound
- **Wound dehiscence with evisceration:**
  - **Wound is covered with moist towels**
  - **Under GA, any exposed bowel or omentum is rinsed with RL containing antibiotics and then returned to abdomen**
  - **Previous sutures are removed, wound** is reclosed (**Tension suturing**[Q])

73. Ans. a. Impending wound dehiscence

MESENTERIC LYMPHADENITIS

74. Ans. d. Yersinia *(Ref: Sabiston 19/e p1105; Bailey 26/e p982, 25/e p1004)*

Acute Mesenteric Lymphadenitis

- Syndrome of **acute right lower quadrant abdominal pain** associated with **mesenteric lymph node enlargement** and a **normal appendix**Q.
- **Diagnosis is made upon exploration** of the abdomen of a **patient suspected of having acute appendicitis** at which time a **normal appendix** and **enlarged mesenteric lymph nodes**Q are discovered.
- Occurs **most commonly** in **children** and **young adults**Q
- Equal frequency in males and females.
- **Etiology often remains unknown**, although **some cases** are associated with **Yersinia infection of the ileum.**
- **Yersinia enterocolitica** has been **associated with** this **syndrome** in **children**Q.

75. Ans. d. Idiopathic

76. Ans. a. Yersinia enterocolitica

Peritoneum (Important Points)

- **Largest cavity** in the body: **Peritoneal cavity**Q\
- **Least sensitive peritoneum**: **Pelvic peritoneum**Q
- **Most sensitive peritoneum**: **Parietal** (anterior) **peritoneum**Q
- **Healing in parietal peritoneum**: **Metamorphosis** of **mesenchymal cells**Q

  - **Duodenal perforation** is **usually sterile** while **intestinal perforation** is **usually infected**Q.
  - **Periodic peritonitis do not require laparotomy, treatment** is **colchicine**Q.
  - **Shifting tenderness** is sign of **mesenteric lymphadenitis**Q

- **Brucellosis** is also known as **disease of mistake**Q.
- **MC solid tumor** of **omentum**: **Metastatic carcinoma**Q

MISCELLANEOUS

77. Ans. d. Very rapid adaptation *(Ref: Guyton 11th/603-604; Ganong 23/e p169-170)*

Characteristic Features Visceral Pain

- **Visceral pain** is **poorly localized**, often the pain is **referred** or **radiating**Q
- **Pain of hollow viscus** is often **felt as a colic**Q (it comes and goes to reappear again).

  - **Highly localized** types of **damage** to the viscera **seldom cause severe pain**
  - Often accompanied by **vomiting** and **hypotension**Q

78. Ans. a. Perforated peptic ulcer

79. Ans. b. Appendices epiploicae *(Ref: Bailey 26/e p981, 25/e p1002)*

Peritoneal Loose Bodies (Peritoneal Mice)

- Peritoneal loose bodies **almost never cause symptoms**Q.
- One or more may be **found in** a **hernial sac** or in the **pouch of Douglas**Q.
- The loose body may **come from an appendix epiploica**Q that has undergone axial rotation followed by necrosis of its pedicle and detachment but they are **also found in** those who suffer from **subacute attacks of pancreatitis**Q.
- These hyaline bodies attain the **size of a pea** or **bean** and **contain saponified fat surrounded by fibrin.**

80. Ans. c. Retroperitoneum *(Ref: Bailey 26/e p985, 25/e p1007)*

A **retroperitoneal lipoma is often malignant** (liposarcoma) and **may increase rapidly in size**.

Retroperitoneal Lipoma

- The patient may seek advice on account of a swelling or because of **indefinite abdominal pain**.
- **Women** are more often affected. These swellings **sometimes reach** an **immense size**.
- **Diagnosis** is usually by **ultrasound** and **CT scanning**Q.
- A **retroperitoneal lipoma** sometimes **undergoes myxomatous degeneration**, a complication that **does not occur in a lipoma in any other part of** the **body**Q**.**
- Moreover, a **retroperitoneal lipoma** is **often malignant (liposarcoma)** and may **increase rapidly in size**Q**.**

81. Ans. a. Ormond's disease *(Ref: Schwartz 10/e p1458, 9/e p1275; http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2660836)*

Retractile Mesenteritis

- **Retroperitoneal fibrosis** has been **associated with** a variety of sclerosing diseases, among these is a variant known as **retractile mesenteritis**
- Involve predominantly the **mesentery of small intestine** and **associated vessels**, involvement of mesocolon and colon is less frequent.

82. Ans. c. Clostridium nouyi infection **83. Ans. a. Left gonadal vessels** **84. Ans. b. Abdomen X-ray**

85. Ans. a. Parietal peritoneum **86. Ans. a. Appendices epiploice**

87. Ans. b. 4–12 months *(Ref: Sabiston 19/e p1103; 18/e p1144)*

Malignant Peritoneal Mesothelioma

- **MC primary malignant peritoneal neoplasm**: **Malignant mesothelioma**Q
- Results from malignant transformation of the simple squamoid epithelium covering the peritoneal cavity.
- **More common** in **males**, **median age** of presentation is **50 years**.
- **Most patients** had **exposure to asbestos**Q.

Clinical Features

- Most patients present with **abdominal pain** and **weight loss**.
- **Ascites** is common and often **intractable**.
- **Omentum** may become **diffusely involved with tumor**, present as an **epigastric mass**.
- In contrast to pseudomyxoma peritonei, **local invasion of intra-abdominal organs**, such as the liver, intestine, bladder, and abdominal wall, **can occur**.
- **Encasement of bowel** can create a **malignant bowel obstruction**.

Diagnosis

- **CT scan**: **Mesenteric thickening**, **peritoneal studding**, **hemorrhage** within the tumor, and **ascites**Q.

Treatment

- **Complete surgical resection** is usually **not possible** because of the extent of disease.

Prognosis

- **Median survival** is **4–12 months**Q (18th edition)
- **Median survival** is **30–60 months** (19th edition)

NOTES

NOTES

CHAPTER 12

Intestinal Obstruction

MULTIPLE CHOICE QUESTIONS

ACUTE INTESTINAL OBSTRUCTION

1. True about strangulation of intestine is: *(MHPGMCET 2001)*
a. Arterial blood flow affected first
b. Usually venous blood flow affected first
c. Blood flow normal
d. No gangrene

2. Most common cause of hyponatremia in surgical practice:
a. Small intestinal obstruction *(MHPGMCET 2008)*
b. Duodenal fistula
c. Pancreatic fistula
d. Intussusception

3. Best investigation for acute intestinal obstruction is:
a. Barium studies b. X-ray
c. USG d. ERCP

4. Early sign of intestinal strangulation: *(PGI SS June 2001)*
a. Continuous pain
b. Abdominal rigidity and shock
c. Abdominal fluid
d. Dilated bowel loops on USG

5. The most common cause of small intestinal obstruction is: *(All India 96, PGI 97)*
a. Intussusception b. Iatrogenic adhesions
c. Trauma d. Carcinoma

6. Commonest cause of acute intestinal obstruction is: *(NEET Pattern, PGI 88)*
a. Adhesions b. Volvulus
c. Inguinal hernias d. Internal hernias

7. The commonest cause of intestinal obstruction in a 30 years old Indian female: *(All India 93)*
a. TB stricture b. Crohn's disease
c. Post op. adhesions d. Adenocarcinoma

8. Acute intestinal obstruction is characterized by:
a. Vomiting is common in duodenal obstruction
b. Pain after each attack of vomiting is characteristic of ileal obstruction *(PGI Dec 2003)*
c. In colonic obstruction distension is common than vomiting
d. X-ray erect posture is diagnostic
e. Colicky pain to steady pain indicates strangulation

9. Features of intestinal obstruction : clinically/ investigation by: *(PGI June 2006)*
a. Abdominal distension b. Vomiting
c. Fluid level in X-ray >4 d. Localized tenderness
e. Diarrhea

10. In intestinal obstruction, investigations needed are: *(PGI Dec 2001)*
a. Barium swallow
b. Intestinal barium meal
c. Stomach barium meal
d. Erect X-ray abdomen
e. Supine X-ray abdomen

11. A 30-years old lady presented with acute pain abdomen, constipation and vomiting suspecting acute intestinal obstruction. The investigation of choice for the patient is:
a. X-ray abdomen erect posture *(PGI June 2003)*
b. Ba enema
c. USG
d. CT scan

12. A women of 35-years, comes to emergency department with symptoms of pain in abdomen and bilious vomiting but no distension of bowel. Abdominal X-ray showed no air fluid level. Diagnosis is: *(AIIMS June 99)*
a. CA rectum b. Duodenal obstruction
c. Adynamic ileus d. Pseudo-obstruction

13. One of the following will always present with bilious vomiting: *(All India 94)*
a. Pyloric stenosis
b. Esophageal atresia
c. Atresia of the 3rd part of the duodenum
d. Malrotation of the gut

14. Distended abdomen in intestinal obstruction is mainly due to: *(All India 95, PGI Dec 98)*
a. Diffusion of gas from blood
b. Fermentation of residual food
c. Bacterial action
d. Swallowed air

15. In case of new born, the commonest cause of intestinal obstruction is: *(AIIMS Nov 95)*
a. Annular pancreas b. Duodenal atresia
c. Jejunal atresia d. Esophageal atresia

16. Regarding adhesive intestinal obstruction, true is:
a. Avoid surgery for initial 48–72 hours *(AIIMS Nov 94)*
b. Never operate
c. Operate after minimum 10 days of conservative treatment
d. Immediate operation

17. Water loss is severe if intestinal obstruction occurs at: *(JIPMER 90)*
a. First part of duodenum b. Third part of duodenum
c. Mid-jejunum d. Ileum

18. The first to appear in a cause of acute intestinal obstruction is: *(PGI 82, DNB 90)*
a. Constipation b. Colicky pain
c. Vomiting d. Distension

19. Primary feature of small intestinal obstruction: *(APPG 96)*
a. Fever b. High peristalsis with colic
c. Abdominal distension d. Empty rectum

20. Best way to diagnose lower small intestinal obstruction:
a. Pain abdomen *(PGI 96)*
b. Abdominal distension
c. Profuse vomiting
d. Multiple air gas shadows on X-ray

21. For intestinal obstruction immediate operation should not be done in case of: *(Kolkata 2000)*
a. Post-op adhesion
b. Appendix perforation
c. Volvulus
d. Obstructed hernia

22. Which of the following is most suggestive of neonatal small bowel obstruction? *(All India 2003)*
a. Generalized abdominal distension
b. Failure to pass meconium in the first 24 hours
c. Bilious vomiting
d. Refusal of feeds

23. What is the sure sign of intestinal obstruction? *(Recent Questions 2013)*
a. Vomiting and distension
b. Jelly like stool
c. Diarrhoea
d. Localized tenderness

24. Ileal obstruction due to round worm obstruction treatment is: *(Recent Questions 2013)*
a. Resection with end to end anastomosis
b. Resection with side to side anastomosis
c. Enterotomy, removal of worms and primary closure
d. Diversion

INTUSSUSCEPTION

25. A neonate presents with colicky pain and vomiting with sausage-shaped lump in the abdomen, diagnosis is: *(UPPG 2009)*
a. Enterocolitis
b. Perforation of the abdomen
c. Intussusception
d. Acute appendicitis

26. All statement about adult intussusception are true except:
a. Idiopathic and more enteric rather than colonic
b. Lead point present in majority of cases *(PGI Nov 2009)*
c. Resection of bowel is adequate for large bowel intussusception
d. Hydrostatic reduction with barium or air are done if bowel is not gangrenous

27. A previously healthy infant presents with recurrent episode of abdominal pain. The mother says that the child has been passing altered stool after episodes of pain, but gives no history of vomiting or bleeding per rectum. Which of the following is the most likely diagnosis? *(All India 2011)*
a. Rectal polyps
b. Intussusception
c. Meckel's diverticulum
d. Necrotizing enterocolitis

28. True about Intussusceptions in children: *(PGI Nov 2010)*
a. Most common variety is ileocolic
b. Associated with pathological lead point
c. May be seen after viral infection
d. Can be relieved by barium enema
e. Surgery is always indicated

29. True statement about treatment of intussusception: *(PGI Nov 2010)*
a. Air enema
b. Saline enema
c. Ba enema
d. Hydrostatic reduction
e. Colonoscopy is always done to confirm diagnosis

30. Intussusception usually begins from: *(DNB 2007)*
a. Jejenum
b. Terminal ileum
c. Colon
d. Rectum

31. The most common type of intussusception: *(DNB 2009, 2005, 2001, 2000, All India 99, PGI Dec 95, MHPGMCET 2009)*
a. Ileocolic
b. Colocolic
c. Ileoileal
d. Retrograde

32. All are true about intussusception except:
a. Barium must be used in children after 48 hours
b. X-ray shows paucity of colonic gas *(AIIMS GIS May 2011)*
c. X-ray shows lump shadow
d. USG show pseudo-kidney sign

33. A child was operated for small intestine mass with intussusception and after the operation the tumor was diagnosed in histological section. Which is the most likely tumor associated? *(AIIMS Nov 2012)*
a. Carcinoid
b. Villous adenoma
c. Lymphoma
d. Smooth muscle tumor

34. What is intussuscepiens? *(PGI Dec 97)*
a. The entire complex of intussusception
b. The entering layer
c. The outer layer
d. The process of reducing the intussusception

35. A 10-months old infant presents with acute intestinal obstruction. Contrast enema X-ray shows the intussusceptions. Likely cause is: *(All India 2002)*
a. Payers patch hypertrophy
b. Meckel's diverticulum
c. Mucosal polyp
d. Duplication cyst

36. Features of intussusceptions are: *(PGI June 2001)*
a. Pincer sign
b. Target sign
c. Dove sign
d. Coiled spring sign
e. Dance sign

37. Recurrent pain abdomen with intestinal obstruction and mass passes per rectum goes in favor of: *(PGI Dec 99)*
a. Internal herniation
b. Stricture
c. Strangulated hernia
d. Intussusception

38. Recurrent obstruction, mass per rectum and diarrhea in child: *(PGI June 2000)*
a. Intussusception
b. Rectal prolapsed
c. Internal hernia
d. Hemorrhoids

39. Commonest cause of intussusception is: ***(TN 90)***
a. Submucous lipoma
b. Meckel's diverticulum
c. Hypertrophy of submucous Peyer's patches
d. Polyp

40. Intussusception is frequently associated with: *(JIPMER 2014, 2012)*
a. Submucosal lipoma
b. Intramural lipoma
c. Subserusal lipoma
d. Subfascial lipoma

41. Which of the following is true about intussusception?
a. Common in neonates *(DPG 2005, All India 91)*
b. Fever always present
c. Not associated with tumors of intestine
d. Usually relieved by barium enema

42. The least common type of intussusception is: *(PGI 81, APPG 89)*
a. Multiple
b. Colocolic
c. Ileoileal
d. Ileoilecolic

43. Henoch-Schnolein purpura may rarely cause: *(JIPMER 80, 81, AIIMS 90)*
a. Intussusception
b. Volvulus
c. Atrial fibrillation
d. Hernia

44. Claw sign seen in: *(APPG 2008)*
a. Intussusception
b. Volvulus
c. Both
d. None

45. Complete treatment of intussusception is indicated by: *(APPG 2008)*
a. Free passage of barium in the terminal ileum
b. Passage of feces and flatus along with barium
c. Improvement of clinical condition
d. None

46. A 12-months old male child suddenly draws up his legs and screams with pain. This is repeated periodically throughout the night interspersed with periods of quiet sleep. When seen after 12 hours the child looks pale, has just vomited and passed thin blood-stained stool; there is a mass around umbilicus. What is the most likely diagnosis? *(UPSC 97)*
a. Appendicitis
b. Intussusception
c. Gastroenteritis
d. Roundworm obstruction

47. Sign of Dance is: *(MAHE 2005)*
a. Empty right iliac fossa in intussusception
b. Pincer shaped appearance in barium enema in intussusception
c. Tenderness at the McBurney's point
d. Passing of large quantities of urine in hydronephrosis

48. A patient has acute abdominal pain with blood and mucus in stool with palpable mass per abdomen is due to:
a. Meckel's diverticulum *(AIIMS June 2000)*
b. Volvulus
c. Intussusception
d. Hypertrophic pyloric stenosis

49. A 6 months old child woke up in night, crying with abdominal pain, which got relieved on passing red stool. What is the most likely diagnosis? *(AIIMS November 2014)*
a. Meckel's diverticulum
b. Intussusception
c. Malrotation
d. Intestinal obstruction

MECONIUM SYNDROME

50. A new born child has not passed meconium for 48 hours. What is the diagnostic procedure of choice? *(All India 2008)*
a. USG
b. Contrast enema
c. CT
d. MRI

51. Snow storm ascites is seen in: *(APPG 2005)*
a. Meconium ileus
b. Hirschsprung's disease
c. Ileocaecal tuberculosis
d. Pseudomyxoma peritonei

52. Extraluminal abdominal calcifications in the newborn may be seen in: *(COMEDK 2010)*
a. Meconium aspiration
b. Hirschsprung's disease
c. Meconium peritonitis
d. Meconium plug syndrome

53. Intra-abdominal calcification in a plane X-ray abdomen is most often seen in: *(Karnataka 95)*
a. Meconium ileus
b. Meconium peritonitis
c. Meconium plug syndrome
d. Necrotising enterocolitis

54. Which one of the following statements regarding meconium peritonitis is not correct? *(UPSC 2000)*
a. It is a septic peritonitis
b. It develops in later intra-uterine life or during or just after delivery
c. This condition should always be considered when a baby is born with tense abdomen
d. Plain X-ray abdomen of this condition reveals calcification on liver and spleen

55. Meconium ileus is associated with: *(All India 2000, 98, 96)*
a. Fibrocystic disease of pancreas
b. Liver aplasia
c. Cirrhosis of liver
d. Malnutrition

56. Fluid levels are not visible in: *(PGI June 98)*
a. Meconium ileus
b. Intussusception
c. Colon pouch
d. Duodenal obstruction

57. A new born girl not passed meconium for 48 hours, has abdominal distention and vomiting. Initial investigation of choice would be: *(AIIMS Nov 2007)*
a. Manometry
b. Genotyping for cystic fibrosis
c. Lower GI contrast study
d. Serum trypsin immunoblot

58. Meconium peritonitis occurs: *(PGI June 99)*
a. Just before birth
b. Just after birth
c. Before and after birth
d. Due to birth trauma

MESENTERIC ISCHEMIA

59. Occlusion to superior mesenteric artery affects jejunum and:
a. Pyloric antrum *(UPPG 2010)*
b. Fundus of stomach
c. Duodenum distal to the opening of CBD
d. Greater curvature
e. Descending colon

60. Most common cause of acute mesenteric ischemia is: *(AIIMS May 2011, Nov 2008)*
a. Arterial thrombosis
b. Venous thrombosis
c. Embolism
d. Non occlusive disease

61. All are causes of dynamic intestinal obstruction except:
a. Gallstones *(JIPMER 2010)*
b. Bands
c. Intussusception
d. Mesenteric vascular occlusion

62. A young female complains of pain in umbilical region since few days, which is more especially after taking meals. What is the likely diagnosis? *(MHSSMCET 2005)*
a. Peptic ulcer disease
b. Meckel's diverticulum
c. Typhlitis
d. Abdominal angina

63. If patient with superior mesenteric artery thrombosis doesn't develop collateral circulation, then what is the best treatment? *(MHSSMCET 2005)*
a. Resection anastomosis
b. Endarterectomy
c. Arterial reconstruction
d. Papaverine injection

64. Which of the following is a common cause of abdominal angina? *(MHSSMCET 2006)*
a. SMA thrombosis
b. SMA embolism
c. SMA aneurysm
d. SMA rupture

65. Ischemia of which of the vessel would cause least damage?
a. Renal artery
b. SMA *(AIIMS Nov 2011)*
c. IMA
d. Celiac trunk

66. All are true about non-obstructive mesenteric ischemia except: *(AIIMS GIS Dec 2006)*
a. Vasopressor treatment
b. Cardiac shock
c. Burns
d. Hypercoagulable state

67. All are true about acute mesenteric ischemia except:
a. Branch point of middle colic artery is most common location for embolism *(AIIMS GIS 2003)*
b. Acute venous thrombosis is best judged on CT
c. Non-obstructive mesenteric ischemia has very good prognosis
d. Gold standard investigation is angiography

68. All are true about mesenteric ischemia except:
a. Due to embolism to SMA *(AIIMS GIS 2003)*
b. Most common cause is AF
c. Embolus gets lodged most commonly at branching of SMA from aorta
d. Most common cause of small bowel syndrome in adults

69. Type of mesenteric ischemia best visualized by CECT: *(AIIMS GIS Dec 2006)*
a. Mesenteric ischemia by embolic occlusion
b. Acute mesenteric artery thrombosis
c. Non-occlusive mesenteric ischemia
d. Acute mesenteric venous thrombosis

70. 65-years old Ramdeen presents with abdominal pain and distension of abdomen. His stools were maroon colored and he gives a past history of cerebrovascular accident and myocardial infarction. What will be the probable diagnosis? *(AIIMS Nov 2000, Nov 97)*
a. Ulcerative colitis
b. Acute mesenteric ischemia
c. Irritable bowel syndrome
d. Crohn's disease

71. A man aged 60 years has history of IHD and atherosclerosis. He presents with abdominal pain and maroon stools. Most likely diagnosis: *(All India 2001)*
a. Acute intestinal obstruction
b. Acute mesenteric ischemia
c. Peritonitis
d. Appendicitis

72. True about mesenteric vein thrombosis: *(PGI Dec 2003)*
a. Peritoneal signs always present
b. Thrombectomy is always done
c. Heparin is given
d. Surgery can lead to short bowel syndrome

73. True about mesenteric vein thrombosis: *(PGI Dec 2000)*
a. Peritoneal signs are always present
b. Invariably involves long length of bowel
c. I.V. Heparin is the treatment of choice
d. Surgery can lead to short-bowel syndrome

PARALYTIC ILEUS

74. Post-operative ileus is most pronounced in: *(AIIMS Nov 2011, AIIMS GIS Dec 2010)*
a. Colon
b. Stomach
c. Ileum
d. Duodenum

75. Paralytic ileus is seen in: *(PGI June 99)*
a. Spinal cord injury
b. Hypocalcemia
c. Hypermagnesemia
d. Uremia

76. Prolonged post-op ileus is best treated by: *(PGI Dec 98)*
a. Long tube insertion
b. Calcium pentonthenate
c. Laparotomy and exploration
d. Peristaltic stimulants

77. First to recover from post-operative ileus: *(DNB 2008)*
a. Small intestine
b. Stomach
c. Colon
d. None

78. Paralytic ileus is characterized by all except: *(SGPGI 2005)*
a. No bowel sound on ausculatation
b. No passage of flatus
c. Gas filled loops of intestine with multiple fluid levels
d. Loops of intestine are not seen due to loss of peristalsis

79. Routine management of paralytic ileus includes all of the following except: *(MCI March 2005)*
a. Electrolyte correction
b. Nasogastric aspiration
c. Parasympathomimetics
d. IV fluids

80. True about postoperative ileus is: *(MHPGMCET 2003)*
a. No intestinal sounds heard
b. Intestinal peristalsis never becomes normal again
c. Is due to hypernatremia
d. Begins 2-3 days postoperatively

81. Most common electrolyte imbalance that causes Paralytic ileus is: *(DNB 2014)*
a. Hyponatremia
b. Hypernatremia
c. Hypokalemia
d. Hyperkalemia

82. First to recover from post-operative ileus is: *(DNB 2014)*
a. Small intestine
b. Stomach
c. Colon
d. None

LARGE BOWEL OBSTRUCTION

83. A patient has presented with left sided colonic malignancy with obstruction in emergency. What is the treatment of choice?
a. Hartman's Procedure *(MHSSMCET 2005)*
b. Total colectomy
c. Left hemi-colectomy
d. Defunctioning colostomy

84. Treatment of obstructing, resectable right colonic cancer:
a. Ileo-transverse anastomosis after right hemicolectomy
b. Diverting ileostomy *(AIIMS GIS Dec 2010)*
c. Subtotal colectomy with ileorectal anastomosis
d. Subtotal colectomy with exteriorization of the both ends

85. A patient of CA rectum presents with obstruction. Treatment:
a. Defunctioning colostomy *(PGI SS June 2006)*
b. Hartmann's procedure
c. Anterior resection
d. Abdomino-perineal resection

86. What are the features of colonic obstruction? *(PGI Dec 2000)*
a. No passage of gas absolutely (Obstipation)
b. No passage of stools absolutely
c. Distention of abdomen
d. Mild fever initially
e. Fecal vomitus

87. Most common cause of colonic obstruction is: *(AMI 86, PGI 86, UPSC 88)*
a. Volvulus
b. Hernia
c. Adhesions
d. Neoplasm

88. In obstruction of the large gut rupture occurs at the: *(PGI 89)*
a. Cecum
b. Ascending colon
c. Transverse colon
d. Descending colon

89. Commonest cause of colonic obstruction in neonates is: *(TN 90)*
a. Meconium ileus
b. Aganglionic colon
c. Ileal atresia
d. Volvulus

90. Acute mechanical large bowel obstruction should be operated early because: *(UPSC 95)*
a. Electrolyte imbalance due to third space loss
b. Septicemia from absorption of bowel contents
c. Early gangrene and perforation
d. Respiratory embarrassment to massive abdominal distension

91. Acute mechanical large bowel obstruction should be operated early because of the risk of: *(UPSC 97)*
a. Respiratory embarrassment due to abdominal distension
b. Electrolyte imbalance from vomiting
c. Septicemia from bowel contents
d. Closed-loop obstruction and cecal perforation

PSEUDO-OBSTRUCTION

92. Ogilvie's syndrome results from the denervation of the colon distal to the: *(COMEDK 2006)*
a. Hepatic flexure
b. Mid-transverse colon
c. Splenic flexure
d. Descending colon

93. True about Ogilvie's syndrome are all except: *(AIIMS Nov 2007)*
a. It is caused by mechanical obstruction of the colon
b. It involves entire/part of the large colon
c. It occurs after previous surgery
d. It occurs commonly after narcotic use

94. Investigation of choice for pseudo-obstruction: *(AIIMS GIS Dec 2006)*
a. Water soluble contrast enema
b. Barium enema
c. CECT
d. Colonoscopy

95. Colonic Pseudo-obstruction occurs in all, except: *(AIIMS June 94)*
a. Diabetes mellitus
b. Dermatomyositis
c. Scleroderma
d. Hyperthyroidism

96. A 56-years old woman has not passed stools for the last 14 days. X-ray shows no air fluid levels, Probable diagnosis is: *(All India 2001)*
a. Paralytic ileus
b. Aganglionosis of the colon
c. Intestinal pseudo-obstruction
d. Duodenal obstruction

97. Acute pseudo-obstruction of the colon known as: *(DNB 2012, UPPG 2007)*
a. Sjogren's syndrome
b. Gardener's syndrome
c. Ogilvie's syndrome
d. Peutz-Jegher's syndrome

VOLVULUS

98. Sigmoid volvulus: *(PGI SS Dec 2009)*
a. Clockwise
b. CECT is diagnostic
c. Rigid sigmoidoscopy is the initial treatment
d. Sigmoidectomy is contraindicated

99. Most common site of volvulus: *(DNB 2012, GB PANT 2011)*
a. Sigmoid colon
b. Caecum
c. Transverse colon
d. Stomach

100. False about volvulus: *(AIIMS GIS May 2008)*
a. Sigmoid volvulus is most common
b. In absence of ischemia, mesocolopexy is done
c. Ogilvie's syndrome refers to cecal volvulus
d. Elective sigmoid resection after detorsion

101. False regarding cecal volvulus: *(ILBS 2011)*
a. Present with small bowel obstruction
b. Present with air fluid levels in right upper quadrant and convexity towards left
c. Endoscopic derotation is not effective like sigmoid volvulus
d. Cecopexy can be a form of treatment

102. In cecal volvulus: *(AIIMS GIS Dec 2006)*
a. Resolves with endoscopic treatment as frequently as sigmoid volvulus
b. Right hemicolectomy is the treatment of choice
c. Conservative management
d. Colonoscopic decompression

103. Obstruction with multiple air fluid levels in a newborn, suggest diagnosis of: *(MHSSMCET 2010)*
a. Duodenal atresia
b. Ileal atresia
c. Ladd's band
d. Midgut volvulus

104. 'Bird of prey' sign is seen in the radiographic barium examination of: *(COMEDK 2008)*
a. Gastric volvulus
b. Intussusception
c. Sigmoid volvulus
d. Cecal volvulus

105. True about colonic volvulus: *(PGI Nov 2010)*
a. Most common in caecum
b. Common in psychiatric patient
c. Bird's beak sign
d. May present as intestinal obstruction

106. False about cecal volvulus: *(AIIMS GIS 2003)*
a. Mostly resolve with colonoscopic reduction
b. More common than cecal basecule
c. Right hemicolectomy is TOC
d. Truly is cecocolic volvulus

107. Which of the following statement about volvulus is false? *(All India 2008)*
a. More common in psychiatric patients
b. Sigmoid volvulus is more common than caecal volvulus
c. Lower GI scopy is contraindicated in sigmoid volvulus
d. Volvulus of caecum is managed by conservative methods

108. Coffee bean sign is usually seen in: *(J and K 96)*
a. Volvulus
b. Pyloric obstruction
c. Intussusception
d. Intestinal obstruction

109. Definitive treatment of sigmoid volvulus is: *(PGI June 97)*
a. Surgical correction
b. Colectomy
c. Enema
d. Endoscopic correction

110. Predisposing factors for sigmoid volvulus are: *(Kerala 97)*
a. Band of adhesion
b. Long pelvic mesocolon
c. Narrow attachment of pelvic mesocolon
d. Loaded pelvic colon
e. All of the above

111. Rotation of sigmoid volvulus occurs: *(AMU 2005)*
a. Clockwise
b. Anticlockwise
c. Initially clockwise later anticlockwise
d. Either clockwise or anticlockwise

112. Sigmoid volvulus rotation occurs: *(UPPG 2007, 2005)*
a. Clockwise
b. Anticlockwise
c. Both clockwise and anti clockwise
d. Axial in direction

113. Which of the following statements abut sigmoid volvulus is incorrect? *(DPG 2009 March)*
a. More common with laxative abuse
b. Non-operative treatment has no role
c. Recurrence rate around 40%
d. Sigmoid resection is definitive treatment

114. All are predisposing factors for sigmoid volvulus except: *(DNB 2007)*
a. Hirschprung's diseases
b. Chagas diseases
c. Chronic constipation
d. Tuberculosis

115. Least common volvulus site in neonate is: *(JIPMER 2013)*
a. Ilioileal
b. Large bowel volvulus
c. Small bowel volvulus
d. Gastric volvulus

MALROTATION

116. Child presents with recurrent abdominal pain and bilious vomiting. Condition was diagnosed by barium follow through. Surgery was done, mesenteric widening, appendectomy, cutting the Ladd's band. What is the diagnosis? *(AIIMS Nov 2010)*
a. Recurrent cecal volvulus
b. Malrotation
c. Recurrent appendicitis
d. Stricture TB

117. The cecum is found to be placed below the stomach and in the midline. Which of the following abnormality must have taken place while rotation of the gut? *(AIIMS Nov 2010)*

a. Non-rotation
b. Malrotation
c. Reversed rotation
d. Mixed rotation

118. Malrotation presents as: *(PGI Dec 2002)*

a. Mass abdomen
b. Bleeding PR
c. Bilious vomiting
d. Hematemesis

MISCELLANEOUS

119. Bowel can get strangulated in all of the following space except: *(AIIMS Nov 2000)*

a. Recto uterine pouch
b. Ileocolic recess
c. Paraduodenal recess
d. Omental recess

120. Spastic ileus is seen in: *(PGI Dec 99)*

a. Porphyria
b. Retroperitoneal abscess
c. Hypokalemia
d. MI

121. True about visceral pain: *(PGI Nov 2011)*

a. It is poorly localized
b. Resembles "fast pain" produced by noxious stimulation of the skin
c. Mediated by B fibers in the dorsal roots of the spinal nerves
d. Causes relaxation of nearby skeletal muscles
e. Shows relatively rapid adaptation

122. A young healthy male patient presented with abdominal pain and history of altered bowel habits from the last 6 months. On CT examination, there was dilated distal part of ileum, thickened ileocecal junction with thickened cecum with presence of sacculations on the antimesenteric border. The vascularity of adjoining mesentery is also increased and there is surrounding mesentery fat. Which of the following is not a differential diagnosis? *(AIIMS Nov 2013)*

a. Ulcerative colitis
b. Crohn's disease
c. Tuberculosis
d. Ischemic bowel disease

EXPLANATIONS

ACUTE INTESTINAL OBSTRUCTION

1. **Ans. b. Usually venous blood flow affected first** *(Ref: Sabiston 19/e p1236-1244; Schwartz 9/e p988-992; Bailey 26/e p1186-1191, 25/e p1189-1191; Shackelford 7/e p864-872)*

- **Venous return** is **compromised before arterial supply** in **strangulated intestinal obstruction**Q.

Small Bowel Obstruction

- Adhesions secondary to previous surgery are the MC cause of SBOQ.
- Causes: Adhesions (60%) >Malignant tumors (20%) >Hernia (10%) >Crohn's disease (5%)Q

> - **Metastatic** or **peritoneal carcinomatosis** are the **MC malignancies** leading to **SBOQ.**

- Primary **colonic cancers** (particularly those arising from the **cecum** and **ascending colon**) **may present** as a **SBOQ.**

Pathophysiology:

- **Early in the course** of an obstruction, **intestinal motility** and **contractile activity increase** in an effort **to propel luminal contents**Q past the obstructing point.
- **Increase in peristalsis** early in the course of bowel obstruction is present **both above** and **below the point of obstruction**Q (**diarrhea** in partial or even complete small bowel obstruction **in the early period**)
- **Later in the course** of obstruction, the **intestine becomes fatigued** and **dilates**Q, with contractions becoming less frequent and less intense.
- As the **bowel dilates**, **water** and **electrolytes accumulate** both **intraluminally** and in the **bowel wall**Q itself.

> - This **massive third-space fluid loss** accounts for the **dehydration** and **hypovolemia**Q.
> - The **metabolic effects** of **fluid loss depend on** the **site** and **duration** of the obstruction.

- As the **intraluminal pressure increases** in the **bowel,** a **decrease in mucosal blood flow** can occur.

Clinical Features:

- In most patients, a **meticulous history** and **physical examination** complemented by **plain abdominal radiographs** are all that is **required** to **establish the diagnosis** and to devise a treatment plan.
- **Cardinal symptoms** of intestinal obstruction: **Colicky abdominal pain (1st symptom)**Q, nausea, vomiting, **abdominal distention**, and a **failure to pass flatus** and **feces** (i.e., **obstipation**)Q.
- **Typical crampy abdominal pain** occurs **in paroxysms** at **4- to 5-minute intervals** and occurs **less frequently with distal obstruction**Q.

> - Nausea and **vomiting** are **more common** with **proximal obstruction**.
> - **Cramping abdominal pain** is the **initial** and **most prominent symptom** in **distal obstruction**Q
> - **Abdominal distention** is **more common** in **distal obstruction**Q

- **Abdominal distention** occurs as the obstruction progresses, and the **proximal intestine becomes increasingly dilated**Q**.**

> - As the **obstruction** becomes **more complete** with **bacterial overgrowth**, the **vomitus becomes more feculent**, indicating a **late** and **established intestinal obstruction**Q**.**

- Patient may present with **tachycardia** and **hypotension**Q, demonstrating the severe dehydration that is present.
- **Fever suggests** the possibility of **strangulation**Q.
- **Abdominal distention** is dependent **on the level of obstruction**Q.

> - **Early in the course** of bowel obstruction, **peristaltic waves** can be observed, particularly **in thin patients**, and auscultation of the abdomen may demonstrate **hyperactive bowel sounds** with **audible rushes** associated with **vigorous peristalsis**Q (i.e., borborygmi).
> - **Late** in the obstructive course, **minimal** or **no bowel sounds** are noted.

- **Localized tenderness**, **rebound**, and **guarding** suggest **peritonitis** and the likelihood of **strangulation**Q.
- **Rectal examination**: To assess for **intraluminal masses** and to **examine the stool** for **occult blood**Q (an indication of malignancy, intussusception, or infarction)

Diagnosis

- **X-ray Abdomen**: **Confirm** the **clinical suspicion** and **define** more accurately the **site of obstruction** (**60%** diagnostic **accuracy**)Q

> - **Supine radiographs**: **Dilated loops** of **small intestine**Q without evidence of colonic distention, **diagnose site** and **level of obstruction**Q
> - **Erect radiographs: Multiple air-fluid levels**, which often layer in a **stepwise pattern**Q
> - **Supine films** are **better than erect** for **diagnosis** of **intestinal obstruction**Q

CT Scan
• Used in **complex patients,** in whom the **diagnosis** is **not readily apparent**[Q] • **Highly sensitive** for **diagnosing complete** or **high-grade obstruction** of the **small bowel** and for **determining the location** and **cause of obstruction**. • **Less sensitive** for **partial small bowel obstruction**[Q] • Useful for **extrinsic cause** of bowel obstruction (e.g. abdominal tumors, inflammatory disease, or abscess) and **determining bowel strangulation**

- **Enteroclysis** is **investigation of choice** in **low-grade, intermittent** SBO[Q]
- **Barium studies**: **Precisely demonstrate** the **level of** the **obstruction** and **cause** in certain cases[Q]
- **Ultrasound:** Useful in **pregnant patients**[Q]

- **Leukocytosis** may be found in patients with **strangulation**, but **does not necessarily denote strangulation**[Q].
- Absence of leukocytosis does not eliminate strangulation as a possibility.

2. **Ans. a. Small intestinal obstruction** *(Ref: Bailey 24/e p56)*

Hyponatremia
• The **most frequent cause** of **sodium depletion** in **surgical practice** is **obstruction** of the **small intestine**[Q], with its rapid loss of gastric, biliary, pancreatic and intestinal secretions by antiperistalsis and ejection, whether by vomiting or aspiration. • **Duodenal, total biliary, pancreatic** and **high intestinal external fistulae** are all notorious for bringing about **early** and **profound hyponatremia**[Q]**.**

3. **Ans. b. X-ray**

4. **Ans. a. Continuous pain** *(Ref :Sabiston 19/e p1241; Schwartz 9/e p988-990; Bailey 26/e p1182, 1187, 25/e p1188-1189, 1194; Shackelford 7/e p866)*

Simple Obstruction	Strangulating Obstruction
• Simple obstructions that involve **mechanical blockage** of the **flow of luminal contents**[Q] • **Vascular supply** is **not compromised**[Q]	• Usually involves a **closed-loop obstruction**[Q] • **Vascular supply** to a segment of intestine is **compromised**[Q], can lead to intestinal infarction. • Associated with an **increased morbidity** and **mortality risk**[Q] • **Classic signs**: **Tachycardia, fever, leukocytosis**, and a **constant, noncramping abdominal pain**[Q]**.** • **CT scan**: Useful only in **detecting** the **late stages** of **irreversible ischemia** (e.g. **pneumatosis intestinalis**, **portal venous gas**)[Q].

5. **Ans. b. Iatrogenic adhesions** 6. **Ans. a. Adhesions** 7. **Ans. c. Post-operative adhesions**

8. **Ans. a. Vomiting is common in duodenal obstruction, c. In colonic obstruction distension is common than vomiting, d. X-ray erect posture is diagnostic, e. Colicky pain to steady pain indicates strangulation** *(Ref: Sabiston 19/e p1242-1243; Schwartz 9/e p990-991; Bailey 26/e p1190-1194, 25/e p1196-1198; Shackelford 7/e p870-872)*

Treatment of Acute Intestinal Obstruction

- **Fluid Resuscitation** and **Antibiotics**[Q]: Aggressive intravenous (IV) replacement with an isotonic saline solution such as lactated Ringer's.
- **Urine output** should be monitored by the placement of a Foley catheter.
- **Elderly patients** may require **central venous assessment**[Q]
- **Tube Decompression**[Q]**:** Nasogastric suction **reduces** the **risk of pulmonary aspiration** of vomitus and minimizing further **intestinal distention** from preoperatively swallowed air.

- Patients with a **partial intestinal obstruction** may be **treated conservatively** with **resuscitation** and **tube decompression** alone[Q].
- **Resolution of symptoms** and discharge **without** the need for **surgery** has been reported **in 60–85%** of patients with a **partial obstruction**[Q].

- **Clinical deterioration** of the patient or **increasing small bowel distention** on abdominal radiographs **during tube decompression** warrants **prompt operative intervention**[Q].

Operative Management

- **Complete SBO** requires **operative intervention**[Q].
- **Adhesiolysis**: In cases of intestinal obstruction secondary to an **adhesive band**[Q]
- **Incarcerated hernias** can be managed by **manual reduction** of the herniated segment of bowel and **closure of the defect**[Q].

Consideration of laparoscopic management in patients with
• **Mild abdominal distention**[Q] allowing adequate visualization
• **Proximal** obstruction[Q]
• **Partial** obstruction[Q]
• Anticipated **single-band** obstruction[Q]

9. **Ans. a. Abdominal distension, b. Vomiting**

10. **Ans. d. Erect X-ray abdomen, e. Supine X-ray abdomen**

11. **Ans. a. X-ray abdomen erect posture**

12. **Ans. b. Duodenal obstruction** *(Ref: Sabiston 19/e p1239; Schwartz 9/e p988; Bailey 26/e p1186, 25/e p1192-1194; Shackelford 7/e p866)*

- **Abdominal pain, bilious vomiting without abdominal distention** is suggestive of **proximal small intestinal obstruction, distal to ampulla of Vater (Duodenal obstruction)**.

- Nausea and **vomiting** are **more common** with **proximal obstruction**[Q]
- **Abdominal distention** is **more common** in **distal obstruction**[Q]

13. **Ans. c. Atresia of the 3rd part of the duodenum**

14. **Ans. d. Swallowed air** *(Ref: Sabiston 19/e p1238-1239; Schwartz 9/e p988; Bailey 26/e p1186, 25/e p1189; Shackelford 7/e p866)*

Cause of Abdominal Distention	
Gas	**Fluid**
• **Swallowed air**[Q] is the major source (**Nitrogen**[Q] is not well absorbed by intestinal mucosa)	• Enormous quantities of fluid from the extracellular space are lost into gut (third space loss)
• Gases produced by **bacterial fermentation** (H_2, CO_2, CH_4)	• Net **GI secretion** is enhanced in obstruction

15. **Ans. b. Duodenal atresia** *(Ref: Bailey 26/e p120, 1193, 25/e p1199)*

- **MC site** of **intestinal atresia: Duodenum**[Q]
- **MC cause** of **neonatal intestinal obstruction: Duodenal atresia**[Q]

16. **Ans. a. Avoid surgery for initial 48–72 hours** *(Ref: Sabiston 19/e p1243; Schwartz 9/e p990-991; Bailey 26/e p1192, 25/e p1198; Shackelford 7/e p872)*

Treatment of Adhesive Obstruction

- **Initial management** is based on **intravenous rehydration** and **nasogastric decompression**; **occasionally, this treatment** is **curative**[Q].
- Although an initial conservative regimen is considered appropriate, **regular assessment** is **mandatory to ensure** that **strangulation does not occur**[Q].

- **Conservative treatment should not be prolonged beyond 72 hours**[Q]

- When, as is usual, laparotomy is required, although multiple adhesions may be found, **only one may be causative**. **This should be divided** and the **remaining adhesions left in situ**[Q] unless severe angulation is present. Division of these adhesions will only cause further adhesion formation.

- When obstruction is caused by an area of **multiple adhesions**, the adhesions should be **freed by sharp dissection**[Q]

- **To prevent recurrence**, the **bare area** should be **covered with Omental grafts**[Q].
- **Laparoscopic adhesiolysis** may be considered in **highly selected cases** of **chronic subacute obstruction**[Q].

17. **Ans. a. First part of duodenum**

18. **Ans. b. Colicky pain** *(Ref: Bailey 26/e p1186-1187, 25/e p1193)*

Symptoms of Intestinal Obstruction

- Symptoms of intestinal obstruction: **Pain, vomiting, distention** and **constipation**
- **Pain** is the **first symptom encountered**[Q]; it occurs **suddenly** and is usually **severe**.

Pain in Intestinal Obstruction
• It is **colicky in nature** and is usually **centred on the umbilicus** (**small bowel**) or **lower abdomen** (**large bowel**)[Q]
• The pain coincides with **increased peristaltic activity**[Q]
• With increasing distension, the colicky pain is replaced by a mild constant diffuse pain
• The development of **severe pain** is indicative of the **presence of strangulation**[Q]
• **Pain may not be a significant feature** in **postoperative simple mechanical obstruction** and **does not** usually **occur in paralytic ileus**[Q]

19. **Ans. b. High peristalsis with colic**
20. **Ans. d. Multiple air gas shadows on X-ray**
21. **Ans. a. Post-op adhesion**
22. **Ans. c. Bilious vomiting**
23. **Ans. a. Vomiting and distension**
24. **Ans. c. i.e., Enterotomy, removal of worms and primary closure** *(Ref: Schwartz 9/e p990-991; Farquharson's 8/e p470; Sabiston 18/e p1295)*

- Resection of small bowel is done when the affected bowel segment is of questionable viability.
- Diversion is the first step in case of colonic obstruction, followed by resection and anastomosis of affected segment and then closure of diversion colostomy at a later date.
- Intestinal luminal obstruction such as due to Bezoars or fecolihs of worm intestations are dealt with by enterotomy and removal followed by primary closure.

INTUSSUSCEPTION

25. **Ans. c. Intussusception** *(Ref: Sabiston 19/e p1851; Schwartz 10/e p1175-1236, 9/e p1433-1434; Bailey 26/e p1184, 1187, 1193, 25/e p1191, 1196, 1198; Shackelford 7/e p1059-1061)*

Intussusception

- **Telescoping** of one portion of the intestine into the other.
- **Middle layer** is **isolated between two sharp bends** and **first to become gangrenous**Q.
  - **(APEX) is most prone to gangrene**
  - **Highest incidence** between **4** and **10 months**Q of age
  - Approx **80–90%** of cases occur **between 3** and **36 months**Q
- **Mostly idiopathic** in **infants** and **toddlers**Q (no clear etiology).
- **MC type**: **Ileocolic**Q

Etiology and Predisposing Factors

- **Upper respiratory tract infections** or **gastroenteritis**Q (adenovirus and rotavirus have been implicated) have been **thought to be contributory** to the development of "idiopathic" intussusception. **Hypertrophy** of **Peyer's patches**Q can be seen at surgery, but no single etiologic factor predominates.
  - Approximately **5–10%** of cases have a true **pathologic lead point.** The **older the toddler**, the **more likely** there will be a **lead point**Q
  - **MC lead point** is **Meckel's diverticulum**Q
- Other lead points include polyps submucosal lipomas, the appendix, intestinal duplication, foreign bodies, and tumors such as hamartomas associated with **Peutz-Jeghers syndrome.**
  - **Henoch-Schönlein purpura: Submucosal hemorrhage** acts as a **lead point**Q
  - **Cystic fibrosis**: Risk for **recurrent intussusception**Q

Clinical Features

- **Typical history**: **Sudden, short-duration, cyclic crampy abdominal pain**Q.
- **During** these **episodes** the infant **cries** inconsolably with the **knees drawn up**Q.
- **Between episodes** the infant is **asymptomatic**Q**.**
  - **Vomiting** is almost **universal**Q
  - Initially the passage of stools may be normal while later on blood mixed with mucus is evacuated- **red currant jelly stool**
- An abdominal mass may be palpated- a **sausage shaped abdominal mass**Q (increase in size and firmness during the paroxysm of pain)
- There may be an **associated feeling of emptiness** in the **right iliac fossa (Sign of Dance)**Q
- **Occult** or **gross blood** in **60–90%** of cases on rectal examinationQ
- **Apex** may be **palpable** or even **protrude from anus** in extensive **ileocolic** or **colocolic intussusception**Q

Diagnosis

- **USG: Kidney-shaped mass** in the longitudinal view or a **target sign** in the transverse view
  - **Hydrostatic reduction** by **contrast agent** or **air enema (preferred)** is the **diagnostic** and **therapeutic procedure of choice**Q
  - **Successful reduction** is **confirmed** by **reflux of air**Q **(or barium)** into the small bowel

Treatment

- **Hydrostatic reduction** by **contrast agent** or **air enema** is the **diagnostic** and **therapeutic procedure of choice**Q.
- The **success rate** with **air or barium reduction** should exceed **70%**Q.

- **Failure of reduction** or the **presence of peritonitis** mandates **operative intervention**[Q], which can be performed laparoscopically or by a standard approach
- **Definitive surgical procedure: Ileocolectomy with primary anastomosis**[Q]

Recurrence

- **Recurrence** after **successful hydrostatic reduction** is **5–10%,** recurrence rate after operative reduction is 1–4%.
- **Recurrence** is usually **managed by hydrostatic reduction**[Q].
- **Third recurrence**[Q] is an **indication for operative intervention** to look for a **lead point.**

26. **Ans. a. Idiopathic and more enteric rather than colonic** *(Ref: Bailey 25/e p1191)*

Intussusception in Adults

- Bailey says **"Adult** cases of **intussusceptions** are **invariably associated with** a **lead point**, which is usually a **polyp** (e.g. Peutz-Jegher's syndrome), a **submucosal lipoma** or other **tumor**[Q]."
- "In **adults, colocolic**[Q] **intussusception** is **common** but in **children, ileocolic** is the **commonest** variety (77%)."

27. **Ans. b. Intussusception**
28. **Ans. a. Most common variety is ileocolic, b. Associated with pathological lead point, c. May be seen after viral infection, d. Can be relieved by barium enema**
29. **Ans. a. Air enema, b. Saline enema, c. Ba enema, d. Hydrostatic reduction**
30. **Ans. b. Terminal ileum**
31. **Ans. a. Ileocolic**
32. **Ans. a. Barium must be used in children after 48 hours** *(Ref: Sabiston 19/e p1851; Schwartz 9/e p1433; Bailey 26/e p1190, 25/e p1196; Shackelford 7/e p1060-1061)*

Radiological Investigations in Intussusception

Plain X-ray Film	Barium Enema	Ultrasound
• Features of **small intestinal obstruction**[Q] • **Abdominal soft tissue density** in some cases which may show: • **Target sign**[Q]: Soft tissue mass with concentric area of lucency due to mesenteric fat. • **Meniscus sign**[Q]: Crescent of gas within colonic lumen that outlines the apex of intussusception	• **Claw sign**[Q]: Rounded apex of intussusception protrudes into the contrast column • **Coiled spring sign**[Q]: Edematous mucosal folds of returning limb of intussusception outlined by contrast material.	• **Target sign** or **Bull's eye sign** on **transverse scan**[Q] • **Pseudokidney sign** on **longitudinal scan**[Q]

33. **Ans. c. Lymphoma** *(Ref: Sabiston 19/e p1257-1264; Schwartz 9/e p999-1001; Bailey 25/e p1175-1177; Shackelford 7/e p771)*

Small-Bowel Neoplasm

- **MC tumor** of **small bowel**: **Leiomyoma**[Q] **>Adenoma**[Q]
- **MC tumor** of **small bowel in children**: **Lymphoma**[Q]
- **MC malignant tumor** of **small bowel**: **Carcinoid >Adenocarcinoma**[Q]
- **MC site** of small bowel **malignancy, carcinoids, lymphoma: Ileum**[Q]

34. **Ans. c. The outer layer**
35. **Ans. a. Payers patch hypertrophy**
36. **Ans. b. Target sign, d. Coiled spring sign, e. Dance sign**
37. **Ans. d. Intussusception**
38. **Ans. a. Intussusception**
39. **Ans. c. Hypertrophy of submucous Peyer's patches**
40. **Ans. a. Submucosal lipoma**
41. **Ans. d. Usually relieved by barium enema**
42. **Ans. a. Multiple** *(Ref: Bailey 24/e p1195)*

Types of Intussusception (in decreasing order)	
1. **Ileocolic (77%)**[Q]	4. **Colocolic** (2%): **MC in adults**
2. Ileo-ileo-colic (12%)	5. **Multiple**
3. Ilioileal (5%)	6. Retrograde

43. **Ans. a. Intussusception**
44. **Ans. a. Intussusception**

45. **Ans. a. Free passage of barium in the terminal ileum**

- **In intussusception, successful reduction** is **confirmed** by **reflux of air (or barium)**[Q] into the small bowel

46. **Ans. b. Intussusception**

47. **Ans. a. Empty right iliac fossa in intussusceptions**

48. **Ans. c. Intussusception**

49. **Ans. b. Intussusception**

MECONIUM SYNDROME

50. **Ans. b. Contrast enema** *(Ref: Sabiston 19/e p1846-1847; Schwartz 10/e p1617-1619, 9/e p1429; Bailey 26/e p1194, 119, 25/e p1199-1200; Shackelford 7/e p1053-1054)*

- **Failure to pass meconium** in the **first 2 days** of life (48 hours) is typically **suggestive of** a **lower GI tract obstruction** such as **Hirschprung's disease, meconium plug syndrome** or **anorectal malformation**. A **contrast enema** is the **most suitable primary investigation to make the diagnosis,** amongst the options provided.

Meconium Syndrome

- The meconium syndromes of infancy represent a complex **group of gastrointestinal conditions associated with cystic fibrosis** (CF), with considerable overlap in clinical presentation and management.
  - The **abnormal chloride transport** in **patients with CF** results in **tenacious, viscous secretions** affecting a wide variety of organs, including the **intestine, pancreas, lungs, salivary glands, reproductive organs,** and **biliary tract**[Q]
- The **clinical presentation** of the meconium syndromes ranges from a **meconium plug** to **simple** and **complicated meconium ileus**[Q].

Meconium Plug

- Meconium plug syndrome is a frequent **cause** of **neonatal intestinal obstruction**
- **Associated with**
  - **Hirschsprung's disease**[Q], **Maternal diabetes**[Q]
  - **Hypothyroidism**[Q], **Cystic Fibrosis**[Q]

Clinical Features

- **Affected infants** are often **preterm**[Q]
- Present with signs and symptoms of **distal intestinal obstruction**[Q]
- **Abdominal distention** is a **prominent feature**[Q]

Diagnosis

- **Abdominal X-ray: Multiple dilated loops**[Q] of intestine.
- **Diagnostic** and **therapeutic procedure** of **choice** is a **water-soluble contrast enema**[Q].

Treatment

- **Diagnostic and therapeutic procedure of choice** is a **water-soluble contrast enema**[Q]. This often **results in** the **passage of a plug** of **meconium** and **relief of the obstruction**[Q]

51. **Ans. a. Meconium ileus** *(Ref: Sabiston 19/e p1847; Schwartz 10/e p1617-1619, 9/e p1429; Bailey 26/e p1194, 119, 25/e p1199-1200; Shackelford 7/e p1053-1054)*

Meconium Peritonitis in Meconium Ileus

- **Plain X-ray** of abdomen post-natally showed **specks** of **calcification**[Q] mainly at the **flanks**, while on **ultrasonography**, **specks** of **high echogenic areas** seen **throughout the abdomen** which has been described as **"snow-storm sign"**[Q]**.**

Simple Meconium Ileus

- **Meconium ileus** in the newborn represents the **earliest clinical manifestation of CF** and **affects roughly 15%** of **patients** with this inherited disease.
- In simple meconium ileus, the **terminal ileum** is **dilated** and **filled with thick, tarlike, inspissated meconium**[Q].
- **Smaller pellets** of **meconium** are found in the **more distal ileum**, leading into a **relatively small colon**[Q].

Clinical Features

- Present with signs and symptoms of **distal intestinal obstruction**[Q]

Diagnosis

Abdominal X-ray in Meconium Ileus

- **Dilated, gas-filled loops** of **small bowel**[Q]
- **Absence of air-fluid levels**[Q]
- Mass of meconium within the right side of the abdomen mixed with gas to give a **ground-glass** or **soap bubble appearance**[Q].

- **Investigation of choice: Water-soluble (Gastrografin) contrast enema**[Q]

Treatment

- **Water-soluble (Gastrografin) contrast enema** is successful in **relieving the obstruction** in up to **75%** of cases[Q], with a bowel perforation rate of less than 3%.
  - **Contrast agents** are **hypertonic** relative to serum, so **infants** should be **well hydrated** and electrolytes and vital signs carefully monitored following the procedure
- **Operative management** is required when the **obstruction cannot** be **relieved** with **contrast enema**[Q].
- **Simple evacuation** of the **luminal meconium** without the need to create a stoma is all that is necessary in most cases.
- **Irrigate** the **proximal** and **distal bowel with** either **warmed saline solution** or **4% N-acetylcysteine**[Q].

52. Ans. c. Meconium peritonitis *(Ref: Sabiston 19/e p1847; Schwartz 10/e p1617-1619, 9/e p1429; Bailey 26/e p1194, 25/e p1199-1200; Shackelford 7/e p1054)*

Complicated Meconium Ileus

- Meconium ileus is considered complicated when **perforation** of the **intestine** has taken place.
  - This may occur **in utero**[Q] or the **early neonatal period**[Q]
  - Meconium peritonitis is an **aseptic chemical peritonitis**[Q] caused by **spillage of meconium**
- **Meconium within** the **peritoneal cavity** results in **severe peritonitis** with a **dense inflammatory response** and **calcification** (**Snow-storm sign** on **USG**[Q])
- The presentation of complicated meconium ileus is variable and includes formation of a **meconium pseudocyst, adhesive peritonitis** with or without **secondary bacterial infection,** or **ascites**[Q].

53. Ans. b. Meconium peritonitis

54. Ans. a. It is a septic peritonitis

- Meconium peritonitis is an **aseptic chemical peritonitis** caused by **spillage of meconium**

55. Ans. a. Fibrocystic disease of pancreas *(Ref: Sabiston 19/e p1846; Schwartz 9/e p1429; Shackelford 7/e p1053-1054)*

- **Meconium ileus** in the newborn represents the **earliest clinical manifestation of CF** and **affects roughly 15%** of **patients** with this inherited disease.

Cystic Fibrosis

Diagnosis

- The **diagnosis of CF** is **usually confirmed in** the **postoperative period**[Q].
  - The **pilocarpine iontophoresis sweat test** revealing a **chloride concentration >60 mEq/L** is the **most reliable** and **definitive method to confirm** the **diagnosis of CF**[Q]. This test may not be reliable in infants and is usually performed later
- A **more immediate test** includes **detection of** the **mutated CFTR gene**[Q]. This test, coupled **with a careful family history** and **clinical presentation, permits confirmation** of the **diagnosis** in **most infants**[Q].

56. Ans. a. Meconium ileus

57. Ans. c. Lower GI contrast study

58. Ans. a. Before and after birth

- Meconium peritonitis may occur **in utero** or the **early neonatal period**.

MESENTERIC ISCHEMIA

59. Ans. c. Duodenum distal to the opening of CBD *(Ref: Snell 8/e p243; Bailey 25/e p911)*

Superior Mesenteric Artery

- **SMA supplies** the **midgut**, from **distal part of duodenum** to **proximal 2/3rd of transverse colon**[Q].

60. Ans. c. Embolism *(Ref: Sabiston 19/e p1177; Schwartz 10/e p859-866, 9/e p730-732; Bailey 26/e p1173-1174, 25/e p1202-1203; Shackelford 7/e p1075-1077)*

Acute Mesenteric Ischemia
• **Emboli (50%)**[Q]**:** – **Arrhythmia**, **Valvular disease**[Q], Myocardial infarction – Hypokinetic ventricular wall – Cardiac aneurysm, Aortic atherosclerotic disease
• **Thrombosis** (25%)**:** Atherosclerotic disease
• **Nonocclusive** (5–15%)**:** – **Pancreatitis**, **Heart failure**, **Sepsis**[Q] – Cardiac bypass, **Burns**, **Renal failure**[Q]

- **Venous occlusion:**
  - Hypercoagulable state
  - Sepsis Compression, Pregnancy, Portal hypertension

61. Ans. d. Mesenteric vascular occlusion

62. Ans. d. Abdominal angina *(Ref: Sabiston 19/e p1177; Schwartz 10/e p859-866, 9/e p735; Bailey 26/e p1173-1174, 25/e p1202-1203; Shackelford 7/e p1084-1092)*

Chronic Mesenteric Ischemia

- CMI is **most commonly** the result of **advanced atherosclerotic disease** of **multiple mesenteric arteries**[Q].
- **Symptomatic CMI** is **rare** because of the **good collateral circulatory network** that exists between the mesenteric vessels
- **Symptomatic disease** is more common in **females**[Q]
- **Risk factors**: Positive **family history**, **smoking, hypertension**, and **hypercholesterolemia**[Q].

Causes of Chronic Mesenteric Ischemia
• **Atherosclerotic disease**[Q]
• **Arterial hyperplasia**/dysplasia
• **Inflammatory disease**[Q]

Clinical Features

- **Classical picture: Postprandial abdominal pain (intestinal angina** or **intestinal claudication**) leading to an **aversion to food** and **weight loss**[Q].
- **Pain** is characteristically **diffuse**, midabdominal, midepigastric, and **crampy** in nature.
- **Pain** develops **within 15–45 minutes** after eating (**severity related to** the **size of the meal** ingested)

Diagnosis

- **Evaluation** of the mesenteric arteries frequently **begins with** a **duplex scan**.
- **Aortography** with AP and lateral views is **diagnostic technique of choice**[Q].

Treatment

- **Revascularization** by **balloon angioplasty** or **stent placement** for **elderly patients** (poor candidates for surgery). **Restenosis** and **reintervention** rates may be **high** (**30–50%**)
  - **Definitive therapy:** Surgery with **transaortic endarterectomy** or **bypass grafting**
  - **Results of surgery** are generally **highly gratifying** in properly selected patients, with **rapid resolution of symptoms** and **return of weight**
- **Long-term patency** of the grafts is excellent, **exceeding 90%.**

63. Ans. a. Resection anastomosis **64. Ans. a. SMA thrombosis** **65. Ans. c. IMA** *(Ref: Grays 40/e p1141)*

- Grays Anatomy: **Occlusion of IMA does not always result in irreversible ischemia** of the **descending** and **sigmoid colon**, because the **marginal artery of colon** usually **receives an adequate supply** from the **left branch of** the **middle colic artery**[Q]

66. Ans. d. Hypercoagulable state *(Ref: Sabiston 19/e p1177; Schwartz 10/e p859-866, 9/e p735; Bailey 26/e p1173-1174, 25/e p1202-1203; Shackelford 7/e p1081-1082)*

67. Ans. c. Non-obstructive mesenteric ischemia has very good prognosis

Non-occlusive Mesenteric Ischemia

- Accounts for **20%** of all cases of AMI
- Has manifestations similar to those of mesenteric arterial thrombosis, but it occurs with **patent mesenteric arteries**.
- **Splanchnic vasoconstriction** is the underlying pathophysiologic process and is **precipitated by hypoperfusion** from **medications**, **depressed cardiac output**, or **renal** or **hepatic disease**[Q].
- **BP** in the bowel **falls below 40 mm Hg, ischemia** develops leading to **infarction** and bowel necrosis.

Increased Risk of Non-occlusive mesenteric ischemiam	
• **Acute myocardial infarction**[Q]	• **Hemodialysis patients**[Q]
• **CHF**, **dysrhythmia**[Q]	• **Recent history of cardiopulmonary bypass**
• **Sepsis**, **hypovolemia**	• **Major abdominal surgery**[Q]
• Use of **splanchnic vasoconstrictors**[Qm]	• **Pancreatitis**, **aortic dissection**, or **burns**[Q].

- Nonocclusive mesenteric ischemia is typified by **diffuse spasm** of the **SMA branches** with **intermittent areas** of **narrowing and dilation**.
  - **Arteriogram**: **Diffuse vasospasm** with **marked narrowing** of the major branches of the SMA, often with the **"string of lakes" appearance**[Q] with **reflux of contrast** into the aorta
- **Perfusion** is **markedly compromised** because the **intense distal vasospasm** causes high peripheral resistance, with frequent reflux of contrast into the aorta.

68. Ans c. Embolus gets lodged most commonly at branching of SMA from aorta *(Ref: Sabiston 19/e p1177; Schwartz 10/e p859-866, 9/e p735; Bailey 26/e p1173-1174, 25/e p1202-1203; Shackelford 7/e p1077-1078)*

- **More than 50%** of emboli **lodge** in the **mid to distal segment** of the **SMA**.

Embolic occlusion in Acute Mesenteric Ischemia

- Accounts for **40–50%** of cases of AMI.
- **Most emboli** originate in the **heart** and are **secondary to myocardial infarction**Q, **cardiac arrhythmia**, endocarditis, cardiomyopathy, ventricular aneurysm, valvular disorders, or depressed left ventricular function as a result of ischemic heart disease.
  - **Most mesenteric emboli lodge in** the **SMA** (branches from the aorta at **an oblique angle)**Q
  - **More than 50%** of emboli **lodge** in the **mid to distal segment** of the **SMA**Q
- Key to successful management: **High index of suspicion** leading to early diagnosis, **aggressive resuscitation**, and **early mesenteric revascularization**Q.
- **Acute SMA embolism: Sudden** and **dramatic symptoms** because of the absence of collateral circulation.
- **Severe abdominal pain** contrast markedly with the **absence of physical findings**Q.
- **Rectal examination** is **not helpful** because the presence of occult blood is typically a late occurrence.

69. Ans. d. Acute mesenteric venous thrombosis *(Ref: Sabiston 19/e p1177; Schwartz 10/e p918-927, 9/e p735; Bailey 26/e p1173-1174, 25/e p1202-1203; Shackelford 7/e p1082-1084)*

Mesenteric Venous Thrombosis

- **MVT** accounts for **5–15%** of patients with mesenteric ischemia.
- The **SMV** is **MC involved**, frequently with **extension** of thrombus **into portal vein**Q.
  - **IMV** is **most often spared**Q
  - **Mortality rate** is **high**, up to **50%**Q

Clinical Features

- Most commonly, patients complain of **midabdominal colicky pain**Q
- Nausea, vomiting, diarrhea, and anorexia frequently accompany their abdominal discomfort.
- **Occult blood** in the stool in **half** of the patients, gross bleeding such as hematemesis, hematochezia, or melena occurs in approximately 15%.
- Because of the **generalized nature** of symptoms and relative **infrequency**, **diagnosis** is **delayed**.
  - The past **medical history** or **family history** is often informative because **venous thromboembolism**Q is part of the history in **half** of the patients
- **Bowel infarction** ultimately develops in **30–60%**Q.

Diagnosis

- **Elevation** of the **WBC count** in 50–65% of patients.
- **Serum amylase** is usually **normal,** and **serum lactate** is **elevated** only in patients with **advanced bowel ischemia** and **suggests necrosis**Q.
  - **CECT** with **IV contrast** is the **diagnostic test of choice**Q for patients with **suspected acute MVT**

Treatment

- **Rapid initiation** of **systemic anticoagulation**Q is important.
- **Exploratory laparotomy** in localized or diffuse peritoneal irritation,
- **Acute thrombus** in large veins: **Thrombectomy** followed by recombinant **tissue plasminogen activator solution.**
- The patient is treated with **heparin intraoperatively** and **anticoagulation** is **continued postoperatively**Q.

Prognosis

- **MVT** have a **high risk of recurrence** (**35–70%**)Q, most frequently **within 30 days**, thus emphasizing the need for **early** and **persistent anticoagulation**.
- **Mortality rate** is **high**, up to **50%**.

70. Ans. b. Acute mesenteric ischemia *(Ref: Sabiston 19/e p1177; Schwartz 10/e p859-866, 9/e p730-736; Bailey 26/e p1173-1174, 25/e p1202-1203; Shackelford 7/e p1077-1082)*

Acute Mesenteric Ischemia

Clinical Features

- **Early diagnosis** is the **key to successful management** of AMIQ.
- Most patients have **nonspecific symptoms** of **abdominal pain**Q.

- **Abdominal pain out of proportion** to the findings on physical examination and persisting **beyond 2 to 3 hours** is the classic picture.
- Diarrhea, nausea, vomiting, and anorexia can also be part of the initial symptom complex.
- **Melena** or **hematochezia** in **15%**, and **occult fecal blood** is found in **half** of the patients.
- **Leukocytosis** is common.

Diagnosis

- **IOC in AMI** is **mesenteric arteriography**[Q]

- **CT scan: Wall hyperdensity**, absence of wall enhancement, **wall thickening**, bowel dilation, **pneumatosis, gas** in **mesenteric vein branches** and in **portal vein** branches.
- **Hemoconcentration**, **leukocytosis** and **metabolic acidosis** is present.
- **Hyperkalemia** and **hyperphosphatemia** in bowel infarction should be suspected.

Treatment

- Effective management: **Early diagnosis, aggressive resuscitation, early revascularization**, and ongoing supportive care.
- **Mucosal layer** is the **most sensitive to ischemia**, **bacterial translocation** should be anticipated and **intravenous antibiotics**[Q] used to treat the associated bacteremia.

- **Catheter-directed papaverine** to **reverse** the **severe mesenteric vasospasm**[Q] is initiated early after arteriography
- **Anticoagulation** is given **to prevent propagation**[Q] of mesenteric thrombus

- In addition to aggressively correcting the low cardiac output, terminating vasoconstrictor use, and discontinuing digitalis preparations, **intra-arterial papaverine infusion** is the **treatment of choice**[Q].
- In the **absence of peritonitis**, supportive care with **anticoagulation** and **continued papaverine** infusion is recommended.
- **Evidence of peritonitis**: **Exploratory laparotomy**, with conservative resection of necrotic bowel.

71. Ans. b. Acute mesenteric ischemia **72. Ans. c. Heparin is given, d. Surgery can lead to short bowel syndrome**

73. Ans. d. Surgery can lead to short-bowel syndrome

Investigation of Choicem	
Acute mesenteric ischemiam	• Angiography[Q]
Mesenteric venous thrombosism	• CECT[Q]
Chronic mesenteric ischemiam	• Aortography[Q]

PARALYTIC ILEUS

74. Ans. a. Colon *(Ref: Sabiston 19/e p1244; Schwartz 10/e p1151-1152, 9/e p992-993; Bailey 26/e p1197-1198, 25/e p1201-1202; Shackelford 7/e p592-593)*

Post-operative Ileus

- Following most abdominal operations or injuries, the motility of the GI tract is transiently impaired.
- **Proposed mechanisms** responsible for this dysmotility are **surgical stress-induced sympathetic reflexes**, **inflammatory response** mediator release, and **anesthetic/analgesic effects**[Q]; each of which can inhibit intestinal motility.

- **Return of normal motility**: **Small intestine**[Q] (within **24 hours**) **>Gastric (48 hours)**[Q] **> Colonic (3-5 days)**[Q]
- **Post-operative ileus** is most pronounced in **colon**[Q]

- **Characteristic sequence** of return of normal motility: **Small intestinal motility** returning to normal **within the first 24 hours**, **gastric motility** within **48 hours** and **colonic motility** returning to normal **3 to 5 days**[Q].
- Because **small bowel motility** is **returned before colonic** and **gastric motility**, listening for **bowel sounds** is **not a reliable indicator** that **ileus has fully resolved**[Q].

75. Ans. a. Spinal cord injury, c. Hypermagnesemia, d. Uremia *(Ref: Sabiston 19/e p1244; Schwartz 10/e p1151-1152, 9/e p992-993; Bailey 26/e p1197-1198, 25/e p1201-1202; Shackelford 7/e p592-593)*

Paralytic Ileus

- Caused by **impaired intestinal motility**
- **Paralytic ileus** is a state in which there is **failure of transmission of peristaltic waves** secondary to **neuromuscular failure**[Q].

Pathophysiology

- The most frequently encountered factors are **abdominal operations**, **infection** and **inflammation, electrolyte abnormalities**, and **drugs**.

- **Characteristic sequence** of return of normal motility: **Small intestinal motility** returning to normal **within the first 24 hours**, **gastric motility** within **48 hours** and **colonic motility** returning to normal **3 to 5 days**[Q].

Paralytic Ileus: Common Etiologiesm	
• Abdominal **surgery**[Q] • **Uremia**[Qm]	• **Medications:** – **Anticholinergics**[Q] – **Opiates**[Q] – **Phenothiazines**[Q] – **Calcium channel blockers**[Q] – Tricyclic antidepressants
• Infection: – Sepsis – Intra-abdominal abscess – **Peritonitis**[Q] – **Pneumonia**[Qm]	• **Hypothyroidism**[Q] • Ureteral colic • **Retroperitoneal hemorrhage**[Q] • **Spinal cord injury**[Q] • Myocardial infarction • **Mesenteric ischemia**[Q]
• **Electrolyte abnormalities:** – **Hypokalemia**[Q] – **Hypomagnesemia**[Q] – **Hypermagnesemia**[Q] – **Hyponatremia**[Qm]	

Clinical Features

- **Paralytic ileus** is a state in which there is **failure of transmission of peristaltic waves** secondary to **neuromuscular failure.**
- The resultant stasis leads to accumulation of fluid and gas within the bowel with associated **distention, vomiting, absent** or **diminished bowel sounds** and **absolute constipation**[Q].
  - Pain is colicky in mechanical obstruction, **pain** is **not a feature of paralytic ileus** and if present a **steady, diffuse discomfort**[Q]
- There may be an **associated feeling of emptiness** in the **right iliac fossa (Sign of Dance)**[Q]
- **Occult** or **gross blood** in **60–90%** of cases on rectal examination[Q]
- **Apex** may be **palpable** or even **protrude from anus** in extensive **ileocolic** or **colocolic intussusception**[Q]

Diagnosis

- **USG: Kidney-shaped mass** in the longitudinal view or a **target sign** in the transverse view
  - **Hydrostatic reduction** by **contrast agent** or **air enema (preferred)** is the **diagnostic** and **therapeutic procedure of choice**[Q]
  - **Successful reduction** is **confirmed** by **reflux of air**[Q] **(or barium)** into the small bowel

Treatment

- **Hydrostatic reduction** by **contrast agent** or **air enema** is the **diagnostic** and **therapeutic procedure of choice**[Q].
- The **success rate** with **air or barium reduction** should exceed **70%**[Q].

76. Ans. c. Laparotomy and exploration *(Ref: Bailey 26/e p1197, 25/e p1202)*

- If **paralytic ileus** is **prolonged** and **threatens life**, a **laparotomy should be considered to exclude a hidden cause** and **facilitate bowel decompression**.

Management of Post-operative Ileus

- The **essence of treatment** is **prevention**, with the **use of nasogastric suction** and **restriction of oral intake until bowel sounds** and the **passage of flatus return**[Q].
- **Following general principles** should be applied:
  - The **primary cause** must be **removed**[Q].
  - **Gastrointestinal distension** must be **relieved by decompression**[Q].
  - Close attention to **fluid** and **electrolyte balance**[Q] is essential.
  - There is no place for the routine use of peristaltic stimulants.
- **Rarely, in resistant cases, medical therapy** with an **adrenergic blocking agent** in association with **cholinergic stimulation**, e.g. **neostigmine** (the **Catchpole regimen**) [Q], may be used, provided that an intraperitoneal cause has been excluded.
  - If **paralytic ileus** is **prolonged** and **threatens life**, a **laparotomy should be considered to exclude a hidden cause** and **facilitate bowel decompression**[Q]

77. Ans. a. Small intestine

78. Ans. d. Loops of intestine are not seen due to loss of peristalsis

79. Ans. c. Parasympathomimetics *(Ref: Bailey 25/e p1202)*

- **Rarely, in resistant cases, medical therapy** with an **adrenergic blocking agent** in association with **cholinergic stimulation**, e.g. **neostigmine** (the **Catchpole regimen**[Q]), may be used, provided that an intraperitoneal cause has been excluded.

80. Ans. a. No intestinal sounds heard **81. Ans. c. Hypokalemia**

82. Ans. a. Small intestine

LARGE BOWEL OBSTRUCTION

83. Ans. d. Defunctioning colostomy *(Ref: Sabiston 19/e p1317-1319; Bailey 26/e p1194-1196, 25/e p1202; Shackelford 7/e p1854; Maingot 11/e p501)*

- Most common site of colorectal cancer is rectum, in obstructing carcinoma rectum **loop colostomy** or **defunctioning colostomy should be done** to relieve obstruction followed by **neoadjuvant chemoradiation**, with the plan to resect the primary lesion at a later time.

Large Bowel Obstruction

- Classified as **dynamic (mechanical)** or **adynamic (pseudo-obstruction)**.
- **Mechanical obstruction** is characterized by **blockage** of the **large bowel** (luminal, mural, or extramural), resulting in **increased intestinal contractility**[Q]
- **Pseudo-obstruction** is characterized by the **absence of intestinal contractility**, often associated with **decreased** or **absent motility** of the **small bowel** and **stomach**[Q].

> - **MC cause** of **LBO**: **Colorectal cancer**[Q] **(CA Rectum >sigmoid)**

- Adhesions (MC cause of small bowel obstruction) are rarely a cause of colonic obstruction.

Pathophysiology

- **Colon becomes distended** as **gas** (about **two thirds is swallowed air**, the remainder includes the products of bacterial fermentation), **stool,** and **liquid accumulate** proximal to the site of blockage.

> - In **obstructed hernia** or **volvulus**, the **blood supply** can become **compromised**, or **strangulated**; **initially,** the **venous return** is **blocked**[Q]
> - **Vascular compromise** of the **obstructed colon** can occur due **to excessive distention**[Q]

- **Closed-loop obstruction:** When **both** the **proximal** and **distal parts** of the bowel are **occluded**[Q] (strangulated hernia or volvulus).

> - **Closed-loop obstruction** is seen when a **cancer occludes** the **lumen of the colon** in the **presence of a competent ileocecal valve**[Q]
> - **Increasing colonic distention** causes the **pressure in** the **cecum** to become so **high** that the vessels in the bowel wall are occluded, and **necrosis** and **perforation**[Q] can occur

Clinical Features

- **Cancers** of **rectum** or **left colon** are **more likely to obstruct**[Q] than those arising in the more capacious proximal colon.
- **Failure to pass stool** and **flatus** associated with **increasing abdominal distention** and **cramping abdominal pain**[Q].

Diagnosis

- **Abdominal X-ray**: **Distended colon**[Q]
- **CT scan**: Helpful in revealing an **inflammatory process** such as **diverticulitis.**
- **Water-soluble contrast enema:** For the **diagnosis of** suspected case of **volvulus** or **distal sigmoid cancer**[Q]

Treatment

- Virtually **all patients with complete acute large bowel obstruction** require **prompt surgical intervention**[Q] and should not undergo a trial of non-operative management.
- **Acute large bowel obstruction** in patients **with competent ileocecal valve** is **a true surgical emergency** because of **high chances of perforation (MC site: Cecum)**[Q].
- Once diagnosis has been made, **surgical exploration** should be undertaken **as soon as possible after appropriate resuscitation**[Q].

Treatment of Large Bowel Obstructionm

Site of Obstructionm	Procedure
Right-sided colonic obstruction (cancer or volvulus)	• **Resection** with **ileo-transverse anastomosis**[Q]
Cancer of sigmoid colon	• **Hartmann's operation**[Q] (sigmoidectomy with descending colostomy and closure of the rectal stump), • **Sigmoidectomy** with **primary colorectal anastomosis**[Q] • **Abdominal colectomy** with **ileorectal anastomosis**[Q]
Cancer of **distal** or **mid rectum**	• **Loop colostomy** or **defunctioning colostomy**[Q] (to relieve obstruction) followed by **neoadjuvant chemoradiation**[Q], (with the plan to resect the primary lesion at a later time)

84. Ans. a. Ileo-transverse anastomosis after right hemicolectomy

85. Ans. a. Defunctioning colostomy

86. Ans. a. No passage of gas absolutely (Obstipation), b. No passage of stools absolutely, c. Distention of abdomen

87. Ans. d. Neoplasm

88. Ans. a. Cecum

89. Ans. b. Aganglionic colon

90. Ans. c. Early gangrene and perforation

91. Ans. d. Closed-loop obstruction and cecal perforation

- Virtually **all patients with complete acute large bowel obstruction** require **prompt surgical intervention** and should not undergo a trial of non-operative management
- **Acute large bowel obstruction** in patients **with competent ileocecal valve** is **a true surgical emergency** because of **high chances of perforation (MC site: Cecum)**[Q]
- Once diagnosis has been made, **surgical exploration** should be undertaken **as soon as possible after appropriate resuscitation**[Q]

	Small Bowel Obstruction	Large Bowel Obstruction
• **Valvulae conniventesm**	**Thin complete lines**[Q] **Seen** in **jejunum**[Q]	Absent
• **Haustram**	Absent	**Thick incomplete bands**[Q]
• No of loops	**Many**[Q]	Few
• Distribution of loops	**Central**[Q]	**Peripheral**[Q]
• Diameter of loops	**3–5 cm**[Q]	**>5 cm**[Q]
• Radius of curvature	**Small**[Q]	**Large**[Q]
• Solid feces	Absent	**Present**[Q]

PSEUDO-OBSTRUCTION

92. Ans. c. Splenic flexure *(Ref: Sabiston 19/e p1317-1318; Bailey 26/e p1197)*

- radiopaedia.org/articles/colonic-pseudoobstruction
- **Ogilvie's syndrome: Distended colon**, with the **right** and **transverse segments** tending to be **most dramatically affected. Transition point** is frequently present, usually **at or near** the **splenic flexure.**

Colonic Pseudo-obstruction

- **Pseudo-obstruction** of the colon describes the condition of **distention of the colon**, with **signs** and **symptoms** of **colonic obstruction**, in the **absence of** an actual **physical cause** of the obstruction[Q]
- **Acute colonic pseudo-obstruction** is also known as **Ogilvie's syndrome**[Q]
- Two types: Primary and secondary
- **Secondary pseudo-obstruction** is **more common**[Q]

Pathophysiology

- **Mechanism** thought to play: **Sympathetic overactivity overriding the parasympathetic system**[Q]
- Indirect support for this theory has been derived from the **success in treating** the **syndrome with neostigmine**, a **parasympathomimetic agent**[Q]
- **Further support** comes from reports of **immediate resolution of** the **syndrome after administration of** an **epidural anesthetic** that provides sympathetic blockade

Primary pseudo-obstruction

- It is a motility disorder:
  - A **familial visceral myopathy** (hollow visceral myopathy syndrome) or
  - A **diffuse motility disorder involving** the **autonomic innervation** of the intestinal wall.

Causes of secondary Pseudo-obstructionm	
• **Neuroleptic medications**[Q]	• **Uremia**[Q]
• **Opiates**[Q]	• **Lupus, scleroderma, dermatomyositis**[Q]
• Severe metabolic illness	• **Parkinson's disease**[Q]
• **Myxedema** (Hypothyroidism[Q])	• Traumatic **retroperitoneal hematomas**[Q]
• **Hyperparathyroidism**[Q]	• **Diabetes mellitus**[Q]

Clinical Features

- Pseudo-obstruction may present in acute or chronic forms.
- **Acute form**: Most commonly affects patients with **chronic renal, respiratory, cerebral, or cardiovascular disease, involves only** the **colon**[Q]**.**
- **Chronic form**: Affects other parts of the gastrointestinal tract, usually presents as bouts of **subacute** and **partial intestinal obstruction**, and tends to **recur periodically**.

- **Acute colonic pseudo-obstruction** should be suspected when a **medically ill patient** suddenly **develops abdominal distention**[Q]
- The abdomen is **tympanitic,** usually **nontender,** and **bowel sounds** are **usually present**

Diagnosis

- **Abdominal X-ray**: **Distended colon**, with the **right** and **transverse segments**[Q] tending to be **most dramatically affected** (radiologic appearance of large bowel obstruction). **Transition point** is frequently present, usually **at or near** the **splenic flexure**[Q]**.**

  - **Most useful investigation**: **Water-soluble contrast enema**[Q]
  - Contrast enema differentiate mechanical obstruction and pseudo-obstruction

Treatment

- **Initial treatment**: Nasogastric decompression, replacement of extracellular fluid deficits, and correction of electrolyte abnormalities[Q].
- **All medications** that **inhibit bowel motility**, such as opiates, **should be discontinued**.
- **Most patients improve with this regimen**[Q]**.**

  - Treat this condition with **neostigmine**[Q]
  - **Mechanical obstruction should be excluded** (either by water-soluble contrast enema or colonoscopy) **before** the **administration of neostigmine**[Q]
  - **Resolution** is indicated by the **passage of stool** and **flatus** by the patient, **within ten minutes** of drug administration

93. Ans. a. It is caused by mechanical obstruction of the colon

94. Ans. a. Water soluble contrast enema

95. Ans. d. Hyperthyroidism

96. Ans. c. Intestinal pseudo-obstruction

97. Ans. c. Ogilvie's syndrome

VOLVULUS

98. Ans. c. Rigid sigmoidoscopy is the initial treatment *(Ref: Sabiston 19/e p1314-1315; Schwartz 10/e p1219-1220, 9/e p1055; Bailey 26/e p1188, 1190, 1195, 25/e p1194, 1196, 1200; Shackelford 7/e p1850-1853)*

Sigmoid Volvulus

- Volvulus can occur in any segment of large bowel attached to a **long** and **floppy mesentery**[Q] or fixed to the retroperitoneum by a **narrow base of origin**[Q]

  - **MC site** of volvulus: **Sigmoid colon**
  - **More commonly anticlockwise** (can be both clockwise or anticlockwise)

- **Equal frequency** in **both sexes**[Q]

Associated predisposing factors

- Age: **60–70 years**[Q].
- **Chronic constipation**[Q]
- **Institutionalized** or **neurologically impaired** or **psychiatric patients**[Q] (their medication may decrease intestinal motility, or they may fail to pass stool regularly, leading to fecal loaded large bowel predisposing to volvulus)
- **Diet high in fibre** and **vegetables**[Q] (as in **third world countries**)

Clinical Features

- Present as **acute** or **subacute intestinal obstruction**
- **Sudden onset** of **severe abdominal pain**, **vomiting,** and **obstipation.**
- **Abdomen** is **markedly distended** and **tympanitic**, with the **distention** often **more dramatic**[Q] than would be associated with other causes of obstruction.
- Severe abdominal pain, **rebound tenderness**, and **tachycardia** are **ominous signs**[Q].

Radiological (X-ray) Characteristics

- **Markedly dilated sigmoid colon** with the **appearance of a bent inner tube** or **coffee bean appearance**[Q].
- **Inferior convergence** of the dilated loop **points towards left side** of pelvis.

  - **Contrast enema** demonstrates the **point of obstruction** with the pathognomic **'birds beak'** or **'bird of prey'** or **'ace of spades' sign**[Q]

Management of sigmoid volvulus

- **Initial management**: **Resuscitation**[Q] followed by **endoscopic decompression** and **detorsion**[Q].
- **Decompression/detorsion**[Q] can be achieved by placement of **rectal tube** through a **proctoscope** or the use of a **colonoscope.**
- If detorsion/decompression cannot be achieved with either the rectal tube or colonoscope, **laparotomy with resections of the sigmoid colon**[Q] is done.

  - Even if **detorsion** of the sigmoid volvulus is successful, **risk of recurrence is high** (50%)[Q]
  - **Sigmoid colectomy** is indicated after the patient has stabilized

- Any evidence of **bowel gangrene** or **perforation contraindicates non-operative decompression** and an **immediate surgical exploration**[Q] is done.

99. Ans. a. Sigmoid colon

100. Ans. c. Ogilvie's syndrome refers to cecal volvulus *(Ref: Sabiston 19/e p1315-1316; Schwartz 10/e p1219, 9/e p1055; Bailey 26/e p1188, 1190, 1195, 25/e p1194, 1196, 1200; Shackelford 7/e p1853-1854)*

- **Acute colonic pseudo-obstruction** is also known as **Ogilvie's syndrome.**

Cecal volvulus

- Cecal volvulus is **actually** a **cecocolic volvulus**[Q]
- Consists of an **axial rotation** of the **terminal ileum**, **cecum,** and **ascending colon**[Q] with concomitant twisting of the associated mesentery.
- **Cause: Lack of fixation** of the **cecum to the retroperitoneum.**[Q]

> - **Cecal volvulus** occurs in **clockwise** direction[Q]
> - **More common** in **women**[Q]
> - Affects a **younger age group** as compared to sigmoid volvulus, in **5th decade**[Q]

Predisposing Factors for Cecal volvulusm	
• **Previous surgery**[Q]	• **Malrotation**[Q]
• **Pregnancy**[Q]	• Obstructing lesions of the left colon[Q]

Clinical Features

- Sudden onset of **abdominal pain** and **distention**.
- Presents with **features of small bowel obstruction**.
- **Asymmetric distention** of the abdomen, with a **tympanitic mass palpable** in either the **left upper quadrant** or **midabdomen**[Q].

Diagnosis

- **Abdominal X-ray**: **Dilated cecum**, **displaced to** the **left side** of the abdomen.
- **Distended cecum** assumes a **gas-filled comma shape** or **kidney bean shape**[Q], the **concavity** of which faces **inferiorly** and to the **right**.
- **Haustral markings** in the **distended loop** indicate that the dilated bowel is colon.
- **Torsion results** in **small bowel obstruction**[Q] (radiographic pattern of SBO)

> - **Contrast enema** is used to **confirm the diagnosis** and to **exclude** a **carcinoma of the distal bowel** as a **precipitating cause** of the volvulus[Q]

Treatment

- **Most cases require operation to correct** the **volvulus** and **prevent ischemia**[Q].
- If **ischemia** has already occurred, **immediate operation** is obviously required.

> - **Right colectomy** with **primary anastomosis** is the **procedure of choice**[Q]
> - In **frankly gangrenous bowel, resection** of the gangrenous bowel **with ileostomy** is a safar approach

- **Recurrence rates** are **high with ceropoxy**, and **right colectomy re**mains the **procedure of choice for cecal volvulus.**

Cecal bascule
• A condition in which **cecum folds** in a **cephalad direction anteriorly** over a **fixed ascending colon**[Q]
• Cecal bascule **commonly causes intermittent bouts** of **abdominal pain**
• Mobile cecum permits **intermittent episodes** of **isolated cecal obstruction** that are **spontaneously relieved**[Q] as the cecum falls back into its normal position

101. Ans. d. Cecopexy can be a form of treatment

102. Ans. b. Right hemicolectomy is the treatment of choice

103. Ans. d. Midgut volvulus

104. Ans. c. Sigmoid volvulus

105. Ans. b. Common in psychiatric patients, c. Bird's beak sign, d. May present as intestinal obstruction

106. Ans. a. Mostly resolve with colonoscopic reduction

107. Ans. c. Lower GI scopy is contraindicated in sigmoid d. Volvulus of cecum is managed by conservative methods

108. Ans. a. Volvulus

109. Ans. b. Colectomy

110. Ans. d. All of the above

111. Ans. d. Either clockwise or anticlockwise

112. Ans. c. Both clockwise and anti-clockwise

- **Sigmoid volvulus** is **more commonly anticlockwise** (can be **both clockwise** or **anticlockwise**)Q
- **Cecal volvulus** and **small intestine volvulus** are mostly **clockwise**Q

113. Ans. b. Non-operative treatment has no role

114. Ans. d. Tuberculosis *(Ref: Schwartz 9/e p1055)*

- Hirschprung's disease and Chagas disease can lead to megacolon, a risk factor for sigmoid volvulus.

115. Ans. b. Large bowel volvulus

- Small bowel volvulus is most common form of volvulus in neonates. Colonic volvulus is very rare.

MALROTATION

116. Ans. b. Malrotation *(Ref: Sabiston 19/e p1843-1844; Schwartz 10/e p1616-1617, 9/e p1428-1429; Shackelford 7/e p1046-1048; Bailey 26/e p119)*

Malrotation

- Patients have a **30–62%** risk of having **associated anomalies**, and **most involve GIT**Q**.**
- Incidence of **clinically symptomatic malrotation** is **1 in 6000** live birthsQ**.**
- Malrotation may initially be **recognized** at **any age**

> - Approximately in **90%** of patients **symptoms develop before 1 year** of age, with **50% to 75%** appearing **within the first month**Q of life.

Clinical Features

- Malrotation can be **totally asymptomatic** and **discovered** only **during work-up** for an unrelated condition or during an **autopsy** examination.
- **Malrotation without volvulus** may be manifested as **chronic, vague abdominal pain**, with or without intermittent bilious emesis, and **failure to thrive**Q.

> - **Neonates** typically have **bilious emesis**, which may be the **only initial symptom** of **midgut volvulus**Q.
> - **Systemic signs** such as increasing **lethargy** with poor perfusion, **temperature instability**, cardiopulmonary compromise, and **low urine output** in cases of **delayed diagnosis**Q.

- Hematologic studies may show **metabolic acidosis**, thrombocytopenia, and leukopenia.
- The **acute onset of bilious vomiting** in a **neonate** is a **sign of malrotation** until proved otherwise. It demands **immediate radiologic evaluation**Q.

Diagnosis

Upper Gastrointestinal Contrast Study
• The **gold standard test** for the **diagnosis** is an **upper gastrointestinal contrast study**Q.
• Malrotation is diagnosed by an **abnormal position** of the **ligament of Treitz**Q.
• The **normal location** is typically to the **left of** the **vertebral column** and posterior to the stomachQ.

- **Volvulus** can be diagnosed by **contrast-enhanced upper gastrointestinal series** showing a **corkscrew configuration** of the upper portion of the small intestine or a **"bird's beak" appearance** at the **third portion**Q of the duodenum.

Treatment

Acutely ill child with **peritonitis**	**Emergency surgery**Q without radiologic studies
Symptomatic from volvulus	Nasogastric decompression, intravenous fluid, and broad-spectrum antibiotics followed by **urgent surgery**Q
Chronic symptoms or **symptom-free**	**Elective correction**Q

In Malrotation
• **Plain abdominal radiographs** are **not helpful** in **ruling in** or **out** midgut **volvulus**Q.
• A **contrast enema** study is **not part** of the **work-up** for malrotation. The presence of a **normally located cecum** in the right lower quadrant **does not rule out malrotation**Q.

Operative Treatment of Malrotation
• The standard approach via a **right upper quadrant transverse incision**Q.
• **If volvulus** is present, it should be **reduced by counterclockwise rotation**Q as necessary because volvulus usually occurs in a clockwise direction.

- Bowel with **uncertain viability** should be wrapped with **warm moist gauze** sponges for at least 15 minutes.

> - **Frankly gangrenous bowel** should be **resected** and a stoma or stomas fashioned.
> - **Ladd's bands**, which represent the posterior peritoneal attachments of the right colon that cross over the duodenum, **should be divided** on the **lateral aspect** of the duodenumQ.

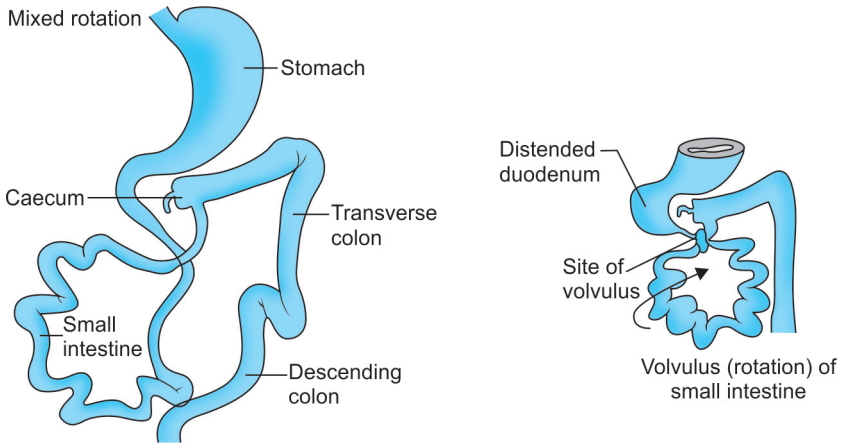
- **Widening of the mesenteric base** is necessary, and the **duodenum** is **mobilized** and **straightened** by dividing the abnormal ligament of Treitz and Ladd's bands.
- **Incidental appendectomy** should be performed **to avoid diagnostic confusion** in the future because the **cecum** will be **placed in** the **left lower quadrant**Q.

> - **Duodenum** and **proximal jejunum** are placed on the **right side**Q
> - **Terminal ileum** and **cecum** are placed in the **left hypochondrium**Q

117. Ans. d. Mixed rotation *(Ref: Sabiston 19/e p1843-144; Schwartz 9/e p1428-1429; Shackelford 7/e p1046-1048)*

Mixed rotation of gut:

- The intestine doesn't rotate as it re-enters the abdomen after physiological hernia.
- **Caecum lies just inferior to the pylorus of the stomach.** It may result in volvulus (twisting) of intestine, which leads to obstruction further.



Malrotation: Embryology

- **Rapid growth** plus **elongation** of the **midgut** starting in the **fifth week** leads to **herniation** of the midgut with the **superior mesenteric vessels** as its **stalk**Q.
- The midgut undergoes **270-degree counterclockwise rotation**Q around the superior mesenteric vessels.
- This **initial rotation** results in the **normal position** of the **DJ flexure** in the **left upper quadrant** at the level of the gastric antrumQ.
- The **DJ flexure** becomes **fixed to** the **posterior abdominal wall** by the **ligament of Treitz**. As a result of this rotation and fixation, the **third portion** of the **duodenum** lies **posterior** to the **SMA**Q.

> - In the **10th week** the **herniated intestinal loop** begins to **return**Q to the abdominal cavity.
> - The **cecocolic loop** undergoes another **270-degree counterclockwise rotation**Q around the **SMA**, which leads to the **normal position** of the **cecum** in the **right lower quadrant**.

- Subsequently, the ascending colon and descending colon become fixed to the posterior abdominal wall.
- During the **fourth** and **fifth weeks** of gestation, the **small intestine mesentery attaches** itself to the **posterior abdominal wall** in a broad base **extending** diagonally from the **DJ flexure** to the **cecum**Q.

> - **MC rotational abnormality**: **Non-rotation**Q
> - **MC type** of **malrotation**: **Incomplete rotation**Q

Types of Malrotation

Non-rotation

- MC rotational abnormality
- **Failure of counterclockwise rotation**Q after return of the midgut to the abdominal cavity.
- **Duodenal 'C' loop, ligament of Treitz** and **small intestine** is on **right side** of abdomen.
- **Cecum** is on the **left side** of abdomenQ
- The **proximal jejunum** and **ascending colon** are **fused** as **one pedicle,** through which **blood supply** to the **entire midgut (SMA)** Q is located.

Incomplete rotation

- The **counterclockwise rotation** is **arrested** at around **180 degrees**Q.
- **Most common**Q **forms** of malrotation.

- The **small intestine** lies on the **right side** with the **DJ flexure** to the **right** of the **vertebral column**, and the **duodenum** has a **corkscrew configuration**Q.
- The **large intestine** lies on the **left side** with the **cecum** at **abnormal locations**, usually in the **midline**Q.

- Other forms of fixation anomalies may be due to **failure of fixation** of the **ascending colon** in the **right hypochondrium**. Associated with this abnormal fixation is a **narrow intestinal mesentery** and **Ladd's bands.**
- **Ladd's bands** represent the **retroperitoneal attachments** that normally **fix** the **cecum** and **ascending colon** to the **posterior abdominal wall**. Because the right colon is more medial, the **bands extend across** the **duodenum** from the right upper quadrant **to** the **cecum** and **ascending colon**Q.

Reverse rotation

- In **reverse rotation**, part of the **rotation** occurs in a **clockwise direction** around the SMA.
- The **duodenum** assumes an **anterior position** and the **colon lies posterior** to the duodenum and the SMA.

Hyper-rotation

- If the **counterclockwise rotation** extends **beyond 270 degrees**, the **cecum** comes to rest in the **left hypochondrium position**.

118. Ans. b. Bleeding PR, c. Bilious vomiting

MISCELLANEOUS

119. Ans. a. Recto uterine pouch

120. Ans. a. Porphyria *(Ref: Harrison 18/e p3173)*

Spastic Ileus

- Spastic ileus or dynamic ileus is rare, results from extreme and prolonged contraction of the intestine.

Spastic ileus is seen inm	
• Heavy metal poisoningQ	• PorphyriaQ
• UremiaQ	• Extensive intestinal ulcerationQ

121. Ans. a. It is poorly localized *(Ref: Guyton 11/e p603-604; Ganong 23rd/169-170)*

Characteristic features Visceral pain

- **Visceral pain** is **poorly localized**, often the pain is **referred** or **radiating**Q

- **Highly localized** types of **damage** to the viscera **seldom cause severe pain**
- Often accompanied by **vomiting** and **hypotension**Q

- **Pain of hollow viscus** is often **felt as a colic**Q (it comes and goes to reappear again).
- There are **no proprioceptors in viscera** and few temperature and touch sense organs. Pain receptors are present, although they are more sparsely distributed than in somatic structures.

- **Afferent fibers** from visceral structures **reach the CNS via sympathetic** and **parasympathetic pathways**.
- Their **cell bodies** are located **in** the **dorsal roots** and the **homologous cranial nerve ganglia**.
- Specifically, there are **visceral afferents** in the **facial, glossopharyngeal**, and **vagus nerves**; in the thoracic and upper lumbar dorsal roots; and in the sacral roots.

- Essentially **all visceral pain** that originates **in the thoracic** and **abdominal cavities** is transmitted through **small type C pain fibers** and, therefore, can transmit only the chronic-aching-suffering type of pain

122. Ans. d. Ischemic bowel disease

- **In ischemic bowel disease or mesenteric ischemia, vascularity of adjoining mesentery is decreased.**
- *History of* **abdominal pain** *and* **altered bowel habits** *with* **thickened cecum** *and* **ileocecal junction** *and* **increased vascularity of surrounding mesentery** *can be observed in* **Ulcerative colitis, Crohn's disease and tuberculosis.**

Mesenteric Ischemia

Sabiston 19/e p1177; Schwartz 9/e p730-736; Bailey 25/e p1202-1203; Schackelford 7/e p1077-1082

- Findings on **CT scans associated with bowel ischemia** include **dilation of the bowel lumen, bowel wall thickening, abnormal bowel wall enhancement, arterial occlusion, venous thrombosis, and intramural or portal venous gas**Q.
- **Dilation of an ischemic bowel segment** suggests **interruption of normal peristaltic activity**Q.
- **Symmetrical bowel wall thickening greater than 3 mm** in a **distended segment**Q of bowel suggests ischemia.
- Greater degrees of bowel wall thickening should raise suspicion of mesenteric venous thrombosis (MVT).
- **Intravenous contrast** is useful in demonstrating the heterogeneity of the ischemic bowel wall **(lack of bowel wall enhancement)** and may show **occlusion of mesenteric arteries if given by rapid bolus administration**Q.

NOTES

NOTES

CHAPTER 13

Small Intestine

MULTIPLE CHOICE QUESTIONS

MECKEL'S DIVERTICULUM

1. **All are true statement about Meckel's diverticulum except:** *(PGI Nov 2010)*
   a. Occurs in 2% of population
   b. Perforation occurs
   c. Common on anti-mesenteric border
   d. Contains ectopic gastric tissue
   e. Diarrhea very common

2. **Ectopic mucosa of Meckel's diverticulum is diagnosed by:** *(AIIMS GIS Dec 2011, Dec 2010)*
   a. Tc-99 radionuclide scan
   b. Angiography
   c. CT
   d. Endoscopy

3. **All are true about Meckel's diverticulum except:** *(GB Pant 2011)*
   a. Congenital
   b. True diverticula
   c. Develop from omphalomesenteric duct
   d. All incidentally detected Meckel's diverticulum should be resected

4. **Ectopic gastric mucosa is best diagnosed with:** *(GB Pant 2011)*
   a. Scintigraphy
   b. CT
   c. USG
   d. MRI

5. **Most common presenting complication of Meckel's diverticulum:** *(Orissa 2011)*
   a. Hemorrhage
   b. Intussusception
   c. Meckel's diverticulitis
   d. Intestinal obstruction

6. **Meckel's diverticulum is a derivative of:** *(All India 94, AIIMS May 2005)*
   a. Allantoic diverticulum
   b. Vitellointestinal duct
   c. Ventral mesogastrium
   d. Ductus arteriosus

7. **The most frequent congenital anomaly of the GI tract is:** *(PGI 80, AIIMS 80, 81)*
   a. Imperforate anus
   b. Meckel's diverticulum
   c. Malrotation
   d. Duodenal atresia

8. **All of the following are true about Meckel's diverticulum except:** *(All India 96)*
   a. Bleeding
   b. Intussusception
   c. Arises at the mesenteric border
   d. Located 60 cm from the cecal valve

9. **Which one of the following statements is incorrect regarding Meckel's diverticulum?**
   a. Is found on the anti-mesenteric border of the small intestine
   b. Consists of mucosa without a muscle coat
   c. Heterotopic gastric mucosa can ulcerate and cause a brisk gastrointestinal bleed
   d. A fibrous band between the apex and umbilicus can cause intestinal obstruction

10. **Best investigation for diagnosis of ectopic gastric mucosa in Meckel's diverticulum:** *(AIIMS June 99)*
    a. Fluoroscopy
    b. Occult blood test in stool
    c. Ultrasound abdomen
    d. Radionuclide scan

11. **A wide mouthed Meckel's diverticulum is found accidently on laparotomy. What will be the treatment of choice?**
    a. Resection of diverticulum
    b. Leave as such
    c. Ligate at base
    d. Resection with part of ileum

12. **Meckel's diverticulum, true are all except:** *(PGI June 2006)*
    a. Has three layers with artery
    b. Heterotopic epithelium in 50-60% cases
    c. Always gastric epithelium
    d. May present with hemorrhage
    e. When accidentally seen in laparotomy always resected

13. **True about Meckel's diverticulum is/are:** *(PGI June 2001)*
    a. Bleeding PR
    b. Can be a leading point of intussusception
    c. Multiple diverticuli common
    d. Visualized best by barium meal
    e. Almost never requires active treatment

14. **Which is true regarding site of Meckel's diverticulum?** *(PGI June 95)*
    a. 2 feet proximal to ileocecal valve on mesenteric border
    b. 2 feet distal to duodenojejunal flexure on antimesenteric border
    c. 2 feet distal to D-3 flexure on mesenteric border
    d. 2 feet proximal to ileocecal valve on antimesenteric border

15. **Complications of Meckel's diverticulum include:** *(Kerala 86)*
    a. Hemorrhage
    b. Intussusception
    c. Strangulation
    d. All are correct

16. **The commonest presentation of Meckel's diverticulum is:**
    a. Bleeding
    b. Obstruction *(All India 91)*
    c. Diverticulitis
    d. Intususception

17. **Which one of the following conditions is diagnosed by Tc^{99}-Pertechnate scintigraphy?** *(UPSC 2004)*
    a. Pharyngeal diverticulum
    b. Duodenal diverticulum
    c. Meckel's diverticulum
    d. Colonic diverticulum

18. **Meckel's diverticulum is remnant of:** *(UPPG 2007)*
    a. Vitello intestinal duct
    b. Urachus
    c. Oganic diaphragm
    d. None

19. **The Meckel's diverticulum is situated within about _____ cm from the ileocecal valve:** *(COMEDK 2008, 2007)*
    a. 25
    b. 60
    c. 75
    d. 100

20. **Most common presentation of Meckel's diverticulum?** *(APPG 2008)*
    a. Lower GI bleeding
    b. Upper GI bleeding
    c. Diarrhea
    d. Abdominal pain

21. **Which of the following statement is not true about Meckel's diverticulum?** *(DPG 2007)*
    a. Most common congenital anomaly of small intestine
    b. Most common is ectopic gastric mucosa
    c. Bleeding may occur from the wall
    d. Wide mouth stapling at the base for non bleeding cases

22. Most common presentation of Meckel's diverticulum? *(APPG 2008)*
a. Lower GI bleeding b. Upper GI bleeding
c. Diarrhea d. Abdominal pain

23. Uncommon complication of Meckel's diverticulum: *(MCI Sept 2005)*
a. Intussusception b. Diverticulitis
c. Malignancy d. Increased bleeding

24. Common congenital anomaly of midgut is: *(COMEDK 2008)*
a. Hirschsprung's disease b. Omphalocele
c. Duodenal atresia d. Meckel's diverticulum

25. Efficacy of Tc-Pertechnate scan is increased by all except: *(AIIMS GIS Dec 2006)*
a. Glucagon b. Pentagastrin
c. Cimetidine d. Metoclopramide

SMALL INTESTINAL DIVERTICULA

26. True about small bowel diverticula: *(PGI June 2005)*
a. Contains all the layers of bowel wall
b. Common in terminal ileum
c. Surgical treatment is not required
d. Seen on the mesenteric border

27. All are true about duodenal diverticula except: *(AIIMS GIS May 2011)*
a. Whenever found, should be treated due to increased risk of complications
b. Most common site is periampullary region
c. Can cause acute pancreatitis
d. Most are asymptomatic

28. Feature(s) of Jejunal diverticula is/are: *(PGI Nov 2010)*
a. ↑ Folate absorption b. ↓ Ferritin absorption
c. ↓ B12 absorption d. Urea breath test
e. Steatorrhea

GASTROINTESTINAL TUBERCULOSIS

29. Which one is not true regarding hyperplastic ileocecal tuberculosis? *(AIIMS June 97, All India 2001)*
a. Mass in right iliac fossa
b. Common site ileocecal region
c. X-ray shows indrawing of caecum from ileum
d. Conservative management is treatment of choice

30. Which is true about intestinal tuberculosis?
a. Common site is appendix *(PGI Dec 99, PGI June 96)*
b. Causes intestinal perforation
c. Commonly associated with pulmonary TB
d. Caused by M. tuberculosis

31. Small intestinal tuberculosis can cause: *(PGI 88)*
a. Diarrhea b. Constipation
c. Structure d. Malabsorption

32. Most common indication for laparotomy in intestine TB is: *(PGI 93)*
a. Peritonitis
b. Intestine obstruction
c. Doubtful diagnosis
d. Lower GI bleeding

33. Not true about hyperplastic tuberculosis: *(UPPG 2000)*
a. Most common site is ileo-cecal region
b. Presents as mass in right iliac fossa
c. Surgery is the treatment of choice
d. Barium studies are characteristic

34. Most common indication for operation in tuberculosis of intestine is: *(Kerala 2001)*
a. Obstruction b. Perforation
c. Mass abdomen d. GI symptoms

35. Commonest site of tuberculosis of the intestines:
a. Stomach b. Ileum *(All India 89)*
c. Jejunum d. Colon

36. Commonest site involved in Ileocecal TB:
a. Intestinal wall b. Lymph node
c. Mesentery d. Intestinal mucosa

37. True regarding barium study of ileocecal tuberculosis: *(PGI June 2009)*
a. String sign b. Goose neck sign
c. Right sided obstruction d. Pulled up caecum
e. Sterlein sign

38. The most common cause of perforation of the distal ileum in India is: *(UPSC 2005)*
a. Tuberculosis b. Typhoid
c. Amoebiasis d. Regional enteritis

39. Pulled up cecum is seen in: *(Recent Questions 2013)*
a. CA colon
b. Carcinoid
c. Ileocecal tuberculosis
d. Crohn's disease

40. Fleischner sign on barium study is seen in? *(DNB 2014)*
a. Ileocecal TB b. Crohn's disease
c. Small bowel carcinoid d. Typhoid

SUPERIOR MESENTERIC ARTERY SYNDROME

41. All are true regarding superior mesenteric artery syndrome, except: *(All India 2000)*
a. Caused by compression of distended duodenum
b. Common in young females
c. Does not occur in obese individuals
d. Most common in 6th-7th decade

42. What is probable diagnosis of a patient with spinal POP cast presenting with bilious vomiting?
a. Acute dilation of stomach b. Duodenal obstruction
c. Peritonitis d. Acute pancreatitis

43. All of the following is true regarding superior mesenteric artery syndrome, except: *(MHSSMCET 2008)*
a. Common in young females
b. Caused by compression of third part of duodenum
c. Vomiting and post-prandial abdominal pain are typical symptoms
d. Gastrojejunostomy is treatment of choice in chronic cases

PNEUMATOSIS INTESTINALIS

44. A young, apparently healthy patient presented with air under bilateral domes of diaphragm, which is because of:
a. Pneumatosis cystoides intestinalis *(GB PANT 2011)*
b. Diverticulitis
c. Perforated peptic ulcer
d. Band with Meckel's diverticulum

45. Treatment of choice for pneumatosis intestinalis, which is uncomplicated: *(MHPGMCET 2007)*
a. High flow oxygen therapy
b. Steroids and antibiotics
c. Surgical resection
d. Sulfasalazine therapy

46. Pneumatosis intestinalis in plain abdominal Roentgenogram is seen in: *(Orissa 2011)*
a. Meconium ileus
b. Neonatal necrotizing enterocolitis
c. Duodenal atresia
d. Intestinal obstruction

47. All are correct regarding pneumatosis cystoides except one: *(AIIMS June 95)*
a. Spontaneous regression is seen
b. Surgical resection indicated
c. May cause tension pneumoperitoneum
d. May cause severe bleeding

48. When the gas filled cysts are found in subserosa or submucosa of small intestine or colon, it is called: *(AMU 2005)*
a. Pneumatosis cystoides intestinalis
b. Colonoscopy
c. Double contrast barium enema
d. Mesenteric cyst

49. Pneumatosis intestinalis is diagnostic of: *(COMEDK 2009)*
a. Ileal perforation
b. Necrotizing enterocolitis
c. Meconium ileus
d. Colonic aganglionosis

SHORT BOWEL SYNDROME

50. Which one of the following gastrointestinal disorders predisposes to urolithiasis? *(UPSC 2007)*
a. Peutz-Jegher's syndrome
b. Short bowel syndrome
c. Familial polyposis coli
d. Ulcerative colitis

51. Which is not seen in massive resection of small bowel? *(AIIMS June 95, All India 98, PGI June 99, DPG 2008)*
a. Hypogastrinemia
b. Vitamin B12 deficiency
c. Malabsorption
d. Oxalate stone

52. Complications of short bowel syndrome: *(GB Pant 2011)*
a. Gall stones
b. Oxalate renal stones
c. Cirrhosis
d. All of the above

53. Deficiency of which of the following vitamin is most commonly seen in short bowel syndrome with ileal resection? *(DNB 2012, All India 2012)*
a. Vitamin B12
b. Vitamin B1
c. Folic acid
d. Vitamin K

54. Renal calculus is seen in massive bowel resection due to: *(AIIMS Nov 94)*
a. Reduced renal calcium excretion
b. More calcium absorption in gut
c. More oxalate absorption in gut
d. None of the above

55. Resection of 90% of the ileum and jejunum causes all the following except: *(All India 94)*
a. Hypogastrinemia
b. Steatorrhea
c. Anemia
d. Extracellular volume depletion

RADIATION ENTERITIS

56. Multiple structures in intestine are found in: *(All India 2000)*
a. Radiation enteritis
b. Duodenal ulcer
c. Ulcerative colitis
d. Gastric erosion

57. Dose of radiation causing small intestinal radiation enteritis: *(AIIMS GIS Dec 2006)*
a. 2300 rad
b. 5000 rad
c. 5500 rad
d. 6000 rad

58. Intestine can tolerate a maximum dose of radiation upto: *(ILBS 2011)*
a. 3000 rad
b. 4000 rad
c. 5000 rad
d. 6000 rad

ENTERIC FEVER

59. Typhoid perforation occurs during: *(MHSSMCET 2005, MHPGMCET 2006, UPPG 2009, AIIMS 89)*
a. 1st week
b. 2nd week
c. 3rd week
d. 4th week

60. A 14-years old girl with history of prolonged fever and abdominal discomfort is observed to have splenomegaly and leucopenia. In the course of disease she developed acute abdominal event and died. Which of the following is the likely finding on autopsy? *(All India 2012)*
a. Transverse ulcers
b. Longitudinal ulcers
c. Pin point ulcers
d. Pseudopolyps

61. Typhoid perforation is diagnosed by: *(AIIMS 81)*
a. Plain X-ray of abdomen in erect posture
b. Rectal examination
c. Gastric aspiration
d. Barium enema

62. A 24-years old male, who has been having fever for 15 days starts having acute pain and distension of abdomen. Abdominal examination reveals generalized tenderness with guarding. The most likely diagnosis is: *(UPSC 88)*
a. Acute appendicitis
b. Acute pancreatitis
c. Enteric perforation
d. Duodenal ulcer perforation

SMALL BOWEL RESECTION AND ANASTOMOSIS

63. Anastomosis of small bowel is done by : *(J and K 95)*
a. Suture in 1 layer by non-absorbable suture
b. Suture in 2 layers by non-absorbable suture
c. Suture in 2 layers by absorbable sutures
d. Suture in layers by absorbable suture

64. Treatment of choice in multiple intestinal strictures of segment of Jejunum is: *(AIIMS 92)*
a. Resection and end to end anastomosis
b. Nobles procedure
c. Stricturoplasty
d. End to side anastomosis

ENTERIC FISTULA

65. All are associated with non-healing of fistula except: *(GB PANT 2011)*
a. Contained abscess
b. Distal obstruction
c. Non-epithelialization
d. Radiating enteritis

66. Causes of non-healing of enterocutaneous fistula are all except: *(AIIMS GIS May 2011)*
a. Epithelialization of track
b. Radiation enteritis
c. Acute inflammatory disease
d. Track length >3 cm

67. Favorable features for closure of enterocutaneous fistula are all except: *(AIIMS GIS Dec 2011)*
a. Tract <1 cm
b. No sepsis
c. No underlying bowel disease
d. No distal obstruction

68. All of the following delay healing of enterocu-taneous fistula except: *(JIPMER GIS 2011)*
a. Radiation
b. Foreign body
c. >2 cm fistulous tract
d. High output

69. Flstula leading to highest electrolyte in balance is:
a. Gastric
b. Duodenal *(DNB 2009)*
c. Sigmoid
d. Rectal

INTESTINAL ATRESIA AND DUPLICATION

70. A neonate presented with bilious vomiting and X-ray showing disproportionate size of bowel loops with no air-fluid levels. Most likely diagnosis is: *(KGMC 2011)*
a. Intestinal atresia
b. Midgut volvulus
c. Meconium ileus
d. Meconium plug syndrome

71. Most common site of intestinal duplication: *(PGI SS June 2001)*
a. Duodenum
b. Jejunum
c. Ileum
d. Colon

72. Commonest cause of intestinal obstruction in neonate is: *(MHPGMCET 2001)*
a. Meconium ileus
b. Intestinal atresia
c. Hirschsprung's disease
d. Volvulus

73. True about duplication of intestine is: *(PGI June 98)*
a. Spherical type is MC
b. Tubular type is attached longitudinally with bowel
c. Spherical cyst communicates with lumen
d. All of the above

74. Commonest site of intestinal atresia is in the: *(KGMC 2011, APPG 86, PGI 86, NIMHANS 86, PGI 85, UPSC 87)*
a. Duodenum
b. Jejunum
c. Ileum
d. Colon

75. The treatment of choice in duodenal atresia: *(All India 89)*
a. Gastrojejunostomy
b. Duodenojejunostomy
c. Bishop koop procedure
d. Duodenoduodenostomy

76. "Apple peel bowel with loss of dorsal mesentery is feature of which type of ileal atresia?
a. Type 1
b. Type 2
c. Type 3
d. Type 4

NEOPLASMS OF SMALL INTESTINE

77. Most common tumor of small bowel in children: *(GB PANT 2011)*
a. Lymphoma
b. Carcinoma
c. Leiomyosarcoma
d. Adenocarcinoma

78. In small intestinal malignancy: *(PGI SS June 2009, June 2006)*
a. Most common site is jejunum
b. Most common site is ileum
c. Most common type is adenocarcinoma
d. Less common due to decreased intestinal transit and increased enzymatic action

79. Most common malignancy of small bowel: *(PGI SS 2004)*
a. Adenocarcinoma
b. Carcinoid tumors
c. Lymphoma
d. Papilloma

80. Commonest tumor of small intestine is: *(All India 96, AIIMS Feb, 97, PGI June 95)*
a. Leiomyoma
b. Lymphoma
c. Adenocarcinoma
d. Hemangioma

81. True about small bowel tumour: *(PGI June 2003)*
a. Commonly located in duodenum
b. Lymphoma is common
c. Adenocarcinoma has good prognosis
d. Palliative surgeries are done even in presence of metastasis
e. Adjuvant chemotherapy is given

82. Investigation of choice for small intestine tumor: *(JIMPER 98)*
a. Ba meal follow through
b. Echo
c. X-ray abdomen
d. CT scan with contrast

83. True about duodenal adenocarcinoma: *(PGI 2004)*
a. Commonest small intestinal tumor
b. Arises from periampullary region
c. Jaundice and anaemia found
d. 5-years survival is 5%
e. Surgery is only curative

84. True about abdominal lymphoma: *(PGI Nov 2011)*
a. GIT lymphoma-most commonly has polypoid appearance
b. Primary small-intestinal lymphomas are most commonly located in the ileum
c. Lymphoma is most common primary malignant neoplasm of spleen
d. Stomach is most common site for extranodal lymphoma
e. MALT lymphoma is associated with H. pylori infection

85. Most common primary for small bowel metastasis: *(AIIMS GIS May 2011)*
a. Lungs
b. Melanoma
c. Breast
d. Kidney

86. False statement regarding benign small bowel tumour is:
a. Accidentally discovered during surgeries *(JIPMER 2013)*
b. Most commonly asymptomatic
c. Cause hemorrhage
d. Causes malabsorption

CARCINOID TUMORS

87. All are true about carcinoid tumors except: *(GB PANT 2011)*
a. Small bowel is the least common site
b. Multifocal in 30% cases
c. Associated with synchronous adenocarcinoma
d. Associated with MEN-1 in 10% cases

88. All of the following statements about carcinoid tumors are true except: *(All India 2012)*
a. It is the most common malignant tumor of the small intestine
b. Extensive involvement of small intestine is associated with higher probability of lung metastasis
c. Five year survival for carcinoids tumors is > 60%
d. Appendiceal carcinoids are more common in females

89. Least common volvular disease in carcinoids is:
a. TS
b. TR *(JIPMER GIS 2011)*
c. PR
d. PS

90. All are seen in carcinoid syndrome except: *(HPU 2005)*
a. Diarrhea
b. Constipation
c. Liver metastasis
d. 5-HT secretion

91. Most common site for carcinoid tumor: *(MAHE 2008)*
a. Appendix
b. Liver
c. Stomach
d. Rectum

92. All of the following are associated with carcinoid syndrome except: *(MCI Sept 2005)*
a. Cyanosis
b. Diarrhea
c. Flushing
d. Acute appendicitis

93. All of the following about gastrointestinal carcinoid tumors are true, except: *(All India 2010)*
a. Small intestine and appendix account for almost 60% of all gastrointestinal carcinoid
b. Rectum is spared
c. 5-years survival for carcinoid tumors is >60%
d. Appendiceal carcinoids are more common in females than males

94. True about carcinoid syndrome: *(PGI Nov 2011)*
a. Associated with MEN-1
b. Serum chromagranin-A is elevated
c. Urinary excretion of 5-HIAA in increased
d. Urinary excretion of 5-HIAA is decreased
e. Octreotide is used for treatment

95. False about carcinoid syndrome: *(PGI May 2011)*
a. Foregut carcinoid-↑serotonin in blood
b. Midgut carcinoid-↑serotonin in blood
c. Foregut carcinoid-↑serotonin in blood
d. Midgut carcinoid-normal urinary 5-HIAA

96. Which of the following is true of small bowel carcinoids?
a. Most common site is duodenum *(AIIMS Nov 2006)*
b. It does not cause endocardial fibroelastosis
c. Increased risk of CA lung
d. It is the most common malignancy of small intestine

97. Most common site for carcinoid tumor is: *(Recent Questions 2013)*
a. Esophagus b. Lung
c. Appendix d. Ileum

SMALL INTESTINE TRANSPLANTATION

98. All are true about intestinal transplant except:
a. Principal barrier to widespread application is vigorous rejection reactions *(JIPMER GIS 2011)*
b. Severe form of GVHD occurs when T cells of graft respond to foreign HLA cells
c. Uniquely dangerous complication is loss of protective mucosal barrier, bacterial translocation and severe sepsis
d. Majority of intestinal grafts are multi-visceral grafts

MISCELLANEOUS

99. Gangrene of intestine is seen in all the following conditions, except: *(All India 2000)*
a. Tricuspid valve endocarditis
b. Shock
c. Mesenteric artery thrombosis
d. Volvulus

100. What is the investigation for small intestine abnormalities except? *(PGI Dec 2005)*
a. Enteroclysis b. Radionuclide
c. CT enteroclysis d. MR enteroclysis
e. USG enteroclysis

101. Small intestinal biopsy is diagnostic in: *(PGI June 2006)*
a. Whipple's disease b. Abetalipoproteinemia
c. Celiac disease d. Agammaglobulinemia

102. In intestine, lipoma is commonest in: *(AIIMS 82, PGI 85)*
a. Rectum b. Sigmoid colon
c. Caecum d. Ileum

103. Mass in right iliac fossa can be: *(Kerala 94)*
a. Ileoceccal T.b. b. Ileocecal neoplasm
c. Ameboma d. All

104. Intestine get strangulated most commonly in which space? *(SGPGI 2005)*
a. Omental bursa b. Paraduodenal space
c. Rectourterine space d. Subphrenic

105. Regarding abdominal cocoon all statements are true except:
a. Common in young girl *(PGI Nov 2009)*
b. Associated with liver fibrosis
c. Fibrosis of small bowel and stomach
d. Chronic peritonitis is seen
e. Seen in tropical and subtropical region

106. Maximum water reabsorption in the gastrointestinal tract occurs in: *(All India 2011)*
a. Stomach b. Jejunum
c. Ileum d. Colon

107. On contrast radiography which among the following is false? *(AIIMS May 2011)*
a. Ileum is featureless
b. Colon has haustrations
c. Jejunum is feathery
d. Distal part of duodenum has a cap

108. Pain in hypogastric region may arise from: *(PGI May 2010)*
a. Uterus b. Left colon
c. Urinary bladder d. Gallbladder

109. Vitellointestinal duct closure is usually done at what age? *(MHSSMCET 2007)*
a. At birth b. 9 months
c. 6 weeks d. 12 months

110. Which of the following is most prominent feature of immunoproliferative small intestine disease (IPSID)? *(AIIMS May 2012)*
a. Malabsorption b. Obstruction
c. Bleeding d. Abdominal pain

EXPLANATIONS

MECKEL'S DIVERTICULUM

1. **Ans. e. Diarrhea very common** *(Ref: Sabiston 19/e p1268-1270; Schwartz 10/e p1163-1165, 9/e p1002-1004, 1435; Bailey 26/e p1169-1170, 25/e p1158-1159; Shackelford 7/e p695-698)*

Meckel's Diverticulum

- **Most commonly** encountered **congenital anomaly** of the **small intestine**[Q]
- Occur **2%** of the **population**[Q].

Rule of two in Meckel's diverticulum	
• **2% prevalence**[Q] • **2 inch** in **length**[Q]	• Half of these who are **symptomatic** are **<2 yrs**[Q] of age • **2 feet** proximal to **ileocecal valve**[Q]

- **True**[Q] **diverticulum** as it has **all the 3 layers** of the intestine[Q].
- Located on the **antimesenteric border** of the **ileum 45 to 60 cm proximal** to the **ileocecal valve**
- Results from **incomplete closure** of **omphalomesenteric** or **vitellointestinal duct**.
- An **equal incidence** among **men** and **women**[Q].

- **MC heterotopic tissue**: **Gastric mucosa** (50%)[Q] >Pancreatic mucosa (5%) >colonic mucosa (rarely)

Clinical Features

- **Most** are **entirely benign** and **incidentally discovered** during autopsy, laparotomy, or barium studies

- **MC clinical presentation** is **GI bleeding** (25-50%)[Q]
- **Hemorrhage**: **MC symptomatic presentation** in **children ≤2 years**[Q]

- **Hemorrhage** is manifested as **painless bright red blood** from the **rectum**, with **intermittent episodes**[Q] persisting without treatment.
- **Source** of the bleeding is a **chronic acid-induced ulcer** in the **ileum** adjacent to a Meckel's diverticulum that contains gastric mucosa.
- **Intestinal obstruction** (31%): Due to **volvulus**, **intussusception**, or, rarely, incarceration of the diverticulum in an inguinal hernia (**Littre's hernia**)[Q].

Complications of Meckel's Diverticulum

- **MC complication** in **children and young adults**: **Bleeding**[Q]
- **MC complication** in **adults**: **Intestinal obstruction**[Q]

- **Diverticulitis** (10-20%) is **more common** in **adult patients**.
- Progression of the diverticulitis may lead to perforation and peritonitis.

- When the **appendix** is found to be **normal** during exploration for suspected appendicitis, the **distal ileum** should be **inspected for** the presence of an **inflamed Meckel's diverticulum**[Q].

Diagnosis

- **Most accurate diagnostic test** in **children**: Scintigraphy with sodium **99mTc-pertechnetate**[Q].

- The 99mTc-pertechnetate is **preferentially taken** up by the mucus-secreting cells of **gastric mucosa** and **ectopic gastric tissue** in the diverticulum[Q]. **(Sensitivity-85%, specificity-95%** and an **accuracy-90%** in the pediatric age group)
- **Less accurate in adults** because of the **reduced prevalence** of **ectopic gastric mucosa**[Q]
- The **sensitivity and specificity** can be **improved by pentagastrin** and **glucagon** or **H2-receptor antagonists** (**cimetidine**)[Q].

- In **adults** with normal nuclear medicine findings, **barium studies** should be performed.

Treatment

- **Symptomatic Meckel's diverticulum**: **Diverticulectomy** or **resection** of the **segment of ileum**[Q] bearing the diverticulum.
- **Segmental intestinal resection** is required **for bleeding** because the **bleeding site** usually is in the **ileum** adjacent to the diverticulum[Q].
- **Asymptomatic diverticula** found in **children** during laparotomy should be **resected**[Q].

- **Incidentally found Meckel's diverticulum** should be **removed at any age up to 80 years** as long as no additional conditions (e.g., peritonitis) made removal hazardous[Q].

2. **Ans. a. Tc-99 radionuclide scan**
3. **Ans. d. All incidentally detected Meckel's diverticulum should be resected**
4. **Ans. a. Scintigraphy**
5. **Ans. a. Hemorrhage**

6. **Ans. b. Vitellointestinal duct**
7. **Ans. b. Meckel's diverticulum**
8. **Ans. c. Arises at the mesenteric border**
9. **Ans. b. Consists of mucosa without a muscle coat**
10. **Ans. d. Radionuclide scan**
11. **Ans. a. Resection of diverticulum** *(Ref: Sabiston 19/e p1270; Shackelford 7/e p698, 1065)*

Incidentally Detected Meckel's Diverticulum (Sabiston 19/e p1270)

- Although the treatment of complicated Meckel's diverticulum is straightforward, controversy still exists regarding the optimal treatment of Meckel's diverticulum noted as an incidental finding.
- It is generally recommended that **asymptomatic diverticula found in children** during laparotomy be **resected**[Q].
- The treatment of Meckel's diverticula encountered in the adult patient, however, remains controversial.
- Recent studies suggests that the issue of prophylactic diverticulectomy in adults should be reevaluated and that, **in selected asymptomatic patients, diverticulectomy may be beneficial and safer than originally reported**[Q]**.**

Incidentally Detected Meckel's Diverticulum (Shackelford 7/e p698)

- Epidemologic studies suggest that resection of asymptomatic Meckel's diverticulum is indicated in most patients because of **6.4% life time risk of complications** from a Meckel's diverticulum that persist over increasing age groups; a cumulative incidence of early **(12%)** and **late (7%) post-operative morbidity** and **mortality** after resection of symptomatic Meckel's diverticula and the 2% life time risk of developing complications after incidental diverticulectomy. Authors concluded that **barring any strong contraindications, incidentally discovered Meckel's diverticula should be removed.**

12. **Ans. c. Always gastric epithelium, e. When accidentally seen in laparotomy always resected**
13. **Ans. a. Bleeding PR, b. Can be a leading point of intussusception**
14. **Ans. d. 2 feet proximal to ileocecal valve on antimesenteric border**
15. **Ans. d. All are correct**
16. **Ans. a. Bleeding**
17. **Ans. c. Meckel's diverticulum**
18. **Ans. a. Vitellointestinal duct**
19. **Ans. b. 60**
20. **Ans. a. Lower GI bleeding**
21. **Ans. d. Wide mouth stapling at the base for non bleeding ulcer** *(Ref: Bailey 25/e p1159, 24/e p1160)*
Wide mouth stapling at the base for non bleeding ulcer is not done in Meckel's diverticulum.

Meckel's Diverticulectomy

- A Meckel's diverticulum that is broad based should **not be amputated at its base** and invaginated in the same way as a vermiform appendix, because of **risk of stricture**.
- Furthermore, this does not remove hetrotopic epithelium where it is present.

22. **Ans. a. Lower GI bleeding**
23. **Ans. c. Malignancy**
24. **Ans. d. Meckel's diverticulum**
25. **Ans. d. Metoclopramide**

SMALL INTESTINAL DIVERTICULA

26. **Ans. d. Seen on the mesenteric border** *(Ref: Sabiston 19/e p1264-1268; Schwartz 9/e p1004-1006; Bailey 26/e p1169, 25/e p1158; Shackelford 7/e p691-700)*

- **MC acquired diverticula** of the **small bowel**: **Duodenal diverticula**[Q]
- **MC true congenital diverticulum** of the **small bowel**: **Meckel's diverticulum**[Q]
- **Most small intestinal diverticula** are **false** diverticula **except Meckel's diverticulum**[Q]
- **Most small intestinal diverticula** arises **from mesenteric aspect** except **Meckel's diverticulum**[Q]

27. **Ans. a. Whenever found, should be treated due to increased risk of complications** *(Ref: Sabiston 19/e p1265-1266; Schwartz 9/e p1004-1006; Bailey 25/e p1158; Shackelford 7/e p691-695)*

Duodenal Diverticula

- **Relatively common**, representing the **second MC site** for diverticulum formation **after the colon**.
- **More common** in **women** (rare in patients <40 years)
- **Two thirds to three fourths** are found in the **periampullary region**[Q] (within a **2-cm of** the **ampulla**) and project from the medial wall of the duodenum.

Clinical Features

- **Mostly asymptomatic**, usually **noted incidentally** by an upper GI studies for an unrelated problem
- **Less than 5%** of duodenal diverticula will **require surgery** because of a **complication** of the diverticulum itself.
- Major complications are **obstruction** of the **biliary** or **pancreatic ducts** that may contribute to **cholangitis** and **pancreatitis**, respectively; **hemorrhage**; **perforation**; and rarely, blind loop syndrome.
  - Only those **diverticula associated with the ampulla of Vater** are significantly related to **complications of cholangitis and pancreatitis**[Q].
- In these patients, the **ampulla** most often **enters** the duodenum **at the superior margin of the diverticulum** rather than through the diverticulum itself.

Diagnosis

- Diagnosis by **endoscopy** or by **plain abdominal films** showing an **atypical gas bubble**[Q]

Treatment

- **Asymptomatic**, found incidentally: **No treatment**
- **MC** and **most effective treatment** for **symptoms** or **complications**: **Diverticulectomy**[Q]

28. Ans. c. ↓ B12 absorption, e. Steatorrhoea *(Ref: Sabiston 19/e p1266-1268; Schwartz 9/e p1004-1006; Bailey 26/e p1169, 25/e p1158; Shackelford 7/e p698-700)*

Small Intestinal (Jejuno-ileal) Diverticula

- **Less common** than duodenal diverticula, occur **more commonly along** the **mesentery**
- **False diverticula**, occurring mainly in an **older age group** (after **sixth decade**).
- With an increased frequency in the **proximal jejunum** and **distal ileum**
- **Jejunal diverticula** are **more common** and are **larger** than those in the ileum.
  - **Jejunal diverticula** are **multiple**, usually protrudes from the mesenteric border of the bowel and may be **overlooked at surgery** because they are **embedded within** the **small bowel mesentery**[Q]

Clinical Features

- **Mostly asymptomatic**, discovered incidentally
- **Vague chronic abdominal pain**, **malabsorption**, functional pseudo-obstruction, and chronic low-grade gastrointestinal hemorrhage.
- **Acute complications** are **diverticulitis**, with or without abscess or perforation; **gastrointestinal hemorrhage;** and **intestinal obstruction.**
- Stasis of intestinal flow with **bacterial overgrowth** resulting in **steatorrhea** and **megaloblastic anemia**, with or without neuropathy.
- **Perforation** is the **most common complication** of jejunoileal diverticular disease and is a sequel of **diverticulitis**[Q]

Treatment

- **No treatment** for incidentally noted, **asymptomatic jejunoileal diverticula**[Q]
- In case of **obstruction, bleeding,** and **perforation**: **Intestinal resection** and **end-to-end anastomosis**.
- In **malabsorption** secondary **bacterial overgrowth**: **Antibiotics**[Q]

Blind Loop Syndrome

- A rare condition manifested by **diarrhea, steatorrhea, megaloblastic anemia**, weight loss, abdominal pain[Q].
- **Deficiencies** of the fat-soluble vitamins (**A, D, E,** and **K**) and **neurologic disorders**[Q].

Etiopathogenesis

- **Underlying cause**: **Bacterial overgrowth** in **stagnant areas** of the small bowel produced by **stricture, stenosis, fistulas,** or **diverticula**[Q] (e.g., jejunoileal or Meckel's diverticulum).
- **Bacterial overgrowth** competes for **vitamin B_{12}**, producing systemic deficiency of vitamin B_{12} and **megaloblastic anemia**[Q].

Clinical Features

- Manifested by **diarrhea, steatorrhea, megaloblastic anemia,** weight loss, abdominal pain
- Deficiencies of the fat-soluble vitamins (A, D, E, and K), as well as **neurologic disorders**[Q].

Diagnosis

- Diagnosed with **cultures obtained** through an **intestinal tube (gold standard** diagnostic test)
- By **indirect tests** such as the **^{14}C-xylose** or **^{14}C-cholylglycine breath tests**. Excessive bacterial use of ^{14}C substrate leads to an **increase in $^{14}CO_2$**.
  - **In Schilling test**, vitamin B_{12} excretion is not altered by the addition of intrinsic factor, but a course of a **broad-spectrum antibiotic** (e.g., tetracycline) should **return vitamin B_{12} absorption to normal**[Q].

Treatment

- **Parenteral vitamin B_{12} therapy + Broad-spectrum antibiotic** (tetracycline or amoxicillin-clavulanate)[Q].
- For most patients, a **single course of therapy (7-10 days)** is sufficient, and the patient may remain symptom-free for months.
- **Surgical correction** of the condition producing stagnation and blind loop syndrome **produces a permanent cure** and is indicated in those patients who **require multiple rounds of antibiotics** or are on **continuous therapy[Q].**

GASTROINTESTINAL TUBERCULOSIS

29. Ans. d. Conservative management is treatment of choice *(Ref: Sabiston 19/e p1254-1255; Schwartz 9/e p1007; Bailey 26/e p1158, 25/e p1174-1175)*

Gastrointestinal Tuberculosis

- **Mycobacterium tuberculosis**[Q] is responsible for **all the cases** of GI tuberculosis
- M. bovis has largely been eliminated by public health measures
- More common in **poor socio-economic status**[Q]

Pathogenesis

Primary Intestinal Tuberculosis	Secondary Intestinal tuberculosis
• Ingestion of **contaminated food**[Q] may cause primary tuberculosis (this route of infection has decreased in recent years)	• Arises from **swallowed sputum**[Q] containing tuberculous bacilli • Influenced by **virulence** and **quantity of bacilli** and host resistance of infection[Q]

- When the intestines become infected by **lymphatic spread** from the mesenteric nodes, the **nodal disease** is considered as the **primary site** and intestinal involvement is secondary.
- The **earliest intestinal lesions** are found in **submucosa**[Q], while the overlying mucosa is normal.

Sites of intestinal involvement

- **MC site** is **terminal ileum** and **ileocecal junction**[Q]
- Other regions in decreasing frequency are: colon, jejunum, rectum, anal canal, duodenum, stomach and esophagus
- The **site of predilection** is dictated by the factors: abundance of **lymphoid tissue**, rate of **absorption** of intestinal contents, **prolonged stasis** and **digestive activity** of intestinal contents[Q]

Pathology

Ulcerative Tuberculosis

- **Tuberculous** intestinal **ulcers** are usually **deep** and **transversely placed**[Q] in the direction of lymphatics
- **Multiple ulcers** may be seen, most often in **terminal ileum**[Q]
- Disease progression is associated with the appearance of **inflammatory mass** around the bowel.
- The **diseased** part of the **GIT** becomes **thickened** and **serosal surface** is studded with **tubercles**.
- Marked **increase** in **mesenteric fat** with **fat wrapping** around the bowel loops
- **Regional lymph nodes** become **enlarged** and may **caseate**, leading to **mesenteric abscess** formation
- Bowel perforation is **rare** and is usually confined by perilesional inflammatory mass

Hyperplastic Tuberculosis

- A **fibroblastic reaction** occurs in submucosa and subserosa resulting in **marked thickening** of the **bowel wall**[Q]
- Involvement of adjacent mesentery, lymph nodes and omentum, results in formation of a mass lesion
- Hyperplastic lesions are due to **reduced bacterial virulence** and **increased host resistance**

Sclerotic or Fibrotic Tuberculosis

- Associated with **strictures** of intestine, typically described as "**napkin-ring strictures**" which may be **single** or **multiple**
- When multiple, strictures may occur in **short segment** of bowel or over the **entire length** of intestine.

Clinical Features

- **Initial symptoms** are vague and **non-specific**[Q]
- As the diseases progress, individual may develop **fever** (in **two third**), **night sweats**, malaise, weakness, **anorexia** and **weight loss**[Q].
- **MC symptom** of GI tuberculosis is **abdominal pain**[Q].
- **Diarrhea** is another common symptom.

- Abdominal distention suggests presence of ascites or subacute intestinal obstruction

Primary small bowel disease	Colonic Tuberculosis
Stools are large in amount, **foul smelling** and resemble those seen in patients with **malabsorption**[Q].	**Stools** may be **watery, small** in amount and mixed **with blood** when disease affects predominantly the **colon**[Q].

Complications

- **Intestinal obstruction** and **malabsorption** are **MC complications**[Q]
- **Bowel perforation** and **GI hemorrhage** are less common

Diagnosis:

- **Laboratory tests: MC abnormality** is **raised ESR** (90% cases)[Q]

Ascitic fluid showing	
• **Lymphocytosis**[Q] (WBC **>500**/mm^3)	• **SAAG <1.1**[Q]
• High protein[Q] content (>2.5 gm/dl)	• **Adenosine deaminase** is **raised**, has sensitivity and specificity of 95%[Q]

Radiological Imaging

Ultrasound

- **Club-sandwich appearance**[Q] (presence of alternating echogenic and echofree layers produce by bowel wall, serosa and the adjacent bowel loops with interloop fluid collection)

CT scan

- **High density appearance** of ascitic fluid due to **elevated protein content**[Q]
- **Thickening** of bowel wall and ileocecal valve

Barium studies in GI Tuberculosis

- **Earliest feature** is **spasm** and **hypermotility** with **edema of valve**[Q]
- **Thickening of valve lips** with **narrowing** of the **terminal ileum** (**Fleishner** or **umbrella sign**[Q]) is **characteristic of TB.**
- In advance disease, the characteristic deformity includes **symmetric, annular, napkin ring stenosis**[Q] and obstruction or shortening and pouch formation.
- The **cecum** become **shrunken** and **retracted** out of the iliac fossa due to contraction of mesocolon (**pulled up cecum**[Q])
- **Loss of ileocecal angle** with **dilated terminal ileum** imparting **goose neck deformity**[Q]
- **Narrowing of terminal ileum** due to irritability, along with shortened rigid cecum called as **"Sterlein sign"**[Q]
- **Persistent narrow stream** of **barium** in the bowel indicates stenosis known as **String sign**[Q]

Remember: **String sign** and **Sterlein sign** are also seen in **Crohn's disease** and are **not specific for TB**[Q].

Treatment

- Treatment of GI tuberculosis is **ATT**.
- **Fever, malaise** and **weight loss subside** in a **few weeks**[Q].
- **Majority of patients** (70%) with symptoms of **subacute intestinal obstruction** and evidence of intestinal **strictures** show **complete resolution** of the **radiological abnormality**[Q]

Indications of Surgery in GI Tuberculosis	
• Intestinal obstruction secondary to stricture (MC)[Q]	• Severe GI hemorrhage[Q]
• Free perforation[Q]	• Intra-abdominal abscess[Q]
	• Internal or external fistula[Q]

30. Ans. b. Causes intestinal perforation, c. Commonly associated with pulmonary TB, d. Caused by mycobacterium TB

- **MC site** of **GI tuberculosis**: **Ileocecal region**[Q]
- **MC type** of **Abdominal tuberculosis**: **Peritoneal tuberculosis**[Q]

31. Ans. a. Diarrhea, c. Stricture, d. Malabsorption

32. Ans. b. Intestine obstruction

33. Ans. c. Surgery is the treatment of choice

34. Ans. a. Obstruction

35. Ans. b. Ileum

36. Ans. d. Intestinal mucosa

37. Ans. a. String sign, b. Goose neck sign, c. Right sided obstruction, d. Pulled up cecum, e. Sterlein sign

38. Ans. b. Typhoid *(Ref: J Indian Med Assoc 199; 89:255-6)*

- **Ileal perforation** is a common problem seen in **tropical countries**. The **commonest cause being typhoid fever**[Q].
- In **western countries** the causes are **malignancy, trauma** and **mechanical etiology**, in the order of frequency[Q].

39. Ans. c. Ileocecal tuberculosis

40. Ans. a. Ileocecal TB

SUPERIOR MESENTERIC ARTERY SYNDROME

41. Ans. d. Most common in 6th-7th decade *(Ref: Sabiston 19/e p1276; Shackelford 7/e p866)*

Superior Mesenteric Artery Syndrome

- Vascular compression of **third portion**[Q] of the **duodenum** by the **superior mesenteric artery** as it passes over this portion of the duodenum.
- Also known as **Wilkie's syndrome**, **cast syndrome**, and **arteriomesenteric duodenal ileus** or **compression**[Q]

Three Mechanical Factors Must be Present

- An abnormally **narrow, aortomesenteric angle**[Q]
- An abnormally **highly fixed transverse duodenum**[Q]
- An **abnormal course** of the **mesenteric artery**[Q] continuing inferiorly, anterior to the unyielding vertebral column

- **Most commonly** seen in **young asthenic individuals**, with **women** being more commonly affected than men[Q].
- **SMA** normally **leaves aorta** at an **acute angle (50-60°)**
- Normally a **mass of fat** and **lymphatics** near **origin of SMA** is believed to **protect duodenum from compression.**

Predisposing Factors	
• Rapid weight loss[Q] • Supine immobilization[Q] • Rapid growth of height[Q]	• Scoliosis[Q] • Placement of a body cast[Q]

Clinical Features

- Symptoms include profound nausea and vomiting, **abdominal distention**, **weight loss**, and **postprandial epigastric pain**[Q], which varies from intermittent to constant depending on the severity of the duodenal obstruction.
- **Weight loss** usually occurs **before** the **onset of symptoms** and contributes to the syndrome.

Diagnosis

- **Barium** upper gastrointestinal series or **hypotonic duodenography**[Q], which demonstrates abrupt or near-total cessation of flow of barium from the duodenum to the jejunum.
- CT has been useful in certain instances.

Treatment

- **Conservative measures** are tried initially and have been **increasingly successful** as **definitive treatment.**
- The **operative treatment of choice** is **duodenojejunostomy**[Q]**.**

42. Ans. b. Duodenal obstruction

43. Ans. d. Gastrojejunostomy is treatment of choice in chronic cases

- **TOC** in **annular pancreas**: **Duodenoduodenostomy**[Q]
- **TOC** in **duodenal atresia**: Diamond shaped **Duodenoduodenostomy**[Q]
- **TOC** in **SMA syndrome**: **Duodenojejunostomy**[Q]

PNEUMATOSIS INTESTINALIS

44. Ans. a. Pneumatosis cystoides intestinalis *(Ref: Sabiston 19/e p1272-1273; Schwartz 10/e p1170-1171, 9/e p1009; Shackelford 7/e p1057-1058)*

Pneumatosis Intestinalis

- An uncommon condition presenting as **multiple gas-filled cysts** of the gastrointestinal tract.
- Located in the **subserosa**, **submucosa**, and, rarely, muscularis layer

- **MC site: Jejunum**[Q] >ileocecal region >colon (Can occur anywhere)

- **Equal incidence** among **males** and **females**[Q]
- Most commonly occurs in the **4th-7th decades**[Q] of life.
- Pneumatosis **in neonates** is usually associated with **necrotizing enterocolitis**[Q].

Pathology

- On histologic section, **honeycomb appearance**[Q].
- The cysts are **thin walled** and break easily.
- **Spontaneous rupture** gives rise to **pneumoperitoneum**.

Predisposing Factors

- **COPD**[Q]
- **Immunocompromised state**[Q] (AIDS; transplantation; leukemia, lymphoma, vasculitis, or collagen vascular disease; patients taking chemotherapy or corticosteroids).
- **Inflammatory, obstructive**, or **infectious conditions** of the intestine[Q]
- **Endoscopy** and **jejunostomy** placement; **ischemia**[Q]
- **Diabetes**[Q]

Clinical Features

- Symptoms are **nonspecific**, most commonly **diarrhea, abdominal pain, abdominal distention**, nausea, vomiting, weight loss, and **mucus in stools**[Q].
- **Pneumoperitoneum** occurs usually in association with **small bowel** rather than large bowel **pneumatosis**[Q].

> - **Pneumatosis intestinalis** represents one of the few cases of **sterile pneumoperitoneum** and should be considered in the patient with **free abdominal air** but **no evidence of peritonitis**[Q].

Diagnosis

- On **plain films**, **radiolucent areas** within the **bowel wall** (appear as **grapelike clusters** or **tiny bubbles**)[Q]
- Alternatively, **barium contrast** or **CT studies** can be used to **confirm the diagnosis**[Q].

Treatment

- Management of the **uncomplicated primary disease** is **conservative.**

> - When **symptoms demand treatment**, the **first line** is **intermittent high flow oxygen therapy**[Q], providing a concentration of 70% continuously for 5 days by nasal specula.
> - The cysts may also resolve with antibiotics, particularly **metronidazole**[Q].
> - In **resistant cases**, maintenance treatment with **sulfasalazine**[Q] may be helpful.

- **Prognosis** in most patients is that **of the underlying disease**[Q].

45. **Ans. a. High flow oxygen therapy**
46. **Ans. b. Neonatal necrotizing enterocolitis**
47. **Ans. b. Surgical resection indicated**
48. **Ans. a. Pneumatosis cystoides intestinalis**
49. **Ans. b. Necrotizing enterocolitis**

SHORT BOWEL SYNDROME

50. **Ans. b. Short bowel syndrome** *(Ref: Sabiston 19/e p1274-1276; Schwartz 10/e p1171-1173, 9/e p1009-1010; Bailey 26/e p266, 25/e p228-229; Shackelford 7/e p998-1014)*

SHORT BOWEL SYNDROME

- **Malabsorptive condition** that arises secondary to **removal of significant segments of the small intestine**[Q].
- Most common causes are **Mesenteric infarction**[Q], **Crohn's disease**[Q], **Trauma**[Q], **Volvulus**[Q].

Changes seen in Terminal Ileal Resection	
• **Malabsorption** of **bile salts** and **vitamin B_{12}** (which are normally absorbed in this region) • Vitamin B_{12} Malabsorption → **Megaloblastic anemia**[Q] • **Bile salts Malabsorption** → **Unabsorbed bile salts** escape into **colon** and **stimulate fluid secretion** from the colon → **watery diarrhea**[Q]. • Decreased bile salts in the bile → **Cholesterol gall stones**[Q]	• **Reduction in bile salt pool** → **steatorrhea**[Q] and **Malabsorption** of **fat soluble vitamins** (due to fat malabsorption) • **Unabsorbed fatty acids** bind with **calcium** → Increased concentration of **free oxalates** (oxalates bind with calcium normally and therefore escape without intestinal absorption) → Free oxalates are absorbed → **Oxalate kidney stones**[Q].

Removal of Ileocecal valve

- **Bacterial overgrowth**[Q] from the **colon** → **diarrhea** and **malabsorption**[Q]
- **Decrease** in **intestinal transit time**[Q]

Adaptive Response

- **Resection of up to 70%** of the **small bowel** usually can be **tolerated** if the terminal ileum and ileocecal valve are preserved.
- **Length alone**, however, is **not the only determining factor of complications** related to small bowel resection.

> - **Proximal bowel resection** is **tolerated** much **better than distal resection**[Q]
> - Because the **ileum can adapt** and **increase its absorptive capacity more efficiently than the jejunum**[Q].

Treatment

- **Early phase**: **Control diarrhea**, **replacement** of **fluid and electrolytes**, and **TPN**[Q]
- H2-receptor antagonists or **PPI** for **acid hypersecretion**[Q]
- **Cholestyramine**[Q] for **cathartic effects** of **unabsorbed bile salts** in the colon.

> - **Hypergastrinemia** and **gastric hypersecretion** occur after massive small bowel resection and **greatly contribute to diarrhea** after a **massive small bowel resection**[Q].

Intestinal lengthening operation

- **Bianchi Procedure**[Q]: Longitudinal intestinal lengthening and tailoring
- **STEP: Serial transverse enteroplasty procedure**[Q]

51. Ans. a. Hypogastrinemia **52. Ans. d. All of the above** **53. Ans. a. Vitamin B_{12}**

54. Ans. c. More oxalate absorption in gut

55. Ans. a. Hypogastrinemia *(Ref: Harrison 18/e p2472)*

- Harrison says "**Gastric hypersecretion** of **acid** occurs in many patients **following large resection** of the **small intestine**. The etiology is unclear but may be **related to reduced hormonal inhibition** of **acid secretion** or **increased gastrin levels** due to **reduced small intestinal catabolism** of circulating gastrin."

RADIATION ENTERITIS

56. Ans. a. Radiation enteritis *(Ref: Sabiston 19/e p1273-1274; Schwartz 10/e p1162-1163, 9/e p1001-1002; Shackelford 7/e p986-997)*

Radiation Enteritis

- **Radiation therapy affect rapidly dividing cells** in small intestine
- **Rapidly dividing cells** in small intestinal epithelium **may sustain severe**, **acute**, and **chronic deleterious effects**.

> - **Serious late complications** are **unusual** if the **total radiation dosage** is **<4000 cGy**[Q]
> - **Morbidity risk increases** with dosages **>5000 cGy**[Q].

Pathology

- **Radiation damage** tends to be **acute** and **self-limiting**[Q]
- **Late effects of radiation injury:**
  - **Damage** to the **small submucosal blood vessels**[Q]
  - **Progressive obliterative arteritis** and **submucosal fibrosis**[Q]
  - **Thrombosis** and **vascular insufficiency**[Q]

Predisposing Factors

- Previous **abdominal operations**[Q]
- Preexisting **vascular disease**, **hypertension**, **diabetes**[Q]
- Adjuvant treatment: **5-FU**, **doxorubicin, dactinomycin** and **methotrexate**[Q]

Clinical Features

- **Radiation damage** tends to be **acute** and **self-limiting**, with symptoms consisting mainly of **diarrhea, abdominal pain**, and **malabsorption**[Q].

> - **Late effects** of radiation injury resulting eventually in **thrombosis** and **vascular insufficiency** leading to **necrosis** and **perforation** of the involved intestine, but **more commonly stricture formation** with symptoms of **obstruction** or **small bowel fistulas**[Q].

Prevention

- By **adjusting ports** and **dosages of radiation** to deliver optimal treatment specifically to the tumor and not to surrounding tissues.
- **Exclude the small bowel** from the irradiated field by **reperitonealization, omental transposition**, and placement of **absorbable mesh slings**.
- **Sucralfate** is used to **prevent diarrhea** associated with abdominal radiation.
- **Superoxide dismutase** reduces complications.

> - **Most effective radioprotectant: Amifostine**[Q] (WR-2721)

Treatment

- **Acute radiation enteritis:** Control symptoms with **antispasmodics, analgesics antidiarrheal agents**[Q].

> - **Operative intervention: Obstruction** (MC), **fistula** formation, **perforation** and **bleeding**[Q]
> - **Operative procedures: Bypass** or **resection with reanastomosis**.

57. **Ans. b. 5000 rad**

58. **Ans. b. 4000 rad**

ENTERIC FEVER

59. **Ans. c. 3rd week** *(Ref: Sabiston 19/e p1254; Schwartz 9/e p1007; Bailey 26/e p91-92, 25/e p1174; Harrison 18/e p1276)*

Enteric Fever or Typhoid

- Enteric fever is a potentially life-threatening systemic disease characterized by **fever** and **abdominal pain**[Q]
- It is caused by **Salmonella typhi** or **paratyphi**[Q]
- **Typhoid** is the **MC cause of ileal perforation** in **tropical countries (India)**[Q].

Pathology

- **Ulceration** and **necrosis** of **ileocecal Peyer's patches**[Q]
- The **ulcer** is **parallel to the long axis** of the gut and is usually situated in the **lower ileum (longitudinal ulcers)**[Q]
- **Perforation** of a **typhoid ulcer** usually occurs during the **third week**[Q] and is occasionally the first sign of the disease.

Clinical Features

- **Fever** and **abdominal pain** are **hallmark symptoms**[Q]
- Non-specific symptoms: Headache, cough, sweating, myalgia, arthralgia, fatigue
- **Paralytic ileus** is the **MC complication**[Q] of typhoid.
- **Intestinal hemorrhage (2nd MC)**[Q] may be the leading symptom.

Complications of Enteric Fever	
• **Paralytic ileus (MC)**[Q]	• Phlebitis
• Intestinal **hemorrhage (2nd MC)**[Q]	• Genitourinary inflammation
• **Perforation**[Q]	• Arthritis
• **Cholecystitis**[Q]	• Osteomyelitis

Characteristic signs

- **Rose spots, splenomegaly, leucopenia** with **shift to left**[Q]
- **Lipopolysaccharide endotoxin** is responsible for **leucopenia** and **splenomegaly**[Q]
- **Relative bradycardia** despite of **high fever**[Q]

60. **Ans. b. Longitudinal ulcers**

61. **Ans. a. Plain X-ray of abdomen in erect posture**

62. **Ans. c. Enteric perforation**

SMALL BOWEL RESECTION AND ANASTOMOSIS

63. **Ans. a. Suture in 1 layer by non-absorbable suture** *(Ref: Shackelford 7/e p920-928)*

Bowel Anastomosis

- **Good surgical technique** is **more important than** the **choice of suture material:**
  - **Gentle handling**[Q] of the bowel
  - **Adequate hemostasis**[Q]
  - **Meticulous approximation**[Q] of well-vascularized bowel
  - **Tension-free anastomosis**[Q]

Two-layer Anastomoses	One-layer Anastomoses
• **Inner layer** is an **absorbable** 3-0 or 4-0 running **full-thickness stitch**[Q]	• A **full-thickness technique**, interrupted or running with **nonabsorbable suture**[Q]
• **Outer layer** is an **inverting**, usually 3-0, **seromuscular stitch**, which may be running or interrupted **nonabsorbable**[Q].	

64. **Ans. c. Stricturoplasty**

- For **multiple strictures** involving **long segment** of **small intestine, stricturoplasty** is preferred to **prevent short bowel syndrome**[Q].

ENTERIC FISTULA

65. **Ans. c. Non-epithelialization** *(Ref: Sabiston 19/e p1270-1272; Schwartz 9/e p997-998; Bailey 26/e p1179-1180, 25/e p1184-1185; Shackelford 7/e p944-946)*

Factors Preventing Spontaneous Fistula Closure	
• **High output (>500 mL**/day)[Q] • **Severe disruption** of intestinal continuity[Q] (**>50%** of bowel **circumference**) • **Active inflammatory bowel disease**[Q] of bowel segment • **Cancer**[Q]	• **Radiation enteritis**[Q] • **Distal obstruction**[Q] • **Undrained abscess cavity**[Q] • **Foreign body**[Q] in the fistula tract • **Fistula tract <2.5 cm** long[Q] • **Epithelialization** of fistula tract[Q]

66. Ans. d. Track length >3 cm **67. Ans. a. Tract <1 cm** **68. Ans. c. >2 cm fistulous tract**

Enterocutaneous Fistula

- Enterocutaneous fistulas are **most commonly iatrogenic**, usually the result of a **surgical misadventure**[Q]

Surgical misadventure leading to Enterocutaneous fistula

- **Anastomotic leakage**[Q]
- **Injury of** the **bowel** or **blood supply**[Q]
- **Laceration** of the **bowel** by **wire mesh** or **retention suture**[Q]

Etiology of Enterocutaneous fistula	
• **Iatrogenic (MC)**[Q] • **Erosion** by **suction catheters adjacent abscesses,** or **trauma**[Q] • **Previous radiation therapy**[Q] • **Intestinal obstruction**[Q]	• Inflammatory bowel disease • Mesenteric vascular disease • Intra-abdominal sepsis • **Crohn's disease**[Q] leading to spontaneous fistula in 2% cases

Clinical Features

Typical clinical presentation
• **Typical clinical presentation** is that of a **febrile, postoperative patient** with an **erythematous wound**[Q]. • When a **few skin sutures** are **removed,** a **purulent** or **bloody discharge** is **noted; leakage of enteric contents** then occurs, sometimes immediately, but **often within 1 or 2 days**[Q].

- If the **diagnosis** is **in doubt**, **confirmation** can be obtained by **oral administration** of a **nonabsorbable marker**, such as **charcoal** or **Congo red**, or by **injection of water-soluble contrast medium** into the fistula[Q].

> - In general, the **more proximal the fistula** in the intestine, the **more serious the problem**, with **greater fluid** and **electrolyte loss**[Q].
> - The **drainage** has a **greater digestive capacity**, and the **distal segment** is **not available** for **absorption** of **nutrients**[Q].

Diagnosis

- **Fistulogram**[Q] to determine:
  - **Presence** and **extent of** any **abscess cavities**
  - **Length of the tract**
  - **Extent** of **bowel wall disruption**
  - **Location** of the fistula
  - Whether a **distal obstruction** is present
- **CT** is helpful in determining whether **underlying collections** of **fluid** or **pus** are present.

Treatment

- Successful management requires establishment of **controlled drainage**, usually using a **sump suction apparatus**; **management of sepsis**; **prevention of fluid** and **electrolyte depletion**; **protection of the skin**; and **provision of adequate nutrition**[Q].
- When **sepsis** has been **controlled** and **nutritional therapy** has been instituted, a course of **conservative management**[Q] should be followed.

> - **Most of these fistulas heal spontaneously** within **4-6 weeks** of **conservative management**[Q]. If closure is not accomplished after this time, surgery is indicated.

- This **period of conservative management** not only allows those **fistulas to heal spontaneously** but also **allows for optimization of nutritional status** and **control of the wound** and **fistula sites**[Q].
- Also, a **reasonable delay permits** the **peritoneal reaction** and **inflammation to subside**, thus **making** a **second operation easier** and **safer**[Q].

> - **Preferred operation**: **Fistula tract excision** and **segmental resection** of the **involved segment of intestine** and **reanastomosis**[Q].

- **Simple closure** of the fistula after removing the fistula tract **almost always results in** a **recurrence** of the fistula.
- If an **unexpected abscess** is encountered or if the **bowel wall is rigid** and **distended** over a **long distance**, thus making primary anastomosis unsafe, **exteriorization of both ends** of the **intestine** should be accomplished.

Complications

- **Sepsis**, **fluid** and **electrolyte depletion**, **necrosis** of the **skin** at the site of external drainage, and **malnutrition**[Q].
- **Mortality rates** for patients with enterocutaneous fistulas remain high (**15-20%**)

69. Ans. b. Duodenal

- In general, the **more proximal the fistula** in the intestine, the **more serious the problem**, with **greater fluid** and **electrolyte loss**[Q].
- The **drainage** has a **greater digestive capacity**, and the **distal segment** is **not available** for **absorption** of **nutrients**[Q].

INTESTINAL ATRESIA AND DUPLICATION

70. Ans. a. Intestinal atresia *(Ref: Sabiston 19/e p1841-1843; Schwartz 10/e p1615-1616, 9/e p1427; Bailey 25/e p84-85; Shackelford 7/e p1049-1051)*

Intestinal Atresia

- **MC site** of **intestinal atresia: Duodenum**[Q]
- **MC cause** of **neonatal intestinal obstruction: Duodenal atresia**[Q]

Jejunoileal Atresia

- **Atresia** and**stenosis** are among the **MC causes** of **neonatal intestinal obstruction**[Q].
- Incidence of jejunoileal atresia is **1** in **300 to 1500**[Q] live births.
- **Gender ratio** is **equal.**
- **Jejunal atresia** is slightly **more common** than ileal atresia.
- In **80-90%** of cases the atresia is **isolated**. However, in up to **20%** of cases **atresias are multiple**.

> - **Cystic fibrosis** is an important comorbid condition with **reported incidence** is **10-20%. White infants** with **jejunoileal atresia** have **more than 210 times** the **risk for cystic fibrosis**[Q].

Clinical Features

- Infants with atresia or stenosis usually have **bilious vomiting** on the **first day of life**.
- The **higher the obstruction**, the **earlier the vomiting**.
- **Abdominal distention** is more pronounced with **distal obstruction**.
- More than 60% of these **infants fail** to **pass meconium** in the **first day** of life, may have **grayish mucoid contents** in the rectal vault[Q].

Diagnosis

- Can be diagnosed by **prenatal ultrasonography**[Q].
- Associated with **maternal polyhydramnios**[Q]
- **Abdominal radiographs** show **gas-** and **fluid-filled bowel loops** with **absence of gas distally**[Q]**.**

Treatment

- Management includes **intravenous fluid**, **decompression** of the stomach, withholding of enteral feeding, and **antibiotics**.
- **After resuscitation** the infant is taken to the operating room for **exploratory laparotomy**.
- The goals of the operation are to **restore intestinal continuity after resection** of the **atretic segment** while preserving intestinal length.

Prognosis

- The prognosis in these patients is **excellent**, with **survival rates of 90%**[Q]**.**
- Risk of **adhesive bowel obstruction** and **necrotizing enterocolitis** (NEC)[Q]
- Extensive resection of the bowel can lead to **short-bowel syndrome**.

71. Ans. c. Ileum *(Ref: Shackelford 7/e p1051-1053)*

Small Intestinal Duplication

- Intestinal duplications are **mucosa-lined structures** that are **in continuity** with the GI tract.
- **MC site of duplication: Ileum** (within the **leaves of the mesentery**)[Q]
- Located **along mesenteric border,** contain **all** the **three layers** of **bowel**[Q]
- **Share a common wall** and **blood supply** with **adjacent bowel**[Q]

Types of Small Intestinal Duplication	
Cystic	**Tubular**
• **More common (75%)**[Q] • **Do not have communication** with **the lumen**[Q] of the normal small intestine • Manifested as **partial small bowel obstruction**[Q]	• Less common (25%) • Parallel to the **normal bowel lumen**[Q] • **Higher incidence of communication**[Q] with the existing lumen of the small intestine • Significant incidence of **ectopic gastric mucosa**[Q]**.** • **Bleeding**[Q] is a common manifestation

Clinical Features

- **Recurrent abdominal pain**, emesis from **intestinal obstruction**, and **hematochezia**[Q].
- **Bleeding** from **ulceration in the duplication** or in the **adjacent intestine** if the duplication contains **ectopic gastric mucosa**[Q].

Diagnosis

- **CT**, ultrasonography, and **technetium pertechnetate** scanning can be very helpful.
- **USG:** Classical **triple layer effect**[Q]

Treatment

- **Short duplications: Resection** of the cyst and adjacent intestine with **end-to-end anastomosis**[Q]
- **Long duplications**:
  - **Multiple enterotomies** and **mucosal stripping**[Q] in the duplicated segment, which will allow the walls to collapse and become adherent.
  - **Divide the common wall** using a **linear cutting stapler**[Q] to form a common lumen.
- **Excellent prognosis** in duplications who undergo **complete excision**[Q] without compromise of the length of remaining intestine

72. **Ans. b. Intestinal atresia**

73. **Ans. a. Spherical type is MC, b. Tubular type is attached longitudinally with bowel**

74. **Ans. a. Duodenum**

75. **Ans. d. Duodenoduodenostomy**

76. **Ans. c. Type 3** *(Ref: Sabiston 19/e p1842; Shackelford 7/e p1050)*

Classification of Intestinal Atresia	
Type **I**	**Membranous atresia** with **intact bowel** and **mesentery**
Type **II**	**Blind ends** separated by a **fibrous cord**
Type **IIIa**	**Blind ends** separated by a **V-shaped mesenteric defect**
Type **IIIb**	**Apple peel** atresia[Q] or **Christmas tree**[Q] atresia
Type **IV**	**Multiple atresias (string of sausages)**[Q]

NEOPLASMS OF SMALL INTESTINE

77. **Ans. a. Lymphoma** *(Ref: Sabiston 19/e p1257-1264; Schwartz 9/e p999-1001; Bailey 26/e p1159-1160, 25/e p1175-1177; Shackelford 7/e p771)*

Small-Bowel Neoplasm

- **MC tumor** of **small bowel**: **Leiomyoma**[Q] **>Adenoma**[Q]
- **MC tumor** of **small bowel in children**: **Lymphoma**[Q]
- **MC malignant tumor** of **small bowel**: **Carcinoid >Adenocarcinoma**[Q]
- **MC site** of small bowel **malignancy, carcinoids, lymphoma: Ileum**[Q]

78. **Ans. b. Most common site is ileum** *(Ref: Sabiston 19/e p1257-1264; Schwartz 9/e p999-1001; Shackelford 7/e p771)*

- **Duodenum** is **MC site of Atresia** and **Adenocarcinoma**[Q].
- **Jejunum** is **MC site** of (**PIA**): **P**neumatosis **I**ntestinalis, **A**ngiodysplasia[Q]
- **Ileum** is **MC site** of (**DAL-3**): **D**uplication, **A**denoma (tubular), **L**ipoma, **L**ymphoma, **L**eiomyoma[Q].

79. **Ans. b. Carcinoid tumors**

80. **Ans. a. Leiomyoma** *(Ref: Shackelford 7/e p771)*

Benign Tumors of the Small Intestine	
Type of Lesion	**%**
Leiomyomas[Q]	**25–50**
Adenomas[Q]	**11–35**
Lipomas	**15–25**
Hemangiomas	7–10
Neurogenic tumors (GIST)	<5–10

81. **Ans. d. Palliative surgeries are done even in presence of metastasis** *(Ref: Sabiston 19/e p1258-1264; Schwartz 9/e p999-1001; Bailey 26/e p1159-1160, 25/e p1175-1177; Shackelford 7/e p778-780)*

Small Bowel Malignancies

- **MC malignant neoplasms** of the **small bowel: Carcinoid tumors**[Q] **>adenocarcinomas** >malignant GISTs >lymphomas.
- **Adenocarcinomas** are **more numerous** in the **proximal small bowel**, whereas the **other malignant lesions** are **more common** in the **distal intestine (ileum)**[Q].

Clinical Features

- In contrast to benign lesions, malignant neoplasms **almost always produce symptoms**[Q]
  - **MC symptom: Abdominal pain >weight loss**[Q]
- **Obstruction** develops in **15-35%** of patients and, in contrast to the intussusception produced by benign lesions, is usually the **result of tumor infiltration** and **adhesions.**
- **Diarrhea** with tenesmus and **passage of large amounts** of **mucus** may occur.
- Adenocarcinomas may produce the typical constricting apple-core lesions similar to those observed in the colon.
  - **Gastrointestinal bleeding** is **more common with leiomyosarcomas**[Q]**.**
- A **palpable mass** may be felt in **10-20%** of patients, and **perforations** develop in about **10%,** usually secondary to lymphomas and sarcomas.

Diagnosis

- Barium meal follow through (**BMFT**): **Accurate diagnosis** in **50–70%** of patients with malignant neoplasms of the small intestine
- **Enteroclysis (small bowel enema): Diagnostic accuracy** of about **90%**[Q]

Treatment

- **Wide resection** including **regional lymph nodes**[Q].
  - Often, **surgical resection for cure** is **not possible**. Therefore, **palliative resection should be performed to prevent** further complications of **bleeding, obstruction**, and **perforation**[Q]**.**
- **Adjuvant radiation** and **chemotherapy** have **little role** in the treatment of patients with adenocarcinomas of the small bowel.

Prognosis

- **Only half** of the patients operated on for malignant tumors of the small intestine **have lesions amenable to curative resection.**
- **One third** have a **distant metastasis** at the time of initial surgery
- Overall **5-year survival rate after surgical treatment** of malignant tumors is only **25%**
- **Adenocarcinoma** has the **poorest prognosis**, with an overall **survival rate** of **15-20%.**
  - **Obstruction** in **CA small bowel** develops in **15-35%** of patients, due to **tumor infiltration** and **adhesions**[Q]**.**
  - **Obstruction** in **benign lesions** is due to **intussusceptions**[Q]**.**

82. Ans. a. Ba meal follow through, d. CT scan with contrast

83. Ans. b. Arises from periampullary region, c. Jaundice and anemia found, e. Surgery is only curative

84. Ans. b. Primary small-intestinal lymphomas are most commonly located in the ileum, c. Lymphoma is most common primary malignant neoplasm of Spleen, d. Stomach is most common site for extranodal lymphoma and e. MALT lymphoma is associated with H. pylori infection *(Ref: Robbins 7/e p868-869, 826; Harrison 17/e p767, 775; Sabiston 19/e p1263-1264, 18/e p1507)*

Gastrointestinal Lymphoma

- Any segment of the gastrointestinal tract may be secondarily involved by systemic dissemination of non-Hodgkin lymphomas.
- However, **up to 40%** of **lymphomas arise** in sites **other than lymph nodes**, and the **gut is the most common location**[Q]**.**
  - **Intestinal lymphoma** involves the **ileum (MC)**[Q], jejunum, and duodenum, in decreasing frequency, a pattern that mirrors the **relative amount of normal lymphoid cells** in these anatomic areas.
- **Primary GI lymphomas** usually arise as **sporadic neoplasms**[Q]
- Intestinal tract lymphomas can be classified into **B-Cell** and **T-Cell lymphomas**[Q].
- **Intestinal T-cell lymphoma** is usually **associated with** a **long-standing malabsorption syndrome** (such as **celiac disease**)[Q].
- **MC splenic neoplasm** is **NHL**[Q]**.**
- **Stomach** is the **MC site for extranodal lymphoma**[Q].

Primary GI lymphomas occur more frequently in	
• **Chronic gastritis** caused by **H. pylori**[Q]	• Congenital **immunodeficiency states**[Q]
• **Chronic sprue**[Q] like syndromes	• **HIV infection**[Q]
• Natives of the **Mediterranean region**[Q]	• Following **organ transplantation** with **immunosuppression**[Q]

Pathology

- **All the gut lymphoid tissue** is **mucosal** and **submucosal, early lesions** appear as **plaque-like expansions** of the mucosa and submucosa.
- **Diffusely infiltrating lesions** may produce **full-thickness mural thickening**, with effacement of the overlying mucosal folds and **focal ulceration**.
- **Diffuse infiltrating** type is **more common than polypoidal**[Q].

85. Ans. b. Melanoma *(Ref: Sabiston 19/e p1264)*

- **Cutaneous melanoma**[Q] is the **MC extra-abdominal source** to **involve the small intestine**; others include adenocarcinoma of the **breast** and **carcinoma** of the **lung.**

86. Ans. d. Causes malabsorption

CARCINOID TUMORS

87. Ans. a. Small bowel is the least common site *(Ref: Sabiston 19/e p1258-1262; Schwartz 9/e p999-1001; Bailey 26/e p1160, 25/e p1176-1177; Shackelford 7/e p1021-1023; Harrison 18/e p3060-3064)*

Carcinoid Tumors

- **Distribution (BIRACS)**[Q]: **B**ronchus> **I**leum > **R**ectum > **A**ppendix > **C**olon > **S**tomach
- Arise from **enterochromaffin cells**[Q] at the **base** of the **crypts of Lieberkuhn** in the GI tract.

Foregut carcinoids	**Mostly argyrophilic**[Q] (silver staining only with the addition of a reducing agent)
Midgut carcinoids	**Argentaffinic**[Q] (silver staining)
Hindgut carcinoids	**Mixed (60-70% argyrophilic and 8-16% argentaffinic)**[Q]

- **MC foregut location** for carcinoid tumors: **Stomach**[Q]
- **Colonic carcinoids** occur more commonly on the **right side**, in the **ascending** or **proximal transverse colon**[Q].
- **Small bowel carcinoids** are **multiple** in **25%** of cases[Q].
- **Appendiceal carcinoids** are **typically solitary** lesion[Q].

- **Highest percentage** of **non-localized disease (PCS): Pancreatic**[Q] (91%) >colonic (77%) >**small intestinal carcinoid tumors** (75%)
- Highest percentage **localized disease (LOAR)**[Q]**: Laryngeal carcinoid tumors** (100%) **>Ovary, appendix >rectum**

Pathology

- GIT carcinoids produce a variety of peptide hormones, the **most common** is **serotonin**[Q].
- **Foregut carcinoids** produce **low levels of serotonin**[Q] (5-hydroxytryptamine) but may secrete 5-hydroxytryptophan or adrenocorticotrophic hormone.
- **Hindgut carcinoids rarely produce serotonin**[Q] but may produce other hormones such as somatostatin and peptide YY.
- **Gastric carcinoid** patients are **deficient** in the **enzyme dopa-decarboxylase**, the enzyme responsible for **conversion** of **5-hydroxytryptophan** to **serotonin** (5-hydroxy tryptamine).

Malignant potential in Carcinoids depends on	
• Location[Q]	• Depth of invasion[Q]
• Size[Q]	• Growth pattern[Q]

- In small bowel carcinoid (**SBC**), frequent **coexistence** of a **second primary malignant neoplasm** of a **different histological type**, this usually is a **synchronous adenocarcinoma**, most commonly in the **colon** and **breast**[Q].
- **Associated with MEN-I** in **10%** of cases[Q].

Clinical Features

- **MC symptom** of **SBC**: **Intermittent intestinal obstruction**[Q]

Malignant Carcinoid Syndrome

- Occur in fewer than **10%** of patients with carcinoid tumors.
- **Midgut carcinoids** are the **MC source**[Q] of carcinoid syndrome.
- Attacks may be spontaneous or precipitated by **stress, alcohol,** a **large meal** or **sexual intercourse**.
- Common symptoms and signs include **cutaneous flush** (**80%**)[Q]; **diarrhea** (76%); **hepatomegaly** (71%); **cardiac lesions** (70%); **asthma** (25%).

- **Bright-red patchy flushing** which is **typically seen with gastric carcinoids**[Q]

- The **diarrhea** is directly **related to serum serotonin level** (serotonin stimulates secretin release), **episodic** usually occurring **after meals**, **watery** and often **explosive**; and serotonin antagonist **methylsergide** effectively **controls** the symptoms (**Ondansetron** is particularly **effective in** treating **diarrhea** apparently through the **restoration of normal colonic motility**)Q.
- **MC cardiac lesions**: **Tricuspid insufficiency (TR), pulmonary stenosis (PS), tricuspid stenosis. (TR>PS>PR>TS)**Q

Atypical or Variant Carcinoid Syndrome

- Occur in patients with **gastric carcinoid tumors**Q.
- These patients experience **cutaneous flushes** that are **patchy** and **highly pruritic**.
- **Diarrhea, bronchospasm**, and **cardiac lesions** are **rare.**
- The syndrome is due to large release of **histamine** from the tumor rather than serotonin.

Diagnosis

- Elevated urinary levels of **5-HIAA**Q (5-hydroxyindoleacetic acid) measured **over 24 hours** with high-performance liquid chromatography are **highly specific**Q**.**

- Plasma concentration of **chromogranin A** is **100% specific**Q

- Provocative tests using **pentagastrin**, **calcium**, or **epinephrine** are used to reproduce the symptoms of carcinoid tumors. The administration of **pentagastrin** is the **safest** and **most reliable** and the **most frequently used**Q.
- Radiographic imaging is difficult because of the **small size** of **most tumors** and their common **submucosal location**Q.
- The submucosal location lends to **more accurate localization with contrast studies** especially **enteroclysis**Q, than with conventional sectional imaging such as CT scan.

- **Initial imaging procedure** to **localize** and **stage** the carcinoid tumors: **SRS**Q

Treatment

Surgery

- Carcinoid tumors of the **jejunum** and **ileum: segmental resection** and **en-bloc lymphadenectomy**Q.
- **Resection** of the primary tumor **regardless of metastasis**, to avoid complications from growth of the primary tumor in terms of **bleeding, obstruction** and **abdominal pain** especially with **midgut carcinoids** because of their propensity to cause **intense fibrosing reaction**Q**.**

Medical therapy

- It includes chemotherapy and biological agents such as **somatostatin analogs** and **interferon alpha**Q.
- **Chemotherapy: Dacarbazine, epirubicin** and **5-FU (DEF)**Q**.**
- Carcinoid tumors express **all five subtypes** of somatostatin receptors with **predominance** of receptor subtypes **2** and **5**; receptor subtypes **1** and **3** mediate **anti-tumor effect**Q.
- **Octreotide** administration leads to reduction of symptoms, including flushing and diarrhea.
- Newer treatment includes **In111-Octreotide** and **I124-labeled MIBG** (**metaiodobenzylguanide**)Q.

Targeted Radiotherapy

- **Smart bombs**Q- **Radiolabeled somatostatin analogues** that deliver radiation specifically to carcinoids cells. **Indium-111-labeled pentetreotide** demonstrate an enhanced tumor regression response.

Prognosis

- Carcinoid tumors have the **best prognosis** of **all small bowel tumors,** whether the disease is **localized** or **metastatic**Q**.**

- **Most useful prognostic marker** is an elevated level of **chromogranin A**Q**.**
- **Midgut carcinoid** has the **best prognosis**Q**.**

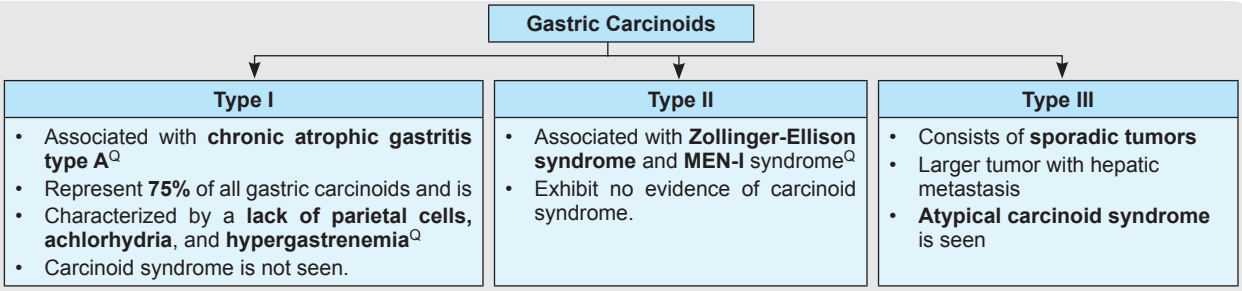
- **Female gender** and **younger age**Q is associated with **better prognosis**
- One of the main determinants of survival is the **presence of liver metastases**Q.

88. **Ans. b. Extensive involvement of small intestine is associated with higher probability of lung metastasis** *(Ref: Sabiston 19/e p1258-1262; Schwartz 9/e p999-1001; Bailey 26/e p1159-1160, 25/e p1176-1177; Shackelford 7/e p1021-1023)*

Extensive involvement of **small intestine by carcinoid tumor** is associated with **higher probability** of **liver (not the lung) metastasis.**

- **MC malignant tumor** of **small intestine**: **Carcinoid >Adenocarcinoma**Q.
- **Carcinoid tumors** have the **best prognosis** of **all small bowel tumors**, whether the disease is localized or metastatic.
- **Resection of a carcinoid tumor localized** to **its primary site** approaches a **100% survival rate**Q**.**
- **Five-year survival rates** are about **65%** among patients **with regional disease** and 25% to 35% among those with distant metastasis.
- **Appendiceal carcinoids** are **more common in females**Q**.**
- **Extensive involvement** of **small intestine** is associated with **higher probability** of **liver metastasis**Q

89. **Ans. c. PR**
90. **Ans. b. Constipatio**
91. **Ans. d. Rectum**
92. **Ans. d. Acute appendicitis**
93. **Ans. b. Rectum is spared**
94. **Ans. a. Associated with MEN-I, b. Serum chromogranin A is elevated, c. Urinary excretion of 5-HIAA in increased, e. Octreotide is used for treatment**
95. **Ans. a. Foregut carcinoid-↑serotonin in blood, d. Midgut carcinoid-normal urinary 5-HIAA**
96. **Ans. d. It is the most common malignancy of small intestine**



Carcinoid Tumors

- **Least malignant potential**: **Rectum** followed by **bronchus** and **lung**[Q].
- **Maximum malignant potential: Pancreatic** carcinoid followed by **small intestine**[Q].

97. **Ans. b. Lung**

SMALL INTESTINE TRANSPLANTATION

98. **Ans. d. Majority of intestinal grafts are multivisceral grafts** *(Ref: Sabiston 19/e p682-689; Schwartz 10/e p352-354, 9/e p1010; Bailey 26/e p1429-1430, 25/e p1427-1428; Shackelford 7/e p1008-1012)*

Small Intestinal Transplantation

- An **alternative to lifelong IV nutrition** is restoration of enteral absorptive function by intestinal replacement.

Three Varieties of Intestinal Transplantation

- **Small bowel** with or without a portion of the colon (**SI**)[Q]
- **Combined liver-small bowel grafts** (**LI**)[Q]
- **Multivisceral grafts** (MV)[Q]

- Nearly **equal numbers of SI** and **LI grafts** have been reported, whereas **only a few MV grafts** have been **performed** (~10% of the total).

- **MC indication** for **intestinal replacement**: **Inability to sustain successful TPN** because of **lack of IV access sites** or **severe complications** from **chronic TPN**, such as liver failure[Q].

- **Principal barrier** to **widespread application** of intestinal replacement: **Vigorous rejection response** elicited **by intestinal grafts** due to **large amount of gut-associated lymphoid tissue**[Q].
- A **uniquely dangerous consequence** of **intestinal transplant rejection** is **loss of the protective mucosal barrier** of the gut, consequent **bacterial translocation**, and **systemic sepsis** in an immunocompromised host[Q].

- **MC cause of death** after **small bowel transplantation** is **sepsis** and **multiorgan failure**[Q].
- Because the **intestine** is the **largest lymphoid organ** in the human body, an **intestinal graft** can **mount a formidable immune response** against the host, **GVHD**[Q].

MISCELLANEOUS

99. **Ans. a. Tricuspid valve endocarditis**
Shock, mesenteric artery thrombosis and volvulus can lead to gangrene of intestine.
100. **Ans. e. USG enteroclysis** *(Ref: Schwartz 10/e p1161,1163,1164, 9/e p1000, 1002, 1004; Shackelford 7/e p868, 884, 993)*

Enteroclysis (Small Bowel Enema)

- **Contrast** in injected directly through **Frekas tube directly into distal duodenum**, filling the small bowel loops[Q].
- The opacified small bowel loops can be **imaged** then **using X-rays** (Barium enteroclysis), **CT** (CT enteroclysis) or **MRI** (MRI enteroclysis).[Q]

Enteroclysis is Investigation of Choice in

- **Partial, intermittent small intestinal obstruction**[Q]
- **Small intestinal diverticula**[Q]
- **Crohn's disease**[Q]

101. Ans. a. Whipple's disease, b. Abetalipoproteinemia, d. Agammaglobulinemia *(Ref: Harrison 18/e p2468)*

Disease That Can Be Diagnosed by Small-Intestinal Mucosal Biopsies	
Lesions	**Pathologic Findings**
Diffuse, Specific	
• **Whipple's disease**[Q]	• **Lamina propria** contains **macrophages containing PAS +** material
• **Agammaglobulinemia**[Q]	• No plasma cells; either **normal or absent villi ("flat mucosa")**
• **Abetalipoproteinemia**[Q]	• Normal villi; **epithelial cells vacuolated with fat postprandially**
Patchy, Specific	
• Intestinal lymphoma	• Malignant cells in lamina propria and submucosa
• Intestinal lymphangiectasia	• Dilated lymphatics; clubbed villi
• Eosinophilic gastroenteritis	• Eosinophil infiltration of lamina propria and mucosa
• Amyloidosis	• Amyloid deposits
• Crohn's disease	• **Noncaseating granulomas**
• Infections	• Specific organisms
• Mastocytosis	• **Mast cell infiltration of lamina propria**
Diffuse, Nonspecific	
• Celiac disease	• **Short** or **absent villi;** mononuclear infiltrate; epithelial cell damage; hypertrophy of crypts
• Tropical sprue	• Similar to celiac disease
• Bacterial overgrowth	• Patchy damage to villi; lymphocyte infiltration
• Folate deficiency	• **Short villi; decreased mitosis in crypts; megalocytosis**
• Vitamin B_{12} deficiency	• Similar to folate deficiency
• Radiation enteritis	• Similar to folate deficiency
• Zollinger-Ellison syndrome	• **Mucosal ulceration** and **erosion** from acid
• Protein-calorie malnutrition	• **Villous atrophy; secondary ba cterial overgrowth**
• Drug-induced enteritis	• Variable histology

102. Ans. d. Ileum **103. Ans. d. All** **104. Ans. a. Omental bursa**

105. Ans. b. Associated with liver fibrosis *(Ref: www.emedicine_hlml/cocoon)*

Idiopathic Sclerosing Encapsulating Peritonitis (Abdominal cocoon)

- **Least malignant potential**: **Rectum** followed by **bronchus** and **lung**[Q].
- **Maximum malignant potential: Pancreatic** carcinoid followed by **small intestine**[Q].
- It is a rare condition of **unknown cause** in which **intestinal obstruction** results from the **encasement of variable lengths** of **bowel** by a **dense fibrocollagenous membrane** that gives the **appearance of a cocoon**[Q].

Causes of Secondary cocoon	
• **Previous abdominal surgery or peritonitis**[Q]	• Use of **providone iodine** for abdominal wash out
• Chronic ambulatory peritoneal dialysis **(CAPD)**[Q]	• Placement of **Lee Veen shunt** for **refractory ascites**[Q]
• **Prolonged use** of **beta-blocker** propranolol[Q]	• **SLE**[Q]

Clinical Features

- Occurrence of **intestinal obstruction** in a relatively **young girl without** an **obvious cause**[Q]
- **History of similar episodes** that **resolved spontaneously**[Q]
- **Abdominal pain** and **vomiting**[Q]
- Presence of a **non tender soft mass** on abdominal palpation
- Features of **increasing abdominal distension**, **jaundice** and features suggestive of liver pathology

Diagnosis

- **Barium meal follow through**: **Serpentine configuration** of **dilated small bowel**[Q]
- **CT** scan is helpful

Treatment

- Laparotomy with **removal of the membrane**, after which recovery is usually complete.

106. Ans. b. Jejunum *(Ref: Ganong 23rd/2341)*

- **Maximum water absorption** from **GIT** occurs in **jejunum**[Q] (5500 ml) **>Ileum** (2000 ml) **>Colon** (1300 ml).

SMALL INTESTINE (ANATOMY AND PHYSIOLOGY)

- **Duodenum: 20 cm**; **Jejunum: 100 cm**; **Ileum: 150 cm**[Q]
- **Largest endocrine organ** of the body: **Small bowel**[Q]
- **Strongest component** of small intestine: **Submucosa**[Q] (used for manufacturing **catgut sutures**)
- **Pacemaker** of **small bowel** is located in: **Duodenum**[Q]
- Proximal bowel (**jejunum**) **absorbs: Calcium, iron, folate** and **fats**[Q]
- Distal bowel (**ileum**) **absorbs**: **Bile salts, vitamin B12**[Q]

107. Ans. d. Distal part of duodenum has a cap *(Ref: BDC 4th/vol II/251)*

The first part of duodenum has duodenal cap or bulb, not the distal part.

SMALL INTESTINE RADIOGRAPHY

- The **first part of duodenum** is visible as a **triangular shadow** on barium studies known as **duodenal cap**[Q].
- The **small intestine** contains **mucosal folds** known as **plicae ciculares** or **valvulae conniventes**[Q] that are visible o barium studies and help in the distinction between small intestine and colon.
- **Colon** can be identified by the presence of **haustrations**[Q].
- **Valvulae conniventes** are **more prominent** in **jejunum** giving the **'feathery'**[Q] **appearance** on barium. These **mucosal folds** are **gradually reduced distally** giving **'featureless' appearance** of distal **ileum**[Q].

108. Ans. a. Uterus, b. Left colon, c. Urinary bladder *(Ref: BDC 4th/vol II/221)*

PAIN IN HYPOGASTRIUM AND PELVIS

- Common causes of pain in this area include **rectal disease** (rectal cancer, proctitis), **bladder diseases** (stones, cystitis, carcinoma), and **uterus** (salpingo-oophoritis, uterine cancer) in females.

109. Ans. c. 6 weeks *(Ref: Bailey 25/e p1288)*

- **Spontaneous obliteration** of **omphalomesenteric** or **vitallointestinal duct** occurs **before** the **6th week** of **intrauterine life**[Q].

110. Ans. a. Malabsorption *(Ref: Harrison 18/e p944)*

IMMUNOPROLIFERATIVE SMALL-INTESTINAL DISEASE (IPSID)

- **IPSID** is recognized as an **infectious pathogen–associated human lymphoma** that has **association with Campylobacter jejuni**[Q].
- It **involves mainly** the **proximal small intestine** resulting in **malabsorption, diarrhea**, and **abdominal pain**[Q].
- IPSID is associated with **excessive plasma cell differentiation** and **produces truncated alpha heavy chain proteins lacking the light chains** as well as the **first constant domain**[Q].

Treatment

- **Early-stage IPSID** responds to **antibiotics** (**30–70% complete remission**)[Q].
- **Most untreated IPSID** patients progress to **lymphoplasmacytic** and **immunoblastic lymphoma**[Q].
- **Patients not responding to antibiotic therapy** are considered for treatment with **combination chemotherapy** used to treat low-grade lymphoma[Q].

CHAPTER 14

Large Intestine

MULTIPLE CHOICE QUESTIONS

HIRSCHSPRUNG'S DISEASE

1. True about Hirschprung's disease: *(PGI May 2010, Dec 2008)*
a. Aganglionic segment is contracted not dilated
b. Descending colon is most common site of aganglionosis
c. Barium enema is diagnostic
d. It is seen in infants and children only
e. Barium enema show calcification

2. Duhamel's operation is done for: *(MHSSMCET 2005)*
a. Hirschsprung's disease b. Meconium ileus
c. Annular pancreas d. Imperforate anus

3. Hirschprung's disease is best diagnosed by: *(All India 2012, AIIMS GIS Dec 2011)*
a. Rectal biopsy b. Anal manometry
c. CT d. MRI

4. Not true regarding Hirschsprung's disease is:
a. Autosomal dominant *(AIIMS Nov 97)*
b. Absent ganglionic cells in myenteric plexus
c. Absent ganglionic cell in submucous plexus
d. Rectal biopsy is diagnostic

5. Aganglionic segment is encountered in which part of colon in case of Hirschsprung's disease? *(AIIMS Nov 99)*
a. Distal to dilated segment
b. In whole colon
c. Proximal to dilated segment
d. In dilated segment

6. Hirschsprung's disease involves which region of intestine? *(MCI March 2008)*
a. Colon b. Rectum
c. Rectosigmoid part d. Terminal ileum

7. Treatment of choice in a child with short segment Hirschsprung's disease with minimal symptoms:
a. Conservative treatment b. Extended myectomy
c. Swenson operation d. Duhamel's operation

8. Hirschprung's disease: *(PGI June 2002)*
a. Is seen in infants and children only
b. Absence of ganglia in involved segment
c. The involved segment is the dilated colon
d. Bleeding PR is a presenting feature
e. Surgery is used in therapy

9. True about Hirschsprung's disease: *(PGI June 2001)*
a. Pathology of myenteric plexus of Auerbach
b. Blood in stools
c. May involve small intestine rarely
d. Involved segment of intestine is dilated
e. Present only in infant and children

10. Investigation of choice in Hirschsprung's disease is: *(AIIMS Nov 2005, DNB 2005, 2000, PGI Dec 98)*
a. Rectal manometry b. Rectal examination
c. Rectal biopsy d. Ba enema

11. True statements about congenital megacolon include all of the following except: *(All India 97)*
a. Dilatation and hypertrophy of pelvic colon
b. Loud borborygmi
c. Symptoms appear within 3 days following birth
d. Large stool

12. Hirschprung's disease true are: *(PGI June 2006)*
a. Sometimes found in adult
b. Dilated segment involved
c. Auerbach's plexus absent
d. Sometimes involve small intestine
e. Bleeding PR is usual presentation

13. In Hirschprung's disease, aganglionic segment is: *(DNB 2010)*
a. Normal or dilated b. Normal or contracted
c. Dilated or contracted d. Always dilated

14. Fecal soiling in children is most commonly due to: *(PGI June 99)*
a. Hirschsprung's disease b. Chronic constipation
c. Rectal atresia d. None of the above

15. Absence of ganglion in myenteric plexus is seen in:
a. Crohn's disease *(PGI June 97)*
b. Ulcerative colitis
c. Hirschprung's disease
d. Intussusception

16. A newborn presented with bloated abdomen shortly after birth with passing of less meconium. A full thickness biopsy of the rectum was carried out. Which one of the following rectal biopsy findings is most likely to be present? *(All India 2005)*
a. Fibrosis of submucosa
b. Hyalinisation of the muscular coat
c. Thickened muscularis propria
d. Lack of ganglion cells

17. Following procedures (except one) are done for correction of Hirschprung's disease: *(JIPMER 81, AIIMS 87)*
a. Duhamel's b. Soave's
c. Swenson's d. Bayar's

18. The operative treatment in Hirschsprung's disease is only undertaken when child: *(PGI 79, TN 89)*
a. Is 2 years of age
b. Is a least 8 kg in weight and thriving
c. Has no distension of abdomen
d. Has failed to respond to conservative treatment

19. When rectal washouts are given to Hirschsprung's disease, the following fluid is used: *(Karnataka 95)*
a. 5% dextrose b. Normal saline
c. Soap solution d. Tap water

20. All are features of congenital megacolon except: *(All India 97)*
a. Large bulky stools b. Tight anal ring
c. Pseudodiarrhoea d. Failure to thrive

21. Hirschprung's disease is treated by: *(APPG 98)*
a. Colostomy
b. Excision of aganglinonic segment
c. Colectomy
d. Sodium chloride wash

22. A 3 years old male child presents with history of constipation and abdominal distension for the last two years. The plain radiograph of abdomen reveals fecal matter containing distended bowel loops. A barium enema study done subsequently shows a transition zone at the recto-sigmoid junction with reversal of recto-sigmoid ratio. The most probable diagnosis is: *(AIIMS Nov 2003)*
a. Anal atresia
b. Malrotation of the gut
c. Hirschsprung's disease
d. Congenital megacolon

COLONIC DIVERTICULA

23. Acquired diverticula are most commonly in seen in: *(MHSSMCET 2007)*
a. Jejunum/ileum
b. Transverse colon
c. Sigmoid colon
d. Ascending colon

24. True about diverticulitis: *(PGI June 2009)*
a. Occur at any age
b. Often incidental finding at operation
c. Young patient has more aggressive disease
d. Left sided colon involvement is more common
e. Operation is not done for all patients

25. True regarding colovesical fistula is: *(JIPMER 2013)*
a. Commonly presents with pneumaturia
b. Barium enema is diagnostic
c. Common in Females
d. May be a surgical complication

26. Most common fistula in diverticulosis of colon" *(MHSSMCET 2010, 2006)*
a. Colocutaneous
b. Colovaginal
c. Vesicovaginal
d. Colovesical

27. A 40 years old male patient presented with mild abdominal pain, mild constipation with a feeling of incomplete evacuation and mucus in stools for the past four years. On examination, tenderness is presenting left iliac fossa. The most likely diagnosis is: *(AIIMS May 2012)*
a. Ulcerative colitis
b. Diverticular disease of colon
c. Irritable bowel syndrome
d. Carcinoma colon

28. Colonic diverticulosis is best diagnosed by: *(AIIMS May 2007)*
a. Colonoscopy
b. Nuclear scan
c. Barium enema
d. CT scan

29. Correct about diverticulosis is: *(PGI June 98)*
a. Arise from diverticula of colon
b. Common in ileum
c. Protrusion of mucosa through muscular layers at point of blood vessel
d. All of the above

30. Massive colonic bleeding in a patient of diverticulosis is from: *(All India 2000)*
a. Inferior mesenteric artery
b. Superior mesenteric artery
c. Celiac artery
d. Gastro-duodenal artery

31. In acute diverticulitis of the colon, the sigmoidoscopic finding is: *(Kerala 87)*
a. Mucosa is inflamed
b. Minute diverticuli seen
c. Saw toothed appearance
d. Sigmoidoscope cannot be passed beyond 15 cm

32. Internal fistulas with colonic diverticulitis are most often:
a. Colovesical
b. Coloenteric *(PGI 81, 89)*
c. Colocolonic
d. Colovaginal
e. Coloureteral

33. Diverticular disease is not common in: *(Karnataka 94)*
a. Colon
b. Jejunum
c. Duodenum
d. Stomach

34. Which of the following about acute diverticulitis is incorrect? *(DPG 2009 March)*
a. Sigmoid is the commonest site
b. Peri-colic abscess can occur
c. Fistulization is an emergency
d. Conservative treatment may be successful in severe attack

35. The most common site of bleeding diverticula is: *(DPG 2008)*
a. Sigmoid colon
b. Descending colon
c. Rectum
d. Ascending colon

36. The term "Left sided appendicitis" as popularly called is nothing but:
a. Diverticulitis
b. Ascending colitis
c. Descending colitis
d. Typhilitis

37. A obese old patient with diverticular disease if presents with perforation, what will the treatment of choice?
a. Primary resection and anastomosis *(MHSSMCET 2005)*
b. Hartman's procedure
c. Conservative approach
d. Left Hemicolectomy

COLORECTAL POLYPS

38. According to Hagitt's classification, a polyp invading neck in between head and stalk is level:
a. 1
b. 2
c. 3
d. 4

39. All are predisposing factor for colorectal carcinoma except: *(AIIMS GIS 2003)*
a. Turcot's syndrome
b. Muir-Torre syndrome
c. Cowden's syndrome
d. Juvenile polyposis coli

40. Intestinal polyps that can potentially grow into cancer: *(DNB 2005, 2001, MHPGMCET 2007)*
a. Adenomatous polyp
b. Hyperplastic polyp
c. Juvenile polyp
d. Hamartomatous polyp

41. Cowden's disease is characterized by the following except:
a. Fibrocystic disease of breast and breast cancer
b. Facial trichilemmomas *(MHPGMCET 2007)*
c. Potentially malignant intestinal polyps
d. Acral keratosis

42. Not associated with GI malignancy: *(GB Pant 2011)*
a. Cowden's syndrome
b. Peutz-Jegher's syndrome
c. Juvenile polyposis
d. Gardner's syndrome

43. All are true about risk factor for malignancy in polyp except:
a. Pedunculated polyp
b. > 2 cm *(GB Pant 2011)*
c. Villous polyp
d. Cellular atypia

44. Carcinoma of the colon develops in all patients with:
a. Juvenile polyposis *(COMEDK 2005)*
b. Hamartomatous polyps
c. Inflammatory polyps
d. Familial adenomatous polyposis

45. Diagnosis of colonic polyps is best done radiologically using: *(COMEDK 2010)*
a. Barium meal series
b. Double-contrast barium enema
c. Instant enema
d. Water-soluble contrast enema

46. Which polyp has maximum malignant potential? *(AIIMS June 93)*
a. Sessile
b. Pendunculated
c. Superficial spreading
d. Any of the above

47. Incidence of malignancy is maximum in: *(AIIMS Feb 97)*
a. Villous adenoma
b. Juvenile polyps
c. Hyperplastic polyps
d. Tubular adenoma

48. All the following statements regarding malignant potential of colorectal polyps are true except: *(AIIMS Nov 2002)*
a. Polyps of the familial polyposis coli could invariably undergo malignant change
b. Pseudopolyps of ulcerative colitis has high risk of malignancy
c. Villous adenoma is associated with high risk of malignancy
d. Juvenile polyps have little or no risk

49. True about neoplastic colorectal polyps: *(PGI June 2003)*
a. Sessile polyps > 1 cm is malignant
b. MC site is colon and rectum
c. Adenomatous polyp is premalignant
d. Tubular adenoma is malignant
e. Pseudpolyps are premalignant

50. Which of the following polyps is not premalignant?
a. Juvenile polyposis syndrome *(PGI June 2003)*
b. Peutz-Jegher's syndrome
c. Ulcerative colitis
d. Familial polyposis coli
e. Cronkhite Canada syndrome

51. All of the following are pre-malignant except:
a. Crohn's disease *(AIIMS November 2014)*
b. Ulcerative colitis
c. Peutz-Jegher's syndrome
d. Barrett's esophagus

52. Following are premalignant except: *(PGI June 98)*
a. Tubulovillous adenoma
b. Hyperplastic polyp
c. Familial adenomatosis
d. Villous adenoma

53. Which of the following colonic polyps is not premalignant?
a. Juvenile polyps *(All India 2006, AIIMS Nov 2006)*
b. Hamartomatous polyps associated with Peutz-Jegher's syndrome
c. Villous adenoma
d. Tubular adenomas

54. All the following polyps are premalignant except:
a. Juvenile polyposis syndrome *(All India 2007)*
b. Familial polyposis syndrome
c. Juvenile polyp
d. Peutz-Jegher's syndrome

55. In children MC type of polyp is: *(PGI Dec 98)*
a. Juvenile polyp
b. Solitary polyp
c. Familial polyposis
d. Multiple adenomatous polyp

56. Metabolic abnormality seen in large colorectal villous adenoma: *(AIIMS May 2008)*
a. Hypokalemic metabolic alkalosis
b. Hypokalemic metabolic acidosis
c. Chlorine sensitive metabolic acidosis
d. Chlorine resistant metabolic alkalosis

57. Lalita, a female patient presents with pigmentation of the lips and oral mucosa and intestinal polyps. Her sister also gives the same history. Most probable diagnosis is: *(DNB 2011, AIIMS June 2001, All India 2000)*
a. Carcinoid tumor
b. Melanoma
c. Villous adenoma
d. Peutz-Jegher's syndrome

58. A 25 years old man has pigmented macules over the palms, soles and oral mucosa. He also has anemia and abdominal pain. Which one of the following is the most likely diagnosis? *(APPG 2015)*
a. Incontinentia pigmenti
b. Peutz - Jegher's Syndrome
c. Cushing's syndrome
d. Albright's Syndrome

59. Strong correlation with colorectal cancer is seen in: *(All India 2003)*
a. Peutz-Jegher's polyp
b. Familial polyposis coli
c. Juvenile polyposis
d. Hyperplastic polyp

60. Prophylactic polypectomy is done is: *(JIPMER 81)*
a. Peutz-Jegher's syndrome
b. Gardner's syndrome
c. Familial polyposis
d. None of the above

61. On colonoscopy which of the following is highly malignant?
a. Single pedunculated polyp *(JIPMER 98)*
b. Multiple flat polyps about hundreds
c. Multiple pedunculated polyp
d. Solitary flat polyp

FAMILIAL ADENOMATOUS POLYPOSIS

62. Which of the following is not true about FAP?
a. AR inheritance *(AIIMS May 2011)*
b. Screening done by sigmoidoscopy
c. Polyps develop in late adulthood
d. Epidermal cysts and osteomas may occur

63. All are true about FAP except: *(JIPMER GIS 2011)*
a. Gastric and duodenal polyps are most common
b. Most of the gastric polyps represents fundal gland hyperplasia
c. Increased risk of ampullary carcinoma
d. CHRPE can be detected by ophthalmoscopy in 25% patients

64. Recommended treatment of FAP involving sigmoid colon: *(AIIMS GIS Dec 2006)*
a. Total colectomy with ileorectal anastomosis
b. Total colectomy with IPAA
c. Segmental resection
d. Total proctocolectomy with IPAA

65. Are true about FAP except: *(AIIMS GIS Dec 2006)*
a. > 100 polyps for diagnosis
b. Mutation in APC gene
c. Budesonide prevent CA colon
d. Endometrial carcinoma is a prominent association

66. Which is not true about familial polyposis? *(AIIMS GIS May 2008)*
a. FAP: 100% risk of CRC cancer
b. Juvenile polyposis: 20% risk of CRC cancer
c. HNPCC: 30-60% risk of endometrium cancer
d. Cowden's syndrome: 30% risk of CRC cancer

67. Most common associated cancer in FAP: *(AIIMS GIS Dec 2009)*
a. CA pancreas
b. Periampullary carcinoma
c. CA thyroid
d. Stomach

68. Which of the following is true about FAP? *(GB Pant 2011)*
a. In stomach, most common are gastric adenomas
b. Gastric carcinoma is common
c. Duodenal carcinoma in 50% patients
d. Duodenal adenoma in 60-90% patients

69. Gardner's syndrome is associated with all except: *(PGI SS Dec 2009)*
a. Brain tumor b. Desmoid tumor
c. Osteoma d. Abnormal dentition

70. "Gardner's syndrome" has all the following except: *(COMEDK 2005)*
a. Colonic polyp b. Multiple epidermal cyst
c. Bony exostosis d. Giant gastric folds

71. True about familial polyposis colon cancer syndrome except: *(JIPMER 2011)*
a. Autosomal recessive
b. Associated with fibroma and osteomas
c. Associated with brain tumors
d. 100% incidence of colon carcinoma

72. Turcot's syndrome is associated with: *(PGI June 2002)*
a. Duodenal polyps
b. Familial adenomatous polyposis
c. Brain tumors
d. Villous adenoma
e. Hyperplastic polyps

73. The most common facial abnormality in Gardener's syndrome: *(AIIMS Nov 2005)*
a. Ectodermal dysplasia b. Odontome
c. Multiple osteomas d. Dental cysts

74. Gardner's syndrome is a rare hereditary disorder involving the colon. It is characterized by:
a. Polyposis colon, cancer thyroid, skin tumors.
b. Polyposis in jejunum, pituitary adenoma and skin tumors.
c. Polyposis colon, osteomas, epidermal inclusion cysts and fibrous tumors of the skin
d. Polyposis of gastrointestinal tract, cholangiocar-cinoma and skin tumors.

75. Following genetic counseling in a family for Familial polyposis coli, next screening test is: *(AIIMS Nov 2006)*
a. Flexible sigmoidoscopy b. Colonoscopy
c. Occult blood in stools d. APC gene

76. All are true about Gardner's syndrome except: *(SGPGI 2005)*
a. Protein losing enteropathy
b. Always in 5th decade of life
c. Small intestine polyp
d. Malignancy is common

77. Desmoid tumor is associated with: *(JIPMER 2014, 2013)*
a. Colonic polyps b. Pancreatic cancer
c. Ovarian cancer d. Gastric cancer

78. All the following are True regarding Familial Adenomatous Polyposis except: *(APPG 2015)*
a. It is due to a mutation of APC gene in chromosome 15
b. > 100 colorectal polyps are present
c. It is an autosomal dominant disorder
d. Congenital Hypertrophy of Retinal Pigment Epithelium is seen in upto 50% patients

HEREDITARY NON-POLYPOSIS COLON CANCER

79. Lynch syndrome is also known as: *(KGMC 2011)*
a. FAP b. PJS
c. HNPCC d. Cowden's syndrome

80. Multiple cutaneous sebaceous adenomas are seen in: *(All India 2011)*
a. Gardner's syndrome b. Turcot's syndrome
c. Muir-Torre syndrome d. Cowden syndrome

81. Patient with proximal CA colon with endometrial and ovarian carcinoma has: *(AIIMS GIS Dec 2006)*
a. Lynch syndrome b. Gardener's syndrome
c. Cowden's disease
d. Cronkhite-Canada syndrome

82. Amsterdam criteria includes all except: *(AIIMS GIS Dec 2009)*
a. At least three relatives should be affected
b. All the three should be first degree relative
c. Two successive generations affected
d. FAP excluded

83. Most common extra-intestinal malignancy in HNPCC: *(AIIMS GIS May 2011)*
a. Pancreatic carcinoma b. CA stomach
c. Small bowel carcinoma d. Transitional cell carcinoma

84. Most common mismatch repair gene mutation in HNPCC:
a. MSH-2 and hMLH-1 b. PMS-1 *(GB Pant 2011)*
c. MSH-6 d. PMS-2

85. Microsatellite instability is most common in: *(PGI SS June 2005)*
a. FAP b. HNPCC
c. Sporadic colonic carcinoma d. Juvenile polyposis

RISK FACTORS COLORECTAL CANCER

86. Premalignant conditions is/are: *(PGI Dec 2006)*
a. Ulcerative colitis b. Amoebic colitis
c. Familial polyposis coli d. Juvenile polyp
e. Peutz-Jegher's syndrome

87. Based on epidemiological studies, which of the following has been found to be most protective against carcinoma colon? *(DNB 2011, AIIMS May 2011, All India 2009)*
a. High fiber diet b. Low fat diet
c. Low selenium diet d. Low protein diet

88. Genetic abnormality in case of late adenoma to carcinoma in CA colon: *(AIIMS GIS Dec 2009)*
a. APC b. K-ras
c. DCC d. p53

89. All of the following genes may be involved in development of carcinoma of colon except: *(All India 2009)*
a. APC b. Beta-Catenin
c. K-ras d. Mismatch repair genes

90. Cholecystectomy may lead to increased risk of: *(COMEDK 2004)*
a. Proximal colon cancer b. CA. pancreas
c. Hepatic cancer d. Cholangiocarcinoma

91. Dietary factors associated with colon carcinoma: *(PGI Dec 2002)*
a. High fiber b. Low fiber
c. Smoked fish d. High fat intake
e. Japanese are common to develop carcinoma colon

92. Which of these are associated with increased risk of colorectal carcinoma? *(PGI June 2002)*
a. More intake of animal fat b. Aspirin
c. Ulcerative colitis d. Amoebic colitis
e. Polyps

93. Predisposing factors for colon carcinoma are: *(PGI June 2002)*
a. Animal fat consumption

b. Familial adenomatous polyposis
c. Ulcerative colitis
d. Crohn's disease
e. TB

94. Commonly undergoing malignant transformation is/are: *(PGI June 2006)*
a. FAP
b. Crohn's disease
c. Ulcerative colitis
d. Enteric colitis
e. Juvenile polyp

95. Which among the following is not premalignant? *(PGI 99)*
a. Ulcerative colitis
b. Peutz-Jegher's syndrome
c. Villous adenoma
d. Familial adenomatous polyposis

CARCINOMA COLON CLINICAL FEATURES AND DIAGNOSIS

96. Most common site of colonic carcinoma: *(GB Pant 2010, UPPG 2009; NEET 2013)*
a. Sigmoid
b. Transverse
c. Descending
d. Ascending

97. Constricting type of colonic carcinoma is seen in: *(MHPGMCET 2001)*
a. Left colon
b. Right colon
c. Transverse colon
d. Caecum

98. Most common site of carcinoma colon: *(MHPGMCET 2008)*
a. Cecum
b. Transverse colon
c. Right colon
d. Left colon

99. Patient having diarrhea and colic on and of with mass in right iliac fossa. Most probable diagnosis is: *(DNB 2009)*
a. Carcinoma rectum
b. Carcinoma cecum
c. Carcinoma sigmoid
d. Carcinoma transverse colon

100. Carcinoma of right colon presents as: *(PGI Dec 2006, June 2002)*
a. Anemia
b. Mass in RIF
c. Bleeding PR
d. Alternate constipation and diarrhea
e. Presents with obstruction

101. True about left sided colon carcinoma: *(PGI June 2001)*
a. Anemia
b. Obstruction
c. Melena
d. Feculant vomiting
e. Sigmoid spared

102. Features of left side carcinoma colon are: *(PGI June 2006)*
a. Anemia
b. Obstruction
c. Altered bowel habit
d. Melena
e. Feculent vomiting

103. Carcinoma right colon is most commonly of which type? *(AIIMS Nov 94, UPPG 2008)*
a. Stenosing
b. Ulcerative
c. Tubular
d. Fungating

104. True regarding carcinoma colon is: *(AIIMS Nov 2000)*
a. Lesion on left side of the colon presents with features of anemia
b. Mucinous carcinoma has a good prognosis
c. Duke's A stage should receive adjuvant chemotherapy
d. Solitary liver metastasis is not a contraindication for surgery

105. True about virtual colonscopy: *(PGI June 2009)*
a. Have better image than conventional colonoscopy
b. VC is performed by CT and MRI
c. Take more time than conventional colonscopy
d. Easy to take tissue sample
e. Helpful in pathology outside colon

106. Colonic disease can be diagnosed by all except: *(PGI May 2010)*
a. Virtual colonoscopy
b. Ba enema
c. Ba swallow
d. Ba follow through
e. Enteroclysis

107. Colonic metastases are related with: *(AIIMS GIS Dec 2010, 2011)*
a. Pre-op CEA level
b. Depth of invasion
c. Size of tumor
d. Circumferential involvement

108. Which of the following is true about colon carcinoma? *(PGI SS Dec 2009)*
a. Inherited in 30% cases
b. Synchronous lesion is seen in 1% cases
c. Metachronous lesion is seen in up to 12% cases
d. Carcinoma is inevitable in untreated cases of FAP

109. What is an acceptable screening technique for detecting recurrent colon cancer? *(COMEDK 2004)*
a. Screening sigmoidoscopy
b. Screening the stool for occult blood
c. Stool cytology
d. Measurement of CEA levels

110. Most important prognostic factor for colorectal carcinoma is: *(AIIMS May 2011)*
a. Site of lesion
b. Tumour size and characteristics
c. Age of patient
d. Lymph node status

111. Most important prognostic factor for colorectal carcinoma is: *(All India 2009)*
a. Site of lesion
b. Stage of lesion
c. Age of patient
d. Lymph node status

112. True about carcinoma colon: *(PGI Dec 2002)*
a. 1/3rd of cases show liver metastasis
b. Obstruction common in sigmoid colon
c. CEA is useful for prognostic importance
d. King's staging is done
e. Alteration of bowel habit is common in CA left colon

113. True regarding cancer colon: *(PGI Dec 2000)*
a. Obstructive features are more common with right colon
b. 40% cases at presentation show liver metastasis
c. Resection possible in 25% cases
d. More common in AIDS patients

114. The tendency of colonic carcinoma to metastasize is best assessed by: *(AIIMS Nov 2003)*
a. Size of tumor
b. Carcinoembryonic antigen (CEA) levels
c. Depth of penetration of bowel wall
d. Proportion of bowel circumference involved

115. Which of the following is true about colon carcinoma?
a. Right sided colon carcinoma associated with young individuals *(PGI Dec 2005)*
b. Most common site is sigmoid colon
c. Right sided colon carcinoma present as chronic anemia
d. Not resectable in case of metastasis
e. Right sided colon has better prognosis than left sided colon

116. The incidence of carcinoma of the caecum in relation to colonic adenocarcinoma is:
a. 2% b. 4.5%
c. 20% d. 44%
e. 62%

117. The best investigation for colorectal carcinoma: *(Kerala 97)*
a. Exfoliative cytology
b. Air contrast barium enema
c. Ultrasound
d. Colonoscopy and biopsy

118. Which of the following is the investigation of choice for diagnosing carcinoma colon? *(MCI Sept 2005)*
a. X-ray abdomen b. CT scan
c. Colonoscopy d. Barium enema

119. Tenesmus occurs in lesions of: *(TN 90)*
a. Ileum b. Right side of colon
c. Descending colon d. Sigmoid colon

120. The area of the colon which is least visualized by barium studies: *(AIIMS 80, PGI 81)*
a. Sigmoid b. Hepatic flexure
c. Splenic flexure d. Caecum

121. The commonest site of perforation during colonoscopy is: *(UPSC 2000)*
a. Caecum b. Hepatic flexure
c. Splenic flexure d. Sigmoid colon

122. A 58-year-old female complains of dull aching pain in right iliac fossa. On examination, gross pallor was found and a mass was palpable in right iliac fossa. What is the most likely diagnosis? *(AIIMS November 2014)*
a. Appendicular mass
b. Ileocecal tuberculosis
c. Diverticulitis
d. Carcinoma ascending colon

CARCINOMA COLON STAGING

123. Three lymph nodes in CA colon represents: *(KGMC 2011)*
a. IB b. IA
c. II d. III

124. Stage IIIC in colorectal cancer: *(GB Pant 2011)*
a. T2N0M0 b. T2N2M0
c. T2N1M0 d. T4N1M0

CARCINOMA COLON TREATMENT

125. Management of carcinoma rectosigmoid with obstructive carcinoma in elderly frail: *(PGI Nov 2009)*
a. Colostomy
b. Abdomino-perineal resection (APR)
c. Resection and primary anastomosis
d. Hartmann procedure
e. Laser recanalisation

126. Treatment of carcinoma left colon with acute obstruction includes: *(PGI June 2008)*
a. Hartman's procedure
b. Left colectomy with anastomosis
c. Proximal colostomy
d. Extended right colectomy with ileoanal anastomosis
e. Primary anastomosis should never be attempted

127. Treatment included in management of unresectable colorectal cancer liver metastases: *(PGI May 2011)*
a. Portal vein embolization b. Radiotherapy
c. Resection d. Staged operation
e. Chemotherapy

128. In case of elective surgery of carcinoma sigmoid colon, which of the following should be done? *(PGI June 2004)*
a. Mechanical bowel wash
b. Broad spectrum antibiotic given 48 hours before operation
c. Broad spectrum antibiotic at the time of operation
d. None

129. After undergoing surgery, for carcinoma of colon a patient developed single liver metastasis of 2 cm. What you do next? *(All India 2002, All India 98)*
a. Resection b. Chemoradiation
c. Acetic acid injection d. Radiofrequency ablation

130. A 60-years old man suffering from left colon carcinoma presented with acute left colonic obstruction the treatment is: *(PGI June 2003)*
a. Primary resection and Hartman's procedure
b. Defunctioning colostomy
c. Right hemicolectomy
d. Resection of whole left bowel and end to end anastomosis
e. Conservative treatment

131. True about treatment of carcinoma left colon with acute obstruction: *(PGI June 2008)*
a. Hartman's procedure
b. Left colectomy with anastomosis
c. Proximal colostomy
d. Extended right colectomy with ileoanal anastomosis
e. Primary anastomosis should never be attempt

132. Ramu is 60 years old male with CA descending colon presents with acute intestinal obstruction. In emergency department treatment of choice is: *(AIIMS Nov 99, Nov 98, Feb 97)*
a. Defunctioning colostomy b. Hartman's procedure
c. Total colectomy d. Left hemicolectomy

COLONIC ISCHEMIA

133. Thumb printing appearance of colon on barium enema is seen in: *(COMEDK 2004)*
a. Diverticulitis b. Ischemic colitis
c. Ulcerative colitis d. Carcinoma colon

134. Are true about ischemic colitis except: *(JIPMER GIS 2011)*
a. IMA is commonly occluded in cases needing aortic surgeries
b. Ischemia is more common in small bowel as compared to large bowel
c. Most common site of post ischemic stricture is sigmoid
d. Transection of IMA doesn't need reimplantation if aortic surgery is attempted

135. Most common site of post ischemic stricture is: *(JIPMER GIS 2011, GB Pant 2011, MHSSMCET 2010)*
a. Ascending colon b. Hepatic flexure
c. Splenic flexure d. Sigmoid colon

136. Commonest site for ischemic colitis is: *(AIIMS June 95, PGI Dec 97)*
a. Hepatic flexure b. Splenic flexure
c. Descending colon d. Ascending colon

137. A 60-years old man presents with acute onset of pain in lower abdomen followed by repeated rectal bleeding. Examination revealed pulse rate of 100/minute, BP 160/96 mm of Hg and a localized tenderness in the left hypochondrium. Stools examination reveals only a few pus cells and sigmoidoscopy was normal. Which one of the following is the most likely diagnosis? *(UPSC 96)*
a. Idiopathic ulcerative colitis b. Bacillary dysentery
c. Ischemic colitis d. Amoebic colitis

PSEUDOMEMBRANOUS COLITIS

138. Psuedomembranous colitis is associated with: *(COMEDK 2005)*
a. Campylobacter
b. Clostridium difficile
c. Clostridium retgari
d. Salmonella typhi

139. Which among the following is the drug of choice for clostridium difficile-induced colitis? *(COMEDK 2009)*
a. Gentamicin
b. Ciprofloxacin
c. Metronidazole
d. Linezolid

140. A patient on antibiotics for treatment for peritonitis presents with mucus diarrhea. Most probable cause could be: *(MCI Sept 2009)*
a. Ulcerative colitis
b. Activation of latent tuberculosis
c. Antibiotic associated diarrhea
d. Gastritis

COLONIC RESECTION AND ANASTOMOSIS

141. After hemicolectomy, on the 6th post operative day patient developed serous discharge from the wound, following are to be done: *(PGI Dec 2003)*
a. Dressing of the wound only
b. Start IVF
c. Do urgent laparotomy
d. Do Ba-enema to see for anastomotic leak

142. On the 4th postoperative day of laparotomy a patient presents with bleeding and oozing from the wound. Management is: *(PGI June 2006)*
a. Dressing of wound and observe for dehiscence
b. IV fluids
c. Send for USG abdomen
d. Start treatments for peritonitis
e. Urgent surgery

143. The appearance of anastomotic leakage following a low colonic anastomosis most often mainfests: *(PGI 80, AIIMS 85)*
a. 1–4 days
b. 5–10 days
c. 11–15 days
d. 16–20 days
e. None of the above

144. The most likely cause for suture leak after colon resection and anastomosis for cancer sigmoid is: *(PGI 81, DPG 83)*
a. Subclinical malnutrition
b. Infection of anastomotic site
c. Mechanical disruption due to colonic pressure and contractility
d. Ischemia

145. Cattle's maneuver is mobilization of: *(MHSSMCET 2005)*
a. Sigmoid colon
b. Descending colon
c. Small bowel
d. Caecum and ascending colon

146. Dunking maneuver is used in: *(MHSSMCET 2009)*
a. Left hemicolectomy
b. Right Hemicolectomy
c. Right extended hemicolectomy
d. Anterior resection

ENTERIC FISTULA

147. True about enterocutaneous fistula: *(PGI Dec 2000)*
a. High output fistula drains 500 ml/day
b. Malignancy is most common cause
c. Fluid and electrolyte loss can occur
d. No skin damage

148. Most common cause of colonic fistula in India at age of 27 years: *(UPPG 2008)*
a. Crohn's disease
b. Ulcerative colitis
c. Tuberculosis
d. Carcinoma rectum

LOWER GI BLEED

149. A 65-year-old man presented with an episode of syncope. He said he felt dizzy during defecation and noticed gross bleeding in the pan. Fecal occult blood test done 3 months ago as a part of routine screening for colon cancer was negative. There is no history of recent weight loss. What is the likely colonoscopic finding? *(AIIMS November 2014)*
a. Early stage carcinoma colon
b. Sigmoid diverticulitis
c. Microscopic colitis
d. Dilated mucosal and submucosal veins in the colon

150. Heyde's syndrome is: *(COMEDK 2010)*
a. Mitral stenosis, arthritis and biliary cirrhosis
b. Mitral regurgitation, hiatus hernia and cirrhosis
c. Aortic stenosis, gastrointestinal bleeding and angiodysplasia of colon
d. Pulmonary arterial hypertension, tricuspid regurgitation and cirrhosis

151. First investigation to be done in a patient with recurrent fecal occult blood loss: *(MHSSMCET 2006)*
a. Esophagogastroscopy
b. Colonoscopy
c. Barium enema
d. Close Observation

152. Most common cause of heavy bleeding in 70 years old male: *(KGMC 2011)*
a. Colorectal carcinoma
b. Colonic diverticulosis
c. Polyp
d. Angiodysplasia

153. False about vascular ectasia: *(AIIMS GIS 2003)*
a. Associated with cutaneous lesions
b. The bleed is usually small and recurrent and never massive
c. The treatment may involve subtotal colectomy in some cases
d. Associated with aortic stenosis

154. Most common cause of lower GI bleed in India is: *(AIIMS Nov 94)*
a. Benign tumour
b. Non specific ulcer
c. Cancer rectosigmoid
d. Hemorrhoids

155. Painless lower GI bleed is seen in child with: *(PGI Dec 2000)*
a. Meckel's diverticulum
b. Rectal polyp
c. Anal fissure
d. Acute Appendicitis

156. A patient presents with lower gastrointestinal bleed. Sigmoidoscopy shows ulcers in the sigmoid. Biopsy from this area shows flask-shaped ulcers. Which of the following is the most appropriate treatment? *(AIIMS Nov 2005)*
a. Intravenous ceftriaxone
b. Intravenous metronidazole
c. Intravenous steroids sulphasalazine
d. Hydrocortisone enemas

157. Following is least common about angiodysplasia of colon: *(All India 96)*
a. Involvement of cecum
b. Involvement of rectum in 50% of cases
c. Affecting age group > 40 years
d. Cause of troublesome lower G.I. hemorrhage

158. The most useful investigation for profuse lower gastrointestinal bleeding is: *(UPSC 2005)*
a. Proctosigmoidoscopy
b. Colonoscopy
c. Double contrast barium enema
d. Selective arteriography

159. Most common cause of lower gastro intestinal bleeding is: *(UPPG 2007)*
a. Diverticulosis
b. Colorectal carcinoma
c. Angiodysplasia
d. Anal fissure

160. The commonest cause of significant lower gastrointestinal bleed in a middle aged person with unknown reason is: *(DPG 2009 March)*
a. Sigmoid diverticula
b. Angiodysplasia
c. Ischemic colitis
d. Ulcerative colitis

161. Most common site of angio dysplasia is: *(DNB 2007)*
a. Sigmoid colon
b. Transverse colon
c. Ascending colon
d. Descending colon

162. All of the following are cause of blood in stools in children except: *(AIIMS 85)*
a. Meckel's diverticulum
b. Carcinoma
c. Intussusception
d. Juvenile polyp

163. The commonest cause of significantly lower gastrointestinal bleed in a middle aged person without any known precipitating factor may be due to: *(MCI March 2008, Sept 2010)*
a. Ulcerative colitis
b. Ischemic colitis
c. Angiodysplasia
d. Diverticulum of sigmoid colon

164. Massive bleeding per rectum in a 70 years old patient is due to: *(DNB 2005, 2000, All India 2000)*
a. Diverticulosis
b. Carcinoma colon
c. Colitis
d. Polyps

165. Guaiac test is used for: *(PGI 82)*
a. Pentosuria
b. Fructosuria
c. For occult blood in stool
d. Pancreatitis

BOWEL PREPARATION

166. Full bowel preparation is avoided in all, except: *(AIIMS June 94)*
a. Carcinoma colon
b. Hirschsprung's disease
c. Ulcerative colitis
d. Irritable bowel syndrome

167. Complete bowel preparation is done in a case of: *(AIIMS Nov 99)*
a. Colonic carcinoma
b. Hirschsprung's disease
c. Irritable bowel disease
d. Ulcerative colitis

168. Agent not used for bowel preparation: *(AIIMS GIS May 2011)*
a. Metronidazole
b. Polymyxin
c. Erythromycin
d. Neomycin

LARGE INTESTINE ANATOMY AND PHYSIOLOGY

169. What is epicolic node? *(APPG 2008)*
a. Node draining colon
b. Adjacent to aorta
c. Epitracheal node
d. None

170. True about colonic organisms is: *(PGI Dec 98)*
a. Distal ileum 103–105 organisms
b. Colon 1010–1011 organisms
c. First organism in new born is coliforms and streptococcus
d. Chyme in jejunum contains many bacteria

171. Antiperistalsis is seen in: *(AIIMS 91)*
a. Distal colon
b. Jejunum
c. Proximal colon
d. Ileum

172. Mass movement of the colon would be abolished by:
a. Extrinsic denervation *(COMEDK 2005)*
b. Distension of the colon
c. Gastrocolic reflex
d. Destruction of Auerbach's plexus

173. Which of the following is the terminal group of lymph node for colon? *(AIIMS May 2011)*
a. Paracolic
b. Epicolic
c. Preaortic
d. Ileocolic

174. Which of the following is not degraded by colonic flora? *(AIIMS May 2011)*
a. Pectin
b. Lignin
c. Starch
d. Glucose

MISCELLANEOUS

175. A patient suffered bullet injury to left side of the colon and presented in the causality department after 12 hours. What will be the management? *(AIIMS Nov 2000)*
a. Proximal defunctioning colostomy
b. Primary closure
c. Proximal colostomy and bringing out the distal end as mucus fistula
d. Resection and primary anastomosis

176. Functional GI disorders can be differentiated from organic GI disorders by: *(SGPGI 2005)*
a. Abdominal pain
b. Diarrhea
c. Tenesmus
d. Bleeding PR

177. All are true about colonic lipoma except: *(PGI SS June 2001)*
a. Squeeze sign on radiology
b. Most common site is cecum
c. Most commonly subserosal
d. Most commonly submucosal

EXPLANATIONS

HIRSCHSPRUNG'S DISEASE

1. Ans. a. Aganglionic segment is contracted not dilated *(Ref: Sabiston 19/e p1848-1849; Schwartz 10/e p1624-1626, 9/e p1435-1437; Bailey 26/e p1177, 25/e p1155-1156)*

Hirschsprung's Disease

- Occurs in **1** out of every **5000 live births**[Q]
  - **MC affected site**: **Rectosigmoid (75%)**[Q] >splenic flexure or transverse colon (17%) >**Entire colon** with **variable extension into** the **small bowel**[Q] (8%)
- **Increased Risk**: **Positive family history**[Q] and **Down syndrome**[Q]

Pathogenesis

- Characterized pathologically by **absent ganglion cells** in the **myenteric (Auerbach's)** and **submucosal (Meissner's) plexus** with **hypertrophy of nerve trunks**[Q] in the plexus
- Associated with **muscular spasm** of the **distal colon** and **internal anal sphincter** resulting in a **functional obstruction**[Q]
- **Abnormal bowel** is the **contracted distal segment**, whereas the **normal bowel** is the **proximal, dilated portion**[Q].

Clinical Presentation		
Neonates	**First few weeks of life**	**Otherwise healthy children and adults**
• **Suspected in** all neonates presenting with: - **Delayed passage** of **meconium beyond** the **first 24 hours** of **life**[Q] - **Abdominal distension** following **feeds**[Q]	• **Suspected in** any child presenting in first view weeks of life with: - **Gross** abdominal **distension**[Q] - **Chronic constipation**[Q] - **Failure** to **thrive**[Q]	• **Short segment Hirschprung disease** should be suspected in **otherwise healthy children** and **adults**[Q] presenting with: - **Severe constipation without fecal soiling**[Q] - **Faecal soiling** is usually **not a feature** of this condition.

Digital Examination

- **Rectum** is **empty** on digital examination[Q]
- **Rapid expulsion of feces** often follows examination[Q]
- **Contracted rectal wall** can sometimes be appreciated by examining finger

Diagnosis		
Rectal biopsy	**Anorectal manometry**	**Radiology**
• **Gold standard for** the **diagnosis** of **Hirschsprung's disease** • Confirms the diagnosis on demonstration of: - **Aganglionosis**[Q] - **Hypertrophic nerve fibres** in the nerve plexus[Q]	• Useful as a **screening test**[Q] • **Rectoanal inhibitory reflex** is **absent**[Q]	• **Water soluble contrast enema** indicates the **length** and **site** of **involved intestine**. • Important positive findings include: - **Coning down** of **transition zone** - **Irregularity in mucosa** - **Abnormal contraction** of intestine

- **Repeated tube decompression** and gentle **rectal washouts** with 30-50 ml of **normal saline** have a positive and significant clinical impact on these patients.

Treatment of Hirschsprung's Disease	
Short segment disease	**Long segment disease**
• **Extended myectomy**[Q] removing a **strip of rectal wall** upto the area where normal ganglion cells start may be sufficient	• **Temporary colostomy**[Q] for a few months to allow proximal intestine to return to its normal caliber followed by **definitive procedures**: - Swenson[Q] - Duhamel[Q] - Soave[Q]

Prognosis

- **Excellent** overall survival
- **MC post-operative problems: Constipation (MC)**[Q] >soiling >incontinence >enterocolitis.

2. **Ans. a. Hirschsprung's disease**
3. **Ans. a. Rectal biopsy**
4. **Ans. a. Autosomal dominant**
5. **Ans. a. Distal to dilated segment**
6. **Ans. c. Rectosigmoid part**
7. **Ans. b. Extended myectomy**
8. **Ans. b. Absence of ganglia in involved segment, e. Surgery is used in therapy**
9. **Ans. a. Pathology of myenteric plexus of Auerbach, c. May involve small intestine rarely**
10. **Ans. c. Rectal biopsy**
11. **Ans. d. Large stool**
12. **Ans. a. Sometimes found in adult, d. Sometimes involve small intestine**

HIRSCHSPRUNG'S DISEASE

- **MC affected site: Rectosigmoid (75%)**[Q] >splenic flexure or transverse colon (17%) >**Entire colon** with **variable extension into** the **small bowel**[Q] (8%)

13. **Ans. b. Normal or contracted**
14. **Ans. b. Chronic constipation**
15. **Ans. c. Hirschprung's disease**
16. **Ans. d. Lack of ganglion cells**
17. **Ans. d. Bayar's**
18. **Ans. b. Is a least 8 kg in weight and thriving** *(Ref: Schwartz 9/e p1436-1437)*

- A diagnosis of **Hirschsprung's disease** requires **surgery in all cases**[Q].
- The **classic surgical approach** consisted of a **multiple-stage procedure**[Q].
- This included a **colostomy** in the **newborn period**, followed by a **definitive pull-through operation** after the **child weighed > 10 kg**[Q].

19. **Ans. b. Normal saline**

- **Repeated tube decompression** and gentle **rectal washouts** with 30-50 ml of **normal saline**[Q] have a positive and significant clinical impact on these patients.

20. **Ans. a. Large bulky stools**
21. **Ans. b. Excision of aganglionic segment**
22. **Ans. c. Hirschsprung's disease**

COLONIC DIVERTICULA

23. **Ans. c. Sigmoid colon** *(Ref: Sabiston 19/e p1309-1310; Schwartz 9/e p1038-1041; Bailey 26/e p1170-1173, 25/e p1160-1163; Shackelford 7/e p1879-1895)*

COLONIC DIVERTICULA

- A **diverticulum** is an **abnormal sac** or **pouch protruding from** the **wall** of a hollow organ
- **True diverticulum** is composed of **all layers** of the **intestinal wall**[Q]
- **False diverticulum** (pseudodiverticulum) **lacks a portion** of the **normal bowel wall**[Q].
  - **Acquired diverticula** are the **MC type**[Q] and are mainly **false**[Q] diverticula
  - **MC site**[Q] of **colonic diverticula**: **Sigmoid colon**

Pathogenesis

- Diverticula are **herniation of** the **mucosa through** the **muscularis propria**
  - **Protrusion** occurs **at** the **point** where the **nutrient artery penetrates** through **the muscularis propria**[Q], resulting in a break of the colonic wall, **mainly on mesenteric side**
- In some cases, the **arteriole** penetrating the wall can be **displaced over** the **dome** of **diverticulum** which results in **massive hemorrhage**[Q]
  - Another factor is **increased intraluminal pressure**[Q], **diets low in fiber** reduce the stool bulk which in turn leads to **increased peristaltic activity**, particularly in the **sigmoid colon**. This increases the intraluminal pressure.
- Diverticulosis is **more common in the western world**[Q], its **rare** in the **underdeveloped and developing countries,** where **diets include** more **fibre** and **roughage**[Q].
  - There is often a **striking hypertrophy** of the **muscular layers** of the **colonic wall**[Q] associated with diverticulosis.
  - This **thickening of the colonic wall, most commonly affecting** the **sigmoid colon, may precede** the appearance of **diverticula**[Q].

Diagnosis

- **Barium enema** is **investigation of choice** for **colonic diverticulosis**[Q].
- **Thickening** of the **circular muscle fibres** develops a **concertina** or **saw-tooth appearance** on **barium enema**[Q].

24. Ans. d. Left sided colon involvement is more common, e. Operation is not done for all patients *(Ref: Sabiston 19/e p1310-1314; Schwartz 10/e p1201-1203, 9/e p1140; Bailey 26/e p1170-1173, 25/e p1160-1163; Shackelford 7/e p1882-1886)*

Diverticulitis

- Diverticulitis is the **result of inflammation** (**perforation**) of **colonic diverticulum**Q
- The **term is** somewhat **misnomer** because the **disease** is **actually an extraluminal pericolic infection** caused by the **extravasation of feces** through the **perforated diverticulum**Q.

Complications

- Recurrent periodic inflammation and pain
- **Perforation** leading to general peritonitis or local (pericolic) abscess formation.
- **Intestinal obstruction**: In the **sigmoid** (as a result of **progressive fibrosis** causing **stenosis**) and in the **small intestine** (caused by **adherent loops** of small intestine on the pericolitis)
- **Hemorrhage**: **Profuse colonic hemorrhage** in **17%** of cases, often requiring blood transfusions.

> - **Bleeding** in **diverticulosis** may be **massive** but **in** about **80% patients** are **self limited** and **stop spontaneously.** These patients **do not require surgery**Q

- **Fistula formation** (vesicocolic, vaginocolic, enterocolic, colocutaneous): **MC** is **vesicocolic**Q

Clinical Features

- **Mild cases**: mDistension, flatulence and a sensation of heaviness in the lower abdomen
- **Emergency: Persistent lower abdominal pain**, usually in the **left iliac fossa,** with or without peritonitis, could be caused by diverticulitis.
- **Fever, malaise** and **leukocytosis** can differentiate diverticulitis from painful diverticulosis.
- The **sigmoid colon** is **often palpable**, **tender** and **thickened**Q.
- **Any urinary symptoms** may herald the formation of a **vesicocolic fistula**, which leads to **pneumaturia**Q (**flatus in the urine**) and even feces in the urine (**fecaluria**)Q

Hinchey[Q] Classification of Sigmoid Diverticulitis	
Stage **I**	**Pericolic** or **mesenteric abscess**
Stage **II**	Walled-off **pelvic abscess**
Stage **III**	Generalized **purulent peritonitis**
Stage **IV**	Generalized **fecal peritonitis**

Diagnosis

- **CT scan: Investigation of choice** for **diverticulitis**Q

Treatment

- Treatment is **mainly medical**Q.

> - **Younger patients** should be **treated in the same manner** as patients whose **first attack of diverticulitis** occurs **after** the age of **50 years**Q.
> - There is **no difference** in **outcome** or **prognosis**Q.

- Surgery done in elective setting is **sigmoid colectomy** with a **primary anastomosis**Q.

Indications of Surgery in Diverticulitis
• Who **do not improve** on **medical therapy**Q
• Patients who have **atleast two documented attacks**Q of diverticulitis
• In all patients with **complicated diverticulitis**Q
• For **recurrent** or **persistent hemorrhage**Q

25. Ans. a. Commonly presents with pneumaturia

26. Ans. d. Colovesical

27. Ans. b. Diverticular disease of colon

28. Ans. c. Barium enema

- **Investigation of choice** for **colonic diverticulosis**: **Barium enema**Q
- **Investigation of choice** for **diverticulitis: CT scan**Q

29. Ans. a. Arise from diverticula of colon, c. Protrusion of mucosa through muscular layers at point of blood vessel

30. Ans. b. Superior mesenteric artery *(Ref: Sabiston 19/e p1175; Schwartz 9/e p1040; Bailey 26/e p1170-1173, 25/e p1160-1163; Shackelford 7/e p1883-1884)*

Although **diverticular disease** is **much more common** on the **left side**, **right-sided disease** is **responsible for more than half episodes** of **bleeding** (from SMA).

Colonic Diverticula

- **MC cause** of **significant lower GI bleeding: Diverticula**Q
- **Bleeding** occurs in **3-15%** of individuals with diverticulosis
- **Bleeding** occurs at the **neck of** the **diverticulum** and is believed to be secondary to bleeding from the vasa recti as they penetrate through the submucosa.

> - Of those that bleed, **more than 75% stop spontaneously**Q, although about **10% rebleed within 1 year** and almost 50% within 10 years.
> - Although **diverticular disease** is **much more common** on the **left side**, **right-sided disease** is **responsible for more than half episodes** of **bleeding**Q.

- **Best method** of **diagnosis** and **treatment**: **Colonoscopy**Q
- **Epinephrine injection, electrocautery, endoscopic clips** have been successfully applied **to control** the **hemorrhage**Q.
- If none of these maneuvers is successful or if hemorrhage recurs, **colonic resection** is indicated.
- **Blind hemicolectomy** is associated with **rebleeding** in **more than half** of patients,
- **Subtotal colectomy does not eliminate the risk** for **recurrent hemorrhage**Q
- **Mortality rate** of **emergent subtotal colectomy** for bleeding: **30%**Q

31. Ans. a. Mucosa is inflamed

32. Ans. a. Colovesical

33. Ans. b. Jejunum *(Ref: Shackelford 7/e p1879)*

Incidence of Diverticula

- **Most common sites** of diverticula: **CMD PES JAI** (**C**olon >**M**eckel's >**D**uodenum >**P**harynx >**E**sophagus >**S**tomach >**J**ejunum >**A**ppendix >**I**leum)Q

34. Ans. c. Fistulization is an emergency *(Ref: Sabiston 19/e p1313)*

- Sabiston says "In diverticulitis, fistula between colon and bladder: a **fistula arising from the colon is rarely a cause for emergency surgery**Q; infact, the **patient general condition** is **often improved** when the abscess fistulizes and drains. **Antibiotics** should be administered to reduce the adjacent cellulitis, and the **diagnostic steps** should be taken to confirm the cause of the fistula **before a definitive operation** is undertaken."

35. Ans. d. Ascending colon

36. Ans. a. Diverticulitis

37. Ans. b. Hartman's procedure *(Ref: Sabiston 19/e p1313-1314)*

Generalized Peritonitis after Diverticular Perforation

- **Generalized peritonitis** resulting from diverticulitis can have two causes:
  - **Diverticular perforation into the peritoneal cavity (perforation is not sealed by the body's normal defenses)**
  - **Abscess bursts** into the unprotected peritoneal cavity
- In either situation, the result is an **overwhelming infection** that requires **immediate operative intervention**Q.

Clinical Features

- **Diffuse abdominal tenderness**, with voluntary and involuntary guarding over the entire abdomen.
- **Elevated white blood count, fever, tachycardia**, and **hypotension**Q.

Diagnosis

- **Abdominal X-ray** or **CT scans** may **reveal intraperitoneal free air**Q
- **Absence of extra-intestinal air does not exclude** the **diagnosis**Q.

Treatment

- **Immediate laparotomy** is **mandatory**Q to identify and excise the segment of colon containing the perforation.

> - The **proper operation** in this situation is to **resect** the **diseased sigmoid colon**, **construct** a **colostomy** using noninflamed descending colon, and **suture** the **divided end** of the **rectum closed**. This procedure is called **Hartmann's operation**Q.

- **Hartmann's operation** is the **most common technique** for **emergency operations** required for **control of infection secondary to diverticulitis**Q.
- **Anastomosis** between the **descending colon** and **rectum** to restore intestinal continuity is done **after a period** of **at least 10 weeks**Q.

COLORECTAL POLYPS

38. Ans. b. 2 *(Ref: Sabiston 19/e p1343; Shackelford 7/e p2030-2032)*

Haggit's Classification for Polyps

- **Haggit's classification**Q for **polyps containing cancer** according to the **depth of invasion**
- By definition, all **sessile polyps with invasive carcinoma** are **level 4** by Haggitt criteria.

Level	Depth of Invasion by Carcinoma
0	Does not invade the muscularis mucosa (**carcinoma-in-situ** or **Intramucosal carcinoma**)Q
1	Invades through the muscularis mucosa into the **submucosa** but is **limited to** the **head** of the polyp.
2	Invades the level of the **neck** of the polyp (junction **between** the **head** and the **stalk**)Q
3	Invades any part of the **stalk**Q
4	Invades into the **submucosa** of the bowel wall **below the stalk** of the polyp but **above** the **muscularis propria**Q.

39. Ans. c. Cowden's syndrome *(Ref: Sabiston 19/e p1346-1347; Schwartz 10/e p1205-1206, 9/e p1043; Bailey 25/e p631; Shackelford 7/e p2047)*

- **No increased risk** of **invasive** gastrointestinal **malignancy** is seen in Cowden's syndromeQ.

40. Ans. a. Adenomatous polyp *(Ref: Sabiston 19/e p1342; Schwartz 10/e p1205-1206, 9/e p1042-1043; Bailey 26/e p1161-1164, 25/e p1177-1178; Shackelford 7/e p2030-2032)*

Histological Classification of Colorectal Polyps	
Neoplastic Polyps	**Non-neoplastic polyps**
Adenomatous polyps or Adenomas: • Tubular • Tubulovillous • Villous	1. **Hyperplastic** polyps 2. **Hamartomatous** polyps: **- Juvenile polyps - PJS** 3. **Inflammatory** polyps

Non-neoplastic Polyps

- **Hyperplastic Polyps**
  - **MC colorectal polyp**Q
  - Account for **>90%** of all colorectal polyps, mostly found in the **rectosigmoid**Q.
  - Histologic appearance of these polyps is **serrated** (**saw-toothed appearance**)Q
  - **No malignant potential**Q
- **Hamartomatous Polyps**
  - A hamartomatous polyp is a **localized overgrowth** of normal, mature intestinal epithelial cells.
  - Usually **lined with normal epithelium** over a submucosal core.
  - **Juvenile polyps** are the **MC type** of colorectal **hamartomas**Q

Juvenile polyps
• **Juvenile polyps** are the **MC type** of **colorectal hamartomas**Q • Occur most commonly in **children <5 years** of ageQ. • Up to **80%** of juvenile polyps occur as a **single lesion** of the **rectum**Q • Typical symptoms are **rectal bleeding**, **mucus discharge**, **diarrhea**, and abdominal painQ. • Also called **retention polyps** due to the inflammatory obstruction of the crypt necks that leads to cystic dilation of the mucus-filled glands. • **No increased risk** of **cancer**Q

Peutz-Jegher's Syndrome (AD)
• PJS is also characterized by **hamartomatous polyps**Q. • Histological characteristics: **Arborization** and **Pseuoinvasion**Q

- **Inflammatory Polyps**
  - **Inflammatory polyps** occur more frequently in **chronic ulcerative colitis**Q, but are also seen in **Crohn's disease**Q.
  - Inflammatory polyps have **no malignant potential**Q and require **no treatment**Q other than that of underlying colitis.

Adenomatous Polyps

- **Most common neoplastic polyp** is **adenomatous**, which harbors **malignant potential**[Q].
- **Most colon cancers** arise from **adenomatous polyps (adenoma)**[Q].
- Conditions associated with adenomatous polyps: **Strong association** with **ureterosigmoidostomies**[Q], **acromegaly**[Q] and **streptococcus bovis** bactermia[Q]

Probability of development of malignancy depends upon:		
Gross Appearance of lesion	**Histology**	**Size**
• Pedunculated • **Sessile (Increased risk)**[Q]	• **Tubular (MC)**[Q] • Tubulovillous • **Villous (Highest risk)**[Q]	• <1 cm • 1-2 cm • **>2 cm (Increased risk)**[Q]

Adenomatous Polyps			
Types	Incidence	Villous tissue	Risk of Malignancy
Tubular	**65-80%**[Q]	<25%	5%
Tubulovillous	10-25%	25-75%	20%
Villous	5-10%	**>75%**[Q]	**40%**[Q]

41. Ans. c. Potentially malignant intestinal polyps *(Ref: Sabiston 19/e p1346-1347; Schwartz 10/e p292,1206, 9/e p1043; Bailey 26/e p129, 25/e p631; Shackelford 7/e p2047)*

Cowden's Disease

- Characterized by **multiple hamartomatous tumors** arising from **all three embryonal cell layers** (ectoderm, mesoderm and endoderm), **mucocutaneous lesions**, **developmental anomalies**[Q] and a predilection to develop breast and thyroid neoplasia.
- **Polyps** arise more commonly from **ectodermal**[Q] rather than endodermal elements.

  - **MC feature: Multiple trichilemmomas**[Q] (type of benign hair shaft tumor)
  - **2nd MC system** involved: **CNS**
  - Associated with megalencephaly, ataxia, epilepsy, dysplastic gangliocytoma of the cerebellum known as **Lhermitte Duclos syndrome**[Q].

- **Polyps** are **typically small** and occur from mouth to anus, but are observed **most commonly** in the **colon**[Q].
- Developmental disorders include **high arched palate** and **adenoid facies, prominent forehead, hypolastic mandible.**
- **Gene**: **PTEN gene (10q23.3)**[Q]

Associations

- Estimated lifetime risk of **thyroid cancer** (mainly **FCT**): **10%**
- Estimated lifetime risk of **breast cancer**: **30-50%**.
- **No increased risk** of **invasive** gastrointestinal **malignancy**[Q]

42. Ans. a. Cowden's syndrome **43. Ans. a. Pedunculated polyp** **44. Ans. d. Familial adenomatous polyposis**

45. Ans. b. Double contrast barium enema *(Ref: Harrison 18/e p770-771; Bailey 26/e p1162, 25/e p1181)*

- **Best investigation** for **diagnosis of colorectal polyps**: **Colonoscopy >Double-contrast barium enema**[Q]

Screening for Colorectal Cancer

- **American Cancer Society** suggests **fecal Hemoccult screening annually** and **flexible sigmoidoscopy every 5 years** beginning at **age 50** for **asymptomatic individuals**[Q] having no colorectal cancer risk factors.

  - The American Cancer Society has also endorsed a "**total colon examination**" (i.e., **colonoscopy** or **double-contrast barium enema**) **every 10 years as an alternative**[Q] to Hemoccult testing with periodic flexible sigmoidoscopy.

- **Colonoscopy** has been shown to be **superior to double-contrast barium enema** and also to have a **higher sensitivity for detecting villous** or **dysplastic adenomas** or **cancers**[Q] than the strategy employing occult fecal blood testing and flexible sigmoidoscopy.

  - **Double-contrast barium enema** is **done** when **colonoscopy** is **contraindicated**[Q].

Colorectal cancer is an ideal candidate for screening
• It is a **common** and **serious problem**[Q] • Precursor lesions exist[Q] • It is **slow growing**[Q] • **Testing** is **available**[Q]

46. Ans. a. Sessile **47. Ans. a. Villous adenoma**

48. Ans. b. Pseudopolyps of ulcerative colitis has high risk of malignancy

49. Ans. a. Sessile polyps >1 cm is malignant, b. MC site is colon and rectum, c. Adenomatous polyp is premalignant

50. Ans. a. Juvenile polyposis syndrome, b. Peutz-Jegher's syndrome, c. Ulcerative colitis, e. Cronkhite Canada syndrome *(Ref: Schwartz 10/e p1206, 9/e p1043; Shackelford 7/e p2047)*

Cronkhite-Canada Syndrome

- It is an **acquired**[Q], nonhereditary, non-familial gastrointestinal polyposis disorder associated with **skin pigmentary changes**, **hair loss,** and **nail atrophy** (**onychodystrophy**).
- **No evidence** of **colorectal malignancy**[Q]

Characteristic Features

- **MC symptom** is **diarrhea**[Q].
- **Hair loss** occur in **all part of body**[Q] and hair regrowth during spontaneous remission and after therapy.
- **Polyps** are found throughout the gastrointestinal tract with **characteristic esophageal sparing**[Q].
- **MC site of polyp: Stomach**[Q]

> - **Mortality** associated with this syndrome is **upto 60%** due to associated **non-malignant complications** (**diarrhea, dehydration, hypoproteinemia**)[Q].

Management

- Supportive care, with management of **fluids, electrolytes, nutrition** and **anemia** is important consideration.
- **Medical management** is usually required for **6-12 months**, and **corticosteroids** have been used with success for disease **recurrence**[Q]

51. Ans. c. Peutz-Jegher's syndrome

52. Ans. b. Hyperplastic polyp **53. Ans. a. Juvenile polyps** **54. Ans. c. Juvenile polyp**

55. Ans. b. Solitary polyp **56. Ans. b. Hypokalemic metabolic acidosis** *(Ref: Harrison 18/e p313, 352; 17/e p250)*

McKittrick-Wheelock Syndrome

- Villous adenoma causing **profuse watery diarrhea** and **hypokalemia, hyponatremia, hypochloremia** and **metabolic acidosis**[Q].
- **Severe volume loss** can lead to **acute renal failure** and **cardiovascular collapse**[Q].
- Treatment is **resuscitation** followed by **resection**[Q].

57. Ans. d. Peutz-Jegher's syndrome *(Ref: Sabiston 19/e p1345; Schwartz 10/e p1202, 9/e p1043; Bailey 26/e p1159, 25/e p1175-1176; Shackelford 7/e p2045-2046)*

58. Ans. b. Peutz-Jegher's Syndrome

Peutz-Jegher's Syndrome (AD)

- **Hamartomatous** polyps (usually <100) throughout the GIT, **most common** in **jejunum**[Q]
- Associated with **hypermelanotic macule** in the **perioral region**, **buccal mucosa**[Q].
- **Mucocutaneous pigmentation** usually occurs **during infancy** and most commonly noted in **perioral** and **buccal** region.

> - **Pigment spots** usually appear in **first few years** of life, reach a **maximum level** in **early adolescence** and **can fade** in **adulthood**[Q]. However, **pigmentation** on the **buccal mucosa remains throughout** the **life**[Q].
> - The **pigmented macules** of PJS have **no malignant potential**[Q].

- **Polyposis** develops by **age 20**, occur most commonly in the jejunum (**jejunum**[Q] **>colon >stomach**).

Histology

- Smooth muscle extends into the superficial epithelial layer in a tree like manner known as **arborization**[Q].
- **Pseudoinvasion** (**epithelial cell trapping**)[Q] is noted in upto 10% of polyps >3 cm.

Genetics

- It exhibits **autosomal dominant** inheritance

- Chromosome **19p13.3** encodes the serine threonine kinase **LKB1/STK11.**

Extra-intestinal Features

- **Increased risk** for **extra-intestinal cancer** of the **pancreas, thyroid, breast** (may be bilateral), lung, gall bladder, biliary tract (**cholangiocarcinoma**)[Q].
- Increased risk of **gynecologic malignancies** of the **ovary** (bilateral **sex cord tumors** with annular features) and **uterus** (**well-differentiated adenocarcinoma** of the cervix, known as **adenoma malignum**)[Q]
- In men there is increased risk of **feminizing Sertoli cell tumors** of the **testis**.

59. Ans. b. Familial polyposis coli **60. Ans. d. None of the above**

61. Ans. b. Multiple flat polyps about hundreds *(Ref: Sabiston 19/e p1346-1347; Shackelford 7/e p2047)*

Ruvalcaba-Myhre-Smith Syndrome

- Also referred to as **Bannayan-Zonana** syndrome[Q], Ruvalcaba-Riley smith syndrome, and Bannayan-Riley-Ruvalcaba syndrome
- Characterized by **hamartomatous polyposis** and **OLD HM-2**

OLD HM-2
• **O**cular abnormalities, **L**ipomas, **D**evelopmental abnormalities
• **H**ashimoto's thyroiditis, **H**yperpigmentation of penis.
• **Macrocephaly**, **M**ental retardation

- **No increased risk** of **colorectal carcinoma**, other **gastrointestinal** or **extraintestinal malignancy**[Q]

FAMILIAL ADENOMATOUS POLYPOSIS

62. Ans. a. AR inheritance *(Ref: Sabiston 19/e p1348-1349; Schwartz 10/e p1206-1207, 9/e p1043-1044; Bailey 26/e p1161-1162, 25/e p1177-1178; Shackelford 7/e p2033-2041)*

Familial Adenomatous Polyposis (AD)

- **FAP** is an **autosomal dominant**[Q] inherited syndrome
- Results in the development of **>100 adenomatous polyps**[Q].
- **Location** of **APC gene: Long arm** of chromosome **5q21**.
- **Increased number** of polyps **predisposes** patients to a **greater risk of cancer**[Q].
- Accounts for **<1%**[Q] of **all cases of CRC**
- **Earliest phenotypic change** present is known as **aberrant crypt formation**[Q]

- **Average age** of **adenoma development** in FAP is **15 years**[Q], with approximately 15% manifesting polyps by 10 years, 75% by 20 years, and 90% by 30 years of age.
- If left untreated, **colorectal cancer** develops in **nearly 100%**[Q] of these patients **by** age **40 years**[Q].

Extra-intestinal Features		
• **Osteomas (mandible and skull)**[Q]	• Thyroid papillary tumors	• CHRPE[Q]
• Desmoid tumors [Q]	• Medulloblastomas[Q]	• Benign **dental abnormalities**
	• Hypertrophic gastric **fundic polyps**[Q]	• Epidermoid cyst

- Congenital hypertrophy of the retinal epithelium (**CHRPEs)** are **asymptomatic** and have **no malignant potential**; and are significantly **larger, multiple, bilateral** and with **mixed pigment** than sporadic CHRPE.

- **After CRC**, the **MC malignancy** diagnosed **in** patients with **FAP** is **periampullary adenocarcinoma** of **duodenum**[Q].
- **After** the **CRC** is eliminated by surgery, **periampullary tumors**[Q] are **MC cause** of **death** among individuals with FAP.

- Others are tumors of the **brain, hepatoblastoma, adrenal gland, thyroid,** pancreas, biliary tree, stomach, and small intestine.

Diagnosis

- **Most common method** used **to screen** for **APC mutations** is the **APC gene testing** by **protein truncation test**[Q]

- Protein truncation test **detects 80%** of **disease causing mutations** but **doesn't detect missense mutation**[Q].
- **Combination** of **protein truncation test** and **strand gel electrophoresis** has upto **90%** mutation **detection rate**[Q].

- **Direct DNA sequencing** is the **most accurate** method of detecting APC mutations, with **95% detection rate**[Q].
- If a disease causing **mutation** is **documented** in a **family**, the **accuracy** of the test **for other** at risk family **members** is almost **100%**[Q].

- A **positive screening test** should be **confirmed with** a **diagnostic modality**
- Confirmatory tests include **direct DNA sequencing**, allele-specific oligonucleotide hybridization (**ASO-hybridization**), **ASO amplification** (ASO PCR), **RFLP**, and **ligase chain reaction**[Q].

Management

- **After** the **colorectal cancer** is **eliminated by surgery**, **periampullary tumors** are the **MC cause of death**[Q] among individuals with FAP.

- **Prophylactic proctocolectomy** is recommended for patients with FAP, given the near **100% risk** of **early-onset CRC**[Q].
- **Treatment of choice**: **Total proctocolectomy** with **ileal pouch–anal anastomosis** (IPAA)[Q].

Spigelman's Criteria

- **Spigelman's criteria predict** the **malignant risk** of **duodenal polyposis**[Q] **in** patients with **FAP** and guide surveillance and management.
- Spigelman's criteria are determined by duodenal polyp **number**, **size**, **histology** and **dysplasia** (score: **0-12**).

63. Ans. d. CHRPE can be detected by ophthalmoscopy in 25% patients

64. Ans. d. Total proctocolectomy with IPAA

65. Ans. d. Endometrial carcinoma is a prominent association *(Ref: Shackelford 7/e p2038)*

Endometrial carcinoma is a prominent association in HNPCC, not the FAP.

- Management of **duodenal polyps** in patients with FAP includes **medical intervention** (with **NSAIDs** such as sulindac), **endoscopic polyp ablation**, and **surgical resection**[Q].
- **Sulindac** has been used because of its **potential to stabilize**, and in some cases **reverse,** the **development of gastrointestinal neoplasia**, especially **colorectal adenomas**[Q].
- **Sulindac** is **most successful in** the treatment of **small (<1 cm) duodenal polyps**[Q]

66. Ans. d. Cowden's syndrome: 30% risk of CRC cancer

67. Ans. b. Periampullary carcinoma

68. Ans. d. Duodenal adenoma in 60-90% patients *(Ref: Shackelford 7/e p2037)*

- **Incidence** of **duodenal polyps** in the patients with **FAP**: **90-100%**[Q]
- **Incidence** of **duodenal carcinoma** in the patients with **FAP**: **0-5%**[Q]

69. Ans. a. Brain tumor *(Ref: Sabiston 19/e p1346-1347; Schwartz 10/e p666,1207,1485, 9/e p1043-1044; Bailey 25/e p1177-1178; Shackelford 7/e p2035, 2055)*

Gardner's Syndrome (AD)

The combination of FAP with:

- **Bony lesions** (**osteomas**[Q], cortical thickening of long bones and ribs)
- **Benign lymphoid polyposis of ileum**[Q]
- **CHRPE**[Q]
- **Dental anomalies**[Q] (impacted tooth, supernumerary tooth, dental cyst)
- **Desmoid tumors** and **sebaceous cyst**[Q]

70. Ans. d. Giant gastric folds

71. Ans. a. Autosomal recessive

72. Ans. b. Familial adenomatous polyposis, c. Brain tumors *(Ref: Sabiston 19/e p1346-1347)*

Turcot's Syndrome (AR)

- **MC brain tumors** are **medulloblastoma** and particularly **glioblastoma**.
- It is a **phenotypic variant** of **FAP** and is transmitted by an **autosomal recessive** gene.
- Turcot's syndrome kindreds fall into **two groups** based on their types of brain tumor and particularly genetic alteration.
- **Medulloblastoma** in **FAP**[Q]
- **Glioblastoma multiforme** in **HNPCC**[Q]

73. Ans. c. Multiple osteomas http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2635905/

GARDNER'S SYNDROME (AD)

- **Skeletal abnormalities**, the **most common** of which are **osteomas**, are an essential component of Gardner syndrome.
- The **osteomas** are characterized by **slow, continuous growth**, and occur **most frequently** in the **mandible**[Q], the outer cortex of the skull and the paranasal sinuses.
- The **angle of the mandible** is a **particularly diagnostic site**[Q].

74. Ans. c. Polyposis colon, osteomas, epidermal inclusion cysts and fibrous tumors of the skin

75. Ans. d. APC gene

- **Most common method** used **to screen** for **APC mutations** is the **APC gene testing** by **protein truncation test**[Q]

76. Ans. b. Always in 5th decade of life

77. Ans. a. Colonic polyps

78. Ans. a. It is due to a mutation of APC gene in chromosome 15

HEREDITARY NON-POLYPOSIS COLON CANCER

79. Ans. c. HNPCC *(Ref: Sabiston 19/e p1349-1350; Schwartz 10/e p291-292,1183,1207, 9/e p1044; Bailey 26/e p1162-1164, 25/e p1178-1179; Shackelford 7/e p1753-1754)*

HEREDITARY NONPOLYPOSIS COLORECTAL CANCER (AD)

- **HNPCC** is an **autosomal dominant**[Q] inherited syndrome
- **Defective mismatch repair genes** are located on chromosomes **2, 3** and **7**[Q]**.**
- **HNPCC** is responsible for **3-5%**[Q] of all cases of **CRC.**

  - **Incidence** of **adenomas** in **HNPCC** and **CRC** is **similar** to that of the **general population** with sporadic CRC.
  - **Adenomas in** patients with **HNPCC** have **higher incidence** of **high-grade dysplasia** and **villous architecture**[Q].
  - Polyps in patients with HNPCC develop at a **younger age**, **larger** than general population and **distributed equally**[Q] throughout colon.

- **CRC** are mostly **poorly differentiated** and **mucinous** and have **signet ring histology** and **"Crohn's like" pattern** of tumor **infiltrating lymphocytes**[Q]**.**
- Patients with HNPCC have **survival** that is **equivalent**, if not better than patients with **sporadic CRC** of similar stage.
- **Predominance of right sided** colon cancer and increased incidence of **synchronous** and **metachronous CRC**.

  - **Lynch syndrome I**: **CRC only**[Q]
  - **Lynch syndrome II**: **CRC** and **associated malignancies**[Q]

Diagnosis

- **Gold standard** for diagnosis of HNPCC is the detection of a **germline mutation** in **MMR gene**[Q].
- **Mismatch repair genes** associated with HNPCC: (**hMLH1, hMLH3, hPMS1, hPMS2**) and (**hMSH2, hMSH3, hMSH6**)[Q].

  - **More than 90%** of cases are due to **mutation** in **hMLH1** or **hMSH2**[Q]**.**

Extra-intestinal Features

- **Endometrial (39-60%)**[Q], **gastric (13-19%)**[Q], **ovarian (6-12%)**[Q]**,** small intestine, pancreatic, thyroid, transitional cell epithelium of the urinary tract (renal pelvic, ureter, bladder); brain cancers.
- **MC extraintestinal feature**: **Endometrial cancer**[Q].
- HNPCC associated tumor of the CNS: **Glioblastoma**

  - Association with benign and malignant **tumors** of the **sebaceous glands** and **keratocanthomas** is called **Muir-Torre syndrome**[Q]**.**

80. Ans. c. Muir-Torre syndrome

81. Ans. a. Lynch syndrome

82. Ans. b. All the three should be first degree relative *(Ref: Sabiston 19/e p1349; Schwartz 10/e p292, 9/e p1044; Shackelford 7/e p2041-2042)*

Revised Amsterdam Criteria

- **The Revised Amsterdam criteria** are used to **select at-risk patients**[Q] (all criteria must apply).

Criteria

- **Three or more relatives** who are diagnosed with an HNPCC-associated cancer (colorectal, endometrium, small bowel, ureter, or renal pelvis) in which **one** affected person is a **first-degree relative** of the **other two**[Q]
- At least **two successive generations** are affected[Q]
- **One or more cases** of cancer are diagnosed **before** age **50** years[Q]
- **FAP** has been **excluded**[Q], and tumors have undergone pathology review

- The **Bethesda guidelines** are established to **direct patient selection** for **MSI testing**[Q].

83. Ans. b CA stomach *(Ref: Sabiston 19/e p1350; Schwartz 10/e p291-292, 9/e p1044; Shackelford 7/e p2043)*

Extra-intestinal Malignancies in HNPCC

- **Endometrial (39-60%)**[Q] **>gastric (13-19%)**[Q] **>ovarian (6-12%)**[Q]
- Rare Malignancies: Small intestine, pancreatic, thyroid, transitional cell epithelium of the urinary tract (renal pelvic, ureter, bladder); brain cancers.

84. Ans. a. MSH-2 and hMLH-1

85. Ans. b. HNPCC

RISK FACTORS COLORECTAL CANCER

86. Ans. a. Ulcerative colitis, c. Familial polyposis coli *(Ref: Maingot 11th/626-629; Sabiston 19/e p1340-1342; Schwartz 10/e p291-292, 9/e p1041; Bailey 25/e p1179; Shackelford 7/e p2052-2058)*

Risk Factors for the Development of Colorectal Cancer	
1. **Dietary Factors:** • **High animal fat** diet[Q] • **Low fiber** diet[Q] • **Alcohol**[Q] 2. **Hereditary syndromes:** • **FAP**[Q] • **HNPCC**[Q]	3. **Inflammatory bowel disease** (Both **UC** and **Crohn's disease**)[Q] 4. **Streptococcus bovis** bacteremia[Q] 5. **Ureterosigmoidostomy**[Q] 6. **Smoking**[Q] 7. **Acromegaly**[Q] 8. **Pelvic irradiation**[Q]

Chemoprevention

- There is significant chemopreventive role of **NSAIDs, Calcium** carbonate, **Selenium** and **Hormone replacement therapy** in **colorectal neoplasia**[Q].

87. Ans. a. High fiber diet *(Ref: Maingot 11/e p626-627; Schwartz 9/e p1041; Shackelford 7/e p2052)*

- **High fiber diet** has been found to have **protective effect** by **increasing** the **stool bulk**, **diluting** the **toxins**, and **reducing** the **colonic transit time** and thus **reducing exposure time** to **fecal carcinogens**[Q].

88. Ans. d. p53 *(Ref: Sabiston 19/e p1341; Schwartz 9/e p421; Shackelford 7/e p2051)*

- The **most frequently mutated tumor suppressor gene** in **human neoplasia** is **p53** (TP53), located on **chromosome 17p**[Q].
- **Mutations in p53** are present in **75% of colorectal cancers** and **occur, rather late**[Q] in the adenoma-carcinoma sequence.

Fearon-Vogelstein Adenoma Carcinoma Multistep Model

- The **earliest mutations** in the adenoma-carcinoma sequence occur in the **APC gene**[Q]. The **earliest phenotype change** present is known as **aberrant crypt formation**[Q] and the **most consistent genetic aberrations** within these cells are abnormally short proteins known as **APC truncations.**
- **Most APC truncation mutations** occur in the mutational cluster region of the gene, an **area responsible** for **beta-catenin binding**[Q].
- **Mutations in p53** are present in **75% of colorectal cancers** and **occur rather late**[Q] in the adenoma-carcinoma sequence.

89. Ans. b. Beta-Catenin *(Ref: Sabiston 19/e p1338)*

Gene Mutations that Cause Colon Cancer	
Mutation type	**Genes Involved**
Germline	• **APC** and **MMR**[Q]
Somatic	• **Oncogenes: Myc, Ras, Src, erbB2**[Q] • **Tumor suppressor genes: p53, DCC, APC**[Q] • **MMR genes:** bMSH2, bMLH1, bPMS1, bPMS2, bMSH6, bMSH3[Q]
Genetic polymorphism	• APC[Q]

ADENOMATOUS POLYPOSIS COLI (APC) GENE

- **APC gene** is a **tumor suppressor gene** located on chromosome **5q21**[Q].
- **Its product** is 2843 amino acids in length and **forms a cytoplasmic complex** with **GSK-3β** (a serine-threonine kinase), β-catenin, and **axin**[Q].

- **APC** participates in **cell cycle control** by **regulating** the **intracytoplasmic pool of β-catenin**[Q].
- **APC** influences **cell cycle proliferation** by **regulating Wnt expression**[Q].

- The **Wnt signaling proteins** are closely associated with the **APC-β-catenin pathway**.
- Under normal conditions, **reduced intracytoplasmic β-catenin** levels **inhibit Wnt expression**.
- When **APC** is **mutated** however, β-catenin levels rise, and **Wnt is activated**.

90. Ans. a. Proximal colon cancer *(Ref: Maingot 11/e p628)*

- **Bile acids** can induce **hyperproliferation** of the **intestinal mucosa**[Q] via a number of intracellular mechanisms.

- **Cholecystectomy**, which alters the enterohepatic cycle of bile acids, has been associated with a **moderately increased risk** of **proximal colon cancers**[Q].

- It cannot be ruled out, however, that it is less the effect of the cholecystectomy than the impact of other, not yet identified factors in the lithogenic bile of such patients.
- A number of **cofactors** have been identified that **may enhance** or **neutralize the carcinogenic effects of bile acids**, e.g., the amount of **dietary fat, fiber**, or **calcium**[Q].
- **Calcium**, in fact, **binds bile acids** and thus may **reduce their negative impact**[Q].

91. Ans. b. Low fiber d. High fat intake, e. Japanese are common to develop carcinoma colon

92. Ans. a. More intake of animal fat, c. Ulcerative colitis, e. Polyps

93. Ans. a. Animal fat consumption, b. Familial adenomatous polyposis, c. Ulcerative colitis, d. Crohn's disease

94. Ans. a. FAP, b. Crohn's disease, c. Ulcerative colitis

95. Ans. b. Peutz-Jegher's syndrome

CARCINOMA COLON CLINICAL FEATURES AND DIAGNOSIS

96. Ans. a. Sigmoid *(Ref: Bailey 26/e p1163, 25/e p1179*

Site of Carcinoma	Frequency
Rectum (MC)[Q]	**38%**
Sigmoid colon (2nd MC)[Q]	**21%**
Cecum	**12%**
Transverse colon	5.5%
Ascending colon	5%
Descending colon	4%
Splenic flexure	3%
Hepatic flexure (LC)[Q]	**2%**

97. Ans. a. Left colon *(Ref: Sabiston 19/e p1350-1353; Bailey 25/e p1179-1184; Shackelford 7/e p2051-2058)*

Carcinoma Colon

- **Most common form** of **colon cancer** is **sporadic**[Q] in nature, without an associated strong family history.
- **MC site** of **colon cancer: Sigmoid**[Q]
- **MC site** of **metastasis: Liver >Lung**[Q]
- **Mucin production worsens** the **prognosis** since **mucin aids tumor extension**[Q]

- **Incidence** of **metastasis** is **related** to **depth of invasion**[Q]
- **Chemotherapy regimen: FOLFOX-IV (5-FU, Leucovorin, Oxaliplatin)**[Q]

Clinical Features

- **Symptoms** of colonic carcinoma are **non-specific** and generally **develop** when the **cancer** is **locally advanced**[Q].

Symptoms associated with colon cancer	
• **Abdominal pain (44%): MC**[Q]	• Hematochezia or melena (40%)
• Change in bowel habit (43%)	• Weakness or malaise (20%)

Right Colon	Left Colon
• **Fungating** or **cauliflower**[Q] type growth • **Cancer** may become quiet **large without** any **obstructing symptoms** due to relative **liquid** stool **consistency**[Q] • **Lesions ulcerate** leading to **chronic insidious blood loss**[Q] • Patients present with: **- Melena, anemia, fatigue**[Q] **- Abdominal pain**[Q] **- Mass** in **right iliac fossa**[Q] • **Good prognosis**[Q] as compared to left	• **Annular, constricting** or **stenosing** growth[Q] • **Symptoms** of **obstruction** is **more common**[Q] • Patients present with: **- Decrease** in **stool caliber**[Q] **- Alteration** of **bowel habbits** (**increasing constipation**)[Q] **- Palpable lump**[Q] • **Poor prognosis** (more **infiltrative**)[Q]

- **Lesions of transverse colon** are having **mixed symptoms** of **bleeding** and **obstruction**[Q].

Diagnosis:

- **Barium enema**: "**Apple core**" or "**napkin ring**" **lesion**, caused by a **constricting carcinoma**[Q]

Colonoscopy
• **Gold standard for diagnosis** of **colon cancer**[Q].
• **Permits biopsy** of the tumor **to verify the diagnosis**[Q]
• Inspect entire colon to **exclude metachronous polyps** or **cancers**[Q]
• **Incidence** of a **synchronous cancer** is about **3%**[Q].

- **Tumors causing complete obstruction**: **Water-soluble contrast enema** is useful in to **establish** the **anatomic level** of the **obstruction**[Q].

98. Ans. b. Carcinoma cecum
99. Ans. b. Carcinoma cecum
100. Ans. a. Anemia, b. Mass in RIF
101. Ans. b. Obstruction
102. Ans. b. Obstruction, c. Altered bowel habit
103. Ans. d. Fungating

104. Ans. d. Solitary liver metastasis is not a contraindication for surgery *(Ref: Sabiston 19/e p1459-1464; Schwartz 10/e p1293-1294, 9/e p1123; Bailey 26/e p1084-1085, 1168, 25/e p1098-1099; Blumgart 5th/1290-1305; Shackelford 7/e p1585-1589)*

Colorectal Liver Metastasis

- About **5-10%** of these patients are candidates for a potentially **curative liver resection** with a **5-year survival rates** range from **25-58%**[Q].
- About **two-third** of cases **recur**, but in high-risk situations (**four** or **more** tumors, **extrahepatic** disease), recurrence rates are generally **80%** or higher[Q].
- **Synchronous liver metastasis** is associated with **poor prognosis**

- About **half** of the **recurrences** are isolated to the **liver** and a small number of these patients (**5%**) are candidates for a **second liver resection** and can expect further **5-year survival** rates of **30-40%**.

- Resections of **extrahepatic metastases** that appear to be associated with the **best outcome** are **limited lung metastases**, **locoregional recurrences** of the primary tumor, and **portal lymph nodes.**

  - For patients with **unresectable disease**, **preoperative chemotherapy** has been shown to **convert some patients** to **complete resection**.
  - **Combinations of chemotherapy** and **complete resection** of **hepatic metastases** are **associated with long-term survival** in **up to 50%** of patients in modern series.

Factors most influential on outcome of Colorectal liver metastasis
1. Size **>5 cm**[Q]
2. Disease free interval **<1 year**[Q]
3. **More than one** tumor[Q]
4. **Lymph node-positive** primary lesion[Q]
5. CEA **>200** ng/mL[Q]

Contraindication to Liver Resection for Metastatic Colorectal Cancer (Ekberg Criteria)
• The presence of **four** metastasis **or more**[Q]
• Extrahepatic disease[Q]
• A resection margin of **<1 cm**[Q]

105. Ans. a. Have better image than conventional colonoscopy, b. VC is performed by CT and MRI, e. Helpful in pathology outside colon *(Ref: Harrison 18/e p771, 2422)*

Virtual Colonoscopy

- **VC** is a **medical imaging procedure** which **uses x-rays** and **computers** to produce **two-**and **three-dimensional images** of the **colon** and **rectum** and display them on a screen
- VC is **performed via CT** or with **MRI**[Q]
- After the examination, the **images produced** by the scanner must be **processed into a 3D image**[Q] (a cine program allows the user move through the bowel as if performing a normal colonoscopy).

  - **VC** is used to **diagnose colonic polyps, diverticulosis** and **cancer**[Q].
  - VC provides a **secondary benefit** of **revealing diseases** or **abnormalities outside** the **colon**[Q].

- **VC** provides **clearer, more detailed images than** a **barium enema**[Q]
- Takes **less time than** either a conventional **colonoscopy** or **barium enema**[Q].

Disadvantages of Virtual Colonoscopy
• Radiologist **cannot take tissue samples** (**biopsy**) or **remove polyps**[Q] during VC (conventional colonoscopy must be performed if abnormalities are found)
• **VC** performed **with CT exposes** the patient to **ionizing radiation**[Q]

106. Ans. c. Ba swallow, d. Ba follow through, e. Enteroclysis

- **Barium swallow** is used for anatomical disorders of **esophagus**[Q].
- **Barium meal** is used for anatomical disorders of **stomach**[Q].
- **Barium meal follow through** is used for anatomical disorders of **small intestine**[Q].
- **Barium enema** is used for anatomical disorders of **large intestine**[Q].
- **Enteroclysis** is also known as **small bowel enema**, used for small intestine[Q].

107. Ans. b. Depth of invasion *(Ref: Schwartz 9/e p1046; Shackelford 7/e p2133)*

- **Incidence** of **metastasis** (hence **prognosis**) is **related** to **depth of invasion**[Q]
- **No effect on Prognosis: Tumor size** and **duration** of symptoms[Q]
- **Tumor size** and **configuration** (endophytic, exophytic, annular) **do not carry** any **prognostic significance**[Q] in colorectal carcinoma.

108. Ans. d. Carcinoma is inevitable in untreated cases of FAP **109. Ans. a. Screening sigmoidoscopy**

110. Ans. d. Lymph node status *(Ref: Schwartz 10/e p1203-1216, 9/e p1046; Shackelford 7/e p2133-2134)*

Prognostic Factors in Colorectal Carcinoma

- **Most important prognostic factor** for **colorectal carcinoma**: **Stage of the disease**Q
- Single **most important independent prognostic factor** for colorectal carcinoma**: LN status**Q
- The **stage of disease** gives **information related to depth of penetration** into bowel wall and **extent of regional node spread**, both of which are the two most important independent prognostic factorsQ.

No effect on Prognosis

- **No effect on Prognosis: Tumor size** and **duration** of symptomsQ
- **Tumor size** and **configuration** (endophytic, exophytic, annular) **do not carry** any **prognostic significance**Q in colorectal carcinoma.

111. Ans. b. Stage of lesion

112. Ans. a. 1/3rd of cases show liver metastasis, b Obstruction common in sigmoid colon, c. CEA is useful for prognostic importance, e. Alternate bowel habit is common in CA left colon *(Ref: Schwartz 9/e p1048; Harrison 18/e p773)*

- **Schwartz:** "Between **20-40%** of patients who have **undergone curative intent surgery** for **colorectal carcinoma** eventually **develop recurrent disease**. While **most** of these patients will **present with distant metastasis**, a small proportion will have isolated local recurrence."
- **Harrison:** "Regardless of the clinicopathologic stage, a **preoperative evaluation** of the **plasma CEA level predicts** eventual **tumor recurrence**."

Factors Associated With a High Risk of Relapse for Colorectal Cancer		
• Disease **Stage**Q • High-**Grade**Q tumor • Location (**pelvis** and **splenic flexure**Q) • **Obstruction/Perforation**Q	• **Venous** invasionQ • **Perineural** invasionQ • **Mucin** productionQ • Diminished stromal **immune reaction**Q	• **Aneuploidy**Q • **p53** gene mutationQ • **Low microsatellite instability**Q • **Age** <30 yearQ

113. Ans. d. More common in AIDS patients *(Ref: CSDT 11th/723)*

www.hiv.va.gov/provider/manual-primary.../cancer-screening.asp

- **Obstructive features** are more common with **left colon**.
- Approximately **10% lesions** are **not resectable at the time of operation**, and an **additional 20%** of patients have **liver** or **distant metastasis** at the time of presentation. **Operation for cure** can be performed in rest of the **70% of patients**.
- **HIV-infected** persons may be at slightly increased **risk of CRC**

114. Ans. c. Depth of penetration of bowel wall

115. Ans. b. Most common site is sigmoid colon, c. Right sided colon carcinoma present as chronic anemia, e. Right sided colon has better prognosis than left sided colon *(Ref: Robbins 8/e p863)*

- **Left sided colon cancers** are **more infiltrative at** the time of **diagnosis than right lesions,** associated with **poor prognosis**Q**.**

116. Ans. None: Incidence of carcinoma in **cecum** is **12%**Q**.**

117. Ans. d. Colonoscopy and biopsy

118. Ans. c. Colonoscopy

119. Ans. d. Sigmoid colon

120. Ans. a. Sigmoid

121. Ans. d. Sigmoid colon *(Ref: Shackelford 7/e p1747-1748; Harrison 18/e p2409)*

Risks Associated with Colonoscopy

- **Risks of colonoscopy: Perforation** and **hemorrhage**Q
- **MC site** of **bleeding after colonoscopy**: **Stalk** after polypectomy.
- **MC site** of **perforation** during colonoscopy: **Sigmoid colon**Q
- **Perforation** can be caused by **excessive air pressure**, **tearing** of the antimesenteric border of the colon **from excessive pressure** on colonic loops, and at the sites of **electrosurgical applications**Q

122. Ans. d. Carcinoma ascending colon

CARCINOMA COLON STAGING

123. Ans. d. III *(Ref: Sabiston 19/e p1355; Shackelford 7/e p2134)*

7th AJCC: TNM Classification of Colorectal carcinoma	
Tis: Carcinoma in situ: intraepithelial or invasion of lamina propria	**N1a:** Metastasis in 1 regional LN
T1: Tumor invades **submucosa**	**N1b:** Metastasis in **2-3** regional LN
T2: Tumor invades **muscularis propria**	**N1c: Tumor deposits** in in the **subserosa, mesentery,** or **nonperitonealized pericolic** or **perirectal tissues without regional LN metastasis**
T3: Tumor invades through the muscularis propria **into pericolorectal tissue**	**N2a:** Metastasis in **4-6** regional LN
T4a: Tumor **penetrates** the surface of **visceral peritoneum**	**N2b**: Metastasis in **7 or more** regional LN
T4b: Tumor directly **invades** or is **adherent** to other **organs** or **structures**	**M1a:** Metastasis confined to **one organ or site** (e.g. Liver, lung, ovary, non-regional node)
	M1b: Metastasis to **more than one organ**/site or the **peritoneum**

Stage Grouping					
IA	**IIA: T3N0**	**IIIA**	**IIIB**	**IIIC**	**IVa: M1a**
T1N0 **T2**N0	**IIB: T4a**N0 **IIC: T4b**N0	**T1-T2, N1/N1c** **T1, N2a**	**T1-T2, N2b** **T2-T3, N2a** **T3-T4a, N1/N1c**	**T3-T4a, N2b** **T4a, N2a** **T4b, N1-N2**	**IVb: M1b**

Modified Duke's Classification	
Stage	**Description**
A	**Confined** to the **bowel wall**Q
B1	**Partially penetrated** the **muscularis propria**Q
B2	**Fully penetrated**Q the muscularis propria
C1	**Lymph node invasion without penetration** of the entire bowel wallQ
C2	**Lymph node invasion with penetration**Q **of the entire bowel wall**
D	**Distant metastasis**Q

124. Ans. d. T4N1M0

CARCINOMA COLON TREATMENT

125. Ans. a. Colostomy, d. Hartmann procedure, e. Laser recanalisation *(Ref: Maingot 11th/705; CSDT 11th/722; Sabiston 19/e p3154-3156; Schwartz 9/e p1048-1049; Bailey 26/e p1165-1169, 25/e p1181-1184; Shackelford 7/e p2060-2066)*

- Maingot: "**Hartmann's operation** is an **excellent palliative procedure done** in **elderly people** who are **not fit for major surgery** like APR and also **in locally advanced tumors**Q."
- **Unresectable rectal cancer** can be **palliated by fulgration** (**electrocoagulation**) or **laser photocoagulation**Q.
- **Diverting colostomy** is performed **for obstructing rectal cancer that cannot be resected**Q.

Treatment of Large Bowel Obstruction	
Site of Obstruction	**Procedure**
Right-sided colonic obstruction (cancer or volvulus)	• **Resection** with **ileo-transverse anastomosis**Q
Cancer of sigmoid colon	• **Hartmann's operation**Q (sigmoidectomy with descending colostomy and closure of the rectal stump), • **Sigmoidectomy** with **primary colorectal anastomosis**Q • **Abdominal colectomy** with **ileorectal anastomosis**Q.
Cancer of **distal** or **mid rectum**	• **Loop colostomy** or **defunctioning colostomy** (to relieve obstruction) followed by **neoadjuvant chemoradiation**Q, (with the plan to resect the primary lesion at a later time)

126. Ans. a. Hartman's procedure, b. Left colectomy with anastomosis, c. Proximal colostomy, d. Extended right colectomy with ileoanal anastomosis

127. Ans. d. Staged operation, e. Chemotherapy *(Ref: Sabiston 19/e p1460-1463)*

Colorectal Liver Metastases

- With **improved response rates** to **modern chemotherapy** and advances in hepatic surgery, however, **more patients** are **now candidates for hepatectomy**[Q] than in the past.
  - For patients with **unresectable disease**, **preoperative chemotherapy** has been shown to **convert some patients** to **complete resection**[Q].
  - **Combinations of chemotherapy** and **complete resection** of **hepatic metastases** are **associated with long-term survival** in **up to 50%** of patients in modern series.
- **Complete resection** of hepatic metastases **appears to be a critically important treatment modality** that is **necessary for long-term survival**[Q].

Metastatic Colorectal Carcinoma

- At present, only patients who have recurrence of colorectal carcinoma with defined **isolated liver, lung, ovarian**, or **anastomotic metastasis** should **undergo surgery**[Q].

Pulmonary Metastasis

- Prognostic factors include the **number** of metastases, **size** of the lesion, **lymph node involvement,** presence of **additional metastatic sites** and in some series pre-thoracotomy CEA levels.
- Neither primary disease free survival nor primary colorectal cancer stage significantly affect survival rates after thoracotomy.

Prophylactic Bilateral Oophorectomy

- Incidence of **ovarian cancer** with a history of colorectal cancer is **five times**, so the prevention of primary ovarian cancer in postmenopausal women is considered to be the main benefit.

128. Ans. a. Mechanical bowel wash, c. Broad spectrum antibiotic at the time of operation

129. Ans. a. Resection

130. Ans. a. Primary resection and Hartman's procedure, b. Defunctioning colostomy, d. Resection of whole left bowel and end to end anastomosis

131. Ans. a. Hartman's procedure, b. Left colectomy with anastomosis, c. Proximal colostomy, d. Extended right colectomy with ileoanal anastomosis

132. Ans. b. Hartman's procedure

Treatment of Colon Cancer According to Stage	
Stage 0: (**Tis**, N0, M0)	• **Endoscopic polypectomy** for polyps containing **carcinoma in situ**
Stage I: (**T1**, N0, M0) **Malignant Polyp**	• Segmental colectomy[Q]
Stages I and II: (**T1–3**, N0, M0) **Localized Colon Carcinoma**	• Surgical resection[Q]
Stage III: (Tany, **N1**, M0) **Lymph Node Metastasis**	• **Surgical resection+ Adjuvant chemotherapy**[Q] (routinely) • **Reference regimen: FOLFOX-IV**[Q] (5-FU, Leucovorin, Oxaliplatin)
Stage IV: (Tany, Nany, **M1**) **Distant Metastasis**	• **MC site of metastasis**: **Liver >Lung**[Q] • **Resection (metastasectomy)** for **isolated, resectable metastasis + adjuvant chemotherapy**[Q] • **Palliation** for unresectable disease

Indications of adjuvant chemotherapy in Stage II
1. **Insufficient lymph node sampling**[Q] (**<12** nodes resected with the specimen)
2. **Perivascular invasion**[Q]
3. **Poorly differentiated** histology[Q]
4. Bowel **obstruction** or **perforation**[Q]

Chemotherapy in CA Colon

- **FOLFOX-IV[Q] (5-FU, Leucovorin, Oxaliplatin)** is the **reference regimen** with **infusional 5-FU**
- **Irinotecan** based regimen should **not** be **used in the adjuvant setting**, as randomized data have shown increased toxicity and no long term benefit.
- **Bevacizumab, cetuximab** and **panitumumab** should also **not be used** in the **adjuvant setting**, as they add toxicity and expense, and do not add benefit.
- **Irinotecan, bevacizumab and cetuximab** are used for **systemic metastatic disease** or **stage IV[Q]**.

Post-Resection Follow-Up

- In candidates for resection of recurrent disease (e.x. hepatic resection) serum **CEA** testing should be performed **every 3 to 4 months** for 2 to 3 years after resection of the primary tumor. (The **half-life** of **CEA** is **7-14 days[Q]**.)
- **CEA** is **most sensitive** for detection of **retroperitoneal** and **hepatic metastases[Q].**
- The rationale for **colonoscopy** is **not to define recurrent cancer;** the major rationale is to **define synchronous** or **metachronous bowel tumors**, usually polyps.
- **Colonoscopy** is recommended at **1 year after resection[Q],** and every **3 years** thereafter.

COLONIC ISCHEMIA

133. Ans. b. Ischemic colitis *(Ref: Sabiston 19/e p1335-1337; Schwartz 9/e p1057; Bailey 26/e p1174, 25/e p1203; Shackelford 7/e p1866-1877)*

Colonic Ischemia

- **Intestinal ischemia** occurs **most commonly** in the **colon[Q]**.
- Unlike small bowel ischemia, **colonic ischemia** is **rarely associated with major arterial** or **venous occlusion[Q]**.
- **Most colonic ischemia** appears to **result from low flow** and/or **small vessel occlusion[Q]**.

> - **MC site** of **ischemic colitis**: **Splenic flexure[Q]**

- **Ligation** of the **IMA during aortic surgery** predisposes to **colonic ischemia[Q]**.
- **Splenic flexure** is the **MC site[Q]** of ischemic colitis (any segment of the colon may be affected)
- **Rectum** is **relatively spared** because of its **rich collateral circulation[Q]**.

Risk factors for Colonic Ischemia	
• **Vascular disease[Q]**	• **Vasculitis[Q]**
• **Diabetes mellitus[Q]**	• **Hypotension[Q]**

Clinical Features

- Diagnosis of ischemic colitis is often based upon the **clinical history** and **physical examination[Q]**.
- **Mild ischemia**: **Diarrhea** (usually bloody) **without abdominal pain[Q]**.
- **Severe ischemia**: **Intense abdominal pain** (often out of proportion to the clinical examination), **tenderness, fever**, and **leukocytosis[Q]**
- **Peritonitis** and/or **systemic toxicity** are signs of **full-thickness necrosis** and **perforation.**

Diagnosis

- **Abdominal X-ray**: **Thumb printing[Q]** (due to **mucosal edema** and **submucosal hemorrhage)[Q]**.
- **CT scan**: Nonspecific **colonic wall thickening** and **pericolic fat stranding[Q]**.
- **Angiography** is usually **not helpful[Q]** because major arterial occlusion is rare.

> - **Sigmoidoscopy:** Characteristic **dark, hemorrhagic mucosa[Q]**
> - **Risk of precipitating perforation** is **high**, so **sigmoidoscopy** is **relatively contraindicated[Q]** in ischemic colitis.

Treatment

- **Majority** of patients with ischemic colitis **can be treated medically[Q]**.
- **Bowel rest** and **broad-spectrum antibiotics** are the mainstay of therapy (**80%** of **patients recover[Q]** with this regimen)

Indications of Surgery
• **Failure to improve** after **2 to 3 days** of **medical management**[Q]
• **Progression**[Q] of symptoms
• **Deterioration** in clinical condition[Q]

Complications

- **Stricture** (10-15%): **MC site of stricture** is **sigmoid colon**[Q]
- **Chronic segmental ischemia** (15-20%).

134. Ans. d. Transection of IMA doesn't need reimplantation if aortic surgery is attempted *(Ref: Sabiston 19/e p1335, 1705)*

- Indeed, the **IMA is frequently occluded** in **conditions requiring aortic surgery**, and **in such circumstances**, **transection of** the **IMA does not require reimplantation**[Q]. However, **in this situation**, the **left colon is dependent** on **collateral blood supply**, and transient hypotension at the time of the vascular procedure or immediately after surgery may result in ischemic injury to the vulnerable colonic mucosa.
- In **aortic surgeries**, the **IMA is assessed for backbleeding**. If there is **strong backbleeding** (stump pressure **>40 mm Hg**), the **IMA is ligated close to the aorta** or oversewn from within the sac. **Poor backbleeding from** the **IMA** is a **sign of insufficient collateral circulation** to the **sigmoid colon**, and **reimplantation of the IMA** with a **patch of the aorta into** the **aortic limb is warranted**[Q].

135. Ans. d. Sigmoid colon

136. Ans. b. Splenic flexure

Important Most Common Sites	
• Gastric ulcer[Q]	**Lesser curvature (near incisura angularis)**
• Peptic ulcer[Q] • Gastric outlet obstruction[Q]	**1st part of duodenum**
• Small bowel[Q] adenocarcinoma • Atresia[Q]	**Duodenum**
• **Polyps** in **PJS**[Q] • **Pneumatosis intestinalis**[Q]	**Jejunum**
• **Crohn's** disease[Q] • **Fistula, perforation** and **carcinoma in Crohn's** disease[Q] • **Typhoid** ulcer[Q] • **Tubercular** ulcer[Q] • **Small intestinal lymphoma**[Q] • **Gall stone ileus**[Q]	**Terminal Ileum**
• **Amebic colitis**[Q] • Bleeding in **angiodysplasia**[Q] • **Bleeding** in **colonic diverticula**[Q]	**Cecum and ascending colon**
• Ischemic colitis[Q]	**Splenic flexure**
• **Colonic diverticula**[Q] • **Stricture** after **ischemic colitis**[Q] • **Volvulus**[Q]	**Sigmoid**
• Ulcerative colitis[Q] • Colorectal cancer[Q] • Hirschprung's disease[Q]	**Rectum**

137. Ans. c. Ischemic colitis

PSEUDOMEMBRANOUS COLITIS

138. Ans. b. Clostridium difficile *(Ref: Sabiston 19/e p1334-1335; Schwartz 10/e p1222, 9/e p1057; Bailey 26/e p1159, 25/e p1165)*

Pseudomembranous Colitis

- **PMC** is caused by **C. difficile**, a **gram-positive**[Q] bacillus.
- **C. difficile colitis** is the **leading cause** of **nosocomially acquired diarrhea**[Q].

Pathogenesis

- Colitis is thought to result from **overgrowth** of this **organism after depletion of** the **normal commensal flora** of the gut **with** the use of **antibiotics**[Q].

> - **Clindamycin**[Q] was the **first antimicrobial agent** associated with **C. difficile colitis,** almost **any antibiotic** may **cause this disease**.
> - Toxins produced: **Toxin A** (an **enterotoxin**) and **toxin B** (a **cytotoxin**)[Q].

- **Immunosuppression**, **medical comorbidities**, **prolonged hospitalization** or **nursing home residence**, and **bowel surgery increase** the risk[Q].

Clinical Features

- The **spectrum of disease** ranges from **watery diarrhea** to **fulminant, life-threatening** colitis

Diagnosis

- Diagnosis is made after **detection of one** or **both toxins by:**
  - **Stool cytotoxin assay**[Q]
  - **ELISA**[Q]
- **Colonoscopy**: Characteristic **ulcers, plaques**, and **pseudomembranes**[Q]

Treatment

- **Immediate cessation** of the **offending antimicrobial agent**[Q].
- **Mild disease:**
  - **Oral metronidazole** (10-day course): **Drug of choice**[Q]
  - **Oral vancomycin**: **Second-line agent,** used in **metronidazole allergy** or in **recurrent disease**[Q]
- **Severe disease**: **Bowel rest**, **IV hydration**, and **IV metronidazole** or oral **vancomycin**[Q].

> - **Recurrent colitis** occurs in up to **20%** of patients and may be **treated by a longer course** of **oral metronidazole** or **vancomycin** (up to 1 month).
> - **Fulminant colitis**, characterized by septicemia and/or evidence of perforation, **requires emergent laparotomy**[Q].

139. Ans. c. Metronidazole **140. Ans. c. Antibiotic associated diarrhea**

COLONIC RESECTION AND ANASTOMOSIS

141. Ans. b. Start IVF, c. Do urgent laparotomy *(Ref: CSDT 11/e p24)*

Wound Dehiscence (Burst Abdomen)

- **Serous** or **serosanguinous discharge** from the wound is the **first sign**[Q] of dehiscence

> - **Most commonly** observed between **5th** and **8th** post-operative **day**[Q] (may occur at any time following wound closure)

- Wound dehiscence is **partial** or **total disruption** of any or all layers of the operative wound.
- **Extrusion** of **abdominal viscera** after rupture of all layers is known as **evisceration**[Q].

Predisposing Factors for Wound Dehiscence	
Local Risk Factors	**Systemic Risk Factors**
• **Inadequate closure (Most important)**[Q] • **Increased** intra-abdominal **pressure** • **Deficient wound healing** due to: - **Infections**[Q] - **Seroma**[Q] - **Hematoma**[Q] - **Presence of drain**[Q]	• **Old age**[Q] • **Obesity**[Q] • **Immunosuppression**[Q] • **Systemic diseases:** - **Diabetes**[Q] - **Uremia**[Q] - **Jaundice, Sepsis**[Q] - **Cancer**[Q]

Management

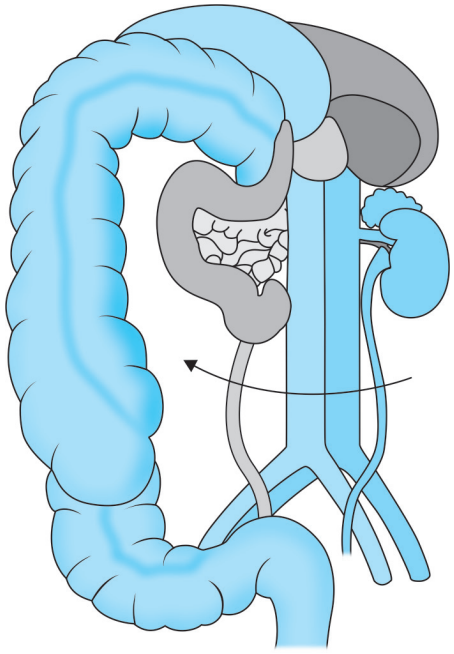
- **Wound dehiscence** without evisceration: **Prompt elective closure**[Q] of the wound
- **Wound dehiscence with evisceration:**
  - Wound is **covered with moist towels**
  - Under GA, **any exposed bowel** or **omentum** is rinsed with **RL** containing **antibiotics** and then **returned to abdomen**
  - Previous sutures are removed, wound is reclosed (**Tension suturing**[Q])

142. Ans. b. IV fluids, e. Urgent surgery **143. Ans. b. 5-10 days** **144. Ans. d. Ischemia**

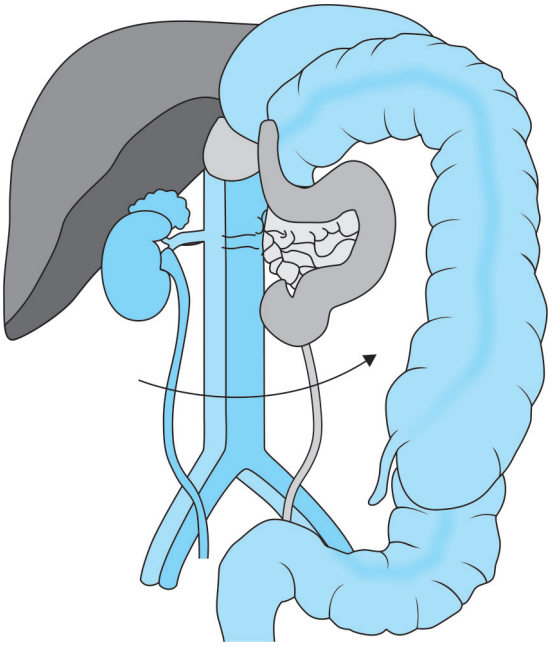
145. Ans. d. Cecum and ascending colon *(Ref: Sabiston 19/e p1796-1797)*

Maneuvers for Retroperitoneal Exposure

Kocher's Maneuver	Extended Kocher's Maneuver	Mattox Maneuver	Cattel-Braasch Maneuver
• Surgical maneuver to **expose structures** in the **retroperitoneum**[Q] **behind** the **duodenum** and **pancreas**[Q] • Used for **mobilization of duodenum**[Q]	• **Right sided medial visceral rotation**[Q] • **Right colon** and **duodenum** is **reflected medially**[Q] • **Exposes IVC, Infrarenal aorta, right renal artery** and **iliac vessels**[Q] • Recommended for **drainage** of **infra-mesocolic hematoma**[Q]	• **Left sided medial visceral rotation**[Q] • Left sided viscera (**Left kidney**, **left colon**, **spleen** and **pancreas**) are **brought to midline**[Q] • **Exposes** entire length of **abdominal aorta**, **celiac axis**, **proximal part** of **mesenteric arteries** and **proximal left renal artery**[Q] • Recommended for **drainage** of **central supra-mesocolic hematoma**[Q]	• For **extensive retroperitoneal exposure**[Q] • **Right colon** is **fully mobilized** and **reflected medially**[Q] • Good option for **exposure of** the **infrapancreatic segment**[Q]



Left medial visceral rotation to expose the abdominal-aorta



Right medial visceral rotation to expose the infrahepatic vena cava

146. Ans. b. Right hemicolectomy

ENTERIC FISTULA

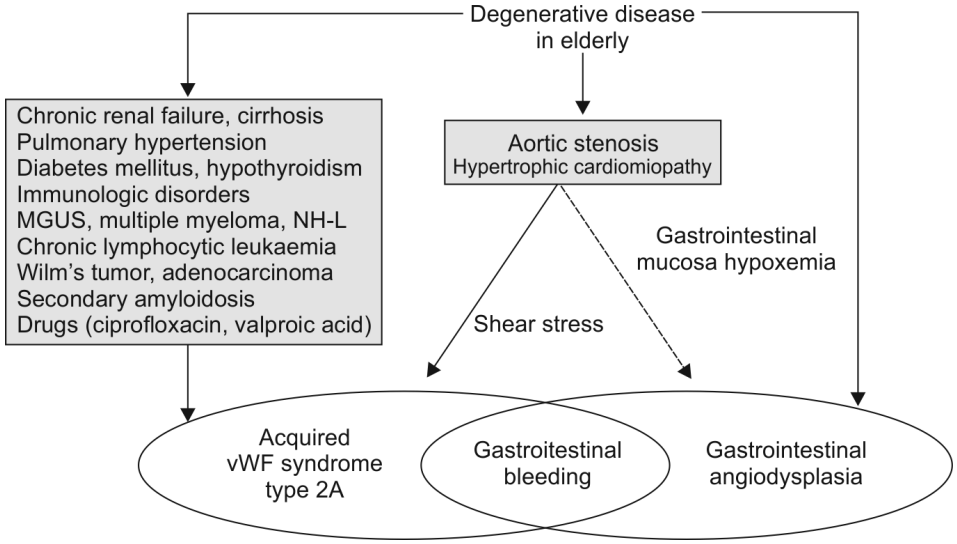
147. Ans. a. High output fistula drains 500 ml/day, c. Fluid and electrolyte loss can occur

148. Ans. a. Crohn's disease

LOWER GI BLEED

149. Ans. d. Dilated mucosal and submucosal veins in the colon *(Ref: Harrison 18/e p972; Bailey 26/e 1174, 25/e p1157)*

Diagnosis in a 65-year-old patient of bleeding per rectum with syncope and negative fecal occult blood test and no history of recent weight loss is Heyde's syndrome. The colonoscopic finding in Heyde's syndrome is dilated mucosal and submucosal veins in the colon.



HEYDE'S SYNDROME

- **Heyde's syndrome** is a **triad of aortic stenosis,** an **acquired coagulopathy** and **anemia** due to **bleeding from intestinal angiodysplasia**Q.
- It is due to the induction of **von-Willebrand disease type IIA** by the **valvular stenosis**Q**.**

Clinical Features:

- **Gastrointestinal hemorrhage** may present as **hematemesis**, **melena**, or **hematochezia**.
- **It is not necessary for the aortic stenosis to lead to any other symptoms,** but **evidence of heart failure, syncope, or chest pain may be present** if the stenosis is severe.

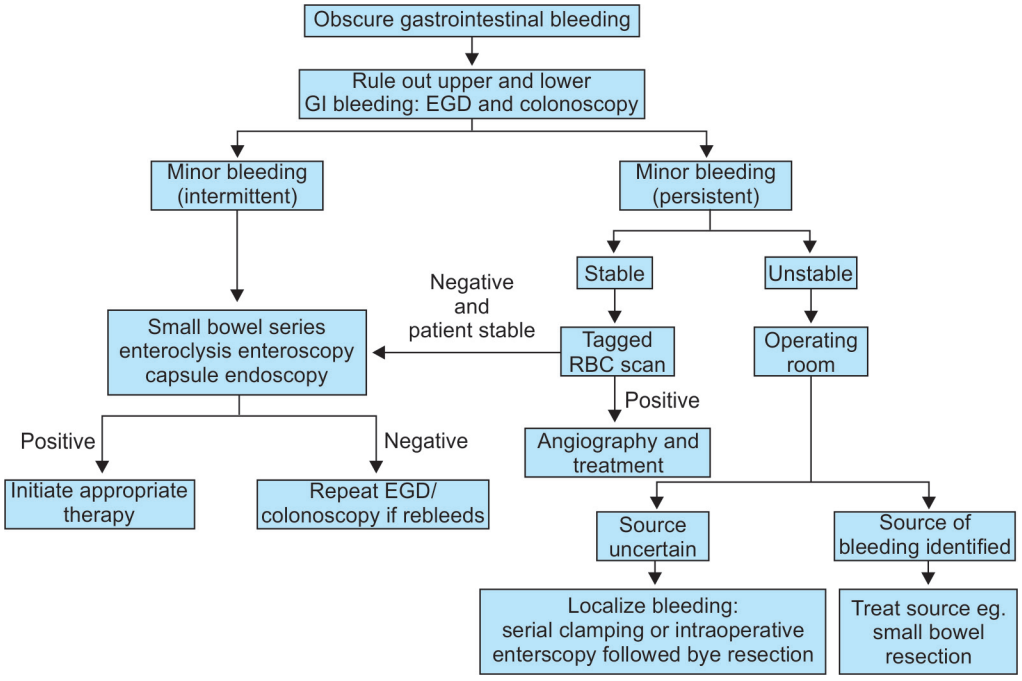
Diagnosis:

- **Endoscopy or colonoscopy shows angiodysplasia**Q **(Dilated mucosal and submucosal veins).**

150. Ans. c. Aortic stenosis, gastrointestinal bleeding and angiodysplasia of colon *(Ref: Harrison 18/e p972; Bailey 26/e p1174, 25/e p1157)*

151. Ans. b. Colonoscopy *(Ref: Sabiston 19/e p1173)*

- **Colonoscopy** is the **mainstay of diagnosis** because it **allows both visualization** of the **pathology** and **therapeutic intervention** in **colonic, rectal,** and **distal ileal sources** of bleedingQ.



152. Ans. b. Colonic diverticulosis *(Ref: Sabiston 19/e p1173)*

Lower Gastrointestinal Bleeding		
Colonic Bleeding (95%)	**%**	**Small Bowel Bleeding (5%)**
Diverticular disease[Q]	**30-40**	**Angiodysplasias**
Anorectal disease[Q]	**5-15**	Erosions or ulcers (potassium, NSAIDs)
Ischemia	5-10	Crohn's disease
Neoplasia	5-10	Radiation
Infectious colitis	3-8	Meckel's diverticulum
Postpolypectomy	3-7	Neoplasia
Inflammatory bowel disease	3-4	Aortoenteric fistula
Angiodysplasia	3	
Radiation colitis/proctitis	1-3	
Other	1-5	
Unknown	10-25	

153. Ans. a. Associated with cutaneous lesions *(Ref: Sabiston 19/e p1175; Shackelford 7/e p1856-1863; Bailey 26/e p1174, 25/e p1156-1157)*

Vascular Ectasia (Angiodysplasia)

- **MC vascular lesions** found in the **colon**: **Vascular ectasia[Q]**
- **MC cause** of **recurrent lower intestinal bleeding after 60 years** of age: **Vascular ectasia[Q]**
- Arise from **age-related degeneration** of **previously normal colonic blood vessels[Q]**.
- **Acquired condition[Q]**
  - Almost **always occur in** the **cecum** or the **proximal ascending colon[Q]**
  - **Usually multiple**, are **<5 mm[Q]** in diameter
  - **Rarely identified** with **gross inspection** or **routine pathologic examination**
  - **Diagnosed with colonoscopy** or **angiography**
  - **Angiography: Slow emptying** of **vein[Q]** and **dilation** of **submucosal vessels[Q]**
- **Not associated with** synchronous **angiomatous lesions** of the **skin, mucous membranes**, or **other viscera[Q].**

154. Ans. d. Hemorrhoids *(Ref: API Medicine 6/e p509, 511)*

- API: "**Hemorrhoids** and **anal fissure** are the **most common cause** of **lower GI bleeding**, however the **bleeding** is **rarely massive[Q]**."

155. Ans. a. Meckel's diverticulum, b. Rectal polyp

156. Ans. b. Intravenous metronidazole *(Ref: Harrison 18/e p1686; Bailey 26/e p1157, 25/e p1173)*

Amebic Colitis

- **MC site** of **amebic colitis**: **Cecum and ascending colon[Q]**
- **Flask shaped ulcers** on **colonoscopy confirms** the **diagnosis** of **amebic colitis[Q]**

Drug Therapy for Amebiasis

- **Asymptomatic carrier**: Luminal agents (**Iodoquinol, paromomycin**)[Q]
- **Acute colitis: Metronidazole** and **luminal agents[Q]**
- **Amebic liver abscess: Metronidazole, tinidazole** and **luminal agents[Q]**

157. Ans. b. Involvement of rectum in 50% cases

158. Ans. b. Colonoscopy

159. Ans. a. Diverticulosis

160. Ans. a. Sigmoid diverticula

Lower Gastrointestinal Bleed

- **Lower gastrointestinal bleed** is defined as a **bleeding** from a site **distal** to the **ligament of Treitz[Q].**

- **MC site** of lower GI bleed: **colon (95%)**[Q]
- **MC cause** of **lower GI bleed in India: Hemorrhoids**[Q] **(Rarely massive bleeding)**

  - **MC cause** of **significant lower GI bleed: Diverticular disease (overall)**[Q]
  - **MC cause** of **significant small bowel bleed: angiodysplasia**[Q]
  - **MC cause** of **recurrent, obscure lower GI bleed: Vascular ectasia**[Q] (angiodysplasia)

161. Ans. c. Ascending colon

162. Ans. None > b. Carcinoma

163. Ans. d. Diverticulum of sigmoid colon

164. Ans. a. Diverticulosis

165. Ans. c. For occult blood in stool *(Ref: Harrison 18/e p662, 671)*

Fecal Occult Blood Tests

- Based on the property of an organic compound, **guaiac**, to **turn blue** after **oxidation** by **oxidants, peroxidases**, or the **pseudoperoxidase** of hemoglobin in the presence of an oxygen donor such as hydrogen peroxide.
- **Guaiac tests** are **more sensitive** for detecting **bleeding from** the **lower** than from the upper GI tract because hemoglobin (and its pseudoperoxidase activity) is degraded as it moves down the GI tract.
- **Fecal hemoglobin levels** must **exceed 10 mg/g** (**blood loss of 10 ml daily**)[Q] for 50% of Hemoccult II tests to be positive.

BOWEL PREPARATION

166. Ans. a. Carcinoma colon *(Ref: Sabiston 19/e p1308-1309; Schwartz 10/e p1194-1195, 9/e p1033; Shackelford 7/e p2308-2310)*

Bowel Preparation

- **Normal microbial organisms** in the **colon** compose up to **90%** of the **dry weight of feces**, reaching concentrations up to **10^9 organism/ml** of **feces**[Q].

  - **Bacteroides: MC colonic microbe**[Q] (anaerobe)
  - **Escherichia coli: MC aerobic colonic microbe**[Q]

- **Colon** is generally **cleansed** in preparation for **colonic operations** and adequate **colonoscopy** or **contrast enema**.

Bowel Preparation Consists of
1. **Special diet**: **Two days prior** to surgery, patient is put on **clear fluids**
2. **Purging** the fecal contents (**mechanical preparation**) by using cathartic, night before surgery
3. **Antibiotics** effective against colonic bacteria

- **Complete bowel obstruction** and **free perforation** are **absolute contraindications** to bowel preparation[Q].

Agents Used for Purging
• **Polyethylene glycol solution** (PEG)[Q]
• **Sodium phosphate solution**[Q]

- **Sodium phosphate** has been linked to rare, but serious, **electrolyte imbalances** in patients with **impaired renal function**[Q].
- **PEG** is the **recommended bowel preparation** in patients with renal **insufficiency, cirrhosis, ascites, or congestive heart failure**[Q].

  - **Benefit from** routine **single-dose administration** of **parenteral antibiotics 30 minutes before incision**[Q] is well established.

- **Antibiotics** active **against both aerobes** and **anaerobes** are ideal:
  - **Second-** or **third-generation cephalosporins**[Q]
  - **Fluoroquinolone + metronidazole**[Q]
  - **Clindamycin**[Q]

  - A preparation often used consists of **erythromycin base** (1g) and **neomycin** (1g) given in **three preoperative doses** the **day before surgery**[Q].

167. Ans. a. Colonic carcinoma

168. Ans. b. Polymyxin

LARGE INTESTINE ANATOMY AND PHYSIOLOGY

169. Ans. a. Node draining colon *(Ref: BDC 4/vol II/254; Grays 40/e p1077)*

Lymphatic drainage of Large Intestine

- Lymphatic drainage also **follows** the **arterial anatomy**.
- **Lymphatics from** the **colon** and **proximal two thirds** of the **rectum** ultimately **drain into** the **para-aortic nodal chain**, which empties into the **cisterna chyli**Q.

Lymphatic drainage of Large Intestine

- **Superior** and **inferior mesenteric nodes** are part of **Pre-aortic group** of lymph nodesQ.
- **Lymphatics draining** the **distal rectum** and **anal canal** may **drain either** to the para-**aortic nodes** or **laterally**, through the **internal iliac system**, to the **superficial inguinal nodal basin** (dentate line roughly marks the level where lymphatic drainage diverges)
- **Lymph nodes** are commonly **grouped into levels** depending **on their location**.

Epicolic	Located **along** the **bowel wall** and in the **epiploicae**Q
Paracolic	Located **adjacent to** the **marginal artery**Q
Intermediate	Located **along** the **main branches**Q of the large blood vessels
Primary or **terminal**	Located **on** the **superior** or **inferior mesenteric artery**Q

170. Ans. b. Colon 10^{10}-10^{11} organisms *(Ref: Jawetz Microbiology 23rd/1154; Sabiston 19/e p1303; Schwartz 9/e p1019)*

Normal Microbial Flora of Intestinal Tract

- **At birth**, the **intestine is sterile**, but organisms are soon introduced with food.
- In the **breastfed children**, the organisms present in the intestine: **Lactic acid streptococci** and **Lactobacilli**Q
- In **normal adults**, the **stomach acidity** keeps the number of **microorganism** at **minimum**, unless obstruction at the pylorus favors the proliferation of gram positive cocci and bacilli.
- As the **pH of intestinal contents** becomes **alkaline**, the resident **flora gradually increases**Q.
- In **diarrhea**, **bacterial count decrease**s, whereas count **increases in intestinal obstruction**Q.

Part of GIT	No. of Microorganisms
Stomach	**10^3-10^5**/gm of contents
Duodenum	**10^3-10^6**/gm of contents
Jejunum and Ileum	**10^5-10^8**/gm of contents
Cecum and Transverse colon	**10^8-10^{11}**/gm of contents
Sigmoid and Rectum	**10^{11}**/gm of contentsQ

171. Ans. c. Proximal colon *(Ref: Sabiston 19/e p1307)*

Motility Pattern of Colon

- **Right colon** is the **fermentation chamber** of the **human GI tract**Q
- **Bacteria** are **most metabolically active** in **cecum**Q
- **Left colon** is a **site of storage** and **dehydration of stool**Q.

Site	Motility Pattern
Right colon	• **Antiperistaltic,** or **retropulsive waves**Q generate retrograde flow of colonic contents back to the cecum.
Left colon	• Antegrade tonic contractionsQ

- **Mass peristalsis** is interspersed with the propulsive and retropulsive contractions and occurs at varying intervals, **more frequently after meals**Q.
- **Mass peristaltic contraction** advances a **column of colonic contents** through **one third of** the **colonic length**Q.
- **Increased postprandial contractility** is **greater in** the **sigmoid**Q **than** in the transverse colon.
- **Gastrocolic reflex**: **Effects of a meal on colonic motility**Q

172. Ans. d. Destruction of Auerbach plexus *(Ref: Ganong 22/e p479)*

Auerbach Plexus	Meissner's Plexus
• Situated **between** and innervates **outer longitudinal** and **inner circular layers**[Q] • Primarily concerned with **peristalsis**[Q]	• Situated between **middle circular layer** and **mucosa**[Q] • Also known as **submucosal plexus**[Q] • Primarily concerned with **intestinal secretion**[Q]

173. Ans. c. Pre-aortic

174. Ans. b. Lignin *(Ref: Sabiston 19/e p1304-1305)*

Fermentation in Colon

- Both microbiota and host obtain clear benefits from this association.
- **Bacteria supply** the host with **butyrate**[Q] (**main fuel** for **colonic epithelial cells**)
- Bacterial fermentation products are absorbed and used as a source of energy.
- **Main sources of energy** for **intestinal bacteria** are **complex carbohydrates**: **starches** and **nonstarch polysaccharides** (NSPs), also known as **dietary fiber**[Q].

  - **Lignin** is **not fermented** by **human colonic flora** and **attracts water**[Q], thus producing bulk.
  - **Celluloses** are **only partially fermented**[Q].
  - **Fruit pectins** are **completely fermented**[Q].

- **Highly fermentable NSPs** provide **minimal bulk** and **slow transit time**[Q].
- **Constipation, diverticulosis**, and **colon cancer** are **uncommon in** populations with a **high intake of roughage** (i.e., **water-insoluble NSPs**)[Q].

Water-insoluble fibers (Lignin)	• **Used for** the **treatment of constipation**[Q]
Water-soluble NSPs (Pectin)	• Used to treat diarrhea[Q]

MISCELLANEOUS

175. Ans. c. Proximal colostomy and bringing out the distal end as mucus fistula *(Ref: Sabiston 19/e p465-466)*

Colonic Injuries

- **Colon injuries** are generally the **result of penetrating trauma**[Q].
- The incidence of **infectious complications after** a **colonic injury** is **related to inadequate treatment** or **delay in diagnosis**[Q].

Diagnosis

- **Physical examination** is particularly useful **to establish that laparotomy is necessary** after a stab wound to the abdomen **if peritoneal signs are present**[Q]

  - A **negative physical examination does not rule out** the presence of a **colonic injury**, particularly in **patients with stab wounds** to the **back** and **flanks**[Q].

- An **objective evaluation** of the abdomen **is warranted after stab wounds** and may include **DPL** or a **triple-contrast** (**oral, IV**, and **rectal**) **CT scan**[Q].

  - **Gunshot wounds** to the abdomen usually **indicate** the **necessity for laparotomy**, and with few exceptions, **no further workup is necessary**[Q] and the colonic injury will be diagnosed during abdominal exploration.

- **Presence of blood** on **rectal examination is strong evidence** of **colon** or **rectal injury**[Q].

Treatment

- **Primary repair** can be selected **when known associated complicating factors** have been **excluded**[Q].

Indications of Primary Repair
• **Early diagnosis** (within **4-6 hours**)[Q]
• **Absence** of **prolonged shock** or **hypotension**[Q]
• **Absence of gross contamination**[Q] of the peritoneal cavity
• **Absence** of **associated** colonic **vascular injury**[Q]
• **Less than 6 units** of **blood transfused**[Q]
• **No requirement** for the use of **mesh**[Q] to permanently close the abdominal wall

- **Low-risk penetrating colonic injuries: Primary closure** or **resection and primary anastomosis**[Q]
- **High-risk colon injuries** or those associated with **severe injuries**: **Resection** and **colostomy**[Q].

Complications

- **Abscess** formation, anastomotic **leak** and **peristomal hernia**

176. Ans. d. Bleeding PR

177. Ans. c. Most commonly subserosal *(Ref: Maingot 11/e p838)*

Colonic Lipoma

- **Ninety percent** of **colonic lipomas** are **localized to** the **submucosa**Q
- Rarely found in other layers of the bowel wall
- **Develop in** the **5th or 6th decade** of life
- **More common** in the **large intestine**Q.
- **Solitary lipomas** tend to occur **more frequently on the right side**Q of the colon in the vicinity of the ileocecal valve or the ascending colon

Clinical Features

- Generally **asymptomatic**Q but may be found **incidentally on colonoscopy**.
- **Big lipomas** may cause symptoms such as **gastrointestinal bleeding, diarrhea, intussusception**, or **bowel obstruction**Q.

Diagnosis

- **Pathognomonic sign** of a **colonic lipoma**: **Squeeze sign**Q
- **Endoscopic signs**: **Cushion** sign, **Tenting** sign, **naked fat** signQ

Treatment

- **Endoscopic removal** of a lipoma

IMPORTANT TOPICS

Short Chain Fatty Acids (SCFA)

- **Short chain fatty acids** are produced **in** the **colon** and **absorbed from it**Q.
- **SCFAs: Acetate (60%), Propionate** (25%), **Butyrate**Q (15%)
- Formed by action of colonic bacteria on complex carbohydrates, resistant starches, and other component of dietary fibers.

Anatomy of Colon

- The **meandering artery** or **Arc of Riolan**Q is a collateral branch that **connects** the **proximal MCA to** the **LCA** and runs in the transverse mesocolon parallel to the left branch of the MCA.
- **Griffith's point**Q: **splenic flexure**, where the vascular arcades connecting the MCA and LCA are often absent
- **Sudek's point**Q: inconsistent marginal artery at the junction of the **lowest sigmoid branch** and the **superior hemorrhoidal artery**

  - **Jackson Membrane**Q**:** Adhesion from the **right abdominal wall** to the **anterior taenia** of the ascending colon.
  - **Gerlach valves**Q**:** A mucosal fold **covering** the **appendiceal orifice.**
  - **Fold of Treves**Q**: Inferior ileocecal fold** (**does not contain any vessel**, referred as the **bloodless fold of Treves**)

- **Fold of Treves** is the **only antimesenteric epiploic appendage** normally found on the **small intestine** and **marks** the **junction** of the ileum and cecumQ

  - **Widest portion** of colon: **Cecum**Q
  - **Narrowest portion** of colon: **Sigmoid**Q
  - **MC site** of **colonic rupture** caused **by distal obstruction**: **Cecum**Q
  - **Colon absorbs water, NaCl**Q**; secretes** K^+, HCO_3 and **mucus**Q
  - **MC site of ischemic colitis: Splenic flexure**

Large Intestine

- Length of **cecum**: **7.5 cm** (x=7.5 cm)
- Length of **Transverse colon: 45 cm** (6x)
- Length of **Sigmoid colon**: **30 cm** (4x)
- Length of **Ascending colon: 15 cm** (2x)
- Length of **Descending colon**: **22.5 cm** (3x)

CHAPTER 15

Ileostomy and Colostomy

MULTIPLE CHOICE QUESTIONS

ILEOSTOMY AND COLOSTOMY

1. **Most common complication of end colostomy:** *(JIPMER 2011)*
   a. Parastomal hernia
   b. Prolapse
   c. Perforation
   d. Bleeding

2. **Known complication of stoma (e.g., Colostomy stoma):** *(MHPGMCET 2009)*
   a. Prolapse
   b. Stenosis
   c. Retraction
   d. All of the above

3. **Continent ileostomy is done in all the following except:** *(MHSSMCET 2005)*
   a. Ulcerative colitis with poor anal tone
   b. Crohn's Disease
   c. Redo Hirschsprung's disease
   d. All

4. **Mercedes procedure is used in?** *(MHSSMCET 2008)*
   a. Discrepancy in size of ileum and stoma
   b. Ileostomy stenosis
   c. Ileostomy prolapse
   d. Ileostomy leak

5. **Early postoperative complication of ileostomy:** *(AIIMS Nov 2006)*
   a. Obstruction
   b. Prolapse
   c. Diarrhea
   d. Necrosis

6. **Guyrope's technique is related to:** *(MHSSMCET 2009)*
   a. Ileal resection and anastomosis
   b. Ileostomy
   c. Colostomy
   d. All of the above

7. **Which of the following in a not a recognized complication of colostomy?** *(MHSSMCET 2011)*
   a. Prolapse
   b. Necrosis
   c. Stenosis
   d. Constipation

8. **Early postoperative complication of ileostomy:** *(JIPMER 2014, AIIMS May 2012)*
   a. Obstruction
   b. Prolapse
   c. Diarrhea
   d. Necrosis

9. **The following regarding colostomy are true except:** *(Kerala 2000)*
   a. A colostomy is an artificial opening made in large bowel to divert the faeces to the exterior
   b. Temporary colostomy is established to defunction and anastomosis
   c. Permanent colostomy is formed after the resection of rectum by the abdominoperineal technique
   d. Double barreled colostomy is commonly done now a days
   e. Colostomy hernia is common complication

10. **Parastomal hernia is most frequently seen with:** *(All India 2009)*
    a. End colostomy
    b. Loop colostomy
    c. End ileostomy
    d. Loop ileostomy

11. **Early complications of ileostomy are all except:** *(GB Pant 2011)*
    a. High output
    b. Ischemic necrosis
    c. Retraction
    d. Stenosis

EXPLANATIONS

ILEOSTOMY AND COLOSTOMY

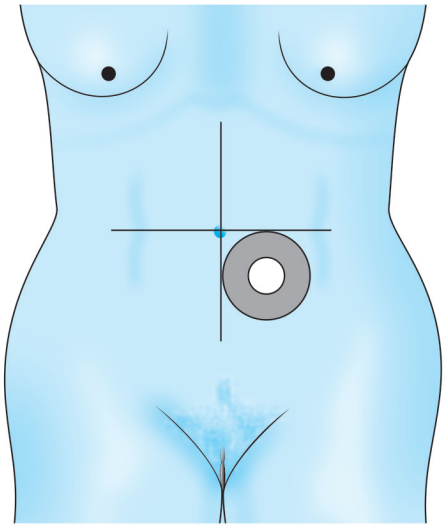
1. **Ans. a. Parastomal hernia** *(Ref: Sabiston 19/e p1362-1365; Schwartz 10/e p1192-1193, 9/e p1029-1032; Bailey 26/e p1175-1176, 25/e p1185-1187; Shackelford 7/e p2248-2260; Maingot 11/e p141-148)*

- **MC complication** of **both end** and **loop colostomy**: **Parastomal hernia**[Q]
- **Complications** (**both parastomal hernia** and **prolapse**) are **more common in loop colostomy**[Q] as compared to end colostomy.
- **MC complication** of **ileostomy: Skin irritation**[Q]
- **MC early complication** of **ileostomy**: **Ischemic necrosis**[Q]

Stoma Formation

- A **colostomy** is a **connection** of the **colon to** the **skin** of the abdominal wall.
- An **ileostomy** involves **exteriorization** of the **ileum on** the abdominal **skin**.
- **MC indications** of **stoma formation**: **Colorectal cancer, chronic ulcerative colitis and Crohn's disease**[Q]
- **Ileostomy revisions** are most commonly performed **for Crohn's disease**[Q].

- **Appearance of a fistula** adjacent to a stoma usually **indicates recurrence of Crohn's disease**[Q].
- A special complication in portal hypertension: **Varices** can form **in** the **peristomal skin**[Q].



Colostomy

- **MC indication** for **fashioning a colostomy: CA rectum**[Q]
- Colostomies are also constructed as **treatment for obstructing lesions** of the **distal large intestine** and for **actual** or **potential perforations**[Q].

Type by Anatomic Location	
• **End-sigmoid colostomy (MC)**[Q]	• Transverse colostomy
• **End-descending colostomy**[Q]	• Cecostomy

- However, **if** the **IMA** is **transected during an operation** for **CA rectum**, the **blood supply to** the **sigmoid colon** is **no longer dependable**, and it **should not be used** for stoma construction. Therefore, an **"end-descending" colostomy** is usually **preferable** to an end-sigmoid colostomy[Q].

- **Location of** the **colostomy** should **avoid any deep folds of fat, scars,** and **bony prominences** of the abdominal wall[Q].

Type by Function
• To **provide decompression of** the **large intestine**[Q]
• To **provide diversion of** the **feces**[Q]

Decompressing Colostomy	Diverting Colostomy
Indications • **Distal obstructing lesions** causing **massive dilation** of the **proximal colon** without ischemic necrosis[Q] • **Severe sigmoid diverticulitis** with **phlegmon**[Q] • **Selected patients** with **toxic megacolon**[Q] **Types of Decompressing Stomas** • **Blow-hole cecostomy** • **Blow hole transverse** colostomy • **Tube type** of **cecostomy** • **Loop-transverse** colostomy	**Indications** • When **distal segment** of **bowel** has been **completely resected** (as during **APR**)[Q] • **Known** or **suspected perforation** or **obstruction** of the **distal bowel** (e.g., **obstructing carcinoma**, **diverticulitis**, **leaking anastomosis**, or **trauma**[Q]) • **Destruction** or **infection of** the **distal colon**, **rectum**, or **anus** (e.g., Crohn's **disease** or failed anal sphincter reconstruction)[Q]. **Types of Diverting Stomas** • **Loop-transverse** colostomy • **Loop sigmoid colostomy**

2. Ans. d. All of the above *(Ref: Sabiston 19/e p312-313, 1362-1365; Schwartz 10/e p1192-1193, 9/e p1032; Bailey 26/e p1175-1176, 25/e p1187; Shackelford 7/e p2256-2260; Maingot 11/e p153-154)*

Stomal Complications

- Stomas are widely used in the treatment of **colorectal, intestinal**, and **urologic diseases**.
- An intestinal stoma can be an **ileostomy, colostomy**, or **urostomy, end, loop,** or **end-loop**, **temporary** or **permanent, diverting** or **decompressing**, or **continent** or **incontinent.**

  - A **tube cecostomy** and a **blowhole** are considered **temporary decompressing colostomies** performed **in emergencies**[Q].

- **Technical factors** are **most important in minimizing** the **complication** rate of stoma construction and are largely preventable.
- **Early complications** are considered those that occur **within 30 days**[Q] after surgery.

Clinical Presentation and Diagnosis	
Ischemic necrosis[Q]	• From **impaired perfusion** to the **terminal portion** of the bowel as a result of a **tight aperture**, **overzealous trimming** of **mesentery**, or **mesenteric tension**.
Stomal retraction[Q]	• Occurs early as a result of **tension** on the bowel or **ischemic necrosis** of the **stoma.**
Late retraction[Q]	• Caused by **increased thickness** of the **abdominal wall** with **weight gain**.
Stenosis[Q]	• As a result of a **small aperture** (natural maturation), **ischemia**, **recurrence** of **Crohn's disease**, or development of **carcinoma**.
Mucocutaneous separation	• As a result of **ischemia**, **inadequate approximation** of mucosa to the dermal layer of skin, **excessive bowel tension**, or **peristomal infection**.
Stomal prolapse[Q]	• Most alarming to the patient and can result in **incomplete diversion** of stool, **interfere with** the **stoma appliance**, lead to **leakage of stool**, or become associated with obstructive symptoms and incarceration.
Parastomal hernia[Q]	• Occurs to some degree **in most patients.**
Peristomal fistula	• **Sign of Crohn's disease**, may result from a deep suture used to mature the stoma, or may be caused by trauma from an appliance.
Chemical dermatitis[Q]	• Caused by **contact of** the **stoma effluent with peristomal skin**[Q] • Manifested as **erythema, ulceration** (ileostomy effluent), **encrustation** (urostomy effluent), or **pseudoepitheliomatous hyperplasia**.
Traumatic dermatitis	• Occurs **during change of** the **stomal device**, from stripping of adhesive, or as a result of friction or pressure from the stomal device or supportive belt. • Manifested as **erythema, erosion** and **ulceration.**
Diarrhea and **dehydration**[Q]	• Commonly occurs in **older patients**, in **hot weather**, during **strenuous exercise**, and in association with **short bowel syndrome.**
Cutaneous manifestations of the disease[Q]	• **Damaged peristomal skin** in **psoriasis**[Q] • **Pyoderma gangrenosa** in **IBD**[Q] • **Parastomal varices** in **portal hypertension**[Q]

3. **Ans. b. Crohn's Disease** *(Ref: Sabiston 19/e p312-313, 1362-1365; Schwartz 10/e p1192-1193, 9/e p1029-1032; Bailey 26/e p1174-1176, 25/e p1185-1187; Shackelford 7/e p2249-2255; Maingot 11/e p154-166)*

ILEOSTOMY

- **Opening** constructed **between** the **small intestine** and the **abdominal wall**, usually by **using distal ileum.**

  - **Indications** of **Permanent ileostomy:** For patients who require **removal of the entire colon** and **rectum** (**Crohn's disease** or **ulcerative colitis**[Q])
  - **Indications** of **loop ileostomy:** Cases where **multiple** and **complex anastomoses** must be **performed distally** (**Crohn's disease** or **CA rectum**[Q]).

- **Loop ileostomy use** is becoming **more frequent** (because of the complex sphincter-preserving operations being performed for **UC** and **FAP**)

Types of ileostomies	
• **End ileostomy (Brooke)** • **Loop ileostomy** • **Loop-end ileostomy**	• Continent ileostomy (Kock pouch) • Urinary conduit

Continent Ileostomy

- Continent ileostomy, or **Kock pouch**, has been used as an **alternative to** a **conventional ileostomy** for **selected patients** with **UC** or **FAP**[Q].

  - **Contraindicated in Crohn's disease**[Q] (risk of **recurrent disease**)
  - **Not recommended for well-functioning end ileostomy**[Q].

- It involves construction of an **internal pouch with** a **continent nipple valve**.
- The **complication rate** for construction of this **continent ileostomy** has been **high** because of the difficulty in maintaining continence of the nipple valve and position of the pouch so that intubation can be easily accomplished.

Continent Ileostomy	
Advantages	**Disadvantages**
• Patient **need not wear** an **appliance**[Q] • Patient is **continent between intubations**[Q] • **Better quality of life**[Q]	• **Not all patients** are **continent** • Require **multiple intubations** during the day • **Difficulty in intubation** • Prolonged surgery with substantial risk of complications.

4. **Ans. a. Discrepancy is size of ileum and stoma**

Mercedes Procedure[Q]	Used when there is **discrepancy between** the **size of** the **ileal loop** and the **ileostomy stoma**.
Mercedes benz or seagull sign[Q]	Rarely the **centre of gallstone** may contain **radioluscent gas** in a **triradiate** or **biradiate fissure** This gives **characteristic dark shapes** on **radiograph**
Mercedes sign incision[Q]	**Excision of xiphoid** process and **downward traction on** the **liver** provides **excellent exposure of** the **hepatic veins** and **suprahepatic IVC**

5. **Ans. d. Necrosis** *(Ref: Sabiston 19/e p312-313; Schwartz 10/e p1193, 9/e p1031; Bailey 26/e p1176, 25/e p1187; Shackelford 7/e p2256-2260; Maingot 11/e p164-165)*

- Schwartz says "**Stoma necrosis** may occur in the **early post-operative period** and usually is **caused by skeletonizing** the **distal small bowel** and/e por **creating an overly tight fascial defect**.

Stomal Complications				
	Early (RAPID)		**Late**	
Stoma	• Poor location • **Retraction*** • **Ischemic necrosis**[Q]	• Detachment • Abscess formation • Opening wrong end	• **Prolapse**[Q] • **Stenosis**[Q] • **Parastomal hernia**[Q]	• **Fistula formation**[Q] • Gas • Odor
Peristomal skin	• **Excoriation**[Q] • **Dermatitis***		• Parastomal varices • Dermatoses	• Cancer • Skin manifestations of IBD
Systemic	• **High output***		• **Bowel obstruction**[Q] • Nonclosure	

- *May also develop as a late complication

Treatment of Stomal Complications

- To prevent most stomal complications, **adherence to sound surgical technique** is imperative.
- **In emergencies** and **difficult cases** such as the **obese, distended bowel**, and **shortened mesentery**, to ensure delivery of a viable stoma free of tension, the **fascial aperture** may be **made larger**Q.
- **Viability of** the **stoma** is **checked with a test tube** and a **flashlight** or **endoscopy**Q.
  - **Necrosis extending to** and **beyond the fascia** requires **immediate reoperation**Q.
  - **Ischemia limited to** a **few millimeters** is **observed** and may not result in any long-term sequelae.
  - **Repair of stomal retraction** often requires **laparotomy**Q.
- **Skin-level stenosis** can be **repaired locally** and **stenoses from other causes** can be **repaired via laparotomy**.
- **Complete separation** or **detachment** usually **requires revision**.
- **Repair of end stomal prolapse** can be **achieved locally** by making a **circumferential incision** at the mucocutaneous junction, **excision of redundant bowel,** and **rematuration**.
  - **Repair of loop stomal prolapse** is achieved by **local revision** to **an end stoma**.
  - **Laparotomy** may be required for the treatment of **recurrent prolapse** and **prolapse associated with a parastomal hernia**.
  - **Large permanent** or **complicated parastomal hernias** are treated by **relocating the stoma** or **reinforcing the fascia ring with mesh** (synthetic or biomaterial).
- Treatment of a **peristomal fistula** entails **resection of** the **diseased** or **involved segment of bowel** and **relocation of** the **stoma**.
- Treatment of **mucosal islands** ranges from **ablation with electrocautery** to **relocation of the stoma**.
- Treatment of **chemical dermatitis** entails **cleaning** the **damaged skin**, the use of **barriers**, and a **properly fitting stomal management system**Q.

6. **Ans. b. Ileostomy** *(Ref: www.ncbi.nlm.nih.gov/pubmed/2658641)*
   - **Guy rope principle** is **used to evert** the **necessary length** of **bowel in** creation of **ileostomy.**

Guy rope Principle

- In the creation of a **permanent ileostomy**, a **fully everted nipple ensures** a **good fit of the stomal appliance.**
- In normal bowel segment this may not pose a problem, but **forceful attempts at eversion in diseased, thickened**, and **friable bowel** may **result in damage to** the **bowel segment**.
- In order to prevent this, **guy rope principle** is **used to evert** the **necessary length** of **bowel**Q**.**

7. **Ans. d. Constipation**
8. **Ans. d. Necrosis**
9. **Ans. d. Double barreled colostomy is commonly done now a days** *(Ref: Bailey 26/e p1176, 25/e p1186)*
   - Bailey says "**Double-barrelled colostomy** was designed so that it **could be closed by crushing the intervening 'spur'** using an **enterotome** or **a stapling device**. It is **rarely used now**, but occasionally the colon is divided so that both ends can be brought to the surface separately, ensuring that the distal segment is completely defunctioned."

Stomas

- May be **colostomy** or **ileostomy**
- May be **temporary** or **permanent**
- **Temporary** or **defunctioning stomas** are usually fashioned as **loop stomas**
- An **ileostomy is spouted**; a **colostomy is flush**Q
- **Ileostomy effluent** is usually **liquid** whereas **colostomy effluent** is usually **solid**Q
- **Ileostomy patients** are more likely to develop **fluid** and **electrolyte problems**
- An **ileostomy** is usually sited in the **right iliac fossa**Q
- A **temporary colostomy** may be **transverse** and sited in the **right upper quadrant**Q
- **End-colostomy** is usually sited in the **left iliac fossa**Q
- All patients should be counseled by a stoma care nurse before operation

10. **Ans. b. Loop colostomy**
11. **Ans. d. Stenosis**

CHAPTER 16

Inflammatory Bowel Disease

MULTIPLE CHOICE QUESTIONS

INFLAMMATORY BOWEL DISEASE

1. Crohn's disease can be seen in: *(COMEDK 2007)*
a. Jejunum only
b. Colon only
c. Terminal ileum and right side
d. Mouth to anus

2. Cobble stone appearance is seen in: *(COMEDK 2008, 2007)*
a. Ulcerative colitis b. Crohn's disease
c. Appendicitis d. Carcinoma rectum

3. String sign of Kantor seen in: *(APPG 2008)*
a. Crohn's disease b. Ulcerative colitis
c. Both d. None

4. Which of the following statements about Crohn's disease is incorrect? *(DPG 2009 March)*
a. Granuloma present frequently
b. It is separate and distinct form ulcerative colitis
c. Cigarette smoking is a risk factor
d. Rectum spared in 50% patients with large bowel involvement

5. Which of the following is not associated with Crohn's disease? *(MCI March 2005)*
a. Fistula b. Stricture
c. Sclerosing cholangitis d. Granuloma

6. True statement regarding anorectal Crohn's disease:
a. Ulceration, fistula is common
b. Fistulas are painless and indurated
c. Non-cutting setons are used in management
d. All of the above

7. Ulcerative colitis starts from: *(GB Pant 2011)*
a. Rectum
b. Sigmoid colon
c. Ascending colon
d. Any part

8. Crohn's disease is best diagnosed by *(GB Pant 2011)*
a. Upper GI series b. Enteroclysis
c. Capsule endoscopy d. CECT

9. Characteristic of Crohn's disease: *(GB Pant 2011)*
a. Transmural involvement with skip lesions
b. Large bowel involvement
c. Pseudopolyps
d. Involvement of mucosa only

10. All are true about ulcerative colitis except: *(PGI SS June 2007)*
a. Terminal ileum may be involved
b. Stricture formation is present
c. Malignancy after 10 years
d. Crypt abscess is pathognomonic

11. Skip lesions are seen in: *(NEET Pattern, AIIMS May 2009)*
a. Ulcerative colitis b. Typhoid
c. Crohn's disease d. Tuberculosis

12. A patient gives chronic history of diarrhea and blood in stool presents with multiple fistulae in the perineum and multiple stricture in small intestine. The diagnosis is: *(AIIMS June 2000)*
a. In Crohn's disease b. Radiation enteritis
c. Ulcerative colitis d. Ischemic bowel disease

13. In Crohn's disease all are seen except: *(PGI Dec 2006)*
a. Hyperplastic polyps b. Diverticulosis
c. Fissuring ulcer d. Epitheloid granuloma
e. Crypt abscess

14. Crohn's disease is associated with following: *(DPG 96)*
a. Stomach not involved
b. No granulomatous + Transmucosal fissures
c. Continuous involvement
d. Through and through involvement of thickness of bowel wall

15. Transmural inflammation with skip lesions in colon are characteristic of: *(Comed-K, AIIMS Nov 94)*
a. Regional ileitis (Crohn's disease)
b. Ischemic colitis
c. Ulcerative colitis
d. Non specific colitis

16. Patient with recurrent diarrhea, pseudopolyp, lead pipe appearance on barium enema has: *(PGI June 2000)*
a. Ulcerative colitis b. Crohn's disease
c. Irritable bowel syndrome d. Short bowel syndrome

17. Skip lesions with tuberculoid granulomas is characteristic of: *(AIIMS 91)*
a. Hodgkin's lymphoma b. Sarcoidosis
c. Crohn's disease d. Ulcerative colitis

18. False regarding involvement in Crohn's disease: *(AIIMS 94)*
a. Anorectal area
b. Rectum
c. Small intestine with right colon
d. Large alone without involvement of small intestine

19. Ulcerative colitis starts in: *(DPG 95)*
a. Descending colon b. Transverse colon
c. Caecum d. Rectum

20. UC can be differentiated from Crohn's disease by all except: *(DNB 2005, AIIMS GIS May 2011)*
a. Pseudopolyps b. Rectal sparing
c. Discontinuous lesions d. Deep longitudinal ulcers

21. Ulcerative colitis involves: *(PGI Dec 2001)*
a. Serosa b. Lamina propria
c. Mucosa d. Circularis muscle
e. Submucosa

22. Inflammatory bowel disease found in children:
a. Ulcerative colitis
b. Tropical sprue
c. Crohn's disease
d. Celiac disease
e. Cystic fibrosis *(PGI June 2006)*

23. In a 27-years old male, most common cause of a colovesical fistula would be: *(All India 2001, 99)*
a. Crohn's disease b. Ulcerative colitis
c. TB d. Cancer colon

24. Ulcerative colitis almost always involves the: *(AIIMS 87)*
a. Caecum b. Sigmoid
c. Right colon d. Rectum

25. Which is true of ulcerative colitis? *(AIIMS 92)*
a. String sign of Kantor positive
b. Skip lesions are seen
c. Rectum is always involved
d. Fistulas are common

26. The commonest site of involvement in the Crohn's disease is: *(COMEDK 2005)*
a. Jejunum b. Transverse colon
c. Terminal ileum d. Rectum

27. The indications of colonoscopy in a patient with ulcerative colitis are all of the following except: *(COMEDK 2010)*
a. Diagnosis of the extent of inflammation
b. Differentiating if from Crohn's disease
c. Diagnosis of toxic megacolon
d. Monitoring the response to treatment

28. Crohn's disease is associated with: *(COMEDK 2011)*
a. NOD2/CARD-15 gene b. P53 suppressor gene
c. Philadelphia chromosomes d. BRAC-1 gene

29. Following statements regarding ulcerative colitis is true:
a. Smoking has a protecting effect *(COMEDK 2011)*
b. Smoking does not have a protective effect
c. There is no relation to smoking
d. Smoking causes relapses

30. Skip lesions are characteristic of *(NEET 2013, JIPMER 2010)*
a. Typhoid b. Ischemic bowel disease
c. Ulcerative colitis d. Crohn's disease

31. Which one is commonly associated with Crohn's disease?
a. Cologastric b. Coloureteric
c. Colovesical d. Coloduodenal
e. Colovaginal *(PGI Nov 2009)*

32. All are true about Ulcerative colitis except:
a. All layers are involved
b. Malabsorption
c. Backwash ileitis in 10–15% *(PGI Nov 2009)*
d. Mesalazine maintains the disease in remission
e. Rarely recurs after surgery

33. True about Ulcerative colitis: *(PGI Dec 2006)*
a. Involves colon only
b. Transmural involvement
c. Recurrent with watery diarrhea
d. Crypt abscess
e. Serosal involvement seen

34. Which of the following is true about ulcerative colitis? *(DNB 2011, MHPGMCET 2005, 2002)*
a. Premalignant condition
b. Cobblestone mucosa is characteristic
c. Almost always leads to toxic megacolon
d. Rarely affects rectum

35. Pathognomonic of Crohn's disease *(MHSSMCET 2009)*
a. Transmural inflammation b. Stricture of small bowel
c. Contiguous involvement d. Lead pipe colon

36. Hose pipe appearance of intestine is a feature of:
a. Crohn's disease *(Recent Questions 2013)*
b. Malabsorption syndrome
c. Ulcerative colitis
d. Hirschsprung's disease

IBD EXTRAINTESTINAL MANIFESTATIONS

37. In ulcerative colitis, after colectomy least likely to resolve is:
a. Ankylosing spondylitis b. PSC *(AIIMS GIS 2003)*
c. Pyoderma gangrenosum d. Erythema nodosum

38. Non-correctable lesion after colectomy for UC: *(AIIMS GIS May 2008)*
a. Skin lesions b. Arthritis
c. PSC d. Iritis

39. Pyoderma-gangrenosum is most commonly associated with: *(All India 99)*
a. Ulcerative colitis b. Crohn's disease
c. Amoebic colitis d. Ischemic colitis

40. All are true associations of ulcerative colitis except: *(PGI Dec 99)*
a. Erythema nodosum b. Circinate balanitis
c. Sclerosing cholangitis d. Aphthous stomatitis

41. All of the following extraintestinal manifestations of ulcerative colitis respond to colectomy except:
a. Primary sclerosing cholangitis
b. Pyoderma gangrenosum
c. Episcleritis
d. Peripheral arthralgia

42. The following are complications of ulcerative colitis except:
a. Peptic ulceration b. Arthritis *(All India 90)*
c. Sclerosing cholangitis d. Toxic megacolon

43. Type of renal stone formed in a patient with regional enteritis: *(JIPMER 2011)*
a. Calcium oxalate b. Cysteine
c. Struvite d. Urate

44. Most common stones in ulcerative colitis: *(DPG 2007)*
a. Oxalate b. Cysteine
c. Uric acid d. Phosphate

IBD TREATMENT

45. Treatment of choice in case of chronic ulcerative colitis is:
a. Colectomy with ileostomy *(AIIMS June 95)*
b. Colectomy + manual proctectomy + ileoanal pouch anastomosis
c. Proctocolectomy with ileoanal anastomosis
d. Ileorectal anastomosis

46. Surgical treatment of Ulcerative colitis: *(PGI June 2005)*
a. Done in late cases only
b. Done in cases where medical treatment fails
c. Pouch surgery done
d. Restorative proctocolectomy done in emergency cases

47. Surgical indications in inflammatory bowel diseases are all except: *(PGI June 2006)*
a. Obstruction b. Perianal complication
c. Extraintestinal complication d. Stricture
e. Malignancy

48. True statements about inflammatory bowel disease (IBD
a. Surgery is the 1st management *(PGI June 2003)*
b. Pouch operation is done for fulminant ulcerative colitis
c. 2% case of Crohn's disease undergo malignant changes
d. Ulcerative colitis don't undergo malignant changes

49. Which sulphonamide is used for the treatment of ulcerative colitis? *(All India 88)*
a. Sulphamethiazole b. Sulphathalazole
c. Sulphaguanidine d. Salazopyrin

50. Sulfasalazine exerts its primary action in ulcerative colitis by inhibition of: *(COMEDK 2004)*
a. Folic acid synthesis
b. Formation of prostaglandins (PG)
c. Phospholipase C
d. Formation of interleukins

51. Procedure of choice in ulcerative colitis with acute perforation is: *(AIIMS 86, 88)*
a. Defunctioning ileostomy
b. Closure of perforation
c. Proximal diversion colostomy
d. Total colectomy and ileostomy

52. Sulfonamide useful in treating ulcerative colitis is: *(All India 91)*
a. Sulfadiazine b. Sulfasalazine
c. Sulfamethoxazole d. Sulfadimidine

53. Best treatment for remission of acute ulcerative colitis is: *(AIIMS 97)*
a. Sulphasalazine b. Prednisolone
c. Aminosalicyclic acid d. NSAIDS

54. Indication of emergency surgery in ulcerative colitis is/are: *(PGI Nov 2011)*
a. Toxic megacolon
b. Massive colonic hemorrhage
c. Extraintestinal manifestation
d. Colonic perforation
e. Colonic dysplasia

55. After subtotal colectomy for toxic megacolon in CD, lowest recurrence is with: *(AIIMS GIS 2003)*
a. Complete proctectomy with Brooke ileostomy
b. Ileorectal anastomosis
c. Koch's pouch
d. IPAA

56. Treatment of choice in ulcerative colitis: *(GB Pant 2011)*
a. Total proctocolectomy with IPAA
b. Total colectomy with IRA
c. Total colectomy with ileostomy
d. Total proctocolectomy with ileostomy

57. Not an indication for surgery in ulcerative colitis:
a. Presence of dysplasia on colonic biopsy
b. Pancolitis *(PGI SS Dec 2009)*
c. Toxic megacolon
d. Failure of response to medical therapy of acute colitis

58. True Statement regarding management of ileocaecal cron's disease is: *(JIPMER, 2014, 2007)*
a. Avoid antibiotics
b. Avoid steroids in first week
c. 5-ASA reduces small bowel obstruction
d. Cholestyramine improves diarrhea, worsens steatorrhea

COLITIS ASSOCIATED CARCINOMA

59. Risk of carcinoma in ulcerative colitis: *(GB Pant 2011)*
a. 20% after 20 years
b. 20% after 30 years
c. 30% after 30 years
d. 50% after 30 years

60. Risk of malignancy in ulcerative colitis is more in:
a. Onset in childhood *(PGI Dec 2001)*
b. Extensive involvement of colon
c. Disrupted architecture with crypt abscesses
d. Pseudopolyps
e. Recurrence after treatment

61. Not true about malignancy arising from ulcerative colitis is:
a. Takes at least 10 years to develop *(PGI June 99)*
b. Left sided is more common
c. Associated with dysplasia of the rest of the colon
d. Younger age of onset is associated with increased chance of carcinoma

62. In ulcerative colitis, carcinoma arises from: *(PGI Dec 98)*
a. Pseudopolyps
b. Dysplastic sites
c. Familial polyps
d. Multiple adenomatous polyp

63. Ulcerative colitis progressing to malignancy is characterized by following except: *(PGI 97)*
a. Risk increases with the time
b. Prognosis worsens
c. Prognosis depends on period
d. Arise from pseudo polyps

64. False about malignancy in ulcerative colitis:
a. Poorly differentiated with higher stage *(AIIMS GIS 2003)*
b. Related to extent of disease
c. Poor prognosis as compared to sporadic
d. Evenly distributed

65. All are true about colonic cancer in UC except:
a. In younger patients *(AIIMS GIS Dec 2010)*
b. Depends upon duration of disease
c. Depends on extent of UC in colon
d. Risk of cancer irrespective of grade of dysplasia

IBD COMPLICATIONS

66. Toxic megacolon is seen in: *(COMEDK 2009)*
a. Carcinoma colon b. Gastrocolic fistula
c. Ulcerative colitis d. Amoebic colitis

67. Toxic megacolon is seen in: *(MHPGMCET 2003)*
a. Crohn's disease b. Ulcerative colitis
c. Amebic colitis d. Antibiotic associated colitis

68. Treatment of choice in toxic megacolon: *(MHSSMCET 2005)*
a. Total colectomy
b. Segmental resection
c. Colostomy
d. Clindamycin, Metronidazole, Steroids

69. Toxic megacolon is seen in: *(Orissa 2011)*
a. Crohn's disease b. Ulcerative colitis
c. Diverticulosis d. All of the above

70. All of the following causes megacolon except: *(JIPMER GIS 2011)*
a. Parkinson's disease b. Hirschprung's disease
c. Byler's syndrome d. Ulcerative colitis

71. In which of the following conditions acquired. Secondary megacolon is seen?
a. Fissure in-ano
b. Complete absence of parasympathetic ganglion cells
c. Absence of sympathetic ganglion cells
d. Rectal malignancy

72. All of the following are known complications of ulcerative colitis except: *(PGI June 95)*
a. Stricture b. Perforation
c. Toxic megacolon d. Carcinoma

73. Toxic megacolon is a complication of: *(AIIMS 94)*
a. Ulcerative colitis b. Crohn's
c. Aganglionic megacolon d. Ischemic colitis

74. Toxic megacolon is a known complication of:
a. Pseudomembranous colitis *(AIIMS Nov 94)*
b. Ulcerative colitis
c. Amebic colitis
d. Hirschprung's disease

75. Toxic megacolon is seen in: *(AIIMS 87)*
a. Carcinoma colon
b. Gastrocolic fistula
c. Ulcerative colitis
d. Carcinoid
e. All of the above

76. Most common cause of death in Crohn's disease is due to:
a. Sepsis *(AIIMS May 2009)*
b. Thromboembolic complication
c. Electrolyte disturbance
d. Malignancy

77. Incidence of pouchitis in patients treated for ulcerative colitis with IPAA is: *(JIPMER GIS 2011)*
a. 7–33%
b. 7–15%
c. 18–56%
d. 6–8%

78. All are true about pouchitis except: *(JIPMER GIS 2011)*
a. Probiotics have shown promising response
b. Cause may be related to mucosal ischemia
c. Most commonly seen in ulcerative colitis surgeries
d. Episodes of pouchitis will not respond to antibiotics

79. Most common complication of UC with IPAA:
a. Small bowel obstruction *(AIIMS GIS Dec 2010)*
b. Pouchitis
c. Pelvic sepsis
d. Leak

80. Most common cause of death in Crohn's disease is due to:
a. Sepsis *(AIIMS GIS Dec 2010)*
b. Thromboembolic complication
c. Electrolyte disturbance
d. Malignancy

81. Most common postoperative complication of IPAA in ulcerative colitis is: *(AIIMS Nov 2011)*
a. Pouchitis
b. Pelvic abscess
c. Small bowel obstruction
d. Perianal complications

82. A patient of Crohn's disease underwent resection anastomosis. Now present on 7th post-op day with anastomotic leak from a fistula. Every day leakage volume adds up to 150–200 ml. There is no intra-abdominal collection and the patient is stable without any complaints. What will be next line of management? *(AIIMS May 2012)*
a. Conservative treatment and leave him and hope for the spontaneous resolution
b. Perform laparotomy and check for leakage site and healthy margins
c. Perform laparotomy and completely exteriorize the fistula
d. Perform laparotomy and place drain and leave

EXPLANATIONS

INFLAMMATORY BOWEL DISEASE

1. **Ans. d. Mouth to anus** : *(Ref: Sabiston 19/e p1244-1254; Schwartz 10/e p1153-1157, 9/e p993-997; Bailey 26/e p1151-1156, 25/e p1169-1173; Shackelford 7/e p1966-1969)*

Crohn's Disease

- **Chronic, transmural inflammatory disease** of the GIT for which the **cause is unknown**Q.
- Can **involve any part of the alimentary tract** from the **mouth to the anus** but most commonly affects the **small intestine** and **colon**Q.

  - Involvement of **both large** and **small intestine: 55%**Q
  - Involvement of **only small intestine: 30%**Q
  - Involvement of **only large intestine: 15%**Q

- Crohn's disease primarily **attacks young adults**Q in the **2nd** and **3rd decades** of life.
- **More common** in **smokers** and **urban dwellers**Q
- **Two genders** are **affected equally** with **strong familial association**Q

  - **Upper GI Crohn's disease** is most frequently found in the **gastric antrum** and **duodenum**Q.
  - In patients with **colonic disease, rectal sparing** is **characteristic**Q**.**

Etiology: Unknown

- **Infectious agents** proposed as **potential causes: Mycobacterium paratuberculosis** and **measles virus**Q**.**
- The identification in 2001 of the **CARD-15/NOD2 mutation**Q (on chromosome **16q,** also known as **IBD-1 locus**) provided the first definitive genetic link to the condition and is **relatively specific** for Crohn's disease.

IBD-1 (chromosome **16q**)	Relatively specific for **Crohn's disease**Q
IBD-2 (chromosome **12q**)	More common in **Ulcerative colitis**Q

Pathology

- **Diseased bowel** separated by areas of **grossly appearing normal bowel** (**skip areas**)Q
- **Extensive fat wrapping** caused by the **circumferential growth** of the **mesenteric fat**Q around the bowel wall.
- **Thickened, firm, rubbery**, and almost **incompressible bowel wall**Q.
- **Involved segments** are **adherent to adjacent intestinal loops** or other viscera, with **internal fistulas**Q.
- **Mesentery** of the involved segment is **thickened,** with **enlarged lymph nodes**Q.

  - **Earliest gross pathologic lesion** is a **superficial aphthous ulcer**Q noted in the mucosa.

- **Linear ulcers** may coalesce to produce **transverse sinuses** with **islands of normal mucosa** in between **(cobblestone appearance**Q**)**
- **Inflammatory reaction** is **characterized by extensive edema, hyperemia**Q **lymphangiectasia,** an intense infiltration of mononuclear cells, and **lymphoid hyperplasia**Q**.**

  - **Characteristic histologic lesions** of Crohn's disease are **noncaseating granulomas** with **Langerhans' giant cells**Q.
  - **Granulomas** appear later in the course and are found in the **wall of the bowel** or in **regional lymph nodes**Q in 60-70% of patients

Clinical Features

- **MC symptom** is **intermittent** and **colicky abdominal pain**, most commonly noted in the **lower abdomen**Q.
- **Diarrhea** is the next most frequent symptom and is present, at **least intermittently**, in about 85% of patients.
- In contrast to ulcerative colitis, patients with Crohn's disease **typically have fewer bowel movements,** and the **stools rarely contain mucus, pus, or blood**Q.

  - **Main intestinal complications** of Crohn's disease include **obstruction** and **perforation**Q.
  - **Fistulas occur between** the **sites of perforation and adjacent organs,** usually **at the site of a previous laparotomy**Q**.**

- **Long-standing Crohn's disease** predisposes to **cancer of the small intestine** and **colon**Q**.**
- **Perianal disease (fissure, fistula, stricture, or abscess**Q**)** is common

  - In **Crohn's disease, ileum** is the **MC site** of **fistula (enterocutaneous and enterovesical)**, MC site of **perforation** and MC site of **carcinoma**Q.

Diagnosis

- **Enteroclysis: IOC** for **diagnosis** of **Crohn's** disease
  - **Earliest radiographic findings** in **enteroclysis** are **aphthous ulceration,** a coarse villous pattern of the mucosa, and thickened folds
  - **Ulcerations** on the **mesenteric aspect** with **sacculation** on the **antimesenteric surface)**
- **Serology:** Anti-Saccharomyces cerevisiae (**ASCA**Q) autoantibodies have **specificity of 92%** for **Crohn's disease**.

2. **Ans. b. Crohn's disease**
3. **Ans. a. Crohn's disease**
4. **Ans. d. Rectum spared in 50% patients with large bowel involvement**
5. **None: Sabiston** *(Ref: 19/e p1247; Schwartz 9/e p995; Bailey 26/e p1156, 25/e p1166; Shackelford 7/e p1968)*

Extraintestinal Manifestations of Crohn's Disease	
• **Skin:** Erythema multiforme, **Erythema nodosum**, Pyoderma gangrenosum • **Eyes:** Iritis, Uveitis, Conjunctivitis • **Blood:** Anemia, **Thrombocytosis, Phlebothrombosis, Arterial thrombosis**	• **Joints: Peripheral arthritis**, Ankylosing spondylitis • **Liver:** Nonspecific triaditis, **Sclerosing cholangitis** • **Kidney: Nephrotic syndrome** • **Pancreas: Pancreatitis** • **General:** Amyloidosis

6. **Ans. d. All of the above** *(Ref: Sabiston 19/e p1399-1400; Schwartz 10/e p1153-1157, 9/e p1038; Bailey 25/e p1153, 25/e p1170-1171; Shackelford 7/e p1968)*

Crohn's Disease of the Anorectum

- **Anal manifestations** of Crohn's disease can be **most devastating** because of their **painful nature** and their **threat to** the **patient's continence**Q
- Occur in nearly **20% of patients** with Crohn's disease.
  - Typically presents in three ways: **Ulceration (MC**Q**),** fistula and stricture.
  - Fistulas tend to be **chronic, indurated,** and **cyanotic** and are often **painless**Q.

Clinical Features

- Patients may suffer from **fissures, fistulas**, and **abscesses**Q.
- Symptoms and signs of **anal Crohn's disease** may include **pain, swelling, bleeding, soilage** or **frank incontinenc**e, and fever.
  - **Edematous, purplish tags** are **characteristic of the disease.**

Evaluation

- **Anorectal examination** should include **inspection, digital examination, anoscopy,** and **proctosigmoidoscopy**Q**.**

Treatment

- Although **conservatism is paramount in importance**, patients should not be undertreated if treatment is indicated.
- **Surgery** is usually warranted fr **pain** resulting from a **poorly draining** or **undrained abscess**Q.
  - **Fissures** caused by Crohn's disease are **often multiple** and **located off the midline**; they usually **respond to conservative measures**Q**,** such as sitz baths, stool softeners, and oral analgesics.
  - **Sphincterotomy** and **fissurectomy** should be **avoided** in **perianal Crohn's disease**Q**.**
- **Infliximab**Q has been **very successful** in the treatment of **fistulizing perianal Crohn's** disease with **closure rates** between 25% and 67%.
  - Most successful strategy is a staged approach to perianal disease.
  - Control of local sepsis is an essential first step[Q].
  - Abscesses need to be drained and fistula tracts require chronic drainage with non-cutting setons[Q].
  - Once the perianal sepsis is controlled, infliximab treatment is initiated.
  - After two to three infliximab infusions, the setons are removed to permit closure of the fistulas[Q].
- If the **fistulas do not close** and the **local sepsis has resolved**, **definitive surgical therapy** may be undertaken[Q].

7. **Ans. a. Rectum**
8. **Ans. b. Enteroclysis**
9. **Ans. a. (Transmural involvement with skip lesions)**
10. **Ans. b. Stricture formation is present** *(Ref: Sabiston 19/e p1319-1330; Schwartz 10/e p1197-1198, 9/e p1035-1036; Bailey 26/e p1145-1151,25/e p1163-1169; Shackelford 7/e p1961-1966)*

Ulcerative Colitis

- UC occurs **more commonly** in **developed countries**[Q]
- More commonly affects patients **< 30 years; both genders** are **equally affected**[Q]
- **More common** in **whites, Jews,** and persons of **northern European ancestry**[Q]

Etiology

- Infectious agents, including **C. difficile** and **Campylobacter jejuni**[Q], have been implicated as playing a causative role in the pathogenesis, but such a role has not been confirmed.
- A **family history of IBD** is a **significant risk factor**[Q].

> - **Smoking** appears to confer a **protective effect**[Q]
> - Both **UC** and **Crohn's disease** are **more common in women** who **use OCPs**[Q]
> - Patients who have had an **appendectomy** appear to be at **decreased risk for developing UC**[Q].

Pathology

- Major **pathologic process involves** the **mucosa** and **submucosa** of the colon, with **sparing** of the **muscularis**[Q].
- **Typical gross appearance**: **Hyperemic mucosa**[Q]
- **Rectal involvement** (**proctitis**) is the **hallmark of the disease**[Q], and the diagnosis should be seriously questioned if the rectal mucosa is not affected.
- **Pseudopolyps**, or **inflammatory polyps** are seen in UC.
- **Diagnostic characteristic** of **UC**: **Continuous uninterrupted inflammation** of the colonic mucosa, **beginning in** the **distal rectum** and **extending proximally**[Q] to a variable distance.

> - **Most characteristic lesion of UC: Crypt abscess**[Q] (collections of neutrophils fill and expand the lumina of individual crypts of Lieberkühn)
> - **Crypt abscesses** are **not specific for UC**[Q] and can be seen in Crohn's disease and infectious colitis.

- **Crypt branching** may be seen in **chronic UC** and is an **important characteristic**[Q].
- The **number of goblet cells** in the crypts **is diminished**, as is mucus production.

Clinical Features

- **Diarrhea** with **passage of mucus**[Q]
- **More urgency** than with Crohn's disease, because of **distal proctitis**[Q].
- **Rectal bleeding** is common in UC

> - **Rectal involvement** is present in almost **100%** of patients with UC, whereas anal involvement is rare.
> - **Crohn's disease** may have **normal rectal mucosa** (so-called **rectal sparing**[Q]), although **anal disease** (e.g. **fissures, fistulas, abscesses**) **is common**[Q].

Diagnosis

- In the **acute phase** of UC, **proctosigmoidoscopy** is sufficient because the rectum is invariably inflamed.
- **Double contrast barium enema:** Primary radiologic tool **for confirming** the **diagnosis** and assessing the **extent** and **severity** of UC.

> - **End stage** or **burned out UC** is characterized radiographically by **shortening of the colon, loss of normal redundancy** in the **sigmoid** region and at the **splenic** and **hepatic flexures, disappearance of** the **haustral pattern**, a **featureless mucosa**, absence of discrete ulceration and **narrow caliber** of the bowel.
> - Approximately **15–20%** of patients with **severe UC** have an associated **backwash ileitis,** characterized by a **fixed, patulous ileocecal valve** and a **dilated, granular terminal ileum** on **double contrast barium studies**[Q].

- **p-ANCA** is having **92% specificity** for **UC**[Q].
- **Disease severity of UC** can be graded by **Modified Truelove** and **Witts Classification**[Q].

11. Ans. c. Crohn's disease

12. Ans. a. In Crohn's disease

13. Ans. a. Hyperplastic polyps, b. Diverticulosis

(Ref: Sabiston 19/e p1249, 1320; Schwartz 10/e p1201-1203, 9/e p993-997, 1033- 1038; Bailey 26/e p1145-1156, 25/e p1163-1173; Shackelford 7/e p1962)

Feature	Crohn's Disease	Ulcerative Colitis
A. Macroscopic features		
1. Distribution	Segmental with **skip areas**[Q]	**Continuous** without skip areas[Q]
2. Location	Commonly **terminal ileum** and/or **ascending colon**	Commonly **rectum,** sigmoid colon and extending upwards

3. Extent	Usually involves the **entire thickness** of the affected segment of bowel wall	Usually **superficial,** confined to mucosal layers
4. Ulcers	**Serpiginous ulcers**, that may develop into deep **Fissures**[Q]	**Superficial mucosal ulcers** without fissures
5. **Pseudopolyps**	Rarely seen	**Commonly present**[Q]
6. Fibrosis	**Common**	Rare
7. Shortening	Due to fibrosis	Due to contraction of muscularis
B. Microscopic features		
1. Depth of inflammation	Typically **transmural**[Q]	**Mucosal**[Q] **and Submucosal**
2. Type of inflammation	**Non-caseating granulomas**[Q] and infiltrate of mononuclear cells (lymphocytes, plasma cells and macrophage)	**Crypt abscess** and non-specific acute and chronic inflammatory cells (lymphocytes, plasma cells neutrophils, eosinophils, mast cells)
3. Mucosa	Patchy ulceration	Hemorrhagic mucosa with ulceration
4. Submucosa	Widened due to edema and lymphoid aggregates	Normal or reduced in width
5. Muscularis	Infiltrated by inflammatory cells	Usually spared, except in cases of **Toxic Megacolon**[Q]
6. Fibrosis	Present	Usually absent
C. Complications		
1. **Fistula formation**	**Internal** and **external fistulae** in 10% case	Extremely **rare**[Q]
2. Malignant changes	Less common but present	May occur in disease of more than 10 years duration (**more common**[Q])
3. **Fibrous strictures**	**Common**[Q]	Never[Q]
4. **Toxic megacolon**	–	**Risk present**[Q]
5. Named Features	**Hose pipe** appearance[Q] **Cobble-stone** appearance[Q] **Halo sign** on CT[Q] **String sign of Kantor**[Q] **Raspberry/rosethorn appearance**[Q]	**Garden hose** appearance[Q] **Pseudopolyps**[Q] Pipestem colon (Ahaustral)[Q]

Remember

- **Earliest change** in **Crohn's disease** is- **Apthoid ulceration**[Q].
- **Earliest Change** in **Ulcerative colitis is- Blurring of mucosal stripe and granular appearance**[Q].
- **Surgery** is **palliative in Crohn's disease**[Q] whereas **curative in ulcerative colitis**[Q].

14. Ans. d. Through and through involvement of thickness of bowel wall

15. Ans. a. Regional ileitis (Crohn's disease) **16. Ans. a. Ulcerative colitis** **17. Ans. a. Crohn's disease**

18. Ans. b. Rectum **19. Ans. d. Rectum** **20. Ans. a. Pseudopolyps**

21. Ans. c. Mucosa, e. Submucosa **22. Ans. a. Ulcerative colitis, c. Crohn's disease**

23. Ans. a. Crohn's disease *(Ref: Sabiston 19/e p1247, 1313, 1351; Smith 17/e p581)*

Common Causes of Colovesical Fistula

- **Diverticulitis (50–60%** More common in patients **> 40 years**[Q]
- **CA colon (20–25%** More common in patients **> 50 years**[Q]
- **Crohn's disease 10%** Seen in **2nd** to **3rd decade**[Q]

24. Ans. d. Rectum **25. Ans. c. Rectum is always involved** **26. Ans. c. Terminal ileum**

27. Ans. c. Diagnosis of toxic megacolon *(Ref: Bailey 25/e p1165)*

Colonoscopy is not done in toxic colon for the fear of aggravating the disease or perforation.

Indications of Colonoscopy and Biopsy in Ulcerative Colitis

- To establish the **extent of inflammation**[Q]
- To distinguish **between UC and Crohn's disease**[Q]
- To **monitor** the **response of treatment**[Q]
- To assess long standing cases for **malignant change**[Q]

28. Ans. a. NOD2/CARD-15 gene **29. Ans. a. Smoking has a protecting effect**

30. Ans. d. Crohn's disease

31. Ans. a. Cologastric, c. Colovesical, d. Coloduodenal, e. Colovaginal *(Ref: Sabiston 19/e p1247; Harrison 18/e p2483)*

- Sabiston says "Fistula may develop between intestine and any other intra-abdominal organ, including bladder, bowel, uterus, vagina and stomach."
- Harrison says "Fistula involving stomach or duodenum arise from the small or large bowel and do not necessarily signify the presence of upper GI tract involvement."

32. Ans. a. All layer are involved, b. Malabsorption

- Both are the features of Crohn's disease.

33. Ans. d. Crypt abscess

34. Ans. a. Premalignant condition

35. Ans. a. Transmural inflammation

36. Ans. a. Crohn's disease

IBD EXTRA INTESTINAL MANIFESTATIONS

37. Ans. b. PSC. *Ref: Sabiston 19/e p1322; Schwartz 10/e p1197-1198, 9/e p1034; Bailey 25/e p1166; Shackelford 7/e p1962)*

Extraintestinal Manifestations of Ulcerative Colitis	
• Arthritis • Ankylosing spondylitis • Erythema nodosum	• Pyoderma gangrenosum • Primary sclerosing cholangitis (PSC)

- **Colectomy** has **no effect on** the **course of PSC in UC**[Q]**.**
- **Pyoderma gangrenosum** is **more common in UC**[Q]**.**
- **EPASU** is **more common in Crohn's disease**[Q]**.**
- **EPASU: E**rythema nodosum, **P**eripheral arthritis, **A**nkylosing spondylitis, **S**tones **(Cholilithiasis** and **oxalate stones)**, **U**reteral obstruction[Q].
- **MC cutaneous manifestation of IBD: Erythema nodosum**[Q]
- **Erythema nodosum** is the **most responsive to treatment** of the bowel and persistence of the lesion indicates inadequate control of IBD[Q].

38. Ans. c. PSC

39. Ans. a. Ulcerative colitis

40. Ans. b. Circinate balanitis

- Circinate balanitis is seen in Reiter's syndrome, not in ulcerative colitis.

41. Ans. a. Primary sclerosing cholangitis

42. Ans. a. Peptic ulceration

43. Ans. a. Calcium oxalate

44. Ans. a. Oxalate *(Ref: Harrison 18/e p2488)*

Urologic Manifestations of IBD

- The **most frequent genitourinary complications** are **calculi, ureteral obstruction,** and **ileal bladder fistulas**[Q]**.**
- **Calcium oxalate stones** develop **secondary to hyperoxaluria,** which results from **increased absorption of dietary oxalate**[Q]**.**
- Normally, dietary calcium combines with luminal oxalate to form insoluble calcium oxalate, which is eliminated in the stool.
- In patients with **ileal dysfunction, nonabsorbed fatty acids bind calcium** and **leave oxalate unbound**[Q].
- The **unbound oxalate** is then **delivered to the colon,** where it is **readily absorbed,** especially **in the presence of inflammation**[Q].

IBD TREATMENT

45. Ans. c. Proctocolectomy with ileonal anastomosis *(Ref: Sabiston 19/e p1324-1329; Schwartz 10/e p1187-1188, 9/e p1035-1036; Bailey 26/e p1146-1151, 25/e p1167-1173; Shackelford 7/e p1974)*

Indications of Surgery in Ulcerative Colitis	
• Intractability[Q] • Dysplasia, carcinoma[Q]	• Massive colonic bleeding[Q] • Toxic megacolon[Q]

Surgical Options for Ulcerative Colitis	
• Total proctocolectomy with ileostomy • Restorative proctocolectomy with IPAAQ • Total proctocolectomy with a continent ileal reservoir (Kock pouch)[Q]	• Total abdominal colectomy with end-ileostomy • Toxic megacolon[Q]

Indications of Surgery in Ulcerative Colitis

Total Proctocolectomy With End Ileostomy

- Total proctocolectomy has the advantage of removing all diseased mucosa, thereby preventing further inflammation and the potential for progression to dysplasia or carcinoma[Q].
- Major disadvantage: Need for a permanent ileostomy
- Older patients, those with poor sphincter function, and patients with carcinomas in the distal rectum may be candidates for this procedure[Q].

Total Proctocolectomy With Continent Ileostomy

- The **major problem with the Kock pouch** is the **high complication rate** necessitating **reoperation** in up to **50%** of patients[Q].
- **MC problem** is a **slipped valve**, which occurs when the intussuscepted limb everts and the continent nipple is lost.
- **Other complications:** Inflammation of the ileal pouch mucosa (so-called **pouchitis**) in 15% to 30% of cases, fistula formation (10%), and stoma stricture (10%).
- The **Kock procedure should not be performed** in **obese patients, debilitated patients,** or **any patient with** a **physical** or **mental handicap**[Q] that would prohibit safe catheterization of the reservoir.
- The procedure is **contraindicated in** patients with **Crohn's disease** because of the **high incidence of its recurrence**, causing failure of the pouch.

Total Proctocolectomy With Ileal Pouch-Anal Anastomosis (IPAA)

- Restorative proctocolectomy with IPAA has become the most common definitive operation for the surgical treatment of UC.

Complications of Total Proctocolectomy With IPAA	
Pouchitis (7–33%)[Q] **Small bowel obstruction** (up to 27%) **Pelvic sepsis**	Anastomotic and pouch suture line **leaks** **Pouch-vaginal fistula**

- **Older patients or those with fecal incontinence should undergo a total proctocolectomy with an end ileostomy.**
- **Younger patients with no evidence of rectal dysplasia should undergo restorative proctocolectomy and IPAA with a double-stapled anastomosis and diverting loop ileostomy.**
- **Patients with confirmed rectal dysplasia should be treated with mucosectomy and a hand-sewn IPAA.**
- **Patients with significant debility who are poor operative candidates should undergo a total abdominal colectomy with a very low Hartmann closure and an end ileostomy.**

46. Ans. b. Done in cases where medical treatment fails, c. Pouch surgery done

47. Ans. c. Extraintestinal complication *(Ref: Harrison 18/e p2493)*

Indications for Surgery in IBD		
Ulcerative Colitis	**Crohn's Disease**	
	Small Intestine	**Colon and rectum**
• **Intractable** disease • **Fulminant** disease[Q] • **Toxic megacolon**[Q] • Colonic **perforation**[Q] • **Massive colonic hemorrhage**[Q] • Extracolonic disease • **Colonic obstruction**[Q] • Colon **cancer prophylaxis** • Colon **dysplasia** or **cancer**	• **Stricture** and **obstruction unresponsive** to **medical therapy**[Q] • **Massive hemorrhage**[Q] • **Refractory fistula**[Q] • **Abscess**[Q]	• **Intractable** disease[Q] • **Fulminant** disease[Q] • Perianal disease unresponsive to medical therapy • **Refractory fistula**[Q] • **Colonic obstruction**[Q] • **Cancer prophylaxis**[Q] • Colon dysplasia or cancer

48. Ans. c. 2% case of Crohn's disease undergo malignant changes *(Ref: Sabiston 19/e p1326-1329; Schwartz 9/e p1036; Bailey 26/e p1150-1151, Shackelford 7/e p1982)*

- **Pouch operation** (total proctocolectomy with IPAA) is **not done during fulminant ulcerative colitis**[Q].
- **Fulminant ulcerative colitis not responding to medication** is an **indication for emergency operation.** In emergency operations, **total abdominal colectomy** with **ileostomy** is done.
- The **risk of malignancy** in **Crohn's pancolitis** is **similar to UC pancolitis**, i.e. **2% after 10 years**, **8% after 20** years and **18% after 30** years approximately[Q].

49. Ans. d. Salazopyrin *(Ref: Sabiston 19/e p1249-1250, 1324-1325; Schwartz 9/e p1034-1035; Bailey 26/e p1148,25/e p1166, 1172; Shackelford 7/e p1969-1973)*

- Salazopyrin is brand name of sulfasalazine.

Management Protocol of IBD

5-ASA Derivatives
- **(Mainstay of therapy** for **UC** and **CD)**

↓ Uncontrolled IBD or exacerbation

Glucocorticoids
- Effective for **inducing remission** in both **UC** and **CD**
- **No role in maintenance therapy** in either UC or CD
- Once clinical remission is achieved, they **should be tapered**

↓ Maintenance therapy

Azathioprine and 6-Mercaptopurine
- Commonly employed in the **management of glucocorticoid dependent IBD**
- Promising role as **maintenance therapy**

50. Ans. b. Formation of prostaglandins (PG) *(Ref: Harrison 18/e p2489; Shackelford 7/e p1970)*

- **5-ASA** compounds exert its local anti-inflammatory effect by **inhibiting leukotriene production (PG synthesis)** by **inhibition of 5-lipooxygenase activity;** also inhibits the **production of IL-1** and **TNF**[Q].

Commonly Used 5-ASA Formulations in IBD
- **Sulfasalazine**
- Oral **mesalamine** agents
- Azo compounds: **Balsalazide, Olsalazine**

51. Ans. d. Total colectomy and ileostomy **52. Ans. b. Sulfasalazine** **53. Ans. b. Prednisolone**
54. Ans. a. Toxic megacolon, b. Massive colonic hemorrhage, d. Colonic perforation
55. Ans. a. Complete proctectomy with Brooke ileostomy
56. Ans. a. Total proctocolectomy with IPAA **57. Ans. b. Pancolitis**
58. Ans. c. 5-ASA reduces small bowel obstruction

COLITIS ASSOCIATED CARCINOMA

59. Ans. b. 20% after 30 years *(Ref: Schwartz 10/e p1195,1197-1198, 9/e p1041; Bailey 26/e p1146-1147, 25/e p1165-1166; Shackelford 7/e p1964)*
- The **risk of malignancy** in **Crohn's pancolitis is similar to UC pancolitis,** i.e. **2% after 10 years, 8% after 20** years and **18% after 30** years approximately[Q].

60. Ans. a. Onset in childhood), b. Extensive involvement of colon *(Ref: Sabiston 19/e p1322-1324; Schwartz 10/e p1195,1197-1198, 9/e p1041; Bailey 26/e p1146-1147, 25/e p1165-1166; Shackelford 7/e p1963-1965)*

Risk Factors for Cancer in Ulcerative Colitis patient
- The duration of colitis[Q]
- The extent of colonic involvement[Q]
- The presence of concomitant PSC and family history of CRC[Q] (regardless of the family history of IBD)
- Pancolitis (disease extending proximal to the splenic flexure) and disease diagnosed at a young age[Q]

- **UC-related CRC** tends to be **multicentric** and **evenly distributed** throughout the colon. Tumour tend to be **infiltrative, highly aggressive** and **poorly differentiated**[Q].
- **No significant difference between sporadic** and **UC-related CRC** with respect to **prognosis**[Q].

61. Ans. b. Left sided is more common *(Ref: Sabiston 19/e p1322-1324; Schwartz 9/e p1041; Bailey 26/e p1146-1147, 25/e p1165- 1166; Shackelford 7/e p1963-1965)*

Colitis Associated Colon Cancer (CAC)	Sporadic Colon Cancer (SCC)
• **Arise from flat dysplasia** or **dysplasia associated lesion or mass**[Q] • **Multiple synchronous colon cancer** in **12%**[Q] • Mean age: **30 years**[Q] • **Distributed uniformly**[Q] throughout the colon • **Mucinous** or **anaplastic cancers** are more common[Q]	• Arise from **adenomatous polyps**[Q] • **Multiple synchronous colon cancer** in **3–5%**[Q] • Mean age: **60 years**[Q] • **Left side predominance**[Q] • Mucinous or anaplastic cancers are **less common**[Q]

62. **Ans. b. Dysplastic sites**
63. **Ans. d. Arise from pseudo polyps**
64. **Ans. c. Poor prognosis as compared to sporadic**
65. **Ans. d. Risk of cancer irrespective of grade of dysplasia**

IBD COMPLICATIONS

66. **Ans. c. Ulcerative colitis** *(Ref: Sabiston 19/e p1324-1325; Schwartz 10/e p1195,1198,1199, 9/e p1034; Bailey 26/e p1146, 25/e p1164; Shackelford 7/e p1965-1966)*

Toxic Megacolon

- Toxic megacolon is a **serious life-threatening condition** that can occur in patients with **ulcerative colitis, Crohn's colitis**, and **infectious colitides** such as **pseudomembranous colitis**Q
- This **decompensation** results in a **necrotic thin-walled bowel** in which **pneumatosis**Q can often be seen radiographically.

Management:

- **Medical treatment** is associated with a **high rate of recurrence** with subsequent **urgent operation**Q has been reported.
- **Aggressive preoperative stabilization** is required, using **volume resuscitation** with **crystalloid solutions** to prevent dehydration secondary to third-space fluid losses, stress-dose steroids for patients previously on steroid therapy, **and broad-spectrum antibiotics**Q.

- **Total abdominal colectomy** with **ileostomy** and preservation of the rectum is **treatment of choice** for **toxic megacolon**Q.
- It serves the **main purpose of removing the diseased colon** and **avoiding a difficult** and **morbid pelvic dissection**Q.

67. **Ans. b. Ulcerative colitis a. Crohn's disease**
68. **Ans. a. Total colectomy**
69. **Ans. b. Ulcerative colitis a. Crohn's disease**
70. **Ans. c. Byler's syndrome** *(Ref: Bailey 26/e p1177-1178, 25/e p1155-1156; en.wikipedia.org/wiki/Megacolon)*

Megacolon

- **Megacolon is abnormal dilation of colon**
- **Dilation is often accompanied by paralysis of the peristaltic movements of the bowel.**

- **Total abdominal colectomy** with **ileostomy** and preservation of the rectum is **treatment of choice** for **toxic megacolon**Q.
- It serves the **main purpose of removing the diseased colon** and **avoiding a difficult** and **morbid pelvic dissection**Q.

Organ	Diameter in megacolon
Cecum Cecum	> 12 cmQ
Ascending colon	> 8 cm
Transverse colon	> 5.5 cmQ
Rectosigmoid or descending colon	> 6.5 cm

Etiology of Megacolon

- **Congenital** or **aganglionic megacolon** (**Hirschprung's disease**Q)
- Medications (**antipsychotics**Q)
- **Acquired megacolon**
  - Idiopathic megacolon
  - Toxic megacolon (UC and pseumembranous colitisQ)
  - Infection: Clostridium difficileQ
  - Neurologic, metabolic and Systemic diseases (Chagas disease, ParkinsonismQ)

71. **Ans. d. Rectal malignancy**
72. **Ans. a. Stricture** *(Ref: Sabiston 19/e p1321; Schwartz 10/e p1195,1198,1199, 9/e p1034; Bailey 26/e p1145, 25/e p1163; Shackelford 7/e p1962)*

- **Inflammation** is **purely mucosal** in **ulcerative colitis, strictures** are **highly uncommon. Any stricture diagnosed** in a patient with **ulcerative colitis** is presumed to be **malignant** until proven otherwise.

73. **Ans. a. Ulcerative colitis**
74. **Ans. b. Ulcerative colitis**
75. **Ans. c. Ulcerative colitis**
76. **Ans. d. Malignancy** *(Ref: Sabiston 19/e p1254)*

- Long-term survival studies have suggested that patients with **Crohn's disease** have a **death rate** that is about **two to three times higher** than that in the general population.
- **Gastrointestinal cancer**Q remains the **leading cause of disease-related death** in patients with **Crohn's disease; other causes** of disease-related deaths include **sepsis, thromboembolic complications,** and **electrolyte disorders.**

77. Ans. a. 7–33% *(Ref: Sabiston 19/e p1329; Schwartz 10/e p1194, 9/e p1032; Shackelford 7/e p1995-1997)*

Pouchitis

- **Inflammation** of the **mucosa** of the **ileal pouch**, or **pouchitis**, occurs in **7-33%** of patients with UC **treated by IPAA**[Q].
- The **cause** is **unknown** but may be related to **bacterial overgrowth, mucosal ischemia**, or **other local factors**[Q].

Clinical features:

- Pouchitis typically presents with **increased stool frequency, fever, bleeding, cramps**, and **dehydration**[Q].

Treatment:

- Episodes usually respond to **rehydration** and **oral antibiotics,** usually **metronidazole** or **ciprofloxacin**[Q].
- **Probiotics** have been reported to **provide dramatic resolution** in **some cases** of **pouchitis resistant to antibiotic therapy**[Q].

> - The diagnosis of **Crohn's disease** must also be entertained in patients with **significant pouchitis** that does not **respond to medical treatment**[Q].

78. d. Episodes of pouchitis will not respond to antibiotics **79. b. Pouchitis** **80. d. Malignancy**

81. a. Pouchitis

82. a. Conservative treatment and leave him and hope for the spontaneous resolution *(Ref: Sabiston 19/e p1270-1272; Schwartz 9/e p997-998; Bailey 26/e p1179-1180, 25/e p1184-1185; Shackelford 7/e p944-946)*

Treatment of Enterocutaneous Fistula

- Successful management requires establishment of **controlled drainage**, usually using a **sump suction apparatus; management of sepsis; prevention of fluid** and **electrolyte depletion; protection of the skin;** and **provision of adequate nutrition**[Q].
- When **sepsis** has been **controlled** and **nutritional therapy** has been instituted, a course of **conservative management**[Q] should be followed.

> - **Most of these fistulas heal spontaneously** within **4–6 weeks** of **conservative management**[Q]. If closure is not accomplished after this time, surgery is indicated.

- This **period of conservative management** not only allows those **fistulas to heal spontaneously** but also **allows for optimization of nutritional status** and **control of the wound and fistula sites**[Q].
- Also, a **reasonable delay permits** the **peritoneal reaction** and **inflammation to subside,** thus **making** a **second operation easier** and **safer**[Q].

> - **Preferred operation: Fistula tract excision** and **segmental resection** of the **involved segment of intestine** and **reanastomosis**[Q].

- **Simple closure** of the fistula after removing the fistula **tract almost always results in** a **recurrence** of the fistula.
- If an **unexpected abscess** is encountered or if the **bowel wall is rigid** and **distended** over a **long distance,** thus making primary anastomosis unsafe, **exteriorization of both ends** of the **intestine** should be accomplished.

CHAPTER 17

Vermiform Appendix

MULTIPLE CHOICE QUESTIONS

ACUTE APPENDICITIS

1. Most common initiating factor in acute appendicitis is: *(JIPMER GIS 2011)*
a. Luminal obstruction b. Bacterial infection
c. Lymphoid hyperplasia d. Perforation

2. Appendicitis is diagnosed by: *(PGI June 2003)*
a. TLC and DLC b. X-ray abdomen
c. USG d. Colour Doppler

3. When acute appendicitis is suspected, it can be confirmed by: *(PGI June 2007, June 2002)*
a. Clinical examination b. USG
c. CT scan d. Blood counts
e. Upper GI endoscopy

4. True about appendicular rupture is all except: *(PGI Dec 99)*
a. Common in extremes of age
b. Common in people with fecolith obstruction
c. Early antibiotics prevent rupture
d. Appendectomy is done always in presence of rupture

5. In a case of retrocecal appendicitis which movement aggravates pain? *(AIIMS Nov 2007)*
a. Flexion b. Extension
c. Medial rotation d. Lateral rotation

6. Earliest symptoms in acute appendicitis is: *(DNB 2003, JIPMER 86, 87, Kerala 87)*
a. Pain b. Fever
c. Vomiting d. Rise of pulse rate

7. A patient with Crohn's disease was opened and an inflamed appendix found. The treatment of choice is: *(PGI 88)*
a. Appendectomy
b. Ileocolic resection and anastomosis
c. Close the abdomen and start medical treatment
d. None of the above

8. When the rectum is inflated with air through a rectal tube, pain and tenderness occur in the right iliac fossa in case of appendicitis? This is known as: *(AIIMS 81, AMU 85)*
a. Aaron's sign b. Battle's sign
c. Bastedo sign d. Me Burney's sign

9. The frequent mechanism in perforation of appendix is:
a. Impacted faecolith *(DNB 89, 91)*
b. Tension gangrene due to the accumulating secretions
c. Necrosis of lymphoid patch
d. Retrocaecal infection

10. Acute appendicitis is due to: *(AIIMS 90, AMU 90)*
a. Faecolith b. Wormsofileo-caecalregion
c. Streptococcal infections d. Abuse of purgatives
e. None of the above

11. All are useful in acute appendicitis except: *(Kerala 94)*
a. Antibiotics b. Analgesics
c. IV Fluids d. Purgation

12. Most common organism isolated from perforated appendicitis: *(AIIMS GIS May 2008)*
a. E. coli b. Pseudomonas
c. Klebsiella d. Enterococcus

13. Diffuse peritonitis following appendicitis is usually seen: *(NEET 2013, ICS 2000)*
a. When appendicular perforation occurs early (within 24 hours)
b. When perforation occurs late (after 24 hours)
c. Particularly in non-obstructive appendicitis
d. When antibiotics are withheld

14. All of the following signs are not seen in acute appendicitis except: *(TN 2001)*
a. Rovsing's b. Murphy's
c. Boa's sign d. Mack wen's sign

15. All are to be done in case of 20-years old female coming to casualty with right iliac fossa pain, with local guarding and tenderness, except: *(AIIMS Nov 99)*
a. IV glucose b. Pethidine 100 mg IM
c. Nil orally d. X-ray abdomen

16. Aaron's sign is seen in: *(AIIMS 81, 86)*
a. Achalasia cardia
b. Hiatus hernia
c. Mediastinum emphysema
d. Acute appendicitis

17. Rovsing sign is seen in: *(PGI 95)*
a. Acute appendicitis b. Acute cholecystitis
c. Pancreatitis d. None

18. Acute appendicitis is characterized by all of the following except: *(MCI Sept 2005)*
a. Anorexia b. Rovsing's sign
c. Fever >42 degree Celsius d. Periumbilical colic

19. A 15-years old boy is admitted with a history and physical finding consistent with appendicitis. Which of the following findings is most likely to be positive? *(COMEDK 2004)*
a. Pelvic crepts b. Iliopsoas sign
c. Murphy's Sign d. Flank ecchymosis

20. False about appendicitis in children: *(JIPMER 2011)*
a. Localized pain is the single most important symptom
b. Vomiting precedes abdominal pain
c. Perforation occurs in 80% of cases <5 years
d. 60% perforation occurs within 48 hours

21. Alvarado scoring in appendicitis includes all except:
a. Migratory right iliac fossa pain *(PGI Nov 2011)*
b. Nausea
c. Elevated temperature
d. Leucopenia
e. Shift to right

22. Most common occurrence before appendicitis:
a. Blockage of lumen b. Ileitis *(PGI Nov 2011)*
c. Gastroenteritis d. Perforation

23. In appendicitis, the initial periumbilical pain is eventually localized to right iliac fossa because of:
a. Peritoneum b. Iliopsoas
c. Colon d. Caecum

24. Which of the following clinical signs is not associated with acute appendicitis? *(MHPGMCET 2009)*
a. Pointing sign b. Rovsing's sign
c. Cullen's sign d. Obturator sign

25. "Ten horn" sign is a feature of: *(MHSSMCET 2011)*
a. Rectus muscle hematoma b. Acute pancreatitis
c. Choledocholithiasis d. Acute appendicitis

26. Alvarado scale is for: *(DNB 2012, MHSSMCET 2011)*
a. Diverticulitis b. Mesenteric lymphadenitis
c. Acute appendicitis d. Pelvic abscess

27. Which of the following organisms produces signs and symptoms that mimic acute appendicitis?
a. Enteropathic Escherichia coli *(DNB 2012, Karnataka 2003)*
b. Enterobius vermicularis
c. Trichomonas hominis
d. Yersinia enterocolitica

28. Alvavado score consists of: *(Recent Questions 2013)*
a. Leucopenia b. Anorexia
c. Diarrhea d. Periumbilical pain

29. Most common differential diagnosis for appendicitis:
a. Gastroenteritis *(Recent Questions 2013)*
b. Mesenteric lymphadenopathy
c. Intussusception
d. Meckel's diverticulitis

30. Investigation of choice for acute appendicitis in children: *(AIIMS November 2014)*
a. CT scan b. Ultrasound
c. MRI d. X-ray

APPENDICITIS IN PREGNANCY

31. Regarding appendicitis in pregnancy, false is: *(ILBS 2011)*
a. MC cause of acute abdomen in first trimester
b. Pregnancy doesn't increase the risk
c. Conservative management by antibiotics should be tried
d. After rupture, fetal mortality is around 30–40%

32. A pregnant female presents with pain in abdomen on examination, tenderness is found in right lumbar region. TLC is 12,000/cmm, and urine examination is normal, for diagnosis further test done is: *(AIIMS June 99)*
a. Chest X-ray with abdominal shield
b. Ultrasound abdomen
c. Non contrast CT abdomen
d. Laparoscopy

33. Which is the best test for diagnosis of acute appendicitis in a pregnant female? *(MHSSMCET 2008)*
a. Alder's test b. Aaron's test
c. Angell's test d. Mc Burney's test

OCHSNER-SHERREN REGIME

34. Ochsner-Sherren regime is used in management of: *(JIPMER 92)*
a. Appendicular abscess b. Chronic appendicitis
c. Appendicular mass d. Acute appendicitis

35. Ochsner-Sherren regimen is used for treatment of: *(DNB 2012, 2000, MHPGMET 2005)*
a. Appendicular abscess b. Appendicular mass
c. Acute appendicitis d. Appendicular mucocele

36. A 26-years old male presented with 4 day history of pain in the right sided lower abdomen with frequent vomiting. Patients general condition is fair and clinically a tender lump was felt in the right iliac fossa. Most appropriate management for this case would be: *(MCI March 2010)*
a. Exploratory laparotomy
b. Immediate appendectomy
c. Ochsner-Sherren regimen
d. External drainage

37. True about appendicular mass is all except: *(DPG 2006)*
a. Ochsner-Sherren regime followed
b. Develops after 72 hours
c. Fever is present
d. Operation is to be done immediately

38. Ochsner Sherren regimen is for: *(MHSSMCET 2005, MAHE 2000)*
a. Appendicular perforation b. Colonic mass
c. Appendicular lump d. Appendicular abscess

39. A 25-years old man presents with 3 days history of pain in the right lower abdomen and vomiting. Patient's general condition is satisfactory and clinical examination reveals a tender lump in right iliac fossa. The most appropriate management in this case would be: *(ICS 98)*
a. Immediate appendectomy b. Exploratory laparotomy
c. Ochsner-Sherren regimen d. External drainage

NEOPLASM OF APPENDIX

40. Most common neoplasm of appendix is: *(AIIMS Nov 93)*
a. Lymphoma b. Adenocarcinoma
c. Leiomyosarcoma d. Argentaffinoma

41. A 25-years old patient presented with mass in right iliac fossa, which after laparotomy was found to be carcinoid of 2.5 cm in diameter. What will be next step in management? *(NEET 2013, AIIMS Nov 2000)*
a. Segmental resection b. Appendectomy
c. Right hemicolectomy d. Do yearly 5-HIAA assay

42. What is the treatment of patient with carcinoid tumor of appendix of size more than 2 cm? *(AIIMS June 99)*
a. Right hemicolectomy
b. Appendectomy
c. Appendectomy + abdominal CT scan
d. Appendectomy + 24 hours urinary HIAA

43. Mucocele of the appendix is: *(All India 89)*
a. Benign tumour b. Low grade malignancy
c. Retention cyst d. Infective process

44. Treatment of an incidentally detected appendicular carcinoid measuring 2.5 cm is: *(MCI March 2009)*
a. Right hemicolectomy
b. Limits resection of the right colon
c. Total colectomy
d. Appendectomy

45. All are true about carcinoid tumor of appendix except:
a. Present at tip *(PGI SS June 2001)*
b. Right hemicolectomy is treatment of choice
c. Constitute 50% of GI carcinoid
d. Carcinoid syndrome is rare

46. Most common tumor occurring in appendix: *(JIPMER 2010)*
a. Melanoma b. Carcinoid tumor
c. Adenocarcinoma d. Mucinous carcinoma

47. Treatment of choice for mucinous adenocarcinoma of appendix: *(MHSSMCET 2009)*
a. Right hemicolectomy b. Appendicectomy
c. Percutaneous aspiration d. Total colectomy

APPENDECTOMY

48. Grid-iron incision was first described by: *(MHSSMCET 2005)*
a. McArthur
b. Rutherford Morrison
c. Hamilton Bailey
d. Lanz

49. Stump size in appendectomy should not be more than: *(MHSSMCET 2010)*
a. 1 mm
b. 2 mm
c. 3 mm
d. 4 mm

50. During appendectomy if it is noticed that base of appendix is inflamed then further line of treatment is: *(DPG 2011, PGI 96)*
a. No appendectomy
b. No burying of stump
c. Hemicolectomy
d. Cecal resection

51. The nerve commonly damaged during McBurney's incision is: *(All India 2003)*
a. Subcostal
b. Iliohypogastric
c. 11th thoracic
d. 10th thoracic

52. Which of the following statements is not true of McBurney's incision? *(Karnataka 94)*
a. Most suitable if the diagnosis of appendicitis is definite
b. If it is converted into a muscle cutting incision it is called Rutherford Morison's incision
c. Inguinal hernia is a sequele of the incision
d. The incision can be extended upwards or downwards

53. A Gridiron incision becomes a Rutherford Morison's incision is extended by: *(Karnataka 94)*
a. Splitting the muscles laterally
b. Cutting the muscles laterally
c. Cutting the muscles medially into the rectus sheath
d. Incising vertically along the rectus muscle

54. Which one of the following is a muscle-splitting incision? *(ICS 2005)*
a. Kocher's
b. Rutherford-Morrison
c. Pfannenstiel
d. Lanz

55. An appendicular fistula is least likely to heal if: *(Kerala 98)*
a. The stump was sutured with vicryl
b. There is stenosis/narrowing of the sigmoid colon
c. Superadded infection
d. None

56. All of the following are early complications arising after appendectomy for acute appendicitis except: *(AIIMS 81, Rohtak 88)*
a. Ileus
b. Sterility
c. Intestinal obstruction
d. Pulmonary complications

57. Fecal fistula after appendectomy may occur due to:
a. Adhesions *(MHPGMCET 2003)*
b. Gangrenous appendicitis
c. Undiagnosed ileo-cecal disease
d. Postoperative infection

58. Nerve most commonly injured in Mac Burneys incision:
a. Subcostal *(Recent Questions 2013)*
b. Iliohypogastric N
c. 11th thoracic
d. Ilioinguinal

APPENDIX ANATOMY AND PHYSIOLOGY

59. All are true about appendicular artery except: *(DPG 97)*
a. Supplies only appendix
b. Supplies terminal ileum also
c. Is an end artery
d. Branch of lower division of ileocolic artery

60. True statement about appendix: *(PGI June 2006)*
a. Does not have mesentery
b. Has taenia coli
c. Develops from midgut
d. Supplied by appendicular branch of ileocolic artery

61. The commonest anatomical position of appendix is: *(Karnataka 2013, DNB 2012, MHPGMCET 2007, 2001)*
a. Retrocaecal
b. Pelvic
c. Paracecal
d. Preileal

62. The fold of Treves is: *(MAHE 2005)*
a. The fold of mucous membrane projecting into the lumen of the rectum
b. The ilio-appendicular fold of peritoneum
c. The fold of mucous membrane around the papilla of water
d. The fold of peritoneum over the inferior mesenteric vein

MISCELLANEOUS

63. Malone procedure is used in: *(KGMC 2011)*
a. Anorectal incontinence
b. Urinary incontinence
c. Neurogenic bladder
d. GERD

64. Which of the following present as acute abdomen?
a. Acute intermittent porphyria *(Karnataka 89)*
b. Tabes
c. Pneumonitis of lower lobe
d. All

EXPLANATIONS

ACUTE APPENDICITIS

1. Ans. a. Luminal obstruction *(Ref: Sabiston 19/e p1279-1282; Schwartz 10/e p1243-1251, 9/e p1074-1078; Bailey 26/e p1201-1210, 25/e p1205-1212; Shackelford 7/e p2019-2023)*

Acute Appendicitis

- **Acute appendicitis** is the **MC general surgical emergency**[Q]
- Worldwide, **perforated appendicitis** is the **leading general surgical cause** of **death**[Q].

Pathophysiology

- **Obstruction of the lumen**[Q] is believed to be the **major cause** of **acute appendicitis**[Q].
- **Obstruction of the lumen** may be **caused by inspissated stool** (fecalith[Q] or appendicolith[Q]), **lymphoid hyperplasia**[Q], **vegetable matter** or **seeds**[Q], **parasites**, or a **neoplasm**[Q].

> - Obstruction of the appendiceal lumen contributes to **bacterial overgrowth** and **continued secretion of mucus** leads **to intraluminal distention** and **increased wall pressure**. **Luminal distention** produces the **visceral pain** sensation experienced by the patient as **periumbilical pain**.

- **Subsequent impairment of lymphatic** and **venous drainage** leads to **mucosal ischemia**.

Bacteriology

- **MC bacteria isolated** in **perforated appendicitis: Bacteroides fragilis** (80%) > **E. coli** (77%).

Clinical Features

- **Diagnosis** can be **made primarily** on the basis of the **history** and **physical examination** in **most cases**.
- **Typical presentation**: **Periumbilical pain** followed by **anorexia** and **nausea**.

> - The **pain** then **localizes to** the **right lower quadrant** as the inflammatory process progresses to involve the parietal peritoneum overlying the appendix.
> - This **classic pattern of migratory pain** is the **most reliable symptom** of **acute appendicitis**.
> - A **bout of vomiting** may occur. **Fever ensues, followed by** the development of **leukocytosis**.
> - **Occasional patients** have **urinary symptoms** or **microscopic hematuria**

- **Tenderness** is **directly over** the **appendix**, at **McBurney's point**.
- **Rectal** and **pelvic examinations** are **most likely** to be **negative** (**Tenderness** on **examination** in **pelvic appendix**)

Dunphy's sign[Q]	• **Pain** on **coughing**[Q]
Rovsing's sign[Q]	• **Pain in** the **right lower quadrant** during **palpation of** the **left lower quadrant**[Q]
Obturator sign[Q]	• **Pain** on **internal rotation of** the **hip**[Q] • Suggestive of **pelvic appendix**[Q]
Iliopsoas sign[Q]	• **Pain on extension** of the **right hip**[Q] • Suggestive of **retrocecal appendix**[Q]

Diagnosis

Laboratory Studies
• **WBC count** is **elevated**, with **more than 75% neutrophils** in most patients[Q]. • **Normal WBC count** and **differential** is found in **10%** of **patients** with acute appendicitis[Q]. • **High WBC count (>20,000/mL)** suggests **complicated appendicitis** with **gangrene** or **perforation**[Q]. • **Microscopic hematuria** is **common in appendicitis** (**gross hematuria** may **indicate** the presence of a **kidney stone**)[Q]

Ultrasound

- USG has a **sensitivity of 85%** and a **specificity >90%** for the diagnosis of acute appendicitis in patients of abdominal pain.
- **Characteristic findings**: Appendix **≥ 7 mm diameter**, a **thick-walled**, **noncompressible luminal structure** seen in cross section (**target lesion**), or the **presence of an appendicolith**[Q].
- Commonly used in **children** and **pregnant patients**[Q] with equivocal clinical findings suggestive of acute appendicitis.

Plain X-ray

- A **calcified appendicolith** is **visible** in only **10–15%** of patients with acute appendicitis.
-
- **Failure of the appendix to fill during** a **barium enema** has been **associated with appendicitis**[Q] (this finding lacks sensitivity and specificity because up to 20% of normal appendices do not fill).

CT Scan
• **CT scan**: **Sensitivity** of **90%** and a **specificity** of **80-90%** for the diagnosis of **acute appendicitis** in patients with abdominal pain[Q].
• **Classic findings** on CT: **Distended appendix > 7 mm** in diameter and **circumferential wall thickening** and **enhancement** (appearance of a **halo** or **target**)[Q]
• **CT detects appendicoliths** in **50%** of patients with appendicitis.
• **Most valuable for older patients** and in patients with atypical symptoms

Treatment

- Most patients are managed by prompt **appendectomy[Q].**

2. **Ans. a. TLC and DLC, c. USG**
3. **Ans. a. Clinical examination, b. USG, c. CT scan, d. Blood counts**
4. **Ans. c. Early antibiotics prevent rupture** *(Ref: Sabiston 19/e p1286; Schwartz 10/e p1250-1251, 9/e p1078-1080; Shackelford 7/e p2027)*

Early antibiotic doesn't prevent rupture, most patients are managed by **prompt surgical removal of** the **appendix**.

Appendicular Perforation

- **Immediate appendectomy** has long been the **recommended treatment** for acute appendicitis because of the presumed **risk of progression to rupture**[Q].
- The **overall rate of perforated appendicitis** is **25.8%.**
- **Children <5 years**[Q] of age and **patients > 65 years**[Q] of age have the **highest rates of perforation** (**45** and **51%**, respectively).

Risk Factors for Appendicular Perforation (Fecolith DIE in Pelvic Surgery)	
• **Fecolith**[Q]	• **E**xtremes of ages[Q]
• **D**iabetes mellitus[Q]	• **Pelvic** appendix[Q]
• **I**mmunosuppression[Q]	• Previous abdominal **surgery**[Q]

- It has been suggested that **delays in presentation** are **responsible for the majority of perforated appendices**[Q].
- **Appendiceal rupture** occurs **most frequently distal to** the **point of luminal obstruction along the antimesenteric border** of the appendix[Q].

- **Rupture should be suspected** in the presence of **fever** with a **temperature of > 39°C** (102°F) and a **WBC count of > 18,000 cells/mm^3**.
- **MC bacteria isolated** in **perforated appendicitis: Bacteroides fragilis** (80%) > **E. coli** (77%)[Q].

5. **Ans. b. Extension** *(Ref: Sabiston 19/e p1280; Schwartz 9/e p1076-1077; Bailey 26/e p1203, 25/e p1208-1210; Shackelford 7/e p2020)*
6. **Ans. a. Pain**
7. **Ans. a. Appendectomy**
8. **Ans. c. Bastedo sign** *(Ref: www.medilexicon.com)*

Bastedo sign
• An **obsolete sign** in **chronic appendicitis**[Q]
• **Pain** and **tenderness** in **right iliac fossa** on **inflation of** the **colon with air**[Q]

9. **Ans. b. Tension gangrene due to the accumulating secretions**
10. **Ans. a. Faecolith, b. Worms of ileo-caecal region**
11. **Ans. d. Purgation** *(Ref: Sabiston 19/e p1284-1286; Schwartz 10/e p1243-1251, 9/e p1084; Bailey 26/e p1206-1212, 25/e p1211-1215; Shackelford 7/e p2022-2024)*

Management of Acute Appendicitis

- Most patients are managed by **prompt surgical removal of** the **appendix**[Q].
- A **brief period of resuscitation**[Q] is usually sufficient to ensure the safe induction of general anesthesia.
- **Preoperative antibiotics**[Q] cover aerobic and anaerobic colonic flora.
- **Single** preoperative **dose of antibiotics** in **nonperforated appendicitis reduces postoperative wound infections** and **intra-abdominal abscess** formation[Q].
- **Perforated** or **gangrenous appendicitis:** Continue **postoperative IV antibiotics until** the **patient is afebrile**[Q].

- **Appendectomies** are performed **laparoscopically,** particularly **in fertile women**, **obese patients**, and cases of **diagnostic uncertainty**[Q].
- **Open appendectomy** is usually performed through a **transverse right lower quadrant incision** (**Davis-Rockey**) or an **oblique incision** (**McArthur-McBurney**)[Q].
- For **uncomplicated cases**, a **transverse, muscle-splitting incision** lateral to the rectus abdominis muscle **over McBurney's point is preferred**[Q].

12. **Ans. a. E. coli**

13. **Ans. a. When appendicular perforation occurs early (within 24 hours)** *(Ref: Bailey 26/e p1212, 25/e p1216)*

- In **late stages**, **greater omentum** and **small bowel** becomes **adherent to inflamed appendix**, **walling off the spread** of **peritoneal contamination**[Q].

14. **Ans. a. Rovsing's**

15. **Ans. None** *(Ref: Harrison 16/e p84)*

- Harrison 14 says "Narcotics or analgesics should be withheld until a definitive diagnosis or a definitive plan has been formulated, because these agents often make it more difficult to secure and to interpret the history and physical findings."
- Harrison 16 says "**Narcotics** or **analgesics should not be withheld** until a definitive diagnosis or a definitive plan has been formulated; **obfuscation of diagnosis by adequate analgesia** is **unlikely**[Q]."

16. **Ans. d. Acute appendicitis** *(Ref: Sabiston 19/e p1147)*

Abdominal Examination Signs		
Sign	**Description**	**Diagnosis**
Aaron sign	**Pain** or pressure **in epigastrium** or **anterior chest** with **persistent firm pressure** applied to **McBurney's point**[Q]	**Acute appendicitis**[Q]
Bassler sign	Sharp pain created by compressing appendix between abdominal wall and iliacus	Chronic appendicitis
Blumberg's sign	Transient abdominal wall **rebound tenderness**[Q]	**Peritoneal inflammation**
Carnett's sign	Loss of abdominal tenderness when abdominal wall muscles are contracted	Intra-abdominal source of abdominal pain
Chandelier sign	Extreme lower abdominal and pelvic pain with movement of cervix	Pelvic inflammatory disease
Claybrook sign	Accentuation of breath and cardiac sounds through abdominal wall	Ruptured abdominal viscus
Courvoisier's sign	**Palpable gallbladder** in presence of **painless jaundice**[Q]	**Periampullary tumor**[Q]
Cruveilhier sign	**Varicose veins at umbilicus (caput medusae)**[Q]	**Portal hypertension**[Q]
Danforth sign	Shoulder pain on inspiration	Hemoperitoneum
Fothergill's sign	Abdominal wall mass that does not cross midline and remains palpable when rectus contracted	Rectus muscle hematomas
Mannkopf's sign	Increased pulse when painful abdomen palpated	Absent if malingering
Ransohoff sign	**Yellow discoloration of umbilical region**	**Ruptured CBD**[Q]
Ten Horn sign	**Pain** caused by **gentle traction of right testicle**[Q]	**Acute appendicitis**[Q]

17. **Ans. a. Acute appendicitis** 18. **Ans. c. Fever > 42 degree Celsius** 19. **Ans. b. Iliopsoas sign**

20. **Ans. b. Vomiting precedes abdominal pain** *(Ref: Sabiston 19/e p1280; Bailey 25/e p1208)*

- **Typical presentation**: **Periumbilical pain** followed by **anorexia** and **nausea**[Q].
- **Localized pain** is the **most important symptom**[Q]
- **Perforation** occurs in **80%** of cases < 5-years
- Approximately **60% perforation** occurs **within 48 hours**

21. **Ans. d. Leucopenia, e. Shift to right** *(Ref: Schwartz 9/e p1080; Bailey 26/e p1207, 25/e p1211)*

Alvarado (MANTRELS) scores		
	• Manifestations	**Score**
Symptoms	• **M**igratory RIF pain • **A**norexia • **N**ausea and vomiting	1 1 1
Signs	• **T**enderness (RIF) • **R**ebound tenderness • **E**levated temperature	**2** 1 1
Laboratory	• **L**euocytosis • **S**hift to left	**2** 1
	Total	10

Scores	Prediction
9–10	**Appendicitis** is **certain**
7–8	**High likelihood** of appendicitis
5–6	**Equivocal**
1–4	Appendicitis can be **ruled out**

- **CT scanning** is **appropriate for making diagnosis in** patients with **Alvarado scores** of **5** and **6** (in **equivocal cases**)[Q].

22. **Ans. a. Blockage of lumen**
23. **Ans. a. Peritoneum**
24. **Ans. c. Cullen's sign**
25. **Ans. d. Acute appendicitis**
26. **Ans. c. Acute appendicitis**
27. **Ans. d. Yersinia enterocolitica** *(Ref: Sabiston 19/e p1105)*

Acute Mesenteric Lymphadenitis

- Syndrome of **acute right lower quadrant abdominal pain** associated with **mesenteric lymph node enlargement** and a **normal appendix**[Q].
- **Diagnosis is made upon exploration** of the abdomen of a **patient suspected of having acute appendicitis** at which time a **normal appendix** and **enlarged mesenteric lymph nodes**[Q] are discovered.
- Occurs **most commonly** in **children** and **young adults**[Q]
- Equal frequency in males and females.
- **Yersinia enterocolitica** has been **associated with** this **syndrome** in **children**[Q].

28. **Ans. b. Anorexia**
29. **Ans. b. Mesenteric lymphadenopathy**
30. **Ans. b. Ultrasound**

APPENDICITIS IN PREGNANCY

31. **Ans. c. Conservative management by antibiotics should be tried** *(Ref: Sabiston 19/e p1283; Schwartz 10/e p1256-1257, 9/e p1082-1083; Bailey 25/e p1209; Shackelford 7/e p2021-2022)*

Surgery should be **performed during pregnancy** when **appendicitis is suspected**, just as it would be in a nonpregnant woman.

Appendicitis in Pregnancy

- Appendicitis is the **MC nonobstetric surgical disease of** the **abdomen during pregnancy**[Q].
- Risk during pregnancy is the **same as** it is **in nonpregnant women** of the same age
- Incidence is 1 in 2000 pregnancies.
- Can occur in any trimester, with a **slight increase**[Q] in frequency during the **2nd trimester.**
- **Perforation** is **more common** in the **3rd trimester**[Q]
- **Fetal mortality** can rise up to **35–50%** in cases of **perforation**[Q]**.**

Clinical Features

- Diagnosis may be difficult because symptoms of **nausea, vomiting**, and **anorexia,** as well as elevated **WBC count,** are common during pregnancy[Q].
- **Location of tenderness varies with gestation**[Q].
- After the fifth month of gestation, the appendix is shifted superiorly above the iliac crest and the appendiceal tip is rotated medially into the right upper quadrant by the gravid uterus.

Diagnosis

- **Ultrasound**[Q] is **helpful for establishing the diagnosis** and **location** of the inflamed appendix.

Treatment

- **Early appendectomy**[Q] is the appropriate therapy in suspected appendicitis **during all stages** of pregnancy.
- **Laparoscopic appendectomy** is **safe**[Q]

32. **Ans. b. Ultrasound abdomen**
33. **Ans. a. Alder's test** *(Ref: www.ncbi.nlm.nlh.gov/.../PMC3398111)*

Alder's Test

- **Localizing the area** of **maximal abdominal tenderness** and **maintaining constant pressure** on that point while the **patient** is **being turned to left**[Q].
- If the **pain is constant**, pain is of **extra-uterine origin**; if **pain disappears** it is more likely to be **uterine** or **tubal origin**[Q].
- This is a **very useful** and **important clinical test** which may be **employed in all cases** of an **acute abdomen in pregnancy**[Q].

OCHSNER-SHERREN REGIME

34. Ans. c. Appendicular mass *(Ref: Sabiston 19/e p1286; Schwartz 9/e p1086-1087; Bailey 26/e p1211, 25/e p1215-1216)*

Management of Appendicular Mass

- If an **appendix mass** is present and the **condition of the patient** is **satisfactory**, the standard treatment is the **conservative Ochsner-Sherren regimen**Q.
- This strategy is based on the premise that **inflammatory process** is **already localized** and that **inadvertent surgery is difficult**Q and **may be dangerous**. It may be impossible to find the appendix and, a **fecal fistula** may form.
- For these reasons, it is wise to observe a non-operative programme but to be prepared to operate should clinical deterioration occur.
  - **CECT abdomen** should be performed and **antibiotic therapy** should be given**Q**.
  - An **abscess**, if present, should be **drained radiologically**Q.
- **Temperature** and **pulse rate** should be recorded **4-hourly** and a **fluid balance** record maintained.
- **Clinical deterioration** or **evidence of peritonitis** is an **indication for early laparotomy**Q.
  - **Clinical improvement** is usually evident **within 24-48 hours**Q.
  - **Failure of the mass to resolve** should raise **suspicion of a carcinoma** or **Crohn's disease**Q.
- Using this regimen, approximately **90% of cases resolve without incident**.
- The **great majority of patients will not develop recurrence**, and it is **no longer considered advisable to remove** the **appendix** after an interval of 6–8 weeksQ.

Criteria for stopping conservative treatment of an appendix mass

- A **rising pulse rate**Q
- **Increasing** or **spreading abdominal pain**Q
- **Increasing size of** the **mass**Q

35. Ans. b. Appendicular mass

36. Ans. c. Ochsner-Sherren regimen

37. Ans. d. Operation is to be done immediately

38. Ans. c. Appendicular lump

39. Ans. c. Ochsner-Sherren regimen

NEOPLASM OF APPENDIX

40. Ans. b. Adenocarcinoma *(Ref: Sabiston 19/e p1289-1291; Schwartz 10/e p1258, 9/e p1088; Bailey 26/e p1213-1214, 25/e p1217-1218; Shackelford 7/e p2028)*

- Sabiston says "Although it was **previously believed** that **carcinoid tumors** were the **most common appendiceal neoplasms**, analysis of the Surveillance, Epidemiology, and End Results (SEER) database indicates that **mucinous tumors of the appendix** are **more common**."
- Schwartz says "Data from the **SEER program** identified **mucinous adenocarcinoma** as the **most frequent histologic diagnosis** (**38%** of total reported cases), **followed by adenocarcinoma** (**26%**), **carcinoid** (**17%**), **goblet cell carcinoma** (15%), and **signet-ring cell carcinoma** (4%). Five-year survival for appendiceal malignancies varies by tumor type. Patients with **carcinoid tumors** have the **best 5-year survival** (**83%**), whereas those with **signet-ring cell cancers** have the **lowest** (**18%**)."

- **MC neoplasm of appendix** (**MAC**): **M**ucinous adenocarcinomaQ (**38%**) > **A**denocarcinoma (**26%**) > **C**arcinoid (**17%**).
- **MC malignant neoplasms** of the **small bowel: Carcinoid tumors**Q > **adenocarcinomas** > malignant GISTs > lymphomas.

41. Ans. c. Right hemicolectomy *(Ref: Sabiston 19/e p1289-1291; Schwartz 10/e p1258, 9/e p1088; Bailey 26/e p1213, 25/e p1217; Shackelford 7/e p2028)*

Appendiceal Carcinoid

- **Appearance**: **Firm, yellow, bulbar mass** in the **appendix**Q
- **Majority of carcinoids** are **located in the tip**Q of the appendix.
- **Mean tumor size** for carcinoids is **2.5 cm**Q.
- Carcinoid tumors **usually present with localized disease** (64%)Q.

Clinical Features

- **Carcinoid syndrome** is **rarely associated**Q with appendiceal carcinoid unless widespread metastases are present.
- **Symptoms attributable directly to** the **carcinoid are rare**Q, although the tumor can occasionally obstruct the appendiceal lumen much like a fecalith and result in acute appendicitis
- **Malignant potential** is **related to size**, with **tumors < 1 cm rarely resulting in extension outside of** the **appendix**Q or adjacent to the mass.

Treatment of Appendiceal Carcinoid	
Size	**Treatment option**
Up to 1 cm	• Appendectomy[Q]
> 1–2 cm	• **Appendectomy if located at tip or mid-appendix** • **Right hemicolectomy** if: – **Located at base**[Q] – **Invading mesoappendix**[Q] – **LN involvement**[Q]
> 2 cm	• **Right hemicolectomy**[Q]

Prognosis

- Patients with **carcinoid tumors** have the **best 5-year survival (83%)**[Q].

42. Ans. a. Right hemicolectomy

43. Ans. a. Benign tumour, b. Low grade malignancy, c. Retention cyst *(Ref: Sabiston 19/e p1289-1290; Schwartz 10/e p1258, 9/e p1088; Bailey 26/e p1213, 25/e p1217-1218; Shackelford 7/e p2028)*

Mucocele of Appendix

- A mucocele of the appendix is an **obstructive dilatation** by **intraluminal accumulation** of **mucoid material**[Q].
- Caused by one of four processes: **retention cysts**, **mucosal hyperplasia**, **cystadenomas**, and **cystadenocarcinomas**[Q].
- **Intact mucoceles < 2 cm** are **almost always benign**[Q].
- Larger mucoceles are more likely to be neoplastic.

Clinical Features

- **Clinical presentation** is **nonspecific** (an **incidental finding** at **operation**)
- An **intact mucocele** presents **no future risk** for the patient; however, the **opposite is true** if the **mucocele has ruptured** and **epithelial cells** have **escaped into** the **peritoneal cavity**[Q].

Treatment

- **Every effort** is made **to keep** the **mucocele intact during extraction**, including **placing** the **specimen in a bag** or **converting** a laparoscopic procedure **to an open procedure**[Q], if necessary.
- **Presence of a mucocele does not mandate** performance of a **right hemicolectomy**[Q].
  - Surgery include: **Appendectomy** + **Wide resection of** the **mesoappendix** to include all the appendiceal lymph nodes + **Collection** and **cytologic examination** of all **intraperitoneal mucus** + **Inspection of** the **base** of the appendix[Q].
- **Right hemicolectomy** is **reserved for** patients with a **positive margin at** the **base** of the appendix or **positive periappendiceal lymph nodes**[Q].

44. Ans. a. Right hemicolectomy

45. Ans. c. Constitute 50% of GI carcinoid *(Ref: Harrison 18/e p3058)*

Carcinoid Tumor Location, Frequency of Metastases, and Association with the Carcinoid Syndrome			
	Location (% of Total)	**Incidence of Metastases**	**Incidence of Carcinoid Syndrome**
Foregut			
• Esophagus	< 0.1	—	—
• **Stomach**[Q]	**4.6**[Q]	10	9.5
• Duodenum	2.0	—	3.4
• **Pancreas**[Q]	0.7	**71.9**[Q]	**20**[Q]
• Gallbladder	0.3	17.8	5
• **Bronchus**[Q], lung, trachea	**27.9**[Q]	5.7	13
Midgut			
• Jejunum	1.8	(**58.4**[Q] in jejunum and ileum)	9
• **Ileum**[Q]	**14.9**[Q]		9
• Meckel's diverticulum	0.5	—	13
• **Appendix**[Q]	**4.8**[Q]	38.8	<1
• **Colon**[Q]	**8.6**[Q]	**51**	5
• Liver	0.4	32	—
• Ovary	1.0	32	**50**[Q]
• Testis	< 0.1	—	**50**[Q]
Hindgut			
• **Rectum**[Q]	**13.6**[Q]	3.9	—

46. Ans. d. Mucinous carcinoma

47. Ans. a. Right hemicolectomy *(Ref: Sabiston 19/e p1290)*

Appendiceal Adenocarcinoma

- Appendiceal adenocarcinomas found in **< 1%** of **appendectomy specimens**.
- Most are **discovered incidentally**Q.
- **Typical patient** is **older** and the **duration of symptoms** is **usually longer**.
- **Mucinous adenocarcinoma cell type** is **most common** and has a **better prognosis**Q after resection than the colon or signet ring cell type, with 5-year survival rates approaching 50%.
- **Right hemicolectomy** is **recommended**Q**.**

APPENDECTOMY

48. Ans. a. McArthur *(Ref: Bailey 26/e p1207-1209, 25/e p1212-1213)*

Conventional Appendectomy

- When the preoperative diagnosis is considered reasonably certain, the incision that is widely used for appendectomy is the so called **gridiron incision** (**gridiron**: a **frame of cross-beams** to **support a ship** during repairs)Q.
  - The **gridiron incision** (**described first by McArthur**Q) is **made at right angles** to a **line joining** the **anterior superior iliac spine to** the **umbilicus,** its **centre being along** the line at **McBurney's point**Q.
- If **better access** is required, it is possible to **convert** the **gridiron to a Rutherford Morison incision**Q by **cutting** the **internal oblique** and **transversus muscles** in the line of the incision.
  - In recent years, a **transverse skin crease** (**Lanz**Q) **incision** has become **more popular**, as the **exposure is better** and **extension,** when needed, **is easier**.
  - The **incision**, appropriate in length to the size and obesity of the patient, is made approximately **2 cm below** the **umbilicus centred on** the **mid-clavicular-midinguinal line.**
  - It is a **muscle splitting incision**Q along the **direction of fibers.**
- When the **diagnosis is in doubt**, particularly in the **presence of intestinal obstruction**, a **lower midline abdominal incision**Q is to be **preferred** over a right lower paramedian incision.
  - **Rutherford Morison's incision** is **useful if** the **appendix** is **para** or **retrocaecal** and **fixed**Q**.**
  - It is **essentially an oblique muscle-cutting incision** with its **lower end over McBurney's point** and **extending obliquely upwards** and **laterally** as necessary. All layers are divided in the line of the incisionQ.

49. Ans. c. 3 mm *(Ref: Maingot 11/e p602)*

No matter how the appendix is divided, the **residual appendiceal stump should be no longer than 3 mm to minimize** the **possibility of stump appendicitis** in the future.

Stump Appendicitis

- Appendicitis in the remaining appendiceal stump after appendectomy
- The residual appendiceal **stump should not be more than 3mm**Q to minimize the possibility of stump appendicitis.

50. Ans. b. No burying of stump *(Ref: Sabiston 19/e p1284-1286; Schwartz 10/e p1251-1256, 9/e p1084; Bailey 26/e p1207-1209, 25/e p1212-1213; Shackelford 7/e p2023-2024)*

Steps of Appendectomy

- **Cecum** is identified by the **presence of taeniae coli**, a turgid **appendix** may be **felt at the base** of the cecumQ.
- **Base of** the **mesoappendix** is **clamped in artery forceps**, **divided** and **ligated**Q.
- **Appendix** is **crushed near its junction with** the **cecum** in artery forceps, which is removed and reapplied just distal to the crushed portionQ.
- An **absorbable ligature** is **tied around** the **crushed portion** close to the cecumQ.
- **Appendix** is **amputated** between the artery forceps and the ligature.
- An **absorbable purse-string** or **'Z' suture** may then be **inserted into** the **cecum** about 1.25 cm from the baseQ.
- **Stump** of the appendix **is invaginated while** the **purse-string** or **'Z' suture is tied**, thus burying the appendix stumpQ.
- Many surgeons believe **invagination** of the appendiceal stump **is unnecessary**Q.

Methods to be adopted in special circumstances	
Edematous and **inflamed cecal wall**	• **Purse string suture** is **not applied**[Q] • **Stump** is **not invaginated**[Q]
Inflamed base of appendix	• **Base** is **not crushed** for the fear of spread of infection by way of lymphatics and blood stream[Q]. • **Base** is **ligated close to the cecal wall**[Q], after which the appendix is amputated and the stump invaginated.
Gangrenous base of appendix	• **Neither crushing nor ligation**[Q] • Two **stitches** are **placed through** the **cecal wall close to the base** of the gangrenous appendix, which is **amputated flush with** the **cecal wall**[Q], after which these stitches are tied. **Further closure** is effected by means of a **second layer** of **interrupted seromuscular sutures**[Q].

51. Ans. b. Iliohypogastric *(Ref: Bailey 25/e p1213)*

- **Right inguinal hernia** is **more common** following a **gridiron incision** for appendectomy, and is **due to injury** to the **iliohypogastric nerve**[Q].
- **IH → IH** (**I**lio**H**ypogastric nerve → **I**nguinal **H**ernia)

52. Ans. d. The incision can be extended upwards or downwards *(Ref: Bailey 26/e p1208, 25/e p1213)*

- In **McBurney's incision**, **incision** is **extended upwards** and **laterally**, not downwards.

53. Ans. b. Cutting the muscles laterally

54. Ans. d. Lanz

55. Ans. b. There is stenosis/narrowing of the sigmoid colon *(Ref: Sabiston 19/e p1271)*

- **Unrelieved obstruction** of the tube **distal to fistula** is a **cause of persistence** of fistula.

56. Ans. b. Sterility

57. Ans. c. Undiagnosed ileo-cecal disease *(Ref: Bailey 26/e p1212, 25/e p1216-1217)*

- **Leakage from** the **appendicular stump** occurs rarely, but may follow **if the encircling stitch** has been **put in too deeply** or if the **cecal wall** was **involved by edema** or **inflammation**. Occasionally, a fistula may result **following appendectomy in Crohn's disease**.

Complications of Appendectomy	
• **Wound infection: MC postoperative complication**[Q] (in **5-10%** of all patients). • **Intra-abdominal abscess**[Q] • **Ileus**[Q] • **Respiratory** complications (rare)[Q] • **Venous thrombosis** and **embolism** • **Portal pyaemia** (pylephlebitis) • **Adhesive intestinal obstruction:** – **MC late complication** of appendectomy[Q]. – At operation, a **single band adhesion** is often **found to be responsible**[Q].	• **Fecal fistula**[Q] – **Leakage from** the **appendicular stump** occurs **rarely**, but may follow if the **encircling stitch** has been **put in too deeply** or if the **cecal wall was involved by edema** or **inflammation**[Q]. – Occasionally, a **fistula may result following appendicectomy** in **Crohn's disease**[Q]. – **Conservative management** with **low-residue enteral nutrition** will usually **result in closure**[Q].

58. Ans. b. Iliohypogastric Nerve *(Ref: Love & Bailey 24/e p1217)*

- "Right inguinal hernia is more common following a grid iron (MC Burney's) incision for appendiccectomy and is due to injury to the iliohypogastric nerve"

APPENDIX ANATOMY AND PHYSIOLOGY

59. Ans. b. Supplies terminal ileum also *(Ref: Sabiston 19/e p1279)*

Anatomy of Appendix

- **Appendix, ileum**, and **ascending colon** are all **derived from** the **midgut**[Q].
- **Appendiceal artery (end artery)**, a **branch of** the **ileocolic artery**, supplies the appendix[Q].
- **Length**: **2–20 cm** (average length is 9 cm in adults)[Q].
- **Base** of the appendix is **located at** the **convergence of** the **taeniae along** the **inferior aspect of** the **cecum**[Q]
- **MC location**: **Retrocecal**[Q]

60. **Ans. c. Develops from midgut, d. Supplied by appendicular branch of ileocolic artery**

61. **Ans. a. Retrocaecal**

62. **Ans. b. The ilio-appendicular fold of peritoneum** *(Ref: Sabiston 19/e p1294-1295)*

- **Jackson Membrane**[Q]**:** Adhesion from the **right abdominal wall** to the **anterior taenia** of the ascending colon.
- **Gerlach valves**[Q]**:** A mucosal fold **covering** the **appendiceal orifice.**
- **Fold of Treves**[Q]**: Inferior ileocecal fold** (**does not contain any vessel**, referred as the **bloodless fold of Treves**)

MISCELLANEOUS

63. **Ans. a. Anorectal incontinence** *(Ref: Bailey 25/e p1341; Shackelford 7/e p2292)*

Appendicostomy

- Use in urologic reconstruction as an **appedicovesicostomy** in patients requiring chronic catheterization for bladder emptying (**Mitrofanoff procedure**)[Q]
- An **appendicolostomy** for patients in whom the bladder is absent or too small is created by implanting the appendix under the taeniae of a detubularized patch of cecum or sigmoid colon.
- **Conduit for decompression** after colon surgery or for the **chronic administration** of medications or **enema** (**Malone Procedure**)[Q]

64. **Ans. d. All** *(Ref: Bailey 26/e p1205, 25/e p1211)*

Rare differential diagnoses of Acute Appendicitis	
• **Preherpetic pain**[Q] of the right 10th and 11th dorsal nerves • **Tabetic crises** (Tabes[Q]) • **Acute intermittent porphyria**[Q]	• **Diabetes mellitus**[Q] • **Typhlitis** or **leukemic ileocecal syndrome**[Q]

CHAPTER 18

Rectum and Anal Canal

MULTIPLE CHOICE QUESTIONS

VILLOUS ADENOMA

1. Villous polyp of rectum manifest: *(All India 89)*
a. Bleeding PR
b. Mucus diarrhea with hypokalemia
c. Prolapse rectum
d. Obstruction

2. In villous papillomas of the rectum which is lost: *(DNB 2007, 2003, TN 89)*
a. Na^+ b. Mg^{2+}
c. K^+ d. All

3. The best surgical management for villous adenoma of the rectum is: *(PGI 81, APPG 88)*
a. Local resection of lesion
b. Repeated sigmoidoscopy
c. Abdomino perineal resection
d. Electrolyte infutsion and chemotherapy

4. Rectal adenoma is associated with: *(JIPMER 2003)*
a. Familial polyposis coli b. Hypokalemia
c. Intussusception d. Hemorrhoids

5. Regarding villous adenoma all are true *except:* *(WBPG 2014)*
a. Dysentery b. Watery diarrhea
c. Hypokalemia d. Constipation

RECTAL POLYP

6. Rectal polyps usually present with: *(SGPGI 2005, UPPG 97)*
a. Obstruction b. Perforation
c. Bleeding d. Malignant change

7. A toddler has few drops of blood coming out of rectum. Probable diagnosis is: *(AIIMS May 2013, AIIMS May 2012)*
a. Juvenile rectal polyp
b. Adenomatous polyposis coli
c. Rectal ulcer
d. Piles

8. Most common cause of fresh bleeding per rectum in a 5-years old child is: *(WBPG 2012, AIIMS June 93)*
a. Volvulus b. Trauma
c. Worm infestation d. Rectal polyp

CARCINOMA RECTUM

9. All are true about TME for CA rectum except:
a. Decreases local recurrence *(AIIMS GIS Dec 2009)*
b. Decreases incidence of impotence
c. Decreases incidence of bladder dysfunction
d. Decreases survival

10. Local excision in CA rectum is done in all except:
a. Within 6 cm of anal verge *(AIIMS GIS Dec 2009)*
b. Lesion < 4 cm
c. Involvement of < 40% circumference
d. T1 and T2 cancer with or without lymph node involvement

11. In CA rectum, preoperatively: *(AIIMS GIS Dec 2009)*
a. Only RT is given
b. Only chemotherapy is given
c. Chemoradiation is given
d. Chemoradiation is given postoperatively only

12. In rectal carcinoma, distal margin should be at least:
a. 2 cm b. 3 cm *(PGI SS June 2001)*
c. 4 cm d. 5 cm

13. True about surgical treatment of rectal cancer:
a. Irrigation of divided bowel ends with cytotoxic solution may reduce local true recurrence *(PGI SS Dec 2009)*
b. Intramural spread is commonly > 4 cm
c. Minimum of 5 cm distal resection margin is required
d. Mesorectum is devoid of lymph nodes

14. Dukes A stage of rectal carcinoma is managed by:
a. Surgical resection only *(DNB 2008)*
b. Surgical resection + selective adjuvant chemotherapy
c. Surgical resection + routine adjuvant chemotherapy
d. Chemotherapy primarily

15. All are true about rectal cancer except: *(JIPMER GIS 2011)*
a. Most common symptom is hematochezia
b. Precise location of tumor is done with rigid proctosigmoidoscopy
c. Dissection lateral to endopelvic fascia investing the mesorectum causes local recurrence
d. Radiation dose is 60 Gray

16. False about indications of local resection in CA rectum:
a. T2N0, T1N1 *(AIIMS GIS 2003)*
b. < 10 cm from anal verge
c. < 4 cm or < 40% of circumference involved
d. Well differentiated with no LN involvement

17. Best treatment for a 4 cm moderate grade rectal cancer at the junction of lower and mid one thirds, with less than one third circumference of the rectum being involved?
a. Radiotherapy *(MHSSMCET 2008, 2006)*
b. Anterior resection
c. Transanal resection
d. Abdomino-perineal resection

18. Distal margins of clearance required for treatment of CA rectum is _____ and lateral and proximal margins_____: *(MHSSMCET 2010)*
a. 2 cm and 5 cm
b. 3 cm and 5 cm
c. 5 cm and 2 cm
d. 5 cm and 3 cm

19. A patient with carcinoma of rectum which is 5 cm form anal verge, which procedure you will prefer to perform:
a. Anterior resection *(MHSSMCET 2005)*
b. Abdomino-perineal resection
c. Hartman's procedure
d. Defunctioning colostomy

20. Which of the following is the investigation of choice for assessment of depth of penetration and perirectal nodes in rectal cancer? *(AIIMS Nov 2004)*
a. Transrectal ultrasound
b. CT scan pelvis
c. MRI Scan
d. Double contrast barium enema

21. Vimal, a 70-years old male presents with a history of lower GI bleed for last 6 months. Sigmoido-scopic examination shows a mass, of 4 cm about 3.5 cm above the anal verge. The treatment of choice is: *(AIIMS June 2001)*
a. Colostomy
b. Anterior resection
c. Abdominoperineal resection
d. Defunctioning anastomosis

22. A patient comes with rectal carcinoma situated 6 cm above dentate line with no nodal metastasis. Treatment of choice will be: *(AIIMS Nov 97)*
a. Anterior resection
b. APR
c. Radiotherapy
d. Hartman's procedure

23. For a rectal carcinoma at 5 cm from the anal verge, the best acceptable operation is: *(All India 2004)*
a. Anterior resection
b. Abdomino-perineal resection
c. Posterior resection
d. APR done in lesion of upper zone

24. True about rectal cancer: *(PGI June 2005)*
a. Most common type is adenocarcinoma
b. Surgery is the treatment of choice
c. Surgical treatment indicated in spite of hepatic metastasis
d. APR done in lesion of upper zone

25. Commonest presentation of CA rectum is:
a. Diarrhea *(JIMPER 2012, DPG 95)*
b. Constipation
c. Bleeding P/R
d. Feeling of incomplete defecation

26. Sphincter saving surgery for rectal malignancy is not done in: *(PGI Dec 2001)*
a. Age over 50 years
b. Lymph node involvement
c. Infiltration of lamina propria
d. More than 4 cm from anal verge
e. High grade tumor

27. Abdomino-perineal resection is done in colorectal carcinoma on the basis of: *(PGI June 2002)*
a. Age of patient
b. Distance from anal-verge
c. Fixity of tumor
d. Hepatic metastasis
e. Extent of tumor

28. In which case anterior resection is the method of treatment? *(AIIMS Feb 97)*
a. CA sigmoid colon
b. CA rectum
c. CA colon
d. CA anal canal

29. Prognosis for carcinoma rectum is best assessed by:
a. Site of tumour *(AIIMS 87, Karnataka 89)*
b. Histological grading
c. Size of tumors
d. Duration of the symptoms

30. Best procedure in mid rectal carcinoma is: *(AIIMS 92)*
a. Abdomino perineal resection
b. Anterior resection
c. Perineal loop
d. Transverse colostomy

31. Treatment of carcinoma rectum 5 cm from anal verge without nodal metastasis is: *(Kerala 94)*
a. Abdominoperineal resection
b. Radiotherapy
c. Endoscopic resection
d. Chemotherapy

32. Which of the following is more aggressive rectal carcinoma?
a. Adenocarcinoma *(MAHE 2006)*
b. Secondary mucoid carcinoma
c. Signet ring carcinoma
d. Squamous cell carcinoma

33. A punch biopsy shows carcinoma rectum with fixed mass and X-ray chest normal. Which of the following is least useful investigation? *(UPPG 2008)*
a. Rigid proctoscope
b. Barium enema
c. CT chest
d. MRI-abdomen and pelvis

34. Ideal management in an old and frail patient presenting with a mass situated 15 cm away from anal orifice:
a. Abdomino-perineal resection *(MCI March 2005)*
b. Colonoscopic removal
c. Hartman's operation
d. Anterior resection

35. Aim of surgery in carcinoma rectum is: *(MCI March 2010)*
a. Limited excision of the rectum
b. Sacrificing gastrointestinal continuity
c. Preserving the anal sphincter
d. Preserving mesorectum

36. Anterior resection is contraindicated in the following:
a. Age more than 60 years *(PGI 90)*
b. Undifferentiated carcinoma
c. Melanin in liver
d. Cancer is less than 5 cm from anorectal margin

37. Distal clearness in surgery for carcinoma rectum is:
a. 2 cm
b. 5 cm *(All India 90)*
c. 10 cm
d. 8 cm

38. Which one of the following statements is false regarding carcinoma rectum? *(APPG 2015)*
a. Hartmann's operation is done in old debilitated patients
b. Per rectal examination can diagnose only 10% of cases
c. Early morning spurious diarrhea and tenesmus can occur
d. Growth confined to rectal wall is stage A of Modified Duke staging

HEMORRHOIDS

39. Not true about hemorrhoids: *(AIIMS GIS May 2008)*
a. First degree- no prolapse
b. Excision for externo-internal piles
c. Third degree- no surgery
d. Conservative treatment in first degree

40. Hemorrhoids managed by manual reduction: *(AIIMS GIS May 2011)*
a. I degree
b. II degree
c. III degree
d. IV degree

41. Which of the following is not true about hemorrhoids?
a. Pruritus is not common *(PGI SS June 2007)*
b. Can be palpated on DRE in absence of complications
c. Band ligation is most commonly done office procedure
d. Stapled hemorrhoidectomy causes less postoperative pain

42. True about treatment of hemorrhoids: *(PGI Nov 2010)*
a. Band ligation
b. 5% phenol in almond oil is used as sclerosant
c. May be resolved by diet modification
d. Hemorrhoidectomy is TOC

43. External hemorrhoids below the dentate line are:
a. Painful *(AIIMS May 2012, All India 2007, AIIMS Nov 2006*
b. Ligation is done as management
c. Skin tag is not seen in these cases
d. May turn malignant

44. Injection sclerotherapy is ideal for the following: *(All India 2004)*
a. External hemorrhoids b. Internal hemorrhoids
c. Posterior resection d. Local resection

45. Commonest complication following haemorrhoidectomy is: *(MHSSCET 2005, AIIMS 92)*
a. Hemorrhage b. Infection
c. Fecal impaction d. Urinary retention

46. Treatment of choice in 2nd degree piles is: *(AIIMS 92)*
a. Cryosurgery b. Sclerotherapy
c. Banding d. Surgery

47. Treatment of primary piles is: *(Kerala 94)*
a. Surgery b. Sclerotherapy
c. No treatment d. Analgesics

48. Best investigation to diagnose piles is: *(Kerala 94)*
a. Proctosigmoidoscopy b. Barium enema
c. Ultrasound d. Proctoscopy

49. Most common age for intussusception: *(Recent Questions 2013)*
a. 0–6 months b. 6 months – 3 years
c. 3–5 rears d. > 5 years

50. Five-day self subsiding pain is diagnostic of: *(APPG 97)*
a. Anal fissure
b. Fistula-in-ano
c. Thrombosed external hemorrhoids
d. Thrombosed internal hemorrhoids

51. The following are true of hemorrhoids except:
a. They are arteriolar dilatations *(JIPMER 2001)*
b. They are common causes of painless bleeding
c. They cannot be per rectally palpated
d. They can be banded

52. All of the following are true in management of hemorrhoids except: *(DPG 2009 March)*
a. Excisional surgery is cornerstone
b. Fiber supplementation is effective
c. Improvement in bowel function is helpful
d. Ligation with rubber bands effective

53. Most important disadvantage of cryosurgery for hemorrhoid is: *(DPG 2005)*
a. Pain b. Infection
c. Profuse watery discharge d. Hemorrhage

54. Which of the following is true about hemorrhoids?
a. More common with portal hypertension *(DNB 2008)*
b. External hemorrhoids are proximal to dentate line
c. Internal hemorrhoids bleed profusely and painless
d. Internal hemorrhoids are covered by anoderm

SOLITARY RECTAL ULCER SYNDROME

55. All are true regarding solitary rectal ulcer syndrome:
a. Usually in anterior wall *(DNB 2002)*
b. Associated with rectal prolapse
c. Usually malignant
d. Bowel training helps alot

56. Colitis cystica profunda is seen in case of: *(AIIMS GIS Dec 2009)*
a. SRUS b. Rectal carcinoma
c. Rectocele d. Fissure

57. Most common site of SRUS: *(GB Pant 2011)*
a. Posterior, 7–10 cm from anal verge
b. Anterior, 7–10 cm from anal verge
c. Posterior, 2–3 cm from anal verge
d. Anterior, 2–3 cm from anal verge

58. True about solitary rectal ulcer syndrome is all/except:
a. Increased muscle layer proliferation *(AIIMS May 2007)*
b. Crypt distortion
c. Lamina propria infiltration with lymphocyte
d. Subepithelial fibrosis

59. Not true regarding solitary rectal ulcer: *(AIIMS Nov 97)*
a. 20% are multiple
b. Recurrent rectal prolapsed is a cause
c. Involves posterior wall
d. Managed by digital reposition

60. Treatment of solitary rectal ulcer are all except:
a. Laxatives b. Rectopexy *(PGI Dec 2007)*
c. Banding d. Sclerosant injection
e. Enema

RECTAL PROLAPSE

61. A 40-years old male presented with reducible rectal prolapse with history of constipation from the last 10 years, redundant sigmoid with fecal matter, best form of management for this patient: *(ILBS 2011)*
a. Delorme procedure b. Anterior resection
c. Rectopexy d. Mesh fixation

62. Rectal prolapse is common in: *(WBPG 2014)*
a. 1–3 months b. 3–5 months
c. 5–8 months d. 8–12 months

63. Treatment of rectal prolapse in childhood is:
a. Lahaut's operation *(AIIMS June 94)*
b. Incision of prolapsed mucosa
c. Thiersch wiring
d. Ripstein operation

64. Recurrent prolapse of the rectum in children is treated by: *(JIPMER 87, 88)*
a. Thiersch wiring b. Digital reposition
c. Excision d. Ripstein's operation

65. Delorme's procedure is used for: *(WBPG 2012, MHPGMCET 2007, MP 2002, SGPGI 2004)*
a. Rectal prolapse b. Solitary rectal ulcer
c. Rectal bilharziasis d. Proctalgia fugax

66. A 30-years old male present with complete rectal prolapse. Which of the following procedure is associated with lowest risk of recurrence? *(All India 2012)*
a. Delorme's procedure b. Thiersch procedure
c. Abdominal rectopexy d. Altmeir's procedure

67. A young male patient presents with compete rectal prolapse. The surgery of choice is: *(All India 2010)*
a. Abdominal rectopexy b. Delormes procedure
c. Anterior resection d. Goodsall's procedure

68. In old age for rectal prolapse palliative surgery in a patient unfit for surgery is: *(Recent Questions 2013)*
a. Delorme's procedure b. Well's procedure
c. Thiersch's operation d. Low anterior resection

ANO-RECTAL ABSCESS

69. Commonest type of anorectal abscess is: *(DNB 2012, AIIMS 85)*
a. Ischio rectal b. Submucous
c. Pelvi-rectal d. Perianal

70. The increased incidence of infection in the ischiorectal fossa is due to: *(All India 89)*
a. Absence of deep fascia b. Proximity to anus
c. Poor blood supply d. Presence of fibrofatty tissue

71. Most common cause of anorectal abscess is:
a. Inflammation of anal gland *(MAHE 2007, 2008)*
b. Folliculitis
c. Inflammation of rectal mucosa
d. Rectum

FISTULA-IN-ANO

72. Most common anorectal fistula: *(AIIMS GIS Dec 2009)*
a. Intersphincteric b. Transsphincteric
c. Suprasphincteric d. Extrasphincteric

73. An AIDS patient presents with fistula in ano. His CD_4 count is below 50. Treatment of choice is: *(Punjab 2008, MAHE 2001)*
a. Seton b. Fistulectomy
c. Both d. Medical

74. Which type of malignancy is found in anorectal fistula? *(PGI June 2005)*
a. Squamous cell carcinoma b. Transitional cell carcinoma
c. Adenocarcinoma d. Columnar carcinoma

75. True statement regarding 'Fistula in ano' is :
a. Posterior fistulae have straight tracks *(All India 2001)*
b. High fistulae can be operated with no fear of incontinence
c. High and low divisions are made in relation to the pelvic floor
d. Intersphincteric is the most common type

76. The treatment of choice in fistula in ano: *(JIPMER 93)*
a. Anal dilatation b. Fissurotomy
c. Fistulectomy d. Fistulotomy

77. High or low fistula in ano is termed according to its internal opening present with reference to: *(UPSC 2008)*
a. Anal canal b. Dentate line
c. Anorectal ring d. Sacral promontory

78. Ideal investigation for fistula-in-ano is: *(MCI March 2008)*
a. Endoanal ultrasound b. MRI
c. Fistulography d. CT scan

79. Seton used in fistula in anosurgery is draining seton and: *(Recent Questions 2013)*
a. Cutting seton b. Dissolving seton
c. Dissecting seton d. Fibrosing seton

ANAL FISSURE

80. Most common site of chronic fissure in ano: *(GB Pant 2011)*
a. Anterior b. Posterior
c. Lateral d. Anterolateral

81. Percentage of GTN used in fissure: *(GB Pant 2011)*
a. 2% b. 0.2%
c. 0.02% d. 20%

82. All are treatment of acute fissure in ano except: *(AIIMS Sept 96)*
a. Conservative b. Dilatation under GA
c. Lateral sphincterotomy d. External sphincterotomy

83. Sitz Bath consists of which of the following? *(Karnataka 96)*
a. Patient bathed in normal saline
b. Bathed in molten wax
c. Sitz in a basin containing warm antiseptic lotion
d. Sitz in a basin containing molten wax

84. Sentinel pile indicates: *(AIIMS 87)*
a. Carcinoma rectum b. Internal hemorrhoids
c. Perianal fistula d. Anal fissure

85. Rectal examination should not be done in: *(JIPMER 90)*
a. Anal fissure
b. Fistula in ano
c. Prolapsed piles with bleeding
d. Anal stenosis

86. Internal sphincterotomy is the treatment of choice for: *(JIPMER 81, AMC 86)*
a. Piles b. Fistula
c. Fissure-in-ano d. Carcinoma

87. Anal fissure best diagnosed by: *(All India 2008)*
a. Anoscopy
b. History and superficial clinical examination
c. PR examination
d. USG

88. Lateral internal sphincterotomy is useful for: *(MCI Sept 2007)*
a. Anal fistula b. Anal canal strictures
c. Hemorrhoids d. Anal fissure

89. A sentinel pile indicates: *(MHPGMCET 2008, 2007)*
a. Internal hemorrhoids b. Pilonidal sinus
c. Fissure in ano d. Fistula in ano

90. Most common site for anal fissure is: *(Recent Questions 2013)*
a. 3 O'clock b. 6 O'clock
c. 2 O'clock d. 10 O'clock

PILONIDAL SINUS

91. Which is not a feature of pilonidal sinus? *(PGI June 95)*
a. Branching tracts are common
b. Recurrence is uncommon
c. Bony involvement is uncommon
d. Seen in drivers

92. The following statement about pilonidal sinus is true:
a. More common in females *(All India 2007)*
b. Mostly congenital
c. Prognosis after surgery is poor
d. Treatment of choice is surgical excision of sinus tract

93. Jeep's disease is also known as: *(MCI March 2008)*
a. Anal incontinence b. Hemorrhoids
c. Pilonidal sinus d. Anal fissure

94. All of the following are true regarding pilonidal sinus except: *(MCI Sept 2009)*
a. Seen predominantly in women
b. Occurs only in sacrococcygeal region.
c. Tendency for recurrence
d. Obesity is a risk factor

CARCINOMA ANAL CANAL

95. Treatment of choice for squamous cell carcinoma of anal canal: *(NEET 2013, DNB 2012, JIPMER 2011)*
a. Abdominoperineal resection
b. Chemoradiation
c. Wide local excision
d. CO_2 laser

96. Not included in treatment of squamous cell carcinoma of anal margin: *(PGI May 2011)*
a. Radiotherapy f/b chemotherapy
b. Chemotherapy f/b radiotherapy
c. Local excision
d. Radical surgery
e. Abdominoperineal resection

97. Most common surgical complication of condyloma acuminata? *(MHSSMCET 2008)*
a. Infection b. Recurrence
c. Hemorrhage d. Malignant change

98. Virus that has increased association with anal warts:
a. HPV b. HIV *(MHPGMCET 2009)*
c. LMV d. EBV

99. Quadrivalent vaccine available for HPV protects against: *(JIPMER 2010)*
a. HPV 6, 11, 31, 32 b. HPV 11, 16, 30, 33
c. HPV 6, 11, 16 , 18 d. HPV 16, 18, 31, 35

100. Treatment of choice for squamous cell carcinoma of anal canal not involving deep structures: *(JIPMER 2010)*
a. Chemoradiation
b. Wide local excision+chemoradiation
c. Wide local excision+radiotherapy
d. Abdomino perineal resection

101. Commonest type of carcinoma anal canal is: *(AIIMS June 97)*
a. Squamous cell carcinoma b. Adenocarcinoma
c. Adenocanthoma d. Papillary type

102. Anal carcinoma is most commonly: *(PGI June 97)*
a. Adenocarcinoma b. Epidermoid
c. Mixed d. None of the above

103. Treatment of squamous cell carcinoma of anal canal is: *(Karnataka 2012, AIIMS Nov 2002)*
a. Cisplatin based chemotherapy followed by radical radiotherapy
b. Abdominoperineal resection
c. Radical radiotherapy
d. Radical radiotherapy followed by mitomycin-C based chemotherapy

104. Which of the following statements is true for Nigro's regimen? *(All India 2008)*
a. It is a regimen for anal canal neoplasm
b. It incorporates chemotherapy with radiation as an alternative to surgery
c. Has the advantage of preserving continence
d. All of the above

105. A 50-years old male, working as a hotel cook, has four dependent family members. He has been diagnosed with an early stage squamous cell cancer of anal canal. He has more than 60% chances of cure. The best treatment option is
a. Abdomino-perineal resection *(All India 2003)*
b. Combined surgery and radiotherapy
c. Combined chemotherapy and radiotherapy
d. Chemotherapy alone

106. For CA Anal canal, treatment of choice is: *(DNB 2012, GB Pant 2011, AIIMS Feb 97, Nov 97, June 98, All India 2006)*
a. Surgery b. Surgery + Radiotherapy
c. Chemoradiation d. Chemotherapy

107. In carcinoma of anus distal margin of clearance of anal canal of at least: *(CMC 2001)*
a. 2 cm b. 5 cm
c. 4 cm d. 7 cm

108. Anal margin carcinoma is mostly: *(PGI SS June 2005)*
a. SCC b. BCC
c. Bowen's disease d. Melanoma

PAGET'S DISEASE OF ANAL CANAL

109. Paget's disease of anal canal is: *(JIPMER GIS 2011)*
a. Squamous cell carcinoma in situ
b. Squamous cell adenoma
c. Intra-epithelial adenocarcinoma
d. Marginal anal cell carcinoma

110. Which of the following is true about extra-mammary Paget's disease? *(JIPMER 2011)*
a. MC site is vulva b. MC site is penis
c. MC site is vagina d. MC site is perianal region

ANAL CANAL MELANOMA

111. True about melanoma of the anal canal is: *(PGI June 99)*
a. Present usually as anal bleeding
b. AP resection gives better result than local excision
c. Local recurrence at the same site after resection
d. Radiosensitive

ANORECTAL MALFORMATIONS

112. A newborn baby presents with absent anal orifice and meconuria. What is the most appropriate management:
a. Transverse colostomy *(All India 2008)*
b. Conservative
c. Posterior saggital anorectoplasty
d. Perenial V-Y plasty

113. Invertogram is taken after:
a. 2 hours after birth b. 4 hours after birth
c. 6 hours after birth d. 8 hours after birth

114. Anorectal anomalies are commonly associated with: *(JIPMER 2011)*
a. Cardiac anomalies b. Duodenal atresia
c. CNS malformations d. Abdominal

115. A neonate is brought with history of not having passed meconium on examination there is no anal opening but a dimple. Investigation of choice is: *(JIPMER 90)*
a. X-ray erect posture b. X-ray supine posture
c. Gastrograffin study d. Invertogram

RECTUM AND ANAL CANAL ANATOMY AND PHYSIOLOGY

116. Resting tone of rectum is decreased in all except:
a. Micturition *(All India 91)*
b. Retained feces in the rectum
c. Prolapse rectum
d. Trauma involving the perineum

117. The length of a standard proctoscope is: *(TN 2004)*
a. 4 inches b. 6 inches
c. 8 inches d. 3 inches

118. Muscle which is primarily responsible for rectal continence: *(APPG 86, PGI 86, Kerala 88)*
a. External sphincter b. Internal sphincter
c. Puborectalis d. Sacrococcygeus

119. Below the pectineal line the lymphatic spread is to ..... nodes: *(PGI 89)*
a. Superficial inguinal b. Internal iliac
c. External iliac d. Para aortic

120. Internal sphincter of rectum is formed by: *(AIIMS 79, DPG 96)*
a. Levator ani
b. Puborectalis
c. Longitudinal muscle fibers condensation
d. Circular muscles fibers condensation

121. It can be stated that the superior hemorrhoidal veins: *(AIIMS 84)*
a. Drain into the inferior mesenteric vein
b. Have no valve
c. Leave the anal canal at the pectinate line
d. Cause external hemorrhoids

122. What is false regarding dentate line? *(AIIMS 98)*
a. Glands of Morgagni open below the line
b. Anal glands open at the line
c. Dentate line lies 2 cms above the anal verge
d. Transitional epithelium lies above the dentate line

123. True statement about upper half of anal canal is:
a. Insensitive to pain
b. Drained by superficial inguinal lymph node
c. Lined by squamous epithelium
d. Supplied by superior mesenteric artery

124. Not true about the anal canal is: *(PGI 99)*
a. Completely lined by stratified squamous epithelium
b. Supplied by pudendal nerve
c. Drained by veins forming portosystemic anastomosis
d. Part below pectinate line is supplied by inferior rectal artery

125. Which of the following statement about valves of Houston is true? *(All India 2012, AIIMS GIS Dec 2011)*
a. The middle valve corresponds to middle convex fold to right
b. The upper valve corresponds to peritoneal reflection
c. The valve contain all the three layer of muscle wall
d. Valves disappear after mobilization of rectum

126. A patient with external hemorrhoids develops pain while passing stools. The nerve mediating this pain is: *(DNB 2011, All India 2002)*
a. Hypogastric nerve
b. Pudendal nerve
c. Splanchnic visceral nerve
d. Sympathetic plexus

127. In an adult male, on per rectal examination, the following structures can be felt anteriorly except: *(All India 2005)*
a. Internal iliac lymph nodes
b. Bulb of the penis
c. Prostate
d. Seminal vesicle when enlarged

128. The following are important in maintenance of normal fecal continence except: *(All India 95)*
a. Anorectal angulation
b. Rectal innervations
c. Internal sphincter
d. Haustral valve

129. Rectal incontinence is due to involvement of: *(PGI June 2006)*
a. External anal sphincter
b. Internal anal sphincter
c. Ischiococcygeus
d. Pubococcygeus

130. Which of the following is not a component of anorectal ring? *(AIIMS May 2013)*
a. External anal sphincter
b. Puborectalis
c. Anococcygeal raphe
d. Internal anal sphincter

131. External anal sphincter is innervated by: *(AIIMS Nov 2013)*
a. S2, S3, S4
b. S2, S3
c. L5, S1
d. L2, L3

132. Dentate line measurement from anal margin: *(WBPG 2014)*
a. 1 cm
b. 1.5 cm
c. 2 cm
d. 2.5 cm

MISCELLANEOUS

133. Hemangioma of the rectum: *(PGI June 2007)*
a. Common tumor
b. Fatal hemorrhage seen
c. Ulcerative colitis like symptoms seen
d. None

134. Bleeding per rectum is present in all, except: *(AIIMS June 94)*
a. Meckel's diverticulum
b. Sigmoid volvulus
c. Carcinoma rectum
d. Ulcerative colitis

135. A young office executive, on tout, presents with bright red painless bleed since 7 days and abdominal pain. External and per-rectal examinations are normal. As attending general practitioner what will be your next step: (AIIMS Nov 2010)
a. Proctoscopy
b. Do a barium enema
c. Refer to surgeon for sigmoidoscopy
d. Refer to gastroenterologist for colonoscopy

136. Not a cause of acute anal pain: *(AIIMS Nov 2012)*
a. Thrombosed hemorrhoids
b. Acute anal fissure
c. Fistula in ano
d. Perianal abscess

EXPLANATIONS

VILLOUS ADENOMA

1. **Ans. a. Bleeding PR, b. Mucus diarrhea with hypokalemia** *(Ref: Sabiston 19/e pe p1342; Schwartz 10/e p1205-1206, 9/e p1043; Bailey 25/e p1228, 26/e p1224; Schackelford 7/e p2030; Harrison 18/e p313, 352; 17/e p250)*

   - Villous adenoma causes **profuse watery diarrhea** and **hypokalemia, hyponatremia, hypochloremia** and **metabolic acidosis**[Q].
   - **Best treatment**: **Submucosal resection** endoscopically or surgically (Provided cancerous change has been excluded)

2. **Ans. a. Na^+, c. K^+**
3. **Ans. a. Local resection of lesion**
4. **Ans. b. Hypokalemia**
5. **Ans. a. Dysentery**

RECTAL POLYP

6. **Ans. c. Bleeding**
7. **Ans. a. Juvenile rectal polyp**
8. **Ans. d. Rectal polyp**

Rectal Polyps

- Occur most commonly in **children < 5 years** of age[Q].
- Occur as a **single lesion** of the **rectum**[Q]
- Typical symptoms are **rectal bleeding, mucus discharge, diarrhea**, and abdominal pain[Q].

CARCINOMA RECTUM

9. **Ans. d. Decreases survival** *(Ref: Sabiston 19/e p1359; Schwartz 10/e p1203-1216, 9/e p1049; Bailey 26/e p1229, 25/e p1234; Schackelford 7/e p2123-2124)*

Total Mesorectal Excision	
Advantages	**Disadvantages**
• Significant **increase** in **5-year survival rates**[Q] • **Decrease in local recurrence** rate[Q] • **Decrease** in the incidence of **impotence** and **bladder dysfunction**[Q].	• **TME** is a more **complex operation**[Q] • Associated with a **longer operating time**, more **blood loss, longer hospital stay**[Q] • **Higher leakage rate, higher stoma rate**[Q].

10. **Ans. d. T1 and T2 cancer with or without lymph node involvement** *(Ref: Sabiston 19/e p1358; Schwartz 9/e p1049; Bailey 26/e p1230, 25/e p1233, 1237; Schackelford 7/e p2076)*

Carcinoma Rectum amenable to local excision for curative intent	
Physical features	**Endorectal Ultrasound**
• Tumor **< 4 cm** in **diameter**[Q] • Tumor **< 40%** of bowel **circumference**[Q] • Tumor within **10 cm** of **dentate line**[Q] • Tumor **freely mobile**[Q] on digital rectal examination	• **T1, T2** lesions[Q] • No regional LN involvement

11. **Ans. c. Chemoradiation is given** *(Ref: Sabiston 19/e p1356-1360; Schwartz 10/e p1203-1216, 9/e p1046-1047; Bailey 26/e p1228-1234, 25/e p1230-1239; Schackelford 7/e p2067)*

Carcinoma Rectum

- **MC site** of **colorectal cancer**: **Rectum**[Q]
- **MC type: Adenocarcinoma**[Q]
- **Multiple in 5%** cases[Q]
- Usually **present as an ulcer**, but polypoid and infiltrating types are also common.

  - **MC site of metastasis**: **Liver**[Q] (34%) >Lungs (22%) >Adrenals (11%)
  - With **improved response rates** to **modern chemotherapy** and advances in hepatic surgery, however, **more patients** are **now candidates for hepatectomy**[Q] than in the past.
  - **Dose of radiotherpay** given in CA rectum: **60 Gray**[Q]

Carcinoma Rectum

- **MC site** of **colorectal cancer**: **Rectum**[Q]
- **MC type: Adenocarcinoma**[Q]
- **Multiple in 5%** cases[Q]
- Usually **present as an ulcer**, but polypoid and infiltrating types are also common.

- **MC site of metastasis**: **Liver**[Q] (34%) >Lungs (22%) >Adrenals (11%)
- With **improved response rates** to **modern chemotherapy** and advances in hepatic surgery, however, **more patients** are **now candidates for hepatectomy**[Q] than in the past.
- **Dose of radiotherpay** given in CA rectum: **60 Gray**[Q]

Clinical Features

- **Age of presentation** in **CA rectum**: Above **55 years**
- **Bleeding** is the **earliest** and **MC symptom**[Q].
- **Sense of incomplete defecation**[Q]

Sense of Incomplete Defecation
• Sensation that there are more feces to be passed (**tenesmus**, a distressing **straining to empty** the **bowels without resultant evacuation**[Q]).
• This is a very important **early symptom** and is **almost invariably present in tumours of** the **lower half of the rectum**[Q].
• The patient may endeavor to **empty the rectum several times a day** (**spurious diarrhea**), often with the **passage of flatus** and **a little blood-stained mucus** (**'bloody slime'**)[Q].

- **Alteration in bowel habit:** Patient has to **get up early in order to defecate**[Q], or one who **passes blood** and **mucus** in addition to feces (**'early-morning bloody diarrhea'**[Q]), is usually found to be suffering from carcinoma of the rectum.
- Patient with an **annular carcinoma** at the **rectosigmoid junction** suffers with **increasing constipation**, and the one with a **growth in the ampulla** of the rectum who has **early-morning diarrhea**[Q]**.**

- **Pain in the back**, or **sciatica**, occurs when the **cancer invades the sacral plexus**[Q].
- **Weight loss** is suggestive of **hepatic metastases**[Q]**.**

Diagnosis

- **Sigmoidoscopy** (**rigid,** not flexible) and **Biopsy**: **Investigation of choice** for **diagnosis of CA rectum**[Q]
- **TRUS** (Transrectal ultrasound): **Best for ' T' staging**[Q]
- **Endorectal coil MRI: Best for** predicting **LN invasion** and **overall staging**[Q]
- **CECT:** Evaluation of **metastasis**

Treatment of Carcinoma Rectum	
Stage 0 (**Tis**, N0, M0)	• **Local excision**[Q]
Stage I: **Localized Rectal Carcinoma** (**T1–2**, N0, M0)	• **Polypectomy** with clear margins[Q] • **Radical resection** in good-risk patients with **unfavorable histologic characteristics** and located in the **distal third** of the rectum[Q]
Stage II: Localized Rectal Carcinoma (**T3–4**, N0, M0)	• **Preoperative chemoradiation + radical resection**[Q]
Stage III: Lymph Node Metastasis (Tany, **N1**, M0)	• **Preoperative chemoradiation + radical resection**[Q]
Stage IV: Distant Metastasis (Tany, Nany, **M1**)	• **Palliative procedures**[Q] • Resection to control pain, bleeding, or tenesmus

12. Ans. a. 2 cm *(Ref: Sabiston 19/e p1359-1360; Schwartz 9/e p1050; Bailey 26/e p1229, 25/e p1233; Schackelford 7/e p2061)*

Tumor Margin for Curative Excision

- In **GI malignancies** (**stomach**[Q], **small intestine**[Q], **colon**[Q] and **proximal rectum**[Q]), **tumor margin for curative excision** is **5cm**[Q] except:
  - **Esophagus: 10 cm**[Q]
  - **Distal rectum: 2 cm**[Q]

13. Ans. a. (Irrigation of divided bowel ends with cytotoxic solution may reduce local true recurrence *(Ref: Bailey 25/e p1236)*

- Bailey says "In each of the procedures, it is essential to ensure that **any free tumour cells released by mobilisation of** the **rectum** are **destroyed by irrigation of** the **rectal lumen with a cancercidal solution** such as **1% cetrimide**[Q]. By so doing, the implantation of such cells and subsequent local recurrence is prevented. However, it should be realised that, although a **small percentage of local recurrences** are **due to implantation of shed cells**, the **majority result from inadequate removal of** the **tumour** at the time of the **initial operation**[Q]**.**

14. **Ans. a. Surgical resection only**
15. **Ans. c. Dissection lateral to endopelvic fascia investing the mesorectum causes local recurrence**

    Dissection **medial to endopelvic fascia** investing the mesorectum **causes local recurrence.**
16. **Ans. a. T2N0, T1N1**
17. **Ans. c. Transanal resection**

    Best treatment for this patient is **local resection,** as the **tumor** is **involving less than one third circumference of** the **rectum. Transanal resection** is the best among the provided options.
18. **Ans. a. 2 cm and 5 cm** *(Ref: Bailey 26/e p1229, 25/e p1233)*

- Bailey says "Provided a **minimum distal margin of clearance** of **2 cm**Q can be secured, it is safe to restore gastrointestinal continuity (Williams). The **principles of the operation** involve **radical excision** of the **neoplasm**, **removal of the mesorectum** and **high proximal ligation** of the **inferior mesenteric lymphovascular pedicle**Q."
- The **proximal** and **radial margin** should be **at least 5 cm**Q.

19. **Ans. b. Abdomino-perineal resection** *(Ref: Sabiston 19/e p1359-1360; Schwartz 9/e p1049-1051; Bailey 26/e p1229-1234,25/e p1234-1237; Schackelford 7/e p2066-2067)*

Treatment Options for Carcinoma Rectum	
Low Anterior Resection	• **Sphincter saving operation**Q • Performed for the **cancers** of **proximal third** to **two third of** the **rectum** (Located **> 5 cm above**Q the **anal verge**) • Descending colon is anastomosed with the distal rectum
Abdominoperineal Resection (APR or Miles Procedure)	• **Complete excision** of **rectum** and **anus**, by concomitant dissection through the abdomen and perineum with **creation of permanent colostomy**Q. • Performed for carcinoma of **lower rectum** (**at** or **below 5 cm** from **anal verge**)
Hartmann's Procedure	• When there is **too much destruction** or **sepsis** to allow a safe anastomosisQ • For **elderly** or **severely unstable patients**Q who would not stand a lengthy anterior resection or APR procedure

20. **Ans. c. MRI Scan** *(Ref: Sabiston 19/e p1357-1358; Schwartz 9/e p1047-1048; Bailey 25/e p1232; Maingot 11/e p701)*

ENDORECTAL-COIL MRI

- **Endorectal-Coil MRI** can **identify involved perirectal nodes** on the basis of characteristics other than size. It can **identify foci** not only **within** the **mesorectum** but also **outside the mesorectal fascia** such as **pelvic side walls**Q.
- **Best for** predicting **LN invasion** and **overall staging**Q

21. **Ans. c. Abdominoperineal resection**
22. **Ans. a. Anterior resection**
23. **Ans. b. Abdomino-perineal resection**
24. **Ans. a. Most common type is adenocarcinoma, b. Surgery is the treatment of choice, c. Surgical treatment indicated in spite of hepatic metastasis**
25. **Ans. c. Bleeding P/R**
26. **Ans. d. More than 4 cm from anal verge**
27. **Ans. b. Distance from anal-verge**
28. **Ans. b. CA rectum**
29. **Ans. b. Histological grading** *(Ref: Sabiston 19/e p1357; Schackelford 7/e p2134)*

NO EFFECT ON PROGNOSIS

- **No effect on Prognosis: Tumor size** and **duration** of symptomsQ
- **Tumor size** and **configuration** (endophytic, exophytic, annular) **do not carry** any **prognostic significance**Q in colorectal carcinoma.

30. **Ans. b. Anterior resection**
31. **Ans. a. Surgical resection only Dukes A stage rectal carcinoma is confined to bowel wall, best treated by surgical resection.**
32. **Ans. c. Signet ring carcinoma**
33. **Ans. b. Barium enema**
34. **Ans. c. Hartmann's operation**
35. **Ans. c. Preserving the anal sphincter**
36. **Ans. d. Cancer is less than 5 cm from anorectal margin**
37. **Ans. a. 2 cm**
38. **Ans. b. Per rectal examination can diagnose only 10% of cases**

HEMORRHOIDS

39. Ans. c. Third degree- no surgery *(Ref: Sabiston 19/e p1387-1391; Schwartz 10/e p1222-1225, 9/e p1057-1059; Bailey 26/e p1250-1257, 25/e p1253-1259; Schackelford 7/e p1896-1906)*

Surgery can be done for 3rd degree not controlled by other measures.

Hemorrhoid

- Recent theories regard hemorrhoids as **normal anatomical structures**Q.
- These are **cushions of submucosal tissue** containing **venules, arterioles, smooth muscle fibres** and **elastic connective tissue**.
- Three hemorrhoidal cushions are found in the **left lateral, right anterior and right posterior position (3, 7 and 11 O' Clock)**Q
- Hemorrhoids or **piles** are **symptomatic anal cushions**

- **More common** when **intra-abdominal pressure is raised**, e.g. **in obesity, constipation and pregnancy**Q
- **Symptoms**: **bright-red, painless bleeding, mucus discharge** and **prolapse**
- Hemorrhoids cannot be palpated, **best diagnosed by proctoscopy**Q.

Internal Hemorrhoids	External Hemorrhoids
• Located **proximal to the dentate line**Q • **Painless,** can be **ligated**Q • **Banding** is **preferred**Q	• Located **distal to dentate line**Q • Also known as **5–days painful self curing lesion** • **Painful, not ligated**Q • **Excision is done**Q • Repeated thrombosis leads to **semi-ripe black current appearance**

Classification of Internal hemorrhoids	
1st degree	**Painless bleeding**Q, no prolapse
2nd degree	**Prolapse** through the anus, on straining but **reduce spontaneously**Q
3rd degree	Prolapse through the anal canal and **require manual reduction**Q
4th degree	Permanently prolapsed and **cannot be manually reduced**.Q

Treatment

- Mere presence of hemorrhoids is not necessarily an indication of treatment.
- Treatment is **only indicated** if they are **symptomatic. Best treatment** is the **least invasive** one which is **possible to alleviate** the **symptoms**Q.

Treatment of hemorrhoids	
Medical therapy	• Bleeding from **1st** and **2nd degree** hemorrhoids often improve with the addition of **dietary fibre, stool softeners** and other **diet regulation**Q.
Rubber band ligation	• Done for **1st**,**2nd** and **selected 3rd degree** hemorrhoidsQ
Infrared Photocoagulation	• Done for **1st** and **2nd degree** hemorrhoids
Sclerotherapy	• Done for **1st**,**2nd** and **selected 3rd degree** hemorrhoidsQ • Most commonly used sclerosant is **5% phenol in almond** or **arachis oil.**
Operative hemorrhoidectomyQ	• **3rd** and **4th degree** hemorrhoidQ • **2nd degree not cured by non-operative methods**Q • **Mixed** (combine internal/external hemorrhoids)Q • **Fibrosed hemorrhoids**

Operative Hemorrhoidectomy	
• **Milligan-Morgan open** hemorrhoidectomyQ	• **Ferguson closed** hemorrhoidectomyQ
• **Whitefield submucosal** hemorrhoidectomyQ	• **Longo's stapler** hemorrhoidectomyQ

40. Ans. c. III degree

41. Ans. b. Can be palpated on DRE in absence of complications

- Hemorrhoids cannot be palpated, **best diagnosed by proctoscopy**Q.

42. Ans. a. Band ligation, b. 5% phenol in almond oil is used as sclerosant, c. May be resolved by diet modification, d. Hemorrhoidectomy is TOC

43. Ans. a. Painful

44. Ans. b. Internal hemorrhoids

45. Ans. d. Urinary retention *(Ref: Bailey 26/e p1256, 25/e p1259; Sabiston 19/e p1389-1391; Schwartz 10/e p1223-1224, 9/e p1059)*

Complications of Hemorrhoidectomy	
Early complications	**Late complications**
• **Pain (MC)**Q • **Acute retention of urine (2nd MC)**Q • Reactionary hemorrhage	• Secondary hemorrhage • Anal stricture • Anal fissure • Incontinence

46. **Ans. c. Banding**
47. **Ans. a. Surgery, b. Sclerotherapy**
48. **Ans. d. Proctoscopy**
49. **Ans. b. 6 months – 3 years**
50. **Ans. c. Thrombosed external hemorrhoids**
51. **Ans. a. They are arteriolar dilatations**
52. **Ans. a. Excisional surgery is cornerstone** *(Ref: Bailey 26/e p1252, 25/e p1256)*

Mere presence of hemorrhoids is not necessarily an indication of treatment. Treatment is **only indicated** if they are **symptomatic**. **Best treatment** is the **least invasive one which is possible** to **alleviate** the **symptoms.**

53. **Ans. a. Pain** *(Ref: Bailey 24/e p1259)*

Most important disadvantage of cryosurgery for hemorrhoid is pain.

CRYOSURGERY

- The extreme cold (**-196°C**) of **liquid nitrogen** application causes **coagulation necrosis of the piles,** which subsequently separated and dropped off.
- **Cryosurgery for hemorrhoids cause:**
  - **Pain**Q
  - **Mucous discharge**Q (Not the watery discharge)

54. **Ans. c. Internal hemorrhoids bleed profusely and painless**

SOLITARY RECTAL ULCER SYNDROME

55. **Ans. c. Usually malignant**
56. **Ans. a. SRUS** *(Ref: Sabiston 19/e p1372; Schwartz 9/e p1054; Bailey 25/e p1227; Schackelford 7/e p1768-1769)*

SOLITARY RECTAL ULCER SYNDROME

- SRUS is located on **anterior** or **anterolateral**Q **rectal wall, 7–10 cm** from **anal verge**Q
- May involve bowel anywhere from the sigmoid to the anorectal junction
- **More common** in **women**, age **20-40 years**
- **Multiple ulcers** may be present within a single patch of diseased mucosa in **10–15%** cases
- **Endoscopically**, **only half** of the patients with SRUS **have an actual ulcer**. The **remaining** patients have an area of **mucosal erythema, mucosal nodules** or **frank polyps**, which may or may not have surface ulcerations.

Etiology

- **Internal intussusception**Q
- **Anterior rectal wall prolapse**Q
- **Increased intrarectal pressure**Q

Histopathology

- **Mucosal hyperplasia, crypt distortion** or **elongation**Q
- **Hypocellular lamina propria**Q
- **Subepithelial fibrosis, thickened muscularis mucosa**Q
- **Tongues** of **muscle extending to** the **mucosa**Q

Clinical Features

- Patients are **typically young** and **female**, with an **average age of 25 years** and a **history of straining** and **difficult evacuation**Q.
- Commonly presents with **rectal bleeding** in the **setting of straining** or **constipation, pain, mucus discharge**Q**.**

Diagnosis

- **Defecography: Radiologic procedure of choice** and usually **reveals the underlying disorder**Q**.**
- **Full-thickness rectal prolapse**, **internal prolapse**, **paradoxical Puborectalis syndrome** (failure of relaxation of the pelvic floor musculature on straining) and **thickened rectal folds are common findings**Q**.**

Treatment

- **Non-operative therapy** (**high fiber diet**, **defecation training** to avoid straining, **laxatives** or **enema**) is **effective in majority of the patients**Q**.**
- **Surgery** (either **abdominal** or **perineal repair of prolapse**) **is reserved for highly symptomatic patients**, who have **failed all medical intervention**Q**.**
- **Rectopexy** corrects **anterior rectal wall prolapse**Q**.**

57. **Ans. b Anterior, 7–10 cm from anal verge**

58. **Ans. c. Lamina propria infiltration with lymphocyte**

59. **Ans. c. Involves posterior wall**

60. **Ans. c. Banding, d. Sclerosant injection**

RECTAL PROLAPSE

61. **Ans. b. Anterior resection** *(Ref: Sabiston 19/e p1385-1387; Schwartz 10/e p1218-1219, 9/e p1054; Bailey 26/e p1219-1221, 25/e p1222-1226; Schackelford 7/e p1824-1832)*

Abdominal rectopexy is the **procedure of choice** for **complete rectal prolapse** in **young** and **fit patients**.
Perineal procedures (Delorme's procedure) are **reserved for elderly** and **frail patients**.
Abdominal rectopexy has the **least recurrence rates** and is **most likely to improve continence**.
Perineal procedures are **reserved for elderly, frail** and **infirm patients,** who are **unlikely to tolerate major 'abdominal' procedures.**

Rectal Prolapse

- **Mucous membrane** and **submucosa** of the rectum **protrude outside** the anus for approximately **1–4 cm**[Q].
- It may be **mucosal** or **full thickness** (whole wall of the rectum is included)
- Commences as a **rectal intussusception**[Q]
- In **children**, the prolapse is **usually mucosal** and should be **treated conservatively**
- In the **adult**, the **prolapse** is **often full thickness** and is frequently **associated with incontinence**[Q]
- **Surgery** is **necessary for full-thickness rectal prolapse**[Q]

Clinical Features

Children	• **Mucosal prolapse** often commences **after an attack of diarrhea**, or from **loss of weight** and **consequent loss of fat** in the **ischiorectal fossae**[Q]. • It may also be **associated with fibrocystic disease**, **neurological causes** and **maldevelopment of** the **pelvis**[Q].
Adults	• Often associated with **third-degree hemorrhoids**[Q]. • In the **female a torn perineum**, and in the **male straining from urethral obstruction**, **predisposes to mucosal prolapse**[Q]. • In **old age**, **both mucosal** and **full-thickness prolapse** are associated with **atony of** the **sphincter mechanism**[Q].

- **Prolapsed mucous membrane** is **pink** (**prolapsed internal hemorrhoids** are **plum colored, trifoliate** and **more pedunculated**)[Q]

Diagnosis

- Before operative intervention, a careful **history, physical examination**, and **colonoscopy** should be performed.
- **Manometry** should be done **in cases** associated **with incontinence**[Q].

Abdominal procedures	Perineal procedures
• Considered the **surgical procedures of choice** for **young** and **fit individuals**[Q] • **Not suitable for elderly** and **infirm patients**[Q] • Are most likely **to improve continence**[Q] • Have **least recurrence rates**[Q] • **Postoperative constipation** is the **MC side effect**[Q] • **Abdominal Procedures** • Abdominal rectopexy – **Suture Rectopexy** – **Mesh Rectopexy** – Posterior (**Well's Ivalon's**)[Q] – Anterior (**Ripstein's**)[Q] – Lateral (**Orr-Loygue**) – Ventral – **Resection Rectopexy** (Frykman and Goldberg) • **Anterior resection**[Q]	• **Relatively minor procedures** that may be performed under local or regional anaesthesia • **Well tolerated by elderly**, **frail** and **unfit patients**[Q] • Less likely to improve continence • **Recurrence rates** varying from **5–35% higher than** following **abdominal rectopexy**[Q] • **Postoperative constipation** is **infrequent**[Q] **Perineal Procedure** • **Delorme's muscosectomy**[Q] • **Thiersh and encirclement**[Q] • **Altemeier rectosigmoidectomy**[Q]

62. **Ans. d. 8–12 months**

63. **Ans. c. Thiersch wiring** *(Ref: Bailey 25/e p1220, 25/e p1224-1225)*

Treatment of Rectal Prolapse in Childhood

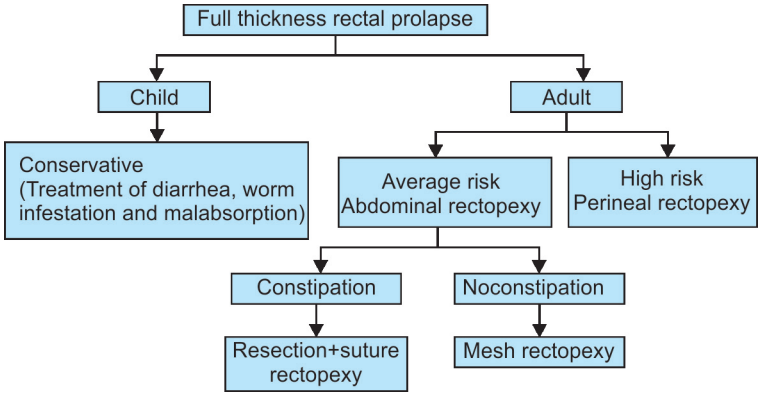
- Prolapse during childhood is best managed conservatively, the only exception is persistence of prolapse despite effective treatment of diarrhea, worm infestation and malabsorption[Q]. These cases are managed by surgery.

Conservative Treatment	Operative Treatment
• Effective **control of diarrhea, worm infestation** and **correction of malnutrition**[Q] • **Sclerotherapy:**	• **Thiersch operation**[Q]: – **Anal encirclement**[Q] • Ideally suited for prolapse in **myelomeningocele** and **sacral agenesis**[Q]
• Usually **reserved for prolapse of** the **redundant mucosa after** an **anoplasty** or **rectoplasty** for an imperforate anus[Q] • **5% phenol** in **olive oil** is **injected submucosally**[Q]	• **Lockhart Mummery Rectopexy**[Q]: • **Simplest** and **safest** operation in childhood complete rectal prolapse[Q] • **Posterior rectal wall stiffening**

64. **Ans. a. Thiersch wiring** 65. **Ans. a. Rectal prolapse** 66. **Ans. c. Abdominal rectopexy**

67. **Ans. a. Abdominal rectopexy**

WAR	• **W**ells **A**bdominal **R**ipstein
PAD	• **P**erineal **A**ltmier's **D**elorme



68. **Ans. c. Thiersch's operation**

ANO-RECTAL ABSCESS

69. **Ans. d. Perianal** *(Ref: Sabiston 19/e p1392-1394; Schwartz 9/e p1060-1064; Bailey 26/e p1258-1259, 25/e p1261-1262 Schackelford 7/e p1914)*

Ano-Rectal Abscess

- Acute sepsis in the region of the anus is common.
- **More common** in **men**[Q]
- **Subdivided into: Perianal (MC)**[Q], **Ischiorectal (2nd MC)**[Q], submucous and pelvirectal
- **Underlying conditions: Fistula-in-ano (MC), Crohn's disease, diabetes, immunosuppression**[Q]

Cryptoglandular theory of Intersphincteric Anal Gland Infection
• Upon **infection of a gland, pus,** which **travels along** the **path of least resistance**, may **spread caudally** to **present as** a **perianal abscess** or **ischiorectal abscess**[Q]

Clinical Features

- Usually produces a **painful, throbbing swelling in** the **anal region** with **swinging pyrexia**
- Patients with infection in the larger **fatty-filled ischiorectal space**, in which **tissue tension is much lower,** usually **present later**, with **less well localized symptoms** but more constitutional upset and fever.

- **Increased incidence of infection** in **ischiorectal fossa** is due to **poor blood supply**[Q].

Treatment

- **Drainage of pus + Antibiotics**[Q]
- Always look for a **potential underlying problem**[Q]

- For **perianal** and **ischiorectal sepsis** (with an **incidence of 60%** and **30%** respectively), **drainage** is **through the perineal skin**, usually through a **cruciate incision** over the **most fluctuant point**, with excision of the skin edges to de-roof the abscess.

70. **Ans. c. Poor blood supply**

71. **Ans. a. Inflammation of anal gland**

FISTULA-IN-ANO

72. **Ans. a. Intersphincteric** *(Ref: Sabiston 19/e p1394-1396; Schwartz 10/e p1229-1231, 9/e p1064-1065; Bailey 26/e p1259-1263, 25/e p1262-1266 Schackelford 7/e p1767, 1914-1924)*

Fistula-in-Ano

- **Fistula-in-ano** is a **chronic abnormal communication**, **runs outwards** from the **anorectal lumen** to an **external opening** on the skin of the **perineum** or **buttock**
- Usually **results from anorectal abscess** (**cryptoglandular abscess**[Q])
- **Other causes**: Crohn's disease, tuberculosis, lymphogranuloma venereum, actinomycosis, rectal duplication, foreign body and malignancy
- **Types**: **High** or **Low** (according to whether **internal opening** is **below** or **above** the **anorectal ring**[Q])

Clinical Presentation

- Non-specific anal fistulae are **more common in men** than women.
- Most commonly affect patients in **3rd-5th decade**
- Patients usually complain of **intermittent purulent discharge** and **pain**[Q] (which increases until temporary relief occurs when the pus discharges).
- There is a **previous episode of acute anorectal sepsis** that settled (**incompletely**) spontaneously or with antibiotics, or which was surgically drained.

- **Passage of flatus or feces through** the **external opening** is suggestive of a **rectal** rather than an anal **internal opening**[Q].

Parks Classification of Fistula-in-ano (ITS-E)

- **Intersphincteric fistulae (45%): MC**[Q]
  - **Runs in intersphinteric space**
- **Trans-sphincteric fistulae (40%):**
  - Extends through both internal and external sphincters
- **Suprasphincteric fistulae:**
  - Originates in the Intersphincteric plane and tracks up and around the entire external sphincter
- **Extrasphincteric fistulae:**
  - Originates in the rectal wall and tracks lateral to both sphincters

Clinical Assessment

- A full **medical history** and **proctosigmoidoscopy** are **necessary** to gain information about **sphincter strength** and to **exclude associated conditions**.

Key Points to Determine	
• **Site of** the **internal opening**[Q]	• **Presence of secondary extensions**[Q]
• **Site of** the **external opening**[Q]	• Presence of **other conditions complicating** the **fistula**[Q]
• **Course** of the **primary track**[Q]	

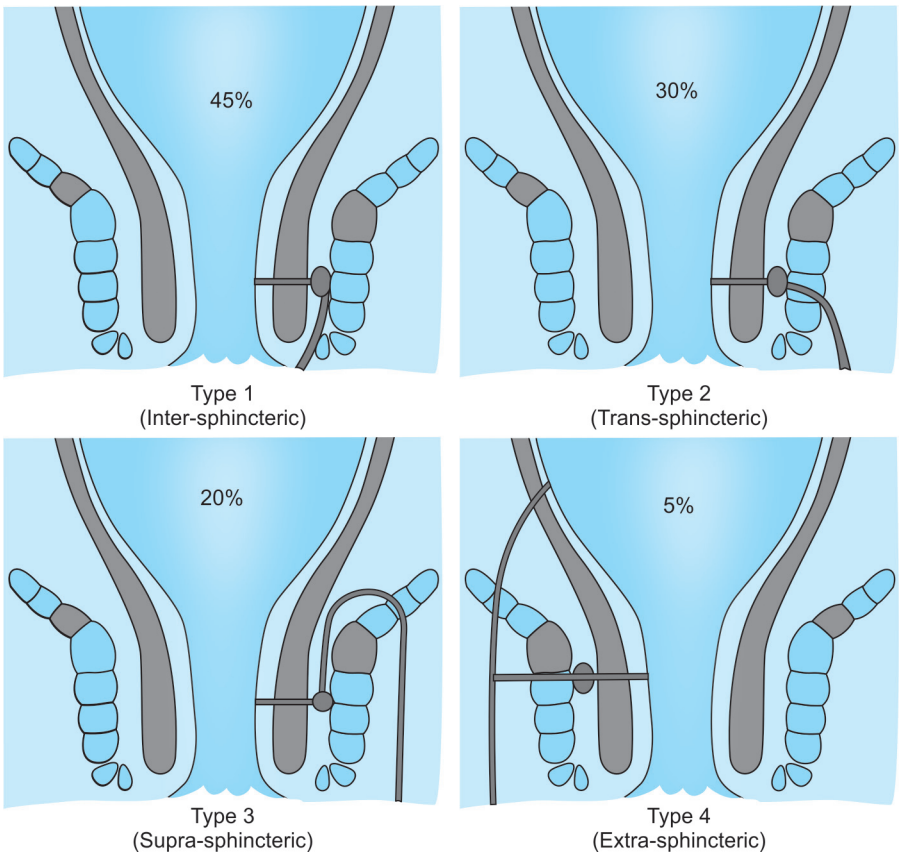
- **Full examination under anesthesia** should be **repeated before surgical intervention**.
- **Dilute hydrogen peroxide**, instilled via the external opening, is a **very useful way** of demonstrating the **site of the internal opening**

- **MRI** is the **'gold standard' for fistula imaging**[Q]
- Usually **reserved for difficult recurrent cases**[Q]
- **Advantage of MRI**: Its ability to **demonstrate secondary extensions**, which may be missed at surgery and which are the **cause of persistence**[Q].

- **Fistulography** and **CT**: Useful techniques if an **extrasphincteric fistula** is suspected.

Treatment

- Treatment options: **Fistulotomy, fistulectomy, setons, advancement flaps** and **glues**
- **Laying open** is the **surest method of eradication,** but **sphincter division** may **result in incontinence**[Q]



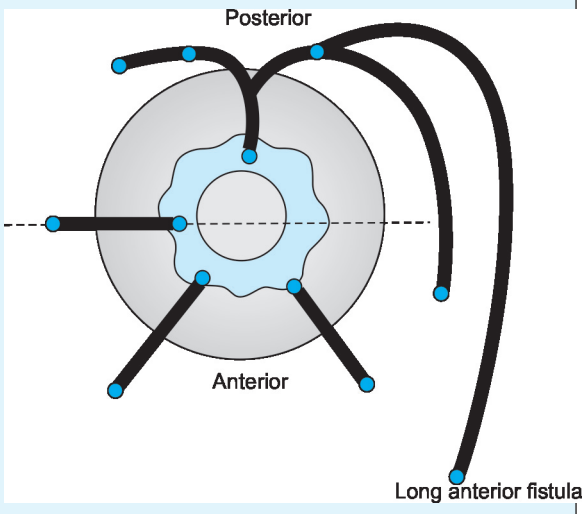
Goodsall's rule

- Used to **indicate** the **likely position of** the **internal opening** according to the position of the external opening(s)

According to Goodsall's rule

- Fistulas with **external openings anterior** to horizontal imaginary line drawn across the mid-point of anus connect to the internal opening by **short straight track**Q.
- Fistulas with **external openings posterior** to horizontal line run a **curvilinear course** and **open internally** into **posterior midline**Q.

- **Exceptions** of Goodsall's rule:
  - If an **anterior external opening** is **> 3 cm from** the **anal margin**. Such fistula track to the **posterior midline**.
  - When there is an **anterior** and also a **posterior opening** of the same fistula, **the rule of posterior opening** applies.



73. Ans. a. Seton *(Ref: Sabiston 19/e p1395-1396; Schwartz 10/e p1231, 9/e p1065; Bailey 26/e p1261-1263,; Schackelford 7/e p1923-1924)*

SETONS

- A **seton** is a **ligature of silk, nylon, silastic** or **linen**Q.
- Used for **marking, draining, cutting** or **staging**Q.
- **A high fistula** may be **converted into** a **low fistula by setons**Q

Setons are useful in the management of

- **Complex anorectal fistulas** with **risk of incontinence** or **poor healing**[Q]
- Patients with **Crohn's disease**[Q]
- **Immunocompromised (HIV)** and **incontinent** patients[Q]
- Patients with **chronic diarrheal states**[Q]
- **Anterior fistula in women**[Q]

74. **Ans. a. Squamous cell carcinoma, b. Transitional cell carcinoma** *(Ref: Schackelford 7/e p1926, 6/e p2058)*

Carcinoma Associated with Fistula-in-ano

- **MC type of carcinoma** to arise in **fistula-in-ano**: **Colloid carcinoma**[Q] (44%) > **Squamous cell carcinoma** (34%) > **Adenocarcinoma** (22%)
- **Clue to early diagnosis** is the appearance of **mucin globules**[Q] in Fistulotomy or fistulectomy specimens

75. **Ans. d. Intersphincteric is the most common type**
76. **Ans. d. Fistulotomy**
77. **Ans. c. Anorectal ring**
78. **Ans. b. MRI**
79. **Ans. a. Cutting seton**

ANAL FISSURE

80. **Ans. b. Posterior** *(Ref: Sabiston 19/e p1391-1392; Schwartz 10/e p1225, 9/e p1059-1060; Bailey 26/e p1248-1249, 25/e p1251-1253; Schackelford 7/e p1906-1912)*

Anal Fissure (Fissure-in-ano)

- An anal fissure is a **longitudinal split in** the **anoderm**, extending from the **anal verge to** the **dentate line**[Q].
- **MC site: Mid-line posteriorly**[Q]
- **MC symptom: Pain**[Q]

Etiology

- **Trauma caused by** the **strained evacuation** of a **hard stool** or from the **repeated** passage of **diarrhea**[Q].
- **Anterior anal fissure: More common in women**, arise **following vaginal delivery**.

Clinical features

- **Acute fissure**: Characterized by **severe anal pain** associated **with defecation** with passage of fresh blood, normally noticed on the tissue after wiping.
  - **Chronic fissures:** Characterized by a **hypertrophied anal papilla + Sentinel tag + Deep canoe shaped ulcer**[Q]
- Mostly seen in **young adults**, **men** and **women** are **affected equally**[Q].

Treatment

- **Conservative initially**, consisting of **sitz bath** (in a basin containing **warm antiseptic lotion**), **stool-bulking agents** and **softeners**, **nitrates** and **calcium channel blockers to relax** the **anal sphincter** and **improve blood flow**[Q]
- **Surgery** if above fails, consisting of **lateral internal sphincterotomy** or **anal advancement flap**[Q]

Treatment of Anal Fissure

- **Chemical sphincterotomy: Nitroglycerine (0.2%**[Q]**)** or **diltiazem (2%**[Q]**)** for relaxation of anal sphincter
- **Lord's procedure: Dilatation** of **sphincter** under GA, not practiced due to **high rate of incontinence**[Q]
- **Notara's lateral sphincterotomy: Surgical procedure of choice** for anal fissure[Q]
- **Anal advancement flap:** An **inverted house-shaped flap** of **perianal skin** is carefully mobilized on its blood supply and **advanced without tension to cover** the **fissure**, and then sutured with interrupted absorbable sutures.

81. **Ans. b. 0.2%**
82. **Ans. d. External sphincterotomy**
83. **Ans. c. Sitz in a basin containing warm antiseptic lotion**
84. **Ans. d. Anal fissure**
85. **Ans. a. Anal fissure**
86. **Ans. c. Fissure-in-ano**
87. **Ans. b. History and superficial clinical examination**
88. **Ans. d. Anal fissure**
89. **Ans. c. Fissure in ano**

Atypical Fissures

- A **fissure sited elsewhere** around the anal circumference or **with atypical features** should raise the **suspicion of a specific etiology**Q
- **Early examination** under anesthesia, **with biopsy** and **culture to exclude:**
  - **Crohn's disease, tuberculosis**Q
  - **STD** (syphilis, Chlamydia, chancroid, lymphogranuloma venereum, HSV, CMV, Kaposi's sarcoma, B-cell lymphoma)
  - **HIV-related ulcers**Q
  - **Squamous cell carcinoma**Q

90. Ans. b. 6 O'clock

PILONIDAL SINUS

91. Ans. b. Recurrence is uncommon *(Ref: Sabiston 19/e p1396-1397; Schwartz 10/e p1233, 9/e p1067-1068; Bailey 26/e p1244-1245, 25/e p1247-1249; Schackelford 7/e p1833-1840)*

Recurrence is **common, even though adequate excision** of the **track is carried out**.

Pilonidal Sinus

- **Acquired** disease, seen in **hairy males**Q
- **Seen in** age group of **20–29 years**
- **Found in** the **natal cleft overlying** the **coccyx**Q

> - Consisting of **noninfected, midline openings communicating with** a **fibrous track** lined by granulation tissue and containing hair lying loosely within the lumen.
> - **Common** among **military personnel**, also known as **'jeep disease'**Q**.**

Etiopathogenesis

- **Hair follicles** have almost **never been demonstrated** in the walls of the sinus.
- **Hairs projecting** from the sinus **are dead hairs**, with their pointed ends directed towards the blind end of the sinus.
- **Recurrence** is **common, even though adequate excision** of the **track is carried out**Q.

> - It is thought that the **combination of buttock friction** and **shearing forces** in that area **allows shed hair** or **broken hairs to drill through** the **midline skin**, or that **infection in relation** to a **hair follicle** allows **hair to enter the skin** by the **suction** created by movement of the buttocks, so creating a **subcutaneous, chronically infected, midline track**Q**.**
> - From this primary sinus, **secondary tracks may spread laterally**, which may emerge at the skin as **granulation tissue-lined, discharging openings**Q.

Clinical Features

- Characteristically seen in **dark-haired individuals** rather than those with softer blond hair
- Patients complain of **intermittent pain**, **swelling** and **discharge** at the base of the spine
- **History of repeated abscesses** that have **burst spontaneously** or which have been incised, **usually away from** the **midline**Q.

> - **Primary sinus** may have **one or many openings**, **all of which are strictly in** the **midline between** the level of **sacrococcygeal joint** and **tip of coccyx**Q.
> - **Interdigital pilonidal sinus** is an **occupational disease of hairdressers**Q
> - Also seen in **axilla** and **umbilicus**Q

Treatment

- **Conservative treatment:** For minor symptoms, **simple cleaning out** of the tracks and **removal of all hair**, with **regular shaving** of the area and **strict hygiene**, may be recommendedQ.
- **Treatment** of an **acute exacerbation (abscess): Abscess drainage** with **thorough curettage** of **granulation tissue** and **hair**Q.

> **Surgical treatment of chronic pilonidal disease**
>
> - **Laying open of all tracks** with or without **marsupialisation**Q
> - **Excision of all tracks** with or without primary closureQ
> - **Excision of all tracks** and **closure by Limberg's flap**Q**, Karydakis procedure**Q
> - **Bascom's procedure**Q**:** Incision lateral to the midline to gain access to the sinus cavity, which is rid of hair and granulation tissue and excision and closure of the midline pits. The lateral wound is left open.

92. Ans. d. Treatment of choice is surgical excision of sinus tract

93. Ans. c. Pilonidal sinus

94. Ans. a. Seen predominantly in women

CARCINOMA ANAL CANAL

95. Ans. b. Chemoradiation *(Ref: Sabiston 19/e p1405-1407; Schwartz 10/e p1218, 9/e p1053; Bailey 26/e p1266-1267, 25/e p1267-1269 Schackelford 7/e p2166-2170)*

Carcinoma Anal Canal

- **MC type** of **CA anal canal: SCC >BCC >Melanoma**[Q]
- **Median age** at diagnosis: **60 years**[Q]

- **MC symptom: Bleeding PR**[Q]
- **MC site of metastasis: Lung**[Q]
- **MC site of LN metastasis: Inguinal LNs**[Q]

Risk Factors for Carcinoma Anal Canal	
• **HPV infection (16, 18, 31, 33)**[Q]	• **Sexual promiscuity**[Q]
• **HIV** or **immunosuppression**[Q]	• **Chronic inflammation**[Q]
• **Smoking**[Q]	• **Anal intra-epithelial neoplasia**[Q]
• **Anal receptive intercourse**[Q]	• History of **vulvar** or **cervical cancer**[Q]

Clinical Features

- **Most patients** present with **rectal bleeding** and **pain**[Q].
- Patients are **frequently misdiagnosed** as having a benign anorectal condition such as **hemorrhoids**[Q].

- Additional symptoms: **Incontinence**, **change in bowel habits**, **pelvic pain**, and **rectovaginal** or **rectovesical fistulas** are **ominous**[Q] suggest **advanced malignancy** with **infiltration into** the **sphincters** or **penetration into** the **rectal wall**[Q]

Diagnosis

- **Proctoscopy** with **biopsy: Investigation of choice** for diagnosis of **CA anal canal**[Q].
- **CT abdomen** and **pelvis**: **Mandatory** because **all of the draining lymph nodes** are **not palpable**[Q].
- **CT scan**: **Evaluate distant metastasis**

Treatment

- **Nigro regimen: Chemoradiation** is the **treatment of choice**[Q].
- More than **80%** are **cured by chemoradiation**. If any **residual tumor** is **left** behind after chemoradiation, **APR** is performed[Q].

- **Chemotherapy regimen**: **5-FU + Mitomycin C/Cisplatin**[Q]
- First **chemotherapy** is given **followed by radiotherapy**[Q].

Prognosis

- Overall **5-year survival**: **66%**

7th AJCC: TNM Classification of Carcinoma of the Anal Canal and Anal Margin	
• **Tis:** Carcinoma in situ (Bowen disease, high-grade squamous intraepithelial lesions (HSIL), anal intraepithelial neoplasia II-III (AIN II-III)	**Anal Canal** **N1:** Metastases to **perirectal LNs**
• **T1**: Tumor **≤ 2 cm** in greatest dimension	**N2:** Metastases to **unilateral internal iliac** and/or **inguinal LNs**
• **T2**: **> 2** cm but **<5 cm** in greatest dimension	**N3:** Metastases to **perirectal** and **inguinal LNs** and/or **bilateral internal iliac** and/or **bilateral inguinal LNs**
• **T3**: **> 5 cm** in greatest dimension	Anal Margin
• **T4 (Anal Canal)**: Invading adjacent structures: vagina, urethra, or bladder (involvement of the sphincter muscle alone, rectal wall, or perirectal subcutaneous tissue or skin is not classified as T4)	**N1:** Metastases to **ipsilateral inguinal LNs**
• **T4 (Anal Margin):** Invading deep extradermal structure: skeletal muscle or bone	**M1:** Distant metastasis

Staging	
Stage **0**	**Tis** N0M0
Stage **I**	**T1** N0M0
Stage **II**	**T2** N0M0 **T3** N0M0

Anal Canal	
Stage **IIIA**	**T4** N0M0 **T1-3 N1** M0
Stage **IIIB**	**T4 N1** M0 Any T **N2,3** M0
Anal Margin	
Stage **III**	**T4** N0 M0 Any T **N1** M0
Both	
Stage **IV**	Any T Any N **M1**

96. Ans. a. Radiotherapy f/b chemotherapy, d. Radical surgery *(Ref: Sabiston 19/e p1402-1405; Schwartz 9/e p1053; Bailey 26/e p1266-1267, 25/e p1267-1269; Schackelford 7/e p2173)*

Anal Margin Tumors

- These tumors **arise on the perianal skin**[Q] beyond the anal verge.
- **Squamous cell carcinoma** of the **anal margin** is treated by **primary surgical excision** similarly to skin cancers[Q].
- **Metastases** are **late** and **rare,** and **recurrences** are **typically locoregional**.
- **Symptoms** include **pain, bleeding, itching**, and **palpable mass**.
- **Diagnosis** is often suspected by the experienced clinician on inspection, but **biopsy prior to definitive treatment** is imperative.

  - **Small lesion**: **Wide-local excision**[Q]
  - **Large lesion** or **sphincter involvement**: **Chemoradiation**[Q]

97. Ans. b. Recurrence

98. Ans. a. HPV *(Ref: Sabiston 19/e p1402; Schwartz 10/e p485,1232,1233,1678,1680, 9/e p1053; Bailey 26/e p1263-1264, 25/e p1266-1267; Schackelford 7/e p2172)*

Anal Warts or Condylomata Accuminata

- HPV forms the **etiological basis of**: **Anal** and **perianal warts**, **AIN**, and **SCC** of the anus[Q].
- Subtypes (**16, 18, 31, 33**) are **associated with a greater risk of progression** to **dysplasia** and **malignancy**[Q].
- **Condylomata accuminata** is the **MC STD encountered by colorectal surgeons**[Q]
- Most frequently observed in **homosexual men**[Q].

Clinical Presentation

- **Many** are **asymptomatic** but **pruritus, discharge, bleeding** and **pain** are **usual presenting complaints**[Q].
- Rarely, **relentless growth results in giant condylomata** (**Buschke- Löwenstein tumour**), which may obliterate the anal orifice[Q].
- **Diagnosis** is **confirmed by biopsy**[Q]

Treatment

- Application of **25% podophyllin**[Q]
- **Surgical excision**[Q]
- **Recurrence** is **common**[Q]

99. Ans. c. HPV 6, 11, 16, 18 *(Ref: Maingot 11/e p732)*

HPV Vaccines

- **Gardisil** is a **recombinant vaccine** against HPV **types 6, 11, 16, 18**[Q].
- It is **currently approved for** use in **females age 9–26 years** of age and requires a series of **three injections over a 6 month** period[Q].

  - Nearly **100% prevention rate** in **genital warts, and vulvar, vaginal**, and **cervical precancerous lesions** caused by the **serotypes against** which the **vaccine is directed**[Q].

- **Vaccine** is **only effective in** patients **not previously exposed to** the **viruses included in** the **vaccine**, and it **confers no protection against viruses not covered** by the vaccine[Q]

100. Ans. a. Chemoradiation **101. Ans. a. Squamous cell carcinoma** **102. Ans. b. Epidermoid**

Epidermoid Carcinoma of Anus

- **Epidermoid carcinoma** of the **anus** includes **SCC, cloacogenic** carcinoma, **transitional carcinoma** and **basaloid carcinoma**[Q].
- The **clinical behavior** and **natural history** of these tumors **are similar**[Q].

103. Ans. a. Cisplatin based chemotherapy followed by radical radiotherapy

104. Ans. d. All of the above

105. Ans. c. Combined chemotherapy and radiotherapy

106. Ans. c. Chemoradiation

107. Ans. a. 2 cm

108. Ans. a. SCC

PAGET'S DISEASE OF ANAL CANAL

109. Ans. c. Intra-epithelial adenocarcinoma *(Ref: Sabiston 19/e p1405; Bailey 26/e p590, 25/e p1269; Schackelford 7/e p2174-2175; Maingot 11/e p743-744)*

Paget's Disease of Anal Canal

- **MC site of extra-mammary Paget's disease: Anogenital region** >Axilla >eyelid
- **MC site in females**: **Vulva**[Q]
- More common in females, median age of **65 years**.
- It can be associated with the **presence of rectal adenocarcinoma**[Q]

> - **Perianal Paget's** is **associated with** an **underlying visceral malignancy** in **20–86%** of cases[Q].
> - MC synchronous tumor: Colorectal adenocarcinoma[Q]

Pathology

- Found in both the **anal canal** and **margin**.

> - **Perianal Paget's cells** are **foamy** and **vacuolar in appearance**[Q]
> - **Positive for PAS, mucicarmine, Alcian blue,** and **cytokeratin 7**[Q]**.**

Clinical Features

- Occurs in **apocrine, hair-bearing areas**[Q].
- **Erythematous, pruritic, scaling plaques** with **well-defined serpiginous borders** are a **typical feature** of the disease[Q].
- Lesions may also **appear ulcerated** and **crusty with a serous discharge**.

Diagnosis

- **Diagnosis** is made **on biopsy**[Q].

Treatment

- **Wide local excision** is **treatment of choice**[Q].
- **Recurrence rates** as high as **61%** have been reported **following excision** of perianal Paget's disease[Q].
- **Re-excision** is the **usual recommendation**[Q]

110. Ans. a. MC site is vulva

ANAL CANAL MELANOMA

111. Ans. a. Present usually as anal bleeding *(Ref: Sabiston 19/e p1407; Schwartz 10/e p1218, 9/e p1053-1054; Bailey 26/e p1267, 25/e p1269; Schackelford 7/e p2173; Maingot 11/e p742)*

Anal Canal Melanoma

- **MC site** of **melanoma**: **Skin >Eye >Anorectum**[Q]
- **More common** in **females**[Q]
- The tumor can appear **small** and **polypoid**, or **large and ulcerating**.

Clinical Features

- **Most common symptoms** include **bleeding, itching**, the presence of a **mass, pain, tenesmus**, or **changes in bowel habits**[Q].
- Like anal squamous cell carcinoma, **misidentification of the tumor as a hemorrhoid**[Q] is a common mistake.
- **Mesorectal lymph node metastases** are found in **40–60%** of patients at initial presentation and **inguinal adenopathy** is present in at **least 20%.**
- **Distant spread** occurs to the **bone, lung,** and **liver.**

Diagnosis

- Diagnosis is frequently made **following hemorrhoidectomy** or **local excision** of the perianal mass.
- Like melanoma of the skin, **anorectal melanoma** is **staged by depth** or **thickness** of the lesion.

Treatment

- **Wide local excision** has **replaced APR** for the **treatment of anal melanoma**[Q].
- **Wide local excision with negative margins** for those patients **without anal sphincter involvement**[Q].
- **Palliative APR:** Large tumor **invading sphincter**[sQ]

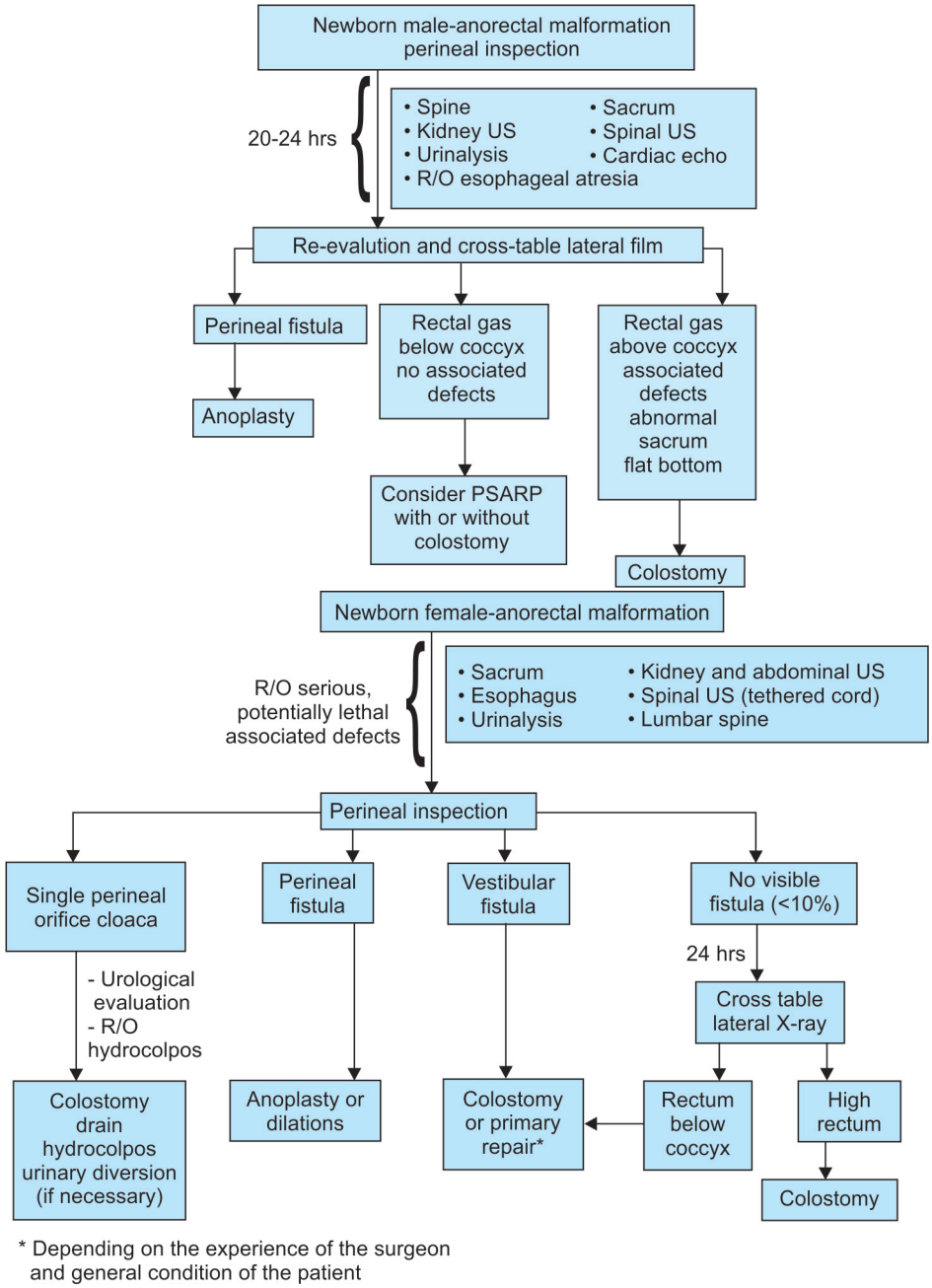
Prognosis

- **Regardless of stage**, **5-year survival rates** for anorectal melanoma is **very poor**, averaging about **6%**.
- The **median survival time** following diagnosis is **12–18 months**[Q].

ANORECTAL MALFORMATIONS

112. Ans. a. Transverse colostomy *(Ref: Nelson 18/e p1637; Sabiston 19/e p1849-1851; Schwartz 10/e p1626-1628, 9/e p1437-1438; Bailey 26/e p1242-1243, 25/e p1244-1249; Schackelford 7/e p2273-2288)*

- The presence of **meconium in urine reflects** some form of **communication between** the **urinary tract** and **rectum**, and suggests a **high type of anorectal malformation**Q.
- Such **patients require** a **diverting colostomy**. The **colostomy decompresses** the **bowel** and **provides protection during** the **healing of subsequent repair**Q.
- **Posterior Saggital Anorectoplasty (PSARP)** is performed **after 4–8 weeks.**
- The presence of **meconium in urine** and a **flat bottom** are considered **indications of a protective colostomy**Q**.**



Management of Patients with Anorectal Malformations

- The principles of management centre around **diagnosing** the **type of defect** present, **Low** or **High**, depending on the **site of termination of rectum** in **relation to pelvic floor**Q**.**

- Wangensteen-Rice (**Invertogram**) is performed **6–12 hours after birth**[Q].

High lesions	Low lesions
• **Rectum ends above** the level of the **level-ani complex**[Q]	• **Rectum ends below** the level of **levator ani complex**[Q]

Clinical clues suggesting Low lesion	Clinical clues suggesting High lesion
• **Bucket Handle**[Q]**:** – Presence of a **prominent midline skin tag stem tap,** below which one can pass an instrument.	• **Flat bottom**[Q]**:** – This usually reflects **poor muscle structures** and is always associated with **very high defects**.
• **Midline Raphe Fistula:** – A subepethelial meconial fistula which looks like a black ribbon, placed in the midline in the perineum.	• **Meconuria (Meconium in urine**[Q]**):** – The presence of meconium in urine means that some form of **communication exists** between the **urinary tract** and **rectum**. – It suggests a **high lesion**.
• **Perineal Fistula (meconial)**[Q]**:** – The presence of meconium coming out through a small orifice located usually anteriorly to the centre of anal dimple	
• **Anal Stenosis:** – Very narrow anal canal	
• **Anal membrane:** – Very thin epithelial membrane through which one can see meconium	

Management

- **High lesions:** Patients with **high lesions** are **difficult to manage** and **require** an **initial protective colostomy. Posterior Saggital Anorectoplasty (PSARP)** is performed **after 4-8 weeks.**
- **Low lesions:** Can be **treated** with a **perennial anoplasty** (without the need of a protective colostomy).

113. Ans. c. 6 hours after birth

114. Ans. a. Cardiac anomalies

115. Ans. d. Invertogram

- **Anorectal malformations** are **associated with VACTERL abnormalities.**

RECTUM AND ANAL CANAL ANATOMY AND PHYSIOLOGY

116. Ans. b. Retained feces in the rectum

117. Ans. a. 4 inches *(Ref: Bailey 26/e p1239-1240, 25/e p1221-1222)*

Proctoscope	**10–12 cm**[Q]
Rigid sigmoidoscope	**25 cm**[Q]
Flexible sigmoidoscope	**60 cm**[Q]
Colonoscope	**160 cm**[Q]

118. Ans. c. Puborectalis *(Ref: Maingot 11/e p663)*

- **Rectal continence depends solely on** the **anorectal ring**[Q] and any damage to this ring results in rectal incontinence.
- The anorectal ring is **muscular ring** present **at** the **anorectal junction**[Q].
- **Anorectal ring** is **formed by fusion of**:
  - **Puborectalis**[Q] (a part of pubococcygeus, which in turn is a part of levator ani)
  - **Deep external anal sphincter**[Q]
  - **Internal anal sphincter**[Q]
- The **Puborectalis muscle** appears to be **most important muscle for maintaining fecal continence**[Q]**.**

119. Ans. a. Superficial inguinal

120. Ans. d. Circular muscles fibers condensation

121. Ans. a. Drain into the inferior mesenteric vein, B Have no valve

122. Ans. d. Transitional epithelium lies above the dentate line

123. Ans. a. Insensitive to pain

Anal canal		
Upper (Mucous) zone	**Middle (Transitional) zone**	**Lower (cutaneous) zone**
• Length: **15 mm**[Q] • Lined by **simple columnar mucous membrane** showing **anal columns** of **Morgagni**, **anal valves**, **anal sinus, anal papilla**[Q]. • **Pain insensitive**[Q]	• Length: **15 mm**[Q] • Lined by **non-keratinized stratified squamous epithelium** without sweat and sebaceous gland[Q] • **Pain sensitive**[Q]	• Length: **8 mm**[Q] • Lined by non-keratinized stratified squamous epithelium **with sweat** and **sebaceous gland**[Q] • **Pain sensitive**[Q]

- **Dentate/ Pectinate line** lies **between upper** and **middle part**[Q]
- **White line** of **Hilton** lies **at lower limit of middle**[Q] (transitional) part
- **Anal glands open at** the **dentate line**[Q]

124. Ans. a. Completely lined by stratified squamous epithelium

125. Ans. d. Valves disappear after mobilization of rectum *(Ref: Sabiston 19/e p1296; Schwartz 9/e p1015; Bailey 25/e p1219; Schackelford 7/e p1703)*

Valves of Houston

- The **middle valve** folds to the **left**[Q] (corresponds to the anterior peritoneal reflection) and the proximal and distal to the right.
- These valves are more properly called **folds,** for they have **no specific function** as impediments to flow.
- They are lost following **full surgical mobilization**[Q] of the rectum, a maneuver that may provide approx. **5 cm** of **additional length** to the rectum[Q].

126. Ans. b. Pudendal nerve *(Ref: BDC 4/e pvol II/e p383)*

Pudendal nerve		
Root value	**Course**	**Branches and supply**
• **S2, S3, S4**[Q]	• **Leaves pelvis** through **greater sciatic foramen**[Q] • **Enter perineum** through **lesser sciatic foramen**[Q]	• **Main** sensory motor **nerve of perineum**[Q] and **sensory nerve** of **external genitalia** • **Dorsal nerve** of **penis/clitoris** • **Inferior rectal nerve**[Q] supply **anal mucosa** (lower ½), **perineal skin** and **external anal sphincter** • **Perineal nerve**

127. Ans. a. Internal iliac lymph nodes

128. Ans. d. Haustral valve *(Ref: Sabiston 19/e p1382-1383; Bailey 26/e p1236-1237, 25/e p1240-1241; Schackelford 7/e p1717-1722)*

Fecal Continence

- **Normal fecal continence requires:**
  - **Adequate rectal wall compliance** to accommodate the fecal bolus[Q]
  - **Appropriate neurogenic control** of the **pelvic floor** and **sphincter** mechanism[Q]
  - **Functional internal** and **external sphincter muscles**[Q]

Anal Canal Physiology

- **Resting pressure** or **tone**: Due to **Internal sphincter** (90 cm H_2O)[Q]
- **Squeeze pressure**: Contraction of the **external anal sphincter** and **puborectalis muscle**[Q]
- **Principal mechanism that provides continence**: **Pressure differential between** the **rectum** (6 cm H_2O) and **anal canal** (90 cm H_2O)[Q].
- **Anorectal angle** is produced by the **anterior pull of** the **puborectalis muscle** as it encircles the rectum at the anorectal ring and contributes to fecal continence. **This angle** may act as a **flap valve** or have a **sphincter-like function**[Q].

129. Ans. a. External anal sphincter, b. internal anal sphincter, d. Pubococcygeus

130. Ans. c. Anococcygeal raphe *(Ref: BDC 5/e pVol-III/e p428; Maingot 11/e p663)*

***Anorectal ring** is a muscular ring present at the anorectal junction. It is formed by the **fusion of** the **Puborectalis, uppermost fibers of external sphincter** and the **internal sphincter**.*

- BDC says "**Anorectal ring** is a **muscular ring** present at the anorectal junction. It is formed by the **fusion of** the **Puborectalis, uppermost fibers of external sphincter** and the **internal sphincter**. It is easily felt by a finger in anal canal. **Surgical division** of this ring results in **rectal incontinence**. The ring is **less marked anteriorly** where the fibers of Puborectalis are absent."

Anorectal Ring

- **Rectal continence depends solely on** the **anorectal ring**[Q] and any damage to this ring results in rectal incontinence.
- The anorectal ring is **muscular ring** present **at** the **anorectal junction**[Q].

Anorectal ring is formed by fusion of		
• **Puborectalis**[Q]	• **Deep external anal sphincter**[Q]	• **Internal anal sphincter**[Q]

- The **Puborectalis muscle** appears to be **most important muscle for maintaining fecal continence**[Q].

131. Ans. a. S_2, S_3, S_4 *(Ref: BDC 5/e pvol II/e p354-355; Gray's 40/e p1158-1159; Snells 8/e p393-394)*

***External anal sphincter** is innervated by **inferior rectal branch of pudendal nerve (anterior divisions of S2, S3, S4**[Q] sacral spinal nerves) **mainly** and by **perineal branch of S4**.*

Anal Sphincter

External Anal Sphincter	Internal Anal Sphincter
• **Voluntary**[Q] • Sphincter complex of **striated muscles,** composed mainly of **type 1 (slow twitch) skeletal muscle fibers**[Q] suited for prolonged contraction • Contributed by fibers from **Puborectalis part of levator ani muscle**[Q] (in **upper most** part); **superficial transverse perineal muscles anteriorly**[Q] and **anococcygeal raphe posteriorly** (in **upper third**); and **anococcygeal ligament**[Q] (in **middle third**). • *It is **innervated by inferior rectal branch of pudendal nerve (anterior divisions of S2, S3, S4**[Q] sacral spinal nerves) **mainly** and by **perineal branch of S4**.* • It also receives **nerve to levator ani** (**Puborectalis**), with which it contracts in unison to maintain continence when internal sphincter is relaxed (except during defecation).	• **Involuntary**[Q] • Formed by **thickening of inner circular smooth muscle layer**[Q] of upper end of anal canal. • This sphincter remains in **state of tonic contraction most of the time to maintain resting tone or pressure**[Q] **(90 cm H_2O)** and to prevent leakage of fluid and flatus. • Its **contraction is maintained by sympathetic fibers** from **superior rectal** (periarterial) and **hypogastric plexuses**; and inhibited (relaxed) by parasympathetic pelvic splanchnic nerves

132. Ans. c. 2 cm

- The dentate line lies abut 2 cm proximal to the anal margin and roughly corresponds to the level where the distal squamous mucosa meets the more proximal columnar mucosa

MISCELLANEOUS

133. Ans. b. Fatal hemorrhage seen, c. Ulcerative colitis like symptoms seen *(Ref: Bailey 26/e p1225-1226, 25/e p1230)*

Hemangioma of Rectum

- Hemangioma of the rectum is an **uncommon cause** of **serious hemorrhage**[Q].
- When localized in the **lower part** of the **rectum** or **anal canal**, a hemangioma can be **excised**[Q].
- When the **lesion is diffuse**, or **lying in** the **upper part** of the rectum, the **symptoms simulate ulcerative colitis**[Q].
- Diagnosis is often missed for a long period, or it is mistakenly thought to be a carcinoma.
- **Selective angiography** and **embolization** may be **helpful**, but **excision of** the **rectum** is sometimes **required**[Q].

134. Ans. b. Sigmoid volvulus

135. Ans. a. Proctoscopy *(Ref: Bailey 26/e p1251, 25/e p1244)*

- Hemorrhoids are most likely cause of fresh, painless bleed in this young patient. Next step would be to check for hemorrhoids by proctoscopy before going for more invasive procedures like sigmoidoscopy or colonoscopy to diagnose other conditions.

136. Ans. c. Fistula in ano *(Ref: Bailey 26/e p1263; Sabiston 19/e p1387, 1391, 1394-1396; Schwartz 10/e p1229-1231, 9/e p1064-1065)*

Fistula in ano is not a cause of acute anal pain (Patients usually complain of **intermittent purulent discharge** and **pain).**

Thrombosed hemorrhoids: *(Sabiston 19/e p1387)*

- **External hemorrhoids** are covered with anoderm and are distal to the dentate line; they may swell, causing discomfort and difficult hygiene, but cause **severe pain** only if actually **thrombosed.**

Acute Anal Fissure: *(Sabiston 19/e p1391)*

Characterized by **severe anal pain** associated **with defecation** with passage of fresh blood, normally noticed on the tissue after wiping.

Fistula-in-Ano: *(Sabiston 19/e p1394)*

Patients usually complain of **intermittent purulent discharge** and **pain**[Q] (which increases until temporary relief occurs when the pus discharges).

(Acute anal pain is not seen in fistula-in-ano)

Perianal Abscess: *(Sabiston 19/e p1392)*

Usually produces a **painful, throbbing swelling in** the **anal region** with **swinging pyrexia**

CHAPTER 19

Hernia and Abdominal Wall

MULTIPLE CHOICE QUESTIONS

CLASSIFICATION OF HERNIA

1. Type IIIA in Nyhus classification of hernia: *(DNB 2011)*
a. Direct inguinal hernia b. Indirect inguinal hernia
c. Femoral hernia d. Umbilical hernia

2. Type 7 Gilbert hernia is:
a. Direct inguinal hernia b. Indirect inguinal hernia
c. Femoral hernia d. Umbilical hernia

3. Femoral hernia Nyhus classifications: *(WBPG 2014)*
a. IIIA b. II
c. IIIC d. IV

RISK FACTORS FOR HERNIA

4. The following are the risk factors for inguinal hernia:
a. Family history of inguinal hernia *(PGI Dec 2007)*
b. Weight lifter
c. COPD
d. Female
e. Obesity

INGUINAL HERNIA

5. Most common type of hernia in females is:
(AIIMS Feb 97, DPG 2005, JIPMER GIS 2011)
a. Direct inguinal hernia b. Indirect inguinal hernia
c. Femoral hernia d. Umbilical hernia

6. For differentiating inguinal hernia and femoral hernia the landmark will be: *(AIIMS Nov 98)*
a. Public symphysis b. Femoral artery
c. Inferior epigastric level d. Public tubercle

7. True statement (s) about indirect inguinal hernia:
a. 25% is bilateral *(PGI June 2004)*
b. In children, if inguinal (indirect) hernia is present on one side, then processus vaginalis is intact on other side
c. In bubonocele sac lies in the inguinal canal
d. Equal incidence in male and female

INDIRECT INGUINAL HERNIA

8. True about inguinal hernia: *(PGI June 2003)*
a. It is more common in female
b. Right sided is more common than left side
c. Direct hernia is less likely to undergo strangulation
d. Femoral hernia is more common in female

9. True statement about inguinal hernia: *(PGI Nov 2011)*
a. Overall male to female ratio is 7:1
b. Femoral and umbilical hernias ratio in female-to-male is same as 4:1
c. Inguinal hernia is commonest groin hernia in female
d. Incidence increases with age
e. Pain indicates obstruction and strangulation

10. All of the following statements are true about repair of groin hernias except: *(AIIMS Nov 2004)*
a. Lichtenstein tension free repair has a low recurrence rate
b. TEP repair is an extraperitoneal approach to laparoscopic repair of groin hernia
c. In Shouldice repair, non-absorbable mesh is used
d. The surgery can be done under local anesthesia in selected cases

11. Most important step in the repair of an indirect inguinal hernia is: *(JIPMER 87)*
a. Herniotomy
b. Narrowing of the internal ring
c. Bassini's repair
d. Transfixation of the neck of the sac

12. The treatment of choice for inguinal hernia in infants is:
a. Herniotomy b. Herniorrhaphy *(AMU 85)*
c. Truss d. Hernioplasty

13. On examination of the patient for a hernia, it is useful to realize that: *(AIIMS 81, PGI 83)*
a. An impulse is often much better seen than felt
b. The internal abdominal ring lies 1.25 cm above the midpoint of poupart's ligament
c. The external abdominal ring lies 1.25 cm above and medial to ASIS
d. None of the above

14. A patient is advised to avoid strenuous activity following herniorrhaphy for a period of: *(AMU 86, 91)*
a. One day b. One week
c. 3 weeks d. 6 weeks

15. Which one of the following is not performed in Lichtenstein tension free hernioplasty? *(Karnataka 2006)*
a. High ligation of indirect hernia sac
b. Mesh sutured to the conjoint tendon and inguinal ligament
c. Conjoint tendon sutured to inguinal ligament
d. Spermatic cord is placed in two tails of the internal ring

16. True statement regarding direct inguinal hernia: *(UPPG 2008)*
a. Most common inguinal hernia in women is direct
b. Direct hernia is medial to inferior epigastric artery
c. Repair of the transversalis fascia and the internal ring
d. Descends downwards and inwards towards the scrotum

17. Content of epilocele is: *(DNB 2011)*
a. Omentum b. Intestine
c. Colon d. Urinary bladder

18. Internal oblique, external oblique and transverses is retracted laterally in : *(AIIMS May 2005)*
a. Classic renal approach b. Laparoscopic approach
c. Spigelian hernia d. _____

19. Triangle of Doom is bounded by all of the following except: *(AIIMS Nov 2008)*
a. Cooper's ligament b. Vas deferens
c. Gonadal vessels d. Peritoneal reflection

20. True regarding indirect inguinal hernia are all except: *(MCI March 2008)*
a. Most common type of hernia
b. Always unilateral
c. Inguinal herniotomy is the basic operation
d. Transillumination distinguishes it from hydrocele

21. Most common type of hernia in the young age group: *(MCI Sept 2006)*
a. Femoral hernia
b. Direct inguinal hernia
c. Indirect inguinal hernia
d. Umbilical hernia

22. Least recurrence rate in incisional hernia repair is following: *(JIPMER 2010)*
a. On lay mesh repair
b. Intra peritoneal mesh repair
c. Inlay mesh repair
d. Shouldice repair

23. Inguinal herniotomy includes all of the following except:
a. Dissection and opening of the hernial sac *(Orissa 2011)*
b. Reduction of contents
c. Transfixation of the neck and excision of redundant sac
d. Repair of stretched inguinal ring and fascia transversalis

24. Hasselbach's triangle is bounded by the following, except:
a. Rectus abdominis muscle *(Orissa 2011)*
b. Transversus abdominis muscle
c. Inferior epigastric artery
d. Inguinal ligament

25. Ilioinguinal nerve is damaged while incising:
a. External oblique aponeurosis *(MHSSMCET 2006)*
b. Internal oblique muscle
c. Transverse abdominis
d. Linea alba

26. Shouldice repair is: *(PGI SS June 2007)*
a. Multilayered repair of inguinal canal
b. Conjoint tendon is sutured to inguinal ligament
c. Conjoint tendon is sutured to Cooper's ligament
d. Transabdominal repair

27. Are true about hernia repair except: *(JIPMER GIS 2011)*
a. Bassini's repair is between inguinal ligament and conjoint tendon
b. Shouldice repair is involvement of the posterior wall strengthening
c. Mcvay's repair is for femoral hernia
d. Lichtenstein is a tension free-mesh repair

28. Funicular hernia is type of: *(DNB 2007)*
a. Direct inguinal hernia
b. Indirect inguinal hernia
c. Femoral Hernia
d. Umbilical hernia

COMPLICATIONS OF HERNIA

29. Which of these would you like to do for a case of strangulated hernia? *(PGI June 2002)*
a. X-ray
b. USG abdomen
c. Aspiration of contents of sac
d. Correction of hypovolemia
e. Prepare OT for urgent surgery

30. In a case of strangulated hernia management is: *(PGI June 2006, Dec 2006)*
a. USG-abdomen
b. X-ray abdomen
c. Aspirate contents
d. Immediate surgery
e. IV fluids

31. Which of the following is not done in case of obstructed inguinal hernia? *(PGI June 2003, PGI Dec 2001)*
a. Aspiration of the sac for diagnosis
b. X-ray abdomen
c. USG abdomen
d. Do early surgery

32. During surgery of hernia, the sac of a strangulated inguinal hernia should be opened at the: *(AIIMS Nov 96, AIIMS June 2004)*
a. Neck
b. Body
c. Fundus
d. Deep ring

33. Treatment of strangulated hernia is: *(Kerala 94)*
a. Observation
b. Immediate surgery
c. Manual reduction
d. Analgesics

34. Which is the 1st sign of strangulation of inguinal hernia? *(UPPG 96)*
a. Tense
b. Tenderness
c. Irreducible
d. Redness

FEMORAL HERNIA

35. True about femoral hernia is: *(PGI Dec 98)*
a. Occurs exclusively in females
b. Pregnancy is common cause
c. Doesn't strangulate
d. In males associated with cryptorchidism

36. Which structures live immediately lateral to femoral hernia? *(AIIMS Nov 2011)*
a. Lateral cutaneous nerve of thigh
b. Femoral nerve
c. Femoral artery
d. Femoral vein

37. Femoral hernia is characteristically ..... the public tubercle: *(MHPGMCET 2007, TN 89)*
a. Lateral and below
b. Medial and above
c. Lateral and above
d. Medial and below

38. In the treatment of femoral hernia, Lockwood's operation refers to: *(Karnataka 2006)*
a. Low inguinal operation
b. High inguinal operation
c. Inguinal operation
d. Laparoscopic surgery

39. Strangulation most commonly occurs in: *(DNB 2012, MCI Sept 2005)*
a. Femoral hernia
b. Direct inguinal hernia
c. Indirect inguinal hernia
d. Lumbar hernia

40. Medial boundary of femoral ring is formed by: *(JIPMER 2011)*
a. Inguinal ligament
b. Pectineal ligament
c. Lacunar ligament
d. Septum separating it from femoral vein

41. A patient with femoral hernia can be managed by:
a. Bassini repair
b. Hunters repair
c. Shouldice repair
d. McVay repair

42. Hernia that lies under the fascia of pectineus muscle is: *(MHSSMCET 2006)*
a. Cloquet's hernia
b. Laugier's hernia
c. Narath's hernia
d. Obturator hernia

43. In Laugier's hernia opening is in the: *(WBPG 2014)*
a. Lacunar ligament
b. Conjoint tendon
c. External oblique
d. Peritoneum

44. Neck of sac of femoral hernia lies: *(Recent Questions 2013)*
a. Below and lateral to pubic tubercle
b. Above and lateral
c. Above and medial
d. Below and medial

SPIGELIAN HERNIA

45. All are true about Spigelian hernia except:
a. Usually occurs above arcuate line *(JIPMER GIS 2011)*
b. Picked up by USG or CT
c. Hernia sac will be posterior to the external oblique aponeurosis
d. Usually small and asymptomatic

46. Spigelian hernia is seen in: *(All India 99)*
a. Lumbar triangle
b. Subumbilical region
c. Paraumbilical region
d. Supraumbilical region

47. Spigelian hernia is a type of hernia occurring at: *(NEET 2013 PGI June 95, PGI June 2000)*
a. Medial border of rectus abdominis
b. Lateral border of rectus abdominis
c. Lumbar region
d. Femoral canal

48. Spigelian hernia is: *(MCI March 2005)*
a. Passes through the obturator canal
b. Hernia occurring through the linea alba
c. Hernia through the triangle of Petit
d. Hernia occurring at the level of arcuate line

49. Spigelian hernia is a defect within the following muscle: *(COMEDK 2004)*
a. Rectus abdominis
b. Internal oblique
c. Transversalis abdominis
d. External oblique

SLIDING HERNIA

50. Most common content in 'Hernia en glissade' is: *(PGI June 96, All India 95)*
a. Omentum
b. Urinary bladder
c. Caecum
d. Sigmoid colon

51. Viscera forms wall of which hernia? *(PGI Dec 95)*
a. Lumbar hernia
b. Sliding hernia
c. Epigastric hernia
d. Femoral hernia

52. Sliding constituent of a large direct hernia is: *(All India 88)*
a. Bladder
b. Sigmoid colon
c. Caecum
d. Appendix

53. Most useful investigation in sliding hernia in female: *(UPPG 2008)*
a. Fluroscopy
b. Barium-meal
b. Palpation method
d. Ultrasound

54. If caecum is involved as a part of the wall of hernia sac and is not its content, then it will be known as:
a. Richter's hernia
b. Spigelian hernia
c. Sliding hernia
d. Interstitial hernia

LUMBAR HERNIA

55. About lumbar hernia, false statements:
a. Superior triangle is Grynfeltt's triangle
b. Inferior triangle is Petit's triangle
c. Mostly acquired
d. More common on right side

OBTURATOR HERNIA

56. True about obturator hernia in adults: *(PGI Nov 2009)*
a. More common in space of Lorentz
b. Common in female
c. Chronic constipation risk factor
d. Surgical treatment should be done
e. May present with intestinal obstruction

57. Howship-Romberg sign is seen in:
a. Sliding hernia
b. Obturator hernia
c. Lumbar hernia
d. Paraduodenal hernia

PARADUODENAL HERNIA

58. False about paraduodenal hernia: *(PGI Nov 2009)*
a. Congenital
b. Found in fossa of Kolb
c. Found in fossa of Landzert
d. Common on right side

59. False about paraduodenal hernia: *(AIIMS GIS 2003)*
a. Left sided is found in fossa of Landzert
b. Right sided is found in fossa of Kolb
c. Congenital
d. More common on right side

60. After retrocolic gastrojejunostomy, hernia occurring through window in the transverse mesocolon is: *(MHSSMCET 2008)*
a. Stammer's hernia
b. Left paraduodenal hernia
c. Right paraduodenal hernia
d. Hernia-en-glissede

UMBILICAL HERNIA

61. The covering over an omphalocele is: *(PGI 87)*
a. Skin
b. Amniotic membrane
c. Chorionic membrane
d. None of the above

62. Omphalocele is caused by: *(DNB 2010)*
a. Duplication of intestinal loops
b. Abnormal rotation of the intestinal loop
c. Failure of gut to return to the body cavity from its physiological herniation
d. Reversed rotation of the intestinal loop

63. In Moore's classification of omphalocele (exomphalos), type I umbilical defect is less than .. cm: *(PGI 81, AIIMS 86)*
a. 0.5
b. 2.5
c. 3.5
d. 4.5

64. Exomphalos major should be operated at: *(PGI 81, DNB 91)*
a. Birth
b. 3 months of age
c. 1 year
d. 3 years

65. Mayo's operation is done for: *(2000)*
a. Spigelian hernia
b. Femoral hernia
c. Richter's hernia
d. Umbilical hernia

66. Umbilical hernia in a child - indication for surgery is/are:
a. Failure to disappear by 3 years *(MAHE 2007)*
b. >2 cm size
c. Symptomatic
d. All of the above

67. What is false regarding gastroschisis and omphalocele? *(DNB 2012, AIIMS 2000)*
a. Intestinal obstruction is common in gastroschisis
b. Gastroschisis is associated with multiple anomalies
c. Umbilical cord is attached in normal position in gastroschisis
d. Liver is the content of omphalocele

68. Hernia that is least likely to strangulate is: *(AIIMS Nov 93)*
a. Femoral hernia
b. Direct inguinal hernia
c. Indirect inguinal hernia
d. Umbilical hernia

69. Incidence of exomphalos: *(MHPGMCET 2006)*
a. 1 in 1000
b. 1 in 3000
c. 1 in 5000
d. 1 in 10,000

70. True regarding gastroschisis is: *(NEET Pattern, DNB 2003)*
a. An omphalocele
b. An anterior abdominal wall tumor
c. A variant of gastric carcinoma
d. Herniation of abdominal contents through body wall

71. In omphalocele abdominal wall defect is more than: *(WBPG 2014)*
a. 0.5 cm b. 2.5 cm
c. 4 cm d. 6 cm

EPIGASTRIC HERNIA

72. The hernia which often simulates a peptic ulcer is:
a. Umbilical hernia *(MCI March 2007, Karnataka 94)*
b. Fatty hernia of the linea alba
c. Incisional hernia
d. Inguinal hernia

73. True about epigastric hernia is: *(AIIMS May 2012)*
a. Located below the umbilicus and always in the midline
b. Located above the umbilicus and always in the midline
c. Located above the umbilicus and on either side
d. Can be seen anywhere on abdomen

RICHTER'S HERNIA

74. The sac contains only a portion of the circumference of the intestine: *(UPPG 2007, 2005)*
a. Richter's hernia b. Littre's hernia
c. Spigelian hernia d. Lumbar hernia

75. Which of the following describes Richter's hernia? *(MCI Sept 2007)*
a. The strangulated loop of 'W' lies within the abdomen
b. Hernia occurring at the level of arcuate line
c. Involves only a portion of the circumference of the bowel
d. Hernia occurring through the linea alba

76. Strangulation without obstruction is seen in: *(DNB 2005)*
a. Inguinal hernia b. Femoral hernia
c. Richters hernia d. Littres hernia

LITTRE'S HERNIA

77. Which of the following is content of Littre's hernia?
a. Urinary bladder *(DNB 2012, MHPGMET 2005)*
b. Meckel's diverticulum
c. Circumference of intestinal wall
d. Appendix

78. Hernia containing Meckel's diverticulum is: *(MHSSMCET 2005)*
a. Richter's hernia b. Pantaloon hernia
c. Littre's hernia d. Mydel's hernia

MISCELLANEOUS HERNIA

79. About hernia, false statements: *(PGI Dec 2003)*
a. In children, indirect inguinal hernia is treated medically
b. In Richter's hernia, absolute constipation seen
c. Indirect inguinal hernia is the MC type
d. Deep inguinal ring is lateral and above the public tubercle

80. True about hernia: *(PGI Dec 2003)*
a. External abdominal hernia is common
b. Direct hernia usually acquired
c. Strangulation is common in femoral hernia
d. Direct hernia is acquired in old age
e. TOC for indirect inguinal hernia is surgery

81. True about hernia: *(PGI Dec 2000)*
a. Direct hernias are usually acquired
b. Femoral is most common hernia to strangulate
c. External abdominal hernia are most common
d. 50% old people suffer from direct type of hernia with strangulation
e. Treatment of choice for indirect inguinal hernia is surgery

82. Causes of recurrent hernia: *(PGI 88)*
a. Absorbable sutures b. Sliding hernia
c. Missed sac d. Infection

83. Hernia with hydrocele is … hernia: *(PGI 79, AIIMS 84)*
a. Gibbon's b. Fruber's
c. Dobson's d. Leobel's

84. Hernia into pouch of Douglas is …… hernia: *(AIIMS 81, PGI 84)*
a. Beclard's b. Bochdaleks
c. Blandin's d. Berger's

85. The person whose work on the radical cure of hernia immortalised his name was: *(Karnataka 96)*
a. William Halsted b. Eduardo Bassini
c. Mc Vay d. Koontz

86. Truss cannot prevent progression of which type of inguinal hernia? *(UPPG 99)*
a. Sliding b. Littre's
c. Indirect d. Direct

INCISIONAL HERNIA

87. Which of the following does not predispose to abdominal wall dehiscence? *(JIPMER 92)*
a. Faulty technique
b. Malignancy
c. Raised intra abdominal pressure
d. Old age

88. Ventral hernia is a/an: *(AMC 99)*
a. Incisional hernia b. Umbilical hernia
c. Femoral hernia d. Inguinal hernia

89. Incisional hernia, not true is: *(DPG 2006)*
a. Faulty operative technique
b. There is distension of abdomen
c. Associated with infection of the wound
d. Caused by use of local anesthesia

90. Hernia prone to re-occur apter primary repair: *(JIPMER 2013)*
a. Femoral b. Epigastric
c. Spigelian d. Inusional

HERNIA AND ABDOMINAL WALL ANATOMY

91. A patient operated for direct inguinal hernia developed anesthesia at the root of the penis and adjacent part of the scrotum, the nerve likely to be injured is: *(AIIMS Nov 2001)*
a. Genital branch of genitofemoral nerve (supply dartos muscle)
b. Femoral branch of genitofemoral nerve
c. Iliohypogastric nerve
d. Ilioinguinal nerve

92. During repair of indirect inguinal hernia, while releasing the constriction at the deep inguinal ring, the surgeon takes care not to damage one of the following structures:
a. Falx inguinalis (conjoint tendon) *(AIIMS Nov 2003)*
b. Interfovelar ligament
c. Inferior epigastric artery
d. Spermatic cord

93. Preservation of ilioinguinal nerve is an important step in inguinal hernia operation while: *(UPSC 97)*
a. Incising the sub-cutaneous tissue
b. Incising the external oblique aponeurosis
c. Incising the cremasteric fascia
d. Isolating the sac

94. All of the following structures pass through the inguinal cannal in females except: *(All India 2012)*
a. Ilioinguinal nerve
b. Round ligament of uterus
c. Lymphatics from uterus
d. Inferior epigastric artery

95. Which of the following is true about deep inguinal ring?
a. Defect in fascia transversalis *(DPG 97)*
b. Transmits deep inferior epigastric artery
c. Lies just above and lateral to public tubercle
d. Opening in external oblique aponeurosis

96. The rectus sheath contains all of the following except:
a. Pyramidalis muscle *(DPG 2010)*
b. Genitofemoral nerve
c. Inferior epigastric vessels
d. Superior epigastric vessels

97. Rectus abdominis is inserted into: *(PGI 98)*
a. Xiphoid process
b. Median raphae
c. Linea alba
d. 1-4 ribs

98. True about inguinal canal *(PGI 2003)*
a. It is an intermuscular canal
b. Superficial inguinal ring is situated superior and lateral to pubic tubercles
c. Deep inguinal ring is superior-medial to attachment wall muscles
d. In male vas deference passes through it
e. Artery and nerve supply pass through it

99. All are true about inguinal canal except: *(All India 2001)*
a. Conjoint tendon forms part of the posterior wall
b. Superficial ring is found in external oblique aponeurosis
c. Deep ring is an opening in transversalis abdominis
d. Internal oblique forms both anterior and posterior wall

100. The inguinal canal is not bounded posteriorly by *(All India 1995)*
a. Transversalis fascia
b. Internal oblique tendon
c. Conjoint tendon
d. Lacunar ligament

101. Deep inguinal ring is deficiency in the
a. Internal oblique muscle
b. Transverses abdominis muscle
c. Internal spermatic fascia
d. Transversalis fascia

102. True statement about lower 1/4th anterior abdominal wall:
a. Linea alba is poorly formed *(PGI June 2006, Dec 2007)*
b. Two layers of rectus sheath present
c. External oblique poorly formed
d. External oblique muscle well formed and strong

103. True about the anatomy of inguinal hernia which is/are true: *(PGI June 2005)*
a. Superficial inguinal ring is an opening in external oblique aponeurosis
b. Indirect hernia lies just medial to inferior epigastric artery
c. Posterior wall is formed by transversalis fascia and conjoined tendon
d. Cremasteric artery is a branch of external iliac artery
e. Indirect hernia lies anteromedial to spermatic cord

104. On an average, the distance between femoral ring and saphenous opening (length of femoral canal) is: *(AIIMS 81, UPSC 87)*
a. 1.25 cm
b. 2.50 cm
c. 3.75 cm
d. 5.00 cm

105. The transpyloric plane passes through the: *(COMEDK 2011)*
a. Pylorus of the stomach
b. Fundus of the stomach
c. Fundus of the uterus
d. Fundus of the gall bladder

106. Which of the following are associated with external oblique muscle? *(PGI Nov 2011)*
a. Poupart's ligament
b. Lacunar ligament
c. Superficial inguinal ring
d. Conjoint tendon
e. Cremaster muscle

UMBILICAL ADENOMA

107. Treatment of choice of umbilical adenoma in a new born is: *(PGI 80, DPG 81, 93)*
a. Occlusion with a coin
b. Strapping
c. Surgery
d. Masterly inactivity

108. "Raspberry tumour" is another name for: *(NEET 2013, PGI 85)*
a. Umbilical fistula
b. Umbilical granuloma
c. Umbilical adenoma
d. Meckel's diverticulum

109. Raspberry tumour is: *(JIPMER 98)*
a. Neoplastic
b. Inflammatory
c. Traumatic
d. Congenital

DESMOID TUMOR

110. Treatment of desmoid tumor is: *(AIIMS Nov 93)*
a. Conservative
b. Radiotherapy
c. Surgery
d. Radiotherapy following chemotherapy

111. Regarding desmoid tumour which is not correct?
a. Often seen below the umbilicus *(DNB 2002, JIPMER 87)*
b. Unencapsulated
c. More common in women
d. Metastasis does not occur
e. Highly radiosensitive

112. Recurrent fibroma refers to desmoid tumor arising in:
a. Uterus
b. Scar tissue *(PGI 88)*
c. Ovary
d. Muscle

113. Treatment of choice of desmoid tumour is: *(AIIMS June 94)*
a. Surgery
b. Chemotherapy
c. Radiotherapy
d. Surgery + Radiotherapy

114. What is the treatment of choice in desmoid tumors?
a. Irradiation *(DNB 2009, UPSC 2008)*
b. Wide excision
c. Local excision
d. Local excision following radiation

115. Regarding desmoid tumour, true is: *(MHSSMCET 2011)*
a. Mostly females are affected
b. Well-capsulated tumor
c. Common above the level of umbilicus
d. Radiotherapy is treatment of choice

MISCELLANEOUS

116. Patent vitello-intestinal duct should preferably be operated at: *(PGI 80, 81, AMU 89)*
a. Birth
b. 6 months of age
c. 12 months of age
d. 3 years of age

117. Which age group most often present with jaundice due to omphalitis in infants is? *(PGI 81, Kerala 90)*
a. At birth
b. 24-72 hours
c. 1-3 weeks
d. 3-6 weeks

118. The patent vitello-intestinal duct most often discharges: *(JIPMER 78,79, TN 89)*

a. Mucus
b. Pus
c. Urine
d. Faeces

119. Congenital hydrocele is best treated by: *(PGI 2001)*

a. Eversion of sac
b. Excision of sac
c. Lords procedure
d. Herniotomy

120. Bleeding from the umbilicus in an adult female during menstruation is suggestive of: *(All India 94)*

a. Bleeding diathesis
b. Vicarious menstruation
c. Persistent urachus
d. Purpura

121. A new born presents with discharge of urine from the umbilicus for 3 days. Diagnosis is: *(UPPG 2008)*

a. Meckel's diverticulum
b. Mesenteric cysts
c. Urachal fistula
d. Umbilical hernia

122. A child complains of fluid coming out of umbilicus on straining. What is the diagnosis? *(AIIMS November 2014)*

a. Urachal fistula
b. Gastroschisis
c. Patent vitellointestinal duct
d. Congenital umbilical hernia

123. A new born presents with mid anterior abdominal wall defect with characteristic spontaneous disappearance at age 4 years: *(UPPG 2008)*

a. Patent urachus
b. Omphalocele
c. Ectopia vesicae
d. Umbilical hernia

124. Most common cause of umbilicus not separated at age of 2 years: *(UPPG 2008)*

a. Raspberry tumour
b. Leukocyte adhesion deficiency
c. Patent urachus
d. Umbilical granuloma

125. Pascal's law is used in which technique of hernia repair? *(DNB 2010)*

a. Lichtenstein mesh repair
b. Stoppa's preperitoneal repair
c. Bassini's repair
d. Darning repair

126. All of the following are true about hernia surgery except: *(AIIMS Nov 2012)*

a. Surgery should not be done unless patient becomes symptomatic
b. Hernia in children is treated with herniotomy
c. Absorbable mesh should not be used for surgery
d. Surgery can be done using laparoscopy

127. Method of reduction of inguinal hernia: *(Recent Questions 2013)*

a. Kugel maneuvve
b. Taxis
c. Macvay procedure
d. Stopa's technique

EXPLANATIONS

CLASSIFICATION OF HERNIA

1. **Ans. a. Direct inguinal hernia** *(Ref: Sabiston 19/e p1120; Schwartz 10/e p1634-1635, 9/e p1316; Schackelford 7/e p567-568)*

Hernia

- **Hernia** is derived from the Latin word for **rupture**.
- A hernia is defined as an **abnormal protrusion** of an organ or tissue **through a defect**[Q] in its surrounding walls.

Nyhus Classification System	
Type **I**	• **Indirect hernia**; **internal ring normal**; typically **in infants**, **children**, **young adults**[Q]
Type **II**	• **Indirect hernia**; **internal ring enlarged**[Q] without impingement on the floor of the inguinal canal; does not extend to the scrotum
Type **IIIA**	• **Direct hernia**[Q] (size is not taken into account)
Type **IIIB**	• **Indirect hernia** enlarged enough to **encroach upon** the **posterior** inguinal **wall**; **indirect sliding** or **scrotal hernias** and **pantaloon hernias**[Q]
Type **IIIC**	• **Femoral hernia**[Q]
Type **IV**	• **Recurrent hernia**
A	• **Direct**[Q]
B	• **Indirect**
C	• **Femoral**
D	• **Combined**

2. **Ans. c. Femoral hernia** *(Ref: Schwartz 10/e p1496, 9/e p1316; Schackelford 7/e p567-568)*

Gilbert Classification System			
Type **1**	**Small, indirect**	Type **5**	**Diverticular,** direct
Type **2**	**Medium,** indirect	Type **6**	**Combined (pantaloon)**
Type **3**	**Large,** indirect	Type **7**	**Femoral**[Q]
Type **4**	**Entire floor, direct**[Q]		

Schumpelick Classification System

- The major feature is the **addition of orifice sizing** to traditional systems.
- The **defects** are then **graded according to size**.

• **L**: **Lateral indirect** site • **M**: **Medial direct** • **F**: **Femoral**	• **Type I**: Defect size **<1.5** cm in diameter • **Type II:** Defect size **1.5-3 cm** • **Type III:** Defect size **>3 cm**

3. **Ans. c. IIIC**

RISK FACTORS FOR HERNIA

4. **Ans. a. Family history of inguinal hernia, b. Weight lifter, c. COPD, e. Obesity** *(Ref: Sabiston 19/e p1114-1115; Schwartz 9/e p1307-1308; Bailey 26/e p949-950, 25/e p968; Schackelford 7/e p558-559)*

Risk Factors for Hernia	
Weakness of Abdominal Muscles	**Increased Intra-Abdominal pressure**
• **Patent processus vaginalis**[Q] • Patent canal of nuck causing indirect inguinal hernia in females • **Connective tissue disorders**[Q] like Ehlers Danlos syndrome • Congenital conditions like **Extrophy of bladder**, **Prune Belly syndrome**[Q] • **Advancing age**[Q] • **Chronic debilitating disease**[Q] • **Defective collagen synthesis**[Q] • Previous **right lower quadrant incision**[Q] • **Cigarette smoking**[Q]	• **Chronic cough**[Q] (Bronchitis, tuberculosis) • **Chronic obstructive pulmonary disease**[Q] • **Obesity**[Q] • Chronic **constipation** with **straining** at stool • **Enlarged prostate** with **straining** at micturition • **Pregnancy**[Q] • **Cirrhosis** with **ascites**[Q] • **Heavy weight lifting**[Q] • Chronic ambulatory peritoneal dialysis • Intra-abdominal tumors • Chronically enlarged pelvic organs

Other Risk Factors
• **Birth weight <1500 gms (Pre-term)**[Q]
• **Arterial aneurysms**[Q]
• **Family history** of a hernia
• **Sex:** Indirect inguinal hernia is more common in **boys**[Q]

INGUINAL HERNIA

5. **Ans. b. Indirect inguinal hernia** *(Ref: Sabiston 19/e p1114; Schwartz 10/e p1634-1635, 9/e p1306-1307; Bailey 26/e p954-960, 25/e p971-972; Schackelford 7/e p558)*

- **MC type** of hernia **in males**: **Indirect inguinal hernia**[Q]
- **Femoral hernia** is **more common in females**[Q].
- **MC type** of hernia **in females**: **Indirect inguinal hernia**[Q]
- **Direct inguinal hernia** is **more common in** the **elderly**[Q]

6. **Ans. d. Public tubercle** *(Ref: Sabiston 19/e p1114, 1126; Schwartz 10/e p1634-1635, 9/e p1308; Bailey 26/e p954-960, 25/e p971-972; Schackelford 7/e p561)*

Inguinal Hernia	Femoral Hernia
• **Neck of sac** lies **above** and **medial** to the **pubic tubercle**[Q]	• **Neck of sac** lies **below** and **lateral** to the **pubic tubercle**[Q]

7. **Ans. b. In children, if inguinal (indirect) hernia is present in on side, then processus vaginalis is intact on other side, c. In bubonocele sac lies in the inguinal canal** *(Ref: Sabiston 19/e p1114-1115; Schwartz 10/e p1634-1635, 9/e p1307, 1316; Bailey 26/e p954-959, 25/e p971-973; Schackelford 7/565-568)*

Indirect Inguinal Hernia

- **MC form of hernia** in both **males** and **females**[Q]
- **Indirect hernias** are **most common in** the **young**, whereas **direct hernias** are most common **in the old**[Q].
- In the **first decade** of life, inguinal hernia is **more common on** the **right side** in the male, due to **later descent of** the **right testis** and a **higher incidence of failure** of **closure of processus vaginalis**[Q].

- In **adult males**, **65%** of **inguinal hernias** are **indirect** and **55% are right-sided**.
- The **hernia is bilateral** in **12%** of cases[Q].
- **If both sides are explored** in an **infant presenting with one hernia**, the incidence of a **patent processus vaginalis on** the **other side** is **60%**[Q].

Types of Indirect Inguinal Hernia	
Bubonocele	• Hernia is **limited to** the **inguinal canal**[Q]
Funicular	• **Processus vaginalis** is **closed just above epididymis**[Q]. • **Contents** of the sac **can be felt separately from testis,** which lies below the hernia[Q].
Complete or scrotal	• **Testis** appears to **lie within** the **lower part of hernia**[Q].

Clinical Features

- **Males** are **20 times more commonly affected** than females[Q].
- The patient complains of **pain in** the **groin** or **pain referred to the testicle** when performing **heavy work** or **taking strenuous exercise**.
- When asked to cough, a **small transient bulging** may be **seen** and **felt** together with an **expansile impulse**[Q].
- **Large hernias: Sensation** of **weight** and **dragging** on the mesentery may produce **epigastric pain.**

Treatment

- **Surgery** is the **treatment of choice** (**open** or **laparoscopic**)[Q]

INDIRECT INGUINAL HERNIA

8. **Ans. b. Right sided is more common than left side, c. Direct hernia is less likely to undergo strangulation, d. Femoral hernia is more common in female** *(Ref: Sabiston 19/e p1114-1115; Schwartz 10/e p1634-1635, 9/e p1306, 1316; Bailey 26/e p954-959, 25/e p971-973; Schackelford 7/e p565-568)*

Direct Inguinal Hernia

- In **adult males**, **35% of inguinal hernias** are **direct**[Q]
- At presentation, **12%** of patients will have a **contralateral hernia**[Q]
- **Fourfold increased risk of** future **development of** a **contralateral hernia** if one is not present at the original presentation.
- **Always acquired**[Q]
- **Sac passes through** a **weakness** or **defect of transversalis fascia** in the **posterior wall** of the inguinal canal.
- Patient has **poor lower abdominal musculature**, presence of elongated bulgings (**Malgaigne's bulges**).

> - **Women** practically **never develop** a **direct inguinal hernia**[Q].

Predisposing Factors

- **Smoking**[Q]
- Occupations that involve **straining** and **heavy weight lifting**[Q]

> - **Damage** to the **iliohypogastric nerve** (**previous appendectomy**) is another cause, because of the resulting **weakness of** the **conjoined tendon**[Q].
> - **IH → IH** (**I**lio**H**ypogastric nerve → **I**nguinal **H**ernia[Q])

Clinical Features

- Direct hernias **do not attain a large size** or **descend into the scrotum**.
- In contrast to an indirect inguinal hernia, a **direct inguinal hernia lies behind** the **spermatic cord.**
- **Sac** is often **smaller than hernial mass would indicate**, the **protruding mass** mainly consisting of **extraperitoneal fat**[Q].

> - As the **neck of the sac is wide**, **direct inguinal hernias do not often strangulate**[Q]

9. Ans. a. Overall male to female ratio is 7:1, c. Inguinal hernia is commonest groin hernia in female, d. Incidence increases with age, e. Pain indicates obstruction and strangulation *(Ref: Sabiston 19/e p1114-1115; Schwartz 10/e p1634-1635, 9/e p1306-1307; Bailey 26/e p954-959, 25/e p971-973; Schackelford 7/e p558)*

- Schwartz says "**Seventy five percent** of all abdominal wall hernias occur **in the groin**. Indirect hernias outnumber direct hernia by about 2:1, with femoral hernia making up a much smaller proportion. **Right sided groin hernias** are **more common** than those to the left. The **male to female ratio** for **inguinal hernia** is **7:1**."
- **Incidence of hernia increase with the age**, particularly for **inguinal, umbilical** and **femoral**. The likelihood of **strangulation** and **need for hospitalization** also **increases with age**.
- In **obstructed hernia**, symptoms (**colicky abdominal pain** and **tenderness** over hernia site) are **less severe** and the onset is **more gradual** than in strangulated hernia. **Strangulated hernia** presents with **local then general pain** and **vomiting**.

10. Ans. c. In Shouldice repair, non-absorbable mesh is used *(Ref: Sabiston 19/e p1120-1126; Schwartz 10/e p1634-1635, 9/e p1318-1331; Bailey 26/e p957-959, 25/e p972-976; Schackelford 7/e p568-579)*

In **Shouldice repair**, inguinal floor is strengthened by approximation of tissues using non-absorbable sutures, **mesh is not used**.

Management of Inguinal Hernia

- **Objectives** of treatment:
  - **Treatment of hernia sac**
  - **Inguinal floor reconstruction**

Management of Inguinal Hernia

Treatment of Hernia Sac	Inguinal Floor Reconstruction
• Basic operation is **inguinal herniotomy**, which entails **dissecting out** and **opening** the **hernial sac, reducing any contents** and then **transfixing the neck** of the sac and **removing the remainder**[Q]. • **Direct sacs** are usually too broad for ligation and should not be opened but instead are simply **inverted into peritoneal cavity**[Q].	• **Management of** the **hernia sac** is **sufficient for children** and **young adults**[Q] • **Reconstruction** (repair or strengthening) of the inguinal floor is **necessary in all adult hernias to prevent recurrence**[Q]. • **Types of repair:** – Primary **tissue repair**[Q] – **Anterior tension-free mesh repair**[Q] – **Pre-peritoneal repairs**: **Open** and **laparoscopic** approach[Q]

Inguinal Floor Reconstruction

Primary Tissue Repair	Anterior Tension-Free Mesh Repair	Laparoscopic and Pre-Peritoneal Repairs
• **Posterior wall** of inguinal wall is **strengthened by approximation of tissues with sutures**[Q]. • There is **no use of prosthetic material**[Q]. • **Advantages**: **Simplicity** of the repair and **absence of** any **foreign body** in groin • **Disadvantage**: **Higher recurrence rates** due to **tension** on the repair and **slower return to unrestricted physical activity**[Q]. **Types:** – **Bassini repair**[Q] – Halsted repair – **McVay**[Q] (Cooper ligament) repair – **Shouldice repair**[Q] – Darn repair	• Current practice in hernia management employ **synthetic mesh** to **bridge the defect** • **Recurrence** is **very low** • **Types:** – **Lichtenstein repair**[Q]**: Mesh** is used to reconstruct the inguinal floor. – **Patch and plug repair**[Q]**: Plug** of mesh is **inserted into** the hernia **defect** and sutured in place. Then another piece of **mesh** is **placed over** the **inguinal floor.**	• Pre-peritoneal space is reached by either trans-abdominal laparoscopy (**TAPP**) or by totally extra-peritoneal repair (**TEP**). • Both techniques are similar in actual repair but differ in the manner by which the preperitoneal space is accessed. • **TAPP (Trans-abdominal Pre-Peritoneal)**[Q]: – Peritoneal space is reached by conventional laparoscopy and pre-peritoneum overlying the inguinal floor is dissected away as a flap. • **TEP (Totally Extra-Peritoneal)**[Q]: – Pre-peritoneal space is accessed without entering the peritoneal cavity

11. Ans. b. Narrowing of the internal ring

Most important step of hernia repair is narrowing of internal ring.

12. Ans. a. Herniotomy

13. Ans. a. An impulse is often much better seen than felt

14. Ans. None

After herniorrhapy, avoid strenuous activity for 6 months.

15. Ans. c. Conjoint tendon sutured to inguinal ligament *(Ref: Sabiston 19/e p1123; Schwartz 10/e p1508, 9/e p1322; Bailey 26/e p959, 25/e p974; Schackelford 7/e p576)*

Lichtenstein Tension-Free Repair

- **Initial exposure** and **mobilization of cord structures** is identical to other open approaches.
- Lichtenstein repair **does not include routine division of** the **transversalis fascia**[Q].
- **Internal inguinal ring is not reconstructed** using canal structures.
- **Floor** and **internal ring** are **reinforced through** the application of the **mesh**.[Q]
- **Mesh** is **split to accommodate** the **spermatic cord**[Q].
- **Rounded edge** is **attached** to the **anterior rectus sheath**[Q] just medial to the pubic tubercle
- **Inferior margin** of the mesh is then **sutured to the shelving edge** of the **inguinal ligament**[Q]

16. Ans. b. Direct hernia is medial to inferior epigastric artery *(Ref: Sabiston 19/e p1114-1115; Schwartz 9/e p1306, 1316; Bailey 25/e p971-975; Schackelford 7/e p558-568)*

	Indirect hernia	Direct hernia
Age	• **Any age**	• Common in **elderly**[Q]
Herniation	• **Protrusion** through **deep inguinal ring;** Herniation occurs latter[Q]	• **Herniation** through **posterior wall** of inguinal canal
Shape	• **Pyriform/oval** in shape[Q]	• **Globular/round** shape
Descent	• **Obliquely** and **downwards**	• **Directly forwards**
Descent to scrotum	• **Descent to** the **bottom of scrotum** and becomes **complete**[Q]	• **Rarely** descent to the bottom of the scrotum
Neck	• Narrow[Q]	• **Wide**[Q]
Sac	• **Lateral** to **inferior epigastric artery**	• **Medial** to **inferior epigastric artery**
Zieman's test	• **Cough impulse** on **index finger**[Q]	• **Cough impulse** on **middle finger**
Invagination test	• **Tip** of **finger**	• **Pulp** of **finger**
Ring occlusion test	• **Does not bulge**	• **Bulge medial** to **occluding finger**
Coverings (from inside out)	• Extraperitoneal tissue • **Internal spermatic fascia**[Q] • **Cremasteric fascia**[Q] • External spermatic fascia • Skin	• Extraperitoneal tissue • **Fascia transversalis** • **Conjoint tendon** • External spermatic fascia • Skin

	• Commonly **unilateral**	• Commonly **bilateral**[Q]
Obstruction/ strangulation	• **Common**	• **Rare**
Sac	• Should be **opened during surgery**	• **Not necessary,** unless obstruction is present

17. Ans. a. Omentum *(Ref: Bailey 25/e p969)*

Content of Hernia	Name
Omentum	Omentocele
Intestine	Enterocele

18. Ans. Question is incomplete, don't worry, it would not be asked again

19. Ans. a. Cooper's ligament *(Ref: Sabiston 19/e p1118; Schwartz 10/e p1496, 9/e p1313-1315; Schackelford 7/e p562-565)*

Landmarks in Laparoscopic Repair

Triangle of Doom

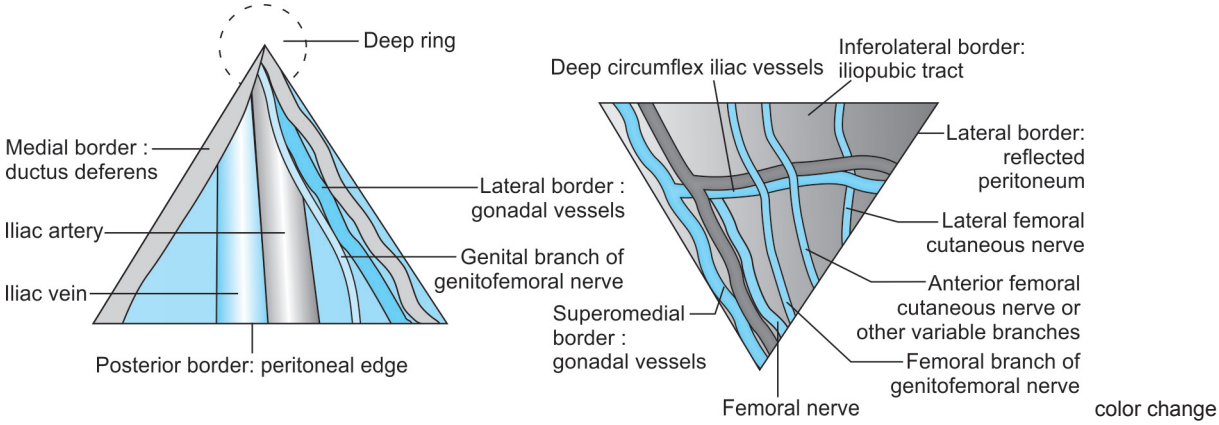
- Bounded **laterally** by the **gonadal vessels**[Q]
- **Medially** by the **vas deferens**[Q]
- **Apex** oriented superiorly at the **internal ring**[Q]
- Contain **external iliac vessels**[Q], deep circumflex iliac vein, the femoral nerve and genital branch of the genitofemoral nerve.

Triangle of Pain

- Also known as **Electrical hazard zone**[Q]
- Bounded **medially** by the **gonadal vessels**[Q]
- **Superiorly** by the **iliopubic tract**[Q]
- **Laterally** by **peritoneum**[Q]
- This triangle **contains** from lateral to medial:
  - **Lateral femoral cutaneous nerve**[Q]
  - **Anterior femoral cutaneous**[Q]
  - **Femoral branch of the genitofemoral nerve**[Q]
  - **Femoral nerve**[Q]

Corona Mortis

- Also known as **Crown of death**[Q]
  - **Vascular connections between the obturator and external iliac systems**[Q]
- **Aberrant obturator artery** arises from the **inferior epigastric** artery, **arches over** the **Coopers ligament** and **joins** the **normal obturator artery**[Q] to complete a vascular ring
- **Significant hemorrhage**[Q] may occur **if accidentally cut** and it is **difficult to achieve** subsequent **hemostasis**



Space of Retzius (Retropubic space)	• Extra-peritoneal space between **pubic symphysis and urinary bladder**[Q]
Space of Bogros (Retroinguinal space)	• Extra-peritoneal space situated **deep to inguinal ligament**[Q] • Situated laterally and cranially to Retzius space

20. Ans. b. Always unilateral **21. Ans. c. Indirect inguinal hernia** **22. Ans. b. Intra peritoneal mesh repair**

23. Ans. d. Repair of stretched inguinal ring and fascia transversalis

24. Ans. b. Transversus abdominis muscle *(Ref: Sabiston 19/e p1118; Bailey 26/e p955, 25th/e p971; Schackelford 7/e p560)*

Hesselbach's triangle		
Lateral border	**Medial border**	**Base**
• **Epigastric artery**[Q]	• **Lateral border** of **rectus abdominis**[Q] where it is attached to pubic crest	• **Inguinal ligament**

- **Indirect inguinal hernia** comes out of abdominal cavity **through deep inguinal ring**[Q], travel inguinal canal and becomes superficial through superficial inguinal ring.
- **Direct inguinal hernia** enters inguinal canal through **medial half** of **weak posterior wall** (**Hesselbach's triangle**[Q]) and becomes superficial through superficial inguinal ring.

25. Ans. a. External oblique aponeurosis *(Ref: Sabiston 19/e p1118, 1127; Schwartz 10/e p1495-1517, 1974, 9/e p1314-1315; Bailey 25/e p971, 973; Schackelford 7/e p562-563)*

External oblique aponeurosis is in close relation to ilioinguinal nerve and hence during operation for inguinal hernia, prevention of injury to ilioinguinal nerve to avoid later development of incisional hernia is very important.

Nerves in Relation to Inguinal Hernia

Ilioinguinal Nerve	Iliohypogastric Nerve	Genitofemoral Nerve
• **Pierces transversus abdominis** and **internal oblique** above the iliac crest and **inters inguinal canal**[Q].	• **Pierces transversus abdominis**, travels **between transversus abdominis** and **internal oblique** until it **pierces** the aponeurosis of **both obliques**[Q] just above the external ring	• Divides into two branches – **Genital branch** of genitofemoral nerve **enters** the **inguinal canal** at **deep ring** and **supplies**[Q] **cremaster** and **scrotal skin**
• It **emerges from superficial** inguinal **ring** to **supply skin of**: – **Proximo-medial skin** of **thigh**[Q] – **Skin** over **penile root**[Q] – **Upper part** of **scrotum**[Q]	• It divides into two branches. – **Lateral cutaneous** supplies **posterolateral gluteal skin**[Q] – **Anterior cutaneous** supplies **suprapubic skin**[Q]	– **Femoral branch** of genitofemoral nerve **passes behind** the **inguinal ligament**, enters femoral sheath lateral to femoral artery, pierces the anterior layer of femoral sheath and fascia lata and **supplies** the **skin anterior** to **upper part of femoral triangle**[Q].

26. Ans. a Multilayered repair of inguinal canal *(Ref: Sabiston 19/e p1121; Schwartz 10/e p1495, 1506-1507, 9/e p1321; Bailey 26/e p955-956, 25/e p973; Schackelford 7/e p575)*

Shouldice Repair

- Primary tenets of the procedure involve **extensive dissection** and **reconstruction of inguinal canal anatomy**[Q].
- The use of a **continuous suture in multiple layers** resulted in the **dual advantage of distributing tension** over several layers and **preventing subsequent herniation** between interrupted sutures[Q].
- Consists of division and **double breasting** of the **transversalis fascia**[Q]

27. Ans. None *(Ref: Sabiston 19/e p1121; Schwartz 9/e p1320-1322; Bailey 26/e p957, 25/e p973; Schackelford 7/e p573-576)*

- **Bassini's repair:** A **triple-layer repair** is then performed to restore integrity to the floor. The **medial tissues**, including the **internal oblique**, **transversus abdominis** muscle and **transversalis fascia**, are **fixed to the shelving edge of the inguinal ligament** and **pubic periosteum** with interrupted sutures (**Inguinal ligament** is **sutured to conjoint tendon**[Q]).
- **Shouldice repair** leads to **posterior wall strengthening**[Q]
- The **advantage of the McVay** (Cooper's ligament) **repair** is the ability to **address both inguinal** and **femoral canal defects**[Q].

28. Ans. b. Indirect inguinal hernia

Complications of Groin Hernia Repairs	
• **Recurrence** • Chronic groin pain • **Seroma** • Hematoma • **Ischemic orchitis** • **Testicular atrophy**	• Bladder injury • Wound infection • **Osteitis pubis** • Prosthetic complications (Contraction, Erosion, Infection)

COMPLICATIONS OF HERNIA

29. Ans. d. Correction of hypovolemia, e. Prepare OT for urgent surgery *(Ref: Sabiston 19/e p1127; Schwartz 10/e p1634-1635, 9/e p1331-1332; Bailey 26/e p950, 25/e p970-971, 976)*

Strangulated Inguinal Hernia

- **Indirect inguinal hernias strangulate more commonly**, the direct variety not so often because of the wide neck of the sac.
- Strangulation occurs **more often in patients** who have **worn a truss for a long time** and in those with a partially reducible or an irreducible hernia.

- **MC constricting agent**: **Neck of the sac**[Q] >External inguinal ring in children >Adhesions within the sac (rarely).
- **MC contents: Small intestine**[Q] **>Omentum**

- It is **rare for** the **large intestine to become strangulated in** an **inguinal hernia**, even when the hernia is of the sliding variety.

Strangulation During Infancy

- Incidence of strangulation in infancy is 4% and the **ratio of girls to boys** is **5:1.**
- **More frequently**, the **hernia is irreducible** but not strangulated.
- **In most cases** of **strangulated inguinal hernia** occurring **in female infants**, the **content of the sac** is **an ovary** or an **ovary plus its fallopian tube**[Q].

Diagnosis

- **Diagnosis of strangulation** is made **on clinical grounds.**

Diagnosis

- **Diagnosis of strangulation** is made **on clinical grounds.**

Clinical features of Strangulated Inguinal Hernia

- In addition to patient having developed an **irreducible hernia** and an **intestinal obstruction**, patient develops **sudden pain**, at **first situated over hernia**, followed by **generalized abdominal pain.**
- The **hernia** is **tense** and **extremely tender**[Q].
- The **overlying skin** may be **discolored** with a **reddish** or **bluish tinge**[Q].
- There is **no expansile cough impulse**[Q].

Treatment

- **Vigorous resuscitation** with intravenous fluids, **nasogastric aspiration** and **antibiotics** is **essential** followed by **emergency operation**[Q].
- **Inguinal herniotomy for strangulation:**
  - An **incision** is made **over the most prominent part** of the swelling.
    - **Each layer covering** the **anterior surface** of the body of the sac "**near fundus**"[Q] is **incised** and, if possible, stripped off the sac.
    - The sac is then incised and **any fluid**, which may be **highly infective**, **drained effectively**[Q].
- **Devitalised omentum** is **excised** after being securely ligated.
- **Viable intestine** is **returned to** the **peritoneal cavity**[Q].
- **Doubtfully viable** and **gangrenous intestine** is **excised**[Q].
    - If the **incision** has been **soiled** or **gangrenous bowel resected**[Q], prosthetic mesh should not be used[Q].
    - **Biosynthetic meshes** made **from collagen** or **dermis** are totally absorbed, are more suited to use in a contaminated environment[Q].

30. Ans. d. Immediate surgery, e. IV fluids

31. Ans. a. Aspiration of the sac for diagnosis, b. X-ray abdomen, c. USG abdomen

32. Ans. c. Fundus **33. Ans. b. Immediate surgery** **34. Ans. b. Tenderness**

FEMORAL HERNIA

35. Ans. b. Pregnancy is common cause *(Ref: Sabiston 19/e p1126; Schwartz 10/e p1504, 9/e p1312, 1332; Bailey 26/e p959-961, 25/e p977-980; Schackelford 7/e p547-554)*

Femoral Hernia

- Femoral hernia is the **3rd MC type of primary hernia**.
- Accounts for **20% of hernias in women**[Q] and **5% in men**.
- **More common** in **multipara**[Q]
- **More common** on **right side; Bilateral** in **20%**[Q]
    - It **cannot be controlled by a truss**[Q]
    - Of all hernias it is the **most liable to become strangulated**[Q] because of:
      - **Narrowness of the neck** of the sac[Q]
      - **Rigidity of** the **femoral ring**[Q]
    - **Strangulation** is the **initial presentation** of **40%** of femoral hernias[Q]
    - Should be **operated** on **as soon as possible**[Q]

- It **cannot be controlled by a truss**[Q]
- Of all hernias it is the **most liable to become strangulated**[Q] because of:
  - **Narrowness of the neck** of the sac[Q]
  - **Rigidity of** the **femoral ring**[Q]
- **Strangulation** is the **initial presentation** of **40%** of femoral hernias[Q]
- Should be **operated** on **as soon as possible**[Q]

Anatomy

- **Femoral canal** occupies the **most medial compartment** of the **femoral sheath** and **extends from femoral ring** to **saphenous opening**[Q].
- **Femoral canal** is **1.25 cm long** and **1.25 cm wide at its base**[Q], which is directed upwards.
- Femoral canal **contains fat, lymphatic vessels** and **lymph node of Cloquet**[Q].

Boundaries of Femoral Ring

- **Anteriorly** by the **inguinal ligament**[Q]
- **Posteriorly** by Astley **Cooper's** (iliopectineal) **ligament**, **pubic bone** and **pectineus fascia**[Q]
- **Medially** by **Gimbernat's** (lacunar) **ligament**[Q], which is also prolonged along the iliopectineal line, as Astley Cooper's ligament
- **Laterally** by a **thin septum separating** it from the **femoral vein**[Q]

Clinical Features

- **Rare before puberty**
- Prevalence rises between **20-40 years**[Q] of age and this continues to old age.
- A small femoral hernia may be unnoticed by the patient or disregarded for years, perhaps **until the day it strangulates**[Q].
- **Mass** or **bulge below** and **lateral to pubic tubercle**[Q]

Treatment

- **Low inguinal** operation (**Lockwood**[Q])
- **Inguinal** operation (**Lotheissen**[Q])
- **High inguinal** operation (**McEvedy**[Q])
- Midline Abdominal Extraperitoneal Femoral Hernioplasty **(Henry Procedure**[Q]**):** This is now considered as the **procedure of choice**; does not damage the transversalis fascial floor; reducing the risk of a subsequent inguinal hernia.

36. **Ans. d. Femoral vein**
37. **Ans. a. Lateral and below**
38. **Ans. a. Low inguinal operation**
39. **Ans. a. Femoral hernia**
40. **Ans. c. Lacunar ligament**
41. **Ans. d. McVay repair** *(Ref: Schwartz 9/e p2514)*

    McVay repair closes the femoral space, is effective for femoral hernia.
42. **Ans. a Cloquet's hernia** *(Ref: Bailey 25/e p978-979)*

Variants of Femoral Hernia	
Laugier's femoral hernia[Q]	• Hernia through a **gap in** the **lacunar** (Gimbernats) **ligament** • Diagnosis is based on **unusual medial position** of a **small femoral hernia sac** • **Always strangulated**
Narath's femoral hernia[Q]	• Occurs in patients with **congenital dislocation of hip** • Due to **lateral displacement of** the **psoas muscle** • Hernia lies hidden **behind** the **femoral vessels**
Cloquet's hernia[Q]	• **Sac lies under** the **pectineus** fascia

43. **Ans. a Lacunar ligament**
44. **Ans. a. Below and lateral to pubic tubercle**

SPIGELIAN HERNIA

45. **Ans. a. Usually occurs above arcuate line** *(Ref: Sabiston 19/e p1135; Bailey 26/e p966, 25/e p983; Schackelford 7/e p609-610)*

Spigelian Hernia

- Spigelian hernia **occurs through** the **spigelian fascia**[Q]
- **Spigelian fascia** is composed of **aponeurotic layer** between **rectus muscle** medially and **semilunar line** laterally[Q].

- Nearly **all spigelian hernias occur at** or **below** the **arcuate line**[Q].
- **Absence of posterior rectus fascia** may **contribute to** an **inherent weakness** in this area[Q].
- These hernias are **often interparietal**, with the **hernia sac dissecting posterior** to the **external oblique aponeurosis**[Q].
- **Spigelian hernia** sac **always penetrates** the **spigelian aponeurosis** and **usually penetrates** the **internal oblique** musculature[Q].

Clinical Features

- **Most spigelian hernias** are **small** (**1-2 cm** in diameter)
- Develop during **4** to **7 decades** of life.
- Patients often present with **localized pain** in the area **without a bulge** because the **hernia lies beneath** the intact **external oblique aponeurosis**[Q].

Diagnosis

- **Ultrasound** or **CT** of the abdomen can be **useful to establish** the **diagnosis**[Q].

Treatment

- A spigelian hernia is **repaired** because of the **risk for incarceration**[Q] associated with its **relatively narrow neck.**
- **Defect** is **closed transversely by simple suture repair**[Q] of the transversus abdominis and internal oblique muscles, followed by closure of the external oblique aponeurosis.
- **Larger defects** are repaired using a **mesh prosthesis**[Q].
- **Recurrence** is **uncommon**[Q].

46. **Ans. b. Subumbilical region**

47. **Ans. b. Lateral border of rectus abdominis**

48. **Ans. d. Hernia occurring at the level of arcuate line**

49. **Ans. b. Internal oblique**

SLIDING HERNIA

50. **Ans. d. Sigmoid colon** *(Ref: Sabiston 19/e p1126; Bailey 25/e p977; Schackelford 7/e p566)*

Sliding Hernia (Hernia en Glissade)

- Hernias in which **posterior wall of** the **sac** is **formed by a viscus**[Q]
- **Viscera** is **liable to be injured** if the **hernia sac** is **resected during surgery**[Q]
- **More common** on **left side**[Q]

Most Common Content
• **Left side**: **Sigmoid colon**[Q] and its mesentery (**MC**)
• **Right side**: **Cecum**[Q]

- **Other contents**: Appendix, urinary bladder, uterus, fallopian tube, ovary or ureter
- **Primary danger**: **Failure to recognize** the **visceral component** of the hernia sac **before injury to** the **bowel** or **bladder**[Q].

Clinical Features

- **Occurs almost exclusively in men**[Q].
- **More common** on the **left side**[Q]; **rarely bilateral**
- Patient is **nearly always over 40 years of age**, the **incidence rising with age**[Q].

- Occasionally, **large intestine is strangulated** in a **sliding hernia**; **more often, non-strangulated large intestine** is **present behind the sac containing strangulated small intestine**[Q].

Treatment

- **Operation** is indicated
- **Sliding hernia contents** are **reduced into the peritoneal cavity**, and **any excess hernia sac** is **ligated** and **divided**[Q].

- Sliding hernia is a cause of considerable discomfort, **impossible to control with a truss**[Q].

51. **Ans. b. Sliding hernia**

52. **Ans. b. Sigmoid colon**

53. **Ans. b. Barium-meal** *(Ref: CSDT 12/e p771)*

An **upper GI barium series (Barium meal)** is the preferred examination in the **investigation of sliding hiatus hernia.** In this question, sliding hernia means sliding hiatus hernia.

By the way, CSDT says "Finding a **segment of colon in** the **scrotum on barium enema** strongly suggests a **sliding hernia.**"

54. **Ans. c. Sliding hernia**

LUMBAR HERNIA

55. Ans. d. More common on right side *(Ref: Sabiston 19/e p1137; Schwartz 10/e p1742, 9/e p1273; Bailey 26/e p966-967, 25/e p983-984; Schackelford 7/e p613-616)*

Lumbar Hernia

- Lumbar hernias can be either **congenital (20%)** or **acquired (80%)**Q
- **Occur in** the **lumbar region** of the **posterior abdominal wall**Q.
- **More common** on **left side,** in **men**Q

> - Hernias through the **superior lumbar triangle** (**Grynfeltt's triangle**) are **more common**Q.
> - **Grynfeltt's triangle** is bounded by the **12th rib, paraspinal muscles** and **internal oblique muscle**Q.

- **Less common** are hernias through the **inferior lumbar triangle** (**Petit's triangle**)Q
- **Petit's triangle** is bounded by the **iliac crest, latissimus dorsi muscle**, and **external oblique muscle**Q.
- **Weakness of** the **lumbodorsal fascia** through either of these areas results in **progressive protrusion of extraperitoneal fat** and a **hernia sac**Q.

Clinical Features

- **MC presentation**: **Unilateral bulge** in the flankQ.
- Lumbar hernias are **not prone to incarceration**Q.

Treatment

- **Lumbar hernia** be **repaired** at the **time of discovery**; the exception is in **newborns** and be undertaken after a child is **6 months of age**Q.
- **Dowd's operation** is done for **lumbar hernia**Q.
- **Repair** is **best done by placement of prosthetic mesh**, which can be sutured to the margins of the herniaQ.

OBTURATOR HERNIA

56. Ans. b. Common in female, c. Chronic constipation risk factor, d. Surgical treatment should be done, e. May present with intestinal obstruction *(Ref: Sabiston 19/e p1137; Bailey 26/e p967-968, 25/e p984; Schackelford 7/e p616-618)*

Obturator Hernia

- Also known as **skinny old lady hernia** or **French hernia**Q.
- **Thin, elderly**, and **debilitated women** are at greatest risk
- More common in **female** secondary to the **larger** and **more oblique** design of the **obturator canal**Q.
- Occur more frequently on the **right** in **female** patients and on the **left** in **male** patientsQ.
- **Bilateral** in **6%** cases.

Predisposing Factors	
• Women with **wider pelvis** and **more triangular obturator canal**Q • **Malnutrition**Q	• Chronic constipation, COPD, ascites, kyphoscoliosisQ • MultiparityQ • Age **70-79 years**Q

Clinical Features

- Patients present **most commonly with intestinal obstruction**Q (the **jejunum** or **ileum** within the hernial sac).

Howship-Romberg SignQ	• **Pain radiating down** the **medial thigh to** the **knee** due to **compression of** the **obturator nerve** (anterior division) by the hernial sac • **Pathognomonic for** an **incarcerated hernia** • Present in **25-50%** cases
Hannington Kiff signQ	• **Absence of** the **obturator reflex** in the thigh **due to compression of** the **obturator nerve.**

Treatment

- **Operation** is **indicated**
- **Posterior approach** (either open or laparoscopic) **is preferred**Q.

57. Ans. b. Obturator hernia

PARADUODENAL HERNIA

58. Ans. d. Common on right side *(Ref: Sabiston 19/e p1106; Schackelford 7/e p954-955)*

Paraduodenal Hernia

- It is the **MC** variety of **congenital internal hernia**[Q]
- Nearly **75%** are **left-sided, more common** in **male**s

> - Herniation into the **left Paraduodenal fossa** (**Fossa of Landzert**[Q]) **occurs more frequently** than herniation into the **right fossa** (**Fossa of Kolb**[Q]).

- **Small bowel herniate** through the **vascular arch of Treitz** formed by the **inferior mesenteric vein** and the **ascending branch of left colic artery**[Q]
- **Herniated bowel** is **posterior** to the **mesocolon**; with the **afferent limb** being the **4 part of** the **duodenum** and **efferent limb** being the **terminal ileum**[Q].

Clinical Features

- Occur between **4 to 5 decade**

> - **Postprandial pain with postural variation** is a **characteristic symptom**[Q]

- Inferior mesenteric vein compression in left PDH may lead to **hemorrhoids.**
- Commonly PDH manifest as **acute intestinal obstruction.** Life time risk of **incarceration** is **50%.**

Diagnosis

- On barium study the **small bowel** is **clustered** to the **left of the midline** with a well-circumscribed edge that corresponds to the hernial sac.
- However **all radiologic studies may be normal** especially in **chronic intermittent cases**, because hernia may **reduce spontaneously**. These investigations are **most often diagnostic** during an **acute episode**[Q].

Treatment

- **Reduction of hernia sac** and **closure of the defect**[Q] or incision of the hernia sac

59. Ans. d. More common on right side

60. Ans. a. Stammer's hernia *(Ref: www.ncbi.nlm.nih.gov› Ann Surg › v.177(5); May 1973)*

Stammer's Hernia

- **Internal hernia** occurring **through window in** the **transverse mesocolon after** retrocolic **gastrojejunostomy** is known as Stammer's hernia[Q].
- Stammer's Hernia **can lead to colonic ischemia**

UMBILICAL HERNIA

61. Ans. b. Amniotic membrane *(Ref: Sabiston 19/e p1855-1856; Schwartz 10/e p1455,1631, 9/e p1442-1443; Bailey 26/e p121, 25/e p980-981)*

Abdominal Wall Defects

Omphalocele	Gastroschisis
• **Intestine fails to return**, abdominal **contents protruding** directly **through** the **umbilical ring** with a **sac covering** the **bowel**[Q] • **Abdominal contents** are **covered with peritoneum** on the **inside** and **amnion** on the **outside**[Q] • **Size of** the **defect** is **variable**, ranging from a small opening through which a **small portion of** the **intestine** is herniated to a **large one** in which the **entire bowel** and **liver** are included[Q]. • **Chromosomal abnormalities**[Q] are present in roughly **30%** of infants, including **trisomies 13, 18** and **21**[Q]. • **More than half** of infants have other **major** or **minor malformations**, with **cardiac being** the **most common**[Q], followed by musculoskeletal, gastrointestinal, and genitourinary. • Close association with **Beckwith-Wiedemann syndrome**[Q] (omphalocele, hyperinsulinemia, and macroglossia). • **Poor prognosis**[Q] due to **associated abnormalities.**	• **Fetal gut** is **extruded** through a defect in the abdominal wall • **Defect** is **always on** the **right side of** the **umbilical ring** with an **intact umbilical cord**[Q] • **Covering sac** is **absent**[Q] • **Risk for associated anomalies** is **low**[Q]. • **Association with intestinal atresia** in up to 15%. • Atresias may involve the **small** and **large intestine**[Q]. • Babies are more often **small for gestational age** and **born to mothers with** a history of **cigarette, alcohol**, and **recreational drug use** and intake of **aspirin, ibuprofen**, and **pseudoephedrine** during the first trimester[Q] • **Increased** risk in **mothers younger than 20 years**[Q]. • In patients with gastroschisis, the **intestine** is often **thickened, edematous**, **matted together,** and **foreshortened**[Q]. • **Good prognosis**[Q]

62. **Ans. c. Failure of gut to return to the body cavity from the physiological herniation**

63. **Ans. b. 2.5** *(Ref: pubmedcentralcanada.ca/e ppmcc/articles/.../annrcse01490-0010.pdf)*

Moore's classification of omphalocele	
Type	**Diameter of Defect**
Type 1	**<2.5 cm**[Q]
Type 2	**2.5 to 5 cm**
Type 3	**>5 cm**

64. **Ans. a. Birth** *(Ref: Sabiston 19/e p1855; Schwartz 10/e p1453,1631,1632, 9/e p1442-1443; Bailey 26/e p121, 25/e p980)*

Exomphalos (Omphalocele)

- **Incidence**: **1 in 5000**[Q] live births
- Due to failure of all or part of the midgut to return to the coelom during early fetal life.
- **Sac** is very thin, consists an **outer layer of amniotic membrane** and **inner layer** of **peritoneum**[Q].
  - **In smaller defects** a **single loop of intestine** may not be obvious[Q]
  - **In large defects**, the **liver, spleen, stomach, pancreas, colon** or **bladder** may be seen through the membrane.
- **Intestine** lies **freely mobile within** the **intact sac**[Q] without evidence of adhesions or inflammation.
- In contrast, the **liver has dense adhesions to the sac**[Q]

Treatment

- **Small defects** may be **closed primarily soon after birth**[Q].

65. **Ans. d. Umbilical hernia** *(Ref: Sabiston 19/e p1130-1131; Schwartz 10/e p1455,1631, 9/e p1441-1442; Bailey 26/961-963, 25/e p980-981; Schackelford 7/e p599-600)*

Umbilical Hernia

- Umbilical hernias **in infants** are **congenital**[Q] and are quite common.
- **Strong predisposition** in individuals of **African descent**.
- **Close spontaneously in most cases** by the **age of 2 years**[Q].
- **Complications** are **unusual**[Q]
- Those that **persist after the age of 5 years** are frequently **repaired surgically**[Q]

Indications of Surgery in Umbilical Hernia	
• Persisting **beyond 5 years**[Q] • **Symptomatic**[Q] • **Strangulated**[Q]	• Defect **size >2 cm**[Q] • **Progressive enlarging**[Q] hernia after the age 1-2 years

Treatment

- **Small defects**: **Closed primarily**[Q]
- **Defects >3 cm**: **Closed using prosthetic mesh**[Q].

Mayo's repair
• **Vest-over-pants repair** proposed by Mayo employs **imbrication of superior** and **inferior fascial edges**[Q]. • Because of **increased tension on** the **repair** and **recurrence rates** of 30%, it is **rarely performed today**[Q].

66. **Ans. d. All of the above**

67. **Ans. b. Gastroschisis is associated with multiple anomalies**

68. **Ans. b. Direct inguinal hernia**

69. **Ans. c. 1 in 5000**

70. **Ans. d. A herniation of abdominal contents through the body wall**

71. **Ans. c. 4 cm**

Omphalocele/exomphalos: Congenital herniation of abdominal contents at the umbilicus (i.e. into the umbilical cord). Occasionally divided into:

- **<4 cm—Umbilical cord hernia**
- **> 4 cm—Omphalocele**

EPIGASTRIC HERNIA

72. **Ans. b. Fatty hernia of the linea alba** *(Ref: Sabiston 19/e p1131; Schwartz 10/e p1455, 9/e p1273; Bailey 26/e p963, 25/e p982-983; Schackelford 7/e p597)*

Epigastric Hernia (Fatty Hernia of the Linea Alba, Epigastric Lipoma)

- About 3% to 5% of the population has epigastric hernias.
- **More common** in **men**Q.
- **Located between** the **xiphoid process** and **umbilicus**Q

> - **Multiple in** up to **20%** of patients, and **about 80%** are **just off**Q **the midline**.

- Usually **within 5 to 6 cm of** the **umbilicus**.
- **Defects** are **small** and often **produce pain out of proportion** to their size owing to **incarceration of preperitoneal fat**Q.

Clinical Features

- **Majority** of these hernias are **asymptomatic**
- Sometimes such a hernia gives rise to **attacks of local pain**. This may be because the **fatty contents become nipped sufficiently** to produce **partial strangulation**Q.

> - **Referred pain**: It is not uncommon to find that the patient, who may not have noticed the hernia, complains of **pain suggestive of a peptic ulcer**Q.

Treatment

- Repair usually consists of **excision of** the **incarcerated preperitoneal tissue** and **simple closure of the fascial defect**Q.

73. **Ans. c. Located above the umbilicus and on either side**

- **Epigastric hernias are multiple in** up to **20%** of patients, and **about 80%** are **just off the midline**Q.

RICHTER'S HERNIA

74. **Ans. a. Richter's hernia** *(Ref: Bailey 26/e p950, 25/e p970)*

Richter's Hernia

- Richter's hernia is a hernia in which the **sac contains only a portion of** the **circumference** of the **intestine**Q (usually small intestine).
- It usually **complicates femoral** and, rarely, obturator hernias.

Strangulated Richter's hernia
• **Operation** is frequently **delayed** because the **clinical features mimic gastroenteritis**Q.
• The **local signs of strangulation** are often **not obvious**Q
• Patient may not vomit and, although colicky pain is present
• **Bowels** are often **opened normally** or there **may be diarrhea**Q
• **Absolute constipation** is **delayed** until paralytic ileus supervenes.
• For these reasons, **gangrene of the knuckle of bowel** and **perforation** have often **occurred before operation** is undertakenQ.

75. **Ans. c. Involves only a portion of the circumference of the bowel**

76. **Ans. c. Richter's hernia**

LITTRE'S HERNIA

77. **Ans. b. Meckel's diverticulum** *(Ref: Bailey 26/e p968, 25/e p969)*

78. **Ans. c. Littre's hernia**

Littre's Hernia

- **Littre's hernia** is the **protrusion of a Meckel's diverticulum**Q through a potential abdominal opening.

MISCELLANEOUS HERNIA

79. **Ans. a. In children, indirect inguinal hernia is treated medically, b. In Richter's hernia, absolute constipation seen, d. Deep inguinal ring is lateral and above the public tubercle** *(Ref: BDC 4/e pvol II/e p208)*

- **Surgery** is the **only treatment option for hernia in any age group**, there is no role of medical treatment.
- **Deep ring** is **situated 1.25 cm above** the **inguinal ligament**, **midway between** the **symphysis pubis** and **ASIS**[Q].
- **Deep ring** is an **opening in** the **fascia transversalis**[Q].
- **Superficial ring** lies **immediately above the pubic tubercle**, as a **triangular gap in** the **external oblique aponeurosis**[Q].
- **Clinical features** mimic **gastroenteritis** in **strangulated Richter's hernia**[Q].

80. Ans. a. External abdominal hernia is common, b. Direct hernia usually acquired, c. (Strangulation is common in femoral hernia), d. Direct hernia is acquired in old age, e. TOC for indirect inguinal hernia is surgery

81. Ans. a. Direct hernias are usually acquired, b. Femoral is most common hernia to strangulate, c. External abdominal hernia are most common, e. Treatment of choice for indirect inguinal hernia is surgery

82. Ans. a. Absorbable sutures, c. (Missed sac), d. Infection *(Ref: Bailey 25/e p977; http://www.medscape.org/viewarticle/420354_7)*

Recurrent Hernias

- **Reported recurrence rates** vary between **0.2% and 15%** depending on the technique employed.
- Only **50% of recurrences** will become apparent **within 2 years**[Q].
- Causes of **recurrent inguinal hernias**, especially those that appear in the **first postoperative year**, are usually due to **errors of observation**, **judgment,** or **surgical technique**[Q].

Causes of Recurrence	
• **Failure to perform high ligation** or **reduce the peritoneal sac** with an indirect hernia[Q] • **Inadequate closure** of the **internal ring**[Q] • Missed sac[Q]	• **Metabolic problems** of the tissues in the groin[Q] • **Infection**[Q] that destroys the repair • **Continuing failure** of the floor of the canal[Q]

Dual (Saddle-bag or Pantaloon) Hernia

- This type of hernia **consists of two sacs** that **straddle the inferior epigastric artery, one sac being medial** and the **other lateral** to this vessel.
- The condition is not rare and is a **cause of recurrence**, one of the sacs having been overlooked at the time of operation.

83. Ans. a. Gibbon's

Gibbon's hernia	• Hernia with hydrocele[Q]
Berger's hernia	• **Hernia** into **pouch** of **Douglas**[Q]
Beclard's hernia	• **Femoral hernia** through **opening of saphenous vein**[Q]
Amyand's hernia	• Inguinal hernia **containing appendix**[Q]
Ogilive's hernia	• Hernia through the **defect in conjoint tendon** just lateral to where it inserts with the rectus sheath[Q]
Stammer's hernia	• **Internal hernia** occurring **through window in** the **transverse mesocolon after** retrocolic **gastrojejunostomy**[Q]
Peterson hernia	• Hernia **under Roux limb** after **Roux-en-Y gastric bypass**[Q]

84. Ans. d. Berger's **85. Ans. b. Eduardo Bassini** **86. Ans. a. Sliding**

INCISIONAL HERNIA

87. Ans. d. Old age *(Ref: Sabiston 19/e p1131-1133; Schwartz 10/e p1454-1455, 9/e p1273; Bailey 26/e p964-966,; Schackelford 7/e p602-608)*

Old age is a risk factor for incisional hernia, but not for wound dehiscence.

Incisional Hernia

- **Postoperative ventral abdominal wall hernia** or incisional hernia is the result of a **failure of fascial tissues to heal** and **close** following laparotomy[Q].
- As the approximated **fascial tissue separates**, the **bowel** and **omentum herniates** through the opening, **covered by a peritoneal sac**[Q].
  - **Highest incidence** is seen with **midline** vertical **incisions**[Q].
  - **Incidence** seems to be **lower in smaller incision**s
- Modern rates of incisional hernia range from **2-11%.**
- **One-third** of these hernias will present **5-10 years postoperatively**.

Risk Factors for Incisional Hernia		
Surgery Related	**Surgeon Related**	**Patient Related**
• **Emergency surgery**[Q] • **Wound infection**[Q] • **Midline vertical incisions**[Q]	• Wounds closed under **excessive tension**[Q] • **Poor technique**[Q] • Use of **absorbable sutures**[Q]	• **Advanced age, malnutrition**[Q] • **Ascites, Steroid use**[Q] • **Diabetes, obesity**[Q] • **Smoking, coughing**[Q] • **Vomiting** and **distension**[Q]

Clinical Features

- **Bulge** in the abdominal wall originating deep to the skin scar.
- **Symptoms aggravated** by **coughing** or **straining** as the hernia contents protrude through the abdominal wall defect.
- In **large ventral hernias**, the **skin** may present with **ischemic** or **pressure necrosis** leading to **frank ulceration**[Q].

Treatment

- **Operative repair**: Primary **suture repair** of the hernia, **open repair** with prosthetic mesh, and **laparoscopic incisional hernia repair**[Q].
  - Laparoscopic incisional hernia repair (IPOM- Intraperitoneal onlay mesh repair) has the lowest rate of recurrence[Q]
- **Major complication** from **open, nonmesh incisional hernia repair**: **Recurrence**[Q]
- **Recurrence rates** vary between **10-50%**, typically reduced by 750% with the use of prosthetic mesh
- **Risk of recurrence** is likely **related to the tension** placed on the repair in large hernias
- Incisional hernias with a **diameter >4 cm** should be **repaired with mesh**[Q].

88. **Ans. a. Incisional hernia**
89. **Ans. d. Caused by use of local anesthesia**
90. **Ans. d. Inusional**

HERNIA AND ABDOMINAL WALL ANATOMY

91. **Ans. d. Ilioinguinal nerve**
92. **Ans. c. Inferior epigastric artery** *(Ref: BDC 4/e pvol II/e p208)*

Deep ring lies immediately lateral to inferior epigastric artery, so artery is being in danger of getting damaged while releasing the constriction at the deep ring.

Openings in Inguinal Canal

Superficial Inguinal Ring	Deep Inguinal Ring
• **Triangular defect in the external oblique aponeurosis**[Q]. • Lies **immediately above** the **pubic tubercle**[Q]	• **Defect in** the **fascia transversalis**[Q] • **Situated 1.25 cm above** the **inguinal ligament**, **midway between** the **symphysis pubis** and **ASIS**[Q]. • Lies **immediately lateral to inferior epigastric artery**[Q]

93. **Ans. b. Incising the external oblique aponeurosis**
94. **Ans. d. Inferior epigastric artery** *(Ref: BDC 5/e pvol II/e p224)*

Structures Passing through Inguinal Canal

Males	Females
• **Spermatic cord**[Q] • **Ilioinguinal nerve**[Q]	• **Round ligament of uterus**[Q] (accompanied by **lymphatics** and **remains** of **processus vaginalis**[Q]) • **Ilioinguinal nerve**[Q]

Spermatic Cord

Constituents	Covering
• Remains of **processus vaginalis**[Q] • **Ductus deferens**[Q] • **Artery** of **ductus deferens**, **testicular artery**, **cremasteric artery** • **Pampiniform plexus of veins**[Q] • Lymphatics • **Genital branch** of **genitofemoral nerve** • Sympathetic nerves around artery of ductus deferens	• **From within out wards:** • **Internal spermatic fascia:** Derived from **fascia transversalis**[Q] • **Cremasteric fascia:** Derived from **internal oblique** and **transverses abdominis**[Q] • **External spermatic Fascia:** Derived from **external oblique aponeurosis**[Q]

95. Ans. a. Defect in fascia transversalis

96. Ans. B Genitofemoral nerve *(Ref: BDC 4/e pvol-II/e p205-206)*

Structure contained within rectus sheath are **rectus abdominis, pyramidal muscle, superior and inferior epigastric vessels** and terminal parts of the lower six thoracic nerves (lower **five intercostals** and **subcostal nerves**[Q]).

Rectus Sheath

- An **aponeurotic sheath covering** the **rectus abdominis muscle**[Q]

Anterior Wall	Posterior wall
• **Complete**, cover the muscle from end to end, with **variable composition**[Q] • **Firmly adherent** to the tendinous intersections of the rectus muscle[Q]	• **Incomplete**[Q], being **deficient**[Q] above the costal margin and below the arcuate line • **Composition is uniform** and is **free** from the rectus muscle[Q]

Formation of Rectus Sheath

Above Costal Margin	Between Costal Margin and Arcuate line	Below Arcuate Line
• **Anterior wall**: **External oblique** aponeurosis[Q] • **Posterior wall**: deficient, rectus muscle rest directly on the 5, 6, 7 costal cartilages[Q]	• **Anterior wall**: **External oblique aponeurosis** and **anterior lamina** of aponeurosis of **internal oblique**[Q] • **Posterior wall**: **Posterior lamina** of aponeurosis of **internal oblique** and aponeurosis of **transversus muscle**[Q]	• **Anterior wall**: Aponeurosis of **all three flat muscles** of the abdomen[Q] • **Posterior wall**: **Deficient**, the rectus muscle rests on the fascia transversalis[Q]

Contents of Rectus Sheath

Muscles	Vessels	Nerves
• **Rectus abdominis**[Q] is **chief** and **largest content** • **Pyramidalis**[Q] lies in front of the lower part of rectus abdominis	• **Superior epigastric vessels**[Q] • **Inferior epigastric vessels**[Q]	• Terminal parts of the lower six thoracic nerves (lower **five intercostals** and **subcostal nerves**[Q])

97. Ans. a. Xiphoid process

98. Ans. a. It is an intermuscular canal, b. Superficial inguinal ring is situated superior and lateral to pubic tubercles, d. In male vas deference passes through it *(Ref: BDC 4/e pvol-II/e p208-209)*

Inguinal Canal

- Inguinal canal is **4 cm long intermuscular canal**[Q], directed downward, forward and medially
- Extends from **deep inguinal ring** to **superficial inguinal ring**

Inguinal Canal

Boundaries	Openings	Contents
Anterior wall: • **External oblique aponeurosis**[Q] (in entire length) • Internal oblique muscle[Q] (in lateral third)	• **Deep** (internal) inguinal **ring**: An oval opening in **fascia transversalis,** situated **1.25 cm above mid inguinal point**[Q] • **Superficial** (external) inguinal **ring**: Triangular defect in aponeurosis of **external oblique muscle**[Q] situated **1cm above** and **lateral** to **pubic tubercle**	• **Spermatic cord** in **males**[Q] • **Round ligament** in **females**[Q] • **Ilioinguinal nerve** in both[Q]
Posterior Wall: • **Fascia transversalis**[Q] (in entire length) • **Conjoint tendon**[Q] (the common tendon of insertion of **internal oblique and transversus abdominis**)		
Inferior wall / floor: • **Inguinal ligament**[Q] (rolled under inferior edge of aponeurosis of external oblique muscle) • **Lacunar ligament**[Q] at medial end		
Superior wall / roof: • **Internal oblique**[Q] • **Transversus abdominis**[Q]		

99. Ans. c. Deep ring is an opening in transversalis abdominis

100. Ans. d. Lacunar ligament

CONJOINT TENDON

- Conjoint tendon is formed by **fusion of the lowest aponeurotic fibers of the internal oblique and transverses abdominis**[Q].
- It is attached to the pubic crest and to the medial part of pectin pubis.
- Medially, it is continuous with the anterior wall of rectus sheath. Laterally, it is usually free[Q].
- **The conjoint tendon strengthens the abdominal wall at the site, where it is weakened by superficial inguinal ring**[Q].

101. Ans. d. Transversalis fascia

102. Ans. a. Linea Alba is poorly formed, c. External oblique poorly formed

103. Ans. a. Superficial inguinal ring is an opening in external oblique aponeurosis, c. Posterior wall is formed by transversalis fascia and conjoined tendon

104. Ans. a. 1.25 cm

105. Ans. a. Pylorus of the stomach

TRANSPYLORIC PLANE

- An **upper transverse line** also known as **Addison's Plane**[Q]
- **Located halfway** between the **jugular notch** and **upper border** of the **pubic symphysis**[Q]
- It is also said to lie roughly a hand's breadth beneath the xiphoid process of the human sternum.
- The plane in most cases **cuts through:** the
- **Pylorus of** the **stomach**[Q]
- **Tips of** the **9 costal cartilages**[Q]
- **Lower border of** the **L1** vertebra[Q]

106. Ans. a. Poupart's ligament, b. Lacunar ligament, c. Superficial inguinal ring *(Ref: BDC 4/e pvol-II/208-209)*

- **Inguinal ligament** is also known as **Poupart's ligament**[Q].
- **Lacunar ligament** (also named **Gimbernat's ligament**) is a ligament in the inguinal region that **connects** the **inguinal ligament to** the **pectineal ligament** near the point where they both insert on the pubic tubercle[Q].
- **Cremaster muscle originates from** the **internal oblique muscle**[Q].

UMBILICAL ADENOMA

107. Ans. None *(Ref: Bailey 26/968, 25/e p986)*

Umbilical adenoma or Raspberry tumour

- **Commonly seen in infants** but only occasionally later in life[Q].
- Due to a **partially** (occasionally a completely) **unobliterated vitellointestinal duct**[Q].
- **Mucosa prolapsing through** the **umbilicus** gives rise to a **raspberry-like tumour**[Q]
- **Moist** and **tends to bleed**

Treatment

- **Pedunculated tumour**: A **ligature is tied around**[Q] it, in a few days, the polypus drops off.
- If tumour reappears after this procedure: **Umbilectomy**[Q]

108. Ans. c. Umbilical adenoma

109. Ans. d. Congenital

DESMOID TUMOR

110. Ans. c. Surgery *(Ref: Sabiston 19/e p1095; Schwartz 10/e p1485, 9/e p1299; Bailey 26/e p969, 25/e p990 Schackelford 7/e p974, 2035)*

Desmoid Tumor

- Tumor arising in the **musculoaponeurotic structures** of the abdominal wall, especially **below** the **level of** the **umbilicus**[Q].
- It is a **completely unencapsulated fibroma**[Q] and is **so hard** that it **creaks when** it is **cut**[Q].
- **Distribution: Extra-abdominal (60%), abdominal wall (25%), intra-abdominal (15%).**
- Some cases **recur repeatedly in spite of** apparently **adequate excision**[Q].
- About **80% of cases** occur **in women**[Q], many of whom have borne children

> - Occurs **occasionally in scars**[Q] of old hernial or other abdominal **operation wounds**.
> - **Surgical trauma**[Q]**: Important etiological factor**
> - **Estrogens stimulate**[Q] desmoid growth
> - Occur in cases of **FAP**[Q]

Pathology

- Tumour is composed of **fibrous tissue** containing **multinucleated plasmodial masses** resembling **foreign body giant cells**[Q].
- Usually of **very slow growth**, it **tends to infiltrate muscle** in the **immediate area**[Q].
- Eventually it **undergoes a myxomatous change** and it then **increases in size more rapidly**.
- **Metastasis does not occur**[Q], **no sarcomatous change**[Q]

Diagnosis

- **MRI** is **investigation of choice** for **extremity** and **abdominal wall desmoids**[Q].

Treatment

- **Wide local excision** (with **2 cm margin**) is **treatment of choice**[Q].
- **Surgery + Radiotherapy:** For **recurrent desmoid tumors**[Q]

111. Ans. e. Highly radiosensitive

112. Ans. b. Scar tissue

113. Ans. a. Surgery

114. Ans. b. Wide excision *(Ref: Devita 9/e p1573)*

- Devita says "In desmoid tumors, **post-operative radiation** is **not recommended** in patients **with negative margins**. **Residual tumor** from a primary lesion **does not invariably lead to treatment failure** and **adjuvant radiation may be omitted** as long as local progression would not cause significant morbidity."

115. Ans. a. Mostly females are affected

MISCELLANEOUS

116. Ans. b. 6 months of age *(Ref: Bailey 26/e p968, 25/e p985)*

Patent Vitellointestinal Duct

- The **resulting umbilical fistula discharges mucus**[Q] and, rarely, feces.
- A **patent vitellointestinal duct** should be **excised, together with** a **Meckel's diverticulum** if present, preferably when the child is about **6 months**[Q] old.

117. Ans. d. 3-6 weeks *(Ref: Bailey 26/e p968, 25/e p985)*

Omphalitis

- Incidence of an **infected umbilicus** is much higher in **communities that do not practice aseptic severance** of the umbilical cord.
- When the stump of the umbilical cord becomes inflamed, **antibiotic therapy** usually **localizes the inflammation.**
- By employing warm, moist dressings, the crusts separate, giving exit to pus.
- **Exuberant granulation tissue** requires a **touch of silver nitrate**.
- In more serious cases, infection is liable to spread along the **defunct hypogastric arteries** or **umbilical vein**.

> - **Jaundice in the newborn**: **Infection reaching** the **liver via** the **umbilical vein** may cause a stenosing intrahepatic cholangiolitis, appearing some **3-6 weeks after birth**Q.

118. Ans. a. Mucus

119. Ans. d. Herniotomy

120. Ans. b. Vicarious menstruation

121. Ans. c. Urachal fistula *(Ref: Bailey 26/e p968, 25/e p986)*

Patent Urachus

- A **patent urachus seldom reveals** itself **until maturity** or **even old age**Q.
- This is because the **contractions of** the **bladder commence at the apex** of the organ and **pass towards the base**Q.
- Because it opens into the apex of the bladder a **patent urachus is closed temporarily during micturition** and so the potential urinary stream from the bladder is cut off.
- Thus, the **fistula remains unobtrusive until a time when** the **organ is overfull**, usually due to **some form of obstruction**Q.

Treatment

- **Remove the obstruction**Q in the lower urinary tract.
- If the **leak continues** or a **cyst develops** in connection with the urachus: **Umbilectomy** and **excision of the urachus**Q

122. Ans. a. Urachal fistula **123. Ans. d. Umbilical hernia** **124. Ans. b. Leukocyte adhesion deficiency**

- **Leukocyte adhesion deficiency** is associated with **recurrent bacterial infection** and **impaired wound healing**Q.

125. Ans. b. Stoppa's preperitoneal repair *(Ref: Recent advances in surgery 10/e p166)*

Stoppa's Preperitoneal Repair

- In **Stoppa's preperitoneal repair**, the expanding intra-abdominal pressure holds the mesh in place without suture fixation.
- According to **Pascal's law,** any additional pressure exerted upon an enclosed fluid mass is transmitted equally in all directions.
- Use of large mesh extending 3-5 cm beyond the edge of defect in all sides **utilizes Pascal's law.**

126. Ans. a. Surgery should not be done unless patient becomes symptomatic *(Ref: Sabiston 19/e p1120-1126; Schwartz 10/e p1509, 9/e p1318-1331; Bailey 25/e p972-976; Schackelford 7/e p568-579)*

Sabiston says "**Most surgeons recommend operation on discovery of an inguinal hernia** because the natural history of a groin hernia is that of **progressive enlargement** and **weakening**, with the **potential for incarceration** and **strangulation."**

Bailey says " The **basic operation** is **inguinal herniotomy**, which entails dissectiong out and opening the hernial sac, reducing any content and then transfixing the neck of the sac and removing the remainder. It is employed either by itself or as the first step in a repair procedure (herniorrhaphy). By itself, it is **sufficient for** the **treatment of hernia in infants, adolescents** and **young adults**."

Non-absorbable mesh is **used in hernia surgery.**

Surgery can be done using laparoscopy (TEP or TAPP)

127. Ans. b. Taxis *(Ref: Schwartz 9/e p1331)*

IMPORTANT TOPICS

Maydl's Hernia (Hernia-in-W)

- Maydl's hernia is **rare.**
- The **strangulated loop of** the **W lies within** the **abdomen**, so **local tenderness** over the hernia **is not marked**Q.
- At operation, **two comparatively normal-looking loops** of **intestine** are **present in** the **sac**Q.

Relation of sac in Inguinal Hernia
• **Indirect Inguinal Hernia**: **Sac** is **anterolateral to cord structures**Q
• **Direct Inguinal Hernia**: **Sac** is **posterior to cord structures**Q.

Herniotomy	• Ligation of hernial sacQ
Herniorrhapy	• Herniotomy with **posterior wall repair** using in-situ structuresQ
Hernioplasty	• Herniotomy with **strengthening of posterior wall** using exogenous material like **mesh**Q

CHAPTER 20

Spleen

MULTIPLE CHOICE QUESTIONS

IDIOPATHIC THROMBOCYTOPENIC PURPURA

1. **Best time to give give platelets in ITP,48,000/μL:** *(ILBS 2011)*
   a. After ligation of splenic artery
   b. Preoperatively
   c. Postoperatively
   d. After ligation of splenic vein
2. **False about ITP:** *(PGI SS Dec 2005)*
   a. More common in females
   b. Splenomegaly
   c. Altered peripheral platelet count
   d. Increased bone marrow megakaryocytes
3. **All are true about ITP except:** *(JIPMER GIS 2011)*
   a. Low platelet count, normal bone marrow seen
   b. In adults, most common in young women
   c. Chronicity if occurs in children, common in girls
   d. Remission occurs in 70% of cases of adult ITP
4. **In the diagnosis of idiopathic thrombocytopenic purpura, one of the statements is true:** *(COMEDK 2006)*
   a. In the bone marrow smear, there is decreased number of megakaryocytes
   b. In the bone marrow smear, there is increased number of megakaryocytes
   c. Prothrombin time is prolonged
   d. Partial thromboplastin time is prolonged
5. **An evidence that splenectomy might benefit a patient with idiopathic thrombocytopenic purpura includes which of the following?** *(UPSC 2007)*
   a. A significant enlargement of the spleen
   b. A high reticulocyte count
   c. Patients age less than five years
   d. An increase in platelet count on corticosteroid therapy
6. **A patient with ITP is being planned for splenectomy. What is the best time for platelet infusion in this patient:**
   a. 2 hours before surgery *(All India 2010, 2008)*
   b. At the time of skin incision
   c. After ligating the splenic artery
   d. Immediately after removal of spleen
7. **During splenectomy in ITP, platelet infusion is given:**
   a. Immediately after ligating splenic artery *(DPG 2008)*
   b. Immediately after removal of spleen
   c. After incision
   d. Next day of surgery

HYPERSPLENISM

8. **All are seen in hypersplenism except:** *(AIIMS GIS Dec 2011)*
   a. Anemia
   b. Thrombocytopenia
   c. Splenomegaly
   d. Hypocellular bone marrow
9. **Which of the following doesn't fit into definition of hypersplenism?** *(JIPMER GIS 2011)*
   a. Bone marrow hypoplasia b. Splenomegaly
   c. Pancytopenia d. Antiplatelet antibodies
10. **Hypersplenism is associated with:** *(PGI Dec 97)*
    a. Pancytopenia
    b. Thrombocytopenia
    c. Leucopenia
    d. Polycythemia

SPLENECTOMY

11. **Most common complication of splenectomy:**
    a. OPSI *(AIIMS GIS Dec 2011)*
    b. Avascular necrosis of greater curvature of stomach
    c. Pancreatitis
    d. Atelectasis
12. **In contemporary world, most common indication for splenectomy is:** *(DNB 2005, 2000 JIPMER GIS 2011)*
    a. Trauma b. Hemolytic anemia
    c. ITP d. Infections
13. **Splenectomy can be curative in all of the following except:** *(DNB 2007, 2005, 2003, MHSSMCET 2005)*
    a. Thalassemia b. Sickle cell disease
    c. Hereditary spherocytosis d. ITP
14. **Splenectomy is indicated in:** *(MHPGMET 2005)*
    a. Spherocytosis b. Pyropoikilosis
    c. Elliptocytosis d. All
15. **Splenectomy is done to tide over the acute crises of uncontrollable:** *(MHPGMCET 2006)*
    a. ITP b. TTP
    c. HUS d. All of the above
16. **Splenectomy done in:** *(PGI Dec 2007)*
    a. ITP
    b. Aplastic anemia
    c. Hereditary spherocytosis
    d. Lymphoma
    e. CML
17. **Auto splenectomy is seen in one of the following hemolytic anemias:** *(COMEDK 2006)*
    a. Hereditary spherocytosis
    b. Sickle cell anaemia
    c. Thalassemia
    d. Immunohemolytic anaemia
18. **Vaccine for post splenectomy infection is given against all except:** *(MCI Sept 2009, Punjab 2007)*
    a. Streptococcus pneumonia b. Haemophilus influenza
    c. Neisseria meningitides d. E. coli

19. All of the followings are true about OPSI except:
a. Develops 1-5 years after splenectomy *(PGI June 2009)*
b. Maximum risk is within 1 year of splenectomy
c. Begin with headache, myalgia and fever
d. May present with severe septic shock
e. Usually not respond with antibiotic treatment

20. Splenectomy is indicated in: *(PGI Dec 2006)*
a. Hypersplenism
b. Hereditary spherocytosis
c. I.T.P.
d. G-6-PD deficiency
e. Portal hypertension

21. Which of the following is not an absolute indication of splenectomy? *(All India 2000)*
a. Splenic abscess
b. Hereditary spherocytosis
c. Fibrosarcoma
d. Autoimmune hemolytic anemia

22. Splenectomy is most useful in: *(All India 96)*
a. Sickle cell anemia
b. Thalassemia
c. Hereditary spherocytosis
d. Acquired autoimmune hemolytic anemia

23. Splenectomy is not done in: *(AIIMS June 2001)*
a. Myelofibrosis
b. Sickle cell anemia
c. Hereditary spherocytosis
d. Splenic abscess

24. Most common infection after splenectomy is: *(PGI May 2005, June 97, AIIMS Nov 93)*
a. Anaerobic
b. Staphylococcal
c. Streptococcal
d. Pneumococcal

25. Most common complication of splenectomy is: *(AIIMS Nov 93)*
a. Hematemesis
b. Left lower lobe atelectasis
c. Peritoneal effusion
d. Acute dilatation of stomach

26. Most common complication after splenectomy is: *(AIIMS June 94)*
a. Chest infection
b. Hematemesis
c. Subphrenic collection
d. Acute dilation of stomach

27. In which case pneumococcal vaccine is most effective?
a. When given preoperatively *(AIIMS Nov 97)*
b. When given post operatively
c. Against all strains of bacteria
d. Against gram negative bacteria

28. Postsplenectomy sepsis is common in: *(PGI June 2000)*
a. ITP
b. Thalassemia
c. Hereditary spherocytosis
d. Trauma

29. Which is the commonest postsplenectomy infection? *(DNB 2003, 2002, 2001, All India 2000, AIIMS Nov 99; NEET 2013)*
a. Streptococcus pyogenes
b. Staphylococcus aureus
c. Streptococcus pneumoniae
d. Pseudomonas aeruginosa

30. Most common complication of splenectomy is: *(AIIMS 92)*
a. Pancreatic leak
b. Pulmonary complications
c. Pneumococcal peritonitis
d. Hemorrhage

31. Splenectomy is least useful in: *(All India 89)*
a. Congenital elliotocytosis
b. Thalassemia major
c. Congenital spherocytic anaemia
d. Hereditary nonspherocytic hemolytic anaemia

32. Splenectomy is indicated in: *(AIIMS 87)*
a. Sickle cell anemia
b. Hereditary spherocytosis
c. Hemoglobin C disease
d. Hodgkin's lymphoma

33. Most common infections after splenectomy are: *(DPG 2010)*
a. Capsulated bacteria
b. Uncapsulated bacteria
c. Gram-positive sepsis
d. Gram-negative bacteria

34. Splenectomy can lead to: *(DNB 2012, MCI Sept 2005)*
a. Leucopenia
b. Thrombocytosis
c. Thrombocytopenia
d. Thrombocytopenia and leucopenia

35. Indications of splenectomy are all except: *(MCI March 2007)*
a. Hereditary spherocytosis
b. Trauma
c. Polycythemia
d. Idiopathic thrombocytopenic purpura

36. Splenectomy is useful in: *(MCI Sept 2008)*
a. Hemophilia
b. Polycythemia
c. Hereditary spherocytosis
d. Thalassemia

SPLENIC TRAUMA

37. The innovative method for treatment of moderate splenic injury: *(MHSSMCET 2006)*
a. Conservative management
b. Mesh repair
c. Splenorraphy
d. Splenectomy

38. Kehr sign is seen in: *(MHSSMCET 2009, AIIMS June 94)*
a. Splenic injury
b. Liver injury
c. Renal injury
d. Mesenteric hematoma

39. Management of grade 3 splenic trauma in a stable child: *(PGI Nov 2010)*
a. Embolization
b. Partial splenectomy
c. Total splenectomy
d. Conservative

40. True about blunt abdominal trauma with splenic rupture: *(PGI June 2008)*
a. Kehr's sign-discoloration around umbilicus
b. Spleen is most common organ to be involved
c. Splenectomy is treatment of choice for splenic rupture
d. Cullen's sign seen

41. Kehr's sign seen in splenic rupture is: *(AIIMS Nov 93, All India 95)*
a. Pain over left shoulder
b. Pain over right scapula
c. Periumbilical pain
d. Pain over renal angle

42. In splenic injury, conservative management is done in:
a. Hemodynamically unstable *(AIIMS JUNE 99)*
b. Young patient
c. Shattered spleen
d. Extreme pallor and hypotension

43. The most important radiological sign of splenic rupture is:
a. Obliteration of psoas shadow *(JIPMER 86, 87)*
b. Obliteration of splenic shadow
c. Indentation of the left side air bubble
d. Fracture of one or more lower ribs on left side

44. Accidental small splenic rupture is treated with: *(PGI 88)*
a. Catgut sutures
b. Silk sutures
c. Omental patch
d. Catgut suturing with omental patch
e. Splenectomy

45. Positive Kehr's sign is: *(MAHE 2006)*
a. Hemoperitoneum
b. Acute cholecystitis
c. Acute pancreatitis
d. Amoebic abscess

46. In a patient presenting with abdominal trauma, fracture rib and bruise over left hypochondrium probable diagnosis is:
a. Rupture left lobe of liver *(PGI 96)*
b. Rupture right lobe of liver
c. Splenic rupture
d. Rupture stomach

47. All of the following are true regarding splenic-rupture except: *(MCI Sept 2009)*
a. Elevation of the left dome of diaphragm
b. Obliterated psoas shadow
c. Obliterated colonic gas shadow
d. Obliterated splenic outline

48. A 27-years old patient presented with left sided abdominal pain to the emergency room; 6 hours after an RTA. He was hemodynamically stable and FAST positive. A CECT (contrast enhanced CT) scan showed grade III splenic laceration. What will be the most appropriate treatment?
a. Splenectomy *(All India 2010)*
b. Splenorrhaphy
c. Splenic artery embolization
d. Conservative management

49. A 27-years old patient presented with left sided abdominal pain to the emergency room, 6 hours after an ART. He is hemodynamically stable and FAST positive. A CECT (contrast enhanced CT) scan shows a contrast blush along with a grade III laceration. What will be the most appropriate management? *(All India 2010)*
a. Splenectomy
b. Splenorrhaphy
c. Splenic artery embolization
d. Conservative management

SPLENIC TUMORS

50. Most common tumor of spleen is: *(All India 2000)*
a. Lymphoma b. Sarcoma
c. Hemangioma d. Metastasis

51. Most common malignancy affecting spleen is: *(UPSC 2008, PGI June 97)*
a. Angiosarcoma b. Hamartoma
c. Secondaries d. Lymphoma

52. Most common cause of isolated splenic metastasis is: *(All India 2012)*
a. Carcinoma pancreas b. Carcinoma stomatch
c. Carcinoma ovary d. Carcinoma cervix

53. True regarding hemangioma of the spleen: *(MCI March 2005)*
a. Least common benign tumour of the spleen
b. May transforms into a haemangiosarcoma
c. Malignant transformation may be managed conservatively
d. None of the above

SPLENIC ABSCESS

54. A patient presents with fever for 3 weeks. On examination he is observed to have splenomegaly. Ultrasonography reveals a hypoechoic shadow in spleen near the hilum. Gram-negative bacilli are isolated on blood culture. Which of the following is the most likely causative organism? *(All India 2010)*
a. Cytomegalovirus b. Toxoplasmosis
c. Salmonella d. Lymphoma virus

SPLENIC CYST

55. Most common cysts of the spleen are: *(All India 2010)*
a. Hydatid cyst b. Dermatoid cyst
c. Pseudocyst d. Lymphangioma

ACCESSORY SPLEEN

56. Most common site of accessory spleen: *(AIIMS GIS Dec 2011)*
a. Gastrocolic ligament b. Gastrosplenic ligament
c. Splenic hilum d. Splenorenal ligament

57. Commonest site of accessory spleen is: *(DNB 2012, AIIMS Nov 93)*
a. Lienorenal ligament b. Hilum of spleen
c. Gastro splenic ligament d. Around tail of pancreas

58. Spleneculi are seen in: *(PGI June 95)*
a. Colon b. Hilum
c. Liver d. Lungs

59. Accessory spleen in is found at all sites, except:
a. Hilum *(AIIMS 1994)*
b. Presacral area
c. Tail of pancreas
d. Greater omentum, small bowel mesentery

60. Spleniculi are most commonly found in: *(UPPG 2009, Orissa 2011)*
a. Splenic hilum b. Tail of pancreas
c. Greater omentum d. Gastrocolic ligament

61. Spleneculi are commonly seen in: *(UPPG 2009)*
a. Hilum of spleen b. Tail of spleen
c. Mesocolon d. Splenic ligaments

MISCELLANEOUS

62. Splenic vein thrombosis is best treated by: *(USPC 97)*
a. Splenectomy b. Porto-caval shunt
c. Spleno-renal shunt
d. Mesenterico-caval shunt

63. The spleen contains about ..... % of the total blood volume: *(PGI 85)*
a. 1 b. 2
c. 5 d. 7

64. Splenosis means: *(PGI 79, AIIMS 85)*
a. Infection of spleen
b. Presence of accessory spleens
c. Rupture of spleen and distribution of its tissue on peritoneum
d. Non-functioning spleen

65. One of the following does not cause increase in the size of spleen in later stages: *(MAHE 2001)*
a. Sickle cell anaemia
b. Cirrhosis
c. Infectious mononucleosis
d. Hairy cell leukemia

66. Removal of senescent RBC from circulation by spleen is called: *(PGI 79, JIPMER 80)*
a. Culling
b. Pitting
c. Filtering
d. Phagocytosis

67. Downward displacement of enlarged spleen is prevented by: *(All India 98)*
a. Lienorenal ligament
b. Phrenicolic ligament
c. Upper pole of right kidney
d. Sigmoid colon

68. Regarding spleen, true is: *(AIIMS 91)*
a. Arises from ventral mesogastrium
b. Inferior border is notched
c. Axis of spleen lies along 9th rib
d. Derives its nerve supply from celiac plexus

69. Right sided isomerism is associated with: *(All India 2011)*
a. Asplenia
b. One spleen
c. Two spleens
d. Polysplenia

70. Splenic vein thrombosis is most commonly caused by: *(MHPGMCET 2001)*
a. Chronic pancreatitis
b. Carcinoma pancreas
c. Spleen trauma
d. Perforation of duodenum

71. Tropical splenomegaly is caused by: *(MHPGMCET 2009)*
a. Malaria
b. Kala-azar
c. Schistosomiasis
d. All of the above

72. Most common splanchnic aneurysm: *(AIIMS GIS 2003)*
a. Splenic artery
b. Hepatic artery
c. Gastroduodenal artery
d. Superior mesenteric artery

EXPLANATIONS

IDIOPATHIC THROMBOCYTOPENIC PURPURA

1. **Ans. a. After ligation of splenic artery** *(Ref: Sabiston 19/e p1550-1552; Schwartz 10/e p90, 9/e p1253; Bailey 26/e p1092, 25/e p1106; Shackelford 7/e p1659-1661)*

Idiopathic Thrombocytopenic Purpura (ITP)

- ITP is characterized by a **low platelet count** despite **normal bone marrow** and the **absence of other causes of thrombocytopenia**[Q].
- ITP is **predominantly** a **disease of young women**[Q]
- ITP **manifests differently** in **children**: **Both genders** are **affected equally**[Q], onset is **sudden, thrombocytopenia** is **severe**, and **complete spontaneous remissions** are seen in **80%** of affected children[Q].
- **Girls >10 years** with **more chronic purpura** are those in whom the **disease seems to persist**[Q].

Pathology

- **Autoantibodies are responsible** for the **disordered platelet destruction** mediated by the **overactivated platelet phagocytosis within** the **reticuloendothelial system**[Q].
- **Relative bone marrow failure**[Q] (production cannot match destruction of thrombocytes to compensate sufficiently).

Clinical Features

- **Typical presentation**: **Purpura, epistaxis**, and **gingival bleeding**[Q].
- Less commonly, gastrointestinal bleeding and hematuria are noted.

> - Despite the destruction of platelets by splenic macrophages, **spleen** is normally **not enlarged in ITP**[Q].

Diagnosis

- The **diagnosis of ITP involves exclusion** of **other relatively common causes** of **thrombocytopenia**: **pregnancy**, drug-induced thrombocytopenia (e.g., **heparin, quinidine, quinine, sulfonamides**), **viral infections**, and **hypersplenism**[Q]

Treatment of ITP	
Asymptomatic patients with platelet counts **>50,000/mm³**	**Observation**[Q]
Platelet counts **30,000-50,000/mm³**	**Observation** with **more routine follow-up**[Q]
Symptomatic patients with **platelets counts <50,000/mm³** or **platelet counts <30,000/mm³**	**Glucocorticoid** (**prednisone**, 1 mg/kg body weight/day)[Q]
Platelets counts <20,000/mm³ with **significant mucous membrane bleeding** or **life-threatening hemorrhage**	**Hospitalization**[Q]

- **Platelet transfusion** is indicated only for those who experience **severe hemorrhage**.
- **IV immunoglobulin** is important for the **treatment of acute bleeding, in pregnancy**, or for **patients being prepared for operation**, including **splenectomy**.
- Other treatment options: Long-term **glucocorticoid therapy, azathioprine** or **cyclophosphamide**.

> - **Indications of splenectomy in ITP**:
> - **Failure of medical therapy**[Q]
> - **Prolonged use of steroids** with **undesirable effects**[Q]
> - Most cases of **first relapse**[Q]
> - **Splenectomy** provides a **permanent response** without subsequent need for steroids in **75-85% of patients**[Q].
> - **Laparoscopic splenectomy**[Q] has become the **gold standard for ITP** patients.
> - **Responses** usually occur **within the first postoperative week**.
> - For patients with **extremely low platelet counts (<10,000/mm³) platelets should be available** for surgery but should **not be given preoperatively**.
> - **Once** the **splenic artery** is **ligated**[Q], **platelets are given** to those who continue to bleed.

2. **Ans. b. Splenomegaly**
3. **Ans. d. Remission occurs in 70% cases of adult ITP**
4. **Ans. b. In the bone marrow smear, there is increased number of megakaryocytes**

Idiopathic Thrombocytopenic Purpura (ITP)

- In ITP, **platelets** are **coated with autoantibodies** to **platelet membrane antigens**, resulting in **splenic sequestration** and **phagocytosis by mononuclear macrophages**[Q].
- The resulting **shortened life span of platelets** in the circulation, together with **incomplete compensation by increased platelet production by bone marrow megakaryocytes**, results in a **decreased platelet count**[Q].

5. **Ans. d. An increase in platelet count on corticosteroid therapy**
6. **Ans. c. After ligating the splenic artery**
7. **Ans. a. Immediately after ligating splenic artery**

HYPERSPLENISM

8. **Ans. d. Hypocellular bone marrow** *(Ref: Sabiston 19/e p1553-1554; Schwartz 10/e p1427, 9/e p1248; Bailey 26/e p1090, 25/e p1104; Shackelford 7/e p1614, 1631)*

HYPERSPLENISM

- Characterized by **splenic enlargement,** any combination of **anemia, leucopenia** or **thrombocytopenia, compensatory bone marrow hyperplasia** and **improvement after splenectomy**[Q].
- Careful clinical judgment is required to balance the long- and short-term risks of splenectomy against continued conservative management.

9. **Ans. a. Bone marrow hypoplasia**
10. **Ans. a. Pancytopenia, b. Thrombocytopenia, c. Leucopenia**

SPLENECTOMY

11. **Ans. d. Atelectasis** *(Ref: Sabiston 19/e p1558-1559; Schwartz 10/e p1429-1445, 9/e p1260-1262; Bailey 26/e p1096, 25/e p1109-1110; Shackelford 7/e p1674-1676)*

Complications of Splenectomy	
Pulmonary Complications: • **Left lower lobe atelectasis**: **MC complication**[Q] • Pleural effusion • Pneumonia	**Thromboembolic Complications:** • DVT • Portal vein thrombosis • **DVT prophylaxis** is **routinely recommended**[Q]. • In patients with **hemolytic anemia** or **myeloproliferative disorders** and **splenomegaly**, **thrombotic risk** is **heightened**, particularly the risk of **portal vein thrombosis**[Q]. • Patients undergoing splenectomy for **malignancy** or **myeloproliferative disorders** should be strongly considered for **perioperative pharmacoprophylaxis**, either **LMWH** or **unfractionated heparin**[Q].
Hemorrhagic Complications: • Subphrenic hematoma	
Infectious Complications: • Subphrenic abscess • Wound infection	
Pancreatic Complications: • Pancreatitis • Pseudocyst • Pancreatic fistula	

12. **Ans. a. Trauma** *(Ref: Sabiston 19/e p1550-1556; Schwartz 10/e p206-207, 9/e p1250; Bailey 26/e p1095, 25/e p1104-1108; Shackelford 7/e p1659-1670; CSDT 11/e p655)*

Overall, the **most common indication for splenectomy** is **trauma to** the **spleen**, whether external trauma (blunt or penetrating) or iatrogenic injury (e.g. during operative procedures for other reasons).

- **MC indication for splenectomy: Trauma**[Q]
- **MC indication for elective splenectomy: ITP**[Q]

Indications for Splenectomy	
Splenectomy always indicated: • **Primary splenic tumor**[Q] • **Hereditary spherocytosis**[Q]	**Splenectomy rarely indicated:** • Chronic leukemia • Splenic lymphoma
Splenectomy usually indicated: • **Primary hypersplenism**[Q] • **Chronic ITP**[Q] • **Splenic vein thrombosis** causing **gastric varices**[Q] • **Splenic abscess**[Q]	• Macroglobulinemia • Thalassemia major • Sickle cell disease • Congestive splenomegaly and hypersplenism due to PHT • Felty's syndrome • Hairy cell leukemia • Chediak-Higashi syndrome • Sarcoidosis

Indications for Splenectomy	
Splenectomy sometimes indicated:	**Splenectomy not indicated:**
• **Splenic injury**[Q] • **Autoimmune hemolytic disease**[Q] • Elliptocytosis with hemolysis • Nonspherocytic hemolytic anemia • **Hodgkin's disease (for staging**[Q]**)** • **Thrombotic thrombocytopenic purpura**[Q] • **Idiopathic myelofibrosis**[Q] • **Splenic artery aneurysm**[Q] • Wiscott-Aldrich syndrome • Gaucher's disease • Mastocytosis (aggressive disease)	• Asymptomatic hypersplenism • Splenomegaly with infection • Splenomegaly associated with elevated IgM • Hereditary hemolytic anemia of moderate degree • Acute leukemia • Agranulocytosis

13. **Ans. b. Sickle cell disease**
Splenectomy is not curative in sickle cell disease.

14. **Ans. d. All** 15. **Ans. a. ITP**

16. **Ans. a. ITP, b. Aplastic anemia, c. Hereditary spherocytosis, d. Lymphoma, e. CML**

17. **Ans. b. Sickle cell anemia**

Autosplenectomy	**Sickle cell anemia**[Q]
Autonephrectomy	**Renal TB**[Q]

18. **Ans. d. E. coli** *(Ref: Sabiston 19/e p1558-1560; Schwartz 10/e p1429-1445, 9/e p1261-1263; Bailey 26/e p1094-1096, 25/e p1109-1110; Shackelford 7/e p1674-1676)*

Splenectomy

- **Most serious sequela** is **overwhelming postsplenectomy infection** (**OPSI**), with meningitis, pneumonia, or bacteremia.
  - Older studies have demonstrated that the risk of OPSI is greatest within the first 2 years after splenectomy but recent studies have confirmed that a **lifelong risk remains**[Q].
  - **One third of cases occur more than 5 years after surgery**, with the overall incidence reported to be 3.2% to 3.5%.
  - For those **who acquire OPSI**, **mortality** is between **40-50%**[Q].
  - **Risk is greatest in** patients with **thalassemia major** and **sickle cell disease**[Q].
- OPSI is **typically caused by polysaccharide-encapsulated organisms**, such as **Streptococcus pneumoniae, Neisseria meningitidis,** and **Hemophilus influenzae**[Q].
  - When elective splenectomy is planned, **vaccination against encapsulated bacteria** should be given **at least 2 weeks before surgery**[Q].
  - If spleen is removed in **emergency**, **vaccination** should be given **as soon as possible**[Q] following surgery.
- **Vaccines** should be given for **Streptococcus pneumoniae, Hemophilus influenzae type b and Meningococcus**[Q].
- In addition to above given 3 vaccines, **annual influenza immunization**[Q] is also advised as influenza has been implicated as a risk factor for secondary bacterial infections.
- **Booster injection** of **pneumococcal vaccine** should be given **every 5-6 years**[Q].
- Harrison says that "**Routine chemoprophylaxis** with oral **penicillin** can result in the **emergence of drug-resistant strains** and is **not recommended**."

Splenectomy Outcomes	
Increased risk of infections	**Hematologic outcomes**
• Life threatening infection in asplenic patients is attributable to **loss of splenic macrophages, diminished tuftsin production,** and **loss of** spleen's **reticuloendothelial screening function**. • After splenectomy, **ability to filter** and **phagocytose bacteria**, particularly **encapsulated bacteria** (**Streptococcus pneumoniae, Hemophilus influenzae, Neisseria meningitides**) and **parasitized blood cells is lost**[Q]. • **MC infection after splenectomy**: **Streptococcus pneumoniae**[Q] (50-90% cases)	• **Immediately after splenectomy:** - **Leucocytosis**[Q] - **Thrombocytosis** (these levels **returns to normal** within **2-3 weeks**)[Q] • **Chronic manifestations:** - **Anisocytosis** and **poikilocytosis**[Q] - **Howell jolly bodies**[Q] (nuclear remnants) - **Heinz bodies**[Q] (denatured hemoglobin) - **Basophilic stippling**[Q] and occasional nucleated erythrocytes

Splenectomy Outcomes	
Increased risk of infections	**Hematologic outcomes**
Other common bacterial infections • **Hemophilus influenzae type b**[Q] • **Meningococcus**[Q] • **Group A** and **B streptococcus**[Q] • Capnocytophaga canimorsus • Enterococcus species • Bacteroides • Salmonella • Bartonella	
Protozoal that invade the RBCs • **Babesia, Ehrlichia, Plasmodium (BEP)**[Q]	

19. **Ans. b. Maximum risk is within 1 year of splenectomy** *(Ref: Sabiston 19/e p1559; Schwartz 9/e p1262; Bailey 26/e p1096, 25/e p1109-1110; Shackelford 7/e p1674-1676)*

Infection may occur at **any time after splenectomy**; in one recent series, **most infections occurred more than 2 years after splenectomy** and **42% occurred more than 5 years after splenectomy**.

Overwhelming Postsplenectomy Infection (OPSI)

- OPSI is the **MC fatal late complication** of **splenectomy**.

  - **Infection may occur** at **any time after splenectomy**[Q]
  - In one recent series, **most infections occurred more than 2 years after splenectomy** and **42% occurred more than 5 years after splenectomy**[Q].

Clinical Features

- OPSI **typically begins with** a **prodromal phase** characterized by **fever, rigors** and chills and other **nonspecific symptoms**, including sore throat, malaise, myalgias, diarrhea, and vomiting.
- Many patients have no identifiable focal site of infection and present only with high-grade primary bacteremia.

  - **Progression of** the **illness is rapid**, with the **development of hypotension, disseminated intravascular coagulation, respiratory distress, coma**, and **death within hours of presentation**[Q].
  - **Despite antibiotics** and **intensive care**, the **mortality rate** is between **50-70% for florid OPSI**[Q].

  Most frequently involved organism in OPSI is **S. pneumoniae**[Q] (**50-90%** of cases)

- Other organisms involved in OPSI: **H. influenzae, N. meningitidis, Streptococcus** and **Salmonella spp**[Q].

  - **Risk for OPSI** is **greater** in **splenectomy for malignancy** or **hematologic conditions** than for those who underwent splenectomy for trauma[Q].
  - **Risk is greater for young children**[Q] (**<4 years** of age).

20. **Ans. a. Hypersplenism, b. Hereditary spherocytosis, c. I.T.P., e. Portal hypertension**

21. **Ans. d. Autoimmune hemolytic anemia**

22. **Ans. c. Hereditary spherocytosis** *(Ref: Sabiston 19/e p1552-1553; Schwartz 10/e p1429,1431, 9/e p1250-1251; Bailey 26/e p1092-1093, 25/e p1106-1107; Shackelford 7/e p1662)*

Hereditary Spherocytosis

- **Autosomal dominant** disease **affecting** the production of **spectrin**, a red blood cell **cytoskeletal protein**[Q].

Pathology

- **Autosomal dominant** disease **affecting** the production of **spectrin**, a red blood cell **cytoskeletal protein**[Q].

  Loss of **spectrin**[Q] → **RBCs lack biconcave shape**[Q] → **Affects RBCs deformability**[Q] → **Increased osmotic fragility**[Q] → More **susceptible to trapping** and **destruction by** the **spleen**[Q].

Clinical Features

- **Anemia,** occasionally with **jaundice**, and **splenomegaly**[Q].

Diagnosis

- Diagnosis is made by examination of a **peripheral blood smear**, **increased reticulocyte count**, **increased osmotic fragility**, and a **negative Coombs' test**[Q].

Treatment

- **Anemia** can be **successfully treated with splenectomy**[Q]
- **Splenectomy** should be **delayed until the age of 5 years to preserve immunologic function** of the **spleen** and **reduce the risk of OPSI**[Q].
- Presence of **pigmented gallstones**: **Cholecystectomy**[Q]

23. Ans. None **24. Ans. d. Pneumococcal** **25. Ans. b. Left lower lobe atelectasis**

26. Ans. a. Chest infection **27. Ans. a. When given preoperatively**

- When elective splenectomy is planned, **vaccination against encapsulated bacteria** should be given **at least 2 weeks before surgery**.
- If spleen is removed in **emergency**, **vaccination** should be given **as soon as possible** following surgery.

28. Ans. a. ITP, b. Thalassemia, c. Hereditary spherocytosis

29. Ans. c. Streptococcus pneumoniae **30. Ans. b. Pulmonary complications** **31. Ans. b. Thalassemia major**

32. Ans. a. Sickle cell anemia, b. Hereditary spherocytosis, d. Hodgkin's lymphoma

33. Ans. a. Capsulated bacteria **34. Ans. b. Thrombocytosis**

35. Ans. c. Polycythemia **36. Ans. c. Hereditary spherocytosis**

SPLENIC TRAUMA

37. Ans. a. Conservative management *(Ref: Sabiston 19/e p457-459; Schwartz 10/e p206, 9/e p152-155; Shackelford 7/e p1638)*

The innovative method for treatment of moderate splenic injury is conservative management.

Splenorrhaphy

- **Splenorrhaphy** represents a variety of **"spleen-sparing" techniques** aimed at **controlling the hemorrhage from a splenic injury**[Q] while sparing the patient the long-term immunologic consequences of splenectomy.

  - **Splenorrhaphy** is most appropriately considered in cases of **less severe splenic injury** (e.g., grades **I** and **II**, and occasionally grade **III**)[Q].
  - Splenorrhaphy **should not be attempted to** repair **extensive** or **complex shatter** or **crush-type injuries** of the spleen, **nor** is it well-**advised** to undertake splenorrhaphy **in** the face of **multiple concomitant traumatic injuries** or **associated hypotension**[Q].

- The placement of a **simple monofilament suture** through the **splenic parenchyma** (often in a mattress technique and incorporating a **piece of Gelfoam** or an **omental patch** placed at the site of bleeding) will often **bring** about **satisfactory hemostasis**[Q].
- **Wrapping** the **entire spleen** with **either absorbable** or **nonabsorbable mesh**[Q] has been described as a means of **effecting external tamponade** and **controlling bleeding** and has not been associated with significantly increased risk of infectious complications.

38. Ans. a. Splenic injury *(Ref: Sabiston 19/e p458; Shackelford 7/e p1636)*

Kehr's sign[Q]	• **Pain** may **be referred to tip** of **left shoulder** in **splenic rupture** (**Kehr's sign**)[Q] • Due to **irritation of undersurface of diaphragm** with **blood** and pain is referred to the shoulder through the affected fibers of phrenic nerve (**C4** and **C5**[Q]) • **Kehr's sign** can be **elicited by bimanual compression** of the **left upper quadrant**[Q] after the patient has been in Trendelenberg's position for about 10 minutes prior to maneuver.
Ballance's sign[Q]	• A fixed area of **percussible dullness** in the **left upper quadrant** due to **coagulation of blood from** the **injured spleen**[Q].

39. Ans. d. Conservative *(Ref: Sabiston 19/e p457-459; Schwartz 10/e p206, 9/e p152-155; Bailey 26/e p1090, 25/e p348; Shackelford 7/e p1636-1639)*

Splenic Injuries

- **MC organ injured** in **blunt trauma abdomen**: **Spleen**[Q]

Pathophysiology

- **Direct compression**[Q] of the organ in the left upper quadrant of the abdomen
- **Deceleration mechanism** that **tears the splenic capsule** or **parenchyma**[Q], mainly at areas fixed or tethered to the retroperitoneum.

Diagnosis

- **Identification of splenic injuries** may occur **during laparotomy** in **unstable patients** taken **emergently to the operating room**Q.
- **Unstable patients** with **intra-abdominal fluid** on **FAST** require **exploration**, with the **spleen** commonly being the **bleeding intra-abdominal organ**Q.

- In **stable patients**, **abdominal CT performed with IV contrast** is the **mainstay for diagnosing** and **characterizing splenic injuries**Q.
- **Images** are typically obtained with the contrast in the **portal venous phase** to enhance the splenic parenchyma maximally while still being able to visualize the vasculature.
- **Splenic injuries** appear as **disruptions in** the **normal splenic parenchyma**, frequently with **surrounding hematoma** and **free intra-abdominal blood**Q.
- Occasionally, **active extravasation of contrast**, identified as a **high-density blush**, can be identified, **contained within a pseudoaneurysm** or **bleeding into** the **peritoneal space**Q.

- **Angiography** has been used **for injuries** that **demonstrate active extravasation by CT**Q.
- **Angiography** can **identify specific sites of bleeding** from the splenic parenchyma and underlying segmental or trabecular vessels; however, it cannot characterize the splenic parenchymal injury but can be complementary to CT.
- **Advantage of angiography**: Potential to **obstruct sites of bleeding endovascularly** using **angioembolization**Q.

- Patients who are candidates for **non-operative management** of their splenic injury but **demonstrate a blush by CT**, indicating **active extravasation**, may **benefit from angiography with embolization** to eliminate the splenic pseudoaneurysmQ.
- **Angiographic embolization** is considered **only in hemodynamically stable patients**Q.

Management

- With appropriate patient selection, **many patients with blunt splenic trauma** can be **managed without splenectomy**Q.
- **No bleeding patient** should go **without splenectomy** or **splenic repair**, especially in an attempt to push the figurative nonoperative envelopeQ.

- **Hemodynamic stability** is a **prerequisite for nonoperative management** and must **be present without ongoing intravascular volume support**Q.
- **Hemodynamic stability** is indicated by a **normal blood pressure** and **lack of tachycardia**, **no** physical examination findings indicating **shock**, and **absence of metabolic acidosis**Q.

- **Nonoperative management is reserved** for **grades I**, **II** and **isolated** grade **III injuries**Q.

Indications of Operative management of Splenic Trauma
• **Instability** at admissionQ
• **Exact location of bleeding** is **unknown**Q
• Failed nonoperative managementQ

- **Best approach**: **Midline incision** with **packing of all four quadrants** in cases of hemodynamic **instability**Q.
- **Drains should not be placed unless** there is concern that the **tail of the pancreas** was also **injured**Q.

Splenic injury secondary to penetrating abdominal trauma
• **Splenic injury** secondary to **penetrating abdominal trauma** is usually **identified during laparotomy** and should be **addressed based on** the presence or absence of **ongoing bleeding.**Q
• **Splenectomy** is performed **in cases of ongoing bleeding**Q.

American Association for the Surgery of Trauma: Spleen Organ Injury Scale		
Grade	**Type**	**Description of Injury**
I	Hematoma	Subcapsular tear **<10%** surface area
	Laceration	**Capsular tear <1 cm** parenchymal depth
II	Hematoma	Subcapsular tear, **10%-50%** surface area; intraparenchymal, **<5 cm** in **diameter**
	Laceration	Capsular tear, **1-3 cm** parenchymal depth that does not involve a trabecular vessel
III	Hematoma	Subcapsular tear **>50%** surface area or expanding; ruptured subcapsular or parenchymal hematoma; intraparenchymal hematoma **≥5 cm** or **expanding**
	Laceration	**>3 cm** parenchymal depth or **involving trabecular vessels**
IV	Laceration	Laceration involving **segmental** or **hilar vessels** producing **major devascularization** (**>25%** of spleen)
V	Hematoma	**Completely shattered spleen**
	Laceration	**Hilar vascular injury** devascularizes spleen

40. **Ans. b. Spleen is most common organ to be involved**

41. **Ans. a. Pain over left shoulder** 42. **Ans. b. Young patients**

43. **Ans. b. Obliteration of splenic shadow**

44. **Ans. d. Catgut suturing with omental patch** *(Ref: Shackelford 7/e p1638)*

The placement of a **simple monofilament suture** through the **splenic parenchyma** (often in a mattress technique and incorporating a **piece of Gelfoam** or an **omental patch** placed at the site of bleeding) will often **bring** about **satisfactory hemostasis**.

45. **Ans. a. Hemoperitoneum** 46. **Ans. c. Splenic rupture**

47. **Ans. c. Obliterated colonic gas shadow** *(Ref: emedicine.medscape.com/article/373694-overview)*

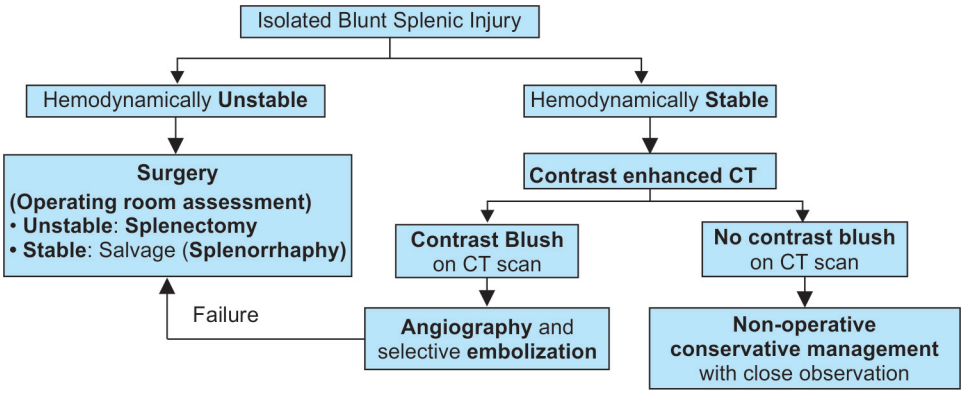
Signs of Splenic Injury in X-ray Abdomen	
• **Obliteration** of **spleen outline**Q	• **Obliteration** of **psoas shadow**Q
• **Intendation of gastric air bubble** on the **left side**Q	• **Elevation** of **left hemidiaphragm**Q
• Some of the **left lower ribs** may be **fractured**Q	• Increased **free fluid** in **between air filled intestinal coils**Q

48. **Ans. d. Conservative management**

49. **Ans. c. Splenic artery embolization** *(Ref: Trauma Manual by Moore and Mattox 4/e p252)*

- The presence of **contrast blush** on '**contrast enhanced' CT scan** is believed to represents **continuous bleeding** and **active extravasation**Q.
- **Presence of contrast blush** on CECT is related to **failure of non operative management** of splenic injury, and is an **indication for angiography** and **selective embolization** in stable patientsQ.
- **Angiographic embolization** can **significantly increase** the **success rate of non operative management in patients with a blush** and is recommended as the most appropriate interventionQ.

Currently Recommended Management strategy for Isolated splenic Injuries
• If the **patient** is **hemodynamically unstable, surgery** is recommendedQ
• If the **patient** is **stable** but has **contrast blush on CT** (either from **pseudoaneurysm** or **active extravasation**), **angiographic embolization** is necessaryQ
• If **neither a blush**, **nor instability** is observed the patient can **managed non-operatively with close monitoring**Q.



SPLENIC TUMORS

50. **Ans. a. Lymphoma** *(Ref: Maingot 11/e p1085; Bailey 26/e p1094, 25/e p1108)*

- **MC neoplasm** of **spleen: Lymphoma**Q (Non-Hodgkin's lymphoma)
- **MC primary tumor** of **spleen**: **Hemangioma**Q
- **MC primary malignant tumor** of **spleen**: **Angiosarcoma**Q (Hemangiosarcoma)

51. **Ans. d. Lymphoma**

52. **Ans. c. Carcinoma ovary** *(Ref: Oncological Imaging by Paul Silvermann 2012/chapter 31/The spleen)*

In case of "**isolated**" splenic metastasis, **ovarian** and **colorectal carcinomas** are the most common causes.

- Causes of **isolated splenic metastasis**: **Carcinoma Ovary**Q (27%) >**Colorectal carcinoma** (26%) >**Uterine cancer** (17%)
- **MC primary** for **metastasis to spleen**: **Malignant melanoma**Q (30-50%) > **CA Breast** (21%) > **CA Lung** (18%).

53. Ans. d. None of the above *(Ref: Shackelford 7/e p1651)*

Hemangioma (Spleen)

- **Hemangioma**: **MC benign tumor** of the **spleen**Q.
- **Primarily asymptomatic, incidentally found** at autopsyQ
- May be **singular, multiple,** or **even involve** the **entire spleen**Q.

Clinical Features

- **Symptoms result** when the **tumor enlarges** to **encroach on adjacent organs**.
- **Spontaneous rupture**Q can occur in up to **25%** of cases.
- A **consumptive coagulopathy** may be present due to the **platelet trapping** in the **cavernous spaces** of the lesionQ.

Diagnosis

- **CT scan** demonstrates **splenomegaly**Q.
- **Angiography** demonstrates a **"laking" effect** similar to that seen with hepatic hemangiomas

Treatment

- **Nonsurgical treatment** is employed for **small, asymptomatic, incidentally detected hemangiomas**Q.
- **Splenectomy** is **the treatment of choice** for **larger** and **symptomatic hemangiomas**Q.

SPLENIC ABSCESS

54. Ans. c. Salmonella *(Ref: Sabiston 19/e p1555-1556; Schwartz 9/e p1255; Bailey 26/e p1090, 25/e p1104; Shackelford 7/e p1655-1658)*

Splenic Abscess

- **Unusual** but **potentially life threatening illness**Q
- **Mortality rate** of **15-20%** in previously **healthy patients**, with **single unilocular lesions**, to **80% for multiple abscesses** in **immunocompromised patients**Q.

Predisposing Factors for Splenic abscess	
• **Malignancies**Q	• **Hemoglobinopathies**Q
• **Polycythemia vera**Q	• **Urinary tract infections**
• **Endocarditis**Q	• **IV drug use**Q
• **Prior trauma**Q	• **AIDS**Q

- Approximately **70%** of **splenic abscesses result from hematogenous spread** of the **infective organism** from another location, as in **endocarditis, osteomyelitis**, and **IV drug use**Q.
- **Gram-positive cocci** (***Staphylococcus-MC***Q, ***Streptococcus***, or *Enterococcus* spp.) and **gram-negative enteric organisms** are typically involved.

  - **Salmonella** and **Enterobacter spp**. and other enteric organisms are commonly seen in splenic abscess in patients of sickle cell anemia.

- **Fungal abscesses** (e.g., ***Candida*** spp.) also occur, **typically in immunosuppressed patients**Q

Clinical Features

- Splenic abscesses present with **nonspecific symptoms**: vague **abdominal pain, fever, peritonitis**, and **pleuritic chest pain**Q.
- Splenomegaly is not typical.

Diagnosis

- **CT**: **Investigation of choice** for diagnosis of **splenic abscess**Q.
- **USG**: Diagnosis can also be made with ultrasound.

Treatment

- **Unilocular abscesses**: **Percutaneous drainage** + **antibiotics** (success rates 75-90%)Q
- **Multilocular lesions**: **Splenectomy** + **Drainage** of the left upper quadrant + **Antibiotics**Q

SPLENIC CYST

55. Ans. a. Hydatid cyst *(Ref: Sabiston 19/e p1555; Schwartz 9/e p1255; Bailey 26/e p1089, 25/e p1103; Shackelford 7/e p1650-1651)*

- **MC splenic cyst**: **Parasitic** or **Hydatid cyst** (Echinococcus)Q
- **MC non-parasitic splenic cyst**: **Pseudocyst** (secondary to **trauma**)Q
- **MC congenital nonparasitic splenic cyst**: **Epidermoid cysts**Q

ACCESSORY SPLEEN

56. Ans. c. Splenic hilum *(Ref: Schwartz 10/e p1424, 9/e p1246; Bailey 26/e p1089, 25/e p1103; Shackelford 7/e p1622, 1660)*

Accessory Spleen

- **Splenunculi** are single or multiple accessory spleens that are found in approximately 10–30% of the population.
- MC site: **Near the hilum** of the spleen (**in 50%**Q) >Related to the **splenic vessels** or **behind the tail of pancreas** (in **30%**)
- **Failure to identify** and **remove** these at the time of splenectomy **may give rise to persistent disease**Q**.**

Usual Location of Accessory Spleens	
• **Splenic hilum (MC)**Q • **Tail of the pancreas**Q • **Gastrosplenic ligament** • **Splenocolic ligament** • **Greater omentum** along the greater curvature of the stomach	• **Left transverse mesocolon** • Mesentery • Left mesocolon • Left ovary • Pouch of Douglas • Left testis

57. Ans. b. Hilum of spleen **58. Ans. b. Hilum** **59. Ans. b. Presacral areas**

60. Ans. a. Splenic hilum **61. Ans. a. Hilum of spleen**

MISCELLANEOUS

62. Ans. a. Splenectomy *(Ref: Sabiston 19/e p1432; Schwartz 10/e p1280-1281, 9/e p1112; Blumgart 5/e p1079-1091; Shackelford 7/e p1597; Harrison 18/e p2598)*

Left Sided Portal Hypertension

- Portal hypertension **due to isolated splenic vein thrombosis**Q is known as left sided portal hypertension or **sinistral hypertension**Q.
- **Pressure** in **portal vein** and **SMV** are **normal**Q
- There is **gastrosplenic venous hypertension** leading to **formation of gastric varices**Q

Causes

- **Pancreatitis** (**MC**) Q leading to splenic vein thrombosis
- Neoplasm, Trauma

Treatment

- **Splenectomy** is the **treatment of choice**Q.

63. Ans. b. 2 *(Ref: Guyton 10/e p160; Sabiston 19/e p1548; Schwartz 10/e p1423-1445, 9/e p1246-1247)*

Spleen

- **Normal weight**: **75-100 gm**Q
- **Average blood flow: 300 ml/min**Q
- Functions as the **primary filter** of the **reticuloendothelial system**Q, sequestering and removing antigens, bacteria, senescent or damaged cellular elements
- **Important role** in **humoral immunity**, **producing IgM** and the **opsonins, tuftsin** and **properdin**Q
- **Important component** of the **complement activation system**Q
- **Source** of **extramedullary hematopoiesis**Q.

- **Contains 2%** of **total blood volume** (known as **blood bank** of **body**)Q

64. Ans. c. Rupture of spleen and distribution of its tissue on peritoneum *(Ref: Shackelford 7/e p1616)*

Splenosis

- **Splenosis** or **regeneration of miniscule splenic remnants** in the **peritoneal cavity**Q
- May be **encountered in cases** of **traumatic rupture** where **splenic tissue disseminates** throughout the **peritoneal cavity**Q.

65. Ans. a. Sickle cell anemia **66. Ans. a. Culling**

67. Ans. b. Phrenicolic ligament *(Ref: Grays 40/e p1107-1108, 1214, 1228, 1191; BDC 4th/vol II/230, 233-234)*

Splenic Anatomy

- Spleen is **largest lymphatic organ**Q
- Related to **9th, 10th** and **11th ribs**; **Long axis** is **along 10th rib**Q
- **Develops from** cephalic part of **dorsal mesogastrium**
- **Superior border** is **notched** at **anterior margin**Q
- **Nerve supply from celiac plexus**Q

Ligaments related to Spleen
• **Phrenicocolic ligament prevents downward displacement**Q • **Linorenal ligament** contain **tail of pancreas** and **splenic vessels**Q • **Gastrosplenic ligament** contain **short gastric vessels**Q

68. Ans. d. Derives its nerve supply from celiac plexus

69. Ans. a. Asplenia *(Ref: Nelson 18/e p1929)*

Right Isomerism (Asplenia)	Left Isomerism (Polysplenia)
• **Spleen** is **absent**, **either side** of midline **resembles right side**Q • Also known as **bilateral right sidedness** • Asplenia is associated with **severe cardiac abnormalities** • Relatively **poor prognosis**	• **Multiple small spleens** placed on either side of midline, **either side** of midline **resembles left side**Q • Also known as **bilateral left sidedness** • Associated with **less severe cardiac abnormalities** • Relatively **better prognosis**

70. Ans. a. Chronic pancreatitis

71. Ans. d. All of the above *(Ref: Bailey 26/e p1091, 25/e p1105)*

Tropical Splenomegaly

- **Massive splenic enlargement** frequently occurs **in** the **tropics from malaria**, **kala-azar** and **schistosomiasis**Q.
- Occasionally, splenomegaly cannot be fully attributed to these diseases.
- It may result from **occult infection** or be **related to malnutrition**.
- The **massive splenomegaly** observed in this condition **may require removal** for those patients **disabled by anemia** or **local symptoms**Q.
- **Lifelong antimalarial therapy** is indicated **in malaria endemic areas**Q.

72. Ans. a. Splenic artery *(Ref: Sabiston 19/e p1761-1763; Schwartz 10/e p1438, 9/e p1256; Bailey 26/e p1089-1090, 25/e p1103-1104; Shackelford 7/e p1098-1100)*

Splenic Artery Aneurysms

- **MC site** of **intra-abdominal aneurysm: Aorta >Splenic artery**Q

  - **MC site** of **splanchnic artery aneurysm: Splenic artery**Q
  - **MC causes: Arteriosclerosis**Q
  - Usually **saccular**, **multiple aneurysm** is **20%**Q

- **Calcification** is present in **one-third**, and **mostly situated** in the **distal third**Q of the splenic artery.
- Four times **more common in women** (possible factors include **multiparity, portal hypertension**, **arterial fibrodysplasia, pancreatitis**, and, less commonly, trauma, arteritis, and septic emboli)Q
- Aneurysmal **rupture** in **pregnancy** usually occurs during the **third trimester**Q.

Factors Increasing the Risk of Rupture	
• **Young age**Q	• Presence of **hypertension**Q
• **Absence of** aneurysmal **calcification**Q	• Aneurysm diameter **>1.5 cm**Q

Management

- Documented **aneurysmal enlargement** and **symptoms** caused by aneurysm are **indications of operation**Q.
- An aneurysm detected in a **female** who anticipate pregnancy should be removed and one **detected during pregnancy** should be **removed before** the **third trimester**Q.

  - **Proximal aneurysms** are **excised** after proximal and distal ligations
  - **Mid-splenic aneurysms** are **excluded** by proximal and distal ligations of the splenic artery and all collateral vessels.
  - **Distal** or **hilar aneurysm** is the **most common** and is treated with **aneurysmectomy** and **splenectomy**Q.

NOTES

SECTION 4

UROLOGY

CHAPTERS

- Chapter 21 Kidney and Ureter
- Chapter 22 Urinary Bladder
- Chapter 23 Prostate and Seminal Vesicles
- Chapter 24 Urethra and Penis
- Chapter 25 Testis and Scrotum

CHAPTER 21

Kidney and Ureter

MULTIPLE CHOICE QUESTIONS

RENAL AND URETERIC CALCULI

1. **Renal calculi associated with proteus infection:** *(All India 2011, 2009)*
   a. Uric acid b. Triple phosphate
   c. Calcium oxalate d. Xanthine
2. **Nephrolithiasis occurs with the toxicity of:** *(COMEDK 2005)*
   a. Ritonavir b. Saquinavir
   c. Indinavir d. Nelfinavir
3. **Not true about 'Struvite Stones' is:** *(AIIMS Nov 2001)*
   a. Better known as staghorn calculus
   b. These are triple phosphate stones
   c. Common in infected urine
   d. Usually seen in acidic urine
4. **Randall's plaques causes:** *(TN 98)*
   a. Bile stones
   b. Urinary stones
   c. Premalignant lesions
   d. Bacterial infections
5. **Commonest stone in case of UTI:** *(AIIMS Nov 97)*
   a. Phosphate b. Urate
   c. Cysteine d. Calcium oxalate
6. **Oxalate stones are found in:** *(PGI June 2006)*
   a. Ethylene glycol b. Ethanol
   c. Diethyl glycol d. Methyl alcohol
7. **Staghorn calculus is made of:** *(DNB 2012 UPSC 97)*
   a. Oxalate b. Phosphate
   c. Uric acid d. Cystine
8. **Renal stones which are laminated and irregular in outline are:** *(Recent Questions 2013)*
   a. Uric acid
   b. Calcium oxalate
   c. Struvite
   d. Cystine

RENAL AND URETERIC CALCULI CLINICAL FEATURES

9. **Locate the renal stone with pain radiating to medial side of thigh and perineum due to slipping of stone in males:**
   a. At pelvic brim *(AIIMS June 2010, All India 96)*
   b. Intramural opening of ureter
   c. Junction of ureter and renal pelvis
   d. At crossing of gonadal vessels and ureter
10. **A patient was admitted with complaints of ureteric stone. He was on treatment with IV fluids and analgesics. Suddenly he developed radiating pain to the pubic area and medial aspect of the thigh. The stone is coming down. What is the most probable site of lodgment of the stone?** *(DPG 2011)*
    a. At renal pelvis
    b. At pelvic brim
    c. At the level of gonadal vessels
    d. Intramural portion of the ureter
11. **Triad of renal colic, swelling in loin which disappears after passing urine is called:** *(All India 96)*
    a. Kocher's triad b. Saint's triad
    c. Dietel's crisis d. Charcot's triad
12. **Ureteric colic due to stone is caused by:** *(UPPG 2010, All India 2008)*
    a. Stretching of renal capsule due to back pressure
    b. Increased peristalsis of ureter to overcome the obstruction
    c. Irritation of intramural ureter
    d. Extravasation of urine
13. **A patient with alkaline urine which is cloudy with plenty of pus cells is suffering from infection with:** *(Kerala 89)*
    a. E. coli b. Proteus
    c. TB d. None
14. **Referred pain from ureteric colic is felt in the groin due to involvement of the following nerve:** *(All India 2003)*
    a. Subcostal b. Iliohypogastric
    c. Ilioinguinal d. Genitofemoral
15. **Commonest presentation of bilateral ureteric stones:**
    a. CRF b. UTI *(AIIMS 91)*
    c. Pain d. Hematuria
16. **Most severe pain in ureteric stone is seen in cases of:** *(UPPG 99)*
    a. Oxalate stones b. Triple phosphate
    c. Cystine stone d. Uric acid stone
17. **Ureteric colic characterized by all except:** *(UPPG 2007)*
    a. Acute onset
    b. Stillness of the patient
    c. Responds to antispasmodics
    d. Radiates to the groin
18. **Treatment of choice of ureteric colic is:** *(GB Pant 2010)*
    a. Nitrites b. Pethidine
    c. Adrenaline d. Diclofenac

RENAL AND URETERIC CALCULI DIAGNOSIS AND TREATMENT

19. **A petient present with pain and tenderness in the left iliac fossa. USG shows a 3 cm stone in the renal pelvis without any hydro-nephrosis. Most appropriate management:** *(AIIMS May 2012)*
    a. PCNL
    b. ESWL
    c. Diuretics
    d. Medical dissolution threapy with KCl
20. **All are radioopaque except one:** *(AIIMS June 2000)*
    a. Oxalate b. Uric acid
    c. Cystine d. Mixed

21. A child presents with complaints of abdominal colic and hematuria USG showed a renal stone 2.5 cm in diameter in renal pelvis the next step in management of this case: *(AIIMS Nov 2000)*
a. ESWL
b. Pyelolithotomy
c. Nephroureterostomy
d. Conservative

22. Which of the following stones is hard to break by ESWL? *(All India 2010)*
a. Calcium oxalate monohydrate
b. Calcium oxalate dehydrate
c. Uric acid
d. Struvite

23. A 50 years old female is admitted with abdominal pain and anuria. Radiological studies revealed: bilateral impacted ureteric stones with hydronephrosis. Urine analysis showed RBCs with pus cells in urine. Serum creatinine level was 16 mg/dl and urea level was 200 mmol/l. Which of the following should be the immediate treatment? *(All India 2010)*
a. Hemodialysis
b. 'j' stent drainage
c. Lithotripsy
d. Ureteroscopic removal of stones

24. What complication should one expect when PCNL is done through 11th intercostals space? *(All India 2010)*
a. Hydrothorax
b. Hematuria
c. Damage
d. Remnants fragments

25. Which of the following is not a contraindication for extra corporeal shockwave lithotripsy (ESWL) for renal calculi? *(AIIMS June 2003)*
a. Uncorrected bleeding diathesis
b. Pregnancy
c. Ureteric stricture
d. Stone in a calyceal diverticulum

26. A 10 mm calculus in the right lower ureter associated with proximal hydroureterone-phrosis is best treated with:
a. ESWL *(All India 2003)*
b. Antegrade percutaneous access
c. Open ureterolithotomy
d. Ureteroscopic retrieval

27. Treatment used for lower ureteric stone is: *(AIIMS June 98)*
a. Endoscopic removal
b. Diuretics
c. Drug dissolution
d. Laser

28. Steinstrasse is: *(HPU 2001)*
a. Staining of stones
b. Stones
c. Failure of ESWL
d. Ureteric obstruction due to fragments in ureter

29. Which of the following statements about the Holmium: YAG laser is incorrect? *(AIIMS June 2004)*
a. It has a wavelength of 2100 nm
b. Its use for uric acid stones has caused deaths due to generation of cyanide
c. It is effective against the hardest urinary stones
d. It can even cut the wire of stone baskets

30. All are indicated in a patient with cystinuria with multiple renal stones except: *(AIIMS Nov 2012)*
a. Cysteamine
b. Increase fluid intake
c. Alkalinization of urine
d. Penicillamine

31. Radioluscent renal stones are composed of: *(PGI 85)*
a. Cysteine
b. Calcium phosphate
c. Calcium phosphate
d. Uric acid
e. Xanthine

32. Percentage of renal stones which are radio opaque:
a. 10%
b. 25 *(JIPMER 86)*
c. 37%
d. 75%
e. 90%

33. Dormia basket is used for removal of renal calculi in the: *(JIPMER 85)*
a. Pelvic ureteric junction
b. Upper 1/3rd of ureter
c. Middle 1/3rd of ureter
d. Lower 1/3rd of ureter

34. Which is false regarding ureteric stones? *(AIIMS 92)*
a. Urine is always infected
b. Should be removed immediately
c. Source is always the kidneys
d. Pain in referred to tip of penis in intramural stones

35. Which one of the following is radiolucent stone? *(GB Pant 2010, MCI Sept 2007)*
a. Calcium oxalate
b. Cystine
c. Uric acid
d. Phosphate

36. Treatment of choice for 0.5 mm renal calyx stone is:
a. ESWL
b. PCNL *(DNB 2007)*
c. Ureteroscopy
d. Cystoscopy

37. All are risk factors for nephrolithiasis except: *(DNB 2007)*
a. Renal tubular acidosis
b. High protein intake
c. High calcium intake
d. Hypercalciuria

38. All of the following statement about renal calculi are true, except: *(All India 93)*
a. Cystine stones form in acidic urine
b. Struvite stones form in alkaline urine
c. Oxalate stones are radiopaque
d. Uric acid stones are resistant to ESWL

39. Staghorn calculus is made of: *(DNB 2000)*
a. Oxalate
b. Phosphate
c. Uric acid
d. Cystine

40. Treatment used for lower ureteric stone is: *(AIIMS June 98)*
a. Endoscopic removal
b. Diuretics
c. Drug dissolution
d. Laser

41. Chandu, 45-years male shows calcification on the right side of his abdomen in an AP view. In lateral view the calcification is seen to overlie the spine. Most likely diagnosis is: *(All India 2001)*
a. Gallstones
b. Calcified mesenteric nodes
c. Renal stones
d. Calcified rib

42. Which of the following advises is not given to a 35 years old female patient with recurrent renal stone? *(AIIMS Nov 2012)*
a. Increase water
b. Restrict protein
c. Restrict salt
d. Restricted calcium intake

43. Stone which is resistant to lithotripsy? *(AIIMS Nov 2010)*
a. Calcium oxalate
b. Triple phosphate stone
c. Cystine stone
d. Uric acid stone

44. Which of the following are radiolucent renal stones? *(MHPGMCET 2002) (JIPMER 2012)*
a. Uric acid stones
b. Cystine stones
c. Mixed stones
d. Calcium oxalate stones

45. Which of the following is not true regarding ureteric calculus? *(MHPGMCET 2008)*
a. Severity of pain increases with size of the calculus
b. Hematuria is invariably seen in all cases
c. Pain may radiate to the anterior aspect of thigh
d. Pain may radiate to tip of the penis

46. Commonest cause of ureteric obstruction:
a. Stone b. Clot *(MHSSMCET 2006)*
c. Cast d. Carcinoma

47. LASER used in treatment of ureteric calculi: *(MHSSMCET 2008, 2006, All India 2003)*
a. Holmium b. Nd-Yag
c. Argon d. CO_2

48. Following is true about PCNL except: *(MHSSMCET 2009)*
a. Bleeding is least concerned complication
b. Involves the placement of a hollow needle into the renal colleting system through the soft tissue of the loin and the renal parenchyma
c. Perforation of the colon or pleural cavity during placement of the percutaneous track
d. Perforation of the collecting system may occur

49. Laser used in treatment of prostatic and ureter diseases: *(MHSSMCET 2010)*
a. Nd-Yag b. Holmium
c. Argon d. CO_2

50. A patient is passing stones recurrently in urine for past few years. All are to be restricted in diet except: *(AIIMS Nov 2010)*
a. Protein restriction b. Calcium restriction
c. Salt restricted d. Phosphate restriction

RENAL INFECTIONS

51. Most common cause of emphysematous pyelonephritis: *(GB Pant 2011, COMEDK 2008)*
a. E. coli b. Proteus
c. Klebsiella d. Pseudomonas

52. Sheela, a middle aged diabetic female presented with flank pain and fever. On U/S the kidney was irregular and showed fat density lesion with calculi. The diagnosis is most probably: *(AIIMS Nov 2001)*
a. TB kidney
b. Xanthogranulomatous kidney
c. Chronic pyelonephritis
d. Renal abscess

53. Following is true of pyonephrosis except: *(AIIMS 92)*
a. Commonly associated with renal calculi
b. Always unilateral
c. Is a complication of hydronephrosis
d. Follows acute pyelonephritis

54. Subcapsular nephrectomy is indicated is: *(PGI 93)*
a. Perinephric abscess
b. Hydronephrosis
c. Pyonephrosis
d. Solitary adenocarcinoma

55. A boy is suffering from acute pyelonephritis. Most specific urinary finding will be: *(AIIMS May 2012)*
a. WBC cast
b. Leucocyte esterase test
c. Nitrite test
d. Bacteria in Gram stain

56. Xanthogranulomatous pyelonephritis is often associated with infection by: *(DNB 2010 COMEDK 2009)*
a. Proteus b. E. coli
c. H. influenza d. Klebsiella

57. Most common predisposing factor for chronic pyelonephritis is: *(DNB 2004, 2000)*
a. Diabetes mellitus b. Renal stone
c. Posterior urethral valve d. Vesicoureteric reflux

GENITOURINARY TUBERCULOSIS

58. Most common route of infection in kidney tuberculosis: *(All India 93)*
a. Ascending spread b. Hematogenous
c. Lymphatic spread d. Direct invasion

59. The most sensitive imaging modality to detect early renal tuberculosis is :
a. Intravenous urography
b. Computed tomography
c. Ultrasound
d. Magnetic resonance imaging

60. In genitourinary TB, true is: *(PGI Dec 98)*
a. Sterile pyuria is consistent finding
b. AFB in early morning sample is always positive
c. MC site is pelvis
d. Commonest cause of pyelonephritis

61. Renal tuberculosis originates in the: *(JIPMER 81, PGI 86)*
a. Renal papilla
b. Renal medulla
c. Afferent tubules
d. Efferent arteriole of glomerulus

62. "Golf-hole" ureter is seen in: *(WBPG 2014; Karnataka 94)*
a. Ureteric calculus b. Ureteral polyp
c. Tuberculosis of ureter d. Retroperitoneal fibrosis

63. Earliest and often the only presentation of TB kidney is: *(DNB 2005, 2001, AIIMS 78, AMU 88)*
a. Increased frequency b. Pain
c. Hematuria d. Renal calculi

64. In a patient who was has acid-fast bacilli in the urine:
a. Calcification of the bladder is common *(AIIMS 83)*
b. Bladder disease is associated with extensive renal disease
c. Ureteric involvement causes shortening of the ureters
d. Renal disease can produce changes identical to reflux nephropathy
e. Ureteric calculi are commonly present

65. Genitourinary TB in a male patient presents with:
a. Painful and tender epididymis *(JIPMER 2011)*
b. Bacteriuria without pyuria
c. Renal cysts (unilateral)
d. Microscopic hematuria

66. Sterile pyuria is characteristically seen in: *(All India 2011)*
a. Renal tuberculosis b. Chronic Hydronephrosis
c. Wilm's Tumor d. Neuroblastoma

HYDRONEPHROSIS

67. A lady present with unilateral hydronephrosis on USG. She is asymptomatic. Ureteropelvic drainage is normal. What is/are treatment modality for her? *(PGI Dec 2008)*
a. Pyloroplasty b. Analgesia SOS
c. Under observation d. Follow up by USG

68. Unilateral hydronephrosis is due to: *(AMC 99)*
a. Bladder neck contracture b. Stricture urethra
c. Carcinoma of prostate d. Ureterocele

69. A 60 years old male with poor stream of urine, post void residual urine is 400 ml, bilateral hydronephrosis and prostate weighing 70g. His urea is 120 and creatinine 3.5. Ideal "next immediate" step: *(AIIMS Nov 2010)*
a. Catheterize with Foley catheter
b. Bilateral PC nephrostomies
c. CT to rule out carcinoma
d. MRI pelvis

70. Hydronephrosis due to obstruction of ureter is best diagnosed by: *(MHPGMCET 2008)*
a. IVU
b. Radioisotope scan
c. Retrograde pyelography
d. Whitaker test

DIAGNOSTIC AND LABORATORY INVESTIGATIONS

71. DTPA scan of hypertensive young lady is normal, USG shows small kidney on left side. Next investigation will be:
a. CT Scan abdomen *(AIIMS Nov 2000)*
b. Retrograde pyelogram
c. Digital subtraction angiography
d. DMSA

72. After a single episode of painless gross hematuria in a boy. Doctor performed an excretory urogram showing a filling defect towards the lower renal infundibulum 1.5 cm in size. What will be the next investigation to be done? *(Karnataka 2003, AIIMS Nov 2000)*
a. Cystoscopy
b. Urine cytology
c. USG
d. Retrograde pyelography

73. An absolute contraindication for IVP is: *(All India 96)*
a. Allergy to the drug
b. Multiple myeloma
c. Blood urea > 200 mg
d. Renal tumor

74. During investigation of hydronephrosis, isotope renogram is useful mainly in: *(UPSC 2000)*
a. Detecting vesicoureteric reflux
b. Anatomical definition
c. Distinguishing between non-obstructed system
d. Identifying ectopic kidney tissue

75. Pseudo kidney is: *(J and K 2001)*
a. Thickened bowel loop on USG
b. Hydronephrosis
c. Unascended kidney
d. Undescended testes

76. The investigation of choice for renal scarring defect in kidney: *(All India 2012)*
a. DMSA scan
b. DTPA scan
c. Dexa scan
d. MCU

77. The substance present in the gallbladder stones or the kidney stones can be best identified by the following techniques: *(All India 2003)*
a. Fluorescence spectroscopy
b. Electron microscopy
c. Nuclear magnetic resonance
d. X-ray diffraction

78. Reflux nephropathy is diagnosed mainly by: *(MCI Sept 2005)*
a. X-ray KUB
b. Micturating cystourethrogram
c. CT scan
d. MRI

79. A patient presents with hematuria of several days and dysmorphic RBC casts in urine. The site of origin is: *(AIIMS Nov 2001)*
a. Kidney
b. Ureter
c. Bladder
d. Urethra

80. Isotope Renogram: *(Karnataka 94)*
a. Study of rennin mechanism
b. Contrast study of kidneys, ureter and bladder
c. Utilized in mapping the anatomy of kidneys
d. Graphic representation of radioactivity of kidneys

81. 'Rim' and 'ball' nephrograms in intravenous urography are seen in: *(COMEDK 2009)*
a. Normal kidneys
b. Acute obstructive nephropathy
c. Chronic obstructive nephropathy
d. Chronic renal failure

82. Radiation exposure is the least in the following procedure:
a. Micturating cystourethrogram *(AIIMS Nov 2010)*
b. IVP
c. Bilateral nephrostogram
d. Spiral CT for stones

83. Indications of percutaneous nephrostomy: *(PGI Nov 2010)*
a. Stone removal
b. Ureteral obstruction
c. Anterograde renography
d. Renal tumor resection
e. Ischemic renal failure

84. One of the following is characterized by RIM sign: *(AIIMS Nov 98)*
a. Hydronephrosis
b. Hypernephroma
c. Chronic pyelonephritis
d. Polycystic kidney

85. Percutaneous nephrostoma is indicated in: *(DNB 2001)*
a. Polycystic kidney disease
b. Solitary adenocarcinoma
c. Simple hydronephrosis
d. Pyonephrosis

BENIGN RENAL TUMORS

86. Regarding angiomyolipoma of kidney, what is incorrect?
a. Pain in the loin *(AIIMS Nov 94)*
b. Presents with hypertension
c. Bleeding is self limited
d. Nephrectomy is the treatment of choice

87. Central stellate scar on CT scans are seen in: *(COMEDK 2008)*
a. Renal hemangioma
b. Renal oncocytoma
c. Wilm's tumour
d. Papillomas

RENAL CELL CARCINOMA TYPES

88. Renal cell carcinoma histopathologicaly showing 'perinuclear halo' and "Plant like" structure in malignant cells is seen in: *(PGI Dec 2000)*
a. Clear cell tumor
b. Papillary carcinoma
c. Collecting duct carcinoma
d. Chromophobe cell carcinoma

89. Which of the following statements is true regarding kidney tumors? *(PGI Dec 2001)*
a. Mutated VHL gene is associated with clear cell carcinoma
b. Extreme hyperdiploidy occurs
c. Extreme hypodiploidy occurs
d. Renal papillary carcinoma has defect in chromosome 8
e. Oncocytoma has defect in chromosome 11

90. The most common histological variant of renal cell carcinoma is: *(AIIMS Nov 2005)*
a. Clear cell type
b. Chromophobe type
c. Papillary type
d. Tubular type

91. Chromophobe variant to renal cell carcinoma is associated with: *(All India 2010)*
a. VHL gene mutations
b. Trisomy of 7 and 17 (+7, +17)
c. 3 p deletions (3 p-)
d. Monosomy of 1 and Y (-1, -Y)

92. Bilateral renal cell carcinoma is seen in: *(COMEDK 2008)*
a. Eagle-Barett's syndrome
b. Beckwith-Weidman syndrome
c. von-Hippel Lindau (VHL) syndrome
d. Bilateral angiomyolipoma

93. Most common site of origin of RCC: *(MHSSMCET 2008)*
a. PCT b. DCT
c. Collecting ducts d. Loop of Henle

RENAL CELL CARCINOMA CLINICAL FEATURES, PARANEOPLASTIC SYNDROMES

94. All can be seen in hypernephroma, except: *(AIIMS Nov 93)*
a. Polycythemia
b. Renal vein thrombosis
c. Hypertension
d. Hematuria

95. Not correct regarding renal cell carcinoma:
a. May be associated with varicocele
b. May invade renal vein *(AIIMS Nov 94, June 95)*
c. More common in female
d. Arises from proximal convoluted tubule

96. Most common site for secondary metastasis in a case of hypernephroma: *(AIIMS Feb 97)*
a. Adrenal
b. Lungs
c. Brain
d. Bones

97. Painless gross hematuria occurs in: *(All India 94)*
a. Renal cell carcinoma b. Polycystic kidney
c. Stricture of urethra d. Wilm's tumor

98. In renal cell carcinoma, which is true? *(JIPMER 95)*
a. Hypercalcemia b. Polycythemia
c. Cushing syndrome
d. All

99. Cannon ball deposits seen in the lungs are characteristic of: *(DNB 2003)*
a. Seminoma testis b. Carcinoid
c. Hypernephroma d. Pheochromocytona

100. Bilateral RCC may be seen in: *(DNB 2002)*
a. Tuberous sclerosis
b. von-Willebrand's disease
c. von-Hippel Lindau disease
d. von-Recklinghausen disease

101. All are features of hypernephroma except: *(HPU 2005)*
a. Persistent pyrexia b. Hematuria
c. Polycythemia d. Lower pole involvement

102. All are true about renal cell carcinoma except: *(DPG 2006)*
a. Invasion of renal vein means inoperability
b. Presents with abdominal pain, hematuria
c. Arises from tubular epithelium
d. More common in males

103. Regarding RCC all are true except: *(DPG 2005)*
a. Renal lump, pain abdomen, hematuria
b. Associated with anemia and low ESR
c. Propensity to invade IVC
d. Invasion of renal vein is contraindication for surgery

104. Not correct regarding renal cell carcinoma:
a. May be associated with varicocele
b. May invade renal vein
c. More common in female
d. Arises from proximal convoluted tubule

105. A 55-years old male with 35 pack years presented with painless mass in left scrotal sac and microscopic hematuria. On laboratory investigation, Alpha-fetoprotein and lactate dehydrogenase was negative. What is the diagnosis? *(AIIMS May 2013)*
a. Epididymitis b. Seminoma
c. Renal cell carcinoma d. Carcinoma lung

106. All can be seen in hypernephroma, except: *(AIIMS Nov 93)*
a. Polycythemia b. Renal vein thrombosis
c. Hypertension d. Hematuria

107. Paraneoplastic syndrome associated with RCC are all of the following except:
a. Polycythemia
b. Hypercalcemia
c. Malignant hypertension
d. Cushing syndrome

108. Most common presentation of renal adenocarcinoma: *(COMEDK 2005)*
a. Hematuria b. Local pain
c. Mass d. Fever

109. Commonest manifestation of Grawitz's tumor in male:
a. Secondary deposits *(MHPGMCET 2009)*
b. Pathological fracture
c. Hematuria
d. Rapidly developing varicocele

RENAL CELL CARCINOMA DIAGNOSIS AND TREATMENT

110. A patient presented with renal cell carcinoma invading IVC and renal vein. False statement is: *(AIIMS Nov 2001, June 2001)*
a. Pre-op biopsy is not necessary
b. IVC involvement indicates inoperability
c. Pre-op radiotherapy is not essential
d. Chest X-ray should be done to rule out pulmonary metastasis

111. Most important prognostic indicator for renal cell carcinoma: *(AIIMS May 2009)*
a. Nuclear grade b. Histological type
c. Size d. Pathological staging

112. The treatment of choice in renal cell carcinoma with the tumor lf less than 4 cm in size is: *(AIIMS Nov 2004)*
a. Partial nephrectomy
b. Radical nephrectomy
c. Radical nephrectomy + post operative radiotherapy
d. Radical nephrectomy + chemotherapy

113. False regarding hypernephroma is: *(AIIMS Nov 93)*
a. Radiosensitive
b. Arise from cortex usually from pre existing adenoma
c. May present with rapidly developing varicocele
d. Usually adenocarcinoma

114. A 30 years old male presents with pain on the right flank and hematuria. CECT abdomen reveals a large 8 x 8 cm sized solid mass in the right kidney and 3 x 3 cm solid mass occupying the upper pole of left kidney. The most appropriate surgical treatment for this patient is: *(AIIMS Nov 2002)*
a. Bilateral radical nephrectomy
b. Right radical nephrectomy and biopsy of the mass from opposite kidney
c. Right radical nephrectomy and left partial nephrectomy
d. Right radical nephrectomy only

115. Ideal approach for renal malignancy is: *(AIIMS 89)*
a. Transperitoneal b. Retroperitoneal
c. Lumbar incision d. Abdominothoracic incision

116. Renal collar to prevent spread of malignancy from kidney is put around: *(JIPMER 93)*
a. Aorta b. IVC
c. Renal vein d. Renal artery

117. A 40 years old man presented with painless hematuria Bimanual examination revealed a ballotable mass over the right flank. Subsequently right nephrectomy was done and mass was seen to be composed of cells with clear cytoplasm. Areas of hemorrhage and necrosis were frequent. Cytogenic analysis of this mass is likely to reveal an abnormality of: *(All India 2004)*
a. Chromosome 1 b. Chromosome 3
c. Chromosome 11 d. Chromosome 1

118. A patient with a suspected renal tumor/mass is diagnosed by exfoliative urinary cytology. Which of the following histological types is most likely to be diagnosed on urinary exfoliative cytology? *(All India 2012)*
a. Transitional cell carcinoma
b. Adenocarcinoma
c. Well differentiated carcinoma (Low grade)
d. All three type can be easily detected on exfoliative cytology

119. The commonest systemic abnormality associated with renal cell carcinoma is: *(COMEDK 2009)*
a. Hypertension b. Polycythemia
c. Elevated ESR d. Pyrexia

120. A 40 years old patient with a single kidney presents with a solitary exophytic mass of 4 cm localized at its lower pole. Which amongst the following is the best recommended management option?
a. Partial nephrectomy
b. Radical nephrectomy
c. Radical nephrectomy with dialysis
d. Radical nephrectomy with immediate renal transplantation

121. Radical Nephrectomy include all of the following except: *(MHSSMCET 2008)*
a. Early ligation of vessels
b. Lymphadenectomy
c. Keeping fascia back in place
d. Removal of kidney including the Gerota's fascia

WILM'S TUMOR

122. Commonest presentation of Wilm's tumour is:
a. Hematuria *(AIIMS Nov 95)*
b. Abdominal lump
c. Hydronephrosis
d. Pain in abdomen

123. True regarding Wilm's tumour is: *(AIIMS Nov 94)*
a. Bone metastasis
b. Always unilateral
c. Very commonly metastasize to liver
d. Worst prognosis among infants

124. The most important determinant of prognosis in Wilm's tumor is: *(All India 2006)*
a. Stage of disease
b. Loss of heterozygosity of chromosome 1p
c. Histology
d. Age less than 1 year at presentation

125. The ideal timing of radiotherapy for Wilm's tumor after surgery is: *(All India 2006)*
a. Within 10 days b. Within 2 weeks
c. Within 2 months d. Anytime after surgery

126. Neuroblastoma differs from Wilm's tumor radiologically by all except: *(AIIMS June 2001)*
a. Calcification
b. Aorta and IVC are not eroded but pushed aside
c. Same location
d. Intraspinal extension of tumor

127. Earliest symptom of Wilm's tumour: *(JIPMER 86)*
a. Hematuria b. Pyrexia
c. Abdominal mass d. Metastases

128. The triad of Wilm's tumour is: *(PGI 88)*
a. Hematuria b. Mass abdomen
c. Pain d. Fever
e. Weight loss

129. All are true about Wilm's tumour except: *(All India 97)*
a. Fever and weakness are clinical features
b. Arises from primitive cells
c. Hematuria almost always present
d. It presents as abdominal mass

130. Good prognosis in Wilm's tumour is seen in: *(Punjab 2008, Kerala 91)*
a. 2-5 years b. Less than 1 year
c. Male child d. Female child

131. All are true regarding Wilm's tumour except: *(AIIMS 92)*
a. Preoperative use of Actinomycin D
b. Postoperative radiotherapy
c. Good prognosis in infants
d. Neuroblastoma is the commonest differential diagnosis

132. Commonest site of metastasis of Wilm's tumour is:
a. Bones b. Lungs *(AIIMS 94)*
c. Liver d. Brain

133. Which of the following is the postchemotherapy based staging system in Wilm's tumor? *(All India 2009)*
a. National Wilm's tumor staging system (NWTSG)
b. International society of Pediatric Oncology (SIOP)
c. AJCC TNM
d. Chadwick

134. All are associated with Wilm's tumor except: *(AIIMS Feb 97)*
a. Aniridia
b. Male pseudo hermaphrodite
c. Arthogryposis multiplex congenita
d. Hemihypertrophy

135. Which of the following is the treatment of choice for stage I Wilm's tumor? *(All India 2012)*
a. Laparoscopic nephrectomy
b. Open nephroureterectomy
c. Chemotherapy
d. Observation

136. Wilm's tumor chromosome is: *(JIPMER 2012)*
a. 13 q b. 13 p 14
c. 11 p 13 d. 17

TUMORS OF RENAL PELVIS

137. Commonest type of cancer of the renal pelvis and upper ureter is: *(NIMHANS 87)*
a. Transitional cell carcinoma
b. Adenocarcinoma
c. Squamous cell carcinoma
d. Nephroblastoma

138. Epidermoid carcinoma of renal pelvis is usually associated with: *(Karnataka 94)*
a. Multiple papillomas
b. Pelvic calculus
c. Tuberculosis of kidney
d. Filariasis

139. 'Stipple sign' in transitional cell carcinoma of the renal collecting system is best demonstrated by: *(COMEDK 2009)*
a. Intravenous urography
b. Retrograde pyeloureterography
c. Radionuclide scan
d. Ultrasound scan

140. Nephroureterectomy is indicated in: *(DNB 2011)*
a. Renal cell carcinoma
b. Chronic pyelonephritis
c. Polycystic kidney disease
d. Transitional carcinoma of the pelvis extending till ureter

RENAL TRAUMA

141. Which of the following is true about renal trauma?
a. Urgent IVP is indicated *(All India 95)*
b. Exploration of the kidney to be done in all cases
c. Lumbar approach to kidney is preferred
d. Renal artery aneurysm is common

142. All except one are correct regarding renal trauma:
a. Observation is best *(AIIMS June 95)*
b. IVP is indicated
c. Exploration indicated in all cases
d. Hematuria is a cardinal sign

143. Which does not happen in unilateral renal trauma?
a. Hypertension *(AIIMS 92)*
b. Uremia
c. Clot formation
d. Perinephric hematoma

144. After RTA, a young male presented with non-pulsatile retroperitoneal hematoma. On table IVU was done. Right kidney was not visualized. Left kidney showed immediate excretion of dye. What is next stap in the management?
a. Nephrectomy *(AIIMS Nov 2011)*
b. Open Gerotas fascia and explore proximal renal vessels
c. Perform retrograde pyelography
d. Perform on table angiography

145. Renal trauma is best treated by: *(UPSC 98)*
a. Observation and supportive measures
b. Early drainage of perirenal hematoma
c. Heminephrectomy
d. Nephrostomy

146. Forty eight after sustaining a blunt abdominal injury, a 15 years old by presents with hematuria and pain in the left side of abdomen. On examination, he has a pulse rate of 96/minute with a BP of 110/70 mm Hg. His Hb is 10.8 gm% with a PCV of 31%. Abdominal examination revealed tenderness in left lumbar region but no palpable mass. The most appropriate investigation to diagnose and find the extent of renal injury would be: *(UPSC 2005)*
a. Sonographic evaluation of abdomen
b. Intravenous pyelography
c. Contrast enhanced computed tomography
d. MR urography

147. What percent of cases with injury to kidney require surgical exploration? *(MAHE 2008)*
a. 20%
b. 90%
c. 50%
d. 70%

148. During renal rupture the nephrectomy is not attempted until: *(UPPG 2010)*
a. Fluid replacement
b. Antibiotics covers
c. Contralateral renal function is ascertained
d. Renal angiogram

149. In renal trauma, which statement is not correct?
a. Exploration is indicated in 90% of cases *(Orissa 2011)*
b. Hematuria is a cardinal sign
c. Transperitoneal approach is preferred
d. IVP is urgently indicated

150. Number of grades of blunt trauma kidney by C.T. scan are:
a. 3
b. 4 *(Orissa 2011)*
c. 5
d. 6

151. Absolute indication for surgical exploration after renal trauma? *(MHSSMCET 2008)*
a. Hematuria
b. Pulsatile hematoma
c. Cortical renal contusion
d. Delayed arterial injury

152. A 25 years old male presents to emergency with history of road traffic accident two hours ago. The patient is hemodynamically stable. Abdomen is soft. On catheterization of the bladder, hematuria is noticed. The next step in the management should be: *(AIIMS Nov 2004)*
a. Immediate laparotomy
b. Retrograde cystouretherography (RGU)
c. Diagnostic peritoneal lavage (DPL)
d. Contrast enhanced computed tomography (CECT) of abdomen

URETERIC INJURY

153. Inadvertent surgical injury of the ureter leads to: *(PGI 80, AIIMS 81, 87)*
a. Complete renal atrophy
b. Hematuria
c. Renal failure
d. Hydronephrosis
e. Hypertension

154. Commonest cause of ureteric injury during surgical operation is: *(UPPG 2007, 2006)*
a. Abdominaoperineal resection
b. Hysterectomy
c. Prostatectomy
d. Colectomy

POLYCYSTIC KIDNEY DISEASE

155. All of the following are features of adult polycystic kidney disease except: *(COMEDK 2005)*
a. Autosomal recessive trait
b. Present as renal mass
c. Haematuria
d. Renal failure

156. Polycystic kidney disease is associated with all of the following except: *(COMEDK 2010)*
a. Cerebral aneurysms
b. Mitral valve prolapsed
c. Renal cell carcinoma
d. Hepatic cysts

157. Not true about polycystic kidney disease is: *(AIIMS Nov 97)*
a. Autosomal dominant
b. Proteinuria < 2 gm/day
c. Leads to CRF
d. Decompression of cyst leads to normal renal function

158. In adult polycystic kidney, all are true except:
a. Hypertension is rare *(AIIMS June 2001)*
b. Hematuria is a common symptom
c. Cysts are seen in liver spleen and pancreas
d. Autosomal dominant transmission is seen

159. True of autosomal dominant polycystic kidney disease I and II respectively: *(PGI June 2002)*
a. Chromosomes 16 and 5 b. 16 and 4
c. 11 and 5 d. 11 and 4
e. 4 and 5

160. Polycystic kidneys can be associated with: *(PGI 84)*
a. Cysts in liver lungs
b. Coarctation of aorta
c. Berry aneurysms
d. All

161. Polycystic kidney may be associated with cyst in all the sites except: *(All India 91)*
a. Lung b. Liver
c. Pancreas d. Brain

162. Treatment of choice in polycystic kidney is: *(Kerala 91)*
a. Removal of cyst b. Nephrectomy
c. Dialysis d. Renal transplant

163. The incidence of liver cysts in childhood polycystic kidney disease is: *(All India 92)*
a. 5% b. 10%
c. 18% d. 50%

164. Polycystic disease of the kidney may have cysts in all the following organs except: *(All India 2004)*
a. Lungs b. Liver
c. Pancreas d. Spleen

165. "Spider leg" deformity in excretory urogram occurs in: *(MCI March 2010, UPPG 2007)*
a. Hydronephrosis b. Polycystic kidney
c. Ureterocele d. Renal agenesis

166. The typical appearance of "spider leg" on excretory urography is seen in: *(UPSC 2008)*
a. Hydronephrosis b. Polycystic kidney
c. Medullary sponge kidney d. Renal cell carcinoma

167. All are true about polycystic kidney except: *(UPPG 2009)*
a. Inherited as autosomal recessive
b. Hypertension and hematuria are common symptoms
c. Spider leg deformity
d. Associated with cysts in the liver and spleen

168. True about adult polycystic kidney disease is all except:
a. Autosomal dominant inheritance *(AIIMS 2001)*
b. Hypertension is rare
c. Can be associated with cysts in liver, lungs and pancreas
d. Pyelonephritis is common

169. Which of the following is the common extrarenal involvement in autosomal dominant polycystic kidney disease? *(AIIMS Nov 2004)*
a. Mitral valve prolapse
b. Hepatic cysts
c. Splenic cysts
d. Colonic diverticulosis

170. Which one of the following statements is wrong regarding adult polycystic kidney disease? *(AIIMS May 2004)*
a. Kidneys are enlarged in size
b. The presentation is unilateral
c. Intracranial aneurysms may be associated
d. Typically manifests in the 3rd decade

171. All of the following are true about childhood polycystic kidney disease, except:
a. Autosomal dominant
b. Pulmonary hypoplasia may be seen
c. Renal cysts are present at birth
d. Congenital hepatic fibrosis may be seen

PUJ OBSTRUCTION

172. Not true about congenital PUJ obstruction is: *(AIIMS Nov 2001)*
a. Can be associated with renal agenesis
b. Can be diagnosed antenatally
c. Bilateral in 10–15% of cases
d. Aberrant vessel is the most common cause

173. All are true in PUJO except:
a. Commoner in boys
b. Bilateral lesions occur in 10-40%
c. Right sided lesions predominate
d. Intrinsic lesions predominate

174. Most infants and children with PUJO present with:
a. Pain b. Hematuria *(GB Pant 2008)*
c. Painless abdominal mass d. Renal failure

175. Best management for a symptomatic 6 years male with PUJ obstruction: *(GB Pant 2010)*
a. Endopyelotomy b. Foley V-Y pyeloplasty
c. Dismembered pyeloplasty d. Wait and watch

176. Investigation of choice for documentation of obstructive nature of pelvicalyceal system dilatation:
a. IVP b. DTPA scan
c. Whittaker test d. Ultrasound

177. Not true about PUJ obstruction is: *(AIIMS Nov 2001)*
a. Retrograde pyelography is useful to locate the site of obstruction
b. Endoscopic pyelotomy is contraindicated
c. Whittakar test is of clinical significance
d. Dismembered pyeloplasty is the procedure of choice

178. Distention of abdomen with passage of large amount of urine is known as: *(MHPGMCET 2001)*
a. Dietl's crisis b. Anderson-Hynes crises
c. Meteriorism d. Strangury

CONGENITAL ANOMALIES OF KIDNEY

179. Potter facies and oligohydromnios are pathognomic of:
a. Bilateral renal agenesis b. Unilateral renal agenesis
c. bilateral renal disease d. Unilateral cystic disease

180. Potter's facies is characterized by:
a. Hyperteleorism b. Prominet inner canthus
c. Recessive chin d. Low set ears
e. All are true

181. A symptom of medullary sponge kidney disease is:
a. Nocturia b. Anemia *(All India 95)*
c. Azotemia d. UTI

182. Which of the following is the most common renal vascular anomaly? *(All India 2010)*
a. Supernumerary renal arteries
b. Supernumerary renal veins
c. Double renal arteries
d. Double renal veins

183. Renal collar which surrounds the aorta has its two limbs split by: *(All India 99)*
a. Left renal vein b. Left renal artery
c. Isthmus of horseshoe kidney
d. All of the above

184. Persistent fetal lobulation of adult kidney is due to:
a. Congenital renal defect *(AIIMS Nov 2007)*
b. Obstructive uropathy
c. Intrauterine infections and scar
d. Is a normal variant

185. Incidence of Renal ectopia is: *(All India 92)*
a. 1:100000 b. 1:75000
c. 1:10,000 d. 1:1000

186. 'Reverse J' deformity on IVP is seen in:
a. Congenital megaureter b. Ureterocele
c. Retrocaval ureter d. VUR

187. Aberrant renal artery, all true except:
a. More common in women
b. Usually towards left
c. May cause hydronephrosis
d. Usually divided to gain access to renal pelvis

188. All are true of aberrant renal artery except: *(PGI 93)*
a. Bilateral b. Leads to hydronephrosis
c. Common in females d. More common on left side

189. An absent kidney is found in: *(AMU 2005)*
a. 1:200 individuals b. 1:700 individuals
c. 1:1400 individuals d. 1:5000 individuals

190. Medullary cystic disease of the kidney is best diagnosed by:
a. Ultrasound b. Nuclear scan
c. Urography d. Biopsy

HORSE SHOE KIDNEY

191. Which is false of Horseshoe kidney? *(AIIMS 92)*
a. Spider like appearance in IVP
b. Ureteral obstruction common
c. Lower calyx is reversed
d. Heminephrectomy improves function

192. Isthmus of horses is located at what level?
a. L1-L2 vertebra b. L3-L4 vertebra
C. L4-L5 vertebra d. L2-L3 vertebra

193. "Hand joining sign" and 'Flower vase' pattern of uteters is characteristic of:
a. Sigmoid kidney b. Horseshoe kidney
c. Crossed ectopia d. L-shaped kidney

194. With regard to horse-shoe kidneys, true is:
a. Usually symptomatic
b. Most cases require surgery
c. Division of isthmus is usually required to ensure adequate dependent drainage
d. Isthmus may contain aberrant vessels

RENAL CYST

195. Spider leg appearance in IVP is suggestive of: *(AP 84, Kerala 86, 88, JIPMER 87)*
a. Renal cyst b. Renal carcinoma
c. Renal Tb d. Hydronephrosis
e. Chronic renal failure

196. Which of the following is the most common renal cystic disease in infants is?
a. Polycystic kidney b. Simple renal cyst
c. Unilateral renal dysplasia d. Calyceal cyst

URETEROCELE

197. Cobra head appearance on excretory urography is suggestive of: *(MCI March 2010)*
a. Horseshoe kidney
b. Duplication of renal pelvis
c. Simple cyst of kidney
d. Ureterocele

198. Treatment of choice for ureterocele? *(MHSSMCET 2009)*
a. DJ stent b. Laparoscopic repair
c. LASER ablation d. Endoscopic diathermy

199. Adder head appearance on IVP is/are seen in: *(PGI Nov 2011)*
a. Polycystic kidney b. Ureterocele
c. Horseshoe kidney d. Hydronephrosis
e. Ectopic ureter

200. A 3-years old girl presents with recurrent UTI. On USG shows hydronephrosis with filling defect and negative shadow of bladder with no ectopic orifice: *(UPPG 2004)*
a. Vesicoureteric reflux b. Hydronephrosis
c. Ureterocele d. Sacrococcygeal teratoma

URETERIC ABNORMALITIES

201. Ectopic ureter opening is not located in: *(MAHE 2005, AIIMS Nov 98)*
a. Bulbar urethra b. Prostatic urethra
c. Seminal vesicle d. Bladder neck

202. Most common congenital anomaly of the upper renal tract is: *(JIPMER 87)*
a. Duplication of renal pelvis b. Duplication of ureter
c. Ectopic ureteric orifice d. Congenital megaureter

203. A 9 years old boy presented with abdominal pain and recurrent UTI, IVP reveals duplication of left ureter. The most likely site of ectopic opening would be: *(All India 99)*
a. Prostatic urethra b. Ejaculatory duct
c. Seminal vesicle d. Vas deference

204. Ectopic ureter may be frequently associated with: *(JIPMER 81, AMU 89)*
a. Oliguria b. Dysuria
c. Bilateral hydroureter d. Paradoxical incontinence

205. True statement about duplex draining system of urinary tract are all except: *(Punjab 2007)*
a. It is most common anomaly of the upper urinary tract
b. Upper moiety drains lower in the bladder
c. Lower pole moiety is more prone to obstruction and upper pole more prone to reflux
d. Yo-Yo Reflux may occur if ureters get fused

206. Weigert-Meyer's rule applies to:
a. Fusional anomalies b. Renal dysplasia
c. Polycystic kidney disease d. Ureteral duplications

207. In a patient with complete ureteral duplication, the opening of ureter draining the upper pole of the kidney is:
a. Above and medial to the lower pole ureter
b. Above and lateral to the lower pole ureter
c. Below and medial to the lower pole ureter
d. Below and lateral to the lower pole ureter
e. Always lateral to lower pole ureter

208. In the male, the most common site of termination of the ectopic ureter is the:
a. Posterior urethra b. Anterior urethra
c. Seminal vesicles d. Vas deference

209. In the female, the most common site of termination of the ectopic ureter is the:
a. Vestibule b. Fallopian tube
c. Ovary d. Uterus

210. Presentation and evaluation of ectopic ureter, all are true except:
a. In males there is duplication in 80% of cases
b. Can present as abdominal mass or HDN on antenatal USG
c. IVP will usually show a functioning but dilated upper pole segment and identify the site of ureteral opening
d. The lower pole is seen as the classic 'drooping lily' sign

211. Classic symptom of ectopic ureter in females:
a. Painful defecation
b. Urinary frequency
c. Ureteral incontinence with otherwise normal voiding
d. Labial swelling

212. MC presentation of ectopic ureter in males:
a. Recurrent UTI
b. Epididymitis
c. Pelvic pain
d. Seminal vesicle infections

VESICOURETERIC REFLUX

213. In case of vesicoureteric reflux which will be investigation of choice: *(AIIMS Nov 98)*
a. Micturating cystourethrogram
b. IVP
c. Cystography
d. Radionuclide study

214. In a patient suspected to be suffering from vesicoureteric reflex, which one of the following radiological investigations may confirm the diagnosis? *(UPSC 2007)*
a. Intravenous urography
b. Micturating cystourethrography
c. Pelvic ultrasound
d. Antegrade pyelography

215. Reflux filling the pelvicalyceal system without dilatation:
a. I
b. II
c. IV
d. IV

216. Reflux into pelvis and calyces without dilatation:
a. I
b. II
c. IV
d. IV

217. Spontaneous resolution of VUR depends on:
a. Grade of reflux
b. Age of presentation
c. Both
d. None

218. Treatment of choice for grade IV vesicoureteric reflux with recurrent UTI: *(AIIMS June 2000)*
a. Cotrimoxazole
b. Bilateral reimplantation of ureter
c. Injection of collagen in the ureter
d. Endoscopic resection of ureter

219. Which of the following statements is true of primary grade IV-V vesicoureteric reflux in young children? *(AIIMS May 2006)*
a. Renal scarring usually begins in the midpolar regions
b. Postnatal scarring may occur even in the absence of urinary tract infections
c. Long-term outcome is comparable in patients treated with either antibiotic prophylaxis or surgery
d. Oral amoxicillin is the choice antibiotic for prophylaxis

220. The most common cause of renal scarring in a 3 years old child is:
a. Trauma
b. Tuberculosis
c. VUR induced pyelonephritis
d. Interstitial nephritis

RENAL ARTERY ANEURYSM

221. The risk of rupture in renal artery aneurysms is:
a. Less than 1%
b. 5% *(AMU 81, JIPMER 81)*
c. 20%
d. 75%
e. None of the above

HEPATORENAL SYNDROME

222. Features of hepatorenal syndrome are: *(PGI June 2006)*
a. Urine sodium < 10 meq/L
b. Normal renal histology
c. Renal functional abnormal even after liver become normal
d. Proteinuria

223. Which of the following statements are incorrect with regard to hepatorenal syndrome in a patient with cirrhosis?
a. Creatinine clearance 40 ml/min *(All India 2003)*
b. Urinary sodium < 10 mEq/L
c. Urine osmolality lower than plasma osmolality
d. No sustained improvement in renal function after volume expansion

224. Which of the following statement is incorrect with regard to hepatorenal syndrome in a patient with cirrhosis?
a. The creatinine clearance is > 40 ml/min
b. The urinary sodium is < 10 mmol/L
c. The urine osmolality is lower than the plasma osmolality
d. There is poor response to volume expansion

DIALYSIS

225. The following are the complications of hemodialysis except: *(JIPMER 81, AIIMS 86)*
a. Hypotension
b. Peritonitis
c. Hypertension
d. Bleeding tendency

RENAL TRANSPLANT

226. First autologous renal transplantation was done:
a. Hardy
b. Kavosis *(All India 2010)*
c. Higgins
d. Studor

227. All of the following statements are correct about renal transplantation except: *(AIIMS Nov 2004)*
a. Renal transplantation is heterotopic
b. Cyclosporine is the mainstay of immuno-suppression
c. In India, organ harvesting from brain dead patients is not permitted by law
d. Kidney after removal is flushed with cold perfusion solution

228. After renal transplant, the commonest malignancy is: *(AIIMS June 97)*
a. Lymphoma
b. Renal cell carcinoma
c. Skin cancer
d. Adrenal cancer

229. Not true about right kidney is: *(DNB 2003, AIIMS June 2001)*
a. Right kidney is preferred over the left for transplantation
b. It is lower than the left kidney
c. Right renal vein is shorter than the left
d. Right kidney is related to the duodenum

230. After renal transplantation, which drug is given? *(PGI June 96)*
a. Cyclophosphamide
b. Corticosteroids
c. Interferon
d. Cyclosporine

231. Urinary ascites is due to: *(PGI Dec 98)*
a. Injury to bladder during birth
b. Ureteric obstruction
c. Congenital urethral atresia
d. Urethral valves

232. A newborn presents with discharge of urine from the umbilicus for 3 days. Diagnosis is:
a. Meckel's diverticulum b. Mesenteric cysts
c. Urachal fistula d. Omphalocele

KIDNEY AND URETER ANATOMY AND PHYSIOLOGY

233. Ureters are identified during surgery by: *(AIIMS 96)*
a. Peristalsis due to flow of urine
b. Rich arterial plexus
c. Relation to renal vein and artery
d. Relation to lumbar plexus

234. All of the following structures cross the right ureter anatomically except: *(All India 2012)*
a. Terminal ileum
b. Vas deferens
c. Genitofemoral nerve
d. Right colic and ileocolic vessels

235. Ureteric construction is seen at all the following positions, except: *(All India 2002)*
a. Ureteropelvic junction
b. Ureterovesicle junction
c. Crossing of iliac artery
d. Ischial spine

236. The narrowest part of the ureter is at the: *(AIIMS Nov 2005)*
a. Ureteropelvic junction
b. Iliac vessel crossing
c. Pelvic ureter
d. Ureterovesicle junction

237. All the following are true regarding blood supply to the kidney, except: *(All India 2002)*
a. Stellate veins drain superficial zone
b. It is a type of portal-circulation
c. The renal artery divides into five segmental arteries before entering the hilum
d. Its segmental arteries are end-arteries

238. The commonest site of surgical ureterovaginal fistula is:
a. Below infudibulopelvic ligament *(PGI 99)*
b. Below uterine artery in the Mackenrodts ligament
c. Vaginal angle
d. Above uterine artery

239. True about ureter is: *(AIIMS 91)*
a. Gonadal vessels lie anterior to it
b. It lies in front of great vessels
c. About 50 cm long
d. Nerve supply from T8-T10
e. Internal iliac artery

240. What is column of Bertini in kidney? *(APPG 2008)*
a. Renal tumour
b. Tongue like papillary projection
c. Calculus
d. None

241. Ureter is diagnosed during operation by: *(All India 98)*
a. Venous plexus b. High arterial supply
c. Peristaltic movements d. Circumference

242. The resting ureteric pressure: *(PGI June 99)*
a. 5–7 cm of H_2O b. 15–30 cm of H_2O
c. 7–10 cm of H_2O d. 0–5 cm of H_2O

243. Left loin nephrectomy, structure not cut is: *(PGI Dec 98)*
a. Trapezius b. Serratus inferior posterior
c. Latissimus Dorsi d. Internal oblique

244. Unilateral small smooth kidney is seen in: *(Karnataka 2003)*
a. Reflux nephropathy
b. Lobar infarction
c. Renal artery stenosis
d. Chronic glomerulonephritis

245. The neonatal kidney achieves concentrating ability equivalent to adult's kidney by:
a. One year of age b. Eighteen months of age
c. Three to six months of age d. Just before puberty

MISCELLANEOUS

246. A 60 years old male presents with hematuria at onset of micturition, cause is: *(AIIMS June 99)*
a. Urethral stone b. Bladder tumor
c. Ureteric stone d. Prostatitis

247. A 23 years old male who is otherwise normal complains of mild pain in his right iliac fossa in a waveform pattern which increases during the right and he becomes exhausted and is admitted in the hospital. On examination there is mild hematuria. Urine examination reveals plenty of RBCs, 50WBCs/hpf. Urine pH is 5.5. Most likely diagnosis is:
a. Glomerulonephritis
b. CA urinary bladder
c. Ureteral calculus
d. Cystitis

248. What is oliguria? *(JIPMER 87)*
a. Excretion of less than 300 ml in 24 hours
b. Excretion of less than 500 ml in 24 hours
c. Excretion of less than 300 ml in 12 hours
d. Excretion of less than 100 ml in 24 hours

249. Normal capacity of the renal pelvis is: *(AIIMS 87)*
a. 7 ml b. 10 ml
c. 15 ml d. 20 ml

250. Low and fixed specific gravity of urine is seen in: *(SGPGI 2005)*
a. Diabetes mellitus b. Diabetes insipidus
c. Chronic renal failure d. Acute glomerulonephritis

251. Auto nephrectomy is seen in: *(JIPMER 95)*
a. Sickle cell anemia b. Renal TB
c. Sarcoidosis d. Lymphoma

252. Urine incontinence is seen in all except: *(MHPGMCET 2003)*
a. Ureterovaginal fistula b. Vesicovaginal fistula
c. Ectopic ureter d. Urerthrovaginal fistula

253. If due to a certain pathology there is marked loss of ureter, then what is best therapeutic options? *(MHSSMCET 2005)*
a. Transureterostomy
b. Psoas Hitch operation
c. Intestinal segment substitute
d. Boari's flap operation

EXPLANATIONS

RENAL AND URETERIC CALCULI

1. **Ans. b. Triple phosphate** *(Ref: Smith 17/e p249-254; Campbell 10/e p1296-1302; Bailey 25/e p1295-1300)*

Types of Renal Calculi

- **Calcium oxalate**
  - **MC** type of **kidney stone (85%)**[Q]
  - Risk factors are **hypercalciuria, hypercalcemia, hyperoxaluria**
  - Have **hard, small** and **jagged surface**
  - On section-wavy concentric laminae
- **Uric acid stones**
  - **5-10 %** of all kidney stones, **MC radiolucent urinary calculi**[Q], formed in **acidic urine**
  - Patients with uric acid stones may have **gout, myeloproliferative disorders** or **Lesch-Nehan syndrome** (hyperuricemia)

Uric Acid Stones Management
• Cornerstone of treatment: **Low purine diet, hydration** and **alkalization of urine**[Q]
• **Allopurinol**[Q] (Inhibits conversion of hypoxanthine and xanthine to uric acid)
• **Acetazolamide**[Q] (may be added if urine pH is <6.5)

- **Struvite stones (Infection stones)**
  - Composed of **calcium, ammonium, magnesium phosphate (Triple phosphate stones)**[Q]
  - Tend to grow in **alkaline urine**[Q], especially with **Proteus infection** and **fill whole** of the **PCS**, forming **staghorn calculi**[Q]
  - Formed in **high urinary concentration** of **ammonia**
  - More common in **women**[Q] (increased susceptibility for UTI)
  - Most of the **stag horn calculi** are **silent**[Q] and cause **progressive destruction** of **renal parenchyma**[Q].
  - Increased tendency to form struvite calculi is seen in: **Foreign body** in the urinary tract (**Foley's catheter**) and **Neurogenic bladder**[Q]/Bladder dysfunction/Bladder outlet obstruction.

Struvite stones Management
• Complete stone removal +Treatment of a metabolic abnormality + Correction of any anatomic abnormalities contributing to stasis
• **PCNL + ESWL (best treatment option)**[Q]
• **Antibiotics** to prevent stone recurrences or growth after operative procedure
• **Acetohydroxamic acid (irreversible inhibitor of urease)**[Q] decreases likelihood of precipitation
• **Low calcium, low phosphorus diet**.
• Up to **50%** of patient have **stone recurrences** or **UTI** over 10 years follow up

- **Cystine**
  - **Extremely hard stone,** formed in **acidic urine**
  - Relatively **resistant** to fragmentation by **ESWL**
  - Occur in cystinuria with typical **"ground glass" appearance** with a **round smooth outline**[Q]
  - Typical **benzene** or **hexagonal cystine crystals**[Q] in urine.

Cystine Stones Management
• **Stone removal**
• To lower cystine concentration in urine (**Low methionine diet** and **alkalization**)[Q]
• **Cystine complexing agents**: **D-Penicillamine**[Q] and **Alpha-mercaptopropionylglycine (MPG)**[Q]

- **Xanthine**
  - Seen in **xanthinuria, radioluscent**[Q]
  - Stones are **smooth, brick red colored, round** and show **lamination on cross section**[Q].
  - **Management: High fluid intake** (most effective therapy) and **Allopurinol**[Q]
- **Indinavir**
  - **A protease inhibitor** used in **AIDS patients,** resulting in **radioluscent calculi**[Q] in **6% patients.**
- **Silicate:** Associated with **long term use of antacids** containing **silica**[Q]
- **Triamterene: Antihypertensive** medication, leading to **radioluscent**[Q] stones

2. **Ans. c. Indinavir**

3. **Ans. d. Usually seen in acidic urine**
4. **Ans. b. Urinary stones** *(Ref: Campbell 10/e p1262-1263)*

Randall's Plaques

- **Randall's plaques** are **soft tissue calcifications**[Q] found in the **deep renal medulla** skirting the surface of the epithelium of the papilla, where they **act as nucleating elements** for **renal calculi** or **stones**[Q].

5. **Ans. a. Phosphate**
6. **Ans. a. Ethylene glycol** *(Ref: Smith 17/e p248)*

Calcium Oxalate Crystals

- **Calcium oxalate crystals** in the urine are the **most common constituent** of human **kidney stones,** and **calcium oxalate crystal formation** is also one of the **toxic effects of ethylene glycol poisoning**[Q].
- **Excessive oxalate** may occur **secondary to the accidental** or **deliberate ingestion of ethylene glycol** (partial oxidation to oxalate[Q]. This may result in diffuse and massive deposition of calcium oxalate crystals and may occasionally lead to renal failure.

7. **Ans. b. Phosphate**
9. **Ans. b. Calcium oxalate**

RENAL AND URETERIC CALCULI CLINICAL FEATURES

9. **Ans. a. At pelvic brim** *(Ref: Smith 17/e p260-270; Campbell 10/e p1287-1293, 1371-1373; Bailey 26/e p1293, 25/e p1274, 1295-1300)*

Renal Calculi

- Peak incidence 20-40 years, more common in **males**[Q]
- **Infectious stones** are more common in **females**[Q]
- For formation of stones, a period of **abnormal crystalluria** is required. Urine must be supersaturated with salt of the stone forming crystal (**Supersaturation** and **crystallization**)[Q]

Clinical Features

- **MC symptom** is **pain**[Q].
- The **severity of pain** is **not related** to the **size** of the **stone**[Q]

  - Stone in **upper ureter** or **renal pelvis** → pain referred to **testis**[Q]
  - Stone in **mid ureter** → referred along **iliohypogastric**[Q] nerve to **iliac fossa**, mimicking appendicitis
  - Stone in **lower ureter** → referred along **ilioinguinal**[Q] nerve to **thigh, scrotum and perineum**[Q].

- Stone approaching **bladder** → bladder symptoms (frequency, urgency and dysuria)
- Stone in the **intramural ureter** → **strangury**[Q].
- **Drug of choice** for **ureteric colic** is **diclofenac (voveran).**

10. **Ans. b. At pelvic brim**
11. **Ans. c. Dietl's crisis** *(Ref: Bailey 26/e p1293, 25/e p1293)*

Dietl's Crisis

- **Intermittent hydronephrosis (Dietl's crisis)**: A **swelling in** the **loin** is associated with **acute renal pain**. Some hours later the **pain is relieved** and the **swelling disappears** when a **large volume of urine is passed**[Q].

12. **Ans. b. Increased peristalsis of ureter to overcome the obstruction** *(Ref: Smiths urology 17/e p31)*
    - The **severity** and **colicky nature** of **ureteric colic pain** are **caused by** the **hyperperistalsis** and **spasm** of **smooth muscles** of the **ureter** as it **attempts to rid** itself of a **foreign body** or **to overcome obstruction.**

Pain from Acute Obstruction of Ureter (Stone or Blood clot)

- **Ureteral pain** is typically **stimulated by acute obstruction** (passage of a **stone** or a **blood clot**)[Q].

- **Back pain** from **renal capsular distention**[Q] combined with **severe colicky pain** (due to **renal pelvic** and **ureteral muscle spasm**[Q] that radiates from the costovertebral angle down toward the lower anterior abdominal quadrant, along the course of the ureter.
- The **severity** and **colicky nature** of this pain are caused by the **hyperperistalsis**[Q] and **spasm**[Q] of this **smooth muscle organ** as it attempts to **rid itself of a foreign body** or to **overcome obstruction**.

Stone in the **upper ureter**	• **Pain radiates** to the **testicle**[Q] • Since the nerve supply of this organ is similar to that of the kidney and upper ureter **(T11–12)**[Q].
Stone in the **middle ureter**	• **Pain** is referred to **McBurney's point**[Q] and simulate appendicitis on **right side** • **Left side,** it may resemble **diverticulitis**[Q] or other diseases of the descending or sigmoid colon **(T12, L1)**[Q].
Stone in the lower ureter	• Pain is referred to **inner side of thigh or groin (L1, L2)**[Q]
Stones at the **level of orifice**	• Symptoms of **vesical irritability** such as **frequency and urgency**[Q] may occur.

13. **Ans. b. Proteus**
14. **Ans. b. Iliohypogastric**
15. **Ans. c. Pain**
16. **Ans. a. Oxalate stones** *(Ref: Bailey 26/e p1292, 25/e p1296)*

OXALATE STONES

- **Oxalate stones are irregular in shape and covered with sharp projections, which tend to cause bleeding**[Q]**.**
- **The surface of the calculus is discolored by altered blood**[Q]**.**
- **A calcium oxalate monohydrate stone is hard and radiodense**[Q]**.**

17. **Ans. b. Stillness of the patient**
18. **Ans. d. Diclofenac**

RENAL AND URETERIC CALCULI DIAGNOSIS AND TREATMENT

19. **Ans. a. PCNL** *(Ref: Smith 17/e p260-270; Campbell 10/e p1287-1293, 1371-1373; Bailey 26/e p1293, 25/e p1274, 1295-1300)*

RENAL CALCULI

Laboratory Investigations

- **Urine:** pH, microscopic examination (RBCs, pus cells and crystalluria) and culture for splitting organisms

• **Acidic urine**: **C**alcium oxalate, **C**ystine, **U**ric acid)[Q]
• **Alkaline urine**: Calcium **Phosphate**, **Struvite**[Q]

Crystalluria: To determine the stone composition	
Crystal	**Appearance**
Calcium oxalate monohydrate	**Dumbbell** or hourglass[Q]
Calcium oxalate dehydrate	**Enveloped** or **bipyramidal**[Q]
Calcium phosphate (apatite)	**Amorphous**[Q]
Brushite	**Needle shaped**[Q]
Struvite	**Coffin lid**[Q]
Uric acid	Multifaceted, irregular plates or rosettes[Q]
Cystine	**Hexagonal** or benzene ring[Q]

Radiographic Investigations

- **X-ray KUB:**
  - 90% are **radiopaque**[Q]
  - **Radiolucent stones** (**TIXU**): **Triamterene, indinavir, xanthine** and **uric acid**[Q]
- **USG:** A screening tool for hydronephrosis or stone within collecting system.
- **IVP:**
  - Early films (At 1 and 5 min for promptness of contrast excretion and Any obstruction along urinary tract)
  - Delayed films (Identifies cause of delayed contrast excretion)

> • **Non-contrast spiral CT**[Q] is the **most sensitive investigation** for **renal/ureteric calculus**[Q]**.**

- **Retrograde pyelogram (RGP):**
  - Better delineation of anatomy. Especially useful **if distal ureter not visualized**[Q] well.
  - **Excludes unsuspected** additional **ureteric calculi** and allows **assessment of coexistent ureteric disease** such as **stricture**[Q], which may complicate the operative and post operative course.

Radionuclide evaluation

- **DMSA** (Dimercaptosuccinic acid): Renal **morphology**[Q] (scar)
- **DTPA** (Diethylene Triamine Pentacetic Acid): To assess **perfusion** (Effective renal plasma flow) and **function**[Q] (Total and differential GFR), less effective than MAG-3 for decreased renal function
- **MAG-3 (Mercapto-acetyl glycine): Best** for **renal perfusion**[Q] (Assess renal plasma flow).

> • **Metabolic workup** should be done **in young** patients, with **recurrent** calculi, **multiple** calculi and in **nephrocalcinosis**[Q]**, struvite stones, uric acid stones and cystine stones.**

20. **Ans. b. Uric acid**

21. **Ans. a. ESWL** *(Ref: Campbell 10/e p1302-1309; Bailey 26/e p1294-1296, 25/e p1297-1300)*

The **best treatment** in this situation is **PCNL**. Since PCNL is not mentioned in the option, the best option is ESWL despite of size 2.5 cm, as it is preferred over other three for the management of renal stones.

Management of Renal and Ureteric Calculi

Indications of Conservative Treatment (for 4-6 weeks)

(Feature of stone likely to pass spontaneously)

- **Single** stone ≤ **5 mm**[Q]
- Ureter is **undilated**[Q]
- Stone in **lower third** of **ureter**[Q]
- Evidence of **downward movement**[Q]

Surgical Intervention

- **ESWL** (Extracorporeal shock wave lithotripsy)
- **URS** (Ureteroscopy)
- **PCNL** (percutaneous nephrolithotomy)
- Laparoscopic stone surgery
- OSS (Open stone surgery)

- The **majority (80-85%)** of **simple renal calculi** are treated satisfactorily with **ESWL**[Q]**.**
- **Rests** are managed by **PCNL/URS**
- OSS is the least common treatment modality now days.

Indications of Open Stone Surgery

(Ref: Smith 17/e p269; Campbell 10/e p1595, 1645; Bailey 26/e p1294, 25/e p1299)

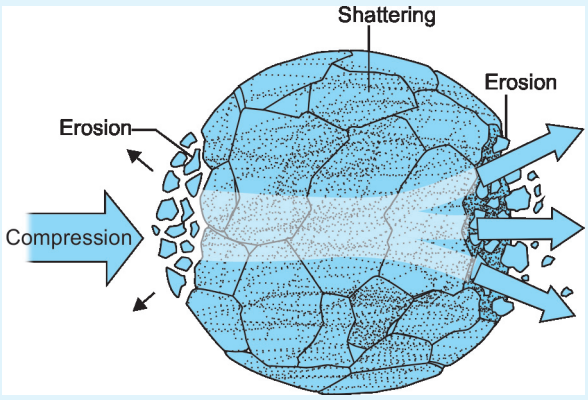
- **Anatomic abnormality** requiring open operative intervention (e.g. PUJO)[Q]
- **Nonfunctioning kidney** with stone (nephrectomy)[Q]

(Ref: Campbell 10/e p1380-1381, 1399-1405; Bailey 26/e p1294, 25/e p1300-1302)

Treatment Decisions by Stone Burden

- **Stone ≤ 2 cm: ESWL**[Q]
- Unless factors of stone composition, location, location or renal anatomy shift the balance towards more invasive modalities (PCNL/URS).
- **Stone > 2 cm: PCNL**[Q]
- **Stag horn calculi: (PCNL + ESWL)** is TOC[Q]
- Initial approach is **PCNL, followed by ESWL,** as an adjunct to minimize the number of repeat PCNL accesses.

22. Ans. a. Calcium oxalate monohydrate *(Ref: Smith 17/e p264-268; Campbell 10/e p1380-1381; Bailey 26/e p1294, 25/e p1298-1299)*



ESWL (Extracorporeal Shock Wave Lithotripsy)

- **High energy shock waves**[Q] are produced outside the patient's body, which are focused on stones with help of fluoroscopy or ultrasound.
- The **change in density** between the **soft renal tissue** and **hard stone** causes **release of energy** at the stone surface which causes "**compression induced tensile cracking** of **stones**"[Q]
- Incoming shock wave result in fragmentation of stones from **erosion** and **shattering**[Q]
- The stone fragments into small pieces and may pass down the ureter.
- **Strongest** or **Gold standard lithotripter** for ESWL is **Dornier unmodified HM-3.**[Q]

- **Difficult (hard) stones** for **ESWL**: **Brushite, Hydroxyapatite, Cystine, Calcium oxalate monohydrate (BHC-2)**[Q]

Factors responsible for decreasing the chances of stone free status

- **Stone burden**: **Multiple stones**, **> 2 cm** and **staghorn calculi**[Q]
- (ESWL is best suited for stone < 2 cm in renal pelvis or calyces with no distal obstruction)
- **Reduced clearance**: **Lower calyceal location**, marked **hydronephrosis or scarring**, **calyceal diverticulum** or **horseshoe kidney**[Q].
- **Stone composition:**
  - **Difficult**: **B**rushite, **H**ydroxyapatite, **C**ystine, **C**alcium oxalate monohydrate **(BHC-2)**[Q]
  - **Breakable**: Uric acid, struvite, Calcium oxalate dihydrate.

Contraindications of ESWL		
Absolute	**Relative**	
• **Pregnancy**[Q] • **Bleeding disorder**[Q]	• **UTI**[Q] • Unrelieved **distal obstruction**[Q] • Cardiac **pacemaker**[Q] • **Uncontrolled hypertension**[Q] • Severe **orthopaedic deformity**	• Weight **> 300 pounds** • Severe **renal failure**[Q] • **Aneurysm**

Complications of ESWL

- **Acute injury** to the **renal parenchyma** leading to **hematuria** and **edema**[Q] around the kidney.
- **Chronic renal injury** leading to accelerated **rise** in the systemic **blood pressure**, **decrease** in **renal function** and increase in rate of **stone recurrence**[Q].
- **Lung parenchymal injury** (if exposed)
- **Extrasystoles**
- **Infection** due to release of bacteria in fragment
- **Steinstrasse** (**street of stones** or **columnation of stone gravel in ureter**)[Q]

23. Ans. b. 'j' stent drainage *(Ref: 'Acute Care Surgery: Principles and Practice' (Springer) 2007/571)*

- **Prompt drainage** of **hydronephrosis** by **'J' stent drainage** is the single **best option to manage uremia** in this patient **with bilateral renal calculi,** to **allow recovery of renal function** at the **earliest**[Q].
- **Hemodialysis** may be **used afterwards** if **renal recovery** is **prolonged necessitating removal of waste products**[Q]
- **Prompt drainage** of hydronephrosis **by 'J' stent placement** is the **procedure of choice for hydronephrosis** complicated with **renal failure** in the **setting of urinary obstruction**[Q].
- Prompt drainage of hydronephrosis is indicated of renal function is compromised or urinary infection (UTI) is suspected, to preserve/salvage renal function.

- **Prompt drainage** can be achieved **by placement** of a **ureteral sent** or through **percutaneous nephrostomy**[Q].

  - The **drainage procedure of choice** in **emergent situations** is **cystoscopy with placement of internalized double 'J' ureteral stent**. This procedure has the advantage of being a **completely internal drainage system**[Q].
  - **Percutaneous nephrostomy** may be used to allow urinary drainage if the **stone is too impacted to allow passage** of a **guide wire for sent placement**[Q]

24. Ans. a. Hydrothorax *(Ref: Smith 17/e p122, 269; Campbell 10/e p1399-1405; Bailey 26/e p1294, 25/e p1298-1299; Schwartz 10/e p1666, 9th /1472)*

- **PCNL** done through the **11th intercostals space** traverses the **lower aspect of pleura** and can **result in significant hydrothorax** from **large amount of irrigative fluid.**

PCNL (Percutaneous Nephrolithotomy)

- Removal of kidney stone via a **'track'** developed **between** the **surface of** the **skin** and the **collecting system** of the kidney.
- The **posterior approach**[Q] is most commonly used, **through the posterior calyx** rather than into the renal pelvis, as it **avoids damage** to the **posterior branches of the renal artery**[Q], which are closely associated with renal pelvis.

Indications of PCNL

- **Obstructive uropathy**[Q] (contraindication for ESWL)
- **Large volume stone (>2 cm), stag horn calculi**[Q]
- Other modalities failure (**Ureteroscopic failure or ESWL failure**)[Q]
- **Lower pole calyceal stone**[Q]
- Difficult (hard) stones for ESWL**: Brushite, Hydroxyapatite, Cystine, Calcium oxalate monohydrate (BHC-2)**[Q]

Complications

- **Injury** to other viscera like **pleura (MC)**[Q]**, colon, spleen**
- **Bleeding, urinary extravasation**
- **Retained fragments**
- **Sepsis**

25. Ans. d. Stone in a calyceal diverticulum *(Ref: Smith 17/e p264-268; Campbell 10/e p1380-1381; Bailey 25/e p1298-1299)*

26. Ans. d. Ureteroscopic retrieval *(Ref: Smith 17/e p268-269; Campbell 10/e p1407-1408; Bailey 26/e p1297-1298)*

Ureteroscopy

- Ureteroscopic stone extraction is **highly efficacious** for **lower ureteric calculi**[Q].
- The use of small-caliber ureteroscopes and the advent of balloon dilatation or ureteral access sheaths have increased **stone-free rates** (**66%-100%**) dramatically.

Indications

- **Lower ureteric calculi**[Q]
- Upper ureteric calculi of **ESWL failure**[Q]
- Suspicion of **urothelial tumor**[Q] (filling defect, Brush cytology)
- **Ureteric dilatations** or **DJ stents**[Q]
- Retrieval of **foreign body**[Q]

Complications

- Iatrogenic injuries or **ureteric perforations**[Q]

27. Ans. a. Endoscopic removal *(Ref: Campbell 10/e p1375-1379; Bailey 26/e p1296-129825/e p1301-1302)*

Ureteric calculi

Proximal and mid-ureteral Stones

- **Stone ≤ 1 cm**: **ESWL**[Q] is primary approach. **Ureteroscopy** is preferred in **failed ESWL, distal obstruction** or **impacted stones.**
- **Stone > 1 cm: Ureteroscopy**[Q] is primary approach. PCNL for large proximal stones or impacted calculi.

Distal ureteral stones

- **Stone ≤ 1 cm:** ESWL and Ureteroscopy equally successful. **Ureteroscopy**[Q] is the primary approach
- **Stone > 1 cm**: **Ureteroscopy**[Q]

Remember: For **all ureteric stones, ureteroscopy** is the **primary approach except ≤ 1 cm proximal** and **mid-ureteral stones**[Q]**.**

28. **Ans. d. Ureteric obstruction due to fragments in ureter**

29. **Ans. b. Its use for uric acid stones has caused deaths due to generation of cyanide** *(Ref: Smith 17/e p130; Campbell 10/e p198-199, 1380-1391)*

Intracorporeal Lithotripsy

Techniques

- **Electro hydrolytic lithotripter (EHL)**
  - **Narrow safety margin**, may damage ureteral mucosa but **least expensive**
  - **Suitable** for **bladder calculi**[Q].
  - **Successfully fragments 90%** of **calculi**[Q]
- Ultrasonic lithotripter
- Ballistic lithotripter
- **Laser lithotripter (Holmium-YAG lager)**
  - **Ho-YAG** is the **best laser source** for **intracorporeal lithotripsy**[Q], primarily through a **photothermal mechanism** that causes **stone vaporization**[Q].
  - **Most effective** and **versatile** with good safety margin
  - **Fragments all stones** regardless of composition. It **can cut through the metal**. So, caution must be exercised while using a basket.
  - **Potential side effect** is **production of cyanide**[Q] when **uric acid stones** are **treated**. This has been reported in vitro. The clinical experience has suggested **no significant cyanide toxicity**[Q].
  - Major disadvantage is **initial high cost** of the device and the laser fibers.

30. **Ans. a. Cysteamine** *(Ref: Harrison 18/e p3221; Smith 17/e p249-254; Campbell 10/e p1296-1302; Bailey 25/e p1295-1300)*
    - **Patient with cystinuria with multiple renal stones** should be **treated with increase urine volume** (high fluid intake)**, alkalinization of urine, Penicillamine** and **tiopronin.**

31. **Ans. d. Uric acid, e. Xanthine**

Renal Stones

- **Renal stones: 90%** are **radiopaque**[Q]
- **Radiolucent stones** (**TIXU**): **Triamterene, indinavir, xanthine** and **uric acid**[Q]

32. **Ans. e. 90%** *(Ref: Smith 17/e p261-262)*

Imaging of Ureteric Colic (Calculus)

- **A plain film** of the abdomen and **renal ultrasound** examination will **diagnose most stones**[Q]**.**
  - **Spiral CT (Non-contrast CT)**[Q] has become the **study of choice** in **emergent situations,** as the **entire urinary tract** can be **scanned rapidly** and **without contrast injection**[Q].
  - **Calculi** can be **readily identified** and **distinguished** from **clot** or **tumor**[Q]**.**
- About of **90%** of **calculi** are **radiopaque**[Q] (calcium, cystine).
- **Excretory urography** is necessary to **verify their location** within the urinary tract and also affords a **qualitative measure** of **renal function**.
- An **acutely obstructed kidney** may show only **increasing density** of **renal shadow** without significant radiopaque material in calices.
- A **non-opaque stone** (**uric acid**) will be seen as a **radiolucent defect** in the opaque contrast media.

33. **Ans. d. Lower 1/3rd of ureter**

34. **Ans. a. Urine is always infected, b. Should be removed immediately**

35. **Ans. c. Uric acid**

36. **Ans. a. ESWL**

37. **Ans. c. High calcium intake**

38. **Ans. d. Uric acid stones are resistant to ESWL**

39. **Ans. b. Phosphate**

40. **Ans. a. Endoscopic removal**

41. **Ans. c. Renal stones** *(Ref: Bailey 25/e p1297; mededconnect.com)*

X-Ray KUB

- **Kidney stones** should be looked **opposite** to **second lumbar vertebra**[Q].
- In a **lateral X-ray** of abdomen **gallstones** are **anterior** and **renal** and **ureteric stones overlie** the **lumbar spine**[Q].

Opacities on a plain X-ray that may be confused with renal calculus	
• **Calcified mesenteric LN** • **Gallstones** or concretion in the **appendix** • **Tablets** or **foreign bodies** in the alimentary canal (e.g. cyclopenthiazide) • **Ossified tip** of the **12th rib**	• **Phleboliths:** calcification in the walls of **veins**, especially in the **pelvis** • **Calcified tuberculous lesion** in the **kidney** • **Calcified adrenal gland**

42. Ans. d. Restricted calcium intake *(Ref: Harrison 18/e p 1817; Smith 17/e p271)*

- A **source of calcium** at each meal may **actually help prevent oxalate stones from forming** as the **calcium binds with oxalate** in **food** and thus **prevents the oxalate from being absorbed** into the body[Q].

Dietary Modification in Stone Disease

Increase Intake of	Decrease Intake of
• Fluid[Q] • Dietary calcium[Q] • Potassium and phytates[Q] • Vitamin C[Q]	• Oxalate[Q] • Animal protein[Q] • Sucrose • Fructose • Sodium

43. Ans. c. Cystine stone

44. Ans. a. Uric acid stones

45. Ans. a. Severity of pain increases with size of the calculus *(Ref: Bailey 26/e p1293, 25/e p1296)*

- The **severity of pain** is **not related to the size** of the **stone.**

Ureteric Colic

- There is a pattern of severe exacerbation on a background of continuing pain
- Radiates to the groin, penis, scrotum or labium as the stone progresses down the ureter
- The **severity of pain** is **not related** to the **size** of the **stone**[Q]
- The pain is **almost invariably associated with haematuria**[Q]
- There may be few physical signs

46. a. Stone

- **MC cause** of **ureteric obstruction: Stone**[Q]
- **MC cause** of **ureteric colic** in **hematuria: Clot**[Q]

47. Ans. a. Holmium

48. Ans. a Bleeding is least concerned complication

49 Ans. b. Holmium

50. Ans. b. Calcium restriction *(Ref: Smith 17/e p271)*

RENAL INFECTIONS

51. Ans. a E. coli *(Ref: Smith 17/e p200-201; Campbell 10/e p299-301)*

Emphysematous Pyelonephritis

- **Necrotizing infection** characterized by the **presence of gas** within the **renal parenchyma** or **perinephric tissue**[Q].
- About **80–90%** of patients have **diabetes**[Q], rest are associated with urinary tract obstruction from calculi or papillary necrosis, more common in **females**
- Bacteria most frequently cultured from the urine include **E. coli**[Q] **(MC), Klebsiella pneumoniae,** and **Enterobacter cloacae.**
- **Decreased host immunity**[Q] is **most important factor.**

Clinical Features

- **Triad "Fever, flank pain,** and **vomiting**[Q]**"** almost always present and fails initial management with parenteral antibiotics
- **Pneumaturia** may be present.
- The **mortality** rate is **19–43%**[Q].

Diagnosis

- **Plain X-ray**: **Gas**[Q] overlying the affected kidney
- **CT scan**[Q] is **more sensitive** than USG in **detecting** the **presence of gas**[Q] in the renal parenchyma

Management

- Fluid resuscitation, **prompt control of blood glucose** and **relief of urinary obstruction**[Q] is essential with **parenteral antibiotics (3-4 weeks)**[Q].
- In addition, **percutaneous drainage**[Q] is helpful in accelerating resolution of the infection and minimizing the morbidity and mortality of the infection.
- **Most cases** require **nephrectomy**[Q].

Prognosis

- **Poor prognostic factors: High creatinine, low platelet**, presence of **renal/perirenal fluid** with a **bubbly/loculated gas** pattern or **gas** in the collecting system.

52. Ans. b. Xanthogranulomatous kidney *(Ref: Smith 17/e p204-206; Campbell 10/e p308)*

Xanthogranulomatous Pyelonephritis

- XGP is a form of **chronic bacterial infection**[Q] of the kidney
- **Most commonly caused** by **Proteus** >E. coli
- The **affected kidney** is almost always **hydronephrotic** and **obstructed**[Q].

Pathology

- In most cases, XGP occurs **unilaterally**. Severe inflammation and necrosis obliterate the kidney parenchyma. Usually **pelvis** is **not dilated** due to peripelvic fibrosis.

  - It is **difficult to distinguish** XGP **from clear cell RCC** pre-operatively.
  - Even **frozen section** has **difficulties to distinguish** XGP **from clear cell RCC**.

- Characteristically, **foamy lipid-laden histiocytes** (**xanthoma cells**)[Q] are present and may be mistaken for renal clear cell carcinoma.

Clinical Features

- Flank pain, fever, chills, and persistent bacteriuria with palpable flank mass.
- A history of **urolithiasis**[Q] is present in **50%** of the patients, **staghorn calculi**[Q] in **80%** cases.
- Primarily occurs **unilaterally**, **azotemia or renal failure** is **not seen**.

Diagnosis

- **Urinalysis:** Demonstrates **WBCs** and **protein**.
- **Proteus species (MC)**[Q] or **E. coli or** are commonly cultured from the urine, **one third** of patients have **no growth**, most likely because they have recently received antibiotic therapy.
- **Serum blood analysis**: **Anemia** and **hepatic dysfunction**[Q] in approximately **50%** of patients.
- **CT scan** is **IOC** for **XGP**.
- **USG**: **Enlarged kidney** with a large **central echogenic area** and **anechoic parenchyma**[Q].

Management

- Kidney-sparing surgery (**partial nephrectomy)** is indicated XGP.
- **Nephrectomy** in cases of **extensive infection.**

53. Ans. b. Always unilateral *(Ref: Smith 17/e p204-206; Campbell 10/e p303-304; Bailey 26/e p1300, 25/e p1283, 1304)*

Pyonephrosis

- Bacterial infection of a **hydronephrotic, obstructed kidney**, which leads to **suppurative destruction** of the renal parenchyma and potential loss of renal function.
- Kidney is a **bag of pus**[Q].
- **MC cause: Renal stones**[Q]**.** Others are infected hydronephrosis, acute pyelonephritis.

Clinical Features

- Mostly **unilateral**[Q], characterized by triad of **anemia, fever** and **swelling in loin**[Q]**.**

Diagnosis

- **USG** diagnose pyonephrosis.

Management

- Immediate institution of **antibiotic therapy** and **drainage**[Q] of the infected collecting system.
- Antibiotics should be started before manipulation of the urinary tract.
- In the **ill patient**, drainage of the collecting system with a **percutaneous nephrostomy**[Q] tube
- **Nephrectomy** in **destroyed** or **non-functioning kidney**

- For **HDN, DJ stenting** and **percutaneous nephrostomy, both** are having **same results** but **DJ stenting** is **less invasive.**
- For **pyonephrosis, percutaneous nephrostomy** is **better** than DJ stenting.

(Ref: Smith 17/e p202-204; Campbell 10/e p304-305; Bailey 26/e p1301, 25/e p1305)

PERINEPHRIC ABSCESS

- Sources of perinephric abscesses are mainly **extension** of **cortical abscesses** or **hematogenous**[Q].
- Generally caused by **E. coli** or **Proteus**[Q] species.

Clinical Features

- **High grade swinging fever**[Q], abdominal tenderness and flank mass

Diagnosis

- **Urine cultures** (positive only if communication with collecting system is present, so most are usually negative) identify causative organisms in **one-third**[Q] and **blood cultures** in **half**[Q] of cases
- Accurately detected on **USG** or **CT scans**.

Management

- Appropriate **antibiotic therapy**[Q]. If the patient **does not respond within 48 hours** of treatment, **percutaneous drainage**[Q] under CT or ultrasound guidance is indicated.
- If the abscess still does not resolve, then **open surgical drainage** or **nephrectomy**[Q] may be necessary.
- Follow-up imaging is needed to confirm the resolution of the abscesses.

54. Ans. c. Pyonephrosis *(Ref: P Modi, G Kadam, R Goel - Journal of Endourology, 2007)*

- A **subcapsular nephrectomy** (SN) is sometimes needed to successfully **remove** the **kidney** because of the **dense perinephric adhesions** in **pyonephrosis.**

55. Ans. c. Nitrite test *(Ref: Smith 17/e p196)*

Sensitivity and Specificity of Urinalysis in UTI		
Tests	**Sensitivity (%)**	**Specificity (%)**
Esterase	83 (67–94)	**78** (64–92)
Nitrite	53 (15–82)	**98 (90–100)**[Q]
Esterase or Nitrite	**93** (90–100)	72 (58–91)
White blood cells	73 (32–100)	81 (45–98)
Bacteria	81 (16–99)	**83** (11–100)
Any above	99.8 (99–100)	70 (60–92)

56. Ans. a. Proteus

57. Ans. d. Vesicoureteric reflux *(Ref: Bailey 25/e p1304-1305)*

- **Chronic pyelonephritis** is so often **associated with vesicoureteric reflux** that some feel that it is **better named "Reflux nephropathy".** It is important cause of renal damage and death from end-stage renal failure.

GENITOURINARY TUBERCULOSIS

58. Ans. b. Hematogenous *(Ref: Smith 17/e p219-225; Campbell 10/e p468-477; Bailey 26/e p1301-1303, 25/e p1306-1308)*

Genitourinary Tuberculosis

- Tubercle bacilli (**M. tuberculosis**) may invade one or more organs of genitourinary tract and cause **chronic granulomatous infection**[Q].
- More common in **males**[Q] (young adults of age **20-40** years)

Etiology

- M. tuberculosis reaches the genitourinary organs by **hematogenous route** from **lungs**[Q].
- The **primary site** is often **not symptomatic** or **apparent**[Q].

> - Tubercle bacilli lodge in **periglomerular capillaries** and form **cortical granulomas**[Q] after hematogenous spread from a distant focus.
> - These contain **dormant bacilli** that may remain stable, but have the potential to multiply, years later producing the disease.
> - **Spontaneous healing** is the **usual response**[Q].

- The development of **disease** depends on the **interaction between pathogen** and **immune response of host**[Q].
- In whole of genitourinary tract, **Kidney and prostate** is the **primary site of infection**[Q] (hematogenous). Rest organs are involved by ascent or descent.
- Generally **testis** is **not involved**[Q].

Pathogenesis

- **Granulomas** at **renal pyramid** → Enlarge (**tubercular abscess**) → **Burst** into **PC system** and **pus discharge** in urine (sterile pyuria[Q].
- **Vesical irritability** is an **early clinical manifestation**[Q].

Complications

> **Stenosis** of calyceal neck or pelvic ureteric junction → **Hydronephrosis** and **pyonephrosis** → **Perinephric abscess** → Kidney replaced by caseous material (**putty kidney**) → **Calcification** → **Autonephrectomy** (a calcified non-functioning kidney, representing end-stage disease)[Q].

- **Autonephrectomy** is the final result of marked parenchymal fibrosis and obstructive uropathy.
- **Scarring** with **stricture formation**[Q] is one of the most typical lesions of tuberculosis and most commonly affects **juxtavesical portion** of **ureter.**
- **Inflammation** of **bladder mucosa** in early stages → **tubercle formation** (seen endoscopically as **white** or **yellow raised nodules**[Q] surrounded by halo of hyperemia) → Mural fibrosis (**Thimble bladder**)[Q]
- **Large calcifications** in the **prostate** and **beaded appearance** of **vas deferens**[Q]

Clinical features

> - **Earliest symptom** is **urinary frequency**[Q]

- **Active tuberculosis** elsewhere in the **body** is found in **less than half** of patients with **genitourinary tuberculosis**[Q].
- In tuberculosis of epididymis, an abscess may drain spontaneously through the scrotal wall. A **chronic draining sinus** should be regarded as **tubercular** until proved otherwise.

> **Tuberculosis of genital tract should be considered in the presence of following situations**
>
> - **Chronic cystitis**[Q] that refuses to respond to adequate treatment
> - **Sterile pyuria**, **gross** or **microscopic hematuria**[Q]
> - Non-tender enlarged epididymis with **beaded** or thickened **vas**[Q]
> - **Chronic draining scrotal sinus**[Q]
> - **Induration** or **nodulation** of **prostate** and **thickening** of one or both **seminal vesicle**[Q]

Diagnosis

- Diagnosis rest on **demonstration** of **tubercle bacilli** in the **urine** by **culture** or **PCR**[Q].

> **Urine: Pyuria** with **acid urine**, **sterile** on ordinary culture (**Persistent pyuria without organisms** on culture means **tuberculosis** until proved otherwise), culture for tubercle bacilli from the **first morning urine sample** is positive in high percentage of patients.

- **Plain X-ray**: May show **calcified lesions** or **punctate calcifications**[Q] in renal parenchyma

> **IVP in Tuberculosis**
>
> - **Earliest sign** is **"moth-eaten" calyx**[Q] (Obliteration of clear cut outline of renal papilla) due to erosion.
> - **Obliteration** of one or more **calyces** (calectasis, hydronephrosis)
> - SOL in pelvis (**TB abscess**) seen as **splaying of calyces**[Q]
> - **Ureteric strictures**[Q] (single or multiple)
> - **Shrunken bladder** with irregular wall (**Thimble bladder**)[Q]
> - Absence of function of kidney due to complete ureteral occlusion and renal destruction (**autonephrectomy**)[Q]

- **RGP**: Extensive calcification or thickness of the ureter (**Pipe-stem ureter**)[Q], are usually associated with **pyonephrosis**.

Cystoscopy in Tuberculosis
• **Earliest sign** is **pallor**[Q] around ureteric orifice. • Other features are **tubercular ulcer** and **golf hole ureteric orifice**[Q].

- **CECT** is **IOC** for **genitourinary tuberculosis**[Q].

Treatment

- **ATT** and **Surgery** (**for complications**)[Q]

Surgery in Genitourinary Tuberculosis
Optimal time of surgery is 3-6 weeks[Q] **after ATT is started.**
Procedures: • **Ureteral dilatations** offer **>50% chances of cure** in **ureteric strictures**[Q] • **Pyeloplasty** for PUJ obstruction • **Boari operation** or bowel interposition for **ureteral strictures**[Q] • **Augmentation** or substitution **cystoplasty** for **bladder contracture**[Q] • **Nephroureterectomy** for **nonfunctioning kidney** (as the ureters are usually refluxing) • **Partial nephrectomy** for **polar lesions** not responding to ATT

Indications of Surgery in Genitourinary TB
• Associated **RCC/malignancy**[Q] • **Non-functioning** kidney with **hypertension**[Q] • **Non-functioning** kidney with **totally destroyed parenchyma** or **deranged function**[Q]

59. **Ans. b. Computed tomography**

- **CT urography replaced intravenous urography** to detect **early renal tuberculosis**[Q].
- **CT urography** can **provide images** that are **markedly better than intravenous urography**[Q].

60. **Ans. a. Sterile pyuria is consistent finding**

61. **Ans. a. Renal papilla** *(Ref: Smith 17/e p219-225; Campbell 10/e p468-477; Bailey 26/e p1301, 25/e p1306-1308)*

Pathogenesis of Genito-Urinary Tuberculosis

- **Granulomas** at **renal pyramid** → Enlarge (**tubercular abscess**) → **Burst** into **PC system** and **pus discharge** in urine (sterile pyuria[Q].
- **Vesical irritability** is an **early clinical manifestation**[Q].

62. **Ans. c. Tuberculosis of ureter**

Cystoscopy in Tuberculosis

- **Earliest sign** is **pallor**[Q] around ureteric orifice.
- Other features are **tubercular ulcer** and **golf hole ureteric orifice**[Q].

63. **Ans. a. Increased frequency**

64. **Ans. b. Bladder disease is associated with extensive renal disease, c. Ureteric involvement causes shortening of the ureters, d. Renal disease can produce changes identical to reflux nephropathy**

65. **Ans. d. Microscopic hematuria**

66. **Ans. a. Renal tuberculosis**

HYDRONEPHROSIS

67. **Ans. b. Analgesia SOS, c. Under observation, d. Follow up by USG** *(Ref: Bailey 26/e p1289-1292, 25/e p1293-1295)*

Hydronephrosis

- Hydronephrosis is an **aseptic dilatation** of the kidney caused by **obstruction to the outflow of urine.**

Unilateral Hydronephrosis		
Extramural obstruction	**Intramural obstruction**	**Intraluminal obstruction**
• **Tumour** from **adjacent structures**[Q], e.g. carcinoma of the cervix, prostate, rectum, colon or cecum • **Idiopathic retroperitoneal fibrosis**[Q] • **Retrocaval ureter**[Q]	• **Congenital stenosis** (PUJ obstruction)[Q] • **Ureterocele** and congenital small ureteric orifice • **Inflammatory stricture**[Q] • **Neoplasm** of the **ureter** or **bladder** cancer **involving** the **ureteric orifice**[Q]	• **Calculus** in the **pelvis** or **ureter**[Q] • **Sloughed papilla** in **papillary necrosis**[Q] (especially in **diabetics**[Q], **analgesic abusers**[Q] and those with **sickle cell** disease[Q]) may obstruct the ureter

Bilateral Hydronephrosis	
Congenital	**Acquired**
• **Posterior urethral valves**[Q] • **Urethral atresia**[Q]	• **BPH** or **CA prostate**[Q] • Postoperative **bladder neck scarring**[Q] • **Urethral stricture**[Q] • **Phimosis**[Q]

Pathology

- There is **calyceal dilatation** and the **renal parenchyma** is **destroyed by pressure atrophy**[Q].
- A **kidney** destroyed by longstanding hydronephrosis is a **thin-walled, lobulated, fluid-filled sac**.
- **Urethral obstruction** tends to lead to **detrusor hypertrophy**, which can lead to **obstruction of** the **ureters** in their **intramural course**[Q].

Clinical Features

Unilateral Hydronephrosis
• Unilateral hydronephrosis (commonly caused by idiopathic pelviureteric junction obstruction or calculus) is more common in women and on the right. • **Presenting features** include the following: • **Mild pain** or **dull aching** in the **loin**, often with a sensation of dragging heaviness made worse by excessive fluid intake. The **kidney may be palpable**[Q]. • **Attacks of acute renal colic** may occur with no palpable swelling. • **Intermittent hydronephrosis (Dietl's crisis)**[Q]. A **swelling in the loin** is associated with **acute renal pain**. Some hours later the **pain is relieved** and the **swelling disappears** when a **large volume of urine is passed**[Q].

Bilateral hydronephrosis
• From lower urinary obstruction symptoms of bladder outflow obstruction[Q] predominate. • The kidneys are unlikely to be palpable[Q] because renal failure intervenes before the kidneys become sufficiently large.

Diagnosis

- **Ultrasound**[Q] is the least invasive means of detecting hydronephrosis and is regularly used to diagnose **PUJ obstruction** in utero.
- **Excretion urography** is only helpful if there is **significant function** in the **obstructed kidney**.
- **Isotope renography (DTPA scan)**[Q] is the **best test** to establish that dilatation of the **renal collecting system** is **caused by obstruction.**
- Very occasionally, a **Whitaker test** is indicated.

Treatment

- The **indications for operation** are **bouts of renal pain, increasing hydronephrosis, evidence of parenchymal damage** and **infection**[Q].
- **Conservation of renal tissue**[Q] is the aim; nephrectomy should be considered only when the renal parenchyma has been largely destroyed.
- **Mild cases** should be **followed by serial USG** and **operated upon** if **dilation is increasing**[Q].

68. Ans. d. Ureterocele

69. Ans. a. Catheterize with Foley catheter *(Ref: Bailey 25/e p1316, 1349; CSDT 13/e p922)*

- **Catheterization** is **mandatory for acute urinary retention**[Q]. Spontaneous voiding may return, but a **catheter** should be **left indwelling for 3 days** while detrusor tone returns.

70. Ans. b. Radioisotope scan

DIAGNOSTIC AND LABORATORY INVESTIGATIONS

71. Ans. c. Digital subtraction angiography *(Ref: Bailey 26/e p1287, 25/e p1277)*

- **Hypertension** in a **young female** is most likely due to **renal artery stenosis**, caused by **fibromuscular dysplasia**. **DSA** will show the stenosis.

Renal Artery Stenosis

- **Satisfactory imaging** of the **renal vessels** can even be achieved by **digital subtraction angiography**[Q] after intravenous injection of contrast medium.
- **Intra-arterial angiography** is considered **"gold standard"** for **diagnosis of large vessel disease**[Q], usually performed simultaneous with planned intervention.

72. Ans. c. USG

- Causes of **filling defect** on **IVP**: **Stone, mass, cyst**[Q].
- After excretory urogram, **next best investigation** will be **USG** for **lesion characterization**[Q].

73. Ans. a. Allergy to the drug *(Bailey 26/e p1274, 25/e p1276)*

Intravenous Urography (IVU)

- Although **IVU** gives **excellent images** of the **urinary tract**, its **use should be restricted** because in a **few patients** the **iodine** in the **contrast medium** may **provoke** a **potentially life-threatening anaphylactic reaction**[Q].
- Patients with a **history of allergy, atopy** and **eczema** are **particularly vulnerable**[Q], but severe reactions may occur without warning.

74. Ans. c. Distinguishing between non-obstructed system *(Ref: Bailey 26/e p1276, 25/e p1279)*

- A **99mTc-DTPA scan** is particularly **useful to prove** that **collecting system dilatation** is **caused by obstruction**.

Radioisotope Scanning

- **Radioisotope scanning** is used in particular to obtain **information about function** in **individual renal units**[Q].
- Diethyltriaminepentaacetic acid (**DTPA**) **behaves** in the kidney **like inulin**: it is **filtered by the glomeruli** and **not absorbed by** the **tubules**. Using a gamma camera, DTPA labelled with technetium-99m can be followed during its transit through individual kidneys to give a **dynamic representation of renal function.**
- A **99mTc-DTPA scan** is particularly **useful to prove** that **collecting system dilatation** is **caused by obstruction**. In **obstruction**, **radioactivity** will **remain in the kidney** even if urine flow is stimulated by administration of a diuretic like furosemide[Q].
- Other substances [**dimercaptosuccinic acid** (**DMSA**), **mercaptoacetylglycine** (**MAG-3**) and **sodium orthoiodohippurate** (Hippuran)] labelled with suitable radioactive isotopes have similarly been used to investigate renal function[Q].
- **Isotope bone scanning** is fundamental to the staging of kidney and prostate cancers, which typically **metastasise to the skeleton**[Q].

75. Ans. a. Thickened bowel loop on USG *(Ref: Sutton 7/e p873)*

- **Pseudokidney sign** or **target sign** is **USG finding** of **intussusception**[Q].

76. Ans. a. DMSA scan *(Ref: Bailey 26/e p1276-1277)*

- **Renal scarring** or **structure of kidney** is best demonstrated by a **DMSA scan**.

Investigation of Choice	
ADPKD (Retroperitoneal Fibrosis)	**CT scan**[Q]
Medullary Sponge Kidney	**IVP**[Q]
VUR	**MCU**[Q]
Retrocaval ureter	**MRI**[Q]
PUJ Obstruction	**DTPA scan**[Q]
Renal structure or **surface**	**DMSA scan**[Q]

77. Ans. d. X-ray diffraction *(Ref: www.imaging.robarts.ca/.../2005pmb50)*

X-ray Diffraction

- The **X-ray diffraction** is dedicated to **materials identification** and characterize through single crystal and power X-ray diffraction analysis.
- Monoenergetic **X-ray diffraction** (XRD) **analysis** is an **established standard** for the assessment of **urinary stone composition**[Q].
- For the **precise determination** of true **stone composition**, **x-ray diffraction analysis** has often been the **method of first choice**[Q].

78. Ans. b. Micturating cystourethrogram

79. Ans. a. Kidney *(Ref: Smith 17/e p51; Campbell 10/e p96)*

Clinical significance of different casts	
1. **Hyaline casts**	• **A normal constituent**[Q] **of urine** and has no attached significance[Q] • **Tom Horsfall protein**[Q] is protein secreted by **epithelial cells** of **loop of henle**. This protein may be excreted as Hyaline cast[Q]
2. **RBC cast**	• Are suggestive of **glomerular injury**[Q] or **acute glomerulonephritis**
3. **WBC casts**	• Are suggestive of **interstitial injury** and may be seen in **interstitial nephritis**[Q] • **WBC cast** with **bacteria** indicate **pyelonephritis**[Q]
4. **Brood granular casts**	• Are seen in **CRF**[Q] and suggests interstitial fibrosis and dilatation of tubules.
5. **Pigmented muddy brown granular casts**	• Are suggestive of ischemic or nephrotoxic injury[Q] **(Tubular Necrosis)**

80. Ans. d. Graphic representation of radioactivity of kidneys

81. Ans. c. Chronic obstructive nephropathy *(Ref: Wolfgang 2nd/550)*

Cortical Rim Nephrogram is seen in	
• Acute total main renal artery occlusion[Q] • Renal vein thrombosis[Q]	• Acute tubular necrosis[Q] • Severe chronic urinary obstruction[Q]

- **Rim and ball nephrogram** on **IVP** is seen in **chronic obstructive nephropathy**[Q].
- **Rim sign** is seen in **chronic hydronephrosis**[Q].

82. Ans. a. Micturating cystourethrogram

Procedure	Mean effective dose (mSv) value
X-ray abdomen	0.7
Intravenous urogram (6 films)	2.5[Q]
MCU	1.2[Q]
Cystography	1.8
Lithotripsy	1.3
Nephrostomy	3.4[Q]
PCNL	4.5
Ureteric stenting	4.7
CECT abdomen	10[Q]
Renal angiogram	2 to 30
Kidney stent insertion	12.7

83. Ans. a. Stone removal, b. Ureteral obstruction, c. Anterograde renography, d. Renal tumor resection *(Ref: Bailey Bailey 26/e p1281, 25/e p1283; Campbell 9/e p689)*

- For **HDN, DJ stenting** and **percutaneous nephrostomy, both** are having **same results** but **DJ stenting** is **less invasive**[Q].
- For **pyonephrosis, percutaneous nephrostomy** is **better** than DJ stenting[Q].

Percutaneous Nephrostomy

- **Percutaneous nephrostomy** is **occasionally essential**, if not life saving, in the treatment of **acute** or **chronic upper urinary tract obstruction**[Q].
- It is the **first step** in **obtaining antegrade access to the kidney**[Q] for various procedures.

Indications of percutaneous nephrostomy	
• Acute or chronic upper urinary tract obstruction[Q] in which access to the kidney is impossible from the lower urinary tract • Creatinine level is rising above the reference range[Q] and the urine cannot be drained through the ureter. • Renal pelvis disorders (UPJ obstruction, horseshoe kidneys, ureter duplex, ureter fissures, double renal collecting systems)[Q] • Hydronephrosis in renal transplant allografts[Q] • Treatment of staghorn calculi and large or lower-pole kidney stones[Q]	• Contraindications to ESWL[Q] • Stones or tumors associated with distal obstruction or a foreign body[Q] that cannot be removed through the ureter • When rapid dilation of the nephrostomy tract is required[Q] • To diagnose ureteral obstruction, filling defects , and anomalies via antegrade radiography • Tumors, such as sarcomas, ovarian tumors, and other retroperitoneal tumors

84. Ans. a. Hydronephrosis

85. Ans. d. Pyonephrosis

BENIGN RENAL TUMORS

86. Ans. d. Nephrectomy is the treatment of choice, c. Bleeding is self limited *(Ref: Smith 17/e p328-329; Campbell 10/e p1498-1501, 9/e p1578-1580; Bailey 26/e p1303, 25/e p1308)*

Angiomyolipoma

- **AML** is a **benign** clonal neoplasm consisting of varying amounts of **mature adipose tissue, smooth muscle and thick-walled vessels**[Q]

  - Approximately **20%-30%** are found in patients with **tuberous sclerosis (TS)**[Q]
  - **AML in TS** is more likely to be **bilateral** and **multicentric**, presents with **accelerated growth rates** and **symptomatic presentation**[Q]

- Who do not have TS (**70-80%**), pronounced **female predominance**, present **later** during **5th** or **6th decade**[Q]
- **Massive retroperitoneal hemorrhage** from AML (**Wunderlich's syndrome**)[Q] is seen in **10%** of patients. It's the most significant and feared complication.
- **Pregnancy** appears to **increase the risk of hemorrhage**[Q] from AML

Diagnosis

  - **CT scan:** The **presence of fat**[Q] within a renal lesion virtually **excludes the diagnosis of RCC** and is considered **diagnostic of AML.**
  - **Lack of calcification**[Q]

- **USG:** Well circumscribed, **highly echogenic lesion**, often associated with **shadowing.**
- **Angiography: Aneurysmal dilation**[Q] is found in **50% of AMLs**
- Positive immunoreactivity for **HMB-45**[Q], is **characteristic** for **AML** (used to differentiate AML from sarcoma)

Treatment

- **Asymptomatic** AML upto **4 cm: Follow up** with imaging at 6-12 months.
- **Symptomatic** or **> 4 cm:** Intervention is required.
  - **Nephron sparing approach** for small symptomatic AML by selective **embolization**[Q] (most preferred) or **partial nephrectomy**
  - **Total nephrectomy** for larger lesions or **life threatening hemorrhage**[Q]

87. **Ans. b. Renal oncocytoma** *(Ref: Smith 17/e p328; Campbell 10/e p1496-1498, 9/e p1577-1578)*

Oncocytoma

- Represents **3–7%** of all solid renal masses
- Most renal oncocytomas **cannot be differentiated** from **eosinophilic malignant RCC**[Q] by clinical or radiographic means

Pathology

- In grossly, tumors are light brown or tan, **homogeneous**, and **well circumscribed**, not truly encapsulated
- A **central scar** without prominent necrosis or hypervascularity.
- Ultrastructurally, **packed** with **numerous large mitochondria,** which contributes to their **distinctive staining characteristics**[Q]

Diagnosis

- **CT scan**: **Central stellate scar**[Q]
- **Angiography: Spoke-wheel pattern**[Q] of feeding arteries
- **MRI:** well-defined capsule, central stellate scar, and distinctive intensities on T1 and T2 images

Treatment

- A **nephron-sparing approach**[Q] is preferred.

Central Stellate Scar is seen in	
• **FNH**[Q]	• **Serous cystadenoma**[Q] (pancreas)
• **Fibrolamellar HCC**[Q]	• Renal **oncocytoma**[Q]

RENAL CELL CARCINOMA: TYPES

88. **Ans. d. Chromophobe cell carcinoma** *(Ref: Smith 17/e p330-336; Campbell 10/e p1419-1449; Bailey 26/e p1304-1305, 25/e p1308-1311)*

Classification of RCC

- **Clear cell carcinoma:**
  - **MC type** of RCC, **mainly sporadic**[Q].
    - Both sporadic and familial cases are associated with **loss of sequence** on **chromosome 3** either by **translocation (3:6, 3:8, 3:11)** or **deletion**[Q].
    - This region harbors the **VHL gene**[Q]
  - Arise from **proximal tubular epithelial cells** particularly of **cortex**[Q].
  - Occurs as **solitary unilateral lesion**[Q], often a pseudocapsule is formed around tumor by compression of surrounding tissue.
  - Tumor cells are **clear** and contain **glycogen and lipids**[Q].
  - Most are **well differentiated**[Q].
- **Papillary carcinoma**:
  - Characterized by **papillary growth pattern**[Q].
    - MC cytogenetic abnormalities are **trisomies 7, 16,** and **17**[Q].
    - Loss of 18 in sporadic form, trisomy 7 in familial form.
    - This is due to **mutated MET gene** on chromosome **7**[Q].
  - **Arise from DCT**[Q], can be **multifocal** and **bilateral**[Q]
  - Typically **hemorrhagic** and **cystic**.
  - Papillary carcinoma is the **MC type** of **RCC** in patients with **dialysis associated cystic disease**[Q].
  - Composed of **cuboidal** and **low columnar cells**[Q].
  - **Psammoma bodies** may be present.
- **Chromophobe renal carcinoma:**
  - Represent 5% of RCC, composed of cells with **prominent cell membrane** and **eosinophilic cytoplasm** with a **halo around nucleus**.
  - Relative **transparent cytoplasm** with a **fine reticular pattern** described as **'Plant cell' appearance.**
  - Associated with **best prognosis**
    - These tumors exhibit **multiple chromosome loss** and **extreme hypodiploidy**[Q].
    - Loss of multiple chromosomes **1**[Q], **2**[Q], 6, 10, 13, 17, 21 and **Y**[Q].
  - Arises from **intercalated cells** of **collecting duct**[Q].
  - Composed of **pale eosinophilic cells** often with a **perinuclear halo**[Q].

- **Collecting duct (bellini duct) carcinoma**:
  - **Rarest type** of RCC[Q], composed of malignant cells enmeshed within a prominent fibrotic stroma typically in medullary location.
  - Arise from **collecting duct cells** in the **medulla**[Q].
  - Has got **very aggressive course**[Q].
- Remember: **Medullary cell carcinoma** is seen **almost exclusively** in association with **sickle cell trait.**

Renal Cell Carcinoma

- **MC type** of RCC: **Clear cell carcinoma**[Q]
- **MC type** seen with **dialysis associated cystic disease: Papillary carcinoma**[Q]
- **Exclusively** associated with **sickle cell trait: Medullary cell carcinoma**[Q]
- **Best prognosis: Chromophobe carcinoma**[Q]

89. Ans. a. Mutated VHL gene is associated with clear cell carcinoma, c. Extreme hypodiploidy occurs

90. Ans. a. Clear cell type

91. Ans. d. Monosomy of 1 and Y (-1, -Y) *(Ref: Smith 17/e p330-336; Campbell 10/e p1419-1449; Bailey 25/e p1308-1311)*

- These tumors exhibit **multiple chromosome loss** and **extreme hypodiploidy**[Q].
- Loss of multiple chromosomes **1**[Q], **2**[Q], 6, 10, 13, 17, 21 and **Y**[Q].

92. Ans. c. von-Hippel Lindau (VHL) syndrome

93. Ans. a. PCT *(Ref: Smith 17/e p330-336; Campbell 10/e p1419-1449; Bailey 25/e p1308-1311)*

RENAL CELL CARCINOMA CLINICAL FEATURES, PARANEOPLASTIC SYNDROMES

94. Ans. None *(Ref: Smith 17/e p329-339; Campbell 10/e p1419-1491; Bailey 26/e p1304-1307, 25/e p1308-1311)*

Renal Cell Carcinoma (Gravitz tumor, Hypernephroma, Internist's tumor, Radiologist's tumor)[Q]

- **MC malignant tumor** of adult kidney and **most lethal**[Q] of all malignancies
- More common in **males**, in 6th and 7th decade
- Majority are **sporadic**
- Hereditary variants are **VHL syndrome, Hereditary clear cell carcinoma** and **Hereditary papillary carcinoma**[Q]
- Tumor usually involve **upper pole**[Q]

Risk Factors

- **Most significant risk factors** are **smoking** and **tobacco chewing**[Q]
- Other risk factors are obesity, hypertension, exposure to **Asbestos,** petroleum products and **cadmium**, chronic renal failure (specially due to **analgesic nephropathy**)[Q]

Spread

- Characteristic feature of RCC is tendency to **invade renal vein.** Further extension produces a **continuous cord of tumor** in **IVC** and even in **right side of heart**[Q]**.**
- **MC route** is **hematogenous**[Q]
  - MC sites of distant metastasis are **lungs** (**cannon ball deposits** and **pulsating secondaries**)[Q] > bone> liver> brain.
- **Lymphatic spread** occurs when tumor extends beyond renal capsule.

Notable features of RCC

- Encapsulated in spite of being malignant (**pseudocapsule**)
- **Spontaneous regression**[Q]
- **Refractoriness** to **cytotoxic agents**[Q]
- **Response** to **biological response modifiers** (**IL-2** and **IFN-alpha**)[Q]
- **Prolonged** period of **stable disease**[Q]

Clinical Features

- Classical triad of **gross hematuria, abdominal mass** and **pain** is seen in **10%** cases[Q] **(Too late triad)**
- **MC** and **consistent presentation** is **hematuria**[Q]**.**

- Other symptoms are fever, weight loss, malaise, **acute** and **non-reducing varicocele, lower limb edema** due to IVC obstruction.

RCC: Paraneoplastic Syndromes (20%)
• **Raised ESR: MC** paraneoplastic manifestation[Q] • **Hypercalcemia:** – Due to production of **PTH-rp**[Q] – **Only paraneoplastic syndrome** in which **medical therapies** are proven **useful.** • **Hypertension**[Q] (**Renin** production from tumor) • **Polycythemia**[Q] (**Erythropoietin** production from tumor) • **Stauffer's syndrome:** – **Non-metastatic hepatic dysfunction**[Q] due to raised **IL-6**[Q] leading to **increased ALP, PT** and **bilirubin** – Hepatic function **normalizes after nephrectomy**[Q] • Others are: **Cushing syndrome**, hypoglycemia, anemia, gynecomastia, amenorrhea

Diagnosis

- **Diagnostic IOC: CT** (95% accurate)[Q]
- **MRI** is **most accurate** non-invasive investigation for detecting **tumor thrombus** in **renal vein** or **IVC. Distinguishes tumor thrombus** from **bland thrombus**[Q]
- **Inferior venocavogram**[Q] is **most sensitive and specific** but **invasive** means to detect involvement of **IVC**.

- **Renal arteriography** is done before **renal sparing surgery** (partial nephrectomy), but 3-D helical CT is also sufficient.
- Specific **plain X-ray** finding is **central calcification**[Q].

FNAC is not routinely done in RCC, indications are:	
• Suspected **secondaries**[Q] • Suspected **lymphoma**[Q]	• Clinical suspicion of **renal abscess**[Q] • To prove pathological diagnosis in **disseminated** or **unresectable disease**[Q]

95. Ans. c. More common in female **96. Ans. b. Lungs**

97. Ans. a. Renal cell carcinoma **98. Ans. d. All**

99. Ans. a. Seminoma testis, c. Hypernephroma

- **Cannon-Ball pulmonary metastases** are **characteristic feature of RCC and testicular carcinoma**. As a rule, RCC produces spherical or round cannon-ball metastases.

100. Ans. c. von-Hippel Lindau disease **101. Ans. d. Lower pole involvement**

102. Ans. a. Invasion of renal vein means inoperability

103. Ans. d. Invasion of renal vein is contraindication for surgery, b. Associated with anemia and low ESR

104. Ans. c. More common in female **105. Ans. c. Renal cell carcinoma**

106. Ans. None **107. Ans. None, d. Cushing syndrome**

- Cushing syndrome is the least common among the given options.

108. Ans. a. Hematuria **109. Ans. c. Hematuria**

RENAL CELL CARCINOMA DIAGNOSIS AND TREATMENT

110. Ans. b. IVC involvement indicates inoperability *(Ref: Smith 17/e p329-339; Campbell 10/e p1419-1491; Bailey26/e p1304-1307, 25/e p1308-1311)*

Renal Cell Carcinoma

Prognostic factors

- **Pathologic stage**[Q] is single **most important** prognostic factor
- **Lymph node involvement** is a **poor** prognostic factor

Staging and grading

- **TNM** (preferred) and **Robson's**[Q] staging are used for RCC.
- **Fuhrman**[Q] histological system is used for **grading**.

Treatment

Localized RCC
• **TOC** is **open radical nephrectomy**[Q]
• Chemotherapy and radiotherapy is not effective

- Patient with **Stauffer's syndrome** are also candidate for **radical nephrectomy**[Q].
- **Radical nephrectomy** or **debulking** is done **for cytoreduction** in both **locally advanced** and **metastatic RCC**[Q].

Indications of nephron sparing surgery
• **Bilateral RCC** or **VHL syndrome**[Q]
• RCC involving a **solitary functioning kidney**[Q]
• Unilateral carcinoma and a functioning opposite kidney affected by a condition that might threaten its future function (e.g. RAS)
• Low stage or **≤ 4 cm RCC**[Q] **at any location**

Locally Advanced and Metastatic RCC
• **Sunitinib** is the **first line treatment** for **metastatic RCC** (response rate-**31%**)[Q]
• Combined **IL-2** and **IFN-alpha** is the **2nd line** treatment for **metastatic RCC** (response rate:**15%**)[Q]
• Chemotherapy with **vinblastine**[Q], as it is single most effective agent
• **Removal of thrombus** should be considered in **renal or IVC extension**[Q]
• **Radiotherapy** for **symptomatic bone metastasis**[Q]

7th AJCC (2010) TNM Staging for Renal Cell Carcinoma	
T: Primary tumor	**N: Regional lymph nodes**
T1a: Tumor **≤ 4 cm** and confined to the kidney **T1b**: Tumor **> 4 cm** and **≤ 7.0 cm** and confined to the kidney	N0: No regional lymph nodes metastasis N1: Metastasis in regional lymph node
T2a: Tumor **> 7 cm** but **≤ 10 cm** and confined to the kidney **T2b**: Tumor **> 10 cm** and confined to the kidney	
T3a: Tumor grossly **extends into renal vein** or **its segmental** (muscle containing) **branches**, or tumor **invades perirenal** and/or **renal sinus fat** but not beyond Gerota's fascia	**M: Distant metastases** M0: No distant metastasis M1: Distant metastasis present
T3b: Tumor grossly extents into **vena cava below diaphragm**	
T3c: Tumor extends into the **vena cava above the diaphragm** or **invades the wall of the vena cava**	
T4: Tumor invades **beyond Gerota's fascia** (including contiguous extension into ipsilateral adrenal gland)	

Stage I	Stage II	Stage III	Stage IV
T1N0M0	**T2**N0M0	**T1-2 N1** M0 **T1 N0-1** M0	**T4** anyN M0 AnyT anyN **M1**

111. Ans. d. Pathological staging

112. Ans. a. Partial nephrectomy

113. Ans. a. Radiosensitive

114. Ans. c. Right radical nephrectomy and left partial nephrectomy

115. Ans. a. Transperitoneal

116. Ans. c. Renal vein

117. Ans. b. Chromosome 3

118. Ans. a. Transitional cell carcinoma

119. Ans. c. Elevated ESR

120. Ans. a. Partial nephrectomy

121. Ans. c. Keeping fascia back in place *(Ref: Smith 17/e p336; Campbell 10/e p1450)*

- The prototypical concept of **Radical nephtrectomy** encompasses the basic principles of **early ligation of the renal artery and vein**, **removal of the kidney** with primary **dissection external to the Gerota's fascia, excision of the ipsilateral adrenal gland**, and **performance of a complete regional lymphadenectomy** from the **crus of the diaphragm** to the **aortic bifurcation**[Q].
- It has been well demonstrated that **removal of the ipsilateral adrenal gland** is **not routinely necessary** in the absence of radiographic adrenal enlargement **unless the malignant lesion extensively involves the kidney**, is **locally advanced**, or is **located in the upper portion** of the kidney **immediately adjacent to the adrenal gland**[Q].

Radical Nephrectomy

- Radical nephrectomy is the **primary treatment for localized RCC**.
- Its goal is to achieve the **removal of tumor** and to take a **wide margin of normal tissue**.
- **Radical nephrectomy** encompasses:
  - Basic principles of **early ligation of** the **renal artery** and **vein**[Q] (Artery Hb vein) First vein is incircled then artry is ligated.
  - **Removal of the kidney** with primary **dissection external to the Gerota's fascia**[Q]
  - **Excision of the ipsilateral adrenal gland**[Q]
  - Performance of a **complete regional lymphadenectomy** from the **crus of** the **diaphragm to** the **aortic bifurcation**[Q].

WILM'S TUMOR

122. Ans. b. Abdominal lump *(Ref: Devita 9/e p1766-1769; Nelson 18/e p2140; Smith 17/e p339-343; Campbell 10/e p3714-3722; Bailey 26/e p1304, 25/e p1308)*

Wilm's Tumor

- Wilm's tumor: **MC primary renal tumor** of **childhood (2-5 years)**[Q].
- Wilm's tumor: **2nd MC malignant abdominal tumor** in **children (MC** is **neuroblastoma).**
- Arise from kidney, composed of **three elements- blastema, epithelium and stroma**[Q]**.** (Best)
- **MC presenting feature** is **asymptomatic abdominal mass or swelling**[Q].
- Mostly **unilateral.**

> - Characterized by **triad of abdominal mass**, **fever** and **microscopic hematuria**[Q].

- Fever typically resolve after tumor resection

Associated malformations

- **WAGR Syndrome**[Q]: It consists of **aniridia, genital anomalies** and **mental retardation.** The risk of **Wilm's tumor is increased** by **33%** in this syndrome[Q]. Associated with WT-1 gene deletion cocated on chromos[Q] 11p 13
- **Denys-Drash Syndrome**[Q]: It consists of **gonadal dysgenesis** (Male pseudohermaphroditism), **nephropathy** leading to **renal failure**. **Majority** of patients with this syndrome **have renal failure**.
- **Beckwith-Wiedmann Syndrome**[Q]: It consists of **enlargement of body organs**, **hemi-hypertrophy, renal medullary cysts** and **abnormal large cells** in **adrenal cortex**, macroglossia, omphalocele, hepatoblastoma. Associated with WT-2 gene deletion located on chromosome 11p 15.5.

Diagnosis

- **USG (first investigation)**[Q] or CT abdomen for staging.
- **MRI** is **superior** to other imaging modalities in **delineating nephroblastomatosis elements.**
- **Calcification** tends to be more **crescent shaped, discrete** and **peripheral**[Q] in comparison of finely stippled calcification of neuroblastoma.

Treatment

- **Surgical excision (transperitoneal radical nephrectomy)** is treatment of choice.
- **Routine exploration** of **contralateral kidney** is **not necessary** if imaging is satisfactory and doesn't suggest bilateral process.

> - In unfavorable histology, **Radiation therapy** should be **started within 10 days**[Q] **after nephrectomy, Chemotherapy** should be **started 5 days after surgery**[Q]**.**

- **Chemotherapy: VCD** (Vincristine + Cyclophosphamide + Doxorubicin or dactinomycin)
- **Whole lung irradiation** is recommended for **pulmonary metastasis.**

Preoperative treatment should be considered	
• **Solitary kidney**[Q] • **Bilateral**[Q] renal tumors • Tumor in **horse shoe kidney**[Q]	• Tumor **thrombus** in **IVC above** the level of **hepatic veins**[Q] • **Respiratory distress** due to **metastatic**[Q] disease

Prognosis

- The **histology**[Q] **of Wilm's tumor** and **tumor stage** is identified as most important **determinant of prognosis**[Q] **(Histology > Stage).**

Pediatric Tumors	
• **MC malignant** tumor of infancy • **MC extracranial solid** tumor in children • **MC abdominal** malignancy in children	**Neuroblastoma**[Q]
• **MC primary malignant renal** tumor of **childhood**	**Wilm's tumor**[Q]
• **MC renal tumor** of **infancy**	**Congenital mesoblastic nephroma**[Q]
• **MC soft tissue** tumor in **infants and children**	**Rhabdomyosarcoma**[Q]
• **MC solid tumor** of **childhood**	**Brain tumor**[Q]
• **MC cancer of childhood**	**Leukemia**[Q] (30%) **>Brain tumors**[Q] (22%)

123. **Ans. a. Bone metastasis**
124. **Ans. c. Histology**
125. **Ans. a. Within 10 days**
126. **Ans. c. Same location**
127. **Ans. c. Abdominal mass**
128. **Ans. a. Hematuria, b. Mass abdomen,d. Fever**
129. **Ans. c. Hematuria almost always present**
130. **Ans. b. Less than 1 year**
131. **Ans. a. Preoperative use of actinomycin D**
132. **Ans. b. Lungs**
133. **Ans. b. International society of Pediatric Oncology (SIOP)** *(Ref: Devita's 8/e p2051, Schwartz 10/e p1638-1639, 8/e p1509)*

The **postchemotherapy based staging system** is the **'SIOP' staging** system developed by the **International society of oncology.**

Two Staging Systems are currently being used for the staging of Wilm's Tumor.

Prechemotherapy Staging System	Postchemotherapy Staging System
• Developed by the **National Wilm's Tumor staging Group (NWTSG** - Staging system) • This staging system is widely used in **North America** and **Canada** • 'NWTSG' approach involves **employment of 'primary surgery'**. • **Chemotherapy** with or without **Radiation therapy** is given **after surgery** • **Staging** is done **at time of surgery (Prechemotherapy)**	• Developed by the **International Society of Pediatric Oncology (SIOP** - Staging system) • This staging system is widely used in Europe • 'SIOP' approach involves employment of **preoperative chemotherapy without histological confirmation** of Wilm's tumor. • **Primary chemotherapy** for **all patients** regardless of extent • **Staging** is done **at time of surgery (Postchemotherapy)**

134. **Ans. c. Arthogryposis multiplex congenita**
135. **Ans. b. Open nephrourecterectomy** *(Ref: Sabiston 18/e p2082)*

- The **treatment of choice** for **satge I Wilm's tumor** is **transperitoneal radical nephrectomy** (**radical nephroureterectomy**)[Q] followed by **chemotherapy with or without radiotherapy** depending upon tumor histology.

136. **Ans. c. 11 p13**

TUMORS OF RENAL PELVIS

137. **Ans. a. Transitional cell carcinoma** *(Ref: Smith 17/e p320-323; Oxford Handbook of Urology 2nd/244-245; Campbell 10/e p1516-1524; Bailey 25/e p1311)*

Carcinoma Renal Pelvis

- **Transitional cell carcinoma** accounts for **90%** of **upper urinary tract cancers**[Q].
- Urothelial cancer often presents as a **widespread urothelial abnormality**: Patients with a single upper-tract carcinoma are at **risk** for developing **bladder carcinoma** (**30-50%**)[Q] and **contralateral upper urinary tract carcinoma** (**2-4%**).
- More common in **males**

Etiology

- **Smoking**[Q]
- **Excessive analgesic (Phenacetin) intake**[Q]
- **Industrial dyes** or **solvents**[Q]
- **Balkan's nephropathy**[Q]

Clinical Features

- **Painless gross hematuria (MC)**[Q], flank pain, irritative voiding symptoms

Diagnosis

- **Ureteroscopic brush cytology for malignant cells**[Q]
- **IVP** showing **radioluscent intraluminal filling defects**[Q]

- **CT urography** is **IOC** for evaluation of **upper urinary tract**[Q]
- Ureteral tumors are often characterized by **ureteral dilation below** the **site** of the **lesion**, creating the appearance of a **"goblet"** (better **appreciated** on **RGP**)[Q]
- **Bergman sign**[Q]**:** A ureteral catheter passed upto ureter may coil distal to the ureter

Treatment

- **Nephroureterectomy** with a cuff of bladder[Q].
- Periodic follow up with cystourethroscopy as **risk** for developing **bladder carcinoma** (**30-50%**) and **contralateral upper urinary tract carcinoma** (**2–4%**)[Q].

138. Ans. b. Pelvic calculus

139. Ans. b. Retrograde pyeloureterography *(Ref: Smith 17/e p320-323; Oxford Handbook of Urology 2nd/244-245; Campbell 10/e p1516-1524; Bailey 26/e p1307, 25/e p1311)*

- **Goblet sign** and **Stipple sign** describe the **appearance of ureteral dilation below** the **site** of an **intraluminal ureteral filling defect**, **best seen at** retrograde pyelography (**RGP**)[Q].
- The **Stipple sign** refers to the **pointillistic end-on appearance**[Q] on IVP or RGP of **contrast material tracking into** the **interstices** of a papillary lesion.
- Because maturity of TCC have a papillary configuration, **presence of this sign** should **raise** the **suspicion of TCC**, while the **Stipple sign** is **best seen** in **large papillary bladder tumors**[Q], it can occur anywhere in urothelial tumor, which expresses papillary architecture.

140. Ans. d. Transitional carcinoma of pelvis extending till ureter

RENAL TRAUMA

141. Ans. a. Urgent IVP is indicated *(Ref: Smith 17/e p281-286; Campbell 10/e p1169-1178; Bailey 26/e p1286-1288, 25/e p1290-1291)*

Renal Injuries

- The **kidney** is the **most commonly injured** part of the **urinary tract**[Q]
- MC cause of blunt renal injury is **motor vehicle accident**[Q].
- **Hematuria** is the **best indicator**[Q] of traumatic urinary system injury.
- **More than 80%** of patients sustaining **penetrating renal injuries** have **other intra-abdominal injuries**[Q].
- Blunt renal injuries are generally divided into minor and major injuries.
- **Minor injuries** account for approximately **85%**[Q] of cases.

> **Penetrating wounds** causing **small parenchymal injuries** are generally treated by **débridement, primary repair,** and **drainage**[Q].

- **Injuries involving the hilum** are **seldom repaired primarily**[Q], and in most circumstances total nephrectomy is necessary.

Imaging studies

Contrast enhanced CT is the IOC for Renal Injuries[Q]
Indications • Gross hematuria[Q] • Microscopic hematuria with hypotension[Q] anytime during initial resuscitation

- **IVP** should be done to see the **function of the opposite kidney**[Q]
- **Arteriography** is used to **define arterial injuries** suspected on CT or to **localize arterial bleeding** that can be controlled by **embolization**[Q].

Management

Non-operative

- **Most (>95%)** of **renal injuries** can be **managed non-operatively**[Q].
- Significant renal injuries (Grade **II –V**) are found only in **5%** of renal trauma.
- A **hemodynamically stable patient** with an **injury well staged by a CT scan** can usually be **managed without renal exploration**[Q]. Hospital admission, bed rest, vital monitoring and repeated CT scan is required.

Renal exploration in Injuries	
• Renal exploration should be done by transabdominal approach in order to have a control on the renal vessels first[Q].	
Absolute indications	**Relative indications**
• Persistent renal bleeding[Q] • Expanding or pulsatile perirenal hematoma[Q]	• Urinary extravasation • Non viable tissue (>20% necrosis) • Segmental arterial injury

Indication of Nephrectomy
• Hemodynamically **unstable patient**, with **low body temperature** and **poor coagulation**, with a **normal contralateral kidney**[Q]. • **Extensive renal injuries**[Q] when the patient's life would be threatened by an attempt at renal repair. • Already **poorly functioning hydronephrotic kidney**[Q] with continuous bleeding

(Ref: Smith 17/e p286; Campbell 10/e p1178, 1203)

Complications after Renal Trauma

- **Complication rate** after renal trauma is **3-10%Q**
- **Urinoma** is the **MC complicationQ** after renal trauma
- **Delayed bleeding** usually occurs **within 1-2 weeksQ** after injury

Early Complications	Late complications
• Urinoma, delayed bleeding • Urinary fistula, abscess • Hypertension	• Hydronephrosis, pyonephrosis • Stone formation, AV fistula • Delayed hypertension

Grade	Type	Description
I	Contusion	Microscopic **(>5 RBCs/HPF)Q** or gross hematuria, urological studies normal
	Hematoma	**Subcapsular,** nonexpanding without parenchymal laceration.
II	Hematoma	Nonexpanding **perirenal** hematoma, confined to renal retroperitoneum
	Laceration	**<1 cm** parenchymal depth of renal cortex **without urine extravasationQ.**
III	Laceration	**>1 cm** parenchymal depth of renal cortex **without collection system rupture or urinary extravasationQ**
IV	Laceration	Parenchymal laceration **extending through collecting systemQ**
	Vascular	**Main renal artery** or **vein injury** with contained hemorrhage
V	Laceration	Completely **"Shattered kidney"Q**
	Vascular	**Avulsion of renal hilum,** devascularising the kidney.

142. Ans. c. Exploration indicated in all cases

143. Ans. b. Uremia

144. Ans. b. Open Gerota's fascia and explore proximal renal vessels *(Ref: Smith 17/e p285; Campbell 10/e p1172-1174)*

The correct option should be "**take the control** or **explore proximal renal vessels before opening Gerota's fascia**", to avoid excessive intra-operative bleeding.

Excretory Urography (IVU or IVP)- Campbell 10/e p1172

- Historically, **excretory urography** was the most commonly used modality to evaluate genitourinary injuries. **Largely replaced by CT,** a **limited role includes** the **intraoperative "single-shot" IVP**. The **indications are uncommon,** but when the surgeon encounters an unexpected **retroperitoneal hematoma surrounding a kidney during abdominal exploration,** the study can provide essential informationQ.
- The **main purpose** of the **one-shot IVP** is to **assess the presence of a functioning contralateral kidney** and to **radiographically stage the injured sideQ.**
- If **findings are not normal** or **near normal**, the **kidney should be explored to complete the staging** of the injury and **reconstruct any abnormality foundQ.**

- In the given problem, patient is having a **non-pulsatile hematoma**, which is **not an indication** for **surgical exploration**.
- **On table IVU** was done **to see** the **function of contralateral kidney**, the function of opposite kidney should be ascertained before planning nephrectomy in any trauma patient.
- **Angiography** is **largely used to define arterial injuries suspected on CT** or to **localize and control arterial bleeding**. **Renal embolization** has proved useful in the **primary setting with persistent bleeding** in a **hemodynamically stable patient**.
- **Take the control** or **explore proximal renal vessels before opening Gerota's fascia**", to avoid excessive intra-operative bleeding.

145. Ans. a. Observation and supportive measures

146. Ans. c. Contrast enhanced computed tomography

147. Ans. a. 20% *(Ref: Smith 17/e p286)*

- **Minor renal injuries** from **blunt trauma** account for **85% of cases** and **do not usually require operationQ.**
- **Bleeding stops spontaneously** with **bed rest** and **hydrationQ**.
- Cases in which **operation is indicated** include those associated with **persistent retroperitoneal bleeding, urinary extravasation,** evidence of **nonviable renal parenchyma,** and **renal pedicle injuries** (less than 5% of all renal injuries)Q.

148. Ans. c. Contralateral renal function is ascertained

149. Ans. a. Exploration is indicated in 90% of cases

150. Ans. c. 5

151. Ans. b. Pulsatile hematoma

152. Ans. d. CECT abdomen

URETERIC INJURY

153. Ans. a. Complete renal atrophy, d. Hydronephrosis *(Ref: Smith 17/e p287-288; Bailey 26/e p1286-1289, 25/e p1292-1293)*

Rupture of the Ureter

Ureteric injury during operation
• **MC cause** of injury to the ureters is **surgical trauma** during **hysterectomy** or other **pelvic surgery**[Q]
• **Preoperative catheterization** of the ureters makes them easier to **protect** during surgery[Q]
• **Injuries discovered** at the time of surgery should be **repaired immediately**[Q]

Clinical Features: Unilateral Injuries

- **No symptoms**[Q]: Secure ligation of a ureter may simply lead to silent atrophy of the kidney.
- **Loin pain** and **fever**[Q]: Possibly with **pyonephrosis**, occur with infection of the obstructed system. **Urography** shows **no function**, which will be permanent unless steps are taken quickly to **relieve the obstruction** by inserting a **percutaneous nephrostomy**.
- **A urinary fistula**[Q] develops through the **abdominal** or **vaginal wound**. **Nephrostomies**[Q] may be inserted and **repair postponed** until edema and inflammation have subsided.

Diagnosis

- The diagnosis is rarely made until there is swelling in the loin or iliac fossa associated with a reduction of urine output.
- **Excretion urogram** or **CECT: Extravasation** of **contrast** from the injured ureter[Q].

Treatment: Early repair is safe provided that the patient is fit for surgery

Injury recognized at the time of operation
• **Ureterovesical continuity** should be restored unless the patient's condition is poor[Q].
• **Deliberate ligation** of the proximal ureter and **temporary percutaneous nephrostomy** is then the best course **until the patient is well enough** for a repair[Q].

Methods for repairing a damaged ureter	
• **No loss** of length	• **Spatulation** and **end-to-end anastomosis** without tension[Q]
• **Little loss** of length	• Mobilise kidney • **Psoas hitch**[Q] of bladder • **Boari operation**[Q]
• **Marked loss** of length	• **Transureteroureterostomy**[Q] • **Interposition** of isolated **bowel loop** or mobilised **appendix**[Q] • Nephrectomy[Q]

Bilateral Ureteral Injury
• Ligation of both ureters leads to **anuria**[Q].
• Ureteric catheters will not pass and urgent relief of obstruction by **nephrostomy** or **immediate surgery**[Q] is essential.

Boari operation

- A **strip of bladder** wall is fashioned into a **tube** to **bridge the gap**[Q] between the cut ureter and the bladder[Q].

154. Ans. b. Hysterectomy

POLYCYSTIC KIDNEY DISEASE

155. Ans. a. Autosomal recessive trait *(Ref: Smith 17/e p507-510; Campbell 10/e p3170-3176; Bailey 26/e p1283-1284, 25/e p1286-1287)*

Adult Polycystic Kidney Disease (AD)

- Inheritance is **autosomal dominant**[Q] with 100% gene penetrance, 50% offsprings are affected.
- Chromosome **16** and **4**[Q] are affected
- Usually **bilateral**[Q]
- An important cause of **renal failure**, accounting for **10-15%** of patients **who receive hemodialysis**.

Pathology

- Kidneys are **grossly enlarged**[Q] with multiple cysts
- Cyst are distributed **uniformly**[Q] throughout cortex and medulla
- Cysts contain straw colored fluid that may become hemorrhagic
- **Renal arteriolar thickening** is a prominent finding in **adults**

Presentation

- Usually occurs in 3rd or 4th decade
- MC clinical feature is **hypertension** (**75% adults** and **25% children**)[Q] due to activation of rennin angiotensin system[Q].
- **Pain** due to infection (pyelonephritis)/obstruction/sudden hemorrhage.
- **Hematuria[Q], nocturia** (due to impaired concentrating ability), **nephrolithiasis** (15–20%)[Q]
- Progressive decline in renal function leading CRF
- **MC cause of death** is **CRF[Q].**

ADPKD Extra-renal manifestations	
• Cysts: **Liver (MC)[Q], spleen, pancreas** and **ovaries** • **Berry aneurysms** (10–40%)[Q]	• **Colonic diverticulosis[Q]** • **Mitral valve prolapse[Q]**

Diagnosis

- **USG:** Enlarged kidney with uniformly increased medullary echogenecity

IVP in ADPKD	
• Stretching of the calyces by the cysts (**spider leg** or **bell like deformity**)[Q]	• **Bubble appearance[Q]** (calyceal distortion) • **Swiss cheese appearance[Q]**

- **CT scan** is **IOC[Q]** in **ADPKD**

Management

- Treatment is mainly aimed to control UTI, hypertension, calculi and general measures for uremia (low protein diet)
- Pain relief by percutaneous aspiration with instillation of sclerosing agent or **Rovsing's operation (deroofing of the cyst)[Q]**
- Treatment of infections by septran or ciplox.
- **Dialysis** or **renal transplantation** (only definitive treatment) for renal failure[Q].

156. Ans. c. Renal cell carcinoma **157. Ans. d. Decompression of cyst leads to normal renal function**

158. Ans. a. Hypertension is rare **159. Ans. b. 16 and 4**

160. Ans. a. Cysts in liver, lungs, c. Berry aneurysms **161. Ans. d. Brain**

- **Brain**, if not given in the options, then **lungs** should be opted as the **cyst not associated with the ADPKD.**

162. Ans. d. Renal transplant **163. Ans. d. 50%** **164. Ans. a. Lungs**

165. Ans. b. Polycystic kidney **166. Ans. b. Polycystic kidney**

Radiological feature	Disease
• **Rim/crescent** sign[Q] • **Soap bubble** appearance[Q]	**Hydronephrosis**
• **Spider leg** appearance[Q]	**Polycystic Kidney**
• **Flower vase** appearance of **ureter[Q]**	**Horse shoe Kidney**
• **Golf hole ureter[Q]**	**TB bladder**
• **Drooping lily** sign[Q]	**Ectopic ureter**
• **Cobra head** or **Adder head** appearance[Q] • **Spring onion** appearance[Q]	**Ureterocele**
• **Egg in cup** appearance[Q]	**Analgesic nephropathy** causing **papillary necrosis**
• **Thimble bladder[Q]**	**Tubercular chronic cystitis**
• **Sandy patches[Q]**	**Schistosomiasis** of bladder
• **Chalice/Bergman sign[Q]**	**Ureteric dilatation** distal to **neoplasm**
• **Fish hook bladder[Q]**	**BPH**
• **B/L spider leg** appearance[Q] • **Swiss-cheese nephrogram[Q]** • **Sun burst nephrogram[Q]**	**Polycystic kidney**

167. Ans. a. Inherited as autosomal recessive **168. Ans. b. Hypertension is rare**

169. Ans. b. Hepatic cyst **170. Ans. b. The presentation is unilateral**

171. Ans. a. Autosomal dominant *(Ref: Campbell 10/e p3167-3170; Bailey 26/e p1284, 25/e p1288)*

Infantile Polycystic Kidney Disease (AR)

- Rare, **autosomal recessive**[Q], usually bilateral
- Always become apparent during childhood, rarely upto 20 years, **most severe forms** are seen **earliest in life**[Q].
- If diagnosed at **birth**, **child dies** in **2 months** due to **uremia** and **pulmonary hypoplasia**[Q]
- Associated with **hepatic fibrosis**, leading to portal hypertension and hepatic failure; **pulmonary fibrosis**[Q]

Diagnosis

- **IVP:** Delayed function with characteristic radial or medullary streaking (**sunburst pattern**)[Q]

Treatment

- No cure, only **palliative support**[Q] (respiratory care, surgery for esophageal varices, hemodialysis and renal transplantation)

PUJ OBSTRUCTION

172. Ans. d. Aberrant vessel is the most common cause *(Ref: Smith 17/e p565-568; Campbell 10/e p3214-3222; Bailey 26/e p1290-1292, 25/e p1293-1295)*

Pelviureteric (PUJ) obstruction

- A blockage of the ureter at the junction with the renal pelvis resulting in restriction of urine flow
- **MC cause** of **fetal hydronephrosis**[Q]
- More common in **boys**[Q], mainly **left sided**, **bilateral** in **10–15%** cases

Causes of PUJ Obstruction	
Congenital	**Acquired**
• **Aperistaltic segment**[Q] due to disorganization of smooth muscle or collagen deposition • Crossing **aberrant renal vessel**[Q]	• **Calculus**[Q] • **Instrumentation**[Q] • **Infection**[Q]

Associated abnormalities

- **PUJ Obstruction** of **opposite kidney** (**MC**)[Q] in 40%
- **VUR**[Q]
- **VATER defects**[Q] (Vertebral anomalies, anorectal malformations, TE fistula, Radial and renal dysplasia)

Clinical Presentation

- Most infants are **asymptomatic**[Q]
- Most infants are discovered by **palpable abdominal mass** or **prenatal USG**[Q].

Diagnosis

- **USG:** Diagnoses **hydronephrosis**, but does not diagnose whether it is obstructive.
- **IVP:** It was the primary radiological study to define PUJO but now **replaced by DTPA scan**[Q].

DTPA scan
• **Investigation of choice for PUJO** to establish that hydronephrosis is due to obstruction.

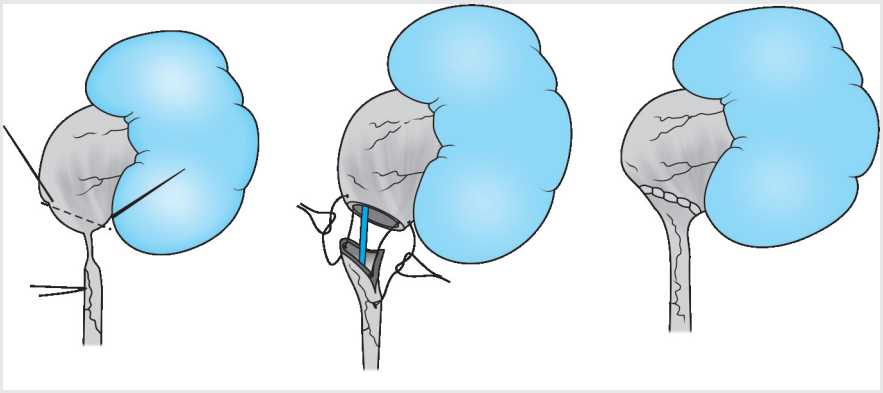
- **Pressure flow studies (Whitaker test)**[Q]
  - **Invasive test**, used only in cases of **equivocal result** of **renal scan**[Q].
  - Measures **differential pressure between kidney** and **bladder**
  - A percutaneous puncture of kidney is made; **contrast fluid** is infused at a constant rate with monitoring of intra-pelvic pressure. **An abnormal rise** confirms obstruction.
- **Retrograde Pyelogram**: Anatomic delineation more clear. Show the **distal end of obstruction**[Q].

Treatment

- **Conservative** in children with **good renal function without any complication**
- Pyeloplasty or nephrectomy

Types of Pyeloplasty	
Open	**Endoscopic**
A. Anderson Hynes (Dismembered) pyeloplasty: • **Gold standard** for **PUJ obstruction**[Q] • For large **redundant pelvis** with **high insertion of ureter**[Q]. • Advantages: Broad applicability, including **preservation of anomalous vessels**[Q] and **excision of** the **pathological UPJ** and **appropriate repositioning**[Q] successful reduction pyeloplasty	• For **small pelvis**[Q] with PUJ dependent for good funnel drainage and **intrarenal pelvis**[Q]. • More than **2 cm** long area of **stricture** is a **contraindication**[Q]. • Endoscopic procedures are: **a. Endopyelotomy** (percutaneous or retrograde) advised for associated renal stone **b. Balloon dilatations** or **Lasers**
B. Foleys V-Y pyeloplasty: Best applied for **high insertion** of the ureter	
C. Flaps (Spiral and **vertical)**	

Indications for nephrectomy in PUJO
• **Permanent severe loss** of **renal function (< 10% function)**[Q]
• **Unmanageable complication** in hydronephrotic kidney (**Severe recalcitrant infection, Intractable pain, Hypertension**)[Q]



173. Ans. c. Right sided lesions predominate

174. Ans. c. Painless abdominal mass

175. Ans. c. Dismembered pyeloplasty

176. Ans. b. DTPA scan

177. Ans. b. Endoscopic pyelotomy is contraindicated

178. Ans. a. Dietl's crisis

CONGENITAL ANOMALIES OF KIDNEY

179. Ans. a. Bilateral renal agenesis *(Ref: Smith 17/e p506; Campbell 10/e p3128-3134; Bailey 26/e p1282, 25/e p1285)*

Renal Agenesis

- Incidence of **unilateral**[Q] renal agenesis is **1 in 1000**[Q], more common in **males**[Q] and on **left side**[Q] in unilateral renal agenesis.
- **Ureter** is **absent** on the side of the unformed kidney in **50%**[Q] cases, in rest blind ureter is found.

- Bilateral is incompatible with life and rare.
- Associated anomalies: **Oligohydramnios**[Q], **pulmonary hypoplasia**[Q] (due to **defective proline synthesis**), **amnion nodosum**[Q], **Potter's facies**[Q] (seen in bilateral RA).
- Unilateral renal agenesis is associated with **unicornuate** or **bicornuate uterus** and **septate vagina** in females.
- **Colonic shadow** is placed **more laterally**[Q] on **X-ray KUB** due to **unilateral renal agenesis.**

Potter's facies

- Hypertelorism, prominent inner canthal fold[Q]
- Blunted nose, recessive chin, broad and low set ears, limb deformities[Q]
- Seen in **bilateral renal agenesis**[Q]

180. Ans. e. All are true

181. Ans. d. UTI *(Ref: Smith 17/e p515; Campbell 10/e p3191-3192)*

Medullary Sponge Kidney (AR)

- Dilatation of **distal portion of** the **collecting duct** with **numerous associated cysts** giving kidneys an **appearance of sponge**
- **Autosomal recessive** defect, **usually bilateral**[Q], affecting all of the papillae, but it may be unilateral
- **Infection** and **calculi** are occasionally seen as a result of urinary stasis in the tubules.

Associated with

- **Hemihypertrophy**[Q] of the body
- **Hypercalcemia**[Q]
- **Stone formation**[Q] (Calcium oxalate or calcium phosphate)
- **Nephrocalcinosis**[Q] (Calcium deposition in renal parenchyma)

Clinical features

- The only symptoms are those arising from **infection** and **stone formation**[Q].

Diagnosis

- Made on the basis of excretory urogram or contrast-enhanced CT scan.

IVP (Excretory urogram): IOC to diagnose medullary sponge kidney[Q]
• **"Bristles on brush"**[Q] appearance due to dilated ducts
• **"Bouquet of flowers"**[Q] appearance due to calcification in the ectatic ducts

Treatment

- There is **no treatment** for medullary sponge kidney.
- Therapy is directed toward the complications (e.g. pyelonephritis and renal calculi).

182. Ans. a. Supernumerary renal arteries *(Ref: Campbell's 10/e p26)*

Vascular anomalies involving the kidney are very common being present in 25% to 40% of kidneys.

Supernumerary renal arteries with two or more renal arteries supplying each kidney are the **most common renal vascular anomaly**.

Abnormalities of Renal vasculature

- **The MC renal vascular anomaly** is the **presence** of **supernumerary renal arteries**[Q].
- **Variations** of the **main renal artery** and **vein** are common, present in **25% to 40%** of kidneys. The **most common variation** is the **occurrence of supernumerary renal arteries** (**two or more arteries** to a **single kidney**[Q])
- The **most common sub-group** of **supernumerary renal arteries** is a **duplicated renal artery** (**double renal artery**)[Q] involving a second dimunitive renal artery supplying each kidney
- Supernumerary renal veins are also common, but occur about half as commonly as supernumerary renal arteries.

183. Ans. a. Left renal vein *(Ref: Smith 17/e p515)*

Renal Collar

- The **main renal vein** divides and sends **one limb anterior** and **another limb posterior** to **aorta** to reach the IVC[Q].
- Formed on the **left side**[Q] and represents **persistence of the embryonic state**.

184. Ans. d. Is a normal variant *(Ref: www.ajronline.org/content/188/5/1380.full)*

Persistent Fetal Lobulation

- **Persistent fetal lobulation** is a **normal variant** seen occasionally **in adult kidneys**.
- It occurs when there is **incomplete fusion** of the **developing renal lobules**[Q].
- Embryologically, the kidneys originate as distinct lobules that fuse as they develop and grow.
- It is often seen on **ultrasound, CT** or **MRI** as **smooth indentations of the renal outline in between renal pyramids**[Q].
- They should be **distinguished from renal cortical scarring**, which **generally overlie the pyramids**[Q].

185. Ans. d. 1:1000 *(Ref: Campbell 10/e p3136)*

Ectopic Kidney

- The **actual incidence** among **autopsy series** varies from **1 in 500** to **1 in 1200** but the **average occurrence** is about **1 in 900**[Q].

186. Ans. c. Retrocaval Ureter *(Ref: Smith 17/e p563; Campbell 10/e p1147-1149; Bailey 26/e p1286, 25/e p1290)*

Retrocaval Ureter (Circumcaval ureter)

- An **embryologically normal ureter** becomes **entrapped behind IVC**[Q]
- Because of **abnormal persistence of** the **right subcardinal** (as opposed to the supracardinal) **vein**. This forces the right ureter to encircle the vena cava from behind (**Altered development of IVC**)[Q]
- The **right ureter** typically **deviates medially behind** the **IVC**[Q], winding about and crossing in front of it from medial to lateral direction, to resume a normal course to the bladder.
- More common in **males**[Q]

Clinical Features

- Signs and Symptoms of **ureteric obstruction**[Q]

Diagnosis

- **MRI** is **IOC** to delineate **anatomy** clearly and **non-invasively**[Q]
- **IVP**: "**Reverse J**", "**Fish Hook**" or **"Shepherd crook"**[Q] deformity.
- Retrograde ureterography

Surgical Management

- Ureteral division with **relocation ureteroureterostomy** in cases of obstruction.

187. Ans. d. Usually divided to gain access to renal pelvis *(Ref: Smith 17/e p515; Bailey 26/e p1285, 25/e p1288)*

Aberrant Renal Artery

- Arteries that originate from vessels other than aorta or the main renal artery
- **Unilateral**[Q], more common on **left side**[Q], involving **lower pole**[Q] of kidney
- May cause **hydronephrosis** due to **extrinsic compression**[Q]
- These are **end arteries**[Q], therefore any injury or division may lead to lower pole infarction.

> - The **renal arteries** are **end-arteries**, **division** leads to **infarction** of parenchyma[Q].
> - **Renal veins** have **extensive collaterals** and an aberrant vein **can be divided** with impunity[Q].

188. Ans. a. Bilateral

189. Ans. c. 1:1400 individuals *(Ref: Campbell 10/e p3128)*

- Most autopsy series suggest that **unilateral renal agenesis** occurs **once in 1100 births**[Q].
- In an historical survey of excretory urograms, the incidence ranged between **1 in 1500**[Q].

190. Ans. d. Biopsy *(Ref: Campbell 10/e p3176-3177)*

Medullary Cystic Disease

- **Excretory urography** and **ultrasonography** frequently **fail to detect cysts** because they are **small**[Q].
- Cysts may be seen on **imaging studies** if they are large enough, but, **early in the disease, cysts are rarely visible**[Q].
- It is **best diagnosed by biopsy**[Q].
- Histologically, there is a **characteristic triad**:
  - **Irregular thickening** and **disintegration** of the **tubular basement membrane**
  - **Marked tubular atrophy** with **cyst development**
  - **Interstitial cell infiltration with fibrosis**

HORSE SHOE KIDNEY

191. Ans. a. Spider like appearance in IVP, d. Heminephrectomy improves function *(Ref: Smith 17/e p512-515; Campbell 10/e p3145-3149; Bailey 26/e p1282-1283, 25/e p1286)*

Horseshoe Kidney

- **MC renal fusion abnormality**[Q] with incidence of **1:400**[Q], more common in **males**[Q]
- Fusion at the **lower poles**[Q] by a parenchymatous or fibrous isthmus

Etiopathogenesis

- Fusion occurs before kidneys have rotated at their long axes
- The axes of these masses are **vertical**[Q] whereas axes of normal kidneys are oblique to spine, because they lie along the edges of the psoas muscle
- **Pelvis and ureters** are usually **anteriorly placed**[Q] or anteromedial, crossing anteriorly to isthmus
- **Calyces** point **posteriorly**[Q]. Lowermost calyx extends caudally or even medially
- **Migration** is **incomplete**. Inferior mesenteric artery (**IMA**) **prevents full ascent**[Q]
- **Isthmus** usually located adjacent to **L3-L4** vertebra, just below the origin of IMA from aorta
- **Ureteral compression** can occurs due to **anteriorly displaced ureter**[Q] or from obstruction by **aberrant vessels** leading to hydronephrosis and infection.

Associated Abnormalities (Present in one third[Q] cases)	
• **CVS** (**VSD**) and **CNS** involvement • **Anorectal malformations**[Q] • **Unicornuate or bicornuate uterus**[Q]	• Renal: **VUR** and **PUJ** obstruction in **one third**[Q] cases • **Hypospadias, undescended testis**[Q]

Clinical Features

- Most are **asymptomatic**[Q], mostly it is an autopsy finding
- **MC symptom**: **vague abdominal pain**[Q]
- **Rovsing sign: abdominal pain, nausea** and **vomiting**[Q] on hyperextension of spine

Diagnosis is usually made on IVP showing
• **Low lying kidneys**[Q], closed to vertebral column • **Vertical axes**[Q] through kidneys point towards the LS spine • Characteristic orientation of the calyces, directed posterior to each renal pelvis, with the **lowermost calyx** pointing **caudally** or **even medially** (**Hand joining sign**)[Q] • High insertion of the ureter appears to drape over a midline mass (**Flower vase like curves of ureters**)[Q]

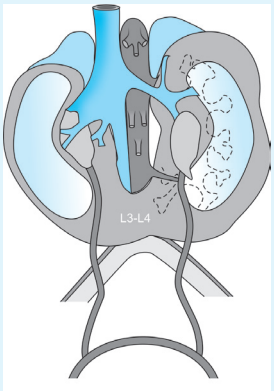
- **Angiography** is done before surgery as **blood supply is unpredictable**[Q] but not needed usually as helical CT is useful.

Complications

- Prone to **ureteral obstruction** due to high incidence of **aberrant renal vessels**[Q] and the necessity for ureters to arch over the renal tissues
- **Hydronephrosis, stone, infection**[Q]
- Large fused kidney occupying the concavity of sacrum may cause **dystocia**[Q]

Treatment

- **Pyeloplasty** is done only in symptomatic cases, **isthmus is not divided**[Q].



Aortic Aneurysm with Horseshoe Kidney

- **Preoperative angiography** is **essential**[Q] for the proper evaluation of the renal arteries, as there are multiple aberrant renal arteries arising from aorta
- Isthmus rarely needs to be divided
- **Left retroperitoneal approach**[Q] is preferred.

192. Ans. b. L3-L4 vertebra **193. Ans. b. Horseshoe kidney**

194. Ans. d. Isthmus may contain aberrant vessels

RENAL CYST

195. Ans. a. Renal cyst *(Ref: Smith 17/e p510-512; Campbell 10/e p3188-3189, 9/e p1575; Bailey 26/e p1284, 25/e p1288)*

Benign Renal Cyst

- **MC benign renal lesions**[Q], represent **> 70%** of all **asymptomatic**[Q] renal masses.
- More common in **men,** and can be **solitary** or **multiple**[Q]
- Prevalence **increases with age,** can be found in **> 50%** of patients > **50 years**[Q]
- **Treatment:** Percutaneous **drainage and sclerosis**[Q] with 95% alcohol.

Bosniak's Classification of Simple and Complex Cyst	
Category I	**Simple benign cyst**[Q] with good through-transmission, no echoes within the cyst, sharply, marginated smooth wall; requires **no surgery**
Category II	**Looks benign** with **septation, minimal calcification**, and **high density**; requires **no surgery**[Q]
Category II F	**Calcification** in wall **thicker** and more **nodular**[Q] than in category II, septa have **minimal enhancement**; requires **no surgery**
Category III	**Complicated lesion** cannot confidently be distinguished from malignancy, **more calcification**, more **prominent septation**; more likely to be **benign** than malignant; requires **surgical exploration**[Q] and/or removal
Category IV	**Malignant lesion**[Q] with large cystic components, **irregular margins; solid vascular elements**; requires **surgical removal**[Q]

196. Ans. a. Polycystic kidney *(Ref: Smith 17/e p510-512; Campbell 10/e p3188-3189, 9/e p1575)*

- **Incidence of polycystic kidney**: **1 in 400**[Q] **(0.25%)**
- **Simple renal cyst** is **MC cystic disease** in **human kidney** (incidence is **0.22% from birth to 18 years**)[Q]

URETEROCELE

197. Ans. d. Ureterocele *(Ref: Smith 17/e p560-561; Campbell 10/e p3240-3259; Bailey 26/e p1286, 25/e p1290)*

Ureterocele

- Cystic dilation of the terminal ureter
- More common in **females**[Q]

Types

- **Intravesical (20%)**: Most often with **single ureter**[Q]
- **Ectopic (80%)**: Nearly always involve the **upper pole** of **duplicated ureters**[Q].

Clinical Features

- **MC presentation** is **UTI** or **urosepsis**[Q]
- Palpable abdominal mass (due to **hydronephrosis**)
- **Prolapse** through female urethra as a cyst
- **Calculi** due to urinary stasis, mostly in distal ureter

Diagnosis

- **USG**: Hydroureteronephrosis, cyst in bladder
- **IVP**: Typical **Adder head** or **Cobra head** or **Spring onion appearance**[Q] is diagnostic of ureterocele
- **MCU**: A **smooth filling defect**[Q] in the trigonal area
- **Cystoscopy**: **Enlarging and collapsing cysts**[Q] as urine flows

Treatment

- Significant upper pole function: **Endoscopic incision** or **cyst excision and reimplantation**[Q]
- Poor upper pole function: Upper pole nephrectomy and partial ureterectomy.

198. Ans. d. Endoscopic diathermy **199. Ans. b. Ureterocele** **200. Ans. c. Ureterocele**

URETERIC ABNORMALITIES

201. Ans. a. Bulbar urethra *(Ref: Smith 17/e p559; Campbell 10/e p3385-3387, 3407-3408; Bailey 26/e p1285-1286, 25/e p1288-1290)*

Duplication of Ureter (AD)

- **MC congenital anomaly** of **upper urinary tract**[Q]
- Mode of inheritance is **autosomal dominant**[Q]
- More common in **females** and often **bilateral**[Q]
- **"Yo-Yo" effect**[Q] in **fused ureter** (incomplete duplication) is seen.

Types

- **Incomplete duplication**: Both ureters join together and a single ureteric opening
- **Complete duplication**: Both ureters open separately
  - **Weigert-Meyer's rule**[Q]: In cases of complete duplication, the upper pole ureter and the lower pole ureter rotate on their long axes so that the **upper pole ureteric orifice** is **medial** and **caudal** to the **lower pole orifice**[Q].
  - The **upper pole ureter** becomes **ectopic and obstructed**[Q], whereas the **lower pole ureter** end laterally and have a **short intravesical tunnel** leading to **VUR**[Q].

Clinical Features

- Many patients are **asymptomatic**[Q]
- A common presentation is **persistent** or **recurrent infections**[Q].

> - In **females**, the **upper pole ureter** may be **ectopic**, with an **opening distal** to the **external sphincter**[Q] or even **outside the urinary tract**.
> - Such patients have **classic symptoms**: **incontinence** characterized by **constant dribbling** with a **normal pattern of voiding**[Q].

- In **males**, because the mesonephric duct becomes the vas and seminal vesicles, the **ectopic ureter** is **always proximal** to the **external sphincter**[Q], and associated **incontinence does not occur**[Q].

Diagnosis

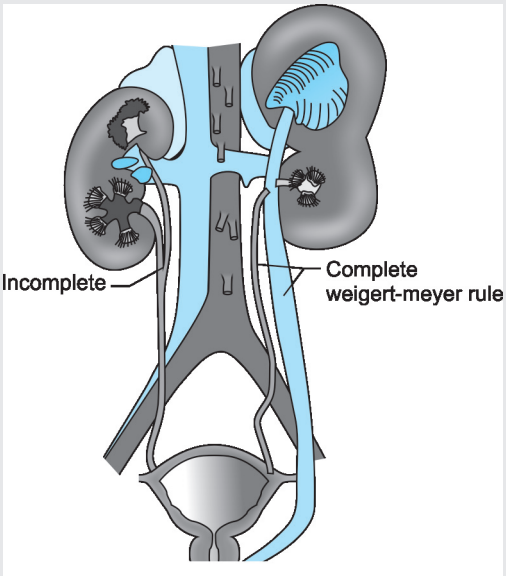
- **IVP**: Shows **duplication** in most of cases
- **MCU** discloses **VUR** (in lower pole ureter) and demonstrate presence of **ureterocele** (in upper pole ureter).

Treatment

- Treatment of reflux alone is not influenced by duplication in most of the cases.
- Lower grade reflux is treated medically and higher grade surgically
- **Surgery** is reserved for **upper pole obstruction** or **ectopy**[Q]. If renal function in one segment is very poor, **heminephrectomy** is the most appropriate treatment.

202. Ans. a. Duplication of renal pelvis

- **MC congenital anomaly** of **upper urinary tract**: **Duplication** of **ureter**[Q]
- **MC congenital anomaly** of **genitourinary tract**: **VUR**[Q]



203. Ans. a. Prostatic urethra *(Ref: Smith 17/e p562-563; Campbell 10/e p3385-3387, 3407-3408; Bailey 26/e p1285-1286, 25/e p1288-1290)*

Ectopic Ureteral Orifice

- Around **80%** is associated with a **duplication collecting system**[Q].
- More common in **females**[Q]

Location

- **Males**: **Prostatic**[Q] or **posterior urethra** (**MC**)[Q], lateral in bladder
- **Females**: **Anterior urethra** (**MC**)[Q], vestibule, vagina

Clinical features

- **Females**: **Continuous incontinence** with an otherwise **normal voiding**[Q], **persistent vaginal discharge** (Ureter opening in **vagina**) [Q]
- **Males**: **MC** presentation is **UTI**, **no urinary incontinence**[Q], recurrent epididymo-orchitis (Epididymitis in a prepubertal boy, ectopic ureter should be ruled out).

Complications

- Ectopic ureter may be severely obstructed, causing massive **hydronephrosis**

Diagnosis

- **IVP: Drooping lily sign**[Q] (Non visualized upper pole of a duplex system displaces the lower pole down, looking like a drooped down lily flower on IVP)

Treatment

- **Mainly expectant,** if there are no symptoms.
- **Ureteric reimplantation** or **upper pole nephrectomy**[Q] depending on moiety function.

204. Ans. d. Paradoxical incontinence

205. Ans. c. Lower pole moiety is more prone to obstruction and upper pole more prone to reflux

206. Ans. d. Ureteral duplications **207. Ans. c. Below and medial to the lower pole ureter**

208. Ans. a. Posterior urethra **209. Ans. a. Vestibule**

210. Ans. a. In males, there is duplication in 80% cases

- **Ectopic ureteral orifice** is associated with a **duplication collecting system**[Q] in **80%**, in **females**[Q], **not** in **males.**

211. Ans. c. Ureteral incontinence with otherwise normal voiding **212. Ans. a. Recurrent UTI**

VESICOURETERIC REFLUX

213. Ans. a. Micturating cystourethrogram *(Ref: Smith 17/e p179-191; Campbell 10/e p3267-3293)*

Vesicoureteric Reflux (VUR)

- **VUR** is the **most common inheritable disease**[Q] of the genitourinary tract.
- **Autosomal dominant** mode of transmission.
- Overall incidence is **>10%**[Q] and in children with UTI is 30%
- **Majority** of cases (**75%**) are **asymptomatic**[Q].
- Major cause of VUR is **attenuation of trigone**[Q] and its contiguous **intravesical ureteric musculature**[Q].

Types

Primary	Secondary
• The length of **submucosal ureter** may be **short** • **Deficiency** of the **longitudinal muscle**[Q] of the intravesical ureter resulting in an inadequate valvular mechanism	• Caused by **elevated pressures** in the bladder • **MC anatomical cause**: **Posterior urethral valves** (**50%** have **VUR**)[Q] • Other causes: **Neurogenic bladder** or bladder dysfunction

Investigations

- **MCU** is **IOC** for **VUR**[Q]
- Urine culture
- **DMSA scan**: **IOC** for **pyelonephritis** and **cortical renal scarring**[Q]

MCU Grading of VUR (International classification)	
Grade I	Reflux into **non dilated ureter**[Q]
Grade II	Reflux into **pelvis and calyces**[Q] without dilation
Grade III	**Mild to moderate dilation** of the **ureter, renal pelvis and calyces**[Q] with minimal blunting of the fornices
Grade IV	**Dilation** of the **pelvis and calyces** with **blunting**[Q].
Grade V	**Gross dilation** of the **ureter, pelvis and calyces**; loss of papillary impression and **ureteral tortuosity**[Q].

Natural History

- **With bladder growth and maturation, most low-grade** reflux **resolves spontaneously**[Q].
- **Severe grades** of reflux are **less likely to resolve**[Q].
- **Mean age** of reflux resolution is **6-7 years**[Q].

• Resolution rates: Grade I and II: 80–84%, Grade III: 50%, Grade IV: 20-30%, Grade V: 0-5%[Q]

- Younger children, especially the **neonates**, are **more likely to have spontaneous resolution**[Q]
- Reflux of **infected urine** cause **pyelonephritis**. Repeated such episodes lead to **renal scarring** and **nephropathy** resulting in **hypertension** and **azotemia**[Q].
- If urine is kept sterile, significant nephropathy rarely occurs.

Management

- **Medical management**: **Keep** the **urine sterile**[Q] and wait for spontaneous resolution

Medical management recommended as the initial management for
• All prepubertal children with **grade I-III reflux**[Q] as most of the cases usually resolve. • **Unilateral grade IV reflux**, especially in **young children**[Q].

Drugs used in VUR
• **Age up to 6 weeks**: **Amoxicillin** or **Ampicillin**[Q]. • **Age after 6 weeks**: The biliary system is mature enough to handle **TMP-SMX** (**DOC** for **prophylaxis**)[Q]. Usually **nighttime doses** are given. Other option is **nitrofurantoin**. • If organism are resistant to a single agent, two drugs can be given alternately in morning and evening.

  - **Periodic cultures** every **3 months**[Q] for evaluation of breakthrough infections.
  - **DMSA scan** if recurrent bouts of **pyelonephritis**[Q] are suspected. Yearly radiographic studies for resolution.
- **Surgical management: Ureterovesicoplasty** or **ureteric reimplantation**[Q] and **STING**[Q] (Subureteric transurethral injection of teflon paste) are the treatment options.

Methods of Ureteric Implantation
• **Lich-Gregoir technique**[Q] by direct implantation of ureter • **Leadbetter-Politano technique**[Q] involves creation of a submucosal anti-reflux tunnel.

Indications of Surgical management in VUR
• **Breakthrough UTIs**[Q] despite prophylactic antibiotics • Severe grades of reflux- **grade V** or **bilateral grade IV**[Q] • **New renal scars** or **deterioration of renal function**[Q] as on serial USG of DMSA scan. • Reflux that **persist in girls** at full linear growth (**at puberty**)[Q] • Reflux **associated with** congenital abnormalities (**Bladder diverticula**)[Q]. • **All secondary reflux**, which **persist**[Q] after correction of the primary cause e.g. fulguration of posterior urethral valves or management of uninhibited detrusor.

214. Ans. b. Micturating cystourethrography **215. Ans. b. Grade II** **216. Ans. a. I**

217. Ans. c. Both **218. Ans. a. Cotrimoxazole**

219. Ans. b. Postnatal scarring may occur even in the absence of urinary tract infections

- Although **UTI** is the **most important cause** for **scarring** and **nephropathy** in patients with **VUR**, **scarring can occur** even **in the absence of UTI** due to **pressure effect of reflux**[Q] **on** the **renal tissue.**

220. Ans. c. VUR induced pyelonephritis

RENAL ARTERY ANEURYSM

221. Ans. b. 5% *(Ref: Smith 17/e p515-516; Campbell 10/e p1078-1080; Bailey 26/e p1288, 25/e p1292)*

Renal Artery Aneurysms

- Most are **saccular**[Q], and **75% occur** at the **bifurcation** of the **primary** or **secondary branches**[Q].

- **Medial fibroplasia**[Q] is the **MC cause** of **true renal aneurysms**, followed by degenerative atherosclerosis and polyarteritis nodosa.**Spontaneous** or **traumatic dissection** is the **MC cause** of **false renal aneurysms**[Q].

Clinical Features

- Usually **asymptomatic**[Q] or have associated renal artery occlusive disease and renovascular hypertension or ischemic nephropathy.
- **Rupture** occurs in **< 3%**[Q] **of cases**, but when the aneurysm ruptures in a **pregnant woman**, the **fetal mortality rate** is **75%**, and the **maternal mortality rate** is **50%**[Q]**.**

Diagnosis

- Around **50%** are **diagnosed incidentally**[Q], when renal arteriogram is performed for another reason or during workup for hypertension.
- Plain film of abdomen may show intra-renal or extra-renal **ring like calcification**[Q].

Treatment

- Surgical repair

Indications of Surgery	
• Any aneurysm **>2 cm**[Q]	• **Enlarging**[Q] on serial X-rays
• Woman of **childbearing age**[Q]	• **Poorly calcified** or **poor access** to **healthcare**[Q]

- Patients who are followed for renal artery aneurysms at regular intervals should have thorough medical control of their blood pressure.

HEPATORENAL SYNDROME

222. Ans. a. Urine sodium < 10 mEq/L, b. Normal renal histology *(Ref: Sabiston 19/e p585; Blumgart 5/e p389; Schackelford 7/e p1449, 1527; Harrison 18/e p2601; wilkepedia.org)*

Hepatorenal Syndrome

- HRS is a state of **functional renal failure** (reduced GFR) **without renal pathology** in patients with **severe liver disease**[Q].
- **Low cardiac output** and **high** plasma rennin predicts development of HRS[Q]
- Occurs in about **10%** of patients with **advanced cirrhosis** or **acute liver failure**[Q].

Pathophysiology of HRS
• **Marked disturbances** in the **arterial renal circulation**: **Increase in renal vascular resistance** accompanied by a **reduction in systemic vascular resistance**[Q].
• The reason for **renal vasoconstriction** is most likely **multifactorial** and is poorly understood.
• **Structurally** or **histologically kidneys** are **normal** and **recover function after** successful **liver transplantation**[Q].
• **Pathogenic hallmark** of HRS is **intense renal vasoconstriction** with **co-existent vasodilatation**[Q]**.**

- In HRS, **urine sodium** is typically **< 10 mEq/L** with **hyperosmolar urine**, **oliguria** (< 400 mL/24 hr), fractional excretion of sodium **< 1**; and urine creatinine-to-plasma creatinine ratio **> 30:1.**

Type 1 HRS	Type 2 HRS
• Characterized by a **progressive impairment**[Q] in **renal function** and a **significant reduction** in **creatinine clearance** within **1–2 weeks** of presentation[Q].	• Characterized by a **reduction in glomerular filtration rate**[Q] with an **elevation of serum creatinine** level, but it is **fairly stable**[Q]
• **Poor outcome**[Q]	• Associated with a **better outcome**

Clinical Features

- HRS is often seen in patients with refractory ascites and requires exclusion of other causes of acute renal failure.

Diagnosis

- The diagnosis is made usually in the presence of a **large amount of ascites** in patients who have a **stepwise progressive increase** in **creatinine**[Q].

International Ascitic Club Criteria for HRS	
• Serum **creatinine > 1.5** mg/dL[Q]	• **Low urine volume** (**< 500** ml/day) and **low urine sodium** (**< 10** mEq/L)[Q]
• **Absence of shock**, **bacterial infection**, **nephrotoxic drugs**, **diarrhea** or **renal fluid losses**[Q]	• **No sustained improvement** in renal function **after diuretic withdrawal** and expansion of plasma volume with **1.5 L** of **isotonic saline**[Q]
• **Absence** of significant **proteinuria** (**< 500** mg/day)[Q]	
• **No evidence** of **obstructive uropathy**[Q]	

Treatment

- **Drug of choice** is **terlipressin**[Q] (**albumin** improves the therapeutic response)
- **Midodrine + octreotide + IV albumin** may **reverse renal failure**[Q] in some patients with HRS.
- **Best therapy for HRS**: **Liver transplantation** (**recovery of renal function** is **typical** in this setting)[Q]
- In patients with either **type 1** or **type 2 HRS**, the **prognosis is poor** unless transplant can be achieved within a short period of time.

223. Ans. c. Urine osmolality lower than plasma osmolality

- **Hepatorenal syndrome** is associated with **urine osmolality greater than plasma osmolality**[Q].

224. Ans. a. The creatinine clearance is > 40 ml/min, c. The urine osmolality is lower than the plasma osmolality

DIALYSIS

225. Ans. b. Peritonitis, c. Hypertension *(Ref: Harrison 18/e p2324-2325)*

Complications during Hemodialysis

- **Hypotension** is the **MC acute complication** of **hemodialysis**, particularly among patients with diabetes mellitus.
- **Muscle cramps** during dialysis are also a common complication of the procedure.
- **Anaphylactoid reactions** to the dialyzer, particularly on its first use, have been reported most frequently with the **bioincompatible cellulosic-containing membranes**.
- **Cardiovascular disease** constitutes the **major cause of death in patients with ESRD**. **Cardiovascular mortality** and **event rates are higher in dialysis patien**ts than in patients post-transplantation, although rates are extraordinarily high in both populations.

RENAL TRANSPLANT

226. Ans. a. Hardy *(Ref: Campbell 10/e p1228)*

First autologous renal transplantation was performed **by 'Hardy'** in **1963**[Q]

'In 1963, Hardy performed the first renal autotransplantation to resolve on extensive ureteral lesion'.

227. Ans. c. In India, organ harvesting from brain dead patients is not permitted by law *(Ref: Bailey 25/e p1417-1421)*

Renal Transplantation

- **Most** of the **organs** used for transplantation are **obtained from brainstem-dead, heart-beating deceased donors**[Q] and in the majority of cases multiple organs are procured.
- **In India**, for **organ harvesting from brain dead patients**[Q], the relatives are formally asked to sign a prescribed form, in contrast to U.K., where the transplant co-ordinators and nurse just write and sign in the file about the consent given.
- **After removal from the donor,** the **kidney is flushed with chilled organ preservation solution** and, **if necessary**, **stored briefly on ice**[Q] until transplanted into the recipient.
- **Calcineurin blockers** are especially useful in renal transplant patients. These include **cyclosporine** and **tacrolimus**[Q].

228. Ans. c. Skin cancer *(Ref: Bailey 26/e p1416-1417, 25/e p1416)*

Malignancy after Transplantation

- After transplantation there is an increased risk of developing most types of malignancy but the **risk is particularly high for** those types of **tumour in which viral infection plays an etiological role.**
- The risk is particularly high for **skin cancer**[Q] and a condition called post-transplant lymphoproliferative disorder (**PTLD**)[Q].
- The **risk** of **skin cancer after transplantation rises with age** and with exposure to sunlight, and it has been predicted that **50% of transplant patients** will **develop a skin malignancy within 20 years** of **transplantation**[Q].

PTLD

- **PTLD** is an **abnormal proliferation of B lymphocytes**, usually in response to **Epstein–Barr virus infection**[Q].
- **PTLD** occurs in around **1–3% of kidney** and **liver transplant recipients** and the incidence is considerably **higher in children**.
- **Patients at most risk** are those who have **received aggressive immunosuppression**. PTLD is a serious condition with a **mortality rate of up to 50%.**
- If it is identified at an early stage, **reduction** or **cessation of immunosuppressive therapy**[Q] may cause disease regression and result in a cure.
- **Chemotherapy** is often given and antiviral therapy, **surgery and radiotherapy** may also have a role in treating established disease.

- **Transplant patients** also have a **300-fold increased risk of developing Kaposi's sarcoma**[Q], although this malignancy is still very uncommon after transplantation.

229. Ans. a. Right kidney is preferred over the left for transplantation *(Ref: Bailey 26/e p1420, 25/e p1420)*

If the **left kidney** has a **single renal artery** (10% of kidneys have two or more renal arteries) it is **usually chosen for transplantation** because it has a **longer renal vein**, which **simplifies the transplant operation**[Q].

Renal Transplantation

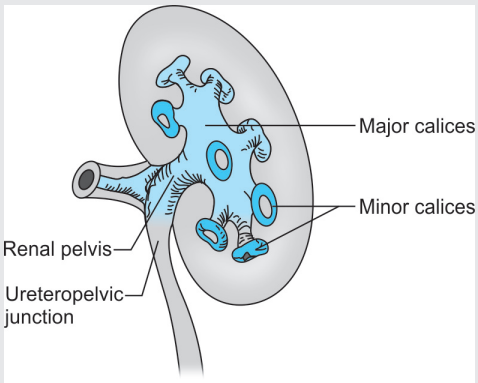
- **Before the donation** it is essential to **perform imaging** (usually **MR angiography** or **CT angiography**) to **delineate the anatomy** of the **arterial supply to the kidneys**[Q].
- If the **left kidney** has a **single renal artery** (10% of kidneys have two or more renal arteries) it is **usually chosen for transplantation** because it has a **longer renal vein**, which **simplifies the transplant operation**[Q].
- The presence of **multiple arteries does not necessarily preclude donation** although implantation of living donor kidneys with multiple arteries may **increase the chances of vascular complications** developing **after implantation**[Q]**.**

230. Ans. b. Corticosteroids, d. Cyclosporine *(Ref: Bailey 26/e p1415, 25/e p1415)*

Immunosuppressive Drug Regimen in Renal Transplantation

- Combination of **glucocorticoid** with **cyclosporine or tacrolimus**, **azathioprine or mycophenolate mofetil** and sometimes **antilymphocyte antibody preparation**[Q].

Kidney and Ureter: Anatomy and Physiology



231. Ans. d. Urethral valves *(Ref: Campbell's 10/e p3394)*

Urinary Ascites

- **Forty percent** of **neonatal ascites** is caused **by urinary conditions**[Q].
- **Urinary ascites** occurs when **high intraluminal pressure forces urine to extravasate from the kidney**[Q], usually across a renal fornix.
- Urine then **enters the retroperitoneum** and **travels across the peritoneum** as a **transudate**.
- If aspirated from the peritoneal cavity, the **ascites** or **extravasated urine** contains **electrolyte** and **creatinine levels similar to serum**[Q].
- The **urine within the peritoneum** is subject to the **large absorptive mesothelial surface that quickly normalizes these values**, masking the identity of ascitic fluid as urine.
- The **diagnosis** of urinary ascites may be difficult and **may require definitive upper tract drainage** in the form of **nephrostomy tubes** in order to establish the etiology of the ascites and allow its resolution.
- **Urinary ascites** in the case of **distal obstruction** may **serve to lower urinary pressures** and offer **some protection to the developing kidneys**[Q].

Causes of Urinary Ascites	
• **Posterior urethral valves**[Q] • **Urethral stricture**[Q] • **Urethral atresia**[Q] • **Bladder outlet obstruction**[Q] • **Ectopic ureterocele**[Q] • **Neurogenic bladder**[Q]	• **Hydrocolpos** • **Sacrococcygeal teratoma**[Q] • **Bladder perforation**[Q] during delivery • **Urachal lacerations** secondary to umbilical artery catheterization

232. Ans. c. Urachal fistula *(Ref: Campbell's 10/e p3382-3384)*

PATENT URACHUS

- A **patent urachus** is suspected in the **neonatal period** by **continuous** or **intermittent drainage** of **fluid from** the **umbilicus**[Q].
- The **most common organisms** cultured from the umbilical drainage include **Staphylococcus aureus, Escherichia coli**[Q]
- **Additional presentations** include an **enlarged** or **edematous umbilicus** and **delayed healing of the cord stump**[Q]

Diagnosis

- The **diagnosis is confirmed by** demonstration of the **fluid-filled canal** on **longitudinal ultrasound** or **contrast filling on retrograde fistulogram** or voiding cystourethrogram (**VCUG**)[Q]

Management

- Management of an **infected urachus with abscess formation** includes **initial drainage under antibiotic coverage**[Q].
- Once the infection has subsided, **complete excision** of the **patent urachus including a bladder cuff** is required.
- **Removing all anomalous tissue avoids:**
  - **Recurrences** or **stone formation**[Q]
  - Prevents the rare event of later transformation into a **malignant adenocarcinoma**[Q].

KIDNEY AND URETER ANATOMY AND PHYSIOLOGY

233. Ans. a. Peristalsis due to flow of urine *(Ref: Oxford Urology 6th/2123)*

- **Ureters** are situated retroperitoneally, and are **identified by peristalsis**[Q].

234. Ans. c. Genitofemoral nerve *(Ref: BDC 5/e p325, 326)*

- The **genitofemoral nerve lies posterior to** the **ureter**[Q]. The ureter lies on the genitofemoral nerve, which is posterior.

235. Ans. d. Ischial spine *(Ref: Snell's 7/e p284, 382)*

At the **level of ischial spine ureter changes its direction** from **down-backward to forward - medially** but there is **no constriction**. The normal **anatomical narrowing of ureter** are the **potential sites of obstruction by ureteric (kidney) stone.**

NORMAL ANATOMICAL NARROWING OF URETER

- **Uretero-pelvic junction**[Q]
- Where ureter **cross the brim** of pelvic inlet[Q] (at site of **crossing of iliac artery**[Q])
- Juxtaposition of **vas deferens** or **broad ligament**
- **Uretero-vesicle junction**[Q]
- **Ureteric orifice**

236. Ans. d. Ureterovesicle junction

237. Ans. b. It is a type of portal-circulation *(Ref: Snell's 7/e p283)*

Renal Circulation	
Artery	**Vein**
• **Right renal artery** is **longer than left**[Q].	• **Left renal vein** is **longer than right**[Q]
• Close to hilum, renal artery divides into **5 segmental arteries**, that are **end-arteries**[Q]	• **Stellate veins drain most superficial zone** of **renal cortex**[Q]
• **Renal artery → 5 segmental arteries → Arcuate artery →Interlobular artery → Afferent glomerular arteriole**[Q]	• **Left kidney** is **preferred for transplantation** due to **longer renal vein**[Q]

238. Ans. b. Below uterine artery in the Mackenrodt's ligament *(Ref: Keith and Moore 4/e p374, 384)*

- **Maximum chance** of **ureteric injury** is **in hysterectomy**, while **ligating uterine vessels in** the **Mackenrodt's ligament**[Q].
- Ureter is also vulnerable to injury when ovarian vessels are being ligated during oophorectomy.

239. Ans. a. Gonadal vessels lie anterior to it *(Ref: Keith and Moore 4/e p281)*

- **Gonadal vessels** and **colic vessels** lie **anterior to ureter; IVC** is **medial; gonadal vein** and **inferior mesenteric vein** is **on left side**[Q].

240. Ans. b. Tongue like papillary projection

241. Ans. c. Peristaltic movements

242. Ans. d. 0–5 cm of H_2O

- **Resting ureteric pressure** is ~**0–5 cm H_2O**[Q]
- **Ureteric contraction pressures** range from **20–80 cm H_2O**[Q].

243. Ans. a. Trapezius *(Ref: Smith 17/e p145-146)*

NEPHRECTOMY

- Two common approaches:
  - **Transperitoneal abdominal**[Q] approach
  - **Retroperitoneal loin**[Q] approach
- **Retroperitoneal loin approach** is **preferred** method **except in malignant tumors** and **renal injuries** (to exclude other injuries)[Q]

NEPHRECTOMY (LOIN APPROACH)

- Following muscles are cut in loin approach:
  - **Lattisimus dorsi**[Q]
  - **Serratus posterior-inferior**[Q]
  - **External and internal oblique, transversus abdominis**[Q]

244. Ans. c. Renal artery stenosis

245. Ans. a. One year of age

- The **neonatal kidney achieves concentrating ability** equivalent to **adult's kidney** by **one year** of age[Q]
- The **neonatal kidney achieves adult's GFR** by **two years of age**[Q].

MISCELLANEOUS

246. Ans. a. Urethral stone

Relation of hematuria to micturition	Site of bleeding
Blood appears **at the beginning**	**Urethra**[Q]
Blood appears **at the end**	**Vesical**[Q]
Blood is **intimately mixed** throughout the process	**Prerenal, renal** or **vesical**[Q]

247. Ans. c. Ureteral calculus

- Clinical picture is suggestive of ureteric colic.

248. Ans. b. Excretion of less than 500 ml in 24 hours

249. Ans. a. 7 ml

- **The average capacity of the renal pelvis is 4–8 ml**[Q].

250. Ans. c. Chronic renal failure *(Ref: Smith 17/e p536)*

- Low and fixed specific gravity of urine is seen in chronic renal failure.

251. Ans. b. Renal TB

Autosplenectomy	**Sickle cell anemia**[Q]
Autonephrectomy	**Renal TB**[Q]

252. Ans. d. Urerthrovaginal fistula *(Ref: Bailey 25/e p1320)*

253. Ans. a. Transureterostomy

CHAPTER 22

Urinary Bladder

MULTIPLE CHOICE QUESTIONS

ECTOPIA VESICAE

1. **In ectopia vesicae, bone divided is:** *(MHSSMCET 2011)*
   a. Pubic bone b. Sacrum
   c. Coccyx d. Iliac bone
2. **Ectopic vesicae includes all except:** *(COMEDK 2005)*
   a. Hypospadias b. Extrophy of bladder
   c. Defective abdominal wall d. Bifid clitoris
3. **All of the following are features of exstrophy of the bladder except:** *(All India 97)*
   a. Epispadias
   b. Cloacal membrane is present
   c. Posterior bladder wall protrudes through the defects
   d. Umbilical and inguinal hernia
4. **Which is not seen in complete ectopic vesicae:** *(TN 89)*
   a. Umbilical hernia
   b. Visible uretero vesical efflux
   c. Hypospadias
   d. Waddling gate
5. **About ectopia vesicae, following is true except:** *(PGI June 98)*
   a. CA bladder may occur
   b. Ventral curvature of penis
   c. Incontinence of urine
   d. Visible ureterovesical efflux
6. **For treatment of the ectopic-vesicle, which of the following bone is divided to reach the site?** *(UPPG 2004)*
   a. Pubic rami b. Iliac bone
   c. Ischium bone d. Symphysis

URINARY BLADDER STONES

7. **Regarding urinary bladder stone one is not true:** *(AIIMS June 98)*
   a. Common in pediatric patient in tropics than that of non tropical areas
   b. Uric acid stones are dropped from above
   c. Jack stone is due to urea splitting bacteria
   d. Commonly distal passage obstruction cause stone
8. **Secondary vesical calculus refers to stones formed due to:** *(Karnataka 2006)*
   a. Hypercalciuria b. Injury
   c. Infection d. Migrating from above
9. **Not true about bladder stones is:** *(AIIMS Nov 2001)*
   a. Rare in Indian children
   b. Primary stones are rare
   c. Small stones can be removed per urethra
   d. Maximum stones are radioopaque
10. **The commonest bladder stone is:** *(PGI 84)*
    a. Triple phosphate b. Xanthine
    c. Uric acid d. Cysteine
11. **The following is true about bladder stones:** *(PGI 84)*
    a. Girls more than boys
    b. Treatment is litholapexy
    c. Always forms in kidneys and passes down to bladder
    d. Usually asymptomatic
12. **Jack stone calculi is seen in which anatomic part:**
    a. Prostate b. Kidney *(MAHE 2006)*
    c. Ureter d. Bladder
13. **Which of the following is false regarding endemic bladder stones?** *(AIIMS Nov 2013)*
    a. Always associated with recurrence
    b. High incidence in cereal based diet
    c. Peak incidence in 3 years old children in India
    d. Most common type is ammonium urate or calcium oxalate

URINARY BLADDER: MALAKOPLAKIA

14. **Malakoplakia of the urinary bladder is considered to be associated with:** *(COMEDK 2005)*
    a. TB b. Urothelial carcinoma
    c. Schistosomiasis d. Defect in phagocytosis
15. **True about malakoplakia is:** *(MHPGMCET 2002)*
    a. Benign lesion of urinary bladder
    b. May turn into malignancy
    c. Michaelis-Gutmann bodies are characteristic feature
    d. May cause sever hematuria and lead to death

URINARY BLADDER: TUBERCULOSIS

16. **Cystoscopic findings in TB bladder are all except:**
    a. Cobblestone mucosa *(PGI Dec 97)*
    b. Thimble bladder
    c. Golf hole ureter
    d. Whitish efflux from the ureteric holes
17. **Thimble bladder is seen in:** *(All India 91)*
    a. Acute tuberculosis b. Chronic tuberculosis
    c. Neurogenic bladder d. Schistosomiasis
18. **Treatment of 'Thimble bladder' is:** *(JIPMER 81, DPG 84)*
    a. Anti-tubercular treatment
    b. Corticosteroids
    c. Ileocystoplasty
    d. Anti-tubercular drugs + steroids

SCHISTOSOMIASIS

19. **A patient, Ramu presents with hematuria for many days. On investigations he is found to have renal calculi, calcifications in the wall of urinary bladder and small contracted bladder; most probable cause is:** *(AIIMS Nov 2001)*
    a. Schistosomiasis b. Amyloidosis
    c. Tuberculosis d. CA urinary bladder

20. One of the following disease will show urinary bladder calcification radiologicaly which resemble fetal head in pelvis: *(AIIMS June 2000)*
a. Tuberculosis
b. Schistosomiasis
c. Chronic cystitis
d. Malignancy

21. Metrifonate is effective against: *(COMEDK 2008)*
a. Amebiasis b. Leishmaniasis
c. Schistosomiasis d. Giardiasis

CARCINOMA URINARY BLADDER: RISK FACTORS

22. Carcinoma common in dye industry workers:
a. Skin *(MHPGMCET 2001)*
b. Scrotum
c. Urinary bladder
d. Maxilla

23. Transitional cell carcinoma can be seen in:
a. Analgesic nephropathy *(MHSSMCET 2006)*
b. Urate nephropathy
c. Pulmonary infections
d. Myocardial infarction

24. Transitional cell carcinoma of bladder is associated with: *(PGI June 2001)*
a. Schistosomiasis b. Naphthylamine
c. Smoking d. Tuberculosis of bladder

25. Squamous cell tumor of urinary bladder is due to: *(PGI June 97)*
a. Stone b. Schistosomiasis
c. Chronic cystitis d. Diabetes mellitus

26. Squamous cell carcinoma of urinary bladder is predisposed to by: *(PGI June 2002)*
a. Urolithiasis b. Persistent urachus
c. Schistosomiasis d. Polyp
e. Smoking

27. In a survey, many children are examined and were found to have urogenital abnormalities. Which congenital anomaly is associated with increased risk of bladder carcinoma? *(AIIMS Nov 97)*
a. Medullary sponge kidney b. Bladder exstrophy
c. Unilateral renal agenesis d. Doubler ureter

28. True about transitional cell carcinoma of urinary bladder:
a. Smoking predisposes *(PGI Dec 2003)*
b. Schistosoma infection predisposes
c. Aniline dye workers d. Radiation

29. All are precancerous for carcinoma bladder except: *(All India 91)*
a. Tuberculosis bladder b. Aniline dyes
c. Schistosomiasis d. Chronic ulcer

30. 'Kiss cancer' of the urinary bladder is: *(AIIMS 80, 81, UPSC 88)*
a. Highly malignant b. Malignant
c. Benign d. Pre-malignant

31. Associated with urinary bladder carcinoma are all of the following except: *(MCI Sept 2009)*
a. Smoking
b. HPV infection
c. Schistosomiasis
d. Cyclophosphamide

32. A 63-year old male from the middle east presented with hematuria. The urine showed RBCs but no RBC casts. BUN level was normal. cystoscopy revealed an irregular growth on the mucus of the bladder. A biopsy from this growth revealed features of squamous cell carcinoma. The etiology of this cogidition is most likely linked to: *(COMEDK 2014)*
a. Cigarette smoking b. HPV infection
c. Parasitic infection d. Chronic alcohol abuse

CARCINOMA URINARY BLADDER: TYPES

33. SCC of bladder is best treated by: *(GB Pant 2011)*
a. Chemotherapy b. Radical cystectomy
c. Radiotherapy d. TUR

34. Most common bladder tumor: *(GB Pant 2011)*
a. TCC b. SCC
c. Rhabdomyosarcoma d. Sarcoma

35. Most common tumor of urinary bladder is:
a. Squamous cell carcinoma *(DNB 2008, PGI June 97)*
b. Adenocarcinoma
c. Transitional carcinoma
d. Stratified squamous carcinoma

36. Most malignant carcinoma of the bladder is: *(APPG 85)*
a. Malignant villous tumour b. Solid tumour
c. Carcinomatous ulcer d. Adenocarcinoma

37. It is true of carcinoma of the urinary bladder that:
a. It usually occurs in childhood *(AIIMS 85)*
b. Occurs more often in aniline dye workers
c. It is located most frequently in the trigone
d. Papillary formation is rare

38. Bladder tumors mostly arises from: *(All India 91)*
a. Mucosa b. Submucosa
c. Muscularis Mucosa d. Serosa

39. About transitional cell carcinoma of bladder following is correct: *(DPG 86, PGI 86)*
a. Most common site is fundus
b. Prognosis is excellent if muscle layer is invaded
c. Exposure to industrial carcinogens predisposes
d. Most of carcinomas are flat, solid and deeply infiltrating

CARCINOMA URINARY BLADDER: CLINICAL FEATURES AND DIAGNOSIS

40. A 55 years old smoker presents with history of five episodes of macroscopic hematuria each lasting for about 4–5 days in the past five years. Which of the following investigations should be performed to evaluate the suspected diagnosis? *(All India 2011)*
a. Urine microscopy and cytology
b. X-ray KUB
c. Ultrasound KUB
d. DTPA scan

41. CA urinary bladder commonly presents as: *(PGI Dec 2003)*
a. Hematuria b. Frequency
c. Dysuria d. Abdominal lump

42. Most constant and persistent feature of CA bladder is:
a. Increased frequency *(PGI Dec 95)*
b. Hematuria
c. Recurrent UTI
d. Pain Abdomen

43. What is true about carcinoma bladder? *(AIIMS June 94)*
a. Common in smokers
b. Commoner in females than that in males
c. Mostly adenocarcinoma
d. Pain in suprapubic region is the first symptom

44. A 60 years old smoker came with a history of painless gross hematuria for one day. Most logical investigation would be: *(All India 2007)*
a. Urine routine
b. Plain X-ray KUB
c. USG KUB
d. Urine microscopy for malignant cytology

45. A 60-years old smoker came with the history of painless gross hematuria for one day. The investigation of choice would be: *(AIIMS Nov 2006)*
a. Urine routine and microscopy
b. Plain X-ray KUB
c. USB KUB
d. Urine for malignant cytology

46. An elderly male presents with one episode of gross heematuria. All of the following investigations are recommended for this patient except: *(All India 2007)*
a. Cystoscopy
b. Urine microscopy for malignant cells
c. Urine tumor markers
d. Intravenous pyelogram

47. Urinary cytology is a useful screening test for the diagnosis of: *(AIIMS 88)*
a. Renal cell carcinoma
b. Wilm's tumour
c. Urothelial carcinoma
d. Carcinoma prostate

CARCINOMA URINARY BLADDER: TREATMENT

48. Treatment of choice for low grade superficial bladder carcinoma: *(JIPMER 2011)*
a. Local excision
b. Radical cystectomy
c. Intravesical BCG
d. Chemotherapy

49. A lady who presented with hematuria was found to have Stage II Transitional Cell Carcinoma of bladder. Which of the following statements about manage-ment of her condition is true?
a. Cystoscopic fulguration is the standard treatment
b. 70% chance of requiring cystectomy in 5 years after TURP
c. History of smoking is not a risk factor
d. There is no role of chemotherapy

50. BCG is used in the treatment of: *(MHPGMCET 2006)*
a. Carcinoma cervix
b. Carcinoma colon
c. Carcinoma of urinary bladder
d. All

51. pT2, pT3 or CIS carcinoma bladder not responding to BCG is best treated by: *(MHSSMCET 2008)*
a. Intravesical mitomycin-C and interferon
b. Systemic chemotherapy
c. Cystoscopic
d. Radical cystectomy

52. Treatment of choice for bladder pTa: *(MHSSMCET 2010)*
a. Endoscopic tumor resection
b. Endoscopic tumor resection and intravesical chemotherapy
c. Partial cystectomy with intravesical
d. Radical cystectomy with or without radical radiotherapy BCG

53. Which of the following is the most effective intravesical therapy for superficial bladder cancer? *(AIIMS Nov 2005)*
a. Mitomycin
b. Adriamycin
c. Thiotepa
d. BCG

54. Which of the following is not an intravesical chemotherapeutic agent? *(UPSC 2005)*
a. Mitomycin C
b. BCG
c. Epirubicin
d. Thiotepa

55. A 65 years old male smoker presents with gross total painless hematuria. The most likely diagnosis is: *(All India 2003)*
a. Carcinoma of urinary bladder
b. Benign prostatic hyperplasia
c. Carcinoma prostate
d. Cystolithiasis

56. BCG is used in tumour therapy: *(JIPMER 98)*
a. Bladder
b. Stomach
c. Esophagus
d. Colon

57. A 60 years old female presented with hematuria and diagnosed transitional cell carcinoma of bladder stage T1N1M0. Best treatment modalities is: *(UPPG 2008)*
a. Transurethral resection
b. Transurethral resection and intravesical chemo-immunotherapy
c. Total cystectomy and pelvic lymphadenectomy
d. Systemic chemotherapy

URINARY BLADDER INJURY

58. A person after pelvic fracture could not pass urine. On examination bladder is not palpable. What is probable diagnosis? *(PGI Dec 2008)*
a. Posterior urethra rupture, with-retention of urine
b. Rectourethral injury
c. Intraperitoneal rupture of bladder
d. Extraperitoneal rupture of bladder

59. True about extraperitoneal urinary bladder rupture is all except: *(MHPGMCET 2002)*
a. Associated with fracture
b. More common than intraperitoneal bladder rupture pelvis in about 70% cases
c. Commonly associated with anterior urethral rupture
d. Can be managed conservatively without surgical intervention

60. Urine gests collected in which place in case of extraperitoneal rupture of bladder: *(AIIMS Nov 95)*
a. Groin
b. Below urogenital diaphragm
c. Above urogenital diaphragm
d. Perineal space

61. In extraperitoneal rupture of bladder, urine extravasates in: *(AIIMS Nov 94, All India 93)*
a. Groin
b. Intraperitoneal region
c. Extraperitoneal region
d. Perivesical space

62. Tear-drop bladder is seen in: *(PGI June 99)*
a. Tuberculosis
b. Hunner's ulcer
c. Perivescial hemorrhage with rupture
d. Perivesical hemorrhage without rupture

63. Most reliable investigation in bladder rupture is
a. IVP
b. Cystoscopy *(JIPMER 87)*
c. Retrograde cystogram
d. Catheterization

URINARY DIVERSION

64. In ureterosigmoidostomy all occur except: *(JIPMER 98)*
a. Hyponatremia b. Hyperkalemia
c. Hyperchloremia d. Acidosis

65. Urinary diversion is indicated in the following except? *(MHSSMCET 2008)*
a. Ectopia vesicae b. Carcinoma bladder
c. Neurogenic bladder d. Bladder hematoma

66. Which among the following will complicate as hyperchloremic acidosis? *(AIIMS June 98)*
a. Ureterosigmoidostomy b. Diarrhea
c. Vomiting d. Ileoplasty

URINARY INCONTINENCE

67. Urinary incontinence results from all except:
a. Neurogenic bladder b. Vesico vaginal fistula
c. Ectopic ureter d. Rectovesical fistula

68. Postmicturition dribbling is due to: *(AMU 2005)*
a. Detrusor
b. Dribbling decreased in case of urethral stricture
c. Collection of urine in 'U' shaped curve of bulb of penis
d. Neurogenic bladder

69. To differentiate between stress incontinence and detrusor instability investigation done is: *(AIIMS June 97)*
a. Cystosurethroscopy
b. Urodynamic study
c. MCU
d. Retrograde urethroscopy

70. In which case cystometric study is indicated? *(AIIMS Nov 98)*
a. Neurogenic bladder b. Stress incontinence
c. Fistula d. Urge incontinence

MISCELLANEOUS

71. Which is a normal finding in cystometry? *(PGI 97)*
a. Absence of systolic detrussor contraction
b. Residual volume of 75 ml
c. Leakage on coughing
d. First sensation of urination at 300 ml

72. Commonest cause for pulsion diverticulum of the urinary bladder is: *(JIPMER 86)*
a. Benign enlargement of prostate
b. Fibrous prostate
c. Contracture of bladder neck
d. Stricture urethra

73. Catheterization of bladder done in: *(PGI Dec 2006)*
a. CA prostate
b. Postoperative retention
c. Preoperative before taking the patient for appendicitis
d. Stricture
e. Rupture

74. A young lady presents with symptoms of urinary tract infection. All of the following findings on a midstream urine sample support the diagnosis of uncomplicated acute cystitis, except: *(All India 2011)*
a. Positive nitrite test
b. CFU count < 1000/ml
c. Detection of one bacteria/field on Gramstain
d. > 10 WBC/HPF

75. Normal intravesical pressure during voiding: *(MHPGMCET 2007)*
a. 20–35 cm H_2O b. 35-50 cm H_2O
c. 50–65 cm H_2O d. 65-80 cm H_2O

76. What is Marion's disease? *(MHSSMCET 2005)*
a. Benign prostatic hypertrophy
b. Superficial thrombophlebitis of breast
c. Bladder outlet obstruction
d. Interstitial cystitis

77. Marion's disease is due to: *(AIIMS 81, DNB 90)*
a. Muscular hypertrophy of internal sphincter of urinary bladder
b. Fibrosis of the neck of bladder
c. Vesicular diverticula
d. Vesicular calculi

78. What is Boari's FLAP surgery? *(MHSSMCET 2005)*
a. Ureterostomy
b. DJ stent in situ
c. Bowel interposition
d. Flap of the bladder wall fashioned into a tube replace lower ureter

79. In Boari operation: *(GB Pant 2011)*
a. Ureteric retransplant
b. Lower ureteric reconstruction
c. Diversion
d. Bowel interposition

80. Interstitial cystitis is also known as: *(DNB 2012)*
a. Eosinophilic cystitis b. Radiation cystitis
c. Hunners cystitis d. Tubercular cystitis

81. All are seen in cystitis except: *(DNB 2014)*
a. Fever b. Hematuria
c. Dysuria d. Nocturia

EXPLANATIONS

ECTOPIA VESICAE

1. **Ans. d. Iliac bone** *(Ref: Smith 17/e p574-575; Campbell's 10/e p3228-3236; Bailey 26/e p1310, 25/e p1314)*
Posterior iliac osteotomy is done in ectopia vesicae.

Extrophy of Bladder (Ectopia Vesicae)

- Extrophy of bladder is **complete ventral defect** of **Urogenital sinus** and the **overlying skeletal system**[Q].
- **Defect in the infraumbilical part** of the **anterior abdominal wall**, associated with **incomplete development** of the **anterior wall of the bladder**[Q].

Embryology

- The **basic defect** is **abnormal overdevelopment** of the **cloacal membrane** and **its rupture**.
- The **timing of this rupture** of this **defective cloacal membrane determines the variant** of the extrophy-epispadias complex that results.

Clinical Features

- The **posterior wall of the bladder protrudes through the defect** with mucosal edges fused with skin and **urine spurts** onto the abdominal wall from the **ureteral orifices**[Q].
- The **rectus muscles** which are inserted on the pubic rami are also **widely separated**[Q].
- An **umbilical hernia**[Q] though usually small is present along with extrophic bladder.
  - In males, **complete epispadias** with a **wide** and **shallow scrotum**. **Undescended testis** and **inguinal hernias**[Q] are common.
  - **Females** also have **epispadias** with **bifid clitoris** and **wide separation** of the **labia**[Q].
- The **anus** is **dislocated anteriorly** in both sexes and there may be **rectal prolapse**[Q].

Complications

- The consequences of untreated bladder exstrophy are **total urinary incontinence**[Q] and an increased incidence of bladder cancer, usually **adenocarcinoma**.
- Many untreated extrophy of bladder reveal fibrosis, derangement of muscularis mucosa and chronic infection leading to **hydronephrosis**[Q].

Treatment

- **Enterocystoplasty**[Q] is the method of choice to augment bladder capacity and aid in reservoir function.
- **Urinary diversion with cystectomy**[Q] is treatment of choice for small, fibrotic or inelastic bladder.
- **Complete reconstruction** is achieved by:
  - Bladder closure with **sacral osteotomy** and **lengthening of penis**[Q] (**Posterior iliac osteotomy**[Q] is **done** in ectopia vesicae)
  - Antiureteral reflux procedure with **bladder neck reconstruction**[Q]
  - **Repair** of **epispadiac penis**[Q]

2. **Ans. a. Hypospadias**
3. **Ans. b. Cloacal membrane is present**
4. **Ans. c. Hypospadias**
5. **Ans. b. Ventral curvature of penis**
6. **Ans. b. Iliac bone**

URINARY BLADDER STONES

7. **Ans. b. Uric acid stones are dropped from above** *(Ref: Smith 17/e p272-273; Campbell 10/e p2521-2527; Bailey 26/e p1320-1322, 25/e p1323-1325)*

Vesical Calculus	
Primary Bladder Calculi	**Secondary Bladder Calculi**
• Develop in **absence of** any **known functional, anatomic** or **infectious factors**[Q]	• Develop in concert with **bladder outlet obstruction**[Q], **infection, impaired bladder emptying** or a **foreign body.**

8. Ans. c. Infection *(Ref: Smith 17/e p272-273; Campbell 10/e p2522-2524; Bailey 26/e p1320-1322, 25/e p1323-1325; emedicine.medscape.com/article/2120102-overview)*

Pathophysiology of Bladder Stones

- **Most vesical calculi** are **formed de novo within** the **bladder**[Q], but some initially may have formed within the kidneys as a dissociated Randall plaque or on a sloughed papilla and subsequently may have passed into the bladder, where additional deposition of crystals cause the stone to grow.
  - **Most renal stones** that are **small enough to pass through the ureters** are also **small enough to pass through** a normally functioning **bladder** and an **unobstructed urethra**[Q].
- In **older men with bladder stones** composed of **uric acid**, the **stone most likely formed in** the **bladder**[Q].
- Stones composed of **calcium oxalate** are usually **initially formed in** the **kidney**[Q].
  - In **adults, MC type of vesical stone** (seen in >50% of cases) is **composed of uric acid**[Q]**.**
- Less frequently, bladder calculi are composed of calcium oxalate, calcium phosphate, ammonium urate, cystine, or magnesium ammonium phosphate (when associated with infection).

Endemic Bladder Calculi

- **In children, stones** are composed mainly of **ammonium acid urate**[Q]**, calcium oxalate,** or an impure mixture of ammonium acid urate and calcium oxalate with calcium phosphate.
- The common link among endemic areas relates to **feeding infants human breast milk** and **polished rice**[Q]**.**
- These foods are **low in phosphorus,** ultimately leading to **high ammonia excretion**[Q]**.**
- These children also usually have a **high intake of oxalate-rich vegetables** (increased oxalate crystalluria) and **animal protein (low dietary citrate)**[Q]**.**

- **Vesical calculi** may be single or multiple, especially in the presence of bladder diverticula, and can be small or large enough to occupy the entire bladder. They **range from soft** to **extremely hard,** with **surfaces** ranging from **smooth** and **faceted** to **jagged** and **spiculated** (**"jack" stones**)[Q].

Secondary Bladder Calculi

- **Most** bladder stones are secondary, more common in **older males**[Q] (>50 years), usually because of **bladder outlet obstruction**[Q].
- **MC type: Uric acid** (sterile urine) > **Struvite stones**[Q] (Infected urine)
- Bladder stones are **usually solitary**[Q]**,** multiple in 25% patients.

Etiology

- Bladder outlet obstruction (MC cause)[Q]
- **Neurogenic bladder**[Q]
- Foreign body (**Foley's catheter**, forgotten **DJ stents**)[Q]
- Bladder **diverticula**[Q]

Clinical Features

- Typical symptoms are **intermittent, painful voiding** and **terminal hematuria** with **severe pain** at **the end of micturition**[Q].
- **Pain** may be referred to the **tip of the penis** or to the **labia majora**[Q].

Diagnosis

- A large percentage of bladder stones are **radiolucent (uric acid)**[Q]**.**
- **USG bladder**: Identifies the stone with its **characteristic shadowing** and **stone moves** with **changing body position**[Q]**.**

Treatment

- **Small stones:** Removed or crushed transurethrally **(Cystolitholapexy)**[Q]
- **Larger stones:** Disintegrated by **transurethral electrohydraulic lithotripsy** or **Cystolithotomy**[Q]

Stones of Genitourinary Tract

- **MC renal** stone**: Calcium oxalate**[Q]
- **MC primary bladder** stone: **Ammonium urate**[Q]
- **MC bladder** stone: **Uric acid**[Q] **>Struvite**
- **MC prostate** stone: **Calcium phosphate**[Q]

9. **Ans. a. Rare in Indian children** *(Ref: Smith 17/e p272-273; Campbell 10/e p2522; Bailey 26/e p1320-1322, 25/e p1323-1325)*

Primary Bladder Calculi (Endemic Bladder Calculi)

- Mainly seen in **underdeveloped countries**Q (North Africa, Thailand, Burma, Indonesia), in **pediatric age** group.
  - **Most common in children <10 years, with a peak incidence at 2 to 4 years of age**.
- **More common in boys** than in girls.
- Common in **Rajasthan, Andhra Pradesh**Q and some north-eastern states of **India.**
  - Related to **chronic dehydration** and **low protein, low phosphate, exclusive milk** and **high carbohydrate diet**Q.
  - Low phosphate diet increases urinary ammonium excretion leading to **ammonium urate stones**Q.

Diagnosis

- **USG bladder**: Identifies the stone with its **characteristic shadowing** and **stone moves** with **changing body position.**

Treatment

- **Small stones:** Removed or crushed transurethrally **(Cystolitholapexy)** Q
- **Larger stones:** Disintegrated by **transurethral electrohydraulic lithotripsy** or **Cystolithotomy**Q
  - Primary bladder calculi rarely recur after treatmentQ.

10. **Ans. c. Uric acid** 11. **Ans. b. Treatment is litholapexy** 12. **Ans. d. Bladder**

13. **Ans. a. Always associated with recurrence** *(Smith 17/e p272-273; Campbell 10/e p2522; Bailey 25/e p1323-1325)*

*"**Primary bladder calculi** are **more common in children exposed to low-protein, low-phosphate diets**. **Primary bladder calculi rarely recur after treatment**."- Campbell 10/e p2522*

*"**Childhood bladder lithiasis remains common in endemic regions**, throughout a stone belt reaching from **northern Africa**, through the **Middle East** and the **Balkans**, and into **India, Japan, Thailand**, and **Indonesia**."- Campbell 10/e p2522*

Primary bladder calculi are most common in children younger than the age of 10, with a *peak incidence at 2 to 4 years of age* .The disease is much **more common in boys** than in girls.

"Stones are usually solitary and, once removed, rarely recur."- *Campbell 10/e p2522*

Ammonium acid urate, calcium oxalate, uric acid, and calcium phosphate are the most common components of primary bladder calculi. ."- *Campbell 10/e p2522*

Children in endemic regions often consume a predominantly cereal-based diet that is poor in animal protein and low in phosphate. ."- *Campbell 10/e p2522*

Low dietary intake of phosphate not only leads to hypophosphaturia but also to hyperammonuria, promoting the precipitation of both calcium oxalate and ammonium acid urate."- *Campbell 10/e p2522*

URINARY BLADDER: MALACOPLAKIA

14. **Ans. d. Defect in phagocytosis** *(Ref: Smith 17/e p207-208; Campbell 10/e p309-311)*

Malacoplakia

- Inflammatory disease of the bladder that can also affect ureters and kidneys
- In the bladder, it manifests as plaques or nodules made of **large histiocytes (von Hansemann cells)**Q with laminar **inclusion bodies (Michaelis-Gutmann bodies)**Q form around bacterial fragments (E. coli) which acts as nidus.
- Believed to result from the **inadequate killing** of **bacteria** by **macrophages** or **monocytes** that exhibit **defective pahgolysosomal activity**Q.

Risk Factors

- **Immunosuppression** (Steroids, Transplantation)Q
- **Diabetes, Lymphoma, Rheumatoid arthritis**Q

Clinical Features

- More commonly affects **women** and associated with a history of **UTI**.

- Patients with malacoplakia often have **chronic illness** or are **immunosuppressed.**Q
- Irritative voiding symptoms (**urgency** and **frequency**) and **hematuria** are common

Diagnosis

- **USG or CT** may demonstrate a **mass in the bladder** and **evidence of obstruction** if the disease extends to the ureter.
- **Culture** of the lesion can yield bacteria, most commonly **E. coli.**

Management

- **TMP-SMX** and **fluoroquinolones**Q are recommended in the treatment of malacoplakia.
- In **malacoplakia limited** to the **lower urinary tract**, **antibiotic therapy** alone is usually sufficient.
- Best chance of **cure: Antibiotics + Surgery**Q
- The **prognosis is poor** and **mortality rate is high** in patients having **bilateral renal involvement**, regardless of treatment.

15. **Ans. c. Michaelis-Gutmann bodies are characteristic feature**

URINARY BLADDER: TUBERCULOSIS

16. **Ans. d. Whitish efflux from the ureteric holes** *(Ref: Smith 17/e p219-225; Campbell 10/e p468-477; Bailey 26/e p1301-1303, 25/e p1306-1308)*

Genitourinary Tuberculosis

- Tubercle bacilli (**M. tuberculosis**) may invade one or more organs of genitourinary tract and cause **chronic granulomatous infection**Q.
- More common in **males**Q (young adults of age **20-40** years)
- **Vesical irritability** is an **early clinical manifestation**Q.

Complications

- **Scarring** with **stricture formation**Q is one of the most typical lesions of tuberculosis and most commonly affects **juxtavesical portion** of **ureter.**
- **Inflammation** of **bladder mucosa** in early stages → **tubercle formation** (seen endoscopically as **white** or **yellow raised nodules**Q surrounded by halo of hyperemia) → Mural fibrosis (**Thimble bladder**)Q

Clinical features

- **Earliest symptom** is **urinary frequency**

Diagnosis

IVP in Tuberculosis
• **Earliest sign** is **"moth-eaten" calyx**Q (Obliteration of clear cut outline of renal papilla) due to erosion. • **Obliteration** of one or more **calyces** (calectasis, hydronephrosis) • SOL in pelvis (**TB abscess**) seen as **splaying of calyces**Q • **Ureteric strictures**Q (single or multiple) • **Shrunken bladder** with irregular wall (**Thimble bladder**)Q • Absence of function of kidney due to complete ureteral occlusion and renal destruction (**autonephrectomy**)Q

- **RGP**: Extensive calcification or thickness of the ureter (**Pipe-stem ureter**)Q, are usually associated with **pyonephrosis**.

Cystoscopy in Tuberculosis
• **Earliest sign** is **pallor**Q around ureteric orifice. • Other features are **tubercular ulcer** and **golf hole ureteric orifice**Q.

- **CECT** is **IOC** for **genitourinary tuberculosis**Q.

Treatment ATT and Surgery (for complications)Q

17. **Ans. b. Chronic tuberculosis**

18. **Ans. c. Ileocystoplasty**

SCHISTOSOMIASIS

19. Ans. a. Schistosomiasis *(Ref: Smith 17/e p227-235; Campbell 10/e p480-486; Bailey 26/e p1328-1329, 25/e p1332-1333)*

Schistosomiasis (Bilharziasis)

- Schistosomiasis is an infection with **Schistosoma haematobium**Q.
- Endemic in **Africa, Egypt** and **Middle East**
- More common in **Males**Q

Lifecycle

- **Man**Q is the **only definitive host** and **intermediate host** is **snail**Q.
- Life cycle begins with the passage of **eggs** into **freshwater** regions through **urine**Q.
- When the **eggs** are hatched, **miracidia** are produced. These **penetrate** the **snail** and eventually form into **cercariae**.

> - **Eggs** → **Miracidium**Q (penetrate the snail) → **Cercaria**Q (penetrate skin of man) → Migrate to **vesical venous plexus**Q for reproduction → **Eggs in urine**Q

- The fluke embryos (**cercariae**) **penetrate** the **skin** of man from infected water and migrate to the **vesical venous plexus**, where **sexual reproduction** takes placeQ.
- The **eggs** are laid in the **submucosal veins** and **penetrate** the **bladder wall** to enter the **urine**Q.

Pathology

- Schistosoma **eggs** are **highly antigenic** and induce **intense granulomatous reaction** in bladder resulting in **bladder fibrosis** with **ureteric** or **urethral strictures**Q.
- **Calcification** of the **dead eggs** within the bladder can produce a **calcified bladder** or **bladder stones**Q**.**

Complications

- **Bladder calcification**: **Schistosomiasis** is the **MC cause**Q of bladder calcification worldwide.
- Urolithiasis, ascending urinary tract infection, urethral and ureteric structure with subsequent hydronephrosis, and renal failure.
- **Squamous cell carcinoma**Q (Most serious complication)

Symptoms

- **MC symptom** of urinary schistosomiasis is **urinary frequency**Q**.**

> - **Swimmer's itch** is the **first clinical sign** due to local inflammatory response from **cercarial penetration (<24 hours)**Q
> - **Katayama fever** (Acute schistosomiasis)Q: Generalized allergic reaction associated with onset of egg laying, which includes fever, urticaria, lymphadenopathy, hepatosplenomegaly and eosinophilia (**3 weeks to 4 months**)

- Acute inflammation phase when eggs are deposited, penetrate tissues and excreted (**hematurea, frequency** and **terminal dysurea**)
- Fever, rigor, toxemia and uremia are manifestations of renal involvement
- Signs:
  - In early uncomplicated cases, there are essentially no clinical findings.
  - In **advanced cases**, rectal examination may reveal a **fibrosed prostate, enlarged seminal vesicle** or **thickened bladder base**Q.

Diagnosis

- Demonstration of schistosomal **eggs** in **early morning urine sample**Q
- **Sandy patches** (eggs in trigone) on **cystoscopy**Q
- IVU, RGU or cystography may show **mucosal irregularity**, inflammatory pseudo polyps, ureterits cystica, **ureteral dilation and stricture**, **reduced bladder capacity**Q

> - **Calcification** in the **wall of the bladder** or distal ureters on **plain radiographs** (**Fetal head appearance**)Q
> - **Calcifications** of the **distal ureters** have a characteristic pattern of **linear or parallel calcifications**Q on plain radiographs

Treatment

- **Praziquantel**Q **(DOC), metrifonate**Q or **oxaminiquine**Q are the drugs used in schistosomiasis.
- Surgery to treat the bladder contraction or for resection of the bladder cancer.

20. Ans. b. Schistosomiasis

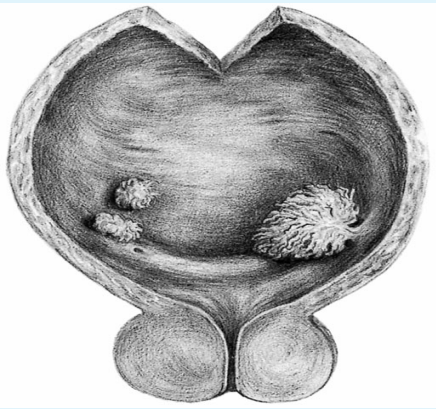
21. Ans. c. Schistosomiasis

CARCINOMA URINARY BLADDER: RISK FACTORS

22. Ans. c. Urinary bladder *(Ref: Smith 17/e p308; Campbell 10/e p2312-2316; Bailey 26/e p1330, 25/e p1333)*

Risk factors for Carcinoma Urinary Bladder	
Transitional Cell Carcinoma	**Squamous Cell Carcinoma**
• **Cigarette smoking**[Q]: **main etiological factor**, account for about 50% bladder cancer • Occupational exposure to chemicals: **Naphthylamine, benzidine, acrolein, aniline dyes, hydrocarbons** [Q] **(BHAAM)** • **Schistosoma hematobium**[Q]: Risk factor **for both TCC** and **SCC, more for SCC** • Drugs: **Phenacetin and Chlornaphazine**[Q] • **Cyclophosphamide**[Q] • **Pelvic irradiation**[Q] • Occupations associated with increased risk: **Chemical, dye, rubber, petroleum, leather and printing industry workers**[Q]	• **Schistosoma hematobium**[Q]: risk factor for both TCC and SCC, more for SCC • **Chronic irritation**: **Urinary calculi, long term indwelling catheters, chronic urinary tract infections**[Q] • **Bladder diverticula**[Q]

23. **Ans. a. Analgesic nephropathy**
24. **Ans. a. Schistosomiasis; b. Naphthylamine; c. Smoking**
25. **Ans. a. Stone; b. Schistosomiasis; c. Chronic cystitis**
26. **Ans. a. Urolithiasis; c. Schistosomiasis**
27. **Ans. b. Bladder exstrophy**
28. **Ans. a. Smoking predisposes; b. Schistosoma infection predisposes; c. Aniline dye workers; d. Radiation**
29. **Ans. a. Tuberculosis bladder; d. Chronic ulcer**
30. **Ans. c. Benign** *(Ref: Bailey 26/e p1330, 25/e p1334)*

Benign Papillary Tumour	
• **'Kiss' cancer**: **Papillary tumour** with **daughter implantation** • The papilloma consists of a **single frond** with a **central vascular core** with **villi**; it looks like a **red sea anemone** • Inverted papilloma is a condition in which the proliferative cells penetrate under normal mucosa so that the lesion is covered with smooth urothelium. • It is **benign.**	

31. **Ans. b. HPV infection** 32. **c. Parasitic infection**

CARCINOMA URINARY BLADDER: TYPES

33. **Ans. b. Radical cystectomy** *(Ref: Smith 17/e p308-311; Campbell 10/e p2317; Bailey 26/e p1330-1335, 25/e p1333-1335)*

Types of Carcinoma Urinary Bladder		
Transitional Cell Carcinoma	**Squamous Cell Carcinoma (Bilharzial carcinoma)**[Q]	**Adenocarcinoma Urinary Bladder**
• More than **90%** of bladder cancer are **TCC**[Q] • Most commonly appear as **papillary** or **exophytic lesions**[Q]	• Account for **5–10%,** arise from **lateral bladder wall** and **dome**[Q] • Often **nodular** and **invasive**[Q] at the time of diagnosis • Do not respond to TURBT, partial cystectomy or chemotherapy • Treatment is **Radical cystectomy**[Q] • Stage to stage and grade to grade prognosis is same as TCC	• Account for **< 2%** bladder cancer • **Urachal remnants** and **ectopia vesicae** are **risk factors**[Q] • Three types: **primary vesical, urachal** and **metastatic**[Q] • Adenocarcinoma also occur in **intestinal urinary conduits, augmentations, pouches** and **ureterosigmoidostomies**[Q] • **Primary adenocarcinoma** arise along the **floor** whereas adenocarcinoma arising from **urachus** occur at the **dome** • **Treatment: Radical cystectomy** with **pelvic lymphadenectomy**[Q] • Poor response to chemotherapy and radiotherapy

34. **Ans. a. TCC** 35. **Ans. c. Transitional carcinoma**
36. **Ans. b. Solid tumour** *(Ref: Bailey 26/e p1333, 25/e p1336)*

- **Muscle-invasive tumours** are **nearly always solid** although there may be a low tufted surface.
- These tumours are **often large** and **broad based**[Q], having an irregular, ulcerated, appearance within the bladder.
- The **incidence of metastases**, whether from lymphatic invasion in the pelvis or blood-borne to the lung, liver or bones, is **much more common** and will cause the **death of 30–50% of patients**[Q].

Squamous Cell Tumours

- **Squamous cell tumours** tend to be **solid** and are **nearly always associated with muscle invasion**Q.
- This is the **most prevalent form of bladder cancer** in **areas** where **bilharzia is endemic**.
- Squamous cell tumours may be **associated with chronic irritation** caused by **stone disease** in the bladder **as a result of metaplasia**Q.

37. **Ans. b. Occurs more often in aniline dye workers, c. It is located most frequently in the trigone**

38. **Ans. a. Mucosa** 39. **Ans. c. Exposure to industrial carcinogens predisposes**

CARCINOMA URINARY BLADDER: CLINICAL FEATURES AND DIAGNOSIS

40. **Ans. a. Urine microscopy and cytology** *(Ref: Smith 17/e p308-315; Campbell 10/e p2311-2332; Bailey 26/e p1333-1338, 25/e p1333-1340)*

Carcinoma Urinary Bladder

- More common in **whites**, **higher socio-economic status** and in **males**Q, in **6th** and **7th** decade
- **75%** are **localized** to bladder and **25%** have **spread to regional nodes** or **distant sites** at the time of presentation
- Most tumors develop at **trigone and adjacent posterolateral wall**Q with ureteral involvement
- Tumors tend to be **multifocal**Q in bladder

Pathology

- **MC type grossly is papillary and histologically, TCC.**Q

Precursor lesions of invasive urothelial cancer
• **Non-invasive papillary tumor** (**Kiss ulcer**)Q causes painless, profuse paroxysmal hematuria • Carcinoma in situ (Malignant cystitis)Q

Carcinoma in situ (Malignant cystitis)
• Typically presents as **irritative**Q lower urinary symptoms • Common in **high grade**Q tumors • **Urinary cytology** is **IOC**Q • Urine cytology is **positive** in **80–90%** cases because of **poor cohesiveness** of cells • Associated with increased chances of **recurrence** and **poor prognosis** • Treatment: **two cycles of BCG**Q, radical cystectomy in cases recurrence

Clinical Features

- **MC symptom: Painless hematurea**Q (85% cases)
- Hematuria is **gross** or microscopic, **intermittent**Q rather than constant
- **Vesical irritability**Q: frequency, urgency and dysurea
- Bone pain and abdominal pain in advanced disease
- **MC** site of **lymphatic metastases**: **Pelvic lymph nodes** (**obturator is MC**)Q
- MC site of **hematogenous spread**: **liver**Q > lung

Diagnosis

Cystoscopy

- Diagnosis and initial staging is made by **cystoscopy and transurethral resection (TUR)** Q
- Urinary Cytology
- Cytologic examination of exfoliated cells are useful in **detecting cancer in symptomatic patients** and **assessing response to treatment**Q
- Most useful for **early diagnosis of recurrence in TCC**Q

Exfoliated Markers for detection of bladder cancer
• Newer urinary tumor markers like **BTA test, urinary nuclear matrix protein (NMP22)** can detect cancer **specific proteins in urine** (**BTA/NMP22**)Q • **Hyaluronidase, Lewis-X antigen** on exfoliated urothelial cells • Determination of **telomerase activity** in exfoliated cells • Have been used to **detect new index tumors** and **recurrent tumors**Q • Expected to play important role in near future

- **CT and MRI:** used for **staging**Q

Management

- **Cystoscopy** and **TUR** or **biopsy**; **further management** is based on **stage, grade, size, multiplicity** and **recurrence pattern**[Q]

Prognosis

- There is strong correlation between **tumor grade and stage** and tumor recurrence, progression and survival
- In patients with **organ confined disease**, presence of **lymph node metastases** appears to be the **most important prognostic factor**
- Presence of **lymphovascular invasion** is associated with **poor prognosis**[Q]

41. **Ans. a. Hematuria**
42. **Ans. b. Hematuria**
43. **Ans. a. Common in smokers**
44. **Ans. d. Urine microscopy for malignant cytology**
45. **Ans. d. Urine for malignant cytology**
46. **Ans. c. Urine tumor markers**
47. **Ans. c. Urothelial carcinoma**

CARCINOMA URINARY BLADDER: TREATMENT

48. **Ans. a. Local excision** *(Ref: Smith 17/e p314; Campbell 10/e p2320-2321, 2375-2385; Bailey 26/e p1334-1336, 25/e p1338-1340)*

7th AJCC (2010) TNM Staging for CA Bladder	
T: Primary tumor	**N: Regional lymph nodes**
Ta: Non-invasive papillary carcinoma **Tis:** Carcinoma in situ **"Flat tumor"**	**N1: Single** regional **LN** in true **pelvis** (hypogastric, obturator, external iliac or presacral LN)
T1: Tumor invades **subepithelial connective tissue**	**N2: Multiple** regional **LN** in true **pelvis** (hypogastric, obturator, external iliac or presacral LN)
T2a: Superficial muscularis propria **invasion (inner half)** **T2b: Deep** muscularis propria **invasion (outer half)**	**N3**: LN metastasis to **common iliac LNs**
T3a: Microscopic extension into perivesical fat **T3b: Macroscopic extension** into perivesical fat	M: Distant metastases
T4a: Cancer invading **pelvic viscera** (e.g., prostatic stroma, vaginal wall, rectum, uterus) **T4b**: Extension to **pelvic sidewalls**, **abdominal walls**, or **bony pelvis**	M0: No distant metastasis M1: Distant metastasis present

Treatment of CA Bladder	
Tis	**Intravesical BCG**[Q]
Ta (single, low to moderate grade, not recurrent)	**Complete TUR**[Q]
Ta (large, multiple, high grade or recurrent) and **T1**	**Complete TUR** followed by **intravesical chemo or immunotherapy**[Q]
T2-T4	• **Radical cystectomy**[Q] • **Neoadjuvant chemotherapy** followed by **radical cystectomy**[Q] • Radical cystectomy followed by adjuvant chemotherapy • Neoadjuvant chemotherapy followed by concomitant chemotherapy and irradiation
Any T, N+,M+	**Systemic chemotherapy** followed by selective **surgery** or **irradiation**

49. **Ans. b. 70% chance of requiring cystectomy in 5 years after TUR**
Treatment of stage II bladder cancer is **radical cystectomy** or **neoadjuvant chemotherapy** followed by **radical cystectomy.**
Rests of the three options are wrong.
50. **Ans. c. Carcinoma of urinary bladder**
51. **Ans. d. Radical cystectomy**
52. **Ans. a. Endoscopic tumor resection**
53. **Ans. d. BCG** *(Ref: Smith 17/e p316; Campbell 10/e p2361-2365; Bailey 26/e p1334, 25/e p1337)*

Drugs used in intravesical chemotherapy	
• Mitomycin C[Q]	• Epirubicin[Q]
• Thiotepa[Q]	• **BCG (most effective)**[Q]

54. **Ans. b. BCG** *(Ref: Smith 17/e p316-317; Campbell 10/e p2343-2345; Bailey 26/e p1334, 25/e p1337-1338)*

BCG

- BCG is attenuated strain of **Mycobacterium bovis**[Q]

- **Mechanism of action**: Immunologically mediated
  - Exact mechanism is not known
  - Binds to fibronectin on bladder cells and **elicits T_{H1} response**[Q]
- **Most effective**[Q] intravesical chemotherapy

Contraindications of BCG	
Absolute	**Relative**
• **Immunosupressed**[Q] patients • **Gross hematurea**[Q] • **Immediately after TURBT**[Q] • **Traumatic catheterization**[Q] • Total **urinary incontinence**[Q] • **History** of **BCG sepsis**[Q]	• Deranged LFT • Previous history of Koch's • UTI • Poor performance status

Side-Effects

- **MC** is **frequency, urgency and dysuria**[Q]
- Patients with **severe BCG sepsis** (high fever, chills confusion, hypotension, jaundice) should be treated with **ATT**[Q].

55. **Ans. a. Carcinoma of urinary bladder**

56. **Ans. a. Bladder**

57. **Ans. c. Total cystectomy and pelvic lymphadenectomy**

URINARY BLADDER INJURY

58. **Ans. D. Extraperitoneal rupture of bladder** *(Ref: Smith 17/e p289-291; Campbell 10/e p2153-2155; Bailey 26/e p1311, 25/e p1314-1315)*

Bladder Rupture

- Bladder injuries occur most often from **external force** to **full bladder** and often associated with **pelvic fractures**[Q].
- **Pelvic fracture** accompanies bladder rupture in **90%**[Q] cases.
- Classic triad suggestive of bladder rupture: **Suprapubic pain and tenderness + Difficulty in ability to pass urine + Hematuria**[Q]

Extraperitoneal (80%)

- **MC cause** is **pelvic fracture**[Q].
- Diagnosed by **cystogram** or **CT cystography**[Q]

  - **Flame sign** or **pear sign**[Q] (pattern of contrast extravasation) is seen
  - Treated by **simple catheter drainage**[Q] (Typically **10 days** of catheter drainage will provide adequate healing time)

- **Surgical repair** is indicated in cases of **repeated blockade** of catheter due to bleeding, **projecting bone fragment** or **tear extending** to the **bladder neck**[Q].

Intraperitoneal (20%)

- **Blow, kick or fall** on **fully distended bladder**[Q] leads to intraperitoneal rupture
- Usually seen in **males**, **MC site of rent** is **dome**[Q] of bladder.

  - Apart from classic triad suggestive of bladder rupture (Suprapubic pain and tenderness + Difficulty in ability to pass urine + Hematuria) patients develop **peritonism** and **abdominal distention**[Q].

- Diagnosis is made by **retrograde cystography** or **CT cystography**.
- **X-ray** abdomen shows **ground glass appearance**[Q] (due to fluid in abdomen)
- **Laparotomy** with **peritoneal lavage and bladder repair** with **SPC**[Q] should be done.

Bladder Rupture

- **Cystography (gold standard)** [Q] reveals **distorted bladder** with **extravasation** of **contrast** in **perivesical space** and **streaks of contrast** into **fascial planes** giving rise to typical **"sun-burst" appearance**[Q].
- **USG** shows **bladder in bladder appearance**[Q] due to **perivesical collection** and rent may be detected.

59. Ans. c. Commonly associated with anterior urethral rupture *(Ref: Smith 17/e p289-291; Campbell 10/e p2153-2155; Bailey 26/e p1311, 25/e p1314-1315)*

Bladder Rupture	
Extraperitoneal (80%)	**Intraperitoneal (20%)**
• **MC cause** is **pelvic fracture**[Q]. • Classic triad: **Suprapubic pain and tenderness + Difficulty** in ability **to pass urine + Hematuria**[Q] • Diagnosed by **cystogram** or **CT cystography**[Q] • **Flame sign** or **pear sign**[Q] (pattern of contrast extravasation) is seen • Treated by **simple catheter drainage** (Typically **10 days** of catheter drainage will provide adequate healing time)[Q] • **Surgical repair** is indicated in cases of **repeated blockade** of catheter due to bleeding, **projecting bone fragment** or **tear extending** to the **bladder neck**[Q].	• **Cause: Blow, kick** or **fall** on **fully distended bladder**[Q] • Usually seen in **males**, **MC site of rent** is **dome** of bladder[Q]. • Apart from classic triad suggestive of bladder rupture (Suprapubic pain and tenderness + Difficulty in ability to pass urine + Hematuria) patients develop **peritonism** and **abdominal distention**[Q]. • Diagnosis is made by **retrograde cystography** or **CT cystography**[Q]. • **X-ray** abdomen shows **ground glass appearance**[Q] (due to fluid in abdomen) • **Laparotomy** with **peritoneal lavage and bladder repair** with **SPC** should be done[Q].

60. Ans. c. Above urogenital diaphragm

61. Ans. d. Perivesical space

62. Ans. c. Perivesical hemorrhage with rupture

63. Ans. c. Retrograde cystogram

URINARY DIVERSION

64. Ans. b. Hyperkalemia *(Ref: Smith 17/e p388-401; Campbell 10/e p2436-2447; Bailey 26/e p1336-1339, 25/e p1339-1342)*

Urinary Diversion

- Urinary diversion can lead to **stricture** at anastomosis, **reflux of urine**, reabsorption of solutes leading to **dyselectrolytemia**[Q].
- **Gold standard conduit** for urinary diversion: **Ileal conduit**[Q]
- Ileal conduit is best for urinary diversion as it is **simplest to perform**[Q] and associated with minimal intra-operative and immediate post-operative complications.
- **Ileal or colonic conduits** (Ureterosigmoidostomy):
  - Hyperchloremic, hypokalemic metabolic acidosis[Q]

  (DK Raised HCl in ureterosigmoidostomy: Decreased K^+, raised H^+ and Cl^-)
- **Jejunal conduits:**
  - Hypochloremic, hyponatremic, hyperkalemic, metabolic acidosis[Q]

  (RH Khurana Decreases NaCl in jejunal conduit: Raised H^+, K^+; Decreased Na^+, Cl^-)
- **Stomach conduit:**
  - Hypochloremic, hypokalemic, metabolic alkalosis[Q]

  (Everything decreases in stomach conduit: Decreased H^+, K^+, Cl^-)

65. Ans. d. Bladder hematoma *(Ref: Bailey 26/e p1336, 25/e p1339)*

Indications of External Urinary Diversion

- To **relieve distal obstruction**[Q]
- When the **bladder has been removed** or has **lost normal neurological control**[Q]
- **Incurable fistula**[Q]
- **Irremovable obstruction**[Q]

66. Ans. a. Ureterosigmoidostomy

URINARY INCONTINENCE

67. Ans. d. Rectovesical fistula *(Ref: Bailey 26/e p1316, 25/e p1320-1321)*

Rectovesical fistula doesn't cause urinary incontinence, as the level of fistula is above the sphincter mechanism.

Causes of incontinence	
Problems of social control	• **Uninhibited detrusor hyperreflexia** and **impaired social perception** in **dementia**[Q]
Storage problems	• **Small bladder capacity owing to fibrosis** (tuberculosis, radiotherapy or interstitial cystitis)[Q] • **Small functional capacity**[Q] owing to severe detrusor instability, neurogenic dysfunction or infection
Impairment of emptying	• **Chronic retention**[Q] or **neurogenic bladder dysfunction**[Q] have **small functional bladder capacities** with **detrusor overactivity** causing incontinence, despite having large residual volumes of urine.
Weak sphincter	• This leads to **genuine stress incontinence**[Q]
Fistulae	• **Leakage from fistulae** (vesicovaginal)[Q] or **upper tract duplication** with an **ectopic ureter**[Q].

68. Ans. c. Collection of urine in 'U' shaped curve of bulb of penis

69. Ans. b. Urodynamic study *(Ref: Bailey 26/e p1315, 25/e p1320)*

Detrusor Instability

- **Phasic increases in pressure** give rise to **urgency** and **urge incontinence** (**detrusor instability**)[Q].
- This abnormality is found in **patients with neurogenic bladder dysfunction**, such as in **multiple sclerosis** (MS) or **Parkinson's disease** or **following a stroke** or **spinal injury**, when it is known as **detrusor hyperreflexia**[Q].
- About **50% of men with bladder outflow obstruction** have **detrusor instability**, and in **about half of them the instability resolves after prostatectomy**[Q].
- **Idiopathic detrusor instability** is common and must be distinguished from genuine stress incontinence (GSI) in women before performing bladder neck suspension procedures.

Genuine Stress Incontinence

- This is defined as **urinary leakage occurring during increased bladder pressure** when this is **solely due to increased abdominal pressure**[Q] and not to increased true detrusor pressure.
- It is **caused by sphincter weakness**[Q].

Uses of Urodynamic Testing

- To **distinguish GSI** (due to sphincter weakness) **from detrusor instability** in **women**[Q]
- For the **classification** of **neurogenic bladder dysfunction**[Q]
- To **distinguish bladder outflow obstruction** from **idiopathic detrusor instability** in **men**[Q]
- To **investigate incontinence** or **other lower urinary tract symptoms**[Q]

70. Ans. a. Neurogenic bladder *(Ref: Bailey 26/e p1315, 25/e p1319-1321)*

Cystometry

- **Cystometic studies** are **urodynamic studies** in which the **pressure changes** in the **bladder** is simultaneously **measured** with **bladder filling** and **during micturition**[Q].
- It **helps in accurate assessment** of **detrusor** and **sphincter activity** especially if a **neurogenic abnormality** is suspected[Q].

MISCELLANEOUS

71. Ans. A. Absence of systolic detrusor contraction

Rest three options are false.

72. Ans. C. Contracture of bladder neck *(Ref: Bailey 26/e p1322-1323, 25/e p1326-1327)*

Pulsion diverticula: The usual cause is **bladder outflow obstruction**.

Bladder Diverticula

- The **normal intravesical pressure** during **voiding** is about **35-50 cm H_2O**[Q]; however, pressures as great as 150 cm H_2O may be reached by a **hypertrophied bladder** endeavouring to **force urine past an obstruction**[Q].
- This **pressure causes** the lining between the inner layer of **hypertrophied muscle to protrude**, forming **multiple saccules**.
- If one or more, but usually one, **saccule** is **forced through the bladder wall**, it becomes a **diverticulum**[Q].

Types

Congenital diverticula

- As a result of a **developmental defect**[Q].

- These are **situated in** the **midline anterosuperiorly** and represent the **unobliterated vesical end** of the **urachus**[Q].

Pulsion diverticula

- The usual cause is **bladder outflow obstruction**[Q].

Pathology

- Diverticula are **lined by bladder mucosa** and the **wall** is **composed of fibrous tissue only**[Q]

Clinical Features

- An **uninfected diverticulum** of the bladder usually causes **no symptoms**[Q].
- The patient is nearly **always male (95%)** and **over 50 years of age**[Q].
- **Symptoms** are those of associated **urinary tract obstruction**, **recurrent infection** and **pyelonephritis**[Q].
- **Hematuria** (due to infection, stone or tumour) is a symptom in about **30%.**
- In a few patients **micturition occurs twice in rapid succession**[Q] (the second act may follow a change of posture).

Diagnosis

- Diverticula are usually **discovered incidentally** on **cystoscopy** or **ultrasound**[Q].

Treatment

- **Operation** is necessary **only for the treatment of complications**[Q].
- If the **diverticulum is small** and **associated outflow obstruction** has been **dealt with by prostate resection**, there is **no reason to resect the diverticulum**[Q].
- Even a large diverticulum may not require treatment in the absence of infection or other complications.

Complications of Bladder Diverticula	
• Recurrent urinary infection • Squamous cell metaplasia and leucoplakia	• Bladder stone • Hydronephrosis and hydroureter • Neoplasm

73. Ans. a. CA prostate; b. Postoperative retention *(Ref: Bailey 26/e p1312-1314, 25/e p1316-1317)*

- **Retention of urine** can occur **after major** and **lengthy operations** of the **anal canal** and **perineal region**[Q]. So, in these types of operations, it is usual to forestall a **catheter before** or **at the conclusion of the operation**.
- **Appendicitis** is **not a major operation**, so catheterization is usually not recommended.
- **Prostatic cancer** presents with **bladder outlet obstruction**. This is **relieved by catheterization**[Q].
- If the catheter will not pass, it is usually due to poor technique, lack of anesthesia, traumatization of urethra or a urethral stricture.
- If the catheter cannot be passed, suprapubic puncture and urethral instrumentation should be done.

74. Ans. a. Positive nitrite test *(Ref: Smith 17/e p196)*

Sensitivity and Specificity of Urinalysis in UTI		
Tests	**Sensitivity** (%)	**Specificity** (%)
Esterase	83 (67–94)	**78** (64–92)
Nitrite	53 (15–82)	98 (90–100)[Q]
Esterase or Nitrite	**93** (90–100)	72 (58–91)
White blood cells	73 (32–100)	81 (45–98)
Bacteria	81 (16–99)	**83** (11–100)
Any above	99.8 (99–100)	70 (60–92)

75. Ans. b. 35–50 cm H_2O *(Ref: Bailey 26/e p1315, 25/e p1319)*

- The **normal voiding pressure** should not exceed **60 cm H_2O in men** and about **40 cm H_2O in women,** with a **flow rate** of between **20 and 25 ml/sec.**

URODYNAMIC TESTING

- The principle is to **artificially simulate bladder filling** and **emptying** while **obtaining pressure measurements**[Q].
- The patient attends with a **full bladder** and is **allowed to void** in private to **measure the maximum urinary flow rate**[Q].
- After voiding, the **residual urine** is measured **by ultrasound**[Q].
- **Radiographic screening** may be carried out **to assess bladder neck closure** and **urinary leakage during movement** or **coughing** (**stress incontinence**) or **during bouts of phasic detrusor pressure** (**detrusor instability**) [Q].
- The **normal bladder** will accept approximately **400–550 ml** when filled at room temperature at a rate of < 50 ml/min.
- The **pressure increase** in the **bladder** should be **< 15 cm H_2O**[Q]. In addition, phasic pressure increases should not be seen.
- The **normal voiding pressure** should not exceed **60 cm H_2O in men**[Q] and about **40 cm H_2O in women,** with a **flow rate** of between **20 and 25 ml/sec**[Q].

76. Ans. c. Bladder outlet obstruction *(Ref: Bailey 26/e p1350, 25/e p1353)*

Marion's Disease

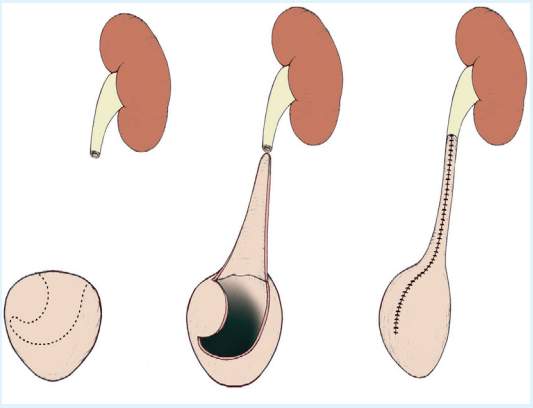
- **Congenital obstruction** of the **posterior urethra** due to **muscular hypertrophy** and **stenosis of the bladder neck**

77. Ans. a. Muscular hypertrophy of internal sphincter of urinary bladder

78. Ans. d. Flap of the bladder wall fashioned into a tube replace lower ureter *(Ref: Bailey 26/e p1289, 25/e p1292, 1307)*

Boari operation

- A **strip of bladder** wall is fashioned into a **tube** to **bridge the gap**[Q] between the cut ureter and the bladder.
- Used for **lower ureteric reconstruction**
- **Boari flap** provides the **needed length** to create a **tension-free anastomosis** between the **ureter and the bladder**[Q]



79. Ans. b. Lower ureteric reconstruction

80. Ans. c. Hunner's cystitis *(Ref: Bailey 26/e p1328; Smith 17/e p576)*

Interstitial cystitis (Hunner's ulcer)

- **Confined to women; Etiology obscure**
- **Chronic pancystitis**, often with marked infiltration with lymphocytes and macrophages.
- **Ulceration of the mucosa** occurs in the **fundus of the bladder**.
- In severe cases the **bladder capacity is reduced to 30–60 ml.**
- **Characteristic linear bleeding ulcer** is caused by **splitting of the mucosa** when the bladder is distended under anaesthesia.

Clinical Features

- **First symptom** is **increased frequency**
- Pain, relieved by micturition and aggravated by jarring and over-distension of the bladder, is another characteristic symptom. Haematuria also occurs.
- In most patients **pyuria andandurinary infection are absent**.

Diagnosis

- **Cystoscopy: Characteristic ulcer in the fundus**, but it may be absent.
- It is important to **check urinary cytology** and to **biopsy the mucosa to exclude underlying neoplastic disease.**

Treatment

- Treatment is difficult and unsatisfactory.
- **Hydrostatic dilatation** under anaesthesia may give relief for some months.
- **Instillation of dimethylsulphoxide** results in improvement in some patients.

81. Ans. a. Fever *(Ref: Smith 17/e p206)*

CHAPTER 23

Prostate and Seminal Vesicles

MULTIPLE CHOICE QUESTIONS

BENIGN PROSTATIC HYPERPLASIA

1. Benign prostatic hyperplasia first develops in the: *(COMEDK 2011)*
a. Periurethral transition zone
b. Peripheral zone
c. Central zone
d. Anterior fibromuscular stroma

2. In BPH most common lobe involved is: *(AIIMS June 2000)*
a. Lateral b. Posterior
c. Median d. Anterior

3. Which is the earliest symptom of benign hypertrophy of prostate? *(Karnataka 94, 96)*
a. Frequency b. Hematuria
c. Incontinence d. Strangury

4. Which of the following is an absolute indication for surgery in cases of benign prostatic hyperplasia? *(All India 2003)*
a. Bilateral hydroureteronephrosis
b. Nocturnal frequency
c. Recurrent urinary tract infection
d. Voiding bladder pressures > 50 cm of water

5. Which of the following lasers is used for treatment of benign prostatic hyperplasia as well as urinary calculi? *(All India 2003)*
a. CO_2 laser b. Excimer laser
c. Ho: YAG laser d. Nd-YAG laser

6. A 60-years old diabetic and hypertensive with second grade prostatism admitted for prostatectomy developed myocardial infarction. Treatment now would be: *(All India 99)*
a. Finasteride b. Terazocin
c. Finasteride and terazocin d. Diethyl stilbestrol

7. The following statements regarding finasteride are true except: *(All India 2005)*
a. It is used in the medical treatment of benign prostatic hypertrophy
b. Impotence is well documented after its use
c. It blocks the conversion of dihydrotestosterone to testosterone
d. It is a 5-α reductase inhibitor

8. Indication for surgery in benign prostatic hypertrophy are all except: *(APPG 85)*
a. Prostatism
b. Chronic retention
c. Hemorrhage
d. Enlarged prostate

9. Grade I benign prostate with outflow obstruction is best treated with: *(AIIMS 84)*
a. Retropubic prostatectomy
b. Transurethral resection
c. Transvesicle prostatectomy
d. Androgen therapy

10. Assessment of patient with prostatism include all except:
a. Rectal examination *(APPG 2013, DPG 2009 March)*
b. Serum prostate specific antigen
c. Pressure flow urodynamic studies
d. Transrectal ultrasound scanning

11. In follow up of BPH, most important indication of surgery is: *(AIIMS Nov 2010)*
a. Prostate size > 75gm
b. Single episode of UTI requiring 3 days of antibiotics
c. Cannot use medication due to hypertension
d. Bilateral hydronephrosis

12. What of the following is an absolute indication for surgery in cases of benign prostatic hyperplasia? *(MHSSMCET 2005, All India 2003)*
a. Bilateral hydroureteronephrosis
b. Nocturnal frequency
c. Recurrent urinary tract infection
d. Voiding bladder pressures > 50 cm of H_2O

13. The drug that has the fastest onset of action in benign prostatic hyperplasia is: *(COMEDK 2008)*
a. Finasteride b. Tamsulosin
c. Dutasteride d. Flutamide

14. In the management of symptomatic benign prostatic hyperplasia with finasteride the period of trial required for determining a satisfactory response is: *(COMEDK 2009)*
a. 1 month b. 2 months
c. 4 months d. 6 months

TURP AND COMPLICATIONS

15. The most important use of transrectal ultrasono-graphy (TRUS) is for: *(COMEDK 2007)*
a. Screening for CA prostate
b. Distinguishing prostate cancer from BPH
c. Systematic prostate biopsy in suspected prostate cancer
d. Guiding transurethral resection of prostate cancer

16. The most common complication of transurethral resection of prostate (TURP): *(COMEDK 2007, 2008, 2009)*
a. Erectile dysfunction b. Retrograde ejaculation
c. Urinary incontinence d. Ringer's lactate
e. 5% dextrose

17. Delirium, mental confusion and nausea in patients who had undergone transurethral resection of prostate suggests:
A. Hypernatremia b. Sepsis *(MCI Sept 2009)*
c. Hepatic coma d. Water retention

18. Which of the following is the most common cause of delayed urinary tract obstructive symptoms after TURP?
a. Stricture of the navicular fossa *(All India 2011)*
b. Stricture of the membranous urethra

c. Stricture of the bulb of urethra
d. Bladder neck stenosis

19. During TURP, surgeon takes care to dissect above the verumontanum to prevent injury to: *(All India 2011)*
a. External urethral sphincter b. Urethral crest
c. Prostatic utricle d. Trigone of bladder

20. What is the reason for following set of symptoms after prostatic surgery- restlessness, vomiting and change in sensorium: *(AIIMS June 99)*
a. Electrolyte imbalance b. Bladder neck obstruction
c. Acute pyelonephritis d. Ureter stenosis

21. TURP was done in an old patient of BHP, after which he developed altered sensorium cause is? *(AIIMS June 2001, AIIMS June 99)*
a. Hypernatremia b. Hypokalemia
c. Hyponatremia d. Hypomagnesemia

22. Commonest cause of periumbilical pain after 30 min. of TURP done under spinal anesthesia with Bupivacaine:
a. Meteorism *(AIIMS June 2000)*
b. Perforation of bladder
c. Recovery from bupivacaine anaesthesia
d. Mesentery artery ischemia

23. Which of the following substances is not used as an irrigant during transurethral resection of the prostate? *(AIIMS Nov 2003)*
a. Normal saline b. 1.5% Glycine
c. 5% Dextrose d. Distilled Water

24. A 70 years old patient benign prostatic hyperplasia underwent transurethral resection of prostate under spinal anaesthesia. One hour later, he developed vomiting and altered sensorium. The most probable cause is: *(MHSSMCET 2008, AIIMS June 2001, All India 2003)*
a. Over dosage of spinal anesthetic agent
b. Rupture of bladder
c. Hyperkalemia
d. Water intoxication

25. All of the following can be seen after transurethral resection of prostate except: *(AIIMS Nov 2000)*
a. Congestive cardiac failure b. Transient blindness
c. Convulsions d. Hypernatremia

26. T.U.R (Transurethral resection) syndrome is due to:
a. Hyponatremia b. Hypokalemia *(UPSC 95)*
c. Hypovolemia d. Hypoxia

27. Consider the following conditions:
1. Urinary flow rate < 10 cc/second
2. Residual volume of urine > 100 cc
3. Serum level of prostatic specific antigen > 10 mmol/litre
4. Trabeculated urinary bladder

Which of the above are indications of TURP for BHP?
a. 1, 2 and 3 b. 2, 3 and 4
c. 1, 2 and 4 d. 1, 3 and 4

28. Which one of the following is used as an irrigation solution during transurethral resection of the prostate? *(COMEDK 2014)*
a. 1.5% glycine b. Physiological Saline
c. Ringer's lactate d. 5% dextrose

CARCINOMA PROSTATE

29. Most common site of development of carcinoma of prostate is: *(DNB 2012, Orissa 2011, MHPGMCET 2002, 2001)*
a. Peripheral zone b. Central zone
c. Transitional zone d. Fibromuscular stroma

30. For carcinoma of the prostate, the commonest site is: *(AIIMS June 2001)*
a. Anterior zone b. Peripheral zone
c. Central zone d. Transitional zone

31. A 49-years old man suffering from carcinoma of prostate was X-rayed. He showed areas of sclerosis and collapse of T10 and T11 vertebrae in X-ray. The spread of this cancer to the above vertebrae in X-ray. The spread of this cancer to the above vertebrae was through: *(AIIMS Nov 2002)*
a. Sacral canal
b. Lymphatic vessels
c. Internal vertebral plexus of veins
d. Superior rectal vein

32. Mr. Chaturvedi, a 70 years old man comes to casualty with urinary retention and back pain. Which investigation should be performed? *(AIIMS Nov 2000, Nov 99)*
a. Serum acid phosphatase b. Serum calcium
c. Serum alkaline phosphates d. Serum electrophoresis

33. A 65-years old male was diagnosed with prostate cancer three years back and was treated by surgery and hormone therapy. Presently he has developed urinary symptoms and progressive backache. What is the tumor marker, which can be indicative of disease relapse? *(AIIMS Nov 2003)*
a. CA-125 b. Beta-HCG
c. CEA d. PSA

34. Specific marker for prostatic cancer is: *(PGI Dec 99)*
a. Alkaline phosphatase b. Prostate specific antigen
c. Acid phosphatase d. CA-125

35. Screening of prostate CA commonly done by: *(PGI Nov 2010, May 2005)*
a. DRE (digital rectal exam) b. USG
c. MRI d. PSA
e. CT scan

36. All of the following are used to detect CA prostate except:
a. PSA b. MRI *(PGI Dec 2006)*
c. CT scan d. DSA
e. TRUS

37. A 50-years old male with positive family history of prostate cancer has come to you for a screening test. The most sensitive screening test to pickup prostate cancer is:
a. DRE *(All India 2007)*
b. PSA
c. DRE+ PSA
d. Endorectal coil MRI with T1W and T2W images

38. Transrectal ultrasonogram in evaluation of carcinoma prostate is most useful for: *(All India 2008)*
a. Taking guided biopsy
b. Identifying seminal vesicle invasion
c. Nodal sampling
d. Measuring the extent of invasion

39. In prostatic metastasis, the site most commonly involved is: *(PGI June 99)*
a. Obturator nodes b. Perivesical nodes
c. Pre-sacral nodes d. Paraaortic nodes

40. CA prostate commonly metastasizes to the vertebrae: *(All India 2001)*
a. Because valveless communication exist with Batson's periprostatic plexus
b. Via drainage to sacral lymph node
c. Of direct spread
d. None of above

41. Secondary deposits form prostatic carcinoma is commonest in: *(APPG 89)*
a. Bone b. Kidney
c. Liver d. Brain

42. In carcinoma prostate with metastasis which is raised? *(TN 89)*
a. ESR b. Alkaline phosphatase
c. Acid phosphatase d. Bilirubin

43. A patient presents with complains of sciatica. On radiological examination there was sclerotic lesions on his skull. Which of the following is most likely to be elevated in this patient? *(AIIMS 2000)*
a. CEA b. Prostate specific antigen
c. Alkaline phosphatase d. Alpha-1 antitrypsin

44. Normal level of PSA in males is: *(DNB 2011)*
a. < 4 ng/ml b. 4–10 ng/ml
c. > 10 ng/ml
d. PSA is not produced by normal males

45. Gleason scoring is done for: *(DNB 2009)*
a. Prostatic cancer b. Lung cancer
c. Bladder cancer d. Hodgkins lymphoma

46. Which of the following is true about prostate cancer screening? *(APPG 2008)*
a. Digital screening along with PSA is additive
b. Prostate cancer is common among young males
c. Tumor markers are diagnostic
d. Bleeding per rectum is earliest manifestation of disease

47. True about prostate CA is: *(DPG 2008)*
a. Arises in the periurethral zone
b. Extremely radio sensitive
c. Obturator nodes are most commonly involved
d. PSA is not used in workup

48. Gleason score: all are true except: *(AIIMS May 2011, Nov 2008)*
a. Used for grading prostate cancer
b. Scores range from 1–10
c. Higher the score, poorer the prognosis
d. Helps in planning management

49. Osteoblastic metastasis commonly arise from: *(JIPMER 2014, 2013, AIIMS May 2013)*
a. Breasts b. Prostate
c. Lung d. RCC

50. Best screening marker of prostate cancer is: *(UPPG 2009)*
a. AFP b. Prostate specific antigen
c. CA 19-20 d. CA 125-26

51. The most important use of transrectal ultrasonography (TRUS) is for: *(COMEDK 2007)*
a. Screening for CA prostate
b. Distinguishing prostate cancer from BPH
c. Systematic prostate biopsy in suspected prostate cancer
d. Guiding transurethral resection of prostate cancer

52. Treatment for metastatic CA Prostate: *(JIPMER 2011)*
a. GnRH analogue
b. Estrogen therapy
c. Radiotherapy with chemotherapy
d. Radiotherapy

CARCINOMA PROSTATE TREATMENT

53. Which is not used in carcinoma prostate? *(PGI Dec 97)*
a. Estrogen b. Progesterone
c. Cyproterone acetate d. Flutamide

54. An 85 years old man underwent transurethral resection of prostate. A histological examination of his specimen showed foci of adenocarcinoma management will be: *(AIIMS Nov 2000)*
a. Endocrine therapy b. Radical surgery
c. Hormone therapy d. No further treatment

55. A 75-years old frail elderly man underwent TURP. The biopsy revealed adenocarcinoma. What is the next line of management? *(All India 94)*
a. Radiotherapy
b. Surgery followed by hormonal replacement therapy
c. Conservative treatment
d. Surgery followed by radiotherapy

56. Which of the following is the most troublesome source of bleeding during a radical retropubic prostatectomy? *(All India 2005)*
a. Dorsal venous complex b. Inferior vesical pedicle
c. Superior vesical pedicle d. Seminal vesicular artery

57. A 70-years old man with CA prostate with osteoblastic secondaries in pelvis and lumbar vertebra showed well differentiated Adeno Carcinoma prostate on needle biopsy. He is ideally treated by:
a. Radical prostatectomy b. TURP
c. Radiation d. Hormonal manipulation

58. Management of Carcinoma prostate in a 50-years old man revealed after TURP: *(MHSSMCET 2006)*
a. No treatment required
b. Hormonal therapy
c. Bilateral subcapsular orchidectomy
d. Radical prostatectomy

59. A 70-years old man with prostate cancer was given radiotherapy. The recurrence of the cancer is monitored biochemically by: *(AIIMS Nov 2012)*
a. Androgens only
b. Prostate specific antigen and carcinoembryonic antigen
c. Prostate specific antigen only
d. ALP and CEA

60. Treatment of metastatil prostate carinoma is: *(JIPMER 2011)*
a. Radiotherapy
b. Estrogen only
c. GnRH analogs
d. Radiotherapy with chemotherapy

61. Which of the following drugs is useful for treatment of advanced prostate cancer? *(AIIMS November, May 2014)*
a. Goserelin b. Ganirelix
c. Cetrorelix d. Abarelix

62. Regarding prostatectomy which one of the statements is false: *(APPG 2015)*
a. Water intoxication and hyponatremia can give rise to CHF
b. Perineal prostatectomy (Young) is a commonly done surgical procedure
c. Retrograde ejaculation occurs in about 65% of men
d. Intraurethral stents are helpful in the management of men who are grossly unfit (ASA grade 4)

PROSTATITIS

63. Complication which commonly accompanies acute prostatitis: *(AIIMS 87)*
a. Epididymitis b. Orchitis
c. Seminal vesiculitis d. Sterility

64. A 60-years old male presented with fever, chills and dysuria. Patient was hospitalized in emergency for 5 days. PSA level was 7.4. Next best step in this patient: *(AIIMS Nov 2013)*
a. Repeat PSA
b. TURP
c. TRUS guided biopsy
d. Antibiotics and admit

INFERTILITY

65. Semen analysis of a young man who presented with primary infertility revealed low volume, fructose negative ejaculate with azoospermia. Which of the following is the most useful imaging modality to evaluate the cause of his infertility? *(All India 2003)*
a. Colour duplex ultrasonography of the scrotum
b. Transrectal ultrasonography
c. Retrograde urethrography
d. Spermatic venography

66. Absence of fructose in semen indicates: *(PGI Dec 2008)*
a. Obstruction to seminal vesicles
b. Obstruction at prostatic urethra
c. Vas deferens obstruction
d. Testicular failure

67. A 25-years old married male presents with infertility. He had undergone retroperitoneal lymph node dissection at age of 15 years for embryonal carcinoma of right testis. Semen analysis shows-quantity-0.5 ml, no. sperm, no fructose. Biopsy of testis shows normal spermatogenesis. Best treatment here would be: *(All India 99)*
a. Artificial insemination of donor
b. Penile-prosthesis
c. Microtesticular aspiration and intracytoplasmic injection
d. None of the above

68. A 55-years old diabetic patient presented with impotence with history of failure to get erection after papaverine intracavernous injection. Color Doppler shows no abnormality of arteries but shows mild venous run-off. Treatment of choice: *(All India 99)*
a. Intracavernous injection of papaverine
b. Penile prosthetic implants
c. Vacuum constriction device
d. Psychotherapy

69. The most important in assessing fertility potential is: *(PGI 80, UPSC 89)*
a. Sperm count
b. Sperm motility
c. Sperm morphology
d. Quantity of ejaculated semen
e. None of the above

70. Which of the following is true about obstructive azoospermia? *(All India 2011)*
a. ↑ FSH and ↑ LH
b. Normal FSH and Normal LH
c. ↑ LH, Normal FSH
d. ↑ FSH, Normal LH

71. In a couple for treatment of infertility from the last four years, female partner is normal. Male partner has 0.8 ml semen volume per ejaculate on two repeated samples and absent fructose, with no sperms on examination under microscope. What is the next line of management? *(AIIMS Nov 2013)*
a. Per-rectal examination to check ejaculatory duct obstruction
b. Give antioxidants
c. Testicular biopsy
d. Transrectal ultrasound to detect duct obstruction

PROSTATE ANATOMY AND PHYSIOLOGY

72. Corpora amylaciae is seen in: *(Kerala 94)*
a. Thymus
b. Lymph node
c. Spleen
d. Prostate

73. Hot flush is not associated with: *(PGI Dec 2008)*
a. Medical castration
b. Surgical castration
c. Ketoconazole therapy
d. Androgen receptor blockade
e. Radical prostatectomy

74. Medical castration is effected by: *(Kerala 90)*
a. Deithylstilbesterol
b. LHRH analogues
c. Gossypol
d. Hanovan

75. Complimentary operation done at the time of prostatectomy is: *(UPSC 88)*
a. Vasectomy
b. Circumcision
c. Hernia repair
d. All of the above

76. Prostate calculi are usually composed of:
a. Calcium oxalate
b. Calcium phosphate
c. Struvite
d. Uric acid

EXPLANATIONS

BENIGN PROSTATIC HYPERPLASIA

1. **Ans. a. Periurethral transition zone** *(Ref: Smith 17/e p348-355; Campbell 10/e p2570-2694; Bailey 26/e p1341-1346, 25/e p1344-1350)*

Benign Prostatic Hyperplasia (BPH)

Incidence and Epidemiology

- **BPH** originates in the **transition zone**Q, **incidence** is **age related**Q
- The prevalence of BPH is **20%** in **41–50** years, **50%** in **51–60** years, **> 90%** older than **80** years.

Etiology

- Seems to be **multifactorial** and **endocrine controlled**Q.
- The prostate is composed of **stromal** and **epithelial elements**Q, and each, either alone or in combination, can give rise to **hyperplastic nodules**Q and symptoms associated with BPH.

Pathology

- **BPH** develops in the **transition zone**. It is truly a **hyperplastic process**Q.
- Nodular growth pattern is composed of varying amounts of **stroma** and **epithelium**.
- **Stroma** is composed of **collagen** and **smooth muscle**Q.

- **Alpha-blocker** therapy result in **excellent responses**Q in patients with BPH having significant component of **smooth muscle**, while those with BPH predominantly composed of **epithelium** might respond better to **5-alpha-reductase inhibitors**Q.
- **Effects starts early** with **alpha-blockers** whereas **effect starts after 1 month** and may **take 6 months for maximum effect** with **5-alpha-reductase inhibitors**Q**.**

- Patients with significant components of **collagen** in the stroma **may not respond** to **either form** of medical therapy.
- As **BPH nodules** in the transition zone enlarge, **compress** the outer zones of the prostate, resulting in the formation of a **surgical capsule** separating the transition zone from the peripheral zone, and serves as a **cleavage plane** for **open enucleation**Q of the prostate.

Pathophysiology

- **Prostatic size** on **DRE correlates poorly with symptoms** because the **median lobe** is **not** readily **palpable**Q**.**

- The **prostatic stroma**, composed of **smooth muscle** and **collagen**, is rich in **adrenergic nerve supply**. The level of autonomic stimulation thus sets a tone to the prostatic urethra. Use of **alpha-blocker therapy decreases this tone**, resulting in a decrease in outlet resistanceQ.
- The **irritative voiding complaints** of BPH result from the **secondary response** of **bladder** to the **increased outlet resistance**Q.

- Bladder outlet obstruction leads to **detrusor muscle hypertrophy, hyperplasia** and **collagen deposition**Q (collagen deposition is most likely responsible for a decrease in bladder compliance).

Symptoms

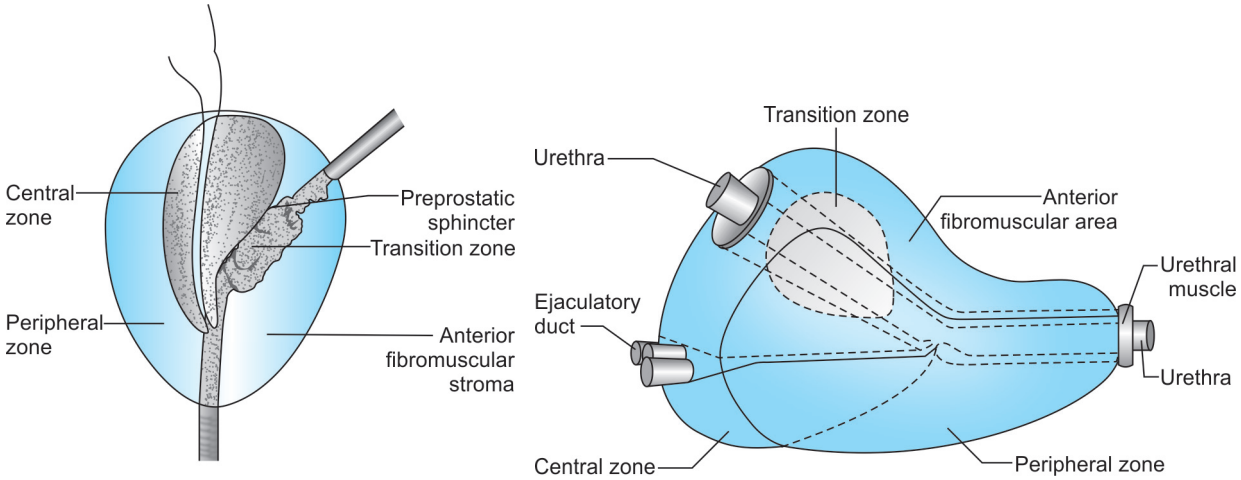
- **Obstructive symptoms** include **hesitancy, decreased force** and caliber of stream, sensation of incomplete bladder emptying, **double voiding** (urinating a second time within 2 hours of the previous void), **straining to urinate** and **post-void dribbling**Q.
- **Irritative symptoms** include **frequency, urgency and nocturia** (**FUN**) Q
- **IPSS symptom score**: score can range from 0–35. **Mild: 0–7**, **moderate: 8–19**, **severe: 20–35**.

Signs

- The **size and consistency** of the prostate is noted.
- BPH usually results in a **smooth, firm, elastic enlargement** of the prostate.
- **Induration** is suggestive of **cancer** and the need for further evaluation (**PSA, TRUS and biopsy**)Q.

Imaging

- **IVP or ultrasound** is recommended only in the **presence of concomitant urinary tract disease** or **complications** from BPH (hematuria, urinary tract infection, renal insufficiency, history of stone disease).
- **Uroflowmetry**: (**Qmax >15 ml/sec** is **normal**, 10–15 ml/sec is equivocal and **< 10 ml/sec** is suggestive of **obstruction**)Q
- **Cystometrograms** and **urodynamic profiles** are reserved to differentiate outflow obstruction from neurogenic bladder (**voiding pressure > 80 cm H_2O** signifies **outlet obstruction**)Q



Anatomy of the prostate gland

2. **Ans. c. Median**
3. **Ans. a. Frequency**
4. **Ans. a. Bilateral hydroureteronephrosis, c. Recurrent urinary tract infection** *(Ref: Campbell 10/e p2605-2608; Bailey 26/e p1346, 25/e p1350)*

Absolute indications for surgery in BPH
1. **Refractory urinary retention**[Q] (failing at least one attempt at catheter removal)
2. **Recurrent UTI**[Q]
3. **Recurrent gross hematuria**[Q]
4. Bladder **stones**[Q] **(BS)**
5. **Renal insufficiency**[Q]
6. Minimal improvement on medical treatment[Q]

5. **Ans. c. Ho: YAG laser** *(Ref: Smith 17/e p354-355; Campbell 10/e p2655-2694; Bailey 26/e p1350, 25/e p1353)*

Minimally Invasive Therapy in BPH	
1. **Laser therapy**: Two main energy sources of lasers have been utilized- **holmium:YAG (best)**[Q], **Nd:YAG**.	4. Transurethral needle ablation
2. Transurethral electrovaporization	5. High intensity focused ultrasound
3. Hyperthermia	6. Intraurethral stents

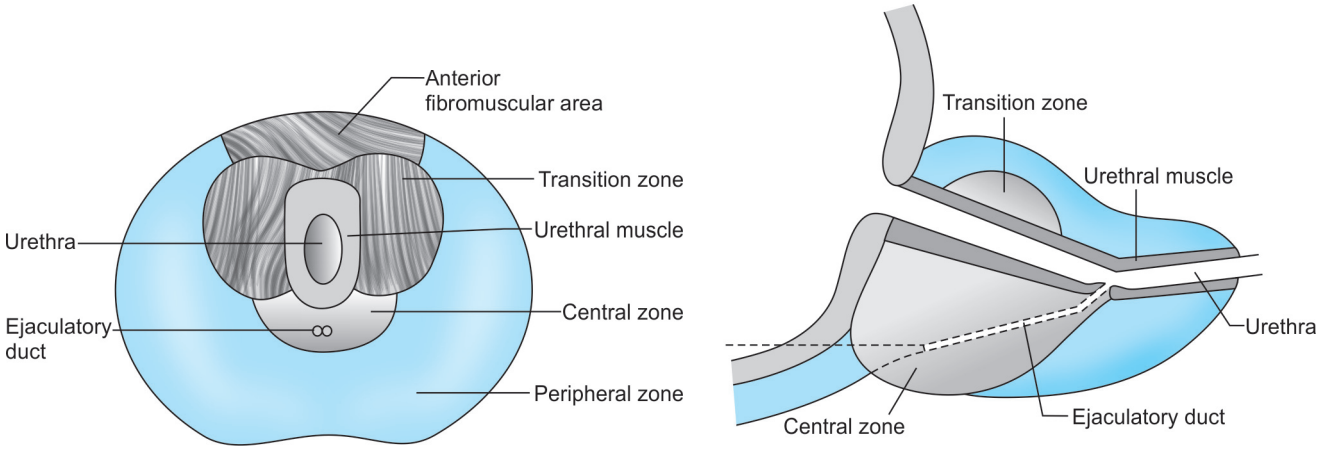
6. **Ans. b. Terazocin** *(Ref: Smith 17/e p352-353; Campbell 10/e p2622-2633; Bailey 26/e p1347, 25/e p1350)*

Medical Therapy in BPH

- **Alpha-blockers:** (Prazosin, terazosin, doxazosin, tamsulosin, alfuzosin)
  - **Relaxes smooth muscle** and **decreases urethral resistance**[Q].
  - **Side effects**: orthostatic hypotension, dizziness, tiredness, retrograde ejaculation, rhinitis and headache[Q].
- **5-Alpha-reductase inhibitors:** (Finasteride, dutasteride, triptorelin pamoate)
  - **Blocks** the conversion of **testosterone** to **dihydrotestosterone**, affecting the **epithelial component**[Q] of the prostate, resulting in a **reduction in the size of gland**[Q] and improvement in symptoms.

    > - **Six months of therapy** are **required** to see the **maximum effects** on prostate size (**20% reduction**)[Q] and symptomatic improvement. However, **symptomatic improvement** is seen **only in** men with **enlarged prostates (> 40 cm**^{3}**)**[Q].

  - **Side effects**: decreased libido, decreased ejaculate volume and impotence[Q].
- **Combination therapy**
  - The **reduction in risk** associated with **combination therapy** (66% risk reduction is **greater than** that associated with **doxazosin or finasteride alone**[Q].
  - Patients most likely to benefit from combination therapy: whom **baseline risk of progression** is **very high**, generally patients with **larger glands** and **higher PSA values**[Q].



7. **Ans. c. It blocks the conversion of dihydrotestosterone to testosterone**

8. **Ans. d. Enlarged prostate**

9. **Ans. b. Transurethral resection** *(Ref: Smith 17/e p354-355; Campbell 10/e p2605-2608; Bailey 26/e p1346-1350, 25/e p1350-1353)*

Treatment of BPH

- **MC indication** for surgery is **symptoms interfering** with **quality of life**[Q] (bothersome symptoms and symptoms of BOO).

Conventional Surgical Therapy

- TURP (Gold standard)[Q]:
  - Cystoscopic removal of strips of prostatic tissue using diathermy loop
  - **Best irrigant fluid** is **1.5% glycine**[Q] (**Electrolyte solutions** like **NaCl** are **not compatible** with **electrocautery**, so **not used**).
  - **Glycine** is composed of **glycolic acid** and **ammonium,** which can **cause CNS (visual) toxicity.**[Q]

TURIS: TUR in saline using bipolar cautery[Q]
• **Verumontanum** is the single most important anatomical **landmark** in **TURP**[Q]. • **Verumontanum** lies immediately **proximal to external sphincter** and serve as the **distal landmark for prostate resection** to prevent injury to the external sphincter. • **Verumontanum: Distal landmark** for **prostate resection**[Q]. • **Verumontanum**: Landmark for **proximal limit** of **external sphincter**[Q].

  - **Risks of TURP**: **Retrograde ejaculation (75%)**[Q], **impotence** (5–10%)[Q] and **incontinence** (< 1%)[Q].
  - **Complications**: Bleeding, **urethral stricture** or **bladder neck contracture**[Q], perforation of the prostate capsule with extravasation, and if severe, TUR syndrome.

TUR syndrome (Dilutional hyponatremia or water intoxication)
• **TUR syndrome** (**Dilutional hyponatremia** or **water intoxication**)[Q] resulting from a hypervolemic, hyponatremic state due to **absorption of** the **hypotonic irrigating solution**. • **Clinical Features**: **Nausea, vomiting, confusion, hypertension, bradycardia,** and **visual disturbances**[Q]. • The risk increases with **resection times > 90 minutes** or **gland size > 75 gm**. • **Treatment** includes **diuresis** (furosemide) and in **severe cases**, **hypertonic saline** (3%) administration.

Late Complications of TURP
• **Bladder neck stenosis** (4%) **> Urethral stricture** (3.6%) • **Bladder neck stenosis is seen more often with small (< 30 gm) fibrotic prostates.**

- **Transurethral incision of the prostate (TUIP):**
  - For **posterior commissure hyperplasia** (elevated bladder neck), involves **two incisions** using the **Collins knife** at the **5- and 7-o'clock** positions.
  - The **incisions** are started **just distal** to the **ureteral orifices** and are **extended** outward **to** the **verumontanum**.

- **TUIP lowers** the **incidence** of **bladder neck contracture** when **compared to TURP,** so **TUIP** should be strongly **considered** in patients with **smaller gland** in place of TURP.
- **TUIP** is used for **smaller (20 gm) prostate, young patients.**
- **Decreased incidence** of **retrograde ejaculation** as compared to TURP.

- **Open simple prostatectomy: Glands > 75 gm**, concomitant bladder **diverticulum** or a bladder **stone** or if **dorsal lithotomy** positioning is **not possible**.
  - **Suprapubic prostatectomy**: Performed **transvesically (Frayer's)**[Q] and **operation of choice** in dealing with concomitant bladder pathology **(Bladder stones** or **diverticulum)**[Q].
  - **Retropubic prostatectomy (Millin's)**[Q]**:** Transverse incision is made in surgical capsule of prostate and enucleation is done.
  - **Perineal prostatectomy (Youngs)**[Q]**:** Abandoned now

- **Carcinoma prostate** originates in **peripheral zone** of prostate, so prostatectomy for **BPH confers no protection** for subsequent cancer[Q].

10. **Ans. d. Transrectal ultrasound scanning** *(Ref: Bailey 25/e p1349, 24/e p1375; Smith Urology 17/e p208-210)*

In prostatitis, DRE examination reveals **tender, enlarged glands** that are **irregular** and **warm. PSA** levels are often **elevated. TRUS** is only **indicated in** patients who **do not respond to conventional therapy.**

Let us Consider Every Option

- **In prostatitis, DRE** examination reveals **tender, enlarged glands** that are **irregular** and **warm**[Q]**.**
- **PSA** levels are often **elevated**[Q]**.**
- **TRUS** is only **indicated in** patients who **do not respond to conventional therapy**[Q]**.**

11. **Ans. d. Bilateral hydronephrosis**
12. **Ans. a. Bilateral hydroureteronephrosis, c. Recurrent urinary tract infection**
13. **Ans. b. Tamsulosin**
14. **Ans. d. 6 months**

TURP AND COMPLICATIONS

15. **Ans. c. Systematic prostate biopsy in suspected prostate cancer** *(Ref: Rumack's Diagnostic Ultrasound 3/e p411)*

Uses of TRUS in CA prostate
• To guide biopsy
• To guide therapy

16. **Ans. b. Retrograde ejaculation** *(Ref: Smith 17/e p354-355; Campbell 10/e p2605-2608; Bailey 26/e p1346-1350, 25/e p1350-1353)*
17. **Ans. d. Water retention**
18. **Ans. d. Bladder neck stenosis**
19. **Ans. a. External urethral sphincter**

- **Verumontanum** is the single most important anatomical **landmark** in **TURP**[Q].
- **Verumontanum** lies immediately **proximal to external sphincter** and serve as the **distal landmark for prostate resection** to prevent injury to the external sphincter.
- **Verumontanum: Distal landmark** for **prostate resection**[Q].
- **Verumontanum**: Landmark for **proximal limit** of **external sphincter**[Q].

20. **Ans. a. Electrolyte imbalance**
21. **Ans. c. Hyponatremia**
22. **Ans. b. Perforation of bladder** *(Ref: Bailey 26/e p1349, 25/e p1352)*

Complications of TURP

- **Perforation of the bladder** or the **prostatic capsule** can occur at the time of transurethral surgery.
- This usually occurs from a **combination of inexperience** in association with a **large prostate** or **heavy blood loss**.
- A **large perforation with marked extravasation** may require the **insertion of a small suprapubic drain.**
- If not detected, it may **present postoperatively** after the effect of spinal anesthesia, as **suprapubic pain**.

23. **Ans. a. Normal saline**
24. **Ans. d. Water intoxication**
25. **Ans. d. Hypernatremia**
26. **Ans. a. Hyponatremia**
27. **Ans. c. 1, 2 and 4**
28. **Ans. a. 1.5% glycine**

CARCINOMA PROSTATE

29. Ans. a. Peripheral zone *(Ref: Smith 17/e p355-169; Campbell 10/e p2715-2740; Bailey 26/e p1351-1356, 25/e p1354-1357)*

Prostate Cancer

- **MC cancer** of **males, MC** cause of **bone secondaries**[Q]
- **African-American men** have highest incidence, **less common in Asians**[Q]
- **Best screening protocol** for CA prostate: **PSA + DRE**[Q]

Risk Factors

- **Advancing age** and **increased fat intake**[Q] increase the risk
- **Lycopene, Vitamin A** and **E** and **selenium** decrease the risk[Q]
- **MC genetic alteration** in CA prostate is **hypermethylation of glutathione transferase (GSTP-1)**[Q] gene promoter located on **chromosome 11**[Q]**.**

Pathology

- **MC type** is **adenocarcinoma**[Q] >TCC
- Prostatic adenocarcinoma are often **multifocal** and **heterogenous**[Q]
- It is often accompanied by premalignant lesion PIN (prostatic intraepithelial neoplasia)

> - **Neoplastic glands** are **smaller, more crowded** and **lack branching** and **papillary infoldings.**
> - **Diagnosis** of **CA prostate** based on **absence of basal cell layer**[Q]**.**

- **Basal cell layer** is present in **normal glands, BPH glands** and the **precursor lesions** of **CA prostate**[Q]**.**
- **Site:** Peripheral zone- **75%**[Q]**,** Transition zone- **15%**, Central zone- **10%**

Spread

- Spread occurs by direct local invasion and through hematogenous and lymphatics
- **Local invasion** most commonly involves **seminal vesicles** and **base of bladder**[Q]

> - **Hematogenous spread** occurs mostly to **bone** (**axial skeleton** is **MC site** with **lumbar spine**[Q] being most frequently implicated) forming **osteoblastic secondaries**[Q]
> - **Visceral metastasis** most commonly involve **lungs**[Q] > liver > adrenal glands
> - **Lymphatic metastasis** are most often identified in **obturator nodes**[Q]

- **CNS involvement** is usually a result of **direct extension** from **skull metastasis**[Q]

Clinical Features

- Most patients with **early-stage** CA prostate are **asymptomatic**, being **peripheral**[Q].
- Presence of **symptoms** suggest **locally advanced** or **metastatic disease**
- **DRE: Hard, irregular, nodular** prostate with **median sulcus obliteration**[Q]

Laboratory Findings

- **Azotemia** (bilateral ureteral obstruction), **anemia** in metastatic disease, **raised ALP** in bony metastasis
- **PSA velocity >0.75** ng/ml/yr indicates carcinoma[Q]

Prostate Biopsy

- **TRUS guided biopsy** is done in patients with **abnormal DRE** or **elevated PSA** or **both**[Q]**.**
- **Differentiation of tumor** is graded by **Gleason score**[Q]**.** A sum of **7** or more suggests an aggressive cancer.

Imaging

- **TRUS** is used for **staging**, most lesions are **hypoechoic**[Q]**.**

Endorectal MRI in CA Prostate
• **Most optimal imaging** to appreciate the **prostate anatomy**[Q]
• Prostate cancer is associated with **lower levels of citrate** and **higher levels of choline** and **creatine**[Q] compared to BPH or normal tissues.
• The combined information provided by **MRI and MR spectroscopy** (for detection of citrate) may allow for a **more accurate assessment** of cancer **location** and **stage**[QQ]

Axial imaging in CA Prostate
• **CT scan** is mainly used to detect **LN metastasis**
• Intravenous administration of **superparamagnetic nanoparticles**, which gain access to lymph nodes by means of interstitial-lymphatic fluid transport, at the time of high resolution MRI, appears to **improve visualization** of **small nodal metastasis**[Q]

Bone Scan

- Patients with **PSA ≥ 15 ng/ml** or greater, **locally advanced disease (T3b, T4)** are at **higher risk** for **bone metastasis**, and should be considered for bone scan[Q].

30. **Ans. b. Peripheral zone**

31. **Ans. c. Internal vertebral plexus of veins**

32. **Ans. a. Serum acid phosphatase** *(Ref: Smith 17/e p360-361; Campbell 10/e p2748-2762; Bailey 26/e p1353, 25/e p1344)*

Tumor Markers of CA prostate (apart from PSA)

- Prostatic acid phosphatase:
  - PAP activity is **1000 fold greater** in the **prostate**[Q] than any other tissue
  - PAP is **not prostate specific**[Q] and detectable levels are noted after prostatectomy
  - **Increased in renal, liver** and **bony malignancies**[Q]
- Alkaline phosphatase:
  - **Raised** in **liver involvement** or **bony metastasis**[Q]
- **Alpha-methyl co-A racemase**[Q]
- **Hepsin**[Q]
- **DD3**[Q]

33. **Ans. d. PSA** *(Ref: Smith 17/e p360-361; Campbell 10/e p2764-2765; Bailey 25/e p1344)*

Prostate Specific Antigen (PSA)

- It is a **glycoprotein**, serine protease[Q].
- **Free**: **10–40%**[Q]**; Complexed** to antiprotease: **60–90%**[Q]
- **Formed in prostate**[Q], secreted in seminal fluid
- Causes **liquefaction** of **seminal coagulum**[Q]
  - **Normal value: ≤ 4 ng/ml**[Q] (in > 50 years); Value **> 20 ng/ml** is **diagnostic of CA prostate**[Q]
  - **PSA** is the single test with **highest positive predictive value** for **CA prostate**[Q].
  - **PSA** is **prostate specific**, **not** the **cancer specific**[Q]
  - **Level of PSA** is directly related to **tumor burden**[Q]
- Its use without DRE is not recommended as 25% of men with CA prostate have PSA levels <4 ng/ml.
- **Best use of PSA** is **monitoring** after **radical prostatectomy**[Q]

PSA related Investigations		
PSA Density	**PSA Velocity**	**Free PSA**
• **PSA/Prostate volume** • If **≥ 0.15**, **biopsy**[Q] recommended	• **Rate of change** of **PSA** per year[Q] • **≥ 0.75 ng/ml/year** indicates **carcinoma**[Q] • Assessment at every 18 months	• **Free PSA** (in %) appears to be **most useful** in **distinguishing** between those with and without **CA prostate** when total **PSA levels** fall in the range of **4–10 ng/ml**[Q]

Prostate Specific Antigen (PSA)	
Increased PSA	**Decreased PSA**
• **CA prostate**[Q], **BPH**[Q] • Acute **prostatitis**, Chronic prostatitis[Q] • Prostatic **abscess**[Q] • **Catheterization, Cystoscopy**[Q] • Prostatic **biopsy**[Q] (TRUS) • **DRE**[Q], Sexual intercourse	• **Castration**[Q] • **Anti-androgen therapy**[Q] • **Radiotherapy** or **chemotherapy**[Q] for CA prostate • **Radical prostatectomy**[Q]

34. **Ans. b. Prostate specific antigen**

35. **Ans. a. DRE, d. PSA**

36. **Ans. b. MRI, c. CT scan, d. DSA**

37. **Ans. c. DRE+ PSA**

38. **Ans. a. Taking guided biopsy**

39. **Ans. a. Obturator nodes**

40. **Ans. a. Because valveless communication exist with Batson's periprostatic plexus**

Most Common Lymph Nodes Involved	
CA Penis	**Inguinal** LN[Q]
CA Testis	On **right: Inter-aortocaval**[Q] LN On **left: Paraaortic**[Q] LN
CA Bladder	**Obturator**[Q] LN
CA Prostate	**Obturator**[Q] LN

41. **Ans. a. Bone**

42. **Ans. c. Acid phosphatase**

43. **Ans. b. Prostate specific antigen**
44. **Ans. a. < 4 ng/ml**
45. **Ans. a. Prostate cancer**
46. **Ans. a. Digital screening along with PSA is additive**
47. **Ans. c. Obturator nodes are most commonly involved**
48. **Ans. b. Scores range from 1–10** *(Ref: Smith 17/e p357-358; Bailey 26/e p132)*

Gleason score ranges from 2 to 10.

GLEASON SCORE AND GRADING SYSTEM

- **Gleason score** is the **MC used histological grading system** for **prostate cancer**[Q].
- The **two most predominant histological patterns** of the prostate cancer are assigned a **Gleason grade** ranging from **1–5**[Q].
  - **Primary grade** is assigned to the **pattern of cancer** that is **most commonly observed** in the histological slides of the specimen[Q].
  - **Secondary grade** is assigned to the **second most commonly observed pattern** in the specimen.
  - **Gleason score** is the **sum of the two grades**. Thus it is also known as **Gleason sum**[Q].
- If the entire specimen has only one pattern present, then both the primary and secondary grades are reported as the same grade.
  - The **Gleason grade** ranges from **1 to 5**, with **5** having the **worst prognosis**[Q].
  - The **Gleason score** ranges from **2 to 10**[Q].
- The **Gleason score** is used to help **evaluate the prognosis** of men with prostate cancer. Together with other parameters, the Gleason score is incorporated into a strategy of prostate cancer staging which predicts prognosis and help guide therapy.
  - A point of importance is that the **primary Gleason grade** is **most important**[Q] with respect to placing patients in prognostic groups.
  - For example in patients with a **Gleason score 7**, a Gleason **4+3** is a **more aggressive cancer** than a **Gleason 3+4.**

49. **Ans. b. Prostate** *(Ref: Harrison 18/e p820-821; Devita 9/e p2512-2513; CSDT 12th/1202)*

Osteoblastic metastasis commonly arises from carcinoma prostate.

- **MC site of primary** for **bone metastasis**: **CA Prostate**[Q]
- **MC cause** of **osteoblastic secondaries** in **males**: **CA Prostate**[Q]
- **MC cause** of **osteoblastic secondaries** in **females**: **CA Breast**[Q]
- **MC tumor metastasize to bone** in **females: CA Breast**[Q]

50. **Ans. b. Prostate specific antigen**
51. **Ans. c. Systematic prostate biopsy in suspected prostate cancer**
52. **Ans. a. GnRH analogue** *(Ref: Smith 17/e p367-369)*

- **In metastatic CA prostate, Androgen ablation** (Hormone therapy) is **first line of treatment**: **Orchiectomy + Flutamide** or **LHRH + Flutamide**[Q].
- **Leuprolide** and **goserelin** are **GnRH analogs,** which are **used primarily** for the treatment of **hormone-responsive prostate cancer**[Q].

CARCINOMA PROSTATE TREATMENT

53. **Ans. b. Progesterone** *(Ref: Smith 17/e p366-369; Campbell 10/e p2767-2770, p2883-2916; Bailey 26/e p1352-1356, 25/e p1357-1359)*

<table>
<tr><th colspan="2">7th AJCC (2010) TNM Staging for CA Prostate</th></tr>
<tr><th>T: Primary tumor</th><th>N: Regional lymph nodes</th></tr>
<tr><td>Tis: Carcinoma in situ (PIN)</td><td>N0:No regional LN metastasis</td></tr>
<tr><td rowspan="2">T1a: ≤5% of tissue in resection for benign disease has cancer, normal DRE
T1b: >5% of tissue in resection for benign disease has cancer, normal DRE
T1c: Tumor identified by needle biopsy (e.g. because of elevated PSA)</td><td>N1: Metastasis in a regional LNs (obturator, internal iliac, external iliac, presacral LNs)</td></tr>
<tr><td>M: Distant metastases</td></tr>
<tr><td>T2a: Tumor involves one half of one lobe but not both lobes
T2b: Tumor involves more than one half of one lobe or less
T2c: Tumor involves both lobes</td><td>M1a: Distant metastasis in non-regional lymph nodes
M1b: Distant metastasis to bone
M1c: Distant metastasis to other sites</td></tr>
</table>

T3a: Extracapsular extension on one or both sides **T3b: Seminal vesicle** involvement	
T4: Tumor directly extends into **bladder neck, sphincter, rectum, levator muscles, or into pelvic sidewall**	

Treatment of CA Prostate	
T1a	• **Incidentally found tumors** at TURP, by definition **low volume (≤5%),** usually **well differentiated** associated with **very slow growth rate**[Q]. • Managed by **watchful waiting** (Regular follow up with **DRE and PSA**)[Q]
T1b, T1c and T2	• Management depends on patient's age, life expectancy, performance status and patient's preference. • In **younger, fitter men (<70 years): Radical prostatectomy**[Q] or **radiotherapy**[Q], if surgery is contraindicated • **Elderly (>70 years)** with **life expectancy <10 years**: **Watchful waiting**[Q] (**Progress rate** is **very slow**, 10% at 10 years)
Advanced disease (T3, T4 or any metastasis)	• Palliative treatment, androgen ablation or palliative radiotherapy • **Androgen ablation** (Hormone therapy) is **first line of treatment**: **Orchiectomy + Flutamide** or **LHRH + Flutamide**[Q] • **Palliative radiotherapy**[Q]

New Drugs in metastatic, castration resistant CA Prostate
• **Cabazitaxel** and **Sipuleucel-T**[Q]

54. Ans. d. No further treatment

55. Ans. c. Conservative treatment

56. Ans. a. Dorsal venous complex

57. Ans. d. Hormonal manipulation

58. Ans. d. Radical prostatectomy

59. Ans. c. Prostate specific antigen only *(Ref: Smith 17/e p355-169; Campbell 10/e p2715-2740; Bailey 25/e p1354-1357; Harrison 18/e p801)*

Cancer control (in CA Prostate) after radiotherapy has been defined by various criterias including: *(Ref: Harrison 18/e p801)*

- A decline in PSA to less than 0.5 or 1 ng/ml
- **"Non-rising" PSA values**
- **Negative biopsy** of the prostate 2 years after completion of the treatment

The current standard definition of biochemical failure (the Phoenix definition) is a rise in PSA by ≥ 2 ng/ml higher than the lowest PSA achieved

60. Ans. c. GnRH analogs

61. Ans. a. Goserelin *(Ref: Katzung12/e p972; Goodman and Gilman 12/e p1763-1764; Smith 17/e p366-369; Campbell 10/e p2767-2770, 2883-2916; Bailey 26/e p1352-1356, 25/e p1357-1359)*

Goserelin is useful for the treatment of advanced prostate cancer.

- "Localized prostate cancer *is frequently curable with* surgery or radiation therapy. *However, when* distant metastases *are present,* hormone therapy is the primary treatment. *Standard approaches either* reduce the concentration of endogenous androgens *or* inhibit their effects. Androgen deprivation therapy (ADT) is the standard first-line treatment. *ADT is accomplished via* surgical castration *(bilateral orchiectomy) or* medical castration *(using* GnRH agonists or antagonists*).* Leuprolide and goserelin *have been compared with orchiectomy in randomized trails and found* equivalent in overall survival, progression-related outcomes *and* time to treatment failure. *The* theoretical advantage is that the GnRH agonist (Leuprolide and Goserelin) will deplete testicular androgens, *while the anti-androgen component will complete at the receptor site with residual androgens made by the adrenal glands.* GnRH antagonists (Abarelix, degarelix*) have been developed to suppress testosterone while avoiding the flare phenomenon of GnRH agonists.* Other than avoidance of the initial flare, GnRH antagonist therapy offers no apparent advantage compared with GnRH agonists."- *Goodman and Gilman 12/e pp1763-1764*

- "The treatment of choice for patients with advanced prostate cancer is elimination of testosterone production by the testes through either surgical or chemical castration. Bilateral orchiectomy or estrogen therapy in the form of diethylstibestrol was previously used as first-line therapy. Presently, the use of GnRH agonists-including leuprolide and goserelin, alone or in combination with anti-androgen (e.g. e.g. flutamide, bicalutamide or nilutamide) is the preferred approach."- *Katzung12/e p972*

62. Ans. b. Perineal prostatectomy (Young) is a commonly done surgical procedure

PROSTATITIS

63. Ans. c. Seminal vesiculitis *(Ref: Smith 17/e p208-209; Campbell 10/e p333-337; Bailey 26/e p1357, 25/e p1359)*

Acute Bacterial Prostatitis

- Acute inflammation of prostate associated with UTI
- Caused by **ascending urethral infection** or **reflux** of **infected urine**[Q] into prostatic ducts
- MC organism: **E. coli**[Q]
- Patients present with sudden onset **high grade fever** with **chills** and **rigors**, severe **irritative symptoms** and **enlarged, tender** and **boggy prostate**[Q]
- **Catheterization** and **prostatic massage** is **contraindicated**[Q]
- MC used antibiotics are: **TMP-SMX** and **Ciprofloxacin** (Both are having better **concentration in prostatic tissue**) [Q]
- Around **4-6 weeks**[Q] of antibiotic therapy is used to avert chronic bacterial prostatitis.

Chronic Bacterial Prostatitis *(Ref: Smith 17/e p209; Campbell 10/e p333-337; Bailey 26/e p1357, 25/e p1360)*

- Due to **persistent bacterial infection**[Q] of prostate
- **Insidious** in onset, characterized by **relapsing or recurrent UTI**[Q] caused by persistence of pathogen in prostatic fluid despite of antibiotic therapy
- **Diagnosis** is made by **microscopic examination** and **culture** of prostatic expressate and culture of urine obtained before and after prostatic massage[Q].
- **Treated** by **chronic antibiotic suppression (3–4 months)** [Q]

Prostatic Abscess *(Ref: Smith 17/e p210; Bailey 26/e p1357, 25/e p1359)*

- Most cases result from **complications** of **acute bacterial prostatitis**[Q]
- **Fluctuation** is a **very late sign**[Q]
- **Predisposing factors**: **Diabetes, renal insufficiency, immunosuppression, urethral instrumentation, chronic indwelling catheter**[Q]
- **Diagnosis**: **TRUS** or **pelvic CT scan** is crucial for diagnosis and treatment
- Treated by **transurethral drainage** and **antibiotics**[Q]

64. Ans. d. Antibiotics and admit *(Ref: Smith 17/e p208-209; Campbell 10/e p333-337; Bailey 25/e p1359)*

A 60 years old male** presented with **fever, chills and dysuria.** Patient was hospitalized in emergency for 5 days. **PSA level** was **7.4.** This patient is most probably suffering from **acute bacterial prostatitis** and **treated by antibiotics.

INFERTILITY

65. Ans. b. Transrectal ultrasonography *(Ref: Smith 17/e p691-699)*

- **Sperms** are produced in **seminiferous tubules** and then **stored** and **matured within** the **epididymis**[Q].
- **Vas deferens carries** the **sperms** from epididymis **to the urethra** where they open by separate openings into prostatic urethra[Q].
- **Just before opening**, each vas deferens is **joined by ducts of seminal vesicles**[Q].
- **Vas deferens** and **seminal vesicle ducts** join to **form** the **ejaculatory duct**[Q].

Semen Analysis

- **Fresh semen** is a coagulum that **liquefies 15-30 minutes** after ejaculation[Q].
- **Ejaculate volume** should be at least **1.5 mL**[Q], as smaller volumes may not sufficiently buffer against vaginal acidity.
- **Sperm concentration** should be **> 20 million sperm/mL**[Q].
- **Sperm motility** and **sperm cytology** or **morphology**[Q] is another measure of semen quality.
- **Sperm morphology** is a **sensitive indicator** of **overall testicular health**[Q], because these characteristics are determined during spermatogenesis.

Abnormalities

- **Low ejaculate volume** may indicate:
  - **Retrograde ejaculation**[Q]
  - **Incomplete collection**[Q]
  - **Ejaculatory duct obstruction**[Q]
  - **Androgen deficiency**[Q]
- Azoospermia:
  - **Testicular failure**[Q]
  - **Obstruction** of **vas deferens**[Q]
- Absence of fructose:
  - **Seminal vesicle agenesis** or **obstruction**[Q]

Semen Analysis-Minimal Standards of Adequacy
Ejaculate volume: **1.5–5.5 mL**[Q]
Sperm concentration: **>20 × 10^6** sperm/mL[Q]
Motility: >50%[Q]
Forward progression: 2 (scale 1–4)[Q]
Morphology: >30% WHO normal forms **(> 4% Kruger** normal forms)
No agglutination (clumping), **white cells**, or **increased viscosity**[Q].

Transrectal Ultrasound
• High-frequency (5–7) mHz **transrectal ultrasound** (TRUS) offers **superb imaging** of the **prostate, seminal vesicles,** and **ejaculatory ducts**[Q]. • Due to both accuracy and convenience, **TRUS** has **replaced surgical vasography** in the **diagnosis of obstructive lesions** that **cause infertility**[Q].

66. Ans. a. Obstruction to seminal vesicles *(Ref: Smith 17/e p691-699)*

- **Absence of fructose** in the semen indicates **seminal vesicle agenesis** or **obstruction of its duct** or the **ejaculatory duct**[Q].

67. Ans. c. Microtesticular aspiration and intracytoplasmic injection *(Ref: Smith 17/e p710-711)*

Sperm Aspiration

- **Sperm aspiration techniques** are indicated for men in whom the **transport of sperm is not possible** because the **ductal system is absent** or **surgically unreconstructable**[Q].
- An example of this is **vasal agenesis**. **Acquired forms of obstruction** may also exist, the most common of which is **failed vasectomy reversal**[Q].
- **Aspiration procedures** can involve **microsurgery** to **collect sperm** from the sperm reservoirs within the genital tract[Q].
- At present, **sperm** are routinely **aspirated from** the **vas deferens, epididymis**, or **testicle**[Q].

- In cases of **sperm aspiration** from the **testicle** and **epididymis**, **IVF along with intracytoplasmic sperm injection (ICSI)** is required[Q].
- An **obvious prerequisite** for these procedures is **ongoing sperm production**[Q].
- Although **evaluated indirectly** by **hormone levels** and **testis volume**, the **most direct way to verify sperm production** is with a **testis biopsy**[Q].

Vasal Aspiration	Epididymal Aspiration	Testis Sperm Retrieval
• Vasal aspiration provides the **most mature** or **fertilizable sperm**[Q], as they have **already passed** through the **epididymis**[Q], where **sperm maturation is completed.**	• Epididymal sperm aspiration is performed when the **vas is not present** or is **scarred** and **unusable**[Q]. • **Epididymal sperm** are **not as mature as vasal sperm**[Q]; as a consequence, **epididymal sperm require ICSI to fertilize the egg**[Q].	• The **most recently developed aspiration technique**[Q] • Indicated for patients in whom there is an **unreconstructable blockage** in the **epididymis,** or in cases of **severe testis failure**[Q], in which so few sperm are produced that they cannot reach the ejaculate.

68. Ans. c. Vacuum constriction device *(Ref: Campbell 10/e p746)*

Vacuum Erection Device Therapy

- In **patients who do not respond** to or **decline oral** or **local vasoactive pharmacotherapeutic options**[Q], vacuum erection device therapy may be alternatively explored.

- The **principle** of **vacuum erection device therapy** is to **mechanically create negative pressure surrounding** the **penis** in order to **engorge it with blood** and then **restrain blood egress from** the **organ** to **maintain** the **erection-like effect**[Q].

- **Efficacy rates** in achieving **satisfactory erections** of **67–90%,** but **satisfaction rates** with the device are lower, ranging from **34–68%.**
- The device is **more acceptable to older men** in a **steady relationship** compared with young, single men.

- **Success is limited** in patients with **severe vascular abnormalities** such as **proximal venous leakage** or **arterial insufficiency** or **fibrosis secondary to priapism** or **prosthesis infection**[Q].

- Further, it **may offer** a **means to preserve the elasticity of penile tissues** after **priapism** or **penile prosthesis explantation** or **after surgical correction of Peyronie's disease**[Q].
- It has been suggested to **facilitate erection recovery after treatments for prostate cancer**[Q]

69. **Ans. b. Sperm motility**

70. **Ans. b. Normal FSH and normal LH** *(Ref: Shaw's 13/e p203; Oxford textbook of Medicine 4/e p283)*

Obstructive azoospermia is associated with **normal levels** of **FSH** and **LH.**

Azoospermia		
Obstructive Azoospermia	**Hypogonadotrophic Azoospermia**	**Hypergonadotrophic Azoospermia**
Azoospermia due to obstruction: • **Normal FSH** and **LH**Q • **Normal testosterone**Q • **Testicular volume** is usually **normal**Q	Azoospermia due to **hypothalamic** or **pituitary failure:** • **Low FSH** and **LH**Q • **Low testosterone**Q • **Testicular volume** is usually **reduced**Q	Azoospermia due to **testicular (end organ) failure:** • **Persistently elevated FSH**Q • **Testicular volume** is usually **reduced**Q

71. **Ans. d. Transrectal ultrasound to detect duct obstruction** *(Ref: Smith 17/e p691-699)*

Absent fructose with no sperms in ejaculate** is suggestive of **obstruction of vas deferens** with **seminal vesicle agenesis or obstruction. Next line of management** in this patient would be **transrectal ultrasound to detect duct obstruction.

*"High-frequency (5-7) mHz **transrectal ultrasound** (TRUS) offers **superb imaging** of the **prostate, seminal vesicles,** and **ejaculatory ducts**Q. Due to both accuracy and convenience, **TRUS** has **replaced surgical vasography** in the **diagnosis of obstructive lesions** that **cause infertility**Q."*

PROSTATE ANATOMY AND PHYSIOLOGY

72. **Ans. d. Prostate** *(Ref: Smith 17/e p273-274; Campbell 10/e p2527-2528; Bailey 25/e p1353)*

73. **Ans. b. Surgical castration, d. Androgen receptor blockade** *(Ref: Bailey 25/e p1358-1359; Campbell 10/e p2942-2943)*

Hot Flashes

- **Hot flashes** (also called **hot flushes**, **vasomotor symptoms**) have been recognized as a **side effect of androgen ablation** (**medical** or **surgical**) Q
- Described as a **subjective feeling** of **warmth** in the **upper torso** and **head** followed by **objective perspiration**
- Are among the **most common side effects of androgen ablation**Q, affecting between **50%** and **80%** of patients
- **Treatment** of hot flashes should be **reserved for** those who find them **bothersome**Q.
- **Drugs used** for treatment: **DES, oral progestogens, cyproterone acetate**, clonidine, sertraline, venlafaxineQ

74. **Ans. a. Diethylstilbestrol, b. LHRH analogues** *(Ref: Smith 17/e p368)*

Androgen Ablation Therapy for Prostate Cancer	
Level	**Agent**
Pituitary	• Diethylstilbestrol^Q • Goserelin^Q • Leuprolide^Q
Adrenal	• Ketoconazole^Q • Aminoglutethimide^Q
Testicle	• Orchiectomy^Q
Prostate cell	• **Bicalutamide**^Q • **Flutamide**^Q • **Nilutamide**^Q

75. **Ans. None**

76. **Ans. b. Calcium phosphate** *(Ref: Smith 17/e p273-274; Campbell 10/e p2527-2528; Bailey 25/e p1350-1351, 25/e p1353)*

Prostatic Calculi

- Thought to represent **calcified corpora amylacea**Q, which is composed of **calcium phosphate**Q
- Usually **phosphate**, seen on **TRUS** in **nearly all elderly males**Q
- Lie at the **periphery** of **transition zone**
- Usually **asymptomatic** due to peripheral location, tend to **occur in clusters**Q
- **Calculi do not predispose** to **infections**Q
- But if **infections** occurs **in the presence of calculi**, it is almost **impossible to eradicate**Q the as the calculi may get infected and serve as a source of bacterial persistence and recurrent UTI.

CHAPTER 24

Urethra and Penis

MULTIPLE CHOICE QUESTIONS

HYPOSPADIAS

1. True about hypospadias: *(JIPMER 2011)*
a. Associated with chordee
b. 50% associated with undescended testis
c. Due to failure of fusion of posterior wall of urethra
d. Circumcision done immediately

2. True about hypospadias: *(PGI May 2010)*
a. Defect seen in ventral penis
b. Always associated with chordee
c. Associated with hooded prepuce
d. Circumcision should be avoided

3. Circumcision is contraindicated in: *(NEET 2013; WBPG 2012; GB Pant 2010)*
a. Paraphimosis
b. Meatal stenosis
c. Hypospadias
d. Phimosis

4. True about hypospadias is all except: *(MHPGMCET 2003)*
a. Sex determination is not possible
b. Prepuce is hooded
c. Incidence is 1 in 3000 male births
d. May not require surgical treatment

5. Most common congenital anomaly of urethra:
a. Hypospadias *(MHSSMCET 2008)*
b. Epispadias
c. Meatal stenosis
d. PU valve

6. Commonest hypospadias is: *(DNB 2011, 2001, AIIMS Dec 95)*
a. Penile
b. Glandular
c. Scrotal
d. A or C

7. All are true about hypospadias, except: *(AIIMS June 93)*
a. Circumcision in infancy is contraindicated
b. Avoid surgery till puberty
c. No treatment required in glandular variety
d. If associated chordee is present, 2 stage operation is done

8. The best time for surgery of hypospadias is: *(All India 2003)*
a. 1–4 months of age
b. 6–10 months of age
c. 12–18 months of age
d. 2–4 years of age

9. Features of hypospadias are all except:
a. Chordee *(WBPG 2014, All India 98)*
b. Hooded prepuce
c. No-treatment required with glandular variety
d. Cryptorchidism

10. In hypospadias all are seen except: *(PGI Dec 99)*
a. Hooded penis
b. Dorsal chordee
c. Spatulated glans
d. Meatal stenosis

11. True about hypospadias is all except: *(PGI June 2001)*
a. Bifid scrotum
b. Metal stenosis
c. Mental retardation
d. Spatulated glans
e. Dorsal chordee

12. True about hypospadias is: *(PGI June 2003)*
a. Metal stenosis
b. Dorsal hood
c. Proximal opening of meatus
d. Lateral curvature
e. Urethral stricture common

13. Which is not true of hypospadias? *(AIIMS 92)*
a. Chordee is reversed after 5 years
b. Glandular type needs no treatment
c. Circumcision should not be done
d. Surgical correction has good results in infancy

14. Penis is curved in downward direction in all types of hypospadias except: *(PGI 80, AIIMS 80)*
a. Glandular
b. Coronal
c. Penile
d. Perineal

15. In severe hypospadias the possibility of an intersex problem is settled by: *(AIIMS 81, AMU 87)*
a. Careful inspection of genitals
b. Biopsy for gonadal tissue
c. Karyotyping
d. Hormone assay

16. All of the following are seen in hypospadias except:
a. Ectopia vesicae *(All India 96)*
b. Hooded prepuce
c. Chordee
d. Infertility

17. Which of the following urethral anomaly is the most common? *(TN 99)*
a. Hypospadias
b. Pin hole meatus
c. Epispadias
d. Stricture urethra

18. Which of the following is true regarding hypospadias? *(APPG 2015)*
a. It is attributed to failure of complete urethral tubularisation in the fetus
b. Urethral opening is most commonly in the perineum
c. Urethra opens proximally and dorsally
d. It is seen in 1 in 1500 boys

EPISPADIAS

19. Epispadias is associated with: *(All India 2008)*
a. Bifid pubic symphysis
b. Chordee
c. Anal atresia
d. Intestinal obstruction

20. Epispadias in relation to hypospadias: *(PGI 81, UPSC 88)*
a. Is more common
b. Less common
c. Occurs with the same frequency
d. Is difficult to treat

POSTERIOR URETHRAL VALVE

21. All are true about posterior urethral valve except: *(GB PANT 2011)*
a. Most common in boys
b. Can be detected by prenatal USG
c. Early catheterization should be done
d. Diagnosed by early urethroscopy

22. A three years old boy presents with poor urinary stream. Most likely cause is: *(AIIMS June 2003)*
a. Stricture urethra
b. Neurogenic bladder
c. Urethral calculus
d. Posterior urethral valve

23. A male child with recurrent UTI with dribbling of urine most likely cause is: *(Punjab 2011)*
a. VUR
b. Posterior urethral valves
c. Stricture urethra
d. Neurogenic bladder

24. For posterior urethral valve- investigation of choice is: *(AIIMS June 97, PGI Dec 2002, Dec 2003, June 2003)*
a. Cyotoscopy
b. MCU
c. Cystourethroscopy
d. Retrograde urethroscopy

25. Posterior urethral valve are commonly observed in:
a. Boys
b. Girls
c. Adult males
d. Adult females

26. Most common uropathic obstruction in children is:
a. Stricture
b. Stones *(UPPG 2009)*
c. Posterior urethral valve
d. Anterior urethral valve

27. Most common location of posterior urethral valve: *(PGI SS 2004, MHPGMCET 2008)*
a. Proximal to verumontanum
b. Distal to verumontanum
c. At the level of verumontanum
d. At the bladder neck

28. Posterior urethral valve is usually seen:
a. Above verumontanum *(MHSSMCET 2005, 2006, 2008)*
b. Below verumontanum
C. At the level of bladder neck
d. At the level of verumontanum

PHIMOSIS

29. The recommended treatment for preputial adhesions producing ballooning of prepuce during micturition in a 2 years old boy is: *(AIIMS June 2003)*
a. Wait and watch policy
b. Circumcision
c. Dorsal slit
d. Preputial adhesions release and dilatation

30. A five-years old child presents with ballooning of prepuce after micturition. Examination of penis reveals prepucial adhesions. Which of the following the best treatment: *(All India 2011)*
a. Adhesiolysis and dilatation
b. Circumcision
c. Dorsal slit
d. Conservative management

PARAPHIMOSIS

31. Not true about paraphimosis is: *(AIIMS June 98)*
a. Iatrogenic
b. Seen in diabetes mellitus
c. Gangrene of glans
d. Circumcision is the treatment

32. About paraphimosis true is: *(PGI June 96)*
a. Catheter induced
b. Circumcision is treatment
c. Hyaluronidase injection
d. All of the above

CIRCUMCISION

33. Circumcision is done in a child in which of the following conditions: *(TN 91)*
a. Phimosis
b. Recurrent balanitis
c. Paraphimosis
d. All of the above

34. Indications of circumcision are all except: *(MHPGMCET 2002)*
a. Chronic balanoposthitis
b. Jew religion
c. Carcinoma penis
d. Paraphimosis

PRIAPISM

35. The Grayhack shunt is established between: *(All India 2010)*
a. Corpora cavernosa and corpora spongiosa
b. Corpora cavernosa and saphenous vein
c. Corpora cavernosa and dorsal vein
d. Corpora cavernosa and glans

36. Persistent priapism is rarely seen as a consequence of:
a. Sickle cell disease *(COMEDK 2010)*
b. Leukemia
c. Spinal cord disease
d. Prolonged sexual activity

37. In Priapism, cavernous blood study will reveal: *(MHSSMCET 2009)*
a. $PO_2 < 30\%$, $PCO_2 > 60\%$
b. $PCO_2 > 60\%$
c. $PCO_2 > 60\%$
d. $PO_2 < 60\%$

38. In children persistent priapism may result due to:
a. Thrombosis of venous plexus *(PGI 81, AIIMS 86)*
b. Leukemia
c. Wilm's tumour
d. Trauma

PEYRONIE'S DISEASE

39. Palpable fibrous plaque on dorsal penile shaft indicates:
a. Paget's disease *(DPG 2005, Karnataka 95)*
b. Potter's syndrome
c. Prehn's sign
d. Peyronie's disease

40. The following statements are true about Peyronie's disease except: *(AIIMS Nov 2002)*
a. Patient presents with complaints of painful erection
b. Condition affects adolescent males
c. The condition can be associated with Dupuytren's contracture of the tendon of the hand
d. Spontaneous regression occurs in 50% of the cases

41. All are true about Peyronie's disease except:
a. Self limiting *(UPPG 2007, 2006)*
b. Medical treatment is effective
c. Association with Dupuytren's contracture
d. Calcified plaques

42. Peyronie's disease affects: *(WBPG 2014, MHPGMET 2005)*
a. Prostate
b. Penis
c. Urinary bladder
d. Kidneys

43. Peyronie's disease is: *MHPGMCET 2007)*
a. Browning of penis
b. Ectopic opening of urethra
c. Curved deformity of penis due to fibrous plaque
d. Absent glans penis

44. Nesbitt's operation is done for: *(MHPGMCET 2009, 2005)*
a. Ectopic testis b. Hypospadias
c. Peyronie's disease d. Any of the above

45. Duputryens contracture is seen in: *(Recent Questions 2013)*
a. Peryonies disease b. Hypospadias
c. Epispadias d. Exstrophy

URINARY TRACT INFECTION

46. What will be next investigation to be done in case of a 2 years old female child with 1st episode of UTI? *(AIIMS June 98)*
a. Abdominal ultrasound b. DMSA scan
c. 6 monthly urine culture d. Nothing actively needed

47. A child with recurrent urinary tract infection is most likely to show: *(All India 2005)*
a. Posterior urethral valves b. Vesicoureteric reflux
c. Neurogenic bladder d. Renal and ureteric calculi

48. Which fruit juice helps in preventing UTI? *(AIIMS Nov 2011, Nov 2006)*
a. Grape b. Raspberry
c. Cranberry d. Orange

49. Commonest organism giving rise to urinary tract infection:
a. E. coli b. Proteus *(APPG 85)*
c. Staphylococcus d. Streptococcus

50. Urinary tract infection exists when the bacterial count in 1 ml. midstream specimen of urine is: *AIIMS 84)*
a. 100 b. 1000
c. 10^4 d. 10^5 or over

51. The most reliable urine specimen is obtained by: *(UPSC 2005)*
a. Urethral catheterization b. Catheter aspiration
c. Midstream voiding d. Suprapubic aspiration

URINARY RETENTION

52. Acute urinary retention in a male child may be due to:
a. Prostatic radiotherapy *(AIIMS 87)*
b. Urethral stricture
c. Hysteria
d. Meatal ulcer with scabbing

53. Acute onset of anuria in elderly men: *(All India 89)*
a. Bilateral infraction of kidneys
b. Obstructive urinary disease
c. Acute tubular necrosis
d. Acute cortical

54. Most frequent causes of acute retention of urine include all except: *(DPG 2009 March)*
a. Meatal ulcer with scabbing in children
b. Haemorrhoidectomy
c. Herniorraphy
d. Fecal impaction

55. Urinary retention in child is most commonly caused by: *(PGI Dec 2003)*
a. Metal scab with ulceration b. Posterior urethral valve
c. Urethral stricture d. Epispadias
e. Congenital short penis

URETHRAL INJURY

56. A 25 years old male presents to emergency department following a road traffic accident. On examination there is pelvic fracture and blood at urethral meatus. Following are true about patient except: *(AIIMS Nov 2002)*
a. Anterior urethra is the most likely site of injury
b. Retrograde urethrography should be done after the patient is stabilized
c. Foley catheter may be carefully passed if the RGU is normal
d. Rectal examination may reveal a large pelvic

57. Not true about urethral injuries is: *(AIIMS Nov 2001)*
a. Catheterize the patient immediately
b. Can be associated with fracture pelvis
c. Bladder injury is associated with post urethral injuries
d. Blood at the external urethral meatus is an imp feature

58. All of the following can be done in a case of pelvic fracture with pelvic hematoma and had not passed urine since trauma except: *(AIIMS Nov 99)*
a. Pass indwelling urethral catheter
b. IV fluid infusion
c. IV pyelography
d. Digital per rectal examination

59. Membranous urethral rupture causes collection of blood in:
a. Ischiorectal fossa *(AIIMS Nov 93)*
b. Deep perineal pouch
c. Superficial inguinal region
d. Pelvic diaphragm

60. All are true about bulbar urethral rupture, except:
a. Perineal hematoma *(DNB 2011, AIIMS June 93)*
b. Floating prostate on per rectal examination
c. Collection of urine in perineum
d. Bleeding per urethra

61. Following trauma, a patient presents with a drop of blood at the trip of urinary meatus. He complains of inability to pass urine. Next step should be: *(All India 2001)*
a. IVP should be done
b. MCU should be done
c. Catheterize, drain bladder, and remove the catheter thereafter
d. Catheterize, drain bladder and retain in catheter thereafter

62. Catheterization should not be done in case of acute retention of urine due to: *(PGI June 2003)*
a. Benign prostate hyperplasia (BPH)
b. CA prostate
c. Stricture urethra
d. Rupture urethra
e. Postoperative retention

63. Urinary catheterization indicated in case of acute retention of urine in following conditions: *(PGI June 2006)*
a. Stricture
b. Rupture
c. Postoperative
d. Carcinoma prostate
e. Before appendectomy in acute appendicitis

64. In case of pelvic fracture with urethral injury, the most important first step in management is: *(AIIMS 84)*
a. Repair in injured urethra
B. Fixation of pelvic fracture
c. Treatment of shock and hemorrhage
d. Splinting urethra with catheters

65. Commonest late complication of traumatic rupture of urethra is: *(JIPMER 92)*
a. Diverticulum
b. Retrograde ejaculation
c. Stricture
d. Chordee

66. Rupture of membranous urethra occurs more commonly due to: *(AIIMS 92)*
a. Thin unsupported wall
b. Fixity of urethra
c. Angulation
d. Proximity to bladder

67. Treatment of fracture pelvis with rupture urethra is:
A. Suprapubic cystostomy *(Kerala 95)*
B. Explore and correct the fracture, repair urethra
C. Catheterization
D. Urethrogram to assess injury

68. Urine extravasation occurs in the following in case of penile urethral rupture, except: *(JIPMER 2003)*
a. Ischiorectal fossa
b. Scrotum
c. Abdomiadias
d. Below superficial fascia of penis

69. A young man gets into a fight after taking beer and is kicked by the lower abdomen. There was pelvic fracture. Blood at meatus. Most likely cause is: *(MAHE 2007)*
a. Rupture of membranous urethra
b. Bulbar urethral injury
c. Kidney laceration
d. Ureteric injury

70. All the features of membranous urethral injury except: *(MAHE 2007, 2008)*
a. Blood of meatus
b. Retention of urine
c. Pelvic fracture
d. None

71. A patient was brought to the hospital with a history of RTA eight hours back. A few drops of blood were noted at the external urethral meatus. He had not passed urine and his bladder palpable per abdomen. The probable diagnosis is:
a. Urethral injury *(AIIMS Nov 2006)*
b. Rupture bladder
c. Urethral injury with extravasation of urine in the retroperitoneum
d. Anuria due to hypovolemia

72. With the knowledge of anatomy of the pelvis and perineum, which of the following is true regarding collection of urine in urethral rupture above deep perineal pouch?
a. Medial aspect of thigh *(AIIMS Nov 2012)*
b. Scrotum
c. True pelvis only
d. Anterior abdominal wall

73. Following urethral rupture, immediate procedure to be done is: *(MCI Sept 2008, March 2009)*
a. Urinary catheterization
b. Suprapubic cystostomy
c. Referral to a urologist
d. Observation

74. A 32-year-old man with pelvic fracture is in urinary retention with blood at the external urinary means. Retrograde urethrogram shows prostatomembrane disruption. The most appropriate immediate treatment is: *(COMEDK 2014)*
a. Urethral catheterization
b. Exploration and repair of urethra
c. Suprapublic cystostomy
d. Perineal urethrostomy

URETHRAL STRICTURE

75. Which of the following is not an appropriate investigation for anterior urethral stricture? *(AIIMS June 97)*
a. Magnetic resonance imaging
b. Retrograde urethrogram
c. Micturating cystourethrogram
d. High frequency ultrasound

76. The commonest cause of an obliterative stricture of the membranous urethra is: *(All India 2003)*
a. Fall-astride injury
b. Road-traffic accident with fracture pelvis and rupture urethra
c. Prolonged catheterization
d. Gonococcal infection

77. The following are complications of stricture urethra except: *(Karnataka 96)*
a. Periurethral abscess
b. Inguinal hernia
c. Hydronephrosis
d. Papilloma of bladder

78. Commonest cause of urethral stricture in a young person is:
a. Trauma
b. Gonococcal *(Karnataka 96)*
C. Syphilis
d. Tuberculosis

79. The recent treatment of short bridle passable stricture of urethra in the penile and bulbous urethra is:
A. Internal urethrotomy with Thompson-Walker's urethrotome *(MAHE 2005)*
b. Optical internal urethrotomy
c. Syme's operation
d. Wheelhouse operation

80. Optical urethroplasty is done in: *(UPPG 2007)*
a. Congenital stricture of urethra
b. Hypospadias
c. Epispadias
d. Testicular tumors

81. On exertion urine stream increased in: *(APPG 96)*
a. Prostate enlargement
b. Marion's disease
c. Posterior urethral valves
d. Urethral stricture

82. Post gonococcal stricture urethra is most commonly situated in the: *(JIPMER 87)*
a. Bulbar urethra
b. Penoscrotal junction
c. Distal part of spongy urethra
d. Just distal to external meatus

83. Most common cause of urethral stricture is:
a. Trauma *(Recent Questions 2013)*
b. Infection
c. Congenital
d. Post endoscopy

CARCINOMA PENIS

84. True about verrucous carcinoma is all except: *(Punjab 2009)*
a. Locally aggressive form of condyloma acuminate
b. Also known as Buschke-Lowenstein Tumor
c. They frequently metastasize
d. Wide excision is the treatment of choice

85. Buschke-Lowenstein tumor is: *(MHPGMCET 2007)*
a. Condyloma lata
b. Molluscum contagiosum
c. Benign lesion of penis
d. 'Verrucous' carcinoma of the penis

86. In CA penis, soft tissue planes are best delineated by:
a. MRI b. CT scan *(GB PANT 2011)*
c. X-ray d. USG

87. The most common cause of death in carcinoma penis: *(MHPGMCET 2008, AIIMS Nov 94)*
a. Uremia b. Urinary sepsis
c. Lung metastases d. Erosion of femoral vessels

88. Cabana procedure is done in: *(GB PANT 2010)*
a. CA testis
b. RPLND
c. Sentinel LN biopsy in penile carcinoma
d. None

89. Sentinel lymph node of carcinoma penis: *(MHSSMCET 2006)*
a. Cabana b. Virchow
c. Delphian d. Darwins

90. Erythroplasia of Queyrat occurs in: *(MCI Sept 2008)*
a. Scrotum b. Testes
c. Penis d. Bladder

91. Not true about carcinoma penis is: *(AIIMS Nov 2001)*
a. Erythroplasia of Queyrat is a precancerous condition
b. 40% of patients are under 40 years of age
c. Circumcision if done any time before puberty provides 100% protection against carcinoma penis
d. More than 50% patients have inguinal LN enlargement when they present

92. What is true about carcinoma penis? *(AIIMS June 94)*
a. Metastasis is rare
b. Occurs more commonly in circumcised male
c. Arises from corona of glans
d. Pain is frequent

93. Circumcision is included in management of CA penis at:
a. Glans b. Prepuce *(PGI Dec 98)*
c. Glandulo prepucial d. Shaft of penis

94. Features of carcinoma penis are all except: *(PGI 85, Kerala 87)*
a. Circumcision soon after birth provides total immunity
b. Metastatic to inguinal nodes
c. Surgery is treatment of choice
d. Transitional cell carcinoma

95. Treatment of choice of small preputial penile carcinoma is:
a. Total penectomy b. Partial penectomy
c. Emasculation d. Wide excision *(DNB 2007)*

96. Sentinel lymph node biopsy was first done in: *(DNB 2012)*
a. Carcinoma breast b. Carcinoma colon
c. Carcinoma penis d. Melanoma

97. All are true about carcinoma penis except:
a. Most common type is verrucous *(Recent Questions 2013)*
b. Spreads by blood borne metastasis
c. Leads to erosion of artery
d. Slowly progressive

URETHRAL CARCINOMA

98. Most common site of urethral carcinoma in men is: *(All India 2010)*
a. Bulbomembranous urethra b. Penile urethra
c. Prostatic urethra d. Fossa navicularis

MISCELLANEOUS

99. True about congenital short urethra: *(PGI Dec 2003)*
a. Urethra is short b. Opening is always ventral
c. Prepuce deficient ventrally
d. Splitting of the two secrotum in the midline
e. Spatulated penis

100. The posterior urethra is best visualized by: *(AIIMS Nov 2005)*
a. Static cystogram b. Retrograde urethrogram
c. Voiding cystogram d. CT cystogram

101. Narrowest part of the urethra is: *(JIPMER 87, All India 89)*
a. External meatus b. Membranous urethra
c. Bulbous urethra d. Internal meatus

102. Length of the male urethra:
a. 10 cm b. 15 cm
c. 20 cm d. 25 cm

103. Length of female urethra:
a. 2 cm b. 4 cm
c. 6 cm d. 8 cm

104. Which part of the male urethra is the widest and most distensible?
a. Prostatic b. Membranous
c. Bulbous d. Penile

105. The least dilatable part of the urethra:
a. Prostatic b. Membranous
c. Spongy d. All are equally dilatable

106. Bleeding penile ulcer is seen in all except: *(Kerala 94)*
a. Syphilis b. LGV
c. Chancroid d. Granuloma inguinale

107. During urethral catheterization in male patients, resistance is encountered at the following sites except: *(ICS 2005)*
a. Base of navicular fossa
b. Mid-penile urethra
c. Urogenital diaphragm
d. Bulbomembranous junction

108. Smegma is secreted by: *(DPG 2008)*
a. Tyson gland b. Brenner gland
c. Cowper's gland d. Bartholin's gland

109. There is a high-risk of renal dysplasia in:
a. Posterior urethral valve *(AIIMS June 2003)*
b. Bladder exstrophy
c. Anorectal malformation
d. Neonatal sepsis

110. Which of the following catheter materials is most suited for long-term is used? *(All India 2005)*
a. Latex b. Silicone
c. Rubber d. Polyurethane

111. All are indications for penile angiography except:
a. Painful priapism *(AIIMS May 2009)*
b. Peyronie's disease
c. Erectile dysfunction
d. Arterio-venous malformation

112. Narrowest part of urethra: *(PGI SS June 2001)*
a. External urethral meatus b. Membranous urethra
c. Prostatic urethra d. Bladder neck

113. Narrowest part of the urethra is: *(MCI March 2009)*
a. Prostatic urethra b. Bulbar urethra
c. Penile urethra d. Membranous urethra

114. Chordee is not seen in: *(MHSSMCET 2005)*
a. Hypospadias b. Chronic urethritis
c. Priapism d. Peyronie's disease

115. In "three glass test" shreds are presents in first glass only. The most probable diagnosis is: *(DNB 2012)*
a. Urethritis b. Cystitis
c. Prostatitis d. Renal pathology

EXPLANATIONS

HYPOSPADIAS

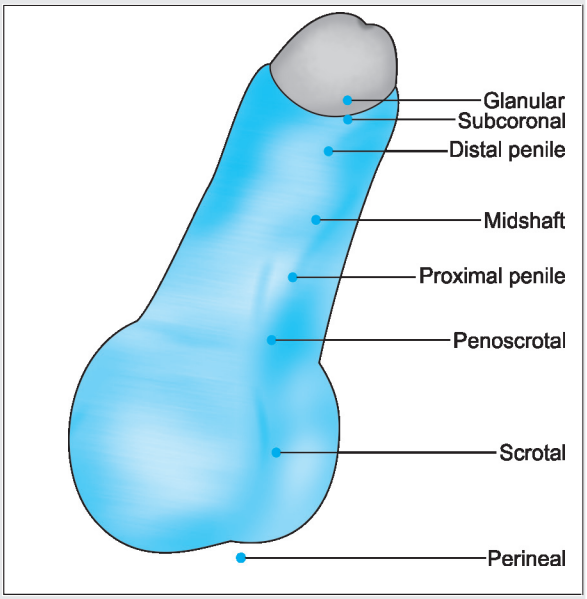
1. **Ans. a. Associated with chordee** *(Ref: Smith's Urology 17/e p629; Campbell 10/e p3505-3530; Bailey 26/e p1360, 25/e p1362-1363)*

Hypospadias

- Hypospadias results when **fusion of urethral folds is incomplete**, and urethral **meatus opens** on the **underside of penis** or **perineum (ventral surface of penis)**[Q].

> - Occurs in **1:250 male births** and **multifactorial**[Q] in inheritance.
> - **Hypospadias** is **MC congenital malformation of urethra**[Q].

- Estrogens and progestins given during pregnancy increase the risk.
- **Anterior forms** are **more** common[Q] then posterior because fusion of urethral folds is from posterior to anterior.
- **70% cases** are **distal penile** or **coronal**[Q].
- **Circumcision is not done** in patients with hypospadias, as the prepuce can later be **used in surgical repair**[Q].



Types of Hypospadias
• Glanular
• Coronal
• Subcoronal
• Penile
• Penoscrotal
• Scrotal
• Perineal

- **Surgical pathology** in addition to ventrally placed ectopic meatus, hypospadias has:
- **Chordee** ventral curvature of penis due to contracture of fibrous cord which has replaced the distal urethra and corpus spongiosum. **Severity of chordee** is proportional to **degree of hypospadias**[Q].
- **Hooded prepuce** deficient on ventral aspect and excess **on dorsal aspect**[Q].
- **Stenosis of ectopic meatus**[Q]
- Multiple urethral orifices
- **Flattening of glans**[Q]
- Microphallus

Associated abnormalities

- **Undescended testis**[Q] (10%) with or without sexual ambiguity
- **Inguinal hernia**[Q] (10%)
- Urinary tract abnormality (upper and lower)

Associated problems

- **Abnormal stream, painful erection** (chordee) and **infertility** (in proximal or posterior types)[Q]

Management

- Treatment is not required in anterior variety. (repair is done for cosmetic reasons only)
- **Optimal time** of repair is **6–12 months**[Q].
- **Meatal advancement** or **local skin flap advancement**[Q] is the surgical procedure done along with removal of chordee.

Named Procedures in Hypospadias
• **Dennis-Brown** technique (Two stage)[Q]
• **MAGPI**[Q] (Meatal advancement and glanuloplasty integrated) for coronal or subcoronal
• **Mathiew procedure**[Q] (Perimeatal based flap, one stage) for distal penile
• **Asopa** or **Duckett**[Q] technique using vascularized preputial island (one stage)
• **Thiersch-Duplay** or **Bracka**[Q] technique for proximal penile

Complications of surgery

- MC complications is **urethral fistula**[Q] (10%)
- **Meatal stenosis**[Q] due to devascularisation of distal neourethra
- **Urethral stricture and stenosis** due to poor vascularity of flap**, persistent chordee**[Q]

- Incidence of **hypospadias: 1 in 250**[Q]
- Incidence of **horse-shoe kidney: 1 in 400** (0.25%)[Q]
- Incidence of **renal agenesis: 1 in 1000**[Q]

2. **Ans. a. Defect seen in ventral penis), c. (Associated with hooded prepuce), d. Circumcision should be avoided**
3. **Ans. c. Hypospadias**
4. **Ans. c. Incidence is 1 in 3000 male births**
5. **Ans. a. Hypospadias**
6. **Ans. b. Glandular**
7. **Ans. b. Avoid surgery till puberty; d. If associated chordee is present, 2 stage operation is done**
8. **Ans. b. 6–10 months of age**
9. **Ans. d. Cryptorchidism**
10. **Ans. b. Dorsal chordee**
11. **Ans. c. Mental Retardation; e. Dorsal chordee**
12. **Ans. a. Metal stenosis; b. Dorsal hood; c. Proximal opening of meatus**
13. **Ans. a. Chordee is reversed after 5 years**
14. **Ans. a. Glandular**
15. **Ans. c. Karyotyping**
16. **Ans. a. Ectopia vesicae**
17. **Ans. a. Hypospadias**
18. **Ans.** a. It is attributed to failure of complete urethral tubularisation in the fetus

EPISPADIAS

19. **Ans. b. Chordee** *(Ref: Smith 17/e p631-632; Oxford Handbook of Urology 2/e p652; Campbell 10/e p3369-3375; Bailey 26/e p1360, 25/e p1363-1364)*

EPISPADIAS

- Urethra opens on the **dorsum (upper aspect)** of the penis in males, in females there is a **fissure in the wall**[Q] of the urethra which opens above the clitoris

Associated anomalies

- **Extrophy of bladder**[Q] (ectopia vesicae) with pubic diastasis and waddling gait
- **Dorsal Chordee**[Q]
- **VUR** in **40%** cases[Q]

Clinical Features

- **Females**: **Bifid clitoris** and **separation of the labia**. **Most** are **incontinent**[Q] because of maldevelopment of the urinary sphincters.
- **Males**: Patients with **glandular epispadias seldom have urinary incontinence**. However, incontinence in **penopubic** is **95%** and **penile epispadias** is **75%**[Q]**.**
- Epispadias is a mild form of bladder exstrophy, and in severe cases, exstrophy and epispadias coexist.

Management

- **Surgery** is required to **correct the incontinence**, **remove the chordee** to straighten the penis, and **extend the urethra** out onto the glans penis[Q].
- **Bladder augmentation** combined with the **artificial sphincter** may be required in patients in whom incontinence cannot be corrected.

20. **Ans. b. Less common**

POSTERIOR URETHRAL VALVE

21. **Ans. d. Diagnosed by early urethroscopy** *(Ref: Smith's Urology 17/e p626-628; Campbell 10/e p3389-3404; Bailey 26/e p1359-1360, 25/e p1362)*

POSTERIOR URETHRAL VALVE

- **Symmetrical folds of urothelium** extending **distally from prostatic urethra to external urinary sphincter**[Q]**.**

  - **Exclusively** an anomaly of **male urethra**[Q].
  - Four types, **Type 1 is MC** (lies just **distal to the verumontanum** or **at the verumontanum**)[Q]

- Acts as a **flap valve**Q (one way valve)- allows catheter, but balloons out during micturition and obstructs stream.

Clinical Features

- **Newborns** may present with **palpable abdominal masses** (**distended bladder, hydronephrotic kidneys and ascites**)Q
- Infants with **urinary infection** and **sepsis**Q.
- **Sometimes,** the **valves** are **incomplete**Q and the patient remains **without symptoms** until adolescence or adulthood.
- Approximately **30%** of patients experience **end stage renal disease**.Q
- **Vesicoureteral reflux** occurs in **50% of patients**Q.

Associated with

- **Oligohydramnios**Q
- Renal parenchymal dysplasia (**most important factor** in overall **prognosis**)Q
- Abnormal bladder function (25%)Q
- **Pulmonary hypoplasia** (**MC cause of death**)Q

Investigations

- **Investigation of choice: MCU**Q (shows proximal urethral dilatation with distal stricture)

- **Cystoscopy:** shows dilation of urethra above valve.
- **Prenatal diagnosis by ultrasound**, showing **bilateral hydroureteronephrosis with enlarged thickened bladder** as early as **28 weeks**Q of gestation.

Management

- First a small polyethylene **feeding tube** is **inserted** in the bladder and left for several days. Then further management is done according to serum creatinine level.
  - **Normal serum creatinine** - transurethral ablation (**endoscopic fulgration**)Q of the valves
  - **Increased serum creatinine** and the worsening of condition – **vesicostomy (Blockson's technique is best)** to bypass the obstruction and **when normal creatinine levels** are achieved, transurethral ablation (**endoscopic fulgration**)Q is done.

Prognosis

- **Bladder dysfunction** and **renal hypoplasia** is associated with **poor prognosis** and is major cause of progressive renal failureQ.
- **Pulmonary hypoplasia** is **MC cause** of **death**Q**.**

22. **Ans. d. Posterior urethral valve**
23. **Ans. b. Posterior urethral valves**
24. **Ans. b. MCU**
25. **Ans. a. Boys**
26. **Ans. c. Posterior urethral valve**
27. **Ans. b. Distal to verumontanum**
28. **Ans. b. Below verumontanum**

PHIMOSIS

29. **Ans. a. Wait and watch policy** *(Ref: Smith's Urology 17/e p633; Campbell 10/e p964, 3539; Bailey 26/e p1359, 25/e p1371)*

Phimosis

- Phimosis is a condition in which the **contracted foreskin cannot be retracted over the glans**Q.
- **Chronic infection** from **poor local hygiene** is its **most common cause**Q.
- Most cases occur in **uncircumcised males**, although excessive skin left after circumcision can become stenotic and cause phimosis.

Types

- Congenital
- **Acquired:** usually presents late in life and associated with **inflammation, balanitis xerotica obliterans, trauma** or **cancer**Q**.**

Clinical features

- **Difficulty in micturition**Q is the main symptom.
- **Ballooning of prepuce during micturition**Q is suggestive of phimosis.
- Edema, erythema, and tenderness of the prepuce and the presence of purulent discharge usually cause the patient to seek medical attention.
- Inability to retract the foreskin is a less common complaint.

Complications

- Balanoposthitis, Hydronephrosis or hydroureter
- **Prepucial calculi, carcinoma under foreskin**Q

Treatment

- **Local steroid** cream for **4–6** weeks[Q].

> - **Circumcision** should be done if **no response to steroids**, **recurrent balanitis** or **balanoposthitis**, age **> 16–18 years**[Q].

- If phimosis is associated with considerable **infection**, it should be treated with **broad-spectrum antimicrobial drugs**. The **dorsal slit of foreskin**[Q], if improved drainage is necessary.
- **Circumcision** for phimosis should be **avoided in children requiring general anesthesia**; **except** in cases with **recurrent infections**[Q].
- The procedure should be **postponed until** the child reaches an age when **local anesthesia** can be used.

30. Ans. b. Circumcision

PARAPHIMOSIS

31. Ans. b. Seen in diabetes mellitus *(Ref: Smith's Urology 17/e p633; Campbell 10/e p964, 3539; Bailey 26/e p1370, 25/e p1373)*

Paraphimosis

- **Acquired** condition in which the **foreskin**, once retracted over the glans, **cannot be replaced** in its normal position, **always acquired**[Q].
- It is uncommon for the urethra to be compressed, so the **micturition** is normally **not affected**[Q].

Pathology

- **Chronic inflammation** under the redundant foreskin leads to **contracture** of the **preputial opening** (phimosis) and formation of a **tight ring of skin** when the foreskin is retracted behind the glans.
- The **skin ring** causes **venous congestion** leading to **edema** and **enlargement** of the **glans**[Q]
- As the condition progresses, **arterial occlusion** and **necrosis of the glans**[Q] may occur.

Treatment

- **Ice bags, gentle manual compression**[Q] and injection of a solution of **hyaluronidase** in normal saline may help to reduce swelling.
- **Circumcision**: If conservative method fails

32. Ans. d. All of the above

CIRCUMCISION

33. Ans. d. All of the above *(Ref: Smith 17/e p633; Bailey 26/e p1369-1370, 25/e p1371-1372)*

34. Ans. c. Carcinoma penis

Indications of Circumcision	
• **Phimosis**[Q]	• **Religion (Jews** and **Muslims)**[Q]
• **Paraphimosis**[Q]	• **Balanitis** or **balanoposthitis**[Q]
• **Recurrent UTI**[Q]	• **BXO** (balanitis xerotica obliterans)

PRIAPISM

35. Ans. b. Corpora cavernosa and saphenous vein *(Ref: Smith's Urology 17/e p632-633; Campbell's Urology 10/e p751; Bailey 26/e p1373, 25/e p1374; Glenn's Urologic Surgery 7/e p489, 490, 491)*

The **Grayhack shunt** is a surgical **shunt between corpora cavernosa** and **saphenous vein** for the treatment of **ischemic priapism.**

Priapism

- **Painful, persistent erection**[Q] not normally associated with sexual excitement or desire, which doesn't subside after sexual excitement or desire.
- Most patients present with an **erection** of **at least 24 hours**[Q] duration.
- **Priapism is an emergency**, if therapy is delayed for 36–48 hours, then marked tissue damage (due to ischemia) is likely to occur with **cavernosal fibrosis** and **impotence**[Q].

Types

- **High flow (non-ischemic) priapism**[Q]: Occurs secondary to **penile or perineal trauma**, arterial sinusoidal shunt within corpus cavernosum.

- **Low flow (ischemic) priapism**[Q]: **Painful priapism**, can lead to **compartment syndrome**, **more common** than high flow Priapism, caused by-
- **Sickle cell anemia**, **leukemia**, spinal cord lesions, fat emboli, **malignant penile inflammation**[Q], autonomic neuropathy, drugs (**Trazadone**)[Q]
- Majority due to **vasoactive intracorporeal injections**[Q]

Clinical presentation: Two peak ages

- **Children 5–10 years old**: Most common due to **sickle cell disease**[Q], attacks are usually nocturnal and the patient awakens with painful erection.
- **Adults 20–50 years**: **Mostly iatrogenic**[Q], priapism involves only corpora cavernosa. The spongiosum and glans are flaccid.

Diagnosis

- Diagnosis is **mainly clinical**[Q], only investigation useful to supplement clinical examination is **doppler**.

Treatment

- If present early, **within 4–6 hours**: **Ketamine**[Q] (dissociative anesthesia) causes 50% detumescence.

> - **Aspiration** and **saline irrigation** till the aspirate is bright red, followed by injection of diluted **phenylephrine**[Q].
> - **Active treatment** in **high flow priapism** as it represents a **compartment syndrome**[Q].

- **Selective internal pudendal arteriography** and **selective embolization of** the **artery** feeding the shunt for **high flow non-ischemic priapism**[Q]
- **Operative intervention:**
- **Winter's procedure** (percutaneous **cavernoglandular** shunt)[Q]
  - Corpora spongiosa shunt
  - Corpora saphenous shunt

Surgical Management of Ischemic Priapism
(surgical creation of shunt to allow **blood to drain** from the **corpora cavernosa)**

Corporo-glanular shunt	Corporo-spongiosal shunt	Corporo- saphenous shunts	Corporo-dorsal vein shunt
• Shunts created between **glans penis** and **corpora cavernosa**[Q]. • These are **distal shunts** and represent the **first line** surgical therapy. **Examples:** • **Winter shunt**[Q] • Al- **Ghorab shunt**[Q] • Ebbehoj and T shunt	• Shunts created between **corpora cavernosa** and **corpora spongiosa**[Q] • These are **proximal shunts** and are performed in rare circumstances • **Examples:** • **Quackel** or **Sacher shunt**[Q]	• **Shunts** created between **corpora cavernosa** and **saphenous vein**[Q] • Rarely performed **Examples:** • **Grayhack shunt**[Q]	• Shunt between **corpora cavernosa** and superficial or deep **dorsal vein** of **penis**[Q] • Rarely performed **Examples:** • **Barry shunt**[Q]

36. Ans. d. Prolonged sexual activity *(Ref: Bailey 26/e p1373, 25/e p1374; Campbell 10/e p751)*

Priapism is **rarely seen** as a consequence of **spinal cord disease**.

PERSISTENT PRIAPISM

- The **penis** remains **erect** and becomes **painful.**
- This is a **pathological erection** and the **glans penis** and **corpus spongiosum** are **not involved**[Q].
- The condition is **usually seen as a complication of** a **blood disorder** such as **sickle cell disease** or **leukaemia**[Q].
- However, it can sometimes follow **therapeutic injection of papaverine** or even an **abnormally prolonged bout** of **otherwise normal sexual activity**[Q].
- A **tiny proportion** is caused by **malignant disease** in the **corpora cavernosa** or the **pelvis**.
- **Priapism** is **rarely seen** as a consequence of **spinal cord disease**[Q].

37. Ans. a. PO_2 < 30%, PCO_2 > 60% *(Ref: Campbell 10/e p757)*

Blood Gas Values in Priapism			
Source	**Po_2** (mm Hg)	**PCO_2** (mm Hg)	**pH**
• Normal arterial blood • (room air)	> 90	< 40	7.40
• Normal mixed venous • blood (room air)	40	50	7.35
• **Ischemic Priapism** • (first corporal aspirate)	**< 30**Q	**> 60**Q	**< 7.25**Q

38. Ans. b. Leukemia

PEYRONIE'S DISEASE

39. Ans. d. Peyronie's disease *(Ref: Smith's Urology 17/e p632-633; Campbell 10/e p792-809; Bailey 26/e p1372, 25/e p1373)*

Peyronie's Disease

- Peyronie's disease (**plastic induration of penis/ penile fibromatosis**Q) usually seen **over 40 years** of age.
  - It is due to **fibrous plaques** in one or both corpus cavernosum of varying sizes **involving tunica albuginea**Q which may later calcify or ossify.
- Cause remains obscure, the dense fibrous plaque is microscopically consistent with **findings of severe vasculitis.**
- Palmar fibromatosis (**Dupuytren's contracture**), plantar fibromatosis and penile fibromatosis (**Peyronie's disease**) are components of the same pathological process called **superficial fibromatosis**Q.

Clinical Features

- **Painful erection, curvature of penis** and **poor erection distal to involved area**Q.
- No pain when the penis is in nonerect state.
- **Palpable induration** or **mass** appears usually on the **dorsolateral aspect**Q of the penis.

Treatment

- **Spontaneous remission** occurs in about **50% cases**Q, so observation and emotional support advised initially.
- If the penile deformity is distressing, **Nesbitt's operation**Q can be performed to straighten the penis.
- **Nesbitt operation**: Straightening of penis by **placing non-absorbable sutures** in **corpus cavernosum opposite** to the **plaque**.

40. Ans. b. Condition affects adolescent males

41. Ans. b. Medical treatment is effective

42. Ans. b. Penis

43. Ans. c. Curved deformity of penis due to fibrous plaque

44. Ans. c. Peyronie's disease

45. Ans. a. Peryonies disease

URINARY TRACT INFECTION

46. Ans. a. Abdominal Ultrasound *(Ref: Smith 17/e p194; Campbell 10/e p274)*

This patient must be having anatomic genitourinary abnormalities (VUR), and the next best investigation is USG.

Epidemiology of UTI by Age Group and Sex			
Age (years)	**Incidence** (%)		**Risk Factors**
	Female	**Male**	
< 1	**0.7**	**2.7**	Foreskin, **anatomic GU abnormalities**
1–5	4.5	0.5	**Anatomic** genitourinary (**GU**) **abnormalities**
6–15	4.5	0.5	Functional GU abnormalities
16–35	20	0.5	Sexual intercourse, diaphragm use
36–65	35	20	Surgery, prostate obstruction, catheterization
> 65	**40**	**35**	Incontinence, catheterization, prostate obstruction

Ultrasound

- **Ultrasound study** is an important renal imaging technique because it is **noninvasive, easy to perform,** and **rapid** and **offers no radiation** or **contrast agent risk** to the patient[Q].

47. **Ans. b. Vesicoureteric reflux**

48. **Ans. c. Cranberry** *(Ref: Smith 17/e p207)*

- **Alternatives to antibiotic therapy** in the **treatment of recurrent cystitis/UTI** include **intravaginal estriol**, **lactobacillus vaginal suppositories**, and **cranberry juice taken orally[Q].**
- **Cranberry juice** is traditionally **used for prophylaxis** and **treatment of UTI[Q].**

49. **Ans. a. E. coli** *(Ref: Smith 17/e p195)*

Urinary tract Infection

- **Most UTIs** are caused **by a single bacterial species[Q]**.
- At least **80%** of the **uncomplicated cystitis** and **pyelonephritis** are due to **E. coli[Q],** with most of pathogenic strains belonging to the **O serogroups**.
- Other less common uropathogens include Klebsiella, Proteus, and Enterobacter spp. and enterococci.
- In **hospital acquired UTIs,** a wider variety of causative organisms is found, including **Pseudomonas** and **Staphylococcus** spp[Q].
  - **UTIs** caused by **S. aureus** often result from **hematogenous dissemination[Q]**.
  - **Group B beta-hemolytic streptococci** can cause **UTIs** in **pregnant women[Q]**.
  - **In children**, **Klebsiella** and **Enterobacter spp**. are **common causes of UTI[Q]**.
- **Anaerobic bacteria**, **lactobacilli, corynebacteria, streptococci** (not including enterococci) and **S. epidermidis** are found in **normal periurethral flora**. They do not commonly cause UTIs in healthy individuals and are considered common **urinary contaminants[Q].**

50. **Ans. d. 10^5 or over** *(Ref: Smith 17/e p196)*

Traditionally, **> 100,000 CFU/mL (> 10^5)** is **used to exclude contamination**.

Urine Culture in UTI

- The **gold standard for identification of UTI** is the **quantitative culture** of **urine** for **specific bacteria[Q]**.
- The urine should be collected in a **sterile container** and **cultured immediately after collection**. When this is not possible, the urine **can be stored** in the **refrigerator for up to 24 hours.**
- The sample is then diluted and spread on culture plates. Each bacterium will form a single colony on the plates.
- The **number of colonies** is counted and adjusted per milliliter of urine (CFU/mL).
- Traditionally, **> 100,000 CFU/mL (> 10^5)** [Q] is **used to exclude contamination**.

51. **Ans. d. Suprapubic aspiration** *(Ref: Smith 17/e p195)*

Suprapubic aspiration avoids potential contamination.

Urinary tract Infection

- Most often, the **urine** is often obtained from a **voided specimen**.
- **In children** who are not toilet trained, a **urine collection device**, such as a bag, is placed over the genitalia, and the urine is cultured from the bagged specimen.
  - **Suprapubic aspiration avoids potential contamination[Q]**; however, due to its invasiveness, it is **rarely used except in children** and **selected patients**.
- **Urine** obtained **from a urinary catheter** is **less invasive** than a suprapubic aspiration and is **less likely to be contaminated than** that from a **voided specimen[Q]**.

URINARY RETENTION

52. **Ans. d. Meatal ulcer with scabbing** *(Ref: Bailey 26/e p1312, 25/e p1315-1318, 24/e p1338-1339; www.ncbi.nlm.nih.gov/pubmed/11176514)*

Acute urinary retention in a male child may be due to local inflammatory causes like meatal ulcer with scabbing.

Etiology of Urinary retention in Children	
• **Neurological** processes (**17%**) • **Severe voiding dysfunction** (15%) • UTI (13%) • Constipation (13%) • Adverse drug effect (13%) • **Local inflammatory causes** (7%)	• Locally invading neoplasms (6%) • Benign obstructing lesions (6%) • Idiopathic (6%) • Combined UTI and constipation (2%) • Incarcerated inguinal hernia (2%)

53. Ans. b. Obstructive urinary disease *(Ref: Bailey 26/e p1312, 25/e p1316)*

Most frequent causes of Acute Urinary Retention		
Male	**Both (Males and Females)**	
• **Bladder outlet obstruction (MC)** • Urethral stricture • Acute urethritis or prostatitis • Phimosis	• **Blood clot** • **Urethral calculus** • **Rupture** of the **urethra** • **Neurogenic** (injury or disease of the spinal cord) • **Smooth muscle cell dysfunction** associated with ageing	• **Fecal impaction** • **Anal pain** (haemorrhoidectomy) • Intensive post-operative analgesic treatment • Some drugs • **Spinal anaesthesia**
Female		
• Retroverted gravid uterus • Bladder neck obstruction (rare)		

Urinary Retention

- In **acute urinary retention** with significant **bladder distention, rapid drainage** might precipitate **decompression induced hematurea (Ex-vacuo hematurea)**Q
- Catheter should be **intermittently clamped** and released to permit **gradual** bladder **decompression** over **30–60 minutes**Q.

54. Ans. c. Herniorrhapy

55. Ans. a. Meatal scab with ulceration

URETHRAL INJURY

56. Ans. a. Anterior urethra is the most likely site of injury *(Ref: Smith's Urology 17/e p291-295; Campbell 10/e p2516-2520; Bailey 26/e p1361-1363, 25/e p1363-1365)*

Urethral Injury

- Urethral injuries occur most often in **men**, usually associated with **pelvic fractures** or **straddle type falls.**
- Urethra is separated in two anatomic divisions:
  - **Posterior urethra: Prostatic urethra + Membranous urethra**Q
  - **Anterior urethra: Bulbous urethra + Penile urethra**Q

Injuries to Posterior Urethra

Etiology

- The part of urethra **most likely injured** in **pelvic fracture** is **membranous urethra**Q.
- Membranous urethra is **sheared from** the prostatic apex at the **prostatomembranous junction**Q.

Clinical features

- **Retention of urine + Blood at urethral meatus + Pelvic hematoma** and **High lying prostate**Q
- The presence of blood at the external urethral meatus indicates that **immediate urethrography**Q is **necessary to establish the diagnosis**.
- Associated with **deep extravasation** of **urine** in **pelvis** and **retroperitoneal tissues**Q.
- **Pie in sky appearance**Q on **IVP** in **membranous urethral injury.**
- **Superior displacement** of the **prostate does not occur** if the **puboprostatic ligaments** remain **intact**.

Instrumental examination

- The only instrumentation involved should be for **urethrography**Q.

> - **Catheterization or urethroscopy** should **not** be **done in every case** (as its associated with an **increased risk** of **hematoma, infection,** and **conversion of partial urethral tear** into **complete transection** of **urethra**)Q.
> - In suspected **partial injury, gentle single attempt** to **catheterize** the patient **acts as** a **stent** over which **urethra heals**Q.

Complications

- **Bladder rupture** may be associated with posterior urethral injuries in **20% of cases**Q.

- **Stricture, impotence,** and **incontinence**[Q] are complications of prostatomembranous disruption.

> - **Stricture** following **primary repair** and **anastomosis** occurs in about **50%** of cases, with **delayed repair** incidence of stricture can be reduced to about **5%**[Q].

- The incidence of **impotence after primary repair** is **30–80%** , can be **reduced to 30-35%** by **delayed urethral reconstruction**[Q].

Treatment

Immediate management

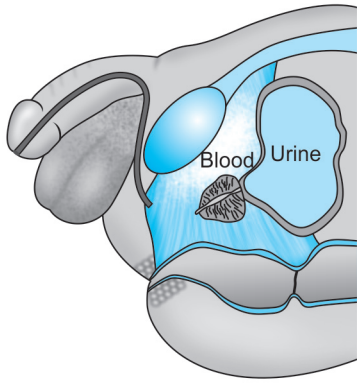
- **No urethral instrumentation** or **manipulation** and **suprapubic cystostomy**

> - In suspected **partial injury, gentle single attempt** to **catheterize** the patient **acts as** a **stent** over which **urethra heals.**

- **Incomplete laceration** of the posterior urethra **heals spontaneously**, and the **suprapubic cystostomy** can be **removed within 2–3 weeks**[Q].
- **SPC** remains the **gold standard** for **initial management, endoscopic alignment** can be done **over guidewire** if patient presents **within 7–10 days**[Q].

Delayed urethral reconstruction

- **Reconstruction** of the urethra after prostatic disruption can be undertaken **within 3 months**[Q].



Injury to the posterior (membranous) urethra

57. **Ans. a. Catheterize the patient immediately**

58. **Ans. a. Pass indwelling urethral catheter**

59. **Ans. b. Deep perineal pouch**

60. **Ans. b. Floating prostate on per rectal examination** *(Ref: Smith's Urology 17/e p291-295; Campbell 10/e p3748-3749; Bailey 26/e p1361-1363, 25/e p1363-1365)*

Injuries to Anterior Urethra

Etiology

- **Direct blow to the perineum**[Q] is the mechanism of injury.
- **Straddle injury**[Q] may cause laceration or contusion of the urethra.
- **Self-instrumentation** or **iatrogenic instrumentation** may cause **partial disruption**[Q].

Pathology and pathogenesis: MC site is bulbar urethra.

A. Contusion

- Is a sign of crush injury without urethral disruption. Perineal hematoma usually resolves without complications.

B. Laceration

- A **severe straddle injury**[Q] may result in laceration of part of the urethral wall, allowing extravasation of urine.
- If the **extravasation** is unrecognized, it may **extend into the scrotum, along the penile shaft, and up to the abdominal wall and limited only by Colles' fascia** and often results in **sepsis, infection,** and **serious morbidity**[Q].

Clinical Features

- **Retention of urine + Blood at urethral meatus + Perineal hematoma** and **Normal prostate** on **P/R**[Q]

- **Superficial extravasation** of **urine,** urine collects in **scrotum, anterior perineum,** beneath **superficial fascia** of **penis** and spreads **under fascia scarpa**[Q].

- **Massive urinary extravasation** and **infection** in the perineum and scrotum in delayed presentation

Complications

- **Heavy bleeding** from **corpus spongiosum** injury and urethral **meatus**[Q].
- **Sepsis** and **infection**[Q] due to **urinary extravasation** (**Aggressive debridement** and **drainage** for infection)
- **Stricture** at the **site of injury**[Q]

Treatment

- Urethral contusion
  - After urethrography, if the voiding occurs normally, without pain or bleeding, no additional treatment.
- **Urethral lacerations:**
  - **Suprapubic cystostomy**[Q] for complete urinary diversion while the urethral laceration heals.
- **Urethral laceration with extensive urinary extravasation:**
  - Suprapubic cystostomy for urinary diversion and antibiotic therapy for Infection and abscess formation

Prognosis

- **Urethral stricture** is a major complication but in **most cases** do **not require surgical reconstruction**[Q].

61. Ans. d. Catheterize, drain bladder and retain in catheter thereafter

62. Ans. d. Rupture urethra

63. Ans. c. Postoperative, d. Carcinoma prostate

64. Ans. c. Treatment of shock and hemorrhage

65. Ans. c. Stricture

66. Ans. b. Fixity of Urethra

67. Ans. a. Suprapubic cystostomy

68. Ans. a. Ischiorectal fossa *(Ref: Smith's Urology 17/e p291-295; Campbell 10/e p3748-3749; Bailey 26/e p1361-1363, 25/e p1363-1365)*

	Bulbar urethral injury	Membranous urethral injury
Incidence	• **More common**[Q]	• Less common
Mechanism of injury	• **Direct blow** to the perineum (**Straddle injury**)[Q]	• **Blunt pelvic trauma** with **fracture pelvis**[Q]
Signs and symptoms	• Retention of urine[Q] • Blood at urethral meatus[Q] • **Perineal** hematoma[Q] • Normal prostate[Q]	• Retention of urine[Q] • Blood at urethral meatus[Q] • **Pelvic** hematoma[Q] • **High lying prostate**[Q]
Urine extravasation	• **Superficial extravasation**[Q]	• **Deep extravasation**[Q]

69. Ans. a. Rupture of membranous urethra

70. Ans. d. None

71. Ans. a. Urethral injury

72. Ans. c. True pelvis only

73. Ans. b. Suprapubic cystostomy

74. Ans. c. Suprapubic cystostomy

URETHRAL STRICTURE

75. Ans. a. Magnetic resonance imaging *(Ref: Smith 17/e p633-636; Oxford Handbook of Urology 2/e p122; Campbell 10/e p967-983; Bailey 25/e p1367-1369)*

Stricture Urethra

- Area of narrowing in the caliber of the urethra due to formation of scar in the tissues surrounding the urethra
- **Male urethra** is **more prone** to **trauma** and **stricture**[Q] formation.
- **Large catheters** and **instruments** are more likely than small ones to cause **ischemia, internal trauma** leading to **stricture**[Q].

Etiology

- **Traumatic** (**MC**)[Q], straddle injuries for anterior and pelvic fracture for posterior urethra
- **Inflammatory** or **infectious** (Infection from **long-term catheter use**[Q] is a major cause, gonococcal urethritis is seldom a cause of strictures today)
- **Ischemia**
- **Malignant**
- Congenital (**Fossa navicularis** and **membranous urethra** is **MC site**[Q] of congenital urethral stricture)

Pathophysiology

- Healing occurs by scar formation after injury to urothelium
- Process of **scar formation** occurs in **spongy erectile tissues**[Q] (corpus spongiosa) of the penis that surrounds urethra (**spongiofibrosis**[Q]
- Scar tissue contracts, reduces the caliber of urethral lumen, causing **resistance** to **antegrade flow** of urine.

Clinical Features

Obstructive voiding symptoms

- **Decreased force** of urinary stream, improving with pressure (**MC**)[Q]
- **Spraying** or **double stream**[Q]
- **Incomplete emptying** of the bladder, **terminal dribbling** and urinary **intermittency**[Q]
- Urinary retention, dilation of proximal urethra and prostatic ducts, urinary tract infections

Complications

- Prostatitis, cystitis, urinary diverticula and chronic UTI
- **Severe prolonged obstruction** result in decompensation of UV junction resulting in **reflux, hydronephrosis** and **renal failure**[Q]
- **Urethral fistula** and **periurethral abscess**[Q] commonly develop in association with chronic severe strictures

Diagnosis

- **Location, length, depth** and **density** of stricture should be evaluated for appropriate treatment.
- **Retrograde urethrogram** or **MCU**[Q] to demonstrate location and extent of stricture
- **Cystourethroscopy** for visualization of stricture
- **High frequency ultrasound** for **short bulbar strictures** (more accurate in measuring stricture length than RGU and is helpful in determining whether to excise or graft)
- **MRI** for defining the **distorted pelvic anatomy** associated with **posterior urethral strictures**[Q] resulting from trauma.

Management

- **Periodic urethral dilations** to stretch the scar without producing additional scarring.
- **Internal urethrotomy**: Incising the stricture transurethrally using endoscopic equipment to release scar tissue. The incision is made under direct vision at **12 O'clock** position with urethrotome, with curative success rate of **20–35%** (**Good** success in **short strictures without spongiofibrosis**[Q])

Open reconstruction

- **Excision** and **re-anastomosis** for strictures **< 2 cm**[Q]**:** Complete excision of the fibrotic segment with a widely spatulated **tension-free re-anastomosis**, most dependable technique
- **Excision** and **tissue transfer** for strictures **> 2 cm**[Q]**:** Full- thickness skin graft tissue is harvested from the desired non-hair bearing location, **penile skin, bladder epithelium**, or **buccal mucosa** (**MC** and **best results**)[Q].
- **Urethral stents:** Endoscopically placed, designed to be incorporated into wall of urethra and provide a patent lumen.

76. Ans. b. Road-traffic accident with fracture pelvis and rupture urethra

77. Ans. d. Papilloma of bladder **78. Ans. a. Trauma**

79. Ans. b. Optical internal urethrotomy *(Ref: Campbell 10/e p971-972)*

Campbell says "The data show that **strictures at the bulbous urethra** that are **< 1.5 cm in length** and **not associated with dense, deep spongiofibrosis** (i.e. straddle injuries) can be **managed with internal urethrotomy**, with a **74% moderately long-term success rate**."

INTERNAL URETHROTOMY

- Internal urethrotomy refers to any procedure that **opens the stricture** by **incising it transurethrally**[Q].
- **Internal urethrotomy** is done for **short, soft, passable, bulbar stricture.**
- The urethrotomy procedure **involves incision through the scar to healthy tissue** to allow the **scar to expand** (**release of scar contracture**)[Q] and the lumen to heal enlarged.
- **MC complication** of **internal urethrotomy** is **recurrence of stricture**.
- The data show that **strictures at the bulbous urethra** that are **< 1.5 cm in length** and **not associated with dense, deep spongiofibrosis**[Q] (i.e., straddle injuries) can be **managed with internal urethrotomy**, with a **74% moderately long-term success rate**[Q].

80. Ans. a. Congenital stricture of urethra *(Ref: www.ncbi.nlm.nih.gov › Postgrad Med J › v.82(970); Aug 2006)*

- **Short bulbar strictures** as a result of trauma or otherwise **congenital** are **best treated by anastomotic urethroplasty**[Q].

81. Ans. d. Urethral stricture **82. Ans. a. Bulbar Urethra**

83. Ans. a. Trauma

CARCINOMA PENIS

84. Ans. c. They frequently metastasize *(Ref: Smith's Urology 17/e p383-386; Campbell 10/e p901-933; Bailey 26/e p1373-1375, 25/e p1374-1375)*

Carcinoma Penis

- Most commonly occur in **6th decade**Q of life, but "**40% patients** are **less than 40 years**"
- Most commonly associated etiologic factor is **poor hygiene**Q
- **Phimosis**Q is commonly associated (**50%**)

> - **Neonatal circumcision** confers **immunity**Q against **CA penis, HIV** or **STDs,** but **not if done later.**

- Most important **carcinogens** are **smegma** and **HPV infection (16,18,31,33)**Q**.**

Premalignant Lesions

- **Buschke-Lowenstein tumour**Q (Verrucous carcinoma): tumour destroy adjacent tissue by compression, no metastasis usually. (Locally Malignant)
- **Balanitis Xerotica Obliterans**Q: whitish patch on glans, meatus and urethra, meatal stenosis.
- **Leukoplakia**Q (more common in **diabetics**)
- Cutaneous horn
- Long standing genital warts

Carcinoma in Situ

- **Bowen's disease**Q**:** Intraepithelial skin neoplasm (solitary thickened, grey white plaque with ulceration and scabbing) with HPV association in 80% cases. Converts into infiltrating **SCC in 10%. No high incidence of visceral malignancy**. When it involves **glans** and **prepuce,** it is called **Erythroplasia of Queyrat**Q
- **Erythroplasia of Queyrat**Q: **Red velvety plaques** over **glans** or **prepuce**, treated by **5% 5-FU cream** or ND YAG laser.

Clinical Features

- **Squamous cell carcinoma (80%)**Q is the MC type, most commonly originates from **glans**Q >sulcus >prepuce >shaft.
- Others are **transitional cell carcinoma (15%),** basal cell carcinoma, malignant melanoma, sarcoma.
- MC symptom is **lesion itself** associated with foul smelling discharge.
- **Phimosis** is associated in **50%**.
- There is **little or no pain**.
- Lesions are typically confined to penis at the time of presentation.

> - **More than 50% patients** of CA Penis presents with **enlarged inguinal lymph nodes**Q.
> - **50%** of patients presenting with **enlarged lymph inguinal lymph nodes are reactive** (non-metastatic), used to **subside after 4-6 weeks of antibiotics**Q.
> - **Priapism** is the **MC and earliest symptom** of **metastatic CA penis**Q.
> - **MC cause of death** is bleeding caused by **erosion of femoral artery** by **metastatic inguinal lymph nodes**Q**.**
> - **2nd MC** cause of death is **sepsis.**

- **Hypercalcemia**Q is seen **in absence** of **osseous metastasis** in **20%** of patients, appears to **correlate with volume of disease**Q**.**

Patterns of spread

- **Buck's fascia**Q and **tunica albuginea** represents a **barrier to corporal invasion** and **hematogenous spread**.
- Primary dissemination is to **inguinal**, **femoral** and **iliac** LNs.

> - **Prepuce** and **shaft skin** drain into the **superficial inguinal LNs**Q (Superficial to tensor fascia lata).
> - **Glans** and **corporal bodies** drain to **both superficial** and **deep inguinal LNs**Q (deep to tensor fascia lata).
> - **Anterior urethra** to **inguinal LN** and **posterior urethra** to **internal iliac LNs.**
> - **Penile drainage** is **bilateral** because of **multiple croos-connections**Q.

- Penetration of buck's fascia and tunica albiginea leads to invasion of vascular corpora and vascular dissemination (rare).
- **Distant metastases** in **< 10% cases**, may involve **lung**, liver bone or brain.

Diagnosis

- **Good incisional biopsy**Q from the periphery of the lesion from its junction with the normal tissue for grade and depth of invasion is **mandatory for diagnosis**.

> - **Sentinel lymph node biopsy (CABANA procedure)** is done for inguinal LN status.

Radiological investigations

- Assessment of depth by **USG** or **MRI**Q (CT is not effective)

> - **MRI** is **IOC for staging** in **CA penis**.

Treatment

- Without any treatment of invasive carcinoma, **death within 2 years**.
- **Small non-invasive lesion involving prepuce**: **5-FU cream**, **Nd-YAG laser**, **radiotherapy + close follow up** is mandatory/ Wide excision or circumcision

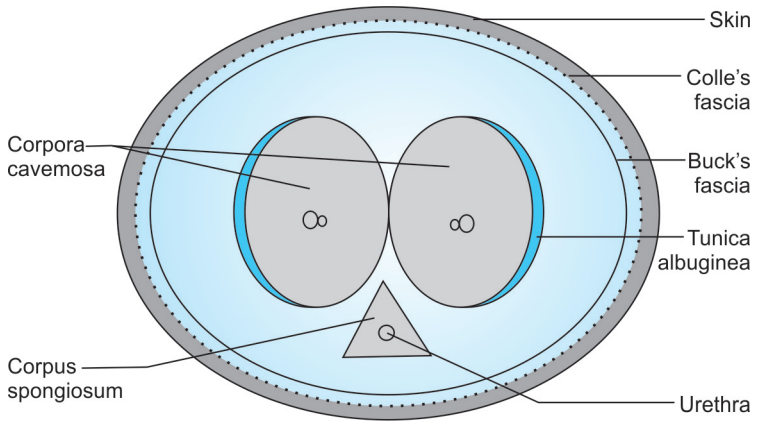
  - Lesions involving **glans or distal shaft**: **Partial penectomy** with **2 cm margin**[Q]
  - Lesions involving **proximal shaft** or 2 cm margins are not achieved: **Total penectomy** with **perineal urethrostomy**[Q].
  - **Bilateral Ilioinguinal LN dissection**[Q] for metastatic lymph nodes.

- Chemotherapy used are **Bleomycin**, 5-FU, **Cisplatin**, methotrexate.
- **Radiotherapy** for selected **superficial small lesions**.

Prognosis

- Survival correlates with **presence** or **absence of nodal disease**[Q].

Jackson (Extent of spread)[Q] Staging for CA Penis	
Stage I	Confined to **glans** or **prepuce**
Stage II	Extension to **shaft**
Stage III	**Operable inguinal LN metastasis**
Stage IV	**Inoperable** inguinal LN metastasis or **local** or **advanced spread**



Cut section of penis

7th AJCC (2010) TNM Staging for CA Penis	
T: Primary tumor	**N: Regional lymph nodes**
Tis: Carcinoma in-situ **Ta**: **Noninvasive verrucous carcinoma**	**N1**: Metastasis in **single superficial** inguinal LN
T1a: **Invades subepithelial connective tissue** without lymphovascular invasion and is not poorly differentiated	**N2**: Metastasis in **multiple** or **bilateral superficial** inguinal LNs
T1b: Invades subepithelial connective tissue **with lymphovascular invasion** or **poorly differentiated**	**N3**: Metastasis in **deep inguinal** or **pelvic** LNs
T2: Invades **corpus spongiosum** or **cavernosus**	
T3: Invades **urethra**	**M: Distant metastases**
T4: Invades **other adjacent structures**	M0: No distant metastasis M1: Distant metastasis present

Stage 0	Stage I	Stage II	Stage IIIA	Stage IIIB	Stage IV
Tis N0M0 **Ta** N0M0	**T1a** N0M0	**T1b** N0M0 **T2** N0M0 **T3** N0M0	**T1-3 N1** M0	**T1-3 N2** M0	**T4** any N M0 Any T **N3** M0 Any T any N **M1**

85. **Ans. d. 'Verrucous' carcinoma of the penis** 86. **Ans. a. MRI**

87. **Ans. d. Erosion of femoral vessels**
88. **Ans. c. Sentinel LN biopsy in penile carcinoma**
89. **Ans. a. Cabana**
90. **Ans. c. Penis**
91. **Ans. c. Circumcision if done any time before puberty provides 100% protection against carcinoma penis**
92. **Ans. c. Arises from corona of glans**
93. **Ans. b. Prepuce**
94. **Ans. d. Transitional cell carcinoma**
95. **Ans. d. Wide excision**
96. **Ans. c. Carcinoma penis** *(Ref: Mastery of Surgery 5/e p1531)*

"The historic contribution by **Cabana** in 1977 (Cancer 1977; 39:456) **established the importance, lymphatic histology with sentinel lymph node mapping** of patients with **penile carcinoma**. This approach identified the **sentinel lymph node** as the **first site of residual nodal metastasis** and is **predictive of the nodal status of the remaining node basin."**

97. **Ans. a. Most common type is verrucous**

URETHRAL CARCINOMA

98. **Ans. A Bulbomembranous urethra** *(Ref: Smith 17/e p416-417; Campbell 10/e p946-951; Bailey 25/e p1367, 25/e p1370)*

Carcinoma of Male Urethra

- **Chronic irritation** and **infection**Q are the strongest risk factors
- Incidence of **urethral stricture** in men with development of urethral cancer: **24–76%**Q
- **HPV-16**Q has a causative role in SCC of urethra
- **MC presenting symptom**: **palpable mass** associated with **obstructive voiding symptoms**Q

Pathology

- **MC site** is **bulbomembranous urethra**Q> penile urethra> prostatic urethra

> - **Overall, MC type** is **SCC**Q >TCC > adenocarcinoma.
> - **MC type** of carcinoma **prostatic urethra** are **TCC**Q >SCC.
> - **MC type** of carcinoma **penile urethra** are **SCC**Q >TCC.

- Lymphatics of the **anterior urethra** drain into the **superficial** and **deep inguinal LNs**Q
- Lymphatics of the **posterior urethra** drain into **external iliac, obturator** and **hypogastric LNs**Q**.**

Diagnosis

- **MRI with gadolinium** is **IOC** for evaluating **local soft tissue, LNs metastasis**Q

Treatment

- **Surgery** is **mainstay of treatment**Q. Radiotherapy is also used.
- **Ilioinguinal node dissection** only in presence of palpable adenopathy.

MISCELLANEOUS

99. **Ans. a. Urethra is short**
100. **Ans. c. Voiding cystogram** *(Ref: Sutton Radiology 7/e p898-899)*
    - **Voiding cystourethrography** is the **best method** to visualize the **posterior urethra** Q.
    - **Anterograde techniques** are **best for** visualization of **posterior urethra** Q.
    - **Reterograde techniques** (contrast is injected through tip of urethra) is **best for** visualization of **anterior (penile) urethra** Q**.**
101. **Ans. a. External meatus** *(Ref: BDC 4/e pvol-II/348-349)*
    - Length of **male** urethra: **20 cm** Q**; Female** urethra: **4 cm** Q
    - **Membranous urethra** is **shortest**Q and **Penile urethra** is **longest**Q
    - **Prostatic urethra** is **widest** and **most dilatable portion** Q
    - **Urethral orifice** (followed by membranous urethra) is **narrowest** or **least dilatable part**Q

Part of urethra	Characteristic Features
Prostatic	• **Widest** and **most dilatable**Q • Shows urethral crest (**verumontanum**)Q, **colliculus seminalis**, **prostatic sinuses** and **opening of prostatic utricle** • Transverse section is semilunar

Part of urethra	Characteristic Features
Membranous	• With the **exception of urethral orifice**, this is the **narrowest** and **least dilatable part**[Q] of **male urethra** • **Shortest**[Q] portion of urethra • **Surrounded by** spincter uretherae or **external sphincter** and **bulbourethral glands of cowper**[Q] • Transverse section is star shapped or stellate.
Spongy/Penile	• **Longest**[Q] portion • **External urethral orifice** is the **narrowest**[Q] **part** • Dilated at commencement to form intrabulbar fossa and at glans to form **navicular** or **terminal fossa.** • **Bulbourethral gland** and **urethral glands of Litter** of open in lacunae of present in roof of navicular fossa

- **Ducts of Bulbourethral gland open into the penile urethrae** while **glands** themselves **lie around the membranous urethra.**

102. Ans. c. 20 cm

103. Ans. b. 4 cm

104. Ans. a. Prostatic

105. Ans. b. Membranous

106. Ans. a. Syphilis

107. Ans. b. Mid-penile urethra

108. Ans. a. Tyson gland

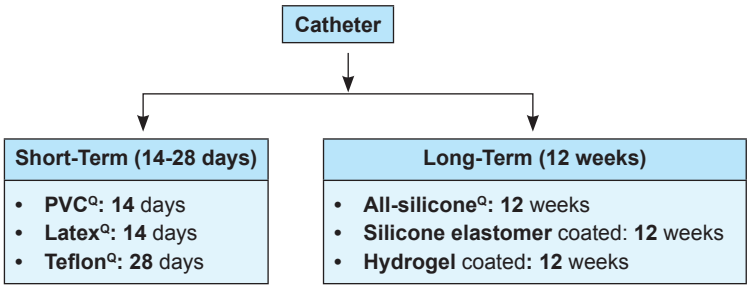
- **Tyson's Glands** ultimately produce an **oily substance**, which, when **mixed with shed skin cells,** constitute **smegma**[Q].

109. Ans. a. Posterior urethral valve

- **Renal parenchymal dysplasia** is the **most important factor** in overall **prognosis**[Q] in posterior urethral valve.

110. Ans. b. Silicone *(Ref: www.nursing-standard..co.uk)*

- **All silicone catheters** are **suitable for use in** patients with **latex allergy** and **can remain in situ for 12 weeks**[Q] or according to manufacturer's instruction.



111. Ans. a. Painful priapism

- **Penile angiography** is **indicated in high flow, non-ischemic priapism**, which is painless[Q].
- It is **not indicated in painful (low-flow) priapism**[Q].

112. Ans. a. External urethral meatus

113. Ans. d. Membranous

114. Ans. c. Priapism

115. Ans. a. Urethritis *(Ref: Bailey 25/e p1366)*

Three Glass Urine Test

- A three glass test will help to **localize the site of bleeding in urinary tract.**
- If there is **blood in the initial specimen** only, the **urethra** is probably the site of bleeding.
- If the blood is primarily in the **final specimen**, the **bladder** is the most likely site of bleeding.
- **Equal blood discoloration** in all specimens points to a **renal lesion.**

CHAPTER 25

Testis and Scrotum

MULTIPLE CHOICE QUESTIONS

UNDESCENDED TESTIS

1. Best time for surgery of undescended testis is: *(All India 2010)*
a. Just after birth
b. 6 months of age
c. 12 months of age
d. 24 months of age

2. Surgery for undescended testis is recommended at what age? *(COMEDK 2014, All India 2011)*
a. 6 months
b. 12 months
c. 24 months
d. 36 months

3. Incidence of undescended testis in normal new born: *(DNB 2007)*
a. 3%
b. 6%
c. 9%
d. 12%

4. Most common tumors in undescended testis: *(DNB 2005, Punjab 2009)*
a. Seminoma
b. Teratoma
c. Embryonal carcinoma
d. None

5. Stephen Fowler surgery is done for: *(GB PANT 2010)*
a. Ectopic testis
b. Undescended testis
c. Hypospadias
d. Epispadias

6. All can be prevented by orchiopexy in cryptorchidism except: *(AIIMS Nov 99)*
a. Testicular tumor
b. Epididymoorchitis
c. Torsion of testis
d. Sexual ambiguity

7. Which of the following investigation is used to confirm anorchia? *(AIIMS Nov 2013)*
a. PET
b. MRI
c. Laparoscopy
d. USG

8. Orchidopexy is done in cases of undescended tests at the age of: *(AIIMS June 2006)*
a. Infancy
b. 1-2 years
c. 5 years
d. Puberty

9. What is not seen in undescended testis? *(AIIMS June 95)*
a. Hydrocele
b. Hernia
c. Teratoma
d. Seminoma

10. Incompletely descended testis is commonest on: *(JIPMER 78, 79, PGI 85)*
a. Right side
b. Left side
c. Both side
d. Right sided only

11. A 5-years old male child has been brought with a complaint that there is only one testis in the scrotum. On examination, it is found that the testis on the opposite side is felt in the inguinal canal. The patients should be advised: *(UPSC 96)*
a. Orchiopexy
b. To wait till puberty
c. Orchidectomy
d. Administration of androgens

12. Which one of the following statement is true of undescended testis? *(UPSC 97)*
a. Usually descends spontaneously at puberty
b. Orchidopexy to be done if no descent by puberty
c. Has higher incidence of malignancy
d. Maintains normal sperm production

13. True about incompletely descended testis are all of the following except: *(MCI March 2008)*
a. Early repositioning can preserve function
b. It may lead to sterility, if bilateral
c. Poorly developed secondary sexual characters
d. May be associated with indirect inguinal. hernia

14. Testis does not descend beyond: *(JIPMER 2012)*
a. 2 months
b. 4 months
c. 6 months
d. 8 months

ECTOPIC TESTIS

15. Most common site of ectopic testis: *(GB PANT 2010)*
a. Superficial inguinal pouch
b. Root of penis
c. Femoral trinangle
d. Perineum

16. Ectopic testis is found in all location except: *(AIIMS 87)*
a. Lumbar
b. Perineal
c. Intra abdominal
d. Inguinal

17. Complication of ectopic testis is: *(Kerala 94)*
a. Seminoma
b. Atrophy
c. Torsion
d. All

TESTICULAR TORSION

18. True about torsion of testis is all except: *(AIIMS Nov 2001)*
a. Presents with sudden pain in testis
b. Commonly associated with pyuria
c. Doppler U/S shows decreased blood flow to the testis
d. Simultaneous orchiopexy of the other side should also be done

19. A 30-years old male patient presents with sudden onset swelling and pain over the right hemiscrotum. On examination the scrotum is reddened and tender. Which of the following statement about the affecting condition is not true? *(All India 2008)*
a. Probable diagnosis is torsion
b. The right testis is likely to ride high in the scrotal compartment
c. If torsion confirmed, treat with antibiotics and analgesics and perform corrective surgery immediately
d. If torsion confirmed, treat with antibiotics and analgesics and perform corrective surgery after 14 days

20. All of the following abnormalities are predisposing causes for torsion of the testis except: *(COMEDK 2006)*
a. Inversion of testis
b. Low investment of tunica vaginalis
c. Between 10 to 25 years of age
d. Separation of the epididymis

21. All are true regarding torsion of the testis, except:
a. Common in adolescents and young adults *(Orissa 2011)*
b. Inversion of testis is the most common predisposing cause
c. Elevation of testis reduces the pain
d. If diagnosis is doubtful, prompt exploration is the rule

22. A 40-years old man in suffering from fever and pain in scrotum which is not relieved by elevation of testis, 3 days before had sexual contact with a young female: *(All India 97)*
a. Testicular tumor b. Acute epididymitis
c. Torsion of testis d. Acute orchitis

23. Torsion of testis has to be treated within: *(DNB 2007)*
a. Immediately b. 6 hours
c. 12 hours d. 15 hours

24. In testicular torsion, surgery within how much time can save viability of testis? *(Recent Questions 2013)*
a. 6 hour b. 12 hour
c. 24 hour d. 1 weeks

25. All the following statements are true regarding torsion of testis except: *(APPG 2015)*
a. Most common between 10 and 25 years of age
b. Prompt exploration and twisting & fixation is the only way to save the torted testis
c. Anatomical abnormality is unilateral and contalateral testis should not be fixed
d. Inversion of testis is the most common predisposing cause

VARICOCELE

26. Not true about varicocele is: *(AIIMS Nov 2001)*
a. Common on the right side
b. Can present as a later sign of renal cell carcinoma
c. Has bag of worm like feeling
d. Can lead to infertility

27. Varicocele is common on left testis because: *(All India 98)*
a. Left testicular vein drains into IVC which has high pressure
b. Left testicular vein drains into left renal vein which has high pressure
c. Left testis is lower situated
d. Compression of testicular vein by rectum

28. In the treatment of varicocele, testicular vein ligation is done at the level of: *(DPG 96)*
a. Above inguinal ligament b. Below inguinal ligament
c. Neck of the sac d. Scrotum

29. Which is not true regarding varicocele? *(All India 88)*
a. Testicular veins involved
b. More common on the right side
c. May be the first feature of a renal tumour
d. Feels like a bag of worms

30. A 58-years old male presenting with acute onset of varicocele on left side most probable cause: *(CMC 98)*
a. CA testes b. Epididymitis
c. Inguinal lymph nodes d. CA kidney

31. Varicocele of pampiniform plexus of veins has all the following characteristics except: *(MPPG 97)*
a. Negative transillumination test
b. Reducible
c. Cough impulse is present
d. Frequently on right side

32. Most common cause of surgically treatable male infertility is: *(MAHE 98)*
a. Varicocele b. Cryptorchidism
c. Stricture urethra d. Epididymitis

33. Which of the following is true about varicocele except?
a. Incompetent valves of testicular vein are responsible for varicocele *(MAHE 2006)*
b. 90% are on the left side
c. Asymptomatic cases require surgery
d. Femoral catheterization with spermatic vein ablation is done in recurrence

34. With reference to varicocele, which one of the following is not true of it? *(UPSC 2007)*
a. Varicosity of cremastric veins
b. Left side is affected usually
c. Feel like a bag of worms
d. May lead to infertility

35. After varicocele surgery, venous drainage occurs by:
a. Cremasteric veins *(MHSSMCET 2006)*
b. Penile veins
c. Ectopic in the iliac fossa
d. Present at the usual location

36. True about varicocele is: *(DNB 2007)*
a. More common on right side
b. Can cause oligospermia
c. No effect on valsalva
d. Lies anterior to testis

37. A young adolescent male came with painless swelling in scrotum since 2-3 months. On palpation, it feels like a bag of worms. What is the possible diagnosis? *(MHSSMCET 2010)*
a. Varicocele
b. Testicular abscess
c. Epididymo-orchitis
d. Hydrocele

38. True about varicocele due to renal cell carcinoma is:
a. More common on right side *(MHPGMCET 2003)*
b. Temperature induced damage to testes occurs
c. Cough impulse is positive
d. Does not decompress in supine position

39. Operative managements of varicocele are indicated in which of the following conditions(s)? *(PGI Dec 2008)*
a. Ipsilateral testis small size
b. Oligopsermia on semen analysis
c. Grade- 3 varicocele (large size)
d. Signs or symptoms present
e. Subclinical presentation

SPERMATOCELE

40. Regarding spermatocele which is correct? *(PGI 88)*
a. Occurs in head of epididymus
b. Barely water fluid in appearance
c. Tender
d. Contain spermatozoa

41. Chinese lantern on transillumination seen in:
a. Spermatocele b. Epididymal cyst
c. Hydrocele of cord d. Secondary Hydrocele

42. Regarding spermatocele all are correct except:
a. Occurs in the head of Epididymis
b. Barley water fluid
c. Tender
d. Contain spermatozoa

HYDROCELE

43. Hydrocele is labeled 'vaginal' when it is: *(AIIMS 96)*
a. Limited to scrotum
b. Upto inguinal canal
c. Communicating into coelomic cavity
d. Upto deep inguinal ring

44. Treatment of a large hydrocele in an infant: *(Kerala 97)*
a. Repeated aspirations
b. Ligation of sac at the opening of inguinal canal
c. Herniotomy
d. Eversion of sac

45. Cause of hydrocele in infants: *(CMC 98)*
a. Patent processus vaginalis
b. Patent gubernaculums
c. Impaired drainage
d. Epididymal cyst
e. Infection

46. Congenital hydrocele is best treated by:
(DNB 2009, 2008, 2005, 2001, Punjab 2011, AIIMS June 2001)
a. Eversion of sac
b. Excision of sac
c. Lords procedure
d. Herniotomy

47. Which is false about hydrocele? *(APPG 2008)*
a. Almost always fluid is transudate
b. Get above the swelling
c. Testis is separate from swelling
d. Obscures inguinal hernia

48. Lord's and Jaboulay's operation is done for: *(AMU 2005)*
a. Rectal prolapsed
b. Fistula in ano
c. Inguinal hernia
d. Hydrocele

49. Lords placation is done for: *(All India 2010)*
a. Inguinal hernia
b. Testicular cancer
c. Hydrocele
d. Testicular varices

50. Classical treatment of hydrocoele: *(DPG 2008)*
a. Aspiration
b. Aspiration and sclerosant agent
c. Surgery
d. Tapping

EPIDIDYMOORCHITIS

51. Most common cause of acute epididymitis in males:
(COMEDK 2010, GB PANT 2011)
a. E. coli
b. Proteus
c. Chlamydia trachomatis
d. N. gonorrhoea

52. Positive Prehn's sign is: *(DNB 2010)*
a. Elevation of testis increases pain of epididymitis
b. Elevation of testis reduces pain of epididymitis
c. Depression of testis increases pain of epididymitis
d. Depression of testis reduces pain of epididymitis

53. T.B. testis first affects: *(DPG 95)*
a. Vas
b. Epididymis
c. Body of testis
d. Tunica vaginalis

54. True about acute epididymitis is: *(AIIMS Feb 97, All India 96)*
a. Associated with urinary infection
b. Painless
c. Scrotum size is reduced
d. Does not mimic with torsion of testes

55. A 16-years old boy presents with acute onset pain in the left testis. The following statements about his management are true except: *(AIIMS Nov 2005)*
a. The patient should be prescribed antibiotics and asked to come after a week
b. Colour flow Doppler will be very useful in diagnosis
c. Scrotal exploration should be done without delay if Doppler is not available
d. If left testis is not viable on exploration, patient should undergo left Orchidectomy and right orchidopexy

56. Orchitis without epididymitis is seen in: *(All India 92)*
a. Gonorrhoea
b. Tuberculosis
c. Syphilis
d. Chlamydia infection

57. In differential diagnosis of epididymo-orchitis and torsion it is important that: *(AIIMS 95)*
a. Elevation of testis in torsion relieves pain
b. Elevation of testis in epididymoorchitis relieves pain
c. Tenderness is characteristic of torsion of testis
d. Fever is characteristic of epididymoorchitis

58. Acute orchitis all are seen except: *(Recent Questions 2013)*
a. Increased local temperature
b. Decreased blood flow
c. Etythematous scrotum
d. Raised TLC

59. Prehn sign is seen in: *(Recent Questions 2013)*
a. Acute orchitis
b. Chronic orchitis
c. Testicular torsion
d. None

FOURNIER'S GANGRENE

60. Fournier's gangrene occurs in the: *(JIPMER 90)*
a. Toes
b. Scrotum
c. Fingers
d. Muscles

61. All are features of Fournier's gangrene except: *(MAHE 2007)*
a. Testicles are involved
b. Obliterative arteritis seen
c. Hemolytic streptococci, isolated
d. Necrotizing fascitis

62. All are features of Fournier's gangrene except: *(MAHE 2008)*
a. Testicles are involved
b. Obliterative arteritis seen
c. Hemolytic streptococci
d. Necrotising fasciitis
e. E. coli, staphylococci, Cl. welchii can be isolated

63. Fournier's gangrene is seen in: *(MCI Sept 2008)*
a. Scrotum
b. Shaft of penis
c. Base of penis
d. Glans penis

TESTICULAR CARCINOMA PREDISPOSING FACTORS

64. Predisposing factor of Testicular germ cell tumor:
a. Cryptorchidism *(PGI Dec 2003)*
b. Testicular feminization syndrome
c. Klinefelter's syndrome
d. Radiation
e. Trauma

65. Testicular cancer is common in: *(All India 91)*
a. Ectopic testis
b. Undescended abdominal testis
c. Atrophic testis
d. Anteverted testis

TESTICULAR CARCINOMA

66. Most radiosensitive testicular tumour is: *(MCI March 2008)*
a. Seminoma b. Teratoma
c. Interstitial tumours d. Lymphoma

67. Most common testicular tumour in 4th decade: *(MCI Sept 2008)*
a. Teratoma b. Dermoid
c. Seminoma d. All of the above

68. Which of the following is false about testicular tumor?
a. Pure seminoma is more aggressive than non-seminoma
b. Seminoma is radiosensitive *(AIIMS May 2009)*
c. Seminoma can be treated by orchidectomy with radiotherapy
d. Seminoma spreads commonly through lymphatics

69. A patient presented with a hard swelling in this right testis. All are true statements except: *(AIIMS Nov 2001)*
a. Trans scrotal biopsy is needed
b. Inguinal exploration is done
c. High inguinal exploration should be done
d. Scrotal USG is done

70. Germ cell tumors of testis are: *(PGI June 2001)*
a. Seminoma
b. Teratoma
c. Leydig cell tumour
d. Gynandroblastoma
e. Rhabdomyoma

71. Most common testicular tumor in prepubertal adults is: *(AIIMS May 2008)*
a. Yolk sac tumor b. Embryonal cell Ca
c. Seminoma d. Teratoma

72. Intratubular germ cell tumor found adjacent to: *(PGI May, Dec 2006)*
a. Spermatocytic seminoma b. Dysgerminoma
c. Yolk sac tumor d. Embryonal carcinoma
e. Choriocarcinoma

73. Which of the following is not seen in testicular carcinoma? *(APPG 2006)*
a. Abdominal lump
b. Epidydimoorchitis
c. Inguinal lymphadenopathy
d. Hydrocele

74. All of the following clinicopathologic features are seen more often in seminomas as compared to non-seminomatous germ cell tumors of the testis except: *(AIIMS May 2005, Nov 2004)*
a. Tumors remain localized to testis for a long time
b. They are radiosensitive
c. They metastasize predominantly by lymphatics
d. They are often associated with raised levels of serum AFP and HCG

75. Following statements are true about germ cell tumors of testis except: *(AIIMS Nov 2002)*
a. They constitute 90–95% of pall primary testicular tumors
b. Seminoma is the most common tumor developing in the patients with cryptorchid testis
c. AFP is markedly raised in all germ cell tumors
d. High inguinal orchidectomy is the initial surgical procedure

76. Testicular tumor with best prognosis is: *(PGI Dec 96)*
a. Teratoma b. Seminoma
c. Choriocarcinoma d. All of the above

77. Marker for testicular tumor is: *(AIIMS June 97, PGI June 95)*
a. Beta-hCG b. Acid phosphatase
c. Alkaline phosphatase d. Alpha-fetoprotein

78. A testicular tumor in a man aged 60-years is; most likely to be: *(All India 2001)*
a. Germ cell tumor b. Sertoli cell tumor
C. Teratocarcinoma d. Lymphoma

79. Shyam, a 50-years old male presents with a hard scrotal swelling. All of the following can be done except: *(AIIMS June 2001)*
a. Testicular biopsy b. Chest X-ray
c. Inguinal exploration d. CT abdomen

80. Regarding testicular tumour, the following are false except: *(AIIMS June 2003)*
a. They are commonest malignancy in older man
b. Seminomas are radiosensitive
c. Only 25% of stage I teratomas are cured by surgery alone
d. Chemotherapy rarely produces a cure in those with metastatic disease

81. Placental alkaline phosphatase is marker of: *(PGI Dec 99)*
a. Theca cell tumour b. Teratoma
c. Choriocarcinoma d. Seminoma

82. Tumor marker for seminoma: *(AIIMS Nov 2013)*
a. PLAP b. LDH
c. AFP d. HCG

83. What % of testicular carcinoma is associated with cryptorchidism?
a. 10% b. 30% *(PGI Dec 98)*
c. 70% d. 90%

84. Which of the following statements is true regarding testicular tumors? *(All India 2006)*
a. Are embryonal cell carcinomas in 95% of cases
b. Bilateral in upto 10% cases
c. Teratomas are more common than seminomas
d. Usually present after 50-years of age

85. Which of the following is true about seminoma?
a. It is radiosensitive *(PGI Dec 2005)*
b. It arises only from cryptorchid testis
c. AFP is increased
d. It is chemosensitive

86. Testicular teratoma in adults is: *(DNB 2011)*
a. Benign b. Malignant
c. Locally aggressive d. Border line

87. It is true about seminoma testis that: *(AIIMS 85)*
a. It commonly occurs in the 6th decade
b. An undescended tests is more liable to develop this tumour
c. Histologically it resembles dysgerminoma of the ovary
d. It is radioresistant

88. Seminoma testis is seen: *(Assam 96)*
a. Always in undescended testis
b. Always bilateral
c. Occurs in younger
d. Occurs in elderly

89. Testis tumor is associated with secondary hydrocele in: *(Karnataka 95)*
a. 1% of cases b. 10% of cases
c. 20% of cases d. 30% of cases

90. Most common testicular tumor in prepubertal adults is: *(AIIMS May 2008)*
a. Yolk sac tumor b. Embryonal cell Ca
c. Seminoma d. Teratoma

91. Carcinoma testis, the lymphatic metastasis goes to the first site seen in: *(UPPG 2010)*
a. Para-aortic lymph nodes b. Superficial inguinal nodes
c. Deep inguinal nodes d. Internal iliac nodes

92. A 25-years old man presents with hydrocele on the left side. Associated condition could be a:
a. Nephroma b. Hepatic malignancy
c. Testicular tumour d. Penile malignancy

93. All are true regarding seminoma except: *(UPPG 2009)*
a. Common in age between 35 and 45 years
b. Metastasis to lymphatics
c. Radioresistant
d. Not seen before puberty

94. Seminoma of testis has all the following tumour markers except: *(COMEDK 2006)*
a. AFP b. HCG
c. LDH d. Alkaline phosphate

95. Most malignant testicular tumour is: *(DNB 2004)*
a. Seminoma b. Teratoma
c. Choriocarcinoma d. Embryonal carcinoma

96. A 20-years old male presents with scrotal mass. The first investigation to be done is: *(JIPMER 2011)*
a. Clinical evaluation (Palpation and transillumination)
b. USG
c. Biopsy
d. AFP

97. Most radiosensitive testicular tumor is: *(UPSC 2005, MHPGMCET 2002)*
a. Seminoma b. Teratoma
c. Lymphoma d. Sertoli cell tumor

98. Testicular tumor, that is rare in childhood: *(MHPGMCET 2006)*
a. Seminoma b. Teratoma
c. Interstitial cell tumor d. None

99. Testicular tumor can simulate: *(PGI SS June 2004)*
a. Hydrocele b. Hematocele
c. Acute epididymoorchitis d. Chronic orchitis

100. A 12-year old boy presents with serotal mass. The next best things to do in this patent is: *(JIPMER 2011)*
a. Clinical evaluation b. USG
c. Biopsy d. Immenate surgery

TESTICULAR CARCINOMA STAGING

101. High inguinal orchidectomy specimen showed tumor testis with involvement of epididymis without vascular invasion; stage is: *(MAHE 2007)*
a. T1 b. T2
c. T3 d. T4

102. High inguinal orchiectomy specimen showed teratoma testis with involvement of epididymis; stage is: *(DNB 2011, MAHE 2008)*
a. T1 b. T2
c. T3 d. T4b

TESTICULAR CARCINOMA TREATMENT

103. Stage I seminoma testis, treatment of choice is:
a. High inguinal orchidectomy *(AIIMS Nov 2001)*
b. High inguinal orchidectomy and radiotherapy
c. Radiotherapy and chemotherapy
d. Trans-scrotal orchidectomy

104. The treatment of metastatic testicular carcinoma is:
a. Bleomycin, Etoposide, Cisplatin *(PGI June 99)*
b. Vinablastine, Etoposide, Cisplatin
c. Doxorubicin, 5-FU, mercaptopurine
d. Methotrexate, 5-FU, Vincristine

105. A 27-years old man presents with a left testicular tumor with a 10 cm retroperitoneal lymph node mass. The treatment of choice is: *(All India 2003)*
a. Radiotherapy
b. Immunotherapy with interferon and interleukins
c. Left high inguinal orchiectomy plus chemotherapy
d. Chemotherapy alone

106. Treatment of extragonadal germ cell tumour is: *(All India 99)*
a. Chemotherapy b. Radiotherapy
c. Surgery d. Immunotherapy

107. Which one of the following is the treatment of choice for a 4 cm retroperitoneal lymph node mass in a patient with non seminomatous germ cell tumor of the testis? *(AIIMS Nov 2004)*
a. Radical radiotherapy alone
b. High orchidectomy + RPLND
c. RPLND alone
d. High orchidectomy alone

108. A patient comes with stage III non seminomatous testicular tumor, treatment of choice is: *(AIIMS June 97)*
a. Radiotherapy b. Chemotherapy
c. Hormonal therapy d. Surgery

109. Disseminated seminoma is treated by: *(PGI 88)*
a. Chemotherapy or radiotherapy and ochidectomy
b. Only radiotherapy
c. Only chemotherapy
d. RPLND

110. Stage-II testicular teratoma is treated by:
a. Orchidectomy + RPLND *(DNB 2008, 2005, AMU 05)*
b. Orchidectomy + Chemotherapy
c. Orchidectomy
d. Radiotherapy

111. Treatment of stage I teratoma is: *(MCI Sept 2008)*
a. Chemotherapy b. Radiotherapy
c. Chemotherapy plus Radiotherapy
d. Observation /RPLND

112. Which of the following is a known complication of modified RPLND (Retroperitoneal lymph node dissection) done for non-seminomatous germ cell tumor of testis? *(MHSSMCET 2005)*
a. Impotence b. Bladder atony
c. Dry ejaculation d. Retrograde ejaculation

113. Which of the following testicular tumor does not require RPLND? *(MHSSMCET 2005)*
a. Germ cell tumor b. Embryonal cell tumor
c. Seminoma d. Teratoma

114. Treatment of Non-seminomatous germ cell tumor of testis with more than 4 cm RPLN includes: *(PGI May 2011)*
a. RPLND b. Inguinal orchidectomy
c. Chemotherapy
d. Radiotherapy
e. Orchidectomy through mid testicular incision

SEX CORD / GONADAL STROMAL TUMORS

115. Not true of sertoli cell tumour: *(Punjab 2009)*
a. Poor response to radiotherapy
b. Prominent lymphocytes in section
c. Common in adults
d. Can be malignant in 10–20% of cases

CARCINOMA SCROTUM

116. The lymph nodes first involved in cancer of the skin of the scrotum are: *(Karnataka 96)*
a. Superficial inguinal
b. External iliac
c. Para aortic
d. Gland of Cloquet

ORCHIDECTOMY

117. Subcapsular orchiectomy is done for cancer of: *(DNB 2008, APPG 96)*
a. Tests
b. Prostate
c. Penis
d. Urethra

118. Ligation of cord in orchidectomy for treatment of testicular tumor is done at: *(PGI 96)*
a. External ring
b. Internal ring
c. Base of scrotum
d. Just above epididimis

119. Subcapsular orchidectomy is done for cancer of: *(DPG 2005)*
a. Testis
b. Prostate
c. Penis
d. Male breast cancer

120. Orchidectomy is not done in: *(AIIMS June 2001)*
a. Prostate cancer
b. Seminoma testes
c. Filarial epididemo-orchitis
d. Male breast cancer

121. Orchiectomy is not indicated in: *(AIIMS Nov 99)*
a. Seminoma testis
b. Prostatic carcinoma
c. Tubercular epididymitis
d. Male breast cancer

MISCELLANEOUS

122. Dermoid arises from: *(PGI June 97)*
a. Pluripotent cell
b. Totipotent cell
c. Ectoderm
d. Mesoderm

123. Differential diagnosis of acute funiculitis with a small inguinal swelling is: *(TN 91)*
a. Undescended testes
b. Acute orchitis
c. Lymphadenitis
d. Small strangulated inguinal hernia

124. Which of the following closely mimics testicular malignancy? *(JIPMER 81, DPG 79, 93)*
a. Hydrocele
b. Hematocele
c. Spermatocele
d. Cyst of epididymis

125. The life of preserved semen for artificial insemination is: *(PGI 82, DNB 90)*
a. One year
b. Two years
c. Five years
d. Ten years
e. Fifty years

126. Best indication for testicular biopsy in a male is: *(All India 97)*
a. Polyspermia
b. Oligospermia
c. Necrospermia
d. Azoospermia

127. Which of the following structure in the spermatic cord is not damaged during vasectomy? *(AIIMS Nov 2012)*
a. Testicular artery
b. Ilioinguinal nerve
c. Autonomic nerves
d. Pampiniform plexus

128. Young male with history of trauma having left sided testis swollen and erythematous. Other side normal. Diagnosis: *(Recent Questions 2013)*
a. Torsion
b. Carcinoma
c. Hematoma
d. Hernia

EXPLANATIONS

UNDESCENDED TESTIS

1. **Ans. b. 6 months of age** *(Ref: Smith 17/e p25, 690, 704; Campbell 10/e p3560-3574; Bailey 26/e p1377-1379, 25/e p1377-1379)*

Undescended Testis

- UDT affects **3%** of **full-term**[Q] newborns.
- **Incidence** by **1 year** of age is **1%.**
- Approximately **70% to 77%** of UDT will **spontaneously descend**, usually by **3 months**[Q] of age.

> - **Birth weight**[Q] may be the **principal determinant** of UDT **at birth** and at **1 year** of life, **independent** of the **length of gestation**.

- In UDT, **80%** are **palpable** and **20%** are **nonpalpable**[Q].
- **MC location** for an ectopic UDT is within the **superficial pouch**[Q].

Pathology

- The **germ cell histology** of **both the testes** is **abnormal.**

The histopathologic hallmarks of UDT are evident between 1-2 years[Q] of age:
• **Decreased** numbers of **Leydig cells** (**Earliest abnormality**)[Q]
• **Degeneration** of **Sertoli cells**[Q]
• **Delayed disappearance** of **gonocytes**[Q]
• **Delayed appearance** of **adult dark spermatogonia**[Q]
• Failure of primary spermatocytes to develop[Q]
• **Reduced total germ cell counts**[Q]

- **Hypoplasia of the Leydig cells**, observed from the **1st month**[Q] of life, is the **earliest postnatal histologic abnormality**[Q] in UDT.
- Adverse effects on **contralateral testes**: Autoantibodies against UDT causes **degenerative changes** in contralateral testis, **germ cell histology** is **abnormal** and **risk of carcinoma**[Q] is also increased.

Associated Anomalies

- **Epididymal anomalies** and **patent processus vaginalis** up to **90%**[Q] cases of UDT.
- **Renal Anomalies** in **10% cases** (Renal hypoplasia, agenesis, horse shoe kidney, PUJ obstruction)
- **Hypospadias**

Hazards: (**SATHI**- Sterility, Atrophy, Trauma, Tumor, Torsion, Hernia, Inflammation)

Neoplasia
• Relative risk of testicular tumor is increased **17 times**.
• MC tumor that develops is **seminoma**[Q].
• **Higher the testis**, **greater the risk**[Q] (Abdominal testis has higher risk than inguinal)
• **Orchiopexy doesn't decrease the risk,** it **helps** in **early detection only**[Q].

Infertility
• **Histopathological changes** start at **1 year**[Q].
• At **6-8 years**, **spermatogenesis** is **absent**[Q].
• **Endocrine functions** are **retained** as the **Leydig cells** are **less sensitive** to **temperature**[Q].
• Surgical repositioning before the onset of histopathological changes decreases the risk of subfertility.
• **Paternity** is significantly **compromised** in men with **bilateral,** but not unilateral UDT.

- **Hernia: Patent processus vaginalis**[Q] is seen in **90%** cases of UDT.
- **Torsion:** Increased susceptibility

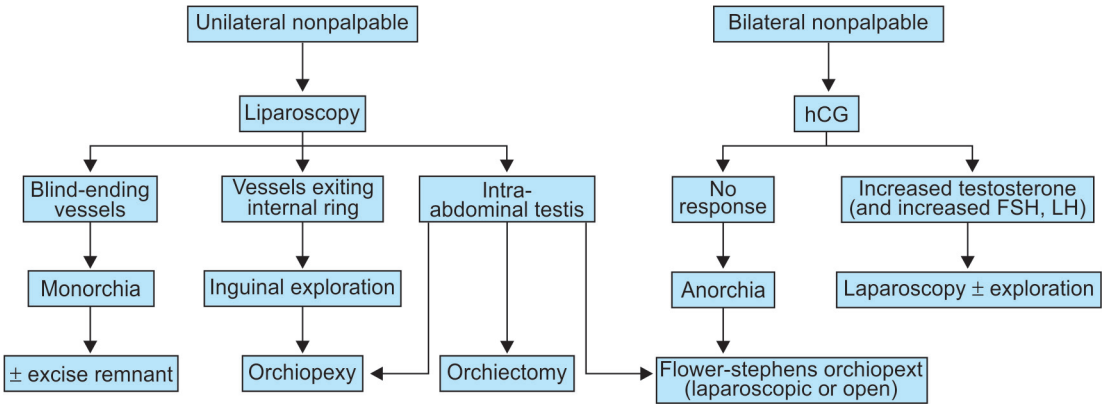
Diagnosis

- **Inguinal exploration** is **IOC** for UDT[Q].

Diagnostic Laparoscopy
• **IOC** for **'non-palpable'** UDT[Q]. • **MC application** of laparoscopy in children is for UDT. • **Accuracy** of transperitoneal laparoscopy in locating a non-palpable testis is **100%**[Q] and it subsequently defines the management options. • **Vas** and **testicular artery** is traced in pelvis. • **Blind ended vas doesn't conclude** the **absence of testis**[Q], whereas **blind ended testicular artery** is a **definitive investigation** for an **absence of testis**[Q]. • Laparoscopy is also useful in lap. assisted orchiopexy.

Management: Orchiopexy, **Ideal time**: **6-12 months**[Q] of age. (**Best time** is **6 months**[Q])

Types of Orchiopexy	
1. **Fowler-Stephens** orchiopexy[Q]	4. **Ombridann's** orchiopexy[Q]
2. **Microvascular testicular autotransplantation (Best results)**[Q]	5. **Placing testis in Dartos pouch**[Q]
3. **Ladd and Gross** orchiopexy[Q]	6. **Keetley-Torek** orchiopexy[Q]



2. **Ans. a. 6 months** *(Ref: Sabiston 18/e p2071; Abdominal wall Hernias- Principle and Management: Springer 2001/176)*

TIMING OF ORCHIOPEXY IN UDT

Sabiston 18/e p2071

- In most pediatric centers, orchiopexy for unilateral UDT is done when patient have reached about **6 months** of age[Q]. This **early intervention** may permit **post-natal germ cell development** to **proceed normally**[Q].

Abdominal wall Hernias- Principle and Management: Springer 2001/176

- In infants with congenital UDT, still undescended after 12 weeks of age, orchiopexy is recommended at **6 months** of age **before germ cell development becomes deranged**[Q].
- Achieve **scrotal placement** ideally by **6 months** of age and by **1 year** of age **at the latest**[Q].

3. **Ans. a. 3%**
4. **Ans. a. Seminoma**
5. **Ans. b. Undescended testis**
6. **Ans. a. Testicular tumor**
7. **Ans. c. Laparoscopy** *(Ref: Smith 17/e p25, 690, 704; Oxford Handbook of Urology 2/e p618-620; Campbell 10/e p3560-3574; Bailey 26/e p111)*

   Diagnostic laparoscopy** is a **definitive investigation** for an **absence of testis (anorchia).

   *"**Impalable undescended testes** are either **absent** or **located in** the **abdomen or inguinal canal**. There is **no benefit from imaging** and these are **best managed with a laparoscopy** and usually a staged approach."- Bailey 26/e p111*
8. **Ans. a. Infancy**
9. **Ans. a. Hydrocele**
10. **Ans. a. Right side**
11. **Ans. a. Orchiopexy**
12. **Ans. c. Has higher incidence of malignancy**
13. **Ans. c. Poorly developed secondary sexual characters**
14. **Ans. b. 4 months**

ECTOPIC TESTIS

15. Ans. a. Superficial inguinal pouch *(Ref: Smith 17/e p25; Bailey 26/e p1379, 25/e p1379)*

Ectopic Testis

- An ectopic testicle **descends normally through the inguinal canal** but then **moves into an abnormal position** in the **groin area**[Q].
- An **ectopic testis** is usually **fully developed**[Q]. The **main hazard** is **liability to injury**[Q].

Locations of Ectopic Testis
• **Superficial inguinal pouch (MC location)**[Q]
• **Femoral canal**[Q] (the inner portion of the thigh near the groin)
• **Perineum**[Q] (below the scrotum)
• **Suprapubic region**[Q] (above the penis)
• **Contralateral scrotum (Least common)**[Q]

Embryology

- Ectopic testis are likely related to **abnormalities of** the **gubernaculum**[Q], which is a fibrous, cord-like membrane that runs through the inguinal canal from the abdomen to the scrotum.
- The **gubernaculum helps to guide the descent** of the **testicles**[Q] and has branches that attach to these other locations.
- Ectopic testicles usually will not descend into the normal position in the scrotum on their own.
- **Most ectopic testicles** can be felt (**are palpable**)[Q].

Treatment

- **Surgical treatment** to place an ectopic testicle in its normal position any time **after about age 6 months** but **no later than 2 years of age**[Q].

16. Ans. a. Lumbar, c. Intra abdominal

17. Ans. d. All

TESTICULAR TORSION

18. Ans. b. Commonly associated with pyuria *(Ref: Smith 17/e p704; Campbell 10/e p67, 3587-3594; Bailey 26/e p1379-1380, 25/e p1379-1380)*

Testicular Torsion

- Twisting of testis on the spermatic cord, resulting in strangulation of the blood supply and infarction of testis.
- Types of testicular torsion: Intravaginal and Extravaginal.

Intravaginal Testicular Torsion

- **Torsion** occurs **within the space of tunica vaginalis**, which is **highly invested**[Q], resulting in lack of normal fixation of the testis and epididymis to the fascial and muscular coverings (scrotal parietal wall)
- **MC age group** affected is **10-25 years**, with peak in **prepubertal age**[Q]
- **Cremaster fibers** have a **spiral attachment over the cord**, it favors rotation **when cremaster reflex** is **strong**[Q].

Predisposing Factors

- **Inversion of the testis** (testis lies transversely or upside down) is **MC predisposing factor**[Q]
- **High investment of tunica vaginalis** causes the **testis to hang within the tunica** like a **clapper in a bell**[Q]
- **Separation of the epididymis from the body of testis**[Q] permit torsion of testis without involving cord

Clinical Features

- **Sudden agonizing scrotal pain** with **nausea or vomiting**[Q]
- **Dysuria** or other **bladder symptoms** are usually **absent**[Q]
- Affected **testis high-riding in scrotum**, may have **abnormal transverse orientation**[Q]
- **Cord** is usually **thickened**[Q]

- **Absent cremasteric reflux**[Q] is **highly suggestive** of torsion testis (**present in epididymitis**)

- After several hours massive scrotal edema may obliterate all the findings
- **Prehn's sign** is **negative**[Q] (On elevation of testis, pain relieved in epididymoorchitis but not in torsion testis)

Imaging

- **Color Doppler** detects the **decreased blood flow** to the testis in torsion and is **investigation of choice**[Q] to exclude torsion from epididymoorchitis.

- **Tc99 pertechnate scan** demonstrate **poor radionuclide tracer uptake**[Q]

Treatment

- Testicular torsion is **urological emergency** as ischemic injury occurs as soon as **4 hours**[Q] after occlusion of the cord.

> - **Immediate surgical exploration**[Q] is indicated if testicular torsion is suspected because if treated within first 4 hours, the chances of testicular salvage are high.

- Even if manual detorsion is done, it may not totally correct the rotation and prompt exploration is still indicated.
- Viable as well as testis of marginal viability are preserved, and **orchiopexy** is done either by **placing into dartos pouch without suture fixation** or **suture fixation of tunica albuginea with the parietal wall**[Q].

> - **Exploration of contralateral hemiscrotum** must be carried. In almost all cases, a **bell clapper deformity is found.**
> - **Contralateral testis** must be **fixed** to **prevent subsequent torsion**[Q].

- **Risk of autoimmunization** against own sperms is **low in children <10 years**, because there is no blood testis barrier and spermatogenesis is dormant.
- Current recommendation is **preserve a compromised testis in children <10 years**, proceed with orchidectomy in older children.

Extravaginal Testicular Torsion

- There is **no anatomical defect**[Q]
- Occurs in **perinatal period**, as there is **no testicular fixation**[Q] (adherence of tunica vaginalis to the dartos layer) by that time, and as a result the spermatic cord and tunica vaginalis **rotate as one unit**[Q]

Prenatal torsion	Postnatal torsion
• A **hard non-tender testis** at birth, **fixed to the overlying skin**[Q] • **Salvage rate** is **nil**[Q] • **Contralateral scrotal exploration** is **not recommended**[Q] as it is not associated with a testicular fixation defect	• **Swelling and tenderness of scrotum**, usually **no fixation**[Q] of the skin • **Prompt surgical exploration** is indicated • **Exploration of contralateral testis** should be done as **20% cases** are associated with **bell clapper deformity**[Q]

19. **Ans. d. If torsion confirmed, treat with antibiotics and analgesics and perform corrective surgery after 14 days**
20. **Ans. b. Low investment of tunica vaginalis**
21. **Ans. c. Elevation of testis reducers the pain**
22. **Ans. c. Torsion of testis**
23. **Ans. a. Immediately**
24. **Ans. a. 6 hour**
25. **Ans. c. Anatomical abnormality is unilateral and contalateral testis should not be fixed**

VARICOCELE

26. **Ans. a. Common on the right side** *(Ref: Smith's Urology 17/e p704-705, 143-144; Campbell's 10/e p3575-3582; Bailey 26/e p1380-1381, 25/e p1380-1381)*

Varicocele

- Dilated and tortuous veins of pampiniform plexus (veins draining testis and epididymis)[Q] lying **posterior and above the testis**
- Most common **surgically correctable cause** of male **subfertility**[Q]
- Surgical **correction** can **reverse atrophy** in **adolescents**[Q]

Etiology

- **Absent or incompetent valves** in the internal spermatic or **left testicular vein (MC)**[Q] and it joins left renal vein at right angles.
- Increased venous pressure in left renal vein (**Nutcracker phenomenon**[Q]- caused by compression of left renal vein between aorta and superior mesenteric artery)
- Collateral venous anastomosis
- Compression by sigmoid colon

Clinical Features

- MC seen in **young adults**[Q], **tall thin men**[Q] are frequently affected
- **Painless**, compressible mass lying **posterior and above the testis**
- **Bag of worms** like feel on on palpation in standing position[Q]
- Marked **left side predominance**[Q] (90%)
- Varicocele **do not regress spontaneously**[Q], associated with testicular atrophy

- **Suspicious varicoceles:** May be **secondary to RCC**, as growth from renal cell carcinoma **blocks the renal vein by venous permeation**. In RCC, varicocele **doesn't decompress in supine position**[Q].
  - **Right sided** varicoceles[Q]
  - **Rapidly evolving** varicoceles[Q]
  - Varicoceles in **elderly**[Q]
  - Varicocele that **doesn't decompress** in supine position[Q]

Varicocele Classification	
Subclinical	Not palpable or visible at rest or during Valsalva maneuver, but **demonstrable by special tests**[Q] (**reflux** found on doppler examination)
Grade 1	**Palpable during Valsalva**[Q] maneuver, but not otherwise
Grade 2	**Palpable at rest**[Q], but not visible
Grade 3	**Visible**[Q] and palpable at rest

Effect on Spermatogenesis

- Varicocele **increases the temperature of scrotum**[Q] and this decreases spermatogenesis
- Infertility is observed in higher percentage of individuals.
- Abnormal semen analysis (**decreased sperm motility** and **number**), normalizes after surgery.
- Improvement in semen quality is seen in upto 65% after varicocele ligation.

Diagnosis

- Diagnosis is made by **clinical examination** and **confirmed by color Doppler analysis** (**reflux/reverse flow** is characteristic of varicoceles)[Q].
- **Venography**: **most accurate** method of varicocele diagnosis, done for varicocele in the **post surgical patients**[Q].

Indications for surgery	
1. Infertility[Q]	4. Significant discomfort
2. Poor testicular growth in adolescents[Q]	5. Recruitment to police or armed forces
3. Defective sperm count or motility[Q]	

Treatment

- **Ligation** of **testicular vein above** the **inguinal ligament**[Q] where the pampiniform plexus has coalesced into one or two vessels. (**Venous drainage** after ligation is by **cremasteric veins**[Q])

> - **Best surgical option is microscopic subinguinal ligation**[Q].

- Other procedures are open inguinal/subinguinal, laparoscopic or retroperitoneal (**Palomas**[Q]) ligation or embolization.
- **Complications of surgery**:
  - **Postoperative hydrocele** formation (**least with microscopic ligation** and **embolization**)
  - **Testicular atrophy**[Q] (seen in **<1%** due to damage of testicular artery).

27. **Ans. b. Left testicular vein drains into left renal vein which has high pressure**
28. **Ans. a. Above inguinal ligament**
29. **Ans. b. More common on the right side**
30. **Ans. d. CA kidney**
31. **Ans. d. Frequently on right side**
32. **Ans. a. Varicocele**
33. **Ans. c. Asymptomatic cases require surgery**
34. **Ans. a. Varicosity of cremasteric veins**
35. **Ans. a. Cremasteric veins**
36. **Ans. b. Can cause oligospermia**
37. **Ans. a. Varicocele**
38. **Ans. a. More common on right side**
39. **Ans. a. Ipsilateral testis small size, b. Oligopsermia on semen analysis, d. Signs or symptoms present**

SPERMATOCELE

40. **Ans. a. Occurs in head of epididymis, b. Barely water fluid in appearance, d. Contain spermatozoa** *(Ref: Bailey 26/e p1383, 25/e p1383)*

Spermatocele

- **Unilocular retention cyst derived from** some portion of the **sperm-conducting mechanism** of the **epididymis**[Q].

Clinical Features

- **Typically lies in** the **epididymal head, above** and **behind** the **upper pole** of the **testis.**

- **Usually small** and **unobtrusive**[Q].
- Usually **softer** and **laxer than other cystic lesions** in the scrotum but, like them, it **transilluminates**[Q]
- **Chinese lantern pattern**[Q] on **transillumination**
- The **fluid contains spermatozoa**[Q] and resembles **barley water in appearance**[Q].

Treatment

- Small spermatoceles can be ignored.
- **Larger ones** should be **aspirated** or **excised** through a scrotal incision.

41. Ans. a. Spermatocele **42. Ans. c. Tender**

HYDROCELE

43. Ans. a. Limited to scrotum *(Ref: Campbell 10/e p3582-3586; Bailey 26/e p1382, 25/e p1381-1382)*

HYDROCELE

An accumulation of fluid in layers of tunica vaginalis

Types:

- **Vaginal hydrocele (MC)**[Q]
  - Abnormal accumulation of serous fluid within the tunica vaginalis.
- **Infantile hydrocele:**
  - Does not necessarily appear in infants.
  - The tunica and processus vaginalis are distended to the inguinal ring **without any connection** with **peritoneal cavity**[Q].
- **Congenital hydrocele** (Communicating hydrocele):
  - **Patent processus vaginalis**[Q] allows peritoneal fluid to freely communicate.
  - Size of hydrocele fluctuates, usually related to activity
  - Congenital hernia has the same defect. UDT are commonly associated.
  - **Wait for 2 years** for **spontaneous closure**[Q]. Otherwise the treatment is **herniotomy**[Q].
- **Funicular hydrocele:**
  - Processus vaginalis remains **patent upto** the **top** of the **testis**[Q], where it is shut off from the tunica vaginalis.
- **Hydrocele En bisac or Bilocular hydrocele:**
  - Hydrocele has **2 intercommunicating sacs**, one **above** and one **below** the **neck**[Q] of the scrotum.
  - The upper sac has **no connection with** the **processus vaginalis**[Q] and it is in fact the herniated tunica vaginalis.
- **Hydrocele of the cord:**
  - **Central portion** of the **processus vaginalis** is **patent**[Q], but its upper and lower parts are obliterated.
  - Presents as **painless groin mass** contiguous with cord structures, moves downward and becomes less mobile if testis is pulled gently downwards.
- **Hydrocele of the canal of Nuck:**
  - Female counterpart of Hydrocele of the cord. It is seen in relation to the round ligament. *(Ref: Smith 17/e p211; Campbell 10/e p3583; Bailey 26/e p1382, 25/e p1383)*

Secondary Hydrocele
• **Causes** are acute or chronic **epididymo-orchitis (MC)**[Q], testicular tumors, torsion of testis
• Usually **lax** and of **small size** with **palpable underlying testis**[Q]
• Subsides with resolution of epididymo-orchitis

44. Ans. c. Herniotomy **45. Ans. a. Patent processus vaginalis**

46. Ans. d. Herniotomy **47. Ans. c. Testis is separate from swelling**

48. Ans. d. Hydrocele *(Ref: Campbell 10/e p1009-1011; Bailey 26/e p1382, 25/e p1382)*

Treatment of Vaginal hydrocele
1. **Small** hydrocele: **Lord's** procedure **(Plication** of sac)[Q]
2. **Medium** hydrocele: **Jaboulay's** procedure **(Eversion** of sac)[Q]
3. **Large** hydrocele: **Excision** of sac[Q]

49. Ans. c. Hydrocele **50. Ans. c. Surgery**

EPIDIDYMOORCHITIS

51. Ans. c. Chlamydia trachomatis *(Ref: Smith's Urology 17/e p210-212, 704; Campbell's 10/e p3117-3118; Bailey 26/e p1384, 25/e p1383-1384)*

Acute Epididymoorchitis

- **Inflammation** of the **epididymis** and **testis**, from an **ascending infection**[Q] from the lower urinary tract.
- Initially epididymis is involved, after that there is involvement of testis.
- Most cases of epididymitis in **men younger than 35 years** are due to **sexually transmitted organisms** [**C. trachomatis** (**MC**)[Q] and **N. gonorrhoe**]
- In **children** and **older men** are due to **urinary pathogens** such as **E. coli**[Q].
- In **homosexual men**, **E. coli**[Q] and other coliform bacteria are common causative organisms.

Clinical Features

- Patient presents with **fever, swollen, red and tender scrotum**[Q].
- The epididymis and testis are swollen (**Thickened cord** with **reactive hydrocoele**)[Q]
- Symptoms of **urethritis, cystitis or prostatitis**[Q]
- Urine analysis typically demonstrates **WBCs and bacteria** in the **urine or urethral discharge**[Q]

Diagnosis

- Scrotal USG showing enlarged epididymis with increased blood flow with reactive hydrocoele.
- **Prepubertal children** diagnosed with epididymitis **require radiologic investigation** for **urinary tract anomalies** such as reflux or ureteral Ectopia[Q].

Treatment

- **Antibiotics, rest , scrotal elevation and NSAIDs**[Q]**.**

- **MC organism** causing epididymoorchitis in **<35** and **sexually active males: Chlamydia**[Q]
- **MC organism** causing epididymoorchitis in **children, elderly, homosexuals: E. coli**[Q]

52. Ans. b. Elevation of testes reduces pain of epididymitis

53. Ans. b. Epididymis

54. Ans. a. Associated with urinary infection

55. Ans. a. The patient should be prescribed antibiotics and asked to come after a week

56. Ans. c. Syphilis

57. Ans. b. Elevation of testis in epididymoorchitis relieves pain *(Ref: Smith's Urology 17/e p210-212, 704; Campbell's 10/e p3117-3118; Bailey 26/e p1384, 25/e p1383-1384)*

Testicular torsion	Epididymoorchitis
• Seen in **prepubertal age group** (**10-25**)[Q]	• **Adults**, age group **20-30**[Q]
• Urine culture is sterile	• Evidence of **UTI**
• No fever, **sudden agonizing pain**[Q] with affected **testis high-riding**[Q] in scrotum	• **Fever, swollen, red** and **tender scrotum**, **thickened cord** with reactive **hydrocele**[Q]
• Cremasteric reflex is **absent**[Q]	• **Cremasteric reflex** is **present**[Q]
• Prehn's sign is **negative**[Q]	• **Prehn's sign** is **positive**[Q]
• **Color Doppler: Decreased blood flow**[Q]	• **Scrotal USG**: **Enlarged epididymis** with **increased blood flow** with **reactive hydrocele**[Q].
• Treatment: **Immediate surgical exploration**[Q]	• Treatment: **Antibiotics, rest ,** scrotal elevation and **NSAIDs**[Q]**.**

58. Ans. b. Decreased blood flow

59. Ans. a. Acute orchitis

FOURNIER'S GANGRENE

60. Ans. b. Scrotum *(Ref: Campbell 10/e p324-325; Bailey 26/e p1388, 25/e p1387-1388)*

Fournier's Gangrene (Idiopathic Scrotal Gangrene)

- A form of **necrotizing fasciitis**, with **abrupt onset** of a **rapidly fulminating genital gangrene** of idiopathic origin and **gangrene upto deep fascia**[Q]**.**

Predisposing Factors	
• **Diabetes mellitus** (**MC**) • Local trauma • Paraphimosis	• Anal infections • **Immunosuppression**Q

- **Multiple organisms** (**aerobes + anaerobes**)Q results in fulminating inflammation of the subcutaneous tissues which results in **obliterative arteritis** of arterioles of the scrotal skin. (**Polymicrobial**)Q

Clinical Features

- History of **recent perineal trauma**, **instrumentation,** urethral **stricture** or a **rectal source** of infection is frequently presentQ.
- Infection commonly starts as cellulitis. Involved area swollen, erythematosus and tender as the infection begins to involve the deep fascia.
  - Areas of **purplish** and **blackish discoloration**, **dishwater** like **discharge**, **fetid odour** and **skin necrosis**.
  - **Pain** is predominant with **fever** and **marked systemic toxicity**Q. **Crepitus** is presentQ.
- **Skin, superficial fascia, deep fascia** is **destroyed,** while **corpora cavernosa, urethra, testis, cord structures** are **preserved**Q**.**

Management

- **Prompt diagnosis** and **aggressive treatment**Q is the initial treatment to limit the spread.
  - **I.V. hydration, antibiotics, surgical debridement** of the necrotic fat and fasciaQ
  - **Mortality** without treatment: **7-75%**Q (Average-**20%)**
- **Surgical debridement** is cornerstone, **serial debridement**Q is usually required.
- **Orchidectomy is almost never required**Q, because the testis have their blood supply independent of the compromised fascial and cutaneous circulation of the scrotum.

61. Ans. a. Testicles are involved **62. Ans. a. Testicles are involved** **63. Ans. a. Scrotum**

TESTICULAR CARCINOMA PREDISPOSING FACTORS

64. Ans. a. Cryptorchidism, b. Testicular feminization syndrome, c. Klinefelter's syndrome *(Ref: Smith 17/e p375; Campbell 10/e p3725; Bailey 26/e p1385, 25/e p1385)*

Predisposing Factors for Testicular GCTs

- **Cryptorchidism**
  - Of the predisposing factors, **cryptorchidism** has the **strongest association** with the **testicular carcinoma**Q.
  - **Higher the testis, greater the risk**Q. Abdominal cryptorchid testis is at higher risk than inguinal cryptorchid testis.
    - **Increased risk** is seen in **both the testis (cryptorchid** and **normally descended testis)**Q
    - **MC tumour seen: Seminoma** > Embryonal cell carcinoma
  - **Orchidopexy doesn't decrease the risk of malignancy**Q, however it facilitates examination and tumour detection.
- **Testicular feminization syndrome**
- **GCT** of **one testis** for other testis
- **Testicular carcinoma** in **sibling**
- **Klinefelter's syndrome** (increases risk of both **testicular** and **mediastinal GCT**) and **male CA breast**Q.
- **Administration of DES** (**estrogen**) in utero

65. Ans. b. Undescended abdominal testis

TESTICULAR CARCINOMA

66. Ans. a. Seminoma *(Ref: Smith's Urology 17/e p375-383; Campbell's 10/e p838; Bailey 26/e p1385-1386; CSDT 11/e p1071)*

Testicular Tumors

- MC **histological type** of testicular tumour: **Mixed**Q (if option is there, otherwise seminoma)

- **MC tumour** of testis: **Seminoma**[Q]
- MC **bilateral primary testicular tumour: Seminoma**[Q]
- **Most radiosensitive** testicular tumor: **Seminoma**[Q]

- MC testicular tumor in **infant** and **children upto 3 years**: **Yolk sac tumour**[Q]
- MC testicular tumor in **pre-pubertal children: Teratoma**[Q]

- **MC testicular tumor** in **patients >60 years**: **Lymphoma**[Q]
- MC **bilateral testicular tumour**: **Lymphoma**[Q]
- MC **secondary testicular tumour**: **Lymphoma**[Q]

- MC **histologic type** of testicular lymphoma: **Diffuse histiocytic lymphoma**[Q]
- Testicular tumour with **best prognosis**: **Yolk sac tumour**[Q]
- Testicular tumour with **worst prognosis**: **Hurricane tumour** (Type of **choriocarcinoma**)[Q]

67. Ans. c. Seminoma

68. Ans. a. Pure seminoma is more aggressive than non-seminoma *(Ref: Smith 17/e p375-381; Campbell 10/e p3725-3729; Bailey 26/e p1385-1386, 25/e p1384-1387)*

Testicular Tumors

- **MC tumour** of testis: **Seminoma**[Q]
- MC **histological type** of testicular tumour: **Mixed**[Q] (if option is there, otherwise seminoma)
- **Genomic change** found in all **germ cell tumors** is an **isochromosome** of **short arm** of chromosome **12**[Q]**.**

Clinical Features

- **MC presentation** is a **nodule or painless swelling of one gonad**[Q].
- 10% patients present with acute pain or manifestation due to secondaries like neck or abdominal masses, GI disturbances, respiratory or CNS symptoms, bone pain or lumbar backache due to nerve roots involvement by bulky retroperitoneal disease.
- **Secondary hydrocele** is also seen in **5-10%**[Q] cases.

- **5% GCT** may present with **gynecomastia**[Q] as a systemic endocrine manifestation.
- **Gynecomastia** is **more commonly** seen with **sex cord** or **gonadal stromal tumors (Leydig cell tumor, Sertoli cell tumor, Granulosa/Theca cell tumor)** [Q]**.**

- **Majority (2/3rd) of seminoma** are **confined to testis**[Q] at the time of presentation, whereas majority of **non-seminomatous GCT** have **widespread metastasis** at presentation.
- Many patients would present with a history of trauma, but trauma merely draws the attention of the patients and has no etiological association with tumour.

Bilateral Testicular Tumors

- **Bilateral testicular tumors** are seen in **1-2%** cases.
- Primary bilateral testicular tumors have tendency of **same histology** on **both sides**[Q].
- **Seminoma**[Q] is the **MC histological finding** in bilateral **primary** testicular tumor, whereas **malignant lymphoma** is the **MC bilateral testicular tumor**[Q].

- Any patient with a **solid firm intratesticular mass** must be considered to have **testicular tumour** unless proved otherwise.

Investigations

- **USG:** Any hypoechoic area within tunica albuginea is markedly suspicious.

- **FNAC** is **Contraindicated** (**Scrotal seedlings** may result in **inguinal LN metastasis**)[Q]

- **Histopathological Diagnosis: Radical orchiectomy** by inguinal canal approach, the **cord is ligated** at **deep inguinal ring** (**high inguinal orchiectomy**)[Q].
- **Trans-scrotal Orchidectomy** is **contraindicated** as it permits the development of alternate **lymphatic channel pathway** to **inguinal** and **pelvic lymph nodes.**

Chavesseac maneuver[Q]

- First a **soft clamp** is applied **to** the **cord**, the suspicious area is **biopsied** and sent for the **frozen section.** If malignant, formally ligate the cord and send the orchiectomy sample for final histopathology.

- **CECT abdomen** for evaluation of **retroperitoneum** and **lymph nodes**[Q]**.**

Spread of Disease

- **Germ cell tumors** of the testis typically **spread** in a **stepwise lymphatic fashion (MC mode)**[Q]**.**

- The **primary landing site for the right testis** is the **interaortocaval area**[Q] at the level of the right renal hilum, and **for the left testis** is the **para-aortic area**[Q] at the level of the left renal hilum.
- In the absence of disease on the left side, no crossover metastases to the right side have ever been identified. However, **right-to-left crossover metastases**[Q] are common.

- **Retroperitoneum** is the **most commonly involved site**[Q] in metastatic disease.
- Most **blood borne metastasis** occurs following LN involvement, **Lung** is **MC organ**[Q] involved.
- **Choriocarcinoma** is the exception and characterized by **early hematogenous spread**, especially to the **lung**[Q].

Chemotherapy

- Chemotherapy for **extragonadal GCT:** Combination of **Bleomycin + Etoposide**[Q] **+ Cisplatin (BEP)**[Q]

69. Ans. a. Trans scrotal biopsy is needed

70. Ans. a. Seminoma, b. Teratoma *(Ref: Smith's Urology 17/e p375-383; Campbell's 10/e p838; CSDT 11/e p1071)*

Classification of Testicular Tumors

- **Germ cell tumors:**
  - Seminomas
  - **Non-seminomas:**
    - Embryonal cell carcinoma
    - Yolk sac tumour
    - Teratoma
    - Choriocarcinoma
- **Sex cord/gonadal stromal tumors:**
  - Leydig cell tumour
  - Granulosa cell tumor
  - Sertoli cell tumor
  - Thecoma/fibroma
- **Tumors containing both germ cell and sex cord/gonadal stromal elements:**
  - Gonadoblastoma
- **Lymphoid and Hematopoetic tumour:**
  - Lymphoma, Leukemia, Plasmacytoma
- **Miscellaneous:**
  - Carcinoid, Adenoma, Carcinoma

71. Ans. d. Teratoma *(Ref: Smith 17/e p376; Campbell 10/e p840-842)*

- **MC testicular tumour** in **prepubertal adults**: **Teratoma**[Q]
- **MC testicular tumor** of **infants** and **children: Yolk sac tumor**[Q]

Yolk sac Tumor

- **MC testicular tumor** of **infants** and **children**[Q].
- The terms **endodermal sinus tumor, adenocarcinoma of the infantile testis, juvenile embryonal carcinoma,** and **orchioblastoma** are all used synonymously[Q].

Pathology

- In its pure form, the lesion has a **homogeneous, yellowish, mucinous** appearance[Q].
- **Embryoid bodies**, a common finding in yolk sac tumors, resemble 1- to 2-week-old embryos.

Three most common microscopic patterns
1. **Microcystic- honeycomb appearance**, with **hyaline globules**[Q]
2. **Endodermal sinus**- perivascular formations known as **Schiller-Duval bodies**[Q]
3. **Solid-** small polygonal cells, clear cytoplasm, frequent mitoses

- The pattern of metastatic disease of yolk sac tumors in childhood differs from the pattern in adult germ cell tumors, owing to a higher incidence of hematogenous spread.

Clinical Features

- **MC testis tumor** in **prepubertal boys**, presents as **slow-growing scrotal mass** in a **young boy**[Q]
- **Hydrocele** is present in **25%** of cases[Q].

Tumor Marker

- **AFP** is elevated in **>90%**[Q].

72. Ans. b. Dysgerminoma, d. Embryonal carcinoma, e. Choriocarcinoma *(Ref: Smith 17/e p377; Campbell 10/e p838-842, 850-851, 9/e p899)*

Intratubular Germ Cell Neoplasia (ITGCN) or Testicular Carcinoma in Situ (CIS)

- **Preinvasive precursor** of **all testicular GCTs except:**
  - **Spermatocytic seminoma**Q
  - **Yolk sac tumor**Q
  - **Teratoma** in **children**Q
- Presently, there is **no established tumor marker** for CIS, and **testicular ultrasound** has been shown to be **unreliable** with respect to diagnosing CIS.
- Therefore, **testicular biopsy** remains the **"gold standard"** for **diagnosing CIS**Q.

Risk Factors for ITGCN	
• History of **testicular carcinoma**Q • **Extragonadal GCT**Q • **Cryptorchidism**Q • **Contralateral testis** with unilateral testicular cancer Q	• **Atrophic contralateral testis**Q with unilateral testicular cancer • **Somatosexual ambiguity**Q • **Infertility**Q

Pathology

- **ITGCN cells** are located on the **basement membrane** of the **seminiferous tubule** and possess morphologic features of malignancy: **large irregular nucleus, coarse chromatin,** and **abundant cytoplasm**Q.
- Typically only **one layer** of ITGCN cells is **seen**, but occasionally the **whole tubule** is **filled with ITGCN** cells, which may represent an **early stage** in **progression to GCT**Q.

Clinical Features

- Testis may be **atrophic** but is usually **normal to palpation**.
- **Testis biopsy** reliably **diagnoses ITGCN** because the **ITGCN** is almost always **found throughout the testis**Q
- Progression of **ITGCN to invasive disease** may take **15 years**Q.

Treatment

- Treatment options include **observation, radiation therapy,** and **orchiectomy**Q
- **Chemotherapy** so far appears to be **ineffective against ITGCN**.

73. Ans. c. Inguinal lymphadenopathy

74. Ans. d. They are often associated with raised levels of serum AFP and HCG *(Ref: Smith 17/e p375-381; Campbell 10/e p3725-3729)*

Tumour Markers	
Oncofetal substances	**Cellular Enzymes**
1. **α-FP:** (Increases in **YET**) Q • Produced by **trophoblastic cells** • **Increases** in **Yolk sac tumour, embryonal carcinoma and terato carcinoma. (YET)** • **Doesn't increase** in **pure choriocarcinoma** and **pure seminoma**Q • Metabolic **half life**: **5-7 days**Q	**1. LDH:** • Not a specific tumour marker • Most useful as a marker for **"bulk'** disease • Raised serum LDH has poor prognosis
2. **β-HCG:** (Increases in **CES**MINOMA) • Produced by **syncytiotrophoblastic cells**Q • **Increases in all choriocarcinomas, 50% embryonal carcinoma and 5-10% of pure seminoma** (as they contain syncytiotrophoblast like giant cells). (**CES**MINOMA) Q • Serum **half life**: **24-36 hours**Q	**2. PLAP** (Placental alkaline phosphatase): • Elevated levels present in as many as 40% patients with advanced disease • Most useful as a marker for **"bulk'** disease • Elevated in **seminoma**Q **3. GGT** (Gamma glutamyl transpeptidase): • Marker of **seminoma testis**Q • Marker for **"bulk"** disease

75. Ans. c. AFP is markedly raised in all germ cell tumors

76. Ans. b. Seminoma *(Ref: Smith 17/e p376; Campbell 10/e p840, 862-866, 9/e p894-895; Bailey 26/e p1385, 25/e p1385-1387)*

Seminoma

- Three subtypes: classic, anaplastic and spermatocytic.
- **Typical or classic seminoma:**
  - Accounts for **80-85%**Q of all seminomas and occurs most commonly in **30 years** of age

- Histologically, it is composed of **islands or sheets of relatively large cells** with **clear cytoplasm** and **densely staining nuclei**Q.

  - **Syncytiotrophoblastic** elements occur in **10-15%**Q and **lymphocytic infiltration** occurs in **20%**Q**.** The incidence of **syncytiotrophoblastic** elements corresponds to the frequency of **β-hCG production**Q**.**

- The **slower growth rate of seminomas**Q may be inferred from the observation that **treatment failures** may become **evident 2-10 years after** apparently adequate **irradiation** of metastatic sites.

- **Anaplastic seminoma**:
  - Accounts for 5% to 10% of all seminomas
  - Despite its rarity, up to **30% of patients dying with seminoma** have an **anaplastic morphology**Q.

    - **More aggressive** and **potentially more lethal**Q variant leading to **less favorable results**Q**.**
    - These characteristics include greater mitotic activity, higher rate of local invasion, increased rate of metastatic spread and higher rate of tumor marker (β-hCG) production.

  - **No difference** from classic seminoma when patients are **treated appropriately** and compared **stage for stage**Q**.**
  - **Inguinal orchiectomy** plus **radiation therapy** is **equally effective** in controlling both **anaplastic** and **classic seminoma**Q**.**
- **Spermatocytic seminoma:**
  - Accounts for 2-12% of all seminomas
  - It is **distinctive tumor both clinically** and **radiologically** as compared to seminomaQ

    - Variants of germ cell tumor that **do not arise from** an **intratubular germ cell neoplasia**Q (the other being teratomas of children**Q**).

  - Composed of **cells** that **vary in size** and have **deeply pigmented cytoplasm** and **rounded nuclei** containing **characteristic filamentous chromatin**Q.
  - Uncommon tumor representing **1-2% of all testicular neoplasms**Q
  - Affected individuals are **>65 years**Q
  - **Slow growing tumor** that **rarely** if ever **produces metastases**Q
  - **Only orchidectomy** is required for treatment**.**
  - **Prognosis** is **excellent**Q

77. Ans. a. Beta hCG, d. Alpha fetoprotein

78. Ans. d. Lymphoma *(Ref: Smith 17/e p382; Campbell 10/e p868-869)*

Testicular Lymphoma

- **MC testicular tumor** in a patient **>50 years**Q
- **MC secondary neoplasm** of the **testis**, accounting for 5% of all testicular tumors.
- It may be seen as **late manifestation** of **widespread lymphoma**; **initial presentation** of clinically **occult disease**; and **primary extranodal disease**Q.

Pathology

- Grossly, bulging, gray or pink lesion with ill-defined margins. **Hemorrhage** and **necrosis**Q are common.
- Microscopically, **diffuse histiocytic lymphoma** is the **MC type**Q.

Clinical Findings

- **Painless enlargement**Q of the testis is common.
- Generalized **constitutional symptoms** occur in one-fourth of patients.
- **Bilateral testis involvement** occurs in **50%** of patients, usually **asynchronously.**

Treatment

- **FNAC** should be considered in a **known** or **suspected** diagnosis of **lymphoma**Q
- **Radical orchiectomy** is reserved for suspected **primary lymphoma**Q of the testicle.

79. Ans. a. Testicular biopsy **80. Ans. b. Seminomas are radiosensitive** **81. Ans. d. Seminoma**

82. Ans. a. PLAP *(Ref: Smith 17/e p375-381; Campbell 10/e p3725-3729; Bailey 25/e p1384-1387)*

Tumor marker for seminoma is PLAP (Placental alkaline phosphatase). *Though* ***beta-HCG*** *is also* ***raised*** *in* ***5-10% of pure seminoma****, as they contain syncytiotrophoblast like giant cells.*

83. Ans. a. 10% *(Ref: Smith 17/e p375)*

The **strongest association** has been with the **cryptorchid testis**. Approximately **7-10%** of **testicular tumors develop in patients** who have a **history of cryptorchidism**; **seminoma is the most common form** of tumor these patients have.

Testicular Tumors: Epidemiology and Risk Factors

- Of all primary testicular tumors, **90-95% are germ cell tumors**[Q] (seminoma and nonseminoma)
- **More common** in **whites** and individuals of **higher socioeconomic class**[Q]
- **Slightly more common** on the **right side** than on the left, which parallels the **increased incidence of cryptorchidism** on the **right side**[Q].
  - Of **primary testicular tumors, 1-2% are bilateral**[Q], and about 50% of these tumors occur in men with a history of unilateral or bilateral cryptorchidism.
  - **Seminoma** is the **most common germ cell tumor** in **bilateral primary testicular tumors**[Q], while **malignant lymphoma** is the **most common bilateral tumor of the testis**[Q].
- The **strongest association** has been with the **cryptorchid testis**[Q]. Approximately **7-10%**[Q] of **testicular tumors develop in patients** who have a **history of cryptorchidism**; **seminoma is the most common form** of tumor these patients have.
  - However, **5-10%** of **testicular tumors** occur in the **contralateral, normally descended testis**[Q].
  - The **relative risk of malignancy** is **highest for the intraabdominal testis**[Q] (1 in 20) and is significantly lower for the inguinal testis (1 in 80).
- **Orchiopexy does not alter the malignant potential** of the **cryptorchid testis;** however, it does **facilitate examination** and **tumor detection**[Q].

84. Ans. None **85. Ans. a. It is radiosensitive** **86. Ans. b. Malignant**

87. Ans. b. An undescended testis is more liable to develop this tumour, c. Histologically it resembles dysgerminoma of the ovary

88. Ans. c. Occurs in younger

89. Ans. b. 10% of cases *(Ref: Smith 17/e p379)*

- Approximately **5-10%** of **testicular tumors** may be **associated with hydroceles**[Q].

90. Ans. d. Teratoma **91. Ans. a. Para-aortic lymph nodes**

92. Ans. c. Testicular tumour **93. Ans. c. Radioresistant** **94. Ans. a. AFP**

95. Ans. c. Choriocarcinoma **96. Ans. a. Clinical evaluation (palpation and transillumination)**

97. Ans. a. Seminoma **98. Ans. a. Seminoma** **99. Ans. b. Hematocele**

100. Ans. b. USG

TESTICULAR CARCINOMA STAGING

101. Ans. a. T1 *(Ref: Campbell 10/e p3726-3727)*

7th AJCC (2010) TNM Staging for Testicular Tumors	
T: Primary tumor	N: Regional lymph nodes
pTis: Intratubular germ cell neoplasia (carcinoma in situ)	**N1**: LN mass **≤2 cm** or multiple LN masses, none >2 cm
p**T1:** Limited to the **testis** and **epididymis** and no vascular/lymphatic invasion	**N2**: LN mass, **>2 cm** but **<5 cm** or multiple LN masses, any one mass >2 cm but not <5 cm
pT2: Limited to the testis and epididymis **with vascular/lymphatic invasion** or extending through **tunica albuginea** with **involvement** of **tunica vaginalis**	**N3**: LN mass **>5 cm**
pT3: Invades the **spermatic cord** with or without vascular/lymphatic invasion	M: Distant metastases
pT4: Invades the **scrotum** with or without vascular/lymphatic invasion	M1: **Non-regional nodal** or **pulmonary metastases** M2: **Non-pulmonary visceral masses**

Serum Tumor Markers (S)			
	LDH	**hCG (mIU/mL)**	**AFP (ng/mL)**
S0	≤N	≤N	≤N
S1	**<1.5** × N	**<5,000**	**<1,000**
S2	**1.5–10** × N	**5,000–50,000**	**1,000–10,000**
S3	**>10** × N	**>50,000**	**>10,000**

7th AJCC (2010) Staging for Testicular Cancer				
Stage Grouping	**T**	**N**	**M**	**S**
Stage **0**	pTis	N0	M0	S0
Stage **Ia**	**T1**	N0	M0	S0
Stage **Ib**	**T2-T4**	N0	M0	S0
Stage **Is**	Any T	N0	M0	**S1-S3**
Stage **IIa**	Any T	**N1**	M0	S0-**S1**
Stage **IIb**	Any T	**N2**	M0	S0-**S1**
Stage **IIc**	Any T	**N3**	M0	S0-**S1**
Stage **IIIa**	Any T	Any N	**M1**	S0-S1
Stage **IIIb**	Any T	Any N	M0-**M1**	**S2**
Stage **IIIc**	Any T Any T	Any N Any N	M0-**M1a** **M1b**	**S3** Any S

102. Ans. a. T1

TESTICULAR CARCINOMA TREATMENT

103. Ans. b. High inguinal orchidectomy and radiotherapy

104. Ans. a. Bleomycin, Etoposide, Cisplatin

105. Ans. c. Left high inguinal orchiectomy plus chemotherapy *(Ref: Smith 17/e p379-381; Campbell 10/e p871-873, 3726-3727; Bailey 25/e p1386-1387)*

Staging and Treatment			
Stage	**Extent of disease**	**Seminoma**	**Nonseminoma**
IA	**Testis only**, without vascular or lymphatic invasion (T_1)	Radiation therapy[Q]	**RPLND** or observation[Q]
IB	Testis with **vascular or lymphatic invasion** (T_2), or extension through **tunica albuginea** (T_2), or involvement of **spermatic cord** (T_3), or **scrotum** (T_4)	Radiation therapy[Q]	**RPLND**[Q]
IIA	Nodes **≤ 2**cm (N_1), S0/S1	Radiation therapy	**RPLND** or chemotherapy followed by RPLND[Q]
IIB	Nodes **>2-5** cm (N_2), S0/S1	Radiation therapy[Q]	**RPLND** ± adjuvant chemotherapy or chemotherapy followed by RPLND[Q]
IIC	Nodes **> 5cm** (N_3), S0/S1	**Chemotherapy**[Q]	**Chemotherapy** followed by RPLND[Q]
III	Distant metastasis	**Chemotherapy**[Q]	**Chemotherapy** followed by surgery (biopsy or resection)[Q]
Is	Only serum tumor markers are raised (S_1 to S_3)[Q]	**Chemotherapy**[Q]	**Chemotherapy**[Q]

106. Ans. a. Chemotherapy

107. Ans. b. High Orchidectomy + RPLND

108. Ans. b. Chemotherapy

109. Ans. c. only chemotherapy

110. Ans. a. Orchidectomy + RPLND *(Ref: Smith 17/e p376; Campbell 10/e p841, 3727-3728; Bailey 25/e p1385-1387)*

TERATOMA

- **Most common testicular tumor** in **prepubertal adults: Teratoma**[Q]
- Tumor is composed of **two or more** embryonic **germ cell layers**[Q] that may be both mature and immature.
- Tumor is very **heterogeneous** with both **solid** and **cystic**[Q] components.

Teratoma is divided into three subsets
1. **Mature:** well-differentiated ectodermal, mesodermal, or endodermal tissues
2. **Immature:** incompletely differentiated tissues
3. **Teratoma with areas of malignant transformation:** sarcoma, squamous carcinoma, adenocarcinoma

- Teratomas are **potentially malignant**[Q]

Clinical Features

- Age range: first, second, and third decades.
- **Mature and immature forms** have **metastatic potential** in **adults** but in **children** are **uniformly benign**[Q].
- The primary tumor generally presents as an **enlarged testis** with both **solid and cystic components**[Q].
- The **teratoma component** of **metastatic GCT** is **resistant to chemotherapy** and **radiotherapy**[Q].

Tumor Markers

- **AFP** is **raised** in **20-25%**[Q]

111. Ans. d. Observation /RPLND **112. Ans. d. Retrograde ejaculation** *(Ref: Smith 17/e p380)*

Retroperitoneal Lymph Node Dissection (RPLND)

- **RPLND** has been the **preferred treatment** of **low-stage NSGCTs**[Q]
- A **thoracoabdominal** or **midline Transabdominal approach** may be used
- All **nodal tissue between** the **ureters from the renal vessels** to the **bifurcation of the common iliac vessels** is **removed**[Q].

- **RPLND** is **associated with significant morbidity**, especially **with respect to fertility** in **young men**[Q].
- With a standard RPLND, **sympathetic nerve fibers** are **disrupted**, resulting in **loss of seminal emission**[Q].

113. Ans. c. Seminoma

114. Ans. a. RPLND, b. Inguinal orchidectomy, c. chemotherapy

SEX CORD/GONADAL STROMAL TUMORS

115. Ans. b. Prominent lymphocytes in section *(Ref: Smith 17/e p381; Campbell 10/e p867-868)*

Leydig Cell Tumors

- **MC non-germ cell tumors** of **testis** and account for **1-3%** of all testicular tumors.
- **Bimodal age distribution**: **5-9** years and **25-35** years
- **25%** tumors occur **in childhood**, **bilateral** in **5-10%.**
- **Cause**: **unknown**; unlike germ cell tumors (**no association with cryptorchidism**)[Q]

Pathology

- Small, yellow, well-circumscribed lesion devoid of hemorrhage or necrosis.
- Microscopically, **hexagonally shaped cells** with granular, eosinophilic cytoplasm containing lipid vacuoles are seen.
- **Reinke crystals**[Q] are **fusiform-shaped cytoplasmic inclusions** are **pathognomonic** for **Leydig cells**.

Clinical Features

- **Prepubertal children** present with **virilization**, and tumors are **benign**[Q].
- **Adults** are usually **asymptomatic**, although **gynecomastia** may be present in **20–25%**[Q].
- **10%** of tumors **in adults** are **malignant.**
- Laboratory findings include **elevated serum** and **urinary 17-ketosteroids** and **estrogens**[Q].

Treatment

- **Initial treatment: Radical orchiectomy**[Q]
- **RPLND** for **malignant lesions**[Q].

Prognosis

- Prognosis is **excellent for benign lesions**, while it remains **poor for disseminated disease**.

CARCINOMA SCROTUM

116. Ans. a. Superficial inguinal *(Ref: Smith's Urology 17/e p387)*

Carcinoma Scrotum (Chimney Sweep's Cancer)

- **Squamous cell carcinoma of scrotum**[Q], most commonly resulted from exposure to environmental carcinogens including **chimney soot, tars, paraffin** and petroleum products[Q].
- **Superficial inguinal lymph nodes** are the **first lymph nodes involved.** [Q]

Risk Factors

- Most cases results from **poor hygiene** and **chronic inflammation**[Q].

Diagnosis

- **Diagnosis** is established by **biopsy of scrotal skin**[Q].

Treatment

- **Wide excision** with **2 cm margins**[Q] should be performed for malignant tumors.
- **Prognosis** correlates with **presence or absence of nodal involvement**[Q].

ORCHIDECTOMY

117. Ans. b. Prostate *(Ref: Bailey 25/e p1378; Smith 17/e p368)*

Bilateral orchidectomy, whether **total** or **subcapsular,** will **eliminate** the **major source of testosterone** production in patients of **carcinoma prostate.**

Carcinoma Prostate

- **Orchidectomy** is performed **to carry out androgen ablation** in the treatment of **locally advanced** (T3 or T4) disease or of **metastatic disease**[Q].
- In 1941, prostate cancer was shown to be responsive to such treatment by **Charles Huggins**, the only urologist to win a Nobel Prize.
- **Bilateral orchidectomy**, whether **total** or **subcapsular**[Q]**, will eliminate the major source of testosterone production.**

118. Ans. b. Internal ring *(Ref: Bailey 26/e p1387, 25/e p1387)*

High Inguinal Orchidectomy

- The **cord** must be **ligated as close as possible** to the **internal ring to facilitate complete removal of cord tissue**[Q] in case a later retroperitoneal lymph node dissection is required.

119. Ans. b. Prostate **120. Ans. c. Filarial epididemo-orchitis**

121. Ans. c. Tubercular epididymitis *(Ref: Bailey 25/e p1358, 1382, 1387)*

Indications of Orchidectomy

- **Clotted hydrocele**[Q]
- **Testicular tumors**[Q]
- **Prostate cancer**[Q]
- **Male breast cancer**[Q]

MISCELLANEOUS

122. Ans. b. Totipotent cell **123. Ans. d. Small strangulated inguinal hernia**

124. Ans. b. Hematocele **125. Ans. d. Ten years** **126. Ans. d. Azoospermia** *(Ref: Smith 17/e p696)*

Testicular Biopsy in Male Infertility

- The **testis biopsy** provides **direct information regarding** the **state of spermatogenesis**[Q].

- **Abnormalities of seminiferous tubule architecture** and **cellular composition** are then categorized into several patterns[Q].
  - This procedure is **most useful in** the **azoospermic patient**[Q], in which it is often difficult to distinguish between a failure of sperm production and obstruction within the reproductive tract ducts.
  - A **testis biopsy allows definitive delineation** between these 2 conditions and can **guide further treatment** options **in azoospermic men**[Q].
- **Testis biopsies** may also be **indicated to identify** patients at high risk for **intratubular germ cell neoplasia.** This premalignant condition **exists in 5% of men with a contralateral germ cell tumor of the testis** and is **more prevalent in infertile** than fertile men[Q].

127. Ans. b. Ilioinguinal nerve *(Ref: BDC 5/e vol II p224; 4/e vol II p201, 208; Snells 7/e p175-177; Grays Anatomy 40/e p1262)*

Ilioinguinal nerve is **not a constituent of spermatic cord, hence, it is not damaged during vasectomy.**

128. Ans. c. Hematoma *(Ref: Schwartz 9/e p1467)*

Important Topics

- **Length** of one **seminiferous tubule**: **1 meter**[Q]
- **Total length** of seminiferous tubules: **250 meters**[Q]
- Length of **epididymis**: **4 meters**[Q]

Most Common Lymph Nodes Involved	
CA Penis	**Inguinal** LN[Q]
CA Testis	On **right: Inter-aortocaval**[Q] LN On **left: Paraaortic**[Q] LN
CA Bladder	**Obturator**[Q] LN
CA Prostate	**Obturator**[Q] LN

NOTES

SECTION 5

CARDIOTHORACIC VASCULAR SURGERY

CHAPTERS

- Chapter 26 Arterial Disorders
- Chapter 27 Venous Disorders
- Chapter 28 Lymphatic System
- Chapter 29 Thorax and Lung

CHAPTER 26

Arterial Disorders

MULTIPLE CHOICE QUESTIONS

ARTERIAL OCCLUSION

1. Acute vascular ischemia manifests as: *(PGI Dec 2008)*
a. Pulselessness b. Paralysis
c. Flushing d. Anesthesia
e. Coolness

2. Syndrome of internal iliac artery occlusion manifested by:
a. Pain in calf *(PGI June 2005)*
b. Absent pulse at the dorsalis pedis artery
c. Intermittent claudication
d. Gangrene

3. The most common cause of peripheral limb ischemia in India is: *(AIIMS Nov 2005)*
a. Trauma b. Atherosclerosis
c. Buerger's disease d. Takayasu disease

4. Which among the following is not a feature of peripheral arterial occlusion? *(NEET Pattern, AIIMS Nov 99)*
a. Shock b. Pallor
c. Pain d. Pulselessness

5. Not a feature of acute arterial occlusion: *(DNB 2010, AIIMS Nov 98)*
a. Cyanosis b. Pallor
c. Paralysis d. Paraesthesia

6. Peripheral arterial occlusion (sudden onset) is characterized by all except: *(PGI June 2000, Dec 98)*
a. Paraesthesia b. Rubor
c. Pallor d. Pain

7. What will be the diagnosis of Ramu, who is 45-years old male with history of chronic smoking and pain in lower limb due to blockage of femoral artery? *(AIIMS Feb 97)*
a. Thromboangitis obliterans b. Atherosclerosis
c. Embolism d. Arteritis

8. Fogarty's catheter is used for: *(UPSC 2007)*
a. Drainage of urinary bladder
b. Parenteral hyperalimentation
c. Removal of embolus form blood vessels
d. Ureteric catheterization

9. Fogarty's catheter is used for? *(AIIMS Nov 2010)*
a. Urethral catheterization
b. Removal of blood clots from the arteries
c. Bladder drainage
d. TPN

10. Which one of the following is not a symptom of atherosclerotic occlusive disease at the bifurcation of aorta (Leriche syndrome)? *(UPSC 2008)*
a. Claudication of buttock and thigh
b. Claudication of the calf
c. Sexual impotence
d. Gangrene localized to the feet

11. Intermittent claudication is defined as: *(All India 2009)*
a. Pain in muscle at rest only
b. Pain in muscle on first step
c. Pain in muscle on exercise only
d. Pain in muscle on last step

12. Pseudoclaudication is caused by: *(All India 2009)*
a. Femoral artery stenosis b. Popliteal artery stenosis
c. Lumbar canal stenosis d. Radial artery stenosis

13. In a subclavian artery block at outer border of 1st rib, all of the following arteries help in maintaining the circulation to upper limb except? *(AIIMS May 2011)*
a. Subscapular artery b. Superior thoracic artery
c. Thyrocervical trunk d. Suprascapular artery

14. Both arterial and venous thrombosis occur in:
a. Antiphospholipid antibodies *(PGI Nov 2011)*
b. Antithrombin III deficiency
c. Hyperhomocysteinemia
d. Protein C deficiency
e. Mutation in factor V gene

15. Maximum tourniquet time for the upper limb is:
a. 1/2 hour b. 1 hour *(JIPMER 87)*
c. 1.5 hours d. 2 hours
e. 2.5 hours

16. Intermittent claudication at the level of the hip indicates:
a. Popliteal artery occlusion *(PGI 87)*
b. Bilateral iliac artery occlusion
c. Common femoral occlusion
d. Superficial femoral artery occlusion

17. Management of a case of iliac artery embolism requires: *(JIPMER 81, UPSC 86)*
a. Embolectomy b. Injection
c. Hypotensive therapy d. Sympathectomy

18. Intermittent claudication is caused by: *(TN 89)*
a. Venous occlusion b. Arterial insufficiency
c. Neural compression d. Muscular dystrophy

19. Treatment of acute femoral embolus is: *(AIIMS 91)*
a. Warfarin
b. Heparin
c. Immediate embolectomy
d. Embolectomy after 5 days bed rest

20. A useful though temporary improvement in a patient's ischemic foot can be attained by giving intravenously: *(PGI 79, DPG 84)*
a. 10% Mannitol b. 10% Dextrose
c. Dextran-40 d. Dextran-100

21. All are true about embolic arterial occlusion except:
a. No previous history *(JIPMER 95)*
b. Muscles are unaffected
c. Pulse is absent
d. Anesthesia is present

22. Tourniquet time of upper limb: *(MHSSMCET 2010)*
a. 1 hour b. 2 hours
c. 3 hours d. 4 hours

BUERGER'S DISEASE

23. Not included in treatment of Buerger's disease:
a. Lumbar sympathectomy *(PGI May 2011)*
b. Endovascular stent
c. Rheostatic agent
d. Extra-anatomical bypass

24. All are true about intermittent claudication except:
a. Most common in calf muscle *(PGI May 2010)*
b. Pain in positional
c. Atherosclerosis is important predisposing factor
d. Relieved by rest

25. A 45-years old male having a long history of cigarette smoking presented with gangrene of left foot. An amputation of the left foot was done. Representative sections from the specimen revealed presence of arterial thrombus with neutrophilic infiltrate in the arterial wall. The inflammation also extended into the neighboring veins and nerves. The most probable diagnosis is: *(AIIMS May 2006)*
a. Takayasu arteritis b. Giant cell arteritis
c. Hypersensitivity angitis d. Thromboangitis obliterans

26. True statement of Buerger's disease is/are: *(PGI June 2004)*
a. Small and medium sized vessels involved
b. Commonly involves upper limb than lower limbs
c. Common in male
d. Common in female

27. Drug used for Buerger's disease: *(MAHE 2005)*
a. Xanthinol nicotinate b. Propranolol
c. GTN d. All of the above

28. Buerger's disease usually affects all of the following except: *(MCI Sept 2009, 2010)*
a. Small sized arteries b. Medium sized arteries
c. Large arteries d. Deep veins

29. Superficial thrombophlebitis is seen in: *(MCI March 2005)*
a. AV fistula b. Raynaud's disease
c. Buerger's disease d. Aneurysm

30. Which of the following is true about Buerger's disease?
a. Atherosclerotic *(AIIMS Nov 2012)*
b. Neural involvement present
c. Ulnar artery and peroneal arteries involved
d. Only arteriole is involved

31. True about ischemic rest pain: *(PGI May 2010)*
a. More in night
b. MC in calf muscle
c. Increase upon elevation of limbs
d. Relieved by dependent position
e. Often associated with trophic changes

32. Most common vessels to be affected in Buerger's disease:
a. Femoral artery *(MCI March 2005)*
b. Iliac artery
c. Popliteal artery
d. Anterior and posterior tibial artery

33. Most common cause of gangrene of foot of 30-years old farmer who is a chronic smoker: *(AIIMS Nov 99)*
a. Raynaud's disease b. Myocardial infarction
c. Atherosclerosis d. Thromboangitis obliterans

34. Ramu, a 40-years old male, a chronic smoker presents with claudication and a medial leg ulcer. For the past following procedures would not relieve his rest pain: *(AIIMS June 2001)*
a. Lumbar sympathectomy b. Omentoplasty
c. Conservative amputation d. Femoropopliteal bypass

35. Which one is not true regarding Buerger's disease?
a. Men are usually involved *(AIIMS June 97)*
b. Occurs below 50 years of age
c. Smoking is predisposing factor
d. Veins and nerves are never involved

36. All of the following are the clinical feature of thromboangitis obliterans except: *(All India 2002)*
a. Raynaud's phenomenon
b. Claudication of extremities
c. Absence of popliteal pulse
d. Migratory superficial thrombophlebitis

37. Buerger's disease is associated with: *(PGI June 2002)*
a. Smoking b. Poor nutrition
c. Alcohol d. Prolonged standing
e. Superficial thrombophlebitis

38. Buerger's disease affects all except: *(DNB 2009)*
a. Lymphatics b. Small vessels
c. Nerves d. Veins

39. Most common cause of death in patients with Buerger's disease is: *(AIIMS 87)*
a. Gangrene b. Pulmonary embolism
c. Myocardial infarction d. Carcinoma lung

40. Buerger's disease is seen in: *(PGI 88)*
a. Only male b. Age less than 40
c. Age more than 40 d. Smoker

41. Commonest site of thromboangitis obliterans is: *(All India 90)*
a. Femoral artery b. Popliteal artery
c. Iliac artery d. Pelvic vessels

42. Following are used in treatment of Buerger's disease except:
a. Trental b. Anticoagulation
c. Sympathectomy d. Antiplatelets *(All India 93)*

LUMBAR SYMPATHECTOMY

43. Indications for sympathectomy are all except:
a. Intermittent claudication *(MHPGMCET 2003)*
b. Ischemic pains
c. Rest pains
d. Buerger's disease

44. Lumbar sympathectomy is of value in the management of:
a. Intermittent claudication *(All India 2009, 2005)*
b. Distal ischemia affecting the skin of the toes
c. Arteriovenous fistula
d. Back pain

45. Sympathectomy is indicated in all following conditions except: *(All India 2009, 2003, Punjab 2007)*
a. Ischemic ulcers b. Intermittent claudication
c. Anhidrosis d. Acrocyanosis

46. Which of the following is spared in lumbar sympathectomy?
a. L1 b. L2 *(MCI Sept 2009)*
c. L3 d. L4

47. In all of the following, sympathectomy is effective except one: *(AIIMS Sept 96)*
a. Intermittent claudication b. Hyperhydrosis
c. Raynaud's disease d. Causalgia

48. Lumbar sympathectomy is not indicated in: *(AIIMS June 97)*
a. Healing of ulcer over great toe
b. Claudication
c. Rest pain
d. Buerger's disease

49. Which of the following best responds to sympathectomy?
a. Buerger's disease *(JIPMER 86)*
b. Hyperhydrosis
c. Raynaud's disease
d. Acrocyanosis

50. In extraperitoneal approach, to left sympathectomy the following may be injured:
a. Ureter b. Gonadal vessels
c. A+B d. IVC

51. In a lumbar sympathectomy the sympathetic chain in its usual position is likely to be confused with the:
a. Ureter *(PGI 81, AIIMS 82)*
b. Psoas minor c. Genitofemoral nerve
d. Ilioinguinal nerve e. Lymphatics

52. Removal of L1 ganglion in sympathectomy results in:
a. Impotence *(DNB 2006, JIPMER 91)*
b. Retention of urine
c. Sterility
d. Causalgia

CRITICAL LIMB ISCHEMIA

53. Which of the following statement is not true?
a. Ankle brachial index <0.5 indicates critical limb ischemia
b. Ankle brachial index changes during exercise and rest
c. Ankle brachial index >1 is normal *(AIIMS Nov 2011)*
d. Smoking is more specific for peripheral vascular disease than coronary artery disease

54. A patient with critical lower limb ischemia presents with:
a. Intermittent claudication
b. Intermittent claudication and gangrene
c. Rest pain and ischemic ulcers *(All India 2009)*
d. Intermittent claudication and ischemic ulcers

55. An adult patient with leg pain and gangrene of toe. His ankle to brachial arterial pressure ratio would be less than:
a. 1 b. 0.3 *(DNB 2011)*
c. 0.5 d. 0.8

56. Definition of critical limb ischemia includes:
a. Rest/Nisht pain *(COMEDK 2014)*
b. Ankle blood pressure > 50 mmHg
c. Intermittent clandication
d. Well preserved tissues

57. Normal value of ankle brachial index is:
a. 0.8 b. 1 *(Recent Questions 2013)*
c. 1.2 d. 1.4

ARTERIAL ULCER

58. One of the following is not indicated for arterial leg ulcer:
a. Debridement *(PGI 96)*
b. Elevation of limb
c. Head end of bed is raised
d. Low dose aspirin

59. Foot ulcers secondary to arterial insufficiency are successfully treated by all of the following techniques except:
a. Debridement of devitalized tissue *(COMEDK 2004)*
b. Elevation of the affected extremity
c. Antibiotic administration
d. Bed rest

AMPUTATION

60. Re-implantation time for lower limb is: *(Kerala 97)*
a. 6 hours b. 4 hours
c. 8 hours d. 10 hours

61. Stump pain is relieved by: *(Kerala 97)*
a. Continuous tapping over the stump
b. Warming up the stump
c. Using steroids
d. Using analgesics

62. For reimplantation surgery, the detached digit or limb is best preserved in cold: *(UPSC 2000)*
a. Glycerol b. Distilled water
c. Hypertonic saline d. Isotonic saline

63. Phantom limb is based upon: *(DNB 2009)*
a. Law of projection b. Webers law
c. Munro-Kellie doctrine d. Renshaw cell inhibition

ARTERIOVENOUS FISTULA

64. Nicoladoni sign is also known as: *(AIIMS Nov 2008)*
a. Murray sign b. Frei sign
c. Darrier sign d. Branham sign

65. All of the following are correct regarding AV fistula except:
a. Arterialisation of the veins
b. Proximal compression causes increases in heart rate
c. Localized gigantism *(MHSSMCET 2005, All India 2001)*
d. Causes LV enlargement and cardiac failure

66. Commonest cause of AV fistula is: *(DNB 2000)*
a. Congenital b. Traumatic
c. Iatrogenic d. Tumour erosion

67. A patient presented with local gigantism of the leg and increased pulsations of the lower limb veins. Most probable diagnosis is: *(AIIMS Nov 2001)*
a. Tumor
b. AV fistula
c. Varicose veins
d. Incompetence of the saphenofemoral junction

68. True regarding AV fistula is: *(PGI June 2002)*
a. Leads to cardiac failure
b. Causes local gigantism
c. Can cause ulcers
d. Causes excess bleeding on injury
e. Closes spontaneously

69. AV fistula causes: ~ *(PGI Dec 2002)*
a. Leads to cardiac failure
b. Causes local gigantism
c. Endocarditis
d. Local ulceration and hemorrhage
e. Closes spontaneously

70. Nicoladoni Branham sign is: *(PGI Dec 98)*
a. Compression cause bradycardia
b. Compression cause tachycardia
c. Hypotension
d. Systolic filling

71. The most common cause of acquired arteriovenous fistula is: *(All India 2006)*
a. Bacterial infection b. Fungal infection
c. Blunt trauma d. Penetrating trauma

72. Commonest cause of A-V fistulae is: *(Recent Question 2013, All India 88)*
a. Congenital
b. Traumatic
c. Surgical creation
d. Tumour erosion

73. Congenital A-V fistulas in the thigh will be associated with all except: *(PGI 89)*
a. Increased cardiac output
b. Increased skin temperature
c. Gigantism of limb
d. Superficial venous engorgement

74. Complications arising out of A-V fistula done for renal failure include the following except: *(JIPMER 2003)*
a. Infection
b. Thrombosis
c. High output cardiac failure
d. Necrosis of the distal part

75. Arterio-venous fistula can safely be ligated if the following is positive: *(COMEDK 2004)*
a. Allen's test
b. Henle-Coenen sign
c. Trendelenberg test
d. Schwartz test

THORACIC OUTLET SYNDROME

76. Thoracic outlet syndrome is primarily diagnosed by:
a. Clinical evaluation
b. CT scan *(All India 2009)*
c. MRI
d. Angiography

77. Which of the following is not a complication of surgery for thoracic outlet syndrome? *(AIIMS May 2007)*
a. Pneumothorax
b. Brachial plexus injury
c. Lymphocutaneous fistula
d. Long thoracic nerve injury

78. Adson's test is positive in: *(MHSSMCET 2005)*
a. Cervical spondylosis
b. Fracture ribs
c. Cervical rib
d. All of the above

79. Which is not true about thoracic outlet syndrome?
a. Radial nerve is commonly affected *(AIIMS Nov 98)*
b. Neurological features are most common
c. Resection of 1st rib relieves symptom
d. Positive Adson's test

80. Which is not true regarding thoracic inlet syndrome?
a. Most commonly radial nerve *(AIIMS Sept 96)*
b. Resection of 1st rib is effective treatment
c. Physiotherapy and position exercises relieves symptom
d. Neurological signs and symptoms are common

81. Commonest symptom associated with thoracic outlet syndrome is: *(PGI 87)*
a. Intermittent claudication
b. Pain on radial distribution
c. Pain in ulnar distribution
d. Gangrene

82. All are seen in thoracic outlet syndrome except: *(PGI 97)*
a. Mass in the neck
b. Wasting of forearm muscles
c. Adson's test positive
d. Pallor

83. Adson test is used for determining vascular suffiency. It is useful in: *(Recent Questions 2013)*
a. Peripheral vascular disease
b. Varicose veins
c. Cervical rib
d. AV fistula

84. Most common age group affected in thoracic outlet obstruction syndrome is? *(DNB 2014)*
a. 10–25 years
b. 25–45 years
c. 45–65 years
d. > 65 years

RAYNAUD'S DISEASE

85. All of the following are true regarding Raynaud's phenomenon except: *(AIIMS Nov 2012)*
a. It involves acral parts of fingers
b. Migratory thrombophlebitis is seen only in Raynaud's phenomenon
c. Drugs acting by inhibiting the beta receptors in blood vessels also play a role
d. Emotional stress may also precipitate Raynaud's phenomenon

86. True statement about Raynaud's phenomena: *(PGI Dec 2006)*
a. Lower limb more commonly involved than upper limb
b. More common in female
c. Superficial thrombophlebitis
d. Associated with migraine

87. Raynaud's syndrome occurs in all of the following except:
a. SLE *(DNB 2009, MCI Sept 2007)*
b. Rheumatoid arthritis
c. Osteoarthritis
d. Cryoglobulinemia

88. Sequence of colour changes observed in Raynaud's disease:
a. Red, blue, white *(MCI Sept 2009)*
b. White, blue, red
c. Blue, red, white
d. White, red, blue

89. If a patient with Raynaud's disease immersed his hand in cold water, the hand will: *(All India 2003)*
a. Become red
b. Remain unchanged
c. Turn white
d. Become blue

90. All are true about Raynaud's phenomena except: *(Kerala 95)*
a. Exposure to cold aggravates
b. Spasm of vessels
c. More common in females
d. Atherosclerosis of vessels

DIABETIC FOOT

91. True regarding management of diabetic foot: *(PGI May 2010)*
a. Strict diabetic control
b. Venous system is commonly involved
c. Topical antibiotics are used
d. Early amputation should done
e. Diabetic ulcers are trophic ulcers

92. Site of diabetic foot ulcer: *(PGI June 2005)*
a. Medial malleolus
b. Lateral malleolus
c. Heel
d. Head of metatarsal
e. Head of toes

93. Diabetic gangrene is due to: *(Kerala 94)*
a. Ischemia
b. Increased blood glucose
c. Altered defense by host and neuropathy
d. All of the above

94. Diabetic gangrene is due to all except: *(TN 86)*
a. Vasospasm
b. Atherosclerosis
c. Peripheral neuritis
d. Increased sugar in blood

95. Etiopathogenesis of diabetic foot include the following except: *(UPSC 2007)*
a. Myelopathy
b. Osteoarthropathy
c. Microangiopathy
d. Infection

AORTIC DISSECTION

96. The most common site of acute aortic dissection is:
a. Right lateral wall of ascending aorta
b. Arch of aorta *(DNB 2013, COMEDK 2010)*
c. Suprarenal abdominal aorta
d. Infrarenal abdominal aorta

97. A 50-years old male patient, an alcoholic and smoker presents with a 3 hours of severe retrosternal chest pain and increasing shortness of breath. He started having this pain while eating, which was constant and radiated to the back and intersapular region. He was a known hypertensive. On examination, he was cold and clammy with a heart rate of 130/min, and a BP of 80/40 mmHg. JVP was normal. All peripheral pulses were present and equal. Breath sounds were decreased at the left lung base and chest x-ray showed left pleural effusion. What is the most likely diagnosis?
a. Acute aortic dissection
b. Acute myocardial infarction
c. Rupture of the esophagus
d. Acute pulmonary embolism

98. Dissection of which artery is seen in pregnancy?
a. Carotid artery b. Aorta *(PGI June 2000)*
c. Coronary artery d. Femoral artery

AORTIC ANEURYSM

99. Most common cause of abdominal aortic aneurysm is:
a. Atherosclerosis b. Trauma *(All India 2010)*
c. Syphilis d. Vasculitis

100. False statement about abdominal artery aneurysm (AAA):
a. Surgery indicated when size AAA >6cm *(PGI Nov 2011)*
b. 90% of AAA is present below renal artery
c. Blue toe syndrome may be associated
d. Mortality rate after surgery is >25%
e. Commonly causes colon ischemia

101. The most common site of rupture of abdominal aortic aneurysm is: *(All India 2009)*
a. Laterally into the left retroperitoneum
b. Laterally into the right retroperitoneum
c. Posteriorly into the posterior retroperitoneum
d. Anteriorly into the peritoneum (Intraperitoneal)

102. Most common complication of descending aortic aneurysm surgery: *(MHSSMCET 2006)*
a. Renal failure
b. Distal emboli
c. Pulmonary infections
d. Myocardial infarction

103. The size at which elective surgery is indicated in abdominal aortic aneurysm: *(MHSSMCET 2008)*
a. 5 cm b. 5.5 cm
c. 6 cm d. 6.5 cm

104. Abdominal aneurysm is characterized by all except: *(PGI June 2000)*
a. Elective surgery complication should be <5%
b. Emergency surgery complication <10%
c. Rarely asymptomatic before rupture
d. Bigger the size it is more prone to rupture

105. Mycotic aneurysm is aneurysm infected because of:
a. Fungal infection *(All India 2006)*
b. Blood borne infection (Intravascular)
c. Infection introduced from outside (Extravascular)
d. Both intravascular and extra-vascular infection

106. The procedure of choice for the evaluation of aortic aneurysm is: *(Recent Question 2013, All India 2006)*
a. Ultrasonography
b. Computed tomography
c. Magnetic resonance imaging
d. Arteriography

107. Which of the following is true about coeliac plexus block?
a. Located retroperitoneally at the level of L3
b. Usually done unilaterally *(AIIMS May 2013)*
c. Useful for the painful conditions of lower abdomen
d. Most common side effect is diarrhea and hypotension

108. Most common cause of aneurysm of abdominal aorta is:
a. Trauma b. Atherosclerosis *(All India 96)*
c. Syphilis d. Cystic medial necrosis

109. In the abdomen, aneurysms of the commonly occur …… next only to the aorta: *(PGI 88)*
a. Internal iliac artery b. External iliac artery
c. Splenic artery d. Inferior mesenteric artery

110. After doing a graft repair of a thoraco-abdominal aneurysm, the patients developed weakness. Most probable cause for this: *(AIIMS May 2012)*
a. Decreased blood supply to the lower limbs
b. Thoraco splanchnic injury
c. Discontinuation of arteria radicularis magna
d. Lumbosacral nerve injury

111. All of the following are true about aortic aneurism except: *(JIPMER 2013)*
a. Saccular aneurism involves whole circumference
b. True aneurism involves all 3 layers
c. Atherosclerosis is the commonest cause
d. False aneurism is not covered by all 3 layers

FEMORAL ARTERY ANEURYSM

112. Treatment of femoral artery aneurysm: *(PGI June 2007)*
a. Ultrasound guided compression of the neck of aneurysm
b. Thrombin injection
c. Bypass graft repair
d. Ligation of involved vessel

113. Pseudoarterial aneurysm in drug abuser's seen in:
a. Radial *(PGI June 2005, June 2007)*
b. Brachial c. Femoral
d. Carotid e. Pedal

114. Pseudoaneurysm in IV drug abusers is commonly found in: *(PGI Dec 2008)*
a. Radial artery b. Brachial artery
c. Femoral artery d. External iliac artery
e. Dorsalis pedis artery

POPLITEAL ARTERY ANEURYSM

115. Most common site of peripheral aneurysm: *(AIIMS Nov 2008)*
a. Femoral artery b. Radial artery
c. Popliteal artery d. Brachial artery

116. Commonest peripheral aneurysm is: *(SCTIMS 98)*
a. Popliteal b. Femoral
c. Carotid d. Iliac

117. Popliteal aneurysm-all are true except: *(SCTIMS 98)*
a. Presents as a swelling behind the knee
b. Presents with symptoms due to complication
c. Surgery is indicated in case of complication
d. Uncommon among peripheral aneurysm

PSEUDOANEURYSM

118. Pseudoaneurysms are most commonly due to: *(JIPMER 93)*
a. Atherosclerosis b. Trauma
c. Congenital deficiency d. Infections

119. Psuedoaneurysm in I.V. drug abusers is commonly found in: *(PGI Dec 2008, June 2007)*
a. Radial artery b. Brachial artery
c. Femoral artery d. External iliac artery
e. Dorsalis pedis artery

120. A drug abuser developed pseudoaneurysm. Which of the following is/are should include in the treatment modalities? *(PGI Dec 2008)*
a. Ligation of involved vessel and wide surgical debridement
b. Exposure and ligation with subsequent revascularization
c. Direct interposition graft with synthetic material in groin for revascularization
d. Direct interposition graft with autogenous graft
e. Selective revascularization using remote iliofemoral bypass

SUBCLAVIAN STEAL SYNDROME

121. Commonest part of subclavian artery to be affected by stenosis is: *(All India 2009)*
a. First part
b. Second part
c. Third part
d. Equally affected

122. Which of the following statement is true regarding subclavian steal syndrome? *(AIIMS Nov 2005)*
a. Reversal of blood flow in the ipsilateral vertebral artery
b. Reversal of blood flow in the contralateral carotid artery
c. Reversal of blood flow in the contralateral vertebral artery
d. Bilateral reversal of the flow in the vertebral arteries

VASCULAR GRAFT

123. Best graft for femoropopliteal bypass? *(MHSSMCET 2007)*
a. Autologous vein b. Dacron
c. Teflon d. PTF

124. Best material for below inguinal arterial graft is:
a. Saphenous vein graft (upside-down) *(All India 2009)*
b. PTFE
c. Dacron
d. Teflon

125. Neointimal hyperplasia causes vascular graft failure as a result of hypertrophy of: *(All India 2006)*
a. Endothelial cells b. Collagen fibers
c. Smooth muscle cells d. Elastic fibers

126. Dacron vascular graft is: *(Recent Question 2013, All India 2006)*
a. Nontextile synthetic b. Textile synthetic
c. Nontextile biologic d. Textile biologic

127. Preferred material for femoro-popliteal bypass: *(PGI 89)*
a. Dacron b. PTFE
c. Saphenous vein d. Gortex

128. For aortic graft the best material available is:
a. Dacron b. Artery *(JIPMER 81, DPG 92)*
c. Vein d. None

129. A knitted dacron artery graft: *(PGI 99, AIIMS 84)*
a. Is not porous
b. Is eventually dissolved by tissue reaction
c. Never gets infected
d. Can be easily incised and the opening resutured

130. Not used as graft material in peripheral vascular disease:
a. Dacron graft b. Vein *(PGI 97)*
c. PTFE d. PVC

131. Graft used in infra inguinal by pass is: *(JIPMER 2000)*
a. PTFE b. Dacron
c. Autologous vein d. Autologous artery

VASCULAR TRAUMA

132. Bullet wounds near major blood vessels should be explored only if: *(PGI 81, AMC 85)*
a. The extremity is cold
b. The fingers or toes are paralyzed
c. The pulse is weakened
d. There is no pulse
e. In all cases regardless of physical findings

133. True about aortic transaction: *(PGI June 2008)*
a. Most commonly associated with deceleration injury
b. High morality
c. Surgery definitive treatment
d. Aortography gold standard

134. Radiological findings of torn thoracic aorta is/are:
a. Mediastinal widening *(PGI Nov 2011)*
b. Abnormal aortic contour
c. Right apical pleural cap
d. Right paratracheal stripe thickening
e. Left apical pleural cap

135. Best approach for surgical repair of the injury to abdominal aorta above the level of renal artery involving superior artery, celiac trunk, and the suprarenal branch:
a. Right medial visceral rotation *(MHSSMCET 2009)*
b. Left medial visceral rotation
c. Right Lateral visceral rotation
d. Left Lateral visceral rotation

ANGIOGRAPHY AND COMPLICATIONS

136. Seldinger needle is used for: *(MCI March 2010)*
a. Suturing muscles b. Arteriography
c. Pulmonary biopsy d. Lymphangiography

137. All of the following complications may commonly follow lower extremity angiography except:
a. Renal failure b. Dehydration
c. Arterial occlusion d. Intracerebral hemorrhage

138. Most common artery used for cannulation: *(PGI June 97)*
a. Radial artery b. Ulnar artery
c. Brachial artery d. Cubital artery

139. Which is not true about femoral artery cannulation?
a. Common femoral artery is cannulated *(AIIMS May 2011)*
b. Single wall puncture is indicated in those with normal coagulation profile
c. Femoral artery is catheterized at medial third of femoral head
d. Seldinger technique is used both for femoral artery and vein

TARAYASI ARTERITIS

140. Bilateral pulseless disease in upper limbs is caused by: *(PGI June 97*
a. Aortoarteritis
b. Coarctation of aorta
c. Fibromuscular dysplasia
d. Buerger's disease

141. In Tarayasi arteritis most common artery involved is: *(JIPMER 2014)*
a. Common carotid artery
b. Subclaviary artery
c. Renal artery
d. Inferior mesenteric artery

MISCELLANEOUS

142. Allen's test is useful in evaluating: *(APPG 2015, DNB 2011, All India 2006)*
a. Thoracic outlet compression
b. Presence of cervical rib
c. Integrity of palmar arch
d. Digital blood flow

143. The artery commonly involved in cirsoid aneurysm is: *(PGI 88)*
a. Occipital
b. Superficial temporal
c. Internal carotid
d. External carotid

144. True about erythrocyanosis except: *(APPG 96)*
a. Affects young girls
b. Cold peripheries
c. Palpable pulses
d. Ulceration and gangrene of fingers

145. The Hunterian ligature operation is performed for: *(DNB 2003, AIIMS Nov 2008, All India 2003)*
a. Aneurysm
b. Varicose veins
c. AV fistulas
d. Acute arterial ischemia

146. Popliteal artery pulsations are difficult to feel because: *(All India 2009)*
a. It is not superficial
b. It does not cross prominent bone
c. It is not superficial and does not cross prominent bone
d. Its pulsations are weak

147. The commonest cause of death following arterial reconstruction of the lower extremity is: *(COMEDK 2004)*
a. Graft infection
b. Cerebrovascular accident
c. Myocardial infarction
d. Systemic sepsis secondary to skin necrosis

148. Saddle thrombus is present at: *(Punjab 2008)*
a. Pulmonary artery
b. Aorta
c. Pulmonary vein
d. Bifurcation of pulmonary artery

149. Allen's test is used to diagnose: *(JIPMER 2011)*
a. Thoracic outlet syndrome
b. Palmar arch insufficiency
c. Superior vena cava syndrome
d. Varicose veins

150. Mycotic aneurysm occurs due to: *(MHSSMCET 2007)*
a. Fungus
b. Syphilis
c. Salmonella
d. Medial necrosis of arteries

151. Normal ankle brachial index: *(MHSSMCET 2008)*
a. 1
b. 2
c. 3
d. 4

152. In-situ thrombosis after drug-iluting stent insertion occurs owing to? *(MHSSMCET 2008)*
a. Delayed re-epithelization
b. Premature termination of anti-platelet therapy
c. Disturbed coagulation
d. All of the above

153. Butcher's thigh is: *(DNB 2010)*
a. Vastus lateral rupture
b. Subcutaneous lipodermatosclerosis
c. Bursa in adductor canal
d. Accidental injury to major vessels in thigh or groin

154. What is the best way to control external hemorrhage? *(DNB 2012)*
a. Direct pressure
b. Elevation
c. Proximal torniquet
d. Artery forceps

155. Which of the following is a feature of temporal arteritis? *(AIIMS Nov 2012)*
a. Giant cell arteritis
b. Granulomatous vasculitis
c. Necrotizing vasculitis
d. Leucocytoclastic vasculitis

156. Which of the following is true about coeliac plexus block? *(AIIMS May 2013)*
a. Located retroperitoneally at the level of L3
b. Usually done unilaterally
c. Useful for the painful conditions of lower abdomen
d. Most common side effect is diarrhea and hypotension

EXPLANATIONS

ARTERIAL OCCLUSION

1. **Ans. a. Pulselessness, b. Paralysis, d. Anesthesia, e. Coolness**
(Ref: Sabiston 19/e p1751; Schwartz 10/e p872-881, 9/e p754; Bailey 26/e p888, 25/e p899-901)

Peripheral Arterial Occlusion

- Clinical features of peripheral arterial occlusion are classically remembered by 5 Ps: **Pain**, **Pallor**, **Pulselessness**, **Paralysis** and **Paraesthesia** (or anesthesia)[Q]
- Some add 6th P: **Poikilothermia** or **perishing cold**[Q]
- **MC presenting symptom** of acute arterial occlusion: **Pain**[Q]

2. **Ans. None** *(Ref: Sabiston 19/e p1710-1718; Schwartz 10/e p872-881, 9/e p742-750; Bailey 26/e p837, 879 25/e p901)*

Internal iliac artery doesn't supply lower limbs, so above-mentioned symptoms are not seen in the occlusion of internal iliac artery. External iliac artery occlusion can lead to symptoms in lower limb.

Aortoiliac Occlusive Disease

- **Distal abdominal aorta** and **iliac arteries** are **common sites affected by atherosclerosis**[Q].
- Symptoms and natural history of the atherosclerotic process are influenced by the disease distribution and extent.
  - Presence of **pelvic and groin collaterals** is important in **providing crucial collateral flow** in **maintaining lower limb viability**[Q].
  - It is **rarely limb threatening**[Q] (Opposite to femoropopliteal disease[Q])

Clinical Features

- **Bilateral thigh** or **buttock claudication**[Q]
- **Erectile dysfunction** or **impotence (Leriche syndrome**[Q]**)**
- Pulses distal to occlusion are absent or diminished
- Rest pain and gangrene are unusual with isolated segment of aortoiliac disease.
- **Examination: Weakened femoral pulses and reduced ABI**[Q]**.**

Diagnosis

- **Duplex ultrasound** make the diagnosis of iliac occlusive disease
- **Angiography** is indicated if symptoms warrant **surgical intervention**[Q].

Treatment

- **Failure to respond to exercise** and/or **drug therapy** should prompt consideration for **limb revascularization**[Q]**.**
- **Limb revascularization options:** Aortobifemoral bypass, aortic endarterectomy, axillofemoral bypass, iliofemoral bypass, femorofemoral bypass

3. **Ans. b. Atherosclerosis** *(Ref: ASI Surgery/1333)*

- ASI says **"Most common cause** of **peripheral limb ischemia in adults in India** is **atherosclerosis**[Q].

Causes of Peripheral Arterial Occlusive Disease

Common	Rare
Atherosclerosis (MC)[Q]	External compression
Buerger's disease[Q]	Popliteal entrapment
Takayasu arteritis	Thoracic outlet syndrome
SLE	Retroperitoneal fibrosis
Post-traumatic	Coarctation of aorta
Radiation injury	Cystic medial necrosis
	Fibromuscular dysplasia

4. **Ans. a. Shock** 5. **Ans. a. Cyanosis** 6. **Ans. b. Rubor**

7. **Ans. b. Atherosclerosis** *(Ref: Sabiston 19/e p1726, 1752, 1753; Schwartz 10/e p872-881, 9/e p753-754; Bailey 26/e p878, 25/e p899-901)*

Causes of Arterial Occlusive Disease

Atherosclerosis	Buerger's Disease
• Seen in patients **>40 years**[Q]	• Seen in **young males <40 years**[Q]
• **MC** in **6th** or **7th** decade[Q]	• Involve **small and medium sized vessels (Tibial, plantar** and **radial arteries**[Q]**)**
• Causes **occlusion of large**[Q] and **medium**[Q] **sized vessels** (Abdominal **aorta, iliac, femoral, Popliteal, tibial** and **peroneal arteries)**	• **Symptoms** of peripheral arterial insufficiency is seen **in both lower** and **upper limbs**[Q]
• **Symptoms** of peripheral arterial insufficiency is predominantly seen **in lower limbs**[Q]	

8. **Ans. c. Removal of embolus form blood vessels** *(Ref: Sabiston 19/e p1751-1752; Schwartz 9/e p755-756; Bailey 26/e p890, 25/e p911)*

Fogarty Balloon Catheter

- **Fogarty balloon catheter** is used for **removal of embolus** form blood vessels[Q]
- **Embolectomy:**
  - Artery (usually the **femoral**), **bulging with clot**, is exposed and held in slings.
  - Through a longitudinal or transverse incision the **clot** begins to extrude and is **removed, together with** the **embolus, with** the help of a **Fogarty balloon catheter**[Q].
  - Catheter, with its balloon tip, is introduced both proximally and distally until it is deemed to have passed the limit of the clot.
  - **Balloon is inflated and catheter withdrawn slowly,** together with any obstructing material.
  - **Procedure** is **repeated until bleeding occurs.**

9. **Ans. b. Removal of blood clots from the arteries**

10. **Ans. d. Gangrene localized to the feet**

11. **Ans. c. Pain in muscle on exercise only** *(Ref: Sabiston 19/e p1738; Schwartz 10/e p828, 882, 9/e p754-755; Bailey 26/e p878-879, 25/e p899-900)*
- **Intermittent Claudication**: **Crampy pain in muscles induced by exercise** (walking) and **relieved by rest.**

Intermittent Claudication

- **Crampy pain in muscles that is:**
  - **Brought on by walking**[Q] (exercise)
  - **Not present on** taking the **first step**[Q] (unlike osteoarthritis)
  - **Relieved by standing still/rest**[Q] (unlike pseudoclaudication)

Boyd Classification of Intermittent Claudication	
Grade **1**	• **Pain starts** but if the **patient continues to walk**, the metabolites increase the muscle flow and sweep away substance P produced by exercise and **pain disappears**[Q].
Grade **2**	• **Pain continues** but the **patient can still walk** with effort[Q]
Grade **3**	• **Pain compels** the patient **to take rest**[Q]
Grade **4**	• **Rest pain**[Q]

12. **Ans. c. Lumbar canal stenosis** *(Ref: Sabiston 19/e p1738; Schwartz 10/e p828,882, 9/e p753-755; Bailey 26/e p878-879, 25/e p923-924)*
- When **symptoms mimicking** the symptoms of **intermittent vascular claudication** arise from **lumbar canal stenosis**, the condition is termed as **neurogenic pseudoclaudication.**
- Pseudoclaudication refers to a variety of conditions that may mimic vascular intermittent claudication. The condition that is **most commonly confused with vascular intermittent claudication** is **neurological pseudoclaudication** due to **lumbar canal stenosis.**

Characteristics	Vascular Claudication	Neurogenic Pseudoclaudication
Age	Old	Old
Gender	**Male**[Q] >female	Male=female
Current or previous low back pain	Less common	**Very common**[Q]
Lower Limb Symptoms: • **Pain** • **Numbness, tingling (Paraesthesias)** • **One** or **both sides**	**Buttock, thigh,** and/or **leg**[Q] No / Rare Yes (May be **unilateral**)	**Buttock, thigh,** and/or **leg**[Q] Frequent Yes (Usually **bilateral**[Q])

Contd...

Contd...

Provoking Factors: • Walking / Exercise • Standing still • Up an incline • Down an incline	**Yes**[Q] No **± More likely**[Q] ± Less likely	**Yes**[Q] **Yes**[Q] ± Less likely **± More likely**[Q]
Relieving Factors: • **Stand still** • **Lean forwards** (flexed posture)	**Helps**[Q] No difference	No help **Helps**[Q]
Preventive Factor: • **Time to relief** • **Pulses** • Neurological examination • Straight - leg raising test	Slightly **quicker**[Q] (2-5 minutes to disappear) **Reduced**[Q] Normal Negative	Slightly **slower**[Q] (15-20 minutes to disappear) Normal **Minor findings**[Q] Usually negative
Walking distance	Fairly **constant**[Q]	More **variable**

13. Ans. b. Superior thoracic artery *(Ref: BDC 4/e pvol I/56, 82)*

A **rich anastomosis** exists **around** the **scapula** between branches of **subclavian artery** (**first part**) and the **axillary artery** (**third part**). This anastomosis **provides** a **collateral circulation** through which blood can flow to the limb **when** the **distal part of subclavian artery** or the **proximal** part of **axillary artery** is **blocked**.

Anastomosis around Scapula
• Formed by branches of: – **First part** of **subclavian artery**[Q] (**Suprascapular**[Q] and deep branches of **transverse cervical** artery[Q]) – **Third part** of **axillary artery**[Q] (**Subscapular** and its **circumflex scapular** branch[Q])

14. Ans. a. Antiphospholipid antibodies, c. Hyperhomocysteinemia *(Ref: Harrison 18/e p462; Sabiston 19/e p1813; Schwartz 9/e p754, 781)*

Abnormality	Arterial Thrombosis	Venous Thrombosis
Factor V Leiden[Q]	-	+
Prothrombin	-	+
Antithrombin III	-	+
Protein C	-	+
Protein S	-	+
Homocystinemia[Q]	+	+
Antiphospholipid syndrome[Q]	+	+

15. Ans. d. 2 hours *(Ref: Bailey 25/e p206-207)*

- Excessive tourniquet time causes both local pressure and distal ischemic effects, with nerve damage and even compartment syndrome.
- **Tourniquets** should usually be **let down after 1 hour**[Q] unless close to the end of a procedure.
- They can then be **reinflated after 5-10 min for a further hour**[Q].

- **Tourniquet time for upper limb: 1 hour**[Q]
- **Maximum tourniquet time for upper limb: 2 hours**[Q]

16. Ans. b. Bilateral iliac artery occlusion *(Ref: Sabiston 19/e p1727-1728; Schwartz 9/e p753; Bailey 26/e p879, 25/e p901)*

Site of Block	Clinical Presentation
Aorto-iliac disease	• **Buttock, thigh** and **calf** claudication[Q] • **Leriche syndrome**[Q]
Common femoral disease	• **Thigh** and **calf** claudication[Q]
Superficial femoral disease	• Calf claudication[Q]
Popliteal artery disease	• Calf claudication[Q]
Crural artery disease	• Calf claudication[Q]

17. Ans. a. Embolectomy *(Ref: Sabiston 19/e p1751-1752; Schwartz 9/e p752-756; Bailey 26/e p888-891, 25/e p909-911)*

Embolic Occlusion

- An embolus is **detached thrombus from heart** or a more **proximal vessel.**
- **MC Source: Left atrium** in **atrial fibrillation**Q **>Mural thrombus following MI**Q
- Less common sources: Aneurysms and thrombi formed on atheromatous plaques

Emboli cause Ischemic Symptoms	
Leg	• **Pain, pallor, paresis, pulselessness and paraesthesia**Q
Brain	• **TIA or stroke**Q
Retina	• **Amaurosis fugax**
Mesenteric vessels	• Possible **gangrene** of corresponding loop of intestineQ
Spleen	• **Local pain**
Kidneys	• **Loin pain** and **hematuria**

Clinical Features

- **Embolic arterial occlusion** is an **emergency** that requires **immediate treatment**Q.
- The leg is often affected, with pain, pallor, paresis, loss of pulsation and paraesthesia (or anesthesia).

> **Diagnosis can be made clinically**Q **in a patient who has no history of claudication and has a source of emboli, who suddenly develops severe pain or numbness of the limb, which becomes cold and mottled**Q**.**

- Movement becomes progressively more difficult and sensation is lostQ.
- Pulses are absent distallyQ but the femoral pulse may be palpable.

Treatment

- Because of the ensuing stasis, a **thrombus can extend distally** and **proximally**Q to the embolus.

> - **Immediate administration of 5000 U of heparin IV can reduce this extension and maintain patency of the surrounding (particularly the distal) vessels until the embolus can be treated**Q**.**

- The relief of pain is essential because it is severe and constant.

> - **Embolectomy and thrombolysis**Q **are the treatments available for limb emboli.**

18. Ans. b. Arterial insufficiency **19. Ans. c. Immediate embolectomy**

20. Ans. c. Dextran-40 pmj.bmj.com/content/70/819/5.full.pdf

- **Dextran-40 or 70 to reduce plasma viscosity can be given in the management of the ischemic limb for temporary improvement**Q**.**
- **Low molecular weight dextrans are used during acute attack of thromboangitis. They cause hemodilution, decrease viscosity of blood and improve microcirculation. Intra-arterial injection is said to be more effective than intravenous**Q**.**

21. Ans. b. Muscles are unaffected **22. Ans. a. 1 hour**

BUERGER'S DISEASE

23. Ans. b. Endovascular stent, d. Extra-anatomical bypass *(Ref: Sabiston 19/e p1752-1753; Schwartz 10/e p906, 1822-1823, 9/e p771; Bailey 26/e p899-900, 25/e p923-924)*

Buerger's Disease (Thromboangitis Obliterans)

- **Segmental inflammatory disease**Q**, affecting small and medium sized**Q **arteries in upper and lower**Q **extremities**
- **Inflammatory process involves neighboring veins and nerves**Q
- **Definite relationship with smoking**Q

Histopathology

- **Sharply segmental acute and chronic vasculitis of small and medium vessels with thrombosis of lumen which may undergo**
- **organization and recanalization**Q
- **Thrombus contains microabscesses**

> - **Inflammatory process extends to involve neighboring veins and nerves**Q
> - **With time, all three structures (artery, vein and nerve) become incased in fibrous tissue**Q

Clinical Features

- **Characterized by triad of intermittent claudication, Raynaud's phenomenon and migratory superficial vein thrombophlebitis**Q

> - **Typically seen in young (<40 years), male smokers**Q

- **Not seen** in **females** and **non-smokers**[Q]
- Patient initially presents with **foot, leg, arm or hand claudication** progressing to **rest pain and ulcerations** on the toes, feet or fingers
  - **TAO** principally **affects distal (small + medium) vessels**[Q], so **claudication** is usually **confined to calves and feet or forearm and hands**

Diagnosis

- Angiography of all four limbs[Q] (multiple limbs may be involved)
- Even if symptoms are not yet present in a limb, angiographic findings may be demonstrated.
  - **Characteristic angiographic findings: Disease confinement to the distal circulation,** usually **infrapopliteal** and **distal to the brachial artery**[Q].
  - **Occlusions** are **segmental** and **show "skip" lesions with extensive collateralization,** the so-called **"corkscrew collaterals**[Q]**."**

Diagnosis

- **Abstinence from smoking**[Q] arrests, but does not reverse, the disease.
- **Sympathectomy** for **rest pain** and **ulcerations**[Q]
- **Omental transposition**[Q]
- **Amputations**[Q] in gangrene

Surgical bypass or revascularization is rarely feasible in Buerger's disease, because of:
1. **Occlusion of small** and **medium sized vessels**[Q]
2. Presence of **segmental** and **skip lesions**[Q]
3. **Absence** of **distal target vessel** for **bypass**[Q]

24. **Ans. b. Pain in positional**
    - **Relief of symptoms** is **not dependent upon sitting** or **other positional changes** in **intermittent claudication.**
25. **Ans. d. Thromboangitis obliterans**
26. **Ans. a. Small and medium sized vessels involved, c. Common in male**
27. **Ans. a. Xanthinol nicotinate en.wikipedia.org/wiki/Xantinol_nicotinate**

Xanthinol Nicotinate
• **Xanthinol nicotinate** (or **xanthinol niacinate** or **complamina**) is **a vasodilator**[Q].
• It is a combination of **xanthinol** and **niacin (nicotinic acid)**[Q].
• This vasodilator is **used** in the treatment of Raynaud's phenomenon and **Buerger's** disease.

- Other than the experimental use of **iloprost (prostacyclin or PGI_2)** and **thrombolytics**, the use of **antibiotics** to treat infected ulcers, and **palliative treatment of ischemic pain** with **nonsteroidal and narcotic analgesics**, **all other forms of pharmacologic treatment** have been generally **ineffective** in the treatment of Buerger's disease, including **steroids, calcium channel blockers**, reserpine, **pentoxifylline** (**Trental**), **vasodilators**, **antiplatelet drugs**.

28. **Ans. c. Large arteries**
29. **Ans. c. Buerger's disease**
30. **Ans. b. Neural involvement present** *(Ref: Robbins 8/e p517; Sabiston 19/e p1752-1753; Schwartz 9/e p771; Bailey 25/e p923-924; Harrison 18/e p2069)*
31. **Ans. a. More in night, b. MC in calf muscle, c. Increase upon elevation of limbs, d. Relieved by dependent position, e. Often associated with trophic changes** *(Ref: Sabiston 19/e p1738; Schwartz 9/e p753; Bailey 26/e p878, 25/e p923-924)*

ISCHEMIC REST PAIN

- **Ischemic rest pain is a grave symptom caused by ischemic neuritis**[Q]
- **Indicates advanced arterial insufficiency that usually terminates in gangrene and amputation of the extremity if arterial reconstruction cannot be performed.**

- **burning pain usually confined to the forefoot, distal to the metatarsals**[Q].
- **It may be localized to the vicinity of an ischemic ulcer or pregangrenous toe.**

  - It is **aggravated by elevation** of the extremity or **by bringing the leg** to the **horizontal position**[Q].
  - Thus it **appears at bed rest** (hence the name) and **prevent sleep**[Q].
  - Because **gravity aids** the **delivery of arterial blood**, classically, the patient with rest pain can obtain **relief by** simply **hanging** the **leg over** the **side of** the **bed**[Q].
  - This simple maneuver **will not relieve pain caused by peripheral neuropathy**, the **most common cause of foot pain at rest**[Q].

- If the foot is constantly kept dependent to relieve pain, the leg and foot may be swollen, causing some confusion in diagnosis.
- **Ischemic neuritis pain** is **severe** and **resistant to opioids** for relief[Q].
- **Rest pain** occurs when **blood flow is inadequate to meet metabolic requirements**[Q].
- In the lower extremity, ischemic rest pain is **localized to the forefoot** and generally is easily distinguished from benign nocturnal muscle cramps in the calf, which are also common in older patients.
- Patients often have **trophic changes**, such as **muscle wasting, thinning of skin, thickening of nails**, and **hair loss** in the **distal affected limb**[Q].

32. Ans. d. Anterior and posterior tibial artery

33. Ans. d. Thromboangitis obliterans

34. Ans. d. Femoropopliteal bypass

35. Ans. d. Veins and nerves are never involved

36. Ans. c. Absence of popliteal pulse

37. Ans. a. Smoking, e. Superficial thrombophlebitis

38. Ans. a. Lymphatics

39. Ans. c. Myocardial infarction

40. Ans. a. Only male, b. Age less than 40, d. Smoker

41. None

42. Ans. b. Anticoagulation

LUMBAR SYMPATHECTOMY

43. Ans. a. Intermittent claudication *(Ref: Sabiston 19/e p1903; Schwartz 9/e p771; Bailey 25/e p924)*

- **Lumbar sympathectomy is not of value in the management of intermittent claudication, as blood flow in the skin but not in the muscle is controlled by sympathetic nervous system.**

  - Blood flow in the skin but not in the muscle is controlled by sympathetic nervous system[Q].
  - If the overlying arterial supply is inadequate, ischemic changes in the skin may be relieved by sympathetic blockage but the impaired blood flow to muscles is unlikely to improve[Q].

Indications of Sympathectomy	
• **Buerger's disease**[Q]	• **Erythrocyanosis**[Q]
• **Atherosclerosis** producing ischemia of limbs[Q]	• **Frost bite**[Q]
• **Raynaud's disease**[Q]	• **Hyperhydrosis**[Q]
• **Acrocyanosis**[Q]	• Peripheral vascular insufficiency
	• **Causalgia**[Q]

44. Ans. b. Distal ischemia affecting the skin of the toes *(Ref: Sabiston 19/e p1903; Schwartz 9/e p771; Bailey 25/e p924)*

- **Lumbar sympathectomy** is **indicated in** the **management of distal ischemia affecting skin of** the **toes.**
- Arteriovenous fistula, back pain and intermittent claudication are not included amongst the indications for lumbar sympathectomy.

  - **MC indication of sympathectomy** is **ischemic disorders mainly of** the **limbs**[Q].
  - **MC ischemic condition** for which sympathectomy is carried out is **peripheral vascular occlusive disease of** the **young male smokers**[Q].
  - **Lumbar sympathectomy** is **not of value in** the **management of intermittent claudication**[Q]

45. Ans. c. Anhidrosis b. Intermittent claudication *(Ref: Sabiston 19/e p1903; Schwartz 9/e p771; Bailey 26/e p900, 25/e p924)*

- **Sympathectomy** is **used for** the treatment of **hyperhydrosis.** It would **worsen anhydrosis** rather than treating it.

46. Ans. a. L1 *(Ref: Sabiston 19/e p1903; Bailey 25/e p924)*

LUMBAR SYMPATHECTOMY

- **Open sympathectomy is done preferably through extraperitoneal approach**[Q].
- **The sympathetic chain lies on the sides of the body of vertebra, sometimes inside psoas muscle sheath.**

- In **unilateral surgeries**, sympathetic ganglia **L1, L2, L3** and sometimes **L4** are removed[Q].
- In **bilateral surgeries, L1 of one side** is **preserved to avoid retrograde ejaculation**[Q].

- Lumbar chain can be mistaken with lymphatic chain, genitofemoral nerve, psoas sheath, psoas minor leading to technical failure[Q].

47. **Ans. a. Intermittent claudication** 48. **Ans. b. Claudication** 49. **Ans. b. Hyperhydrosis**
50. **Ans. c. A+B** 51. **Ans. b. Psoas minor, c. Genitofemoral nerve, e. Lymphatics**
52. **Ans. c. Sterility**

CRITICAL LIMB ISCHEMIA

53. **Ans. d. Smoking is more specific for peripheral vascular disease than coronary artery disease** *(Ref: Harrison 18/e p2067; Sabiston 19/e p1730; Schwartz 10/e p881-900, 9/e p751; Bailey 26/e p878, 25/e p900-902)*

- **Smoking** is **equally related with coronary artery disease** and **peripheral vascular disease**[Q].
- **Ankle brachial index <0.5** indicates **critical limb ischemia**[Q].
- Exercise normally increases systolic pressure and decreases peripheral vascular resistance. In case of PAD, it augments the pressure gradient across a stenotic lesion. Thus exercise helps in detecting low grade stenotic lesion giving normal ABI at rest (**ABI changes during exercise and rest**[Q])
- **ABI >1 is normal**[Q].

Ankle Brachial Index (ABI)

- **ABI** = Systolic **BP** at the ankle / Systolic **BP** in the **arms**
- Compared to the arm, **lower blood pressure in** the **leg** is an **indication of blocked arteries (peripheral vascular disease).**
- ABI is calculated by dividing the systolic blood pressure at the ankle by the systolic blood pressures in the arm.

ABI	Interpretation
>1.2	Noncompressible, severely calcified vessel (in DM and ESRD)[Q]
1.0-1.2	Normal vessels[Q]
0.5-0.9	Intermittent claudication[Q] (mild to moderate ischemia)
0.1-0.4	Critical limb ischemia[Q] (Ischemic ulceration, gangrene)

54. **Ans. c. Rest pain and ischemic ulcers** *(Ref: Harrison 18/e p2067; Sabiston 19/e p1738-1739; Schwartz 10/e p881-900, 9/e p751-753; Bailey 26/e p878, 25/e p900-902)*

- **Critical lower limb ischemia is characterized by rest pain. Ulcers and gangrene may occur in patients with critical limb ischemia.**

Peripheral Arterial Disease (PAD)

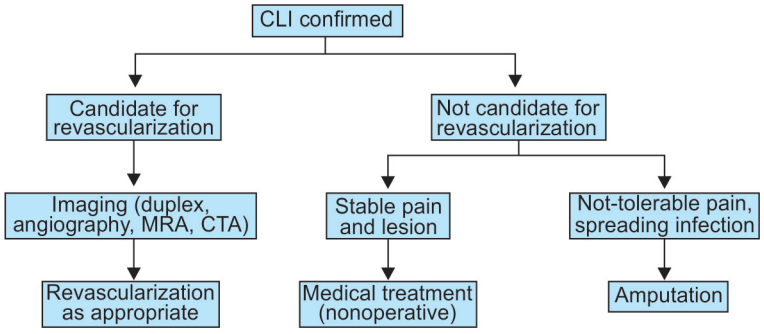
Intermittent Claudication

- **Intermittent claudication** is the **hallmark symptom** of PAD[Q]
- Results from **mild to moderate arterial occlusive disease**[Q]
- **Ischemic symptoms** occur typically **during exercise and relieved by rest**[Q].
- Loss of skin integrity /gangrene is not seen
- **Ankle Brachial Index** (ABI) **>0.5**

Critical Limb Ischemia

- CLI results from **severe arterial occlusive disease**[Q] in whom resting blood flow cannot provide for basal nutritional needs of tissues
- **Ischemic symptoms are present even during rest (rest pain)**[Q]
- **Pain** is **worse** when **legs are horizontal** and may **improve** when **legs** are **kept in** a **dependent position**[Q].
- **Ischemic ulcers, lesions on** the **foot** and **gangrene**[Q] may be seen
- **ABI <0.5Q**

Fontaine Classification of Limb Ischemia	
Stage **I**	Asymptomatic[Q]
Stage **IIa**	**Mild** claudication[Q]
Stage **IIb**	**Moderate to severe** claudication[Q]
Stage **III**	Ischemic **rest pain**[Q]
Stage **IV**	**Ulceration** or **gangrene**[Q]



55. **Ans. b. 0.3** 56. **Ans. a. Rest/Nisht pain** 57. **Ans. b. 1**

ARTERIAL ULCER

58. **Ans. b. Elevation of limb** *(Ref: Schwartz 9/e p224-225; Bailey 26/e p878, 917, 25/e p933-935)*

Because **gravity aids** the **delivery of arterial blood**, classically, the patient with rest pain can obtain **relief by** simply **hanging** the **leg over** the **side of** the **bed.**

Arterial Ulcer

- **Arterial insufficiency ulcers ischemic ulcers** are mostly located on the **lateral surface of** the **ankle** or the **distal digits**Q.
- **Most common** on **distal ends** of limbsQ.

Etiology

- Caused by **lack of blood flow** to the capillary beds of the lower extremities.
- Most often **endothelial dysfunction** is causative factor in **diabetic microangiopathy and macroangiopathy**Q

Characteristic Features

- **Punched-out appearance**Q
- **Intensely painful**Q
- **Pulses** are **not palpable**Q
- Associated **skin changes (thin shiny skin, absence of hair, brittle nails**Q

Diagnosis

- The lesion can be easily identified clinically.
- **Arterial doppler** and **pulse volume recordings** for baseline assessment of blood flow.
- **Radiographs** may be necessary **to rule outosteomyelitis.**

Treatment

- **Vascular surgery** to revascularize the area.
- In **infection: Antibiotics + Debridement**Q

59. **Ans. b. Elevation of the affected extremity**

AMPUTATION

60. **Ans. a. 6 hours** *(Ref: Essential Emergency Trauma by Kaushal Shah, Daniel Egan, Joshua Quaas– 2010/679)*

- **Ischemic time** for **digits** is **upto 8 hours**Q**.**
- **Ischemic time** for **extremities** is **4-6 hours**Q**.**
- **Organ containing bag** should be **placed in** a solution of **saline with ice**Q**.**

61. **Ans. None >D** *(Ref: Analgesics www.stoppain.org/pain_medicine/content/chronicpain/phantom.asp)*

Stump Pain

- Stump pain is **located at the end** of an **amputated limb's stump**.

- It typically is described as a **"sharp," "burning," "electric-like,"** or **"skin-sensitive" pain.**
- Due to a **damaged nerve** in the **stump region.**

Treatment

- **No one treatment** has been **shown to be effective for stump pain**[Q].
- Because it is a pain due to an injured peripheral nerve, **drugs used for nerve pain may be helpful.**
  - Other approaches also are tried in selected cases, including:
  - **Nerve blocks**[Q]
  - **Transcutaneous electrical nerve stimulation**[Q]
  - **Surgical revision** of the stump or **removal of** the **neuroma**[Q]
  - **Cognitive therapies**

62. Ans. d. Isotonic saline

63. Ans. a. Law of Projection *(Ref: Ganong 22nd/125)*

- A phantom limb is the sensation that an **amputated or missing limb** (even an organ appendix) is **still attached to the body** and is moving appropriately with other body parts based upon **"Law of Projection".**
- It states that no matter where a sensory pathwayis stimulated alongits coure, the sensation produced is referred back to site of receptor.

ARTERIOVENOUS FISTULA

64. Ans. d. Branham sign *(Ref: Sabiston 19/e p1785-1786; Bailey 26/e p899, 25/e p923)*

Arteriovenous Fistula (AVF)

- **AVF (**communication between an **artery** and vein**)** may be **congenital or acquired (**penetrating trauma **or** surgically created **for hemodialysis)**

> - **MC type of AVF: Congenital**[Q]
> - **MC cause of acquired AVF: Penetrating trauma**[Q]

- **Structural effects on veins: Veins** are **arterialized (**become **dilated, tortuous** and **thick walled**[Q]**)**

Physiological Effects of AVF

- **Increased pulse pressure**[Q] (Increased systolic and decreased diastolic)
- **Increased venous return** leading to **increased HR** and **increased CO**[Q]
- **Left ventricular enlargement**[Q] and later **cardiac failure**[Q] may occur

> - A **congenital fistula** in the young patient may cause **overgrowth of** the **limb**[Q]
> - In the leg **indolent ulcers** may result from **relative ischemia below** the **short circuit**[Q]

Clinical Signs

- A **pulsatile swelling**[Q]
- **Thrill** on palpation[Q]
- **Continuous bruit** on auscultation[Q]

> - **Nicoladoni's** or **Branham's sign: Pressure** on artery **proximal to fistula** causes the **swelling to diminish in size**, a **thrill** or **bruit to cease**, the **pulse rate** to **fall** and the **pulse pressure** returns to **normal**[Q].

Diagnosis

- **Duplex scan** and/or **angiography** confirm the diagnosis[Q].

Treatment

- Treatment is by **embolization**[Q]**.**
- **Excisional surgery** (rarely) **for severe deformity** or **recurrent hemorrhage**[Q].

65. Ans. b. Proximal compression causes increases in heart rate

66. Ans. b. Traumatic

67. Ans. b. AV fistula

68. Ans. a. Leads to cardiac failure, b. Causes local gigantism, c. Can cause ulcers, d. Causes excess bleeding on injury

69. Ans. a. Leads to cardiac failure, b. Causes local gigantism, d. Local ulceration and hemorrhage

70. Ans. a. Compression cause bradycardia

71. Ans. d. Penetrating trauma **72. Ans. a. Congenital**

73. Ans. b. Increased skin temperature **74. Ans. d. Necrosis of the distal part**

75. Ans. a. Allen's test *(Ref: Sabiston 19/e p1956; Bailey 25/e p437*

Allen's Test

- **Tests the adequacy of the blood supply to the hand from the radial and ulnar arteries and the arcade between them**[Q]
- **Allen's test is used to know the integrity of palmar arch (patency of radial and ulnar arteries)**[Q]**. If these are patent, AVF can be safely ligated.**

Method of Allen's Test
• Elevate the hand and apply digital pressure on the radial and ulnar arteries to occlude them. • Ask the patient to make a fist several times. • The tips of the finger should go pale. Release each artery in turn and observe the return of colour

Types of Surgically Created Fistula	
Brescia-Cimino Fistula	• Radial artery and cephalic vein[Q]
Snuffbox Fistula	• Posterior branch of Radial artery and cephalic vein
Feinberg Fistula	• Radial artery and basilic vein[Q]

THORACIC OUTLET SYNDROME

76. Ans. a. Clinical evaluation *(Ref: Sabiston 19/e p1594-1595; Schwartz 10/e p829, 928, 9/e p704, 790; Bailey 26/e p872, 25/e p895)*

- **Thoracic outlet syndrome** is **diagnosed primarily by clinical evaluation** and the **diagnosis is based on reproducibility of symptoms** (resulting from compression of neurovascular bundle at the thoracic outlet) **during mechanical provocative maneuvers** (Adson's test or costoclavicular test or Hyperabduction test or Roos Arm Claudication test)
- **Specific investigations** (CT scan, MRI, Angiography, X-ray) **are used to exclude other conditions** and to **establish** the **associated diagnosis.**

Thoracic Outlet Compression Syndrome (TOS)

- **TOS** refers to **compression of subclavian vessels** and nerves of the **brachial plexus** in the region of the **thoracic inlet**[Q]**.**
- Divided into: **Vascular forms** (Arterial and /or Venous) and **Neurogenic forms**
- **Compression** resulting from TOS **is dynamic** and **best evaluated clinically by mechanical provocative maneuvers**[Q]

- **Symptoms most commonly** develop **secondary to neural compromise**[Q]
- **Middle-aged women**[Q] are most commonly affected

Neurovascular structures of the upper extremity may be compressed by	
• **Cervical rib**[Q] • **Long transverse process of C7**[Q] • **Abnormal first rib**[Q] • Osteoarthritis • **Scalenes muscle**[Q]	• Trauma (neck hematoma, **bone dislocation**[Q]) • **Fibrous bands**[Q] (congenital and acquired) • **Neoplasms**[Q]

Thoracic Outlet Compression Syndrome (TOS)

Clinical Features

- **Symptoms vary depending on the anatomic structure that is compressed**[Q]**.**
- **In > 90% of cases, neurogenic manifestations are reported**[Q]**.**

- **Ulnar nerve (C8-T1) involvement is most common**[Q]**.**
- It is **associated with:**
  - **Motor weakness** and **atrophy of** the **hypothenar** and **interosseous muscles**[Q]
  - **Pain** and **paresthesia along** the **medial aspect** of the **arm, hand, 5th finger** and **medial aspect of 4th finger**[Q].

- Symptoms of **subclavian artery compression: Fatigue, weakness, coldness, ischemic pain,** and **paresthesia. Thrombosis with distal embolization** rarely can occur, producing vasomotor symptoms **(Raynaud's phenomenon)** in the hand or **ischemic changes**[Q].
- **Venous compression: Edema, venous distention, collateral formation,** and **cyanosis** of the affected limb[Q]

Diagnosis

- **Compression** resulting from TOS **is dynamic** and **best evaluated clinically by mechanical provocative maneuvers**[Q]
- **Specific investigations** (CT scan, MRI, Angiography, X-ray) **are used to exclude other conditions** and to **establish** the **associated diagnosis**[Q].

Treatment

- Approx. **50-90%** of patients can be **successfully treated** by **improvements** in **postural sitting, standing** and **sleeping positions, behavior modification** at work and **muscle stretching** and **strengthening exercises**[Q].

Indications for Surgical Intervention
• **Failure of conservative management**[Q]
• **Progression of** sensory or motor **symptoms**[Q]
• Presence of **excessively prolonged ulnar** or **median nerve conduction velocities**[Q]
• **Narrowing** or **occlusion** of the **subclavian artery**[Q]
• **Thrombosis** of the **axillary** or **subclavian vein**[Q]

- **Operation for TOS: Complete removal** of the **first rib,** with **division of scalenus** anticus and medius[Q].
- **Large aneurysms** or **thrombosis** of the **subclavian artery: Graft reconstruction**[Q]
- **Subclavian vein thrombosis: Thrombolytic** and **anticoagulant therapy** and simultaneous **surgical decompression**[Q].

Provocative Clinical Tests to establishing the diagnosis of Thoracic Outlet Syndrome (TOS)		
Provocative Test	**Instruction**	**Inference**
Adson's Test[Q] **(Scalene Test)**	Patient is instructed to: • Take a **deep breath and hold it** • **Extend** the **neck fully** • **Turn face towards** the **side**	• Maneuver **tightens** the **anterior** and **middle scalene muscles,** thus decreasing the interscalene space and magnifying any preexisting compression. • **Obliteration** or diminution **of radial pulse** suggests the diagnosis
Costoclavicular Test[Q] **(Military Position)**	Patient is instructed to: • **Draw shoulders downwards and backwards**	• Maneuver narrows the costoclavicular space by approximating the clavicle to the first rib thus tending to compress the neurovascular bundle • Obliteration of radial pulse or reproduction of symptoms indicates compression
Hyperabduction Test[Q]	Patient is instructed to: • **Hyperabduct** (Raise) the **arm to 180°**	• Maneuver causes the neurovascular structures to be pulled around the pectoralis minor tendon, coracoid process and head of humerus • Obliteration or diminution of radial pulse suggests the diagnosis
Roos Test[Q] **(Arm Claudication Test)**	Patient is instructed to: • Draw shoulders backwards • Rise **arms to horizontal position** with **elbows flexed to 90°** • Exercise the hands	• **Numbness** or **pain in** the **hands with exercise** suggests the diagnosis

77. Ans. c. Lymphocutaneous fistula *(Ref: Sabiston 19/e p1595; Bailey 26/e p872, 25/e p895)*

Brachial plexus injuries, vascular injuries, pleural effusion, winged scapula, and **infection** are complications that may arise **secondary to first rib removal.**

Complications of Surgical Treatment of TOS	
• **Brachial plexus injuries**[Q]	• **Pleural effusion**[Q]
• **Winged scapula** due to **long thoracic nerve injury**[Q]	• **Pnemothorax**[Q]
• **Horner's syndrome**[Q]	• **Air embolism**
• **Vascular injuries (subclavian** vessels[Q])	• **Infection**

78. Ans. c. Cervical rib **79. Ans. a. Radial nerve is commonly affected**

80. Ans. a. Most commonly radial nerve **81. Ans. c. Pain in ulnar distribution**

82. Ans. b. Wasting of forearm muscles *(Ref: Sabiston 19/e p1594-1595; Schwartz 9/e p704, 790; Bailey 25/e p895)*

Muscles of hand are wasted, not the forearm muscles.

- Ulnar nerve (C8-T1) involvement is most common[Q].
- It is associated with:
  - **Motor weakness** and **atrophy of** the **hypothenar** and **interosseous muscles**[Q]
  - **Pain** and **paresthesia along** the **medial aspect** of the **arm, hand, 5th finger and medial aspect** of **4th finger**[Q].

83. Ans. c. Cervical rib **84. Ans. b. 25–45 years**

RAYNAUD'S DISEASE

85. Ans. b. Migratory thrombophlebitis is seen only in Raynaud's phenomenon *(Ref: Harrison 18/e p2071; Sabiston 19/e p1752; Schwartz 10/e p1823, 9/e p1642; Bailey 26/e p900, 25/e p924)*

Raynaud's Phenomenon

- Raynaud's phenomenon is characterized by **episodic digital ischemia** on **exposure to cold** or **emotional stress**[Q]
- Manifested by the **sequential development of digital blanching, cyanosis and rubor** (redness) of **fingers** or **toes**[Q]
- **BCR: B**lanching, **C**yanosis and **R**ubor (redness)

Triphasic Color Response Include Three Stages	
Blanching[Q] (stage of **local syncope**)	• With exposure to cold, digital arterioles goes into spasm • Decreased flow is evidenced by pallor or blanching • Digits may appear white
Cyanosis[Q] (stage of **local asphyxia**)	• Capillaries and venules dilate • Cyanosis results from deoxygenated blood present in these vessels
Red Engorgement[Q] (stage of **recovery**)	• With rewarming or passing of attack, the digital vasospasm resolves • Blood flow into dilated arteries and capillaries increases dramatically • Reactive hyperemia imparts bright red color to the digits • In addition to rubor and warmth, patient often experiences a throbbing, painful sensation during the hyperemic phase

- **Raynaud's phenomenon** is divided into:
  - **Primary** or **idiopathic (Raynaud's disease**[Q]**)**
  - **Secondary** (associated with other diseases)

Associations

- **Raynaud's phenomenon** occurs frequently in patients who also have **migraine** or **variants angina**[Q]. These associations suggest a **common predisposing cause for vasospasm**[Q].
- Occupational groups that **use vibrating tools** are more predisposed
- **Sclerodactyly**[Q] (thickening and tightening of digital subcutaneous tissue) may develop **in few patients**.

86. Ans. b. More common in female, d. Associated with migraine
(Ref: Harrison 18/e p2071-2072; Sabiston 19/e p1752; Schwartz 9/e p1642; Bailey 26/e p900, 25/e p924)

Raynaud's Disease

- Diagnosis of **Raynaud's disease** is made when the **secondary causes** of Raynaud's phenomenon are **ruled out**[Q].
- **Majority** (70-90%) of patients are **young women**[Q] **<40 years** of age.
- Geographic regions located in **cooler, damp climates** have a **higher reported prevalence**[Q].

Characteristic Features

- **Fingers**[Q] are involved **more commonly** than toes.
- On examination, patient is entirely normal.
- **Radial, ulnar** and **pedal pulses** are **normal**[Q].

Treatment

- There is **no cure,** all **treatments mainly palliate symptoms** and **decrease the severity** and, perhaps, **frequency of attacks**[Q].
- **Majority** (90%) of patients will **respond to avoidance of cold** and **other stimuli**[Q].
- **Remaining** 10% of patients can be **treated with** a variety of **vasodilatory drugs**
- CCBs such as **diltiazem** and **nifedipine** are the **drugs of choice**[Q].

87. **Ans. c. Osteoarthritis** 88. **Ans. b. White, blue, red** 89. **Ans. c. Turn white**

90. **Ans. d. Atherosclerosis of vessels**

DIABETIC FOOT

91. **Ans. a. Strict diabetic control, c. Topical antibiotics are used, e. Diabetic ulcers are trophic ulcers** *(Ref: Harrison 18/e p2987; Sabiston 19/e p1738-1740; Schwartz 10/e p1877, 1879, 9/e p1693; Bailey 26/e p549, 887, 25/e p913*

Diabetic Foot

- Diabetic foot is related to:
  - **Trophic changes** from **peripheral neuropathy**Q
  - **Ischemia** as a result of **microangiopathy** and **macroangiopathy (atherosclerosis)**Q
  - **Low resistance to infection**Q because of excess sugar in the tissues

Parathyroid Gland

- **Neuropathy (stocking-**and**-glove** distributionQ**) impairs sensation** and favours the **neglect of minor injuries** and **infections.**
- Motor involvement is frequently accompanied by **loss of reflexes and deformities (neuropathic joints).**
- **Thick callosities** on the sole and **amateur chiropody** may allow the **entry of infection.**
- Any **infection** can **spread proximally with speed in subfascial planes** in diabetic patients.

Clinical Features

- Diabetic ulcers are usually found on the plantar surface of the foot over the metatarsal heads or heelQ.
- Edema is usually mild with no change in surrounding pigmentation.

Treatment

- Treatment consists of bringing the **diabetes under control** by **diet** and **drugs**Q.
  - **Necrotic tissue** must **be judiciously débrided**, and **topical antimicrobials** are needed **to control local infection**Q.
- **In some cases, resection of the underlying bony prominence may improve wound healing.**

92. **Ans. c. Heel, d. Head of metatarsal** 93. **Ans. d. All of the above** 94. **Ans. a. Vasospasm**

95. **Ans. a. Myelopathy**

AORTIC DISSECTION

96. **Ans. a. Right lateral wall of ascending aorta**
(Ref: Harrison 18/e p2063; Sabiston 19/e p1718-1720; Schwartz 10/e p806-816, 9/e p684-695; Bailey 26/e p846, 25/e p873-874)

Aortic Dissection

- **Aortic dissection is** caused by a **circumferential** or, less frequently**, transverse tear of the intima.**
- **MC site: Right lateral wall** of the **ascending aorta**Q
- **Another common site: Descending thoracic aorta** (just below the ligamentum arteriosum).
- **Peak incidence: 6th** and **7th decades.**Q
- **Men**Q are more **commonly affected**

Predisposing Factors	
• **Systemic hypertension**Q	• Takayasu's arteritis
• **Cystic medial necrosis**Q	• Giant cell arteritis
• Marfan syndrome	• Coarctation of the aorta
• Ehlers-Danlos syndrome	• History of aortic trauma
• Bicuspid aortic valve	• **Third trimester of pregnancy**Q

Classification

DeBakey Classification	
Type I	• **Intimal tear** in **ascending aorta,** involving **descending aorta**Q
Type II	• Dissection **limited to ascending aorta**Q
Type III	• Intimal tear in **descending aorta** with **distal propagation of the dissection**Q

Stanford Classification	
Type A	• Dissection **involves ascending aorta (proximal dissection)**Q
Type B	• Limited to the **descending aorta (distal dissection)**Q

Clinical Features

- Acute aortic dissection: **Sudden onset of pain**, very severe and tearing, associated with diaphoresis.
  - **Pain** may be localized to the **front** or **back of the chest,** often the **interscapular region**, and typically **migrates with propagation** of the **dissection**Q.
- **Other symptoms: Syncope, dyspnea**, and **weakness**Q.
- **Physical findings**: Hypertension or hypotension, **loss of pulses, aortic regurgitation**, **pulmonary edema**, and **neurologic findings** due to carotid artery obstruction (hemiplegia, hemianesthesia) or **spinal cord ischemia** (paraplegia) Q.
- **Signs of aortic regurgitation**: **Bounding pulses**, a **wide pulse pressure**, a **diastolic murmur** often radiating along the right sternal border, and evidence of CHFQ.
  - **Ascending aorta dissection: widened superior mediastinum on Chest x-ray**Q
  - **Pleural effusion (usually left-sided),** typically **serosanguineous** is seenQ.

97. Ans. a. Acute aortic dissection **98. Ans. b. Aorta**

AORTIC ANEURYSM

99. Ans. a. Atherosclerosis *(Ref: Harrison 18/e p2062-2063; Sabiston 19/e p1697; Schwartz 10/e p850-859, 9/e p723; Bailey 26/e p893, 25/e p918)*

- **"90% all abdominal aortic aneurysms are related to atherosclerotic disease and most of these aneurysms are below the level of renal arteries."**

Aneurysm

- **Aneurysm:** permanent and irreversible localized dilatation of blood vessel with at least **50% increase** in diameter
- **Ectasia:** dilatation **<50%** of normal diameter
- **AAA** (abdominal aortic aneurysm) is diagnosed if diameter **>3** cm in males or **>2.6 cm** in **females**
  - **MC location**: **Aorta >Iliac >Popliteal >Femoral (AIPF)**Q
  - **MC site** of **extra-cranial arterial aneurysm** is **infrarenal aorta**Q
  - **MC site** of **peripheral aneurysm**: **Popliteal aneurysm**Q
  - **Degenerative aneurysms (caused by atherosclerosis)** are **MC AAA (90%)**Q
- **Width of aneurysm** is **most important** predicting **factor** of **rupture**Q.
- **Juan Parodi**Q introduced endovascular aortic aneurysm repair **(EVAR).**

Classification

- **True** (all three layers of vessel are involved), **false** (do not have all three layers of vessel)
- **Infected (mycotic) aneurysm** are false aneurysm
- **Dissecting aneurysm** (dissection with aneurysmal dilatation of false lumen)
- **Fusiform (symmetrical enlargement** involving whole circumference of artery)
- **Saccular** (affect **only part** of the arterial circumference) have **higher risk of rupture**Q

100. Ans. a. Surgery indicated when size AAA > 6 cm *(Ref: Harrison 18/e p2062-2063; Sabiston 19/e p1697-1710; Schwartz 10/e p850-859, 9/e p723-730; Bailey 26/e p893-898, 25/e p918-923)*

- **Surgery indicated** when **size of AAA >5.5 cm**Q (Not the 6 cm).
- After rupture, **mortality rate of emergent operation is 45-50%**Q.
- **Most serious gastrointestinal complication** is **ischemia of the left colon** and **rectum. Post-operative hypotension** and **hemodynamic instability are contributory factors**Q.
- Occasionally, **microembolization** can occur, resulting **in small patchy areas of ischemia,** usually on the **plantar aspect of the foot,** referred to as **trash foot**Q.

Abdominal Aortic Aneurysm

- **MC site** of **aortic aneurysm** is **infrarenal aorta**Q
- **Risk Factors: Age, male gender, white race, smoking and family history**Q

- **Inverse relationship** between **diabetes mellitus** and development of **AAA**Q
- Prevalence of AAA is **higher in men** with **inguinal hernia** and **COPD**Q

Clinical Presentation

- **Natural history** of AAAs is **continuous expansion**Q

  - **Rupture** is **MC** and **most lethal complication**Q
  - **Most rupture** occurs **in retroperitoneal space**, others in abdominal cavity, IVC, iliac vein or duodenum (**4th part-MC**)
  - **AAA rupture most commonly** in **left retroperitoneum**Q

- **Growth rate** of AAAs **vary with** aneurysm **size**, more rapid growth seen in aneurysms 5 cm or larger
- **MC symptom**: **Chronic vague abdominal** or **back pain**Q

  - **Triad of aortic rupture: sudden onset midabdominal or flank pain + shock + pulsatile abdominal mass**; present in **one third** cases onlyQ
  - **Acutely expanding AAA** produce **severe deep back pain** or **abdominal pain radiating to back**, associated with **tenderness** to palpation of aneurysm (this presentation signifies **impending rupture** and **urgent evaluation** and **treatment** is required)Q

- In **aortocaval** or **aortoiliac fistula:** Unilateral or bilateral lower extremity edema, high output CHF and continuous abdominal bruit or palpable thrill is present
- CCBs such as **diltiazem** and **nifedipine** are the **drugs of choice**Q**.**
- **Gross hematuria** from **intravesicular venous hypertension** is one of **characteristic sign** of **aortocaval fistula**
- **AAA** may **rupture into GIT**, **MC site is 4th part of duodenum**Q**,** producing primary aortoenteric fistula, shock and massive GI bleeding.

  - Occasionally, **microembolization** can occur, resulting in **small patchy areas of ischemia,** usually on the **plantar aspect of** the **foot**, referred to as **trash foot**Q.

101. Ans. a. Laterally into the left retroperitoneum

102. Ans. d. Myocardial infarction *(Ref: Harrison 18/e p2062-2063; Sabiston 19/e p1699-1710; Schwartz 10/e p850-859, 9/e p725-730; Bailey 26/e p894-898, 25/e p918-923*

- **MC complication of** descending aortic aneurysm surgery is **non-fatal MI >Renal failure.**

Management of Abdominal Aortic Aneurysm

Diagnosis

- **Plain X-ray** detects AAA in upto **70%** cases by characteristic **"eggshell" pattern of calcification**
- **Negative** abdominal **radiograph doesn't exclude** the diagnosis.

  - **CT** is **IOC for diagnosis** and **planning repair** in **AAA**Q
  - **MRI** is **IOC** for **diagnosis** and with **MR angiography** planning **repair** in **AAA** with **renal insufficiency**Q

- Advantage of **Percutaneous arteriography** over CT or MRI is its **ability to measure pressure gradient** across occlusive lesions if present, and **potentially to direct treatment**

Screening for Abdominal Aortic Aneurysm

- AAAs remain **asymptomatic for several years, death** from **rupture** occurs in **one third of untreated cases**
- **Ultrasound is preferred method of screening**Q

Pre-operative Evaluation

- Patients with major clinical predictors of **cardiac risk** are considered **for pre-operative angiography**

  - Patients with **high grade (70-99%) internal carotid stenosis** are considered for **carotid endarterectomy** before AAA repairQ

- **Prompt operative intervention** is indicated in cases of **rupture**Q

Medical Management

- **NSAIDs and tetracycline** may have potential to reduce aneurysmal growth by inhibiting MMP.

Indications of repair of AAA	
• Diameter **5.5 cm** or more in menQ • **Symptomatic** aneurysmQ • For women and patients with **greater than average rupture risk,** AAA diameter **4.5 to 5.0 cm**	• Rate of expansion **>1 cm/year**Q • **Atypical aneurysms**Q (dissecting, pseudoaneurysm, mycotic, saccular and penetrating ulcer) **regardless of size**

Treatment

- **Open repair: Transperitoneal and Retroperitoneal approach**

Indications for Retroperitoneal Approach	
• History of **multiple prior operations**[Q]	• **Horse-shoe kidney**[Q]
• **Hostile abdomen**[Q]	• **Peritoneal dialysis**
• **Radiation treatment**[Q]	• **Inflammatory aneurysm or ascites**[Q]
• **Suprarenal aneurysm extension**[Q]	

- **Advantage: Reduced GI and pulmonary complications, reduced length of ICU and hospital stay**[Q]
- **Disadvantage: Poor accessibility to distal right arteries and right renal artery**

Results of Open Repair

- **Mortality rate** of **elective open infrarenal AAA repair** is **<5%** in good risk patients

  - **MC cause of death** is **myocardial dysfunction**, usually **ischemic in origin**[Q]
  - Complications occur in **10-30%** cases
  - **MC complication** is **non-fatal MI** followed by **renal failure**[Q]
  - **Renal failure** after repair of **ruptured AAA** carries a **high mortality rate**

- Most serious gastrointestinal complication is **ischemia of the left colon and rectum**[Q]
- **Post-operative hypotension and hemodynamic instability** are contributory factors

  - First indication of bowel ischemia may be **substantial IV fluid requirement**[Q] in the first 8-12 hours after the operation.
  - **Diarrhea**, usually **blood** typically follows **within 48 hours**[Q]
  - **If necrosis is limited to mucosa: Conservative treatment** with bowel rest, antibiotics and fluid resuscitation
  - **In full thickness necrosis or peritoneal irritation: Urgent reoperation** with resection of ischemic bowel and **creation of stoma**
  - **Mortality rate: 50%**[Q] (higher when full thickness bowel necrosis and peritonitis occur)

103. Ans. b. 5.5 cm

104. Ans. b. Emergency surgery complication <10%, c. Rarely asymptomatic before rupture

105. Ans. d. Both intravascular and extra-vascular infection *(Ref: Harrison 18/e p2061, 2065; Sabiston 19/e p1884)*

- **A mycotic aneurysm is an infected aneurysm resulting from either an extravascular or an intravascular source of infection.**

Mycotic Aneurysm

- **Mycotic aneurysms are focal dilatation of arteries occurring at points in the arterial wall weakened by infection**

Mycotic aneurysms may originate
1. As a result of **embolization from bacterial endocarditis**[Q]
2. As an **extension of** an **adjacent suppurative process**[Q] **(extravascular source)**, ex. Osteomyelitis, sinus infection, meningitis etc.
3. By **circulating organisms** directly **infecting arterial wall**[Q]

- **MC location: Femoral artery >Aorta**[Q]
- **MC organisms: Staphylococcus >Salmonella**[Q]

106. Ans. b. Computed tomography

107. Ans. d. Most common side effect is diarrhea and hypotension

108. Ans. b. Atherosclerosis

109. Ans. c. Splenic artery *(Ref: Sabiston 19/e p1761-1763; Schwartz 10/e p1425, 9/e p1256; Bailey 25/e p1103-1104) and (Ref: Shackelford 7/e p1098-1100)*

- **MC site of intra-abdominal aneurysm: Aorta >Splenic artery**[Q]
- **MC site of splanchnic artery aneurysm: Splenic artery**[Q]

110. Ans. c. Discontinuation of arteria radicularis magna

Arteria Radicularis Magna
• Arteria radicularis magna **(artery of Adamkiewicz)** is the **main source of blood supply** to the **anterior spinal artery** in the **thoracolumbar segment** of the **spinal cord**[Q].
• It arises from either one of the lower posterior intercostal arteries **(T9-T11)** or of the subcostal artery **(T12)**, or less frequently of the upper lumbar arteries **(L1 and L2)**[Q].
• **Occlusion** or **interruption** is one of the major reasons for **spinal cord ischemia** (leading to **paraparesis /paraplegia) during surgery for thoracoabdominal aneurysms**[Q].

111. Ans. a. Saccular aneurism involves whole circumference

FEMORAL ARTERY ANEURYSM

112. Ans. a. Ultrasound guided compression of the neck of aneurysm, b. Thrombin injection, c Bypass graft repair *(Ref: Sabiston 19/e p1755; Bailey 26/e p899, 25/e p923)*

Femoral Artery Aneurysm

- **Bilateral in >50% cases and 92% have a concomitant aortoiliac aneurysm**[Q]
- **True FAA are almost always degenerative atherosclerotic aneurysms**[Q]

Etiology

- **True FAA** are **almost always degenerative** atherosclerotic aneurysms
- **False FAA** may develop as a result of disruption of **graft-artery anastomosis** following surgical revascularization with aortofemoral or femoropopliteal bypass
- **MC organisms** causing mycotic aneurysms are **Staphylococcus aureus, E. coli, Salmonella**[Q].

Diagnosis

- Diagnosis of atherosclerotic FAA is usually made by **physical examination** and **confirmed** by **USG**[Q].

Treatment

- In patients who present with femoral pseudoaneurysms after catheterization, **USG-guided compression with or without thrombin injection**[Q], can also be used to treat the disease

> - **All true FAA >2 cm** should be **repaired** because of risk of **thrombo-embolic complications** or **increased risk of rupture**[Q]
> - **High risk of rupture** in cases of **large, false** or aneurysm involving **profunda femoris**[Q]

- Treatment involves **resection and replacement with prosthetic interposition graft** with attempt of revascularization of profunda femoris.

Results of Open Repair

- **Asymptomatic patients do well but amputation rate of 10% in symptomatic patients.**

> - **Highest amputation rates** in **drug addicts** requiring treatment of **infected FAA**[Q].
> - **Autologus repair** with a **vein graft** and immediate **coverage with sartorius muscle flap decreases** rate of **reinfection and recurrent bleeding**[Q].

113. Ans. a. Radial, b. Brachial, c. Femoral *(Ref: Rutherford Vascular Surgery 6/e pvol I/456)*

- **"IV drug abusers can lead to number of specific vascular complications including septic thrombophlebitis. Aortic dissection, AV fistula and necrotizing fasciitis with gangrene of extremity. The most frequent vascular complication in drug addicts is infected pseudoaneurysm of the femoral**[Q]**, brachial**[Q] **or radial artery**[Q]**."**

114. Ans. a. Radial, b. Brachial, c. Femoral

POPLITEAL ARTERY ANEURYSM

115. Ans. c. Popliteal artery *(Ref: Sabiston 19/e p1755; Bailey 26/e p899, 25/e p923)*

Popliteal Artery Aneurysm

- **MC peripheral aneurysm and account for 70% cases**[Q]
- **Most patients are male with bilateral disease in 53% cases**
- **Amputation rate in acute thromboembolism is upto 30%**

Indications for treatment	
• **Symptomatic** patients[Q]	• **Thrombus** in aneurysm[Q]
• Aneurysm **>2 cm**[Q]	• Angiographic evidence of **distal embolization**[Q]

Diagnosis

- Diagnosed by **physical examination and duplex scan**[Q]

116. Ans. a. Popliteal

117. Ans. d. Uncommon among peripheral aneurysm

Iliac Artery Aneurysm

- **Occur in conjunction with aortic aneurysm in 40% cases**
- **Most isolated iliac aneurysm involve common iliac artery (70%) and internal iliac artery (20%)**
- **Multiple iliac aneurysms occur in most patients and are bilateral in 33% cases**

Etiology

- Occur in association with **atherosclerosis**
- Can also occur in **pregnancy** in absence of atherosclerosis as well as in **Marfan and Ehlers-Danlos syndromes, Kawasaki disease, Takayasu's arteritis, cystic medial necrosis and arterial dissection**

Clinical Features

- More common in **males, right** and **left sides** are **equally** involved[Q]
- Symptoms are caused by **compression** of **adjacent pelvic structures**[Q] (bladder, colon, ureter, rectum, lumbosacral nerves and pelvic vein)
- Most **common iliac aneurysms** can be palpated on **abdominal exam** whereas **internal iliac artery aneurysm** are more readily palpated on **rectal examination**[Q]

Treatment

- **Operative mortality rate in** patients with **ruptured iliac aneurysm** is **40%.**
- **Iliac aneurysms >3.5**[Q] cm are repaired if possible.

Minimum Size for Surgery (**AIPF**: All India Police Force)
Abdominal **A**ortic Aneurysm (**5.5 cm**) = **I**liac aneurysm (**3.5 cm**) + **P**opliteal/**F**emoral aneurysm (**2.0 cm**)

PSEUDOANEURYSM

118. Ans. b. Trauma http://en.wikipedia.org/wiki/Pseudoaneurysm

- **MC cause** of **pseudoaneurysm**: **Trauma** (**Penetrating** trauma or iatrogenic by **catheterization**)[Q]

119. Ans. a. Radial, b. Brachial, c. Femoral

120. Ans. a. Ligation of involved vessel and wide surgical debridement *(Ref: Rutherford Vascular Surgery 6/e pvol II/248-249, 813, 1055-1056)*

Treatment of Pseudoaneurysm

- **USG guided compression** is the **first therapeutic maneuver**[Q] in non-invasive vascular technology. Although it is **safe** but **efficacy is modest** and the procedure is uncomfortable for patient and provider.
- **Injection of thrombin into** the **pseudoaneurysm under duplex ultrasound guidance** has **not replaced compression** as treatment for pseudoaneurysm. This technique is **safe** and **effective**[Q]. It reduces physical effort and time requirements for the technologist and is significantly less uncomfortable for the patient.
- As **spontaneous resolution** of pseudoaneurysm has a **low incidence**, **surgical repair** is the **main therapy** and **gold standard therapy**[Q].

Indications of Surgery	
Absolute	**Relative**
• **Failure** of **other treatment modalities**[Q] • Suspected **secondary infection**[Q] • Evidence of **vascular compromise**[Q] • Ongoing or imminent **hemorrhage**[Q] • **Skin erosion** and **necrosis** due to **false aneurysm expansion**[Q]	• **Femoral neuropathy** • Continuous **anticoagulation** • Concomitant **AV fistula**

Surgical Intervention
• Operative repair can involve **simple stitch** or **replacement** of the entire vessel **with graft**[Q]. • **Mainstays of surgical treatment: Proximal control** (above inguinal ligament of needed, for extensive groin pseudoaneurysm), use of **monofilament suture** for vascular repair and **debridement** of devitalized tissue[Q]. • In the **presence of** any **infection** or when **large residual tissue defect** persists, **muscle coverage** with either **sartorius** or **rectus abdominis flap** over the repaired vessel must be used[Q].

Treatment of Pseudoaneurysm in IV Drug Abusers
• **Ligation** is optional treatment **for infected pseudoaneurysm** because it is **easy, safe** and **cost effective** (in **IV drug abuser** there is **high chance of infection**)[Q] • **Reconstruction** is **not recommended** because of **extension of infection** at location of pseudoaneurysm and **at artificial graft site**[Q].

SUBCLAVIAN STEAL SYNDROME

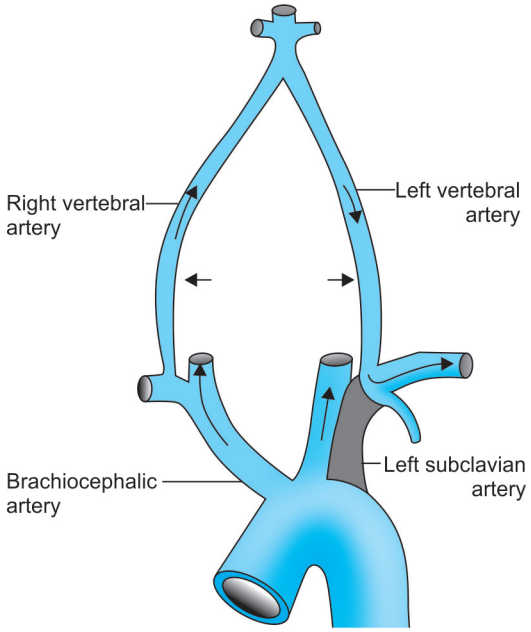
121. Ans. a. First part *(Ref: Grainger Diagnostic Radiology 4/e p 773; Bailey 26/e p886, 25/e p908-909)*

MC site of subclavian artery stenosis is the **first part** of the subclavian artery.

Subclavian Artery Stenosis

- **MC cause of subclavian artery stenosis: Atherosclerotic disease**
- **Left**[Q] **subclavian artery stenosis is significantly more common than right**
  - **MC site** of stenosis: **First part**[Q] of the subclavian artery
  - Stenosis **typically occurs just distal to** the **origin of** the **subclavian artery** and **lies proximal to** the **origin of** the **vertebral artery**[Q].
- **Stenosis of** the **first part** of the subclavian artery may give rise to the **subclavian steal syndrome**[Q]
- **Subclavian steal syndrome** is characterized by **reversed flow in** the **vertebral artery** to compensate for a proximal stenosis in the ipsilateral subclavian artery there by **stealing blood from** the **'brain' to feed** the **'arm'**[Q].

122. a. Reversal of blood flow in the ipsilateral vertebral artery *(Ref: Bailey 26/e p886, 25/e p908-909)*



Subclavian Steal Syndrome

- **Occlusion of either the innominate (brachiocephalic) or the subclavian artery before the origin of the vertebral artery reverses the direction of blood flow in the ipsilateral vertebral artery**[Q].
  - This **reversal of flow** often is **asymptomatic** but **may cause ischemia** in the **posterior circulation**[Q].
  - **Neurological features** are **weakness, vertigo, visual complaints,** and **syncope**[Q].
  - Classically **symptoms occur** when **arm exercise increase** the **steal of blood flow from** the **brainstem**[Q].
- The **exercise reduces peripheral resistance** in the affected arm, **lowering blood pressure distal to occlusion.** This in turn results in **increased retrograde flow from** the **vertebral artery**[Q].
- If the contralateral vertebral artery cannot keep up with the demand, the **arm** may **steal blood from the basilar artery,** lowering the pressure in the **posterior cerebral circulation**[Q].
- The result may be transient vertebrobasilar ischemia[Q].

VASCULAR GRAFT

123. Ans. a. Autologous vein

124. Ans. a. Saphenous vein graft (upside-down) *(Ref: Bailey 25/e p905; Washington Manual of surgery 5/e p322)*

- **Saphenous vein is the most suitable conduit for bypass, below the inguinal ligament. It may be used either as a reversed conduit or as an 'in situ' vein bypass conduit after valve destruction.**

Infra-inguinal Occlusive Disease (Femoral, Popliteal, Tibial occlusive disease)

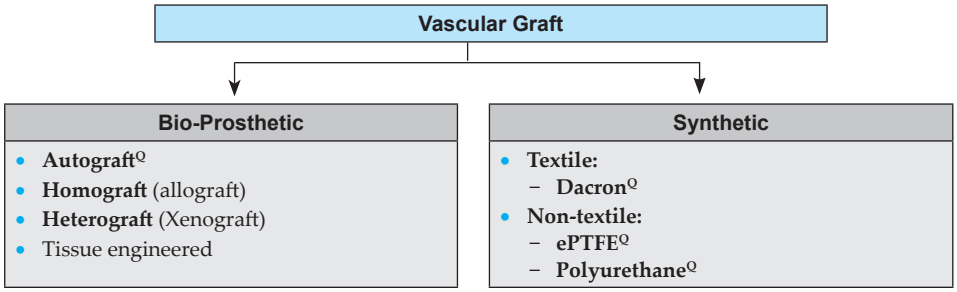
- **Autologous vein is the conduit of choice for infra-inguinal bypass surgery**[Q]
- **Great saphenous vein is the vein of choice (Lesser saphenous vein or arm veins may be used)**[Q]
- **These grafts may be used either 'in situ' after valve destruction or reversed conduit**

When Autologous vein grafts are not available PTFE grafts may be used.
For **above knee grafts, patency rates of PTFE grafts approach** those achieved by autologous venous grafts[Q] • For **below knee / distal grafts, patency rates of PTFE grafts** are **substantially lower**[Q].

125. Ans. c. Smooth muscle cells *(Ref: Vascular.surgery.duke.edu/files/.../Vascular_Grafts_2-27-09.pdf; Schwartz 9/e p762-764)*

Vascular Graft Failure
• Smooth muscle cells in the middle layer (media) of the vessel wall become activated, divide, proliferate and migrate into the inner layer (intima)[Q]. • The resulting abnormal neointimal cells express pro-inflammatory molecules, including cytokines, chemokines, and adhesion molecules that further trigger a cascade of events that lead to occlusive neointimal hyperplasia and eventually graft failure[Q].

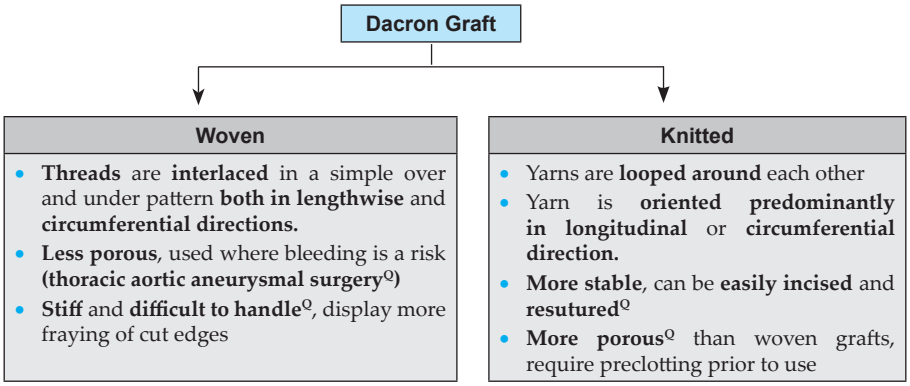
126. Ans. b. Textile synthetic *(Ref: Sabiston 19/e p1791; Schwartz 10/e p4, 9/e p762; Bailey 25/e p905-907)*



127. Ans. c. Saphenous vein

128. Ans. a. Dacron *(Ref: www.ncbi.nlm.nih.gov/pubmed/16222385; Schwartz 10/e p4, 9/e p762)*

- **Dacron** is the **favoured material for aortoiliac work**, it **gives excellent results**.



129. Ans. d. Can be easily incised and the opening resutured

130. Ans. d. PVC

131. Ans. c. Autologous vein

VASCULAR TRAUMA

132. Ans. c. The pulse is weakened, d. There is no pulse

133. Ans. a. Most commonly associated with deceleration injury, b. High morality, c. Surgery definitive treatment, d. Aortography gold standard *(Ref: Sabiston 19/e p1793-1794; Schwartz 10/e p214-215, 9/e p151, 172-173; Bailey 25/e p343; CSDT 11/e p257-259)*

Traumatic Aortic Rupture

- Traumatic aortic rupture is a **cause of sudden death** after an **automobile collision** or **fall from a great height**Q.
- **Vessel** is **relatively fixed distal to** the **ligamentum arteriosum, just distal to** the origin of the **left subclavian artery**Q.
- **Causes: Trauma** to the chest, **Rapid deceleration injury**Q

Clinical Presentation

- **Traumatic aortic rupture is lethal in 75-90%** of patientsQ and only **15-20% arrive** at the hospital aliveQ.
- Approx. **90%** of those **who arrive alive** at the hospital have an **injury** in the region **of** the **aortic isthmus >Injuries to** the **ascending aorta**Q.
- Usually associated with other injuries like solid organ.

Diagnosis

- **X-ray chest: Widened mediastinum**Q
- **Aortography: Gold standard** for diagnosisQ
- **Contrast enhanced CT,** Trans-esophageal Echocardiography **(TEE)** are useful in making diagnosis.

Treatment

- Control of systolic BP to less than 100 mm Hg
- Endovascular intra-aortic stentingQ
- **Direct repair** or **excision and grafting** using **a Dacron graft**Q.

134. Ans. a. Mediastinal widening, b. Abnormal aortic contour, d. Right paratracheal stripe thickening, e. Left apical pleural cap *(Ref: Chapman 4/e p163-164; CSDT 11/e p257-259)*

Traumatic Aortic Rupture

Clinical Features	Radiographic Features
• History of **high-speed deceleration**Q injury	• **Widening** of **mediastinum**Q (70%)
• **Flail chest**Q	• **Esophageal deviation** to the **right**Q
• **Fractured sternum**Q	• **Tracheal deviation** to **right**Q
• **SVC syndrome**	• **Left**Q **apical cap** (65%)
• **Multiple** or 1st or 2nd **rib fractures**	• **Downward displacement** of **left main stem bronchus**Q
• **Upper extremity hypertension or pulse deficits**Q	• **Right paratracheal stripe thickening**Q
• **Hematoma** in the carotid sheaths	• **Deviation** of **NG tube** to **right**
• **Interscapular** bruitsQ	• **Left hemothorax**
• **Hoarseness** with normal larynx	• **Displaced left paraspinal stripe**Q
	• Displaced **right** paraspinal stripe

135. Ans. b. Left medial visceral rotation *(Ref: Sabiston 19/e p1796-1797)*

- **Left medial visceral rotation exposes entire length of abdominal aorta, celiac axis, proximal part of mesenteric arteries and proximal left renal artery**Q.

Maneuvers for Retroperitoneal Exposure

Kocher's Maneuver	Extended Kocher's Maneuver	Mattox Maneuver	Cattel-Braasch Maneuver
• Surgical maneuver to **expose structures** in the **retroperitoneum**Q **behind** the **duodenum** and **pancreas**Q	• **Right sided medial visceral rotation**Q	• **Left sided medial visceral rotation**Q	• For **extensive retroperitoneal exposure**Q
• Used for **mobilization of duodenum**Q	• **Right colon** and **duodenum** is **reflected medially**Q	• Left sided viscera (**Left kidney, left colon, spleen** and **pancreas**) are **brought to midline**Q	• **Right colon** is **fully mobilized** and **reflected medially**Q
	• **Exposes IVC, Infrarenal aorta, right renal artery** and **iliac vessels**Q	• **Exposes** entire length of **abdominal aorta, celiac axis, proximal part** of **mesenteric arteries** and **proximal left renal artery**Q	• Good option for **exposure of** the **infrapancreatic segment**Q
	• Recommended for **drainage** of **infra-mesocolic hematoma**Q	• Recommended for **drainage** of **central supra-mesocolic hematoma**Q	

ANGIOGRAPHY AND COMPLICATIONS

136. Ans. b. Arteriography *(Ref: Sabiston 19/e p1733; Schwartz 10/e p832-833, 918, 9/e p751; Bailey 26/e p190, 25/e p903)*

- **Seldinger needle** is **used for angiography** (arteriography).

Arteriography

- **Aortic and lower extremity arteriograms are generally performed by needle puncture of the femoral[Q] or brachial arteries[Q] followed by guidewire placement and catheter insertion using the Seldinger technique.**

137. Ans. d. Intracerebral hemorrhage *(Ref: Sabiston 19/e p1733; Schwartz 9/e p751; Bailey 26/e p190, 25/e p903)*

Complications of Contrast Arteriography

Puncture Site or Catheter Related	Contrast Agent Related
• **Hemorrhage**, hematoma[Q]	• Anaphylactoid or sensitivity reaction
• **Pseudoaneurysm**[Q]	• **Vasodilation,** hypotension[Q]
• Arteriovenous fistula	• **Nephrotoxicity**[Q]
• **Atheroembolization**[Q]	• **Hypervolemia**[Q] (osmotic load)
• **Local thrombosis**[Q]	

138. Ans. a. Radial artery *(Ref: Lee Anesthesia 12/e p25)*

- Arterial puncture and cannulation is performed to measure PaO_2, $PaCO_2$, SpO_2 and pH to clarify the acid-base and electrolyte status.
- Any artery that can be compressed after puncture may be used (but **not end arteries**), usually the **radial[Q] (preferred)**, brachial or femoral.

139. Ans. b. Single wall puncture is indicated in those with normal coagulation profile *(Ref: Mastery of Surgery 5/e p218)*

- **Single wall puncture is indicated in those with coagulopathy as there is more risk of bleeding in double wall puncture technique.**

Abdominal Aortic Aneurysm

- **Arterial access** is obtained for **hemodynamic monitoring** and **angiography** and **interventions.**
- **Femoral artery** is **most frequently cannulated artery** in the body[Q]**.**
  - **Femoral artery** is a **large caliber vessel appropriate for angioplasty** and **stenting** of peripheral vessels[Q].
  - **Radial artery** is **most frequently used site** of arterial cannulation **for hemodynamic monitoring[Q].**
- Femoral artery is identified in the inguinal region by its pulsation.
- If fluoroscopy is being used, the **femoral artery** is **typically located over** the **medial third** of the **femoral head**[Q].
- Femoral artery cannulation can be done using Seldinger technique.
  - The **Seldinger technique** is a **medical procedure to obtain safe access to blood vessels (both arteries and veins)** and other hollow organs[Q].
- **Single wall puncture** is indicated **in** those with **coagulopathy** or **if thrombolysis is planned** because of **increased risk of bleeding in double wall technique**[Q].

TARAYASI ARTERITIS

140. Ans. a. Aortoarteritis *(Ref: Harrison 18/e p2796; Sabiston 19/e p1753; Schwartz 10/e p788, 901, 9/e p668, 767; Bailey 26/e p900, 25/e p924)*

Takayasu's Arteritis (Aortoarteritis or Pulseless Disease)

- **Rare** but well-recognized **chronic inflammatory arteritis affecting large vessels**, predominantly the **aorta** and its **main branches**[Q].
- **Chronic vessel inflammation** leads to **wall thickening, fibrosis, stenosis**, and **thrombus formation**[Q]**.**
- **Symptoms** are related to **end-organ ischemia.**

- **Pathologic changes** produce **stenosis, dilation, aneurysm formation** and **occlusion**[Q].

Clinical Features

- Occurs predominantly in **adolescent girls** and **young women**[Q], age of **10-40 years**[Q]
- More common in **Asia**[Q]
  - **Subclavian artery is MC involved vessel leading to loss or weakening of pulses (Pulseless Disease)**[Q].
- Characteristic clinical features: **Hypertension** reflecting renal artery stenosis, **retinopathy**, **cerebrovascular symptoms**, angina and congestive heart failure, abdominal pain or GI bleeding or **extremity claudication**.

Diagnosis

- Laboratory data: **Raised ESR, CRP and WBC count**[Q]
- **Angiography: Gold standard for diagnosis**[Q]

Treatment

- **Steroid therapy** initially, with **cytotoxic agents** in patients **who do not achieve remission**[Q].
- **Surgical treatment** is performed **only in advanced stages**, and bypass needs to be delayed during active phases of inflammation.

141. b. Subclaviary artery

MISCELLANEOUS

142. Ans. c. Integrity of palmar arch

143. Ans. b. Superficial temporal http://en.wikipedia.org/wiki/Cirsoid_aneurysm

Cirsoid Aneurysm

- A cirsoid aneurysm is the **dilation of a group of blood vessels** due to **congenital malformations** with AV **(arteriovenous) shunting**[Q].
- **Cirsoid means** resembling a **varix**.
- **Most commonly occurs over** the **head** usually the **superficial temporal artery.**
- **Superficial temporal artery** is the **most commonly involved artery**[Q].

144. Ans. c. Palpable pulses *(Ref: www.ncbi.nlm.nih.gov Br Med J v.1(3927); Apr 11, 1936)*

Erythrocyanosis

- A condition caused by **exposure to cold**[Q]
- Characterized by **swelling of the limbs** and the appearance of **irregular red-blue patches** on the skin[Q]
- Occurring especially in **girls** and **women**[Q]

145. Ans. a. Aneurysm Endovascular Hunterian Ligation/ - *(Ref: Youmans Neurological Surgery)*

Hunterian Ligation

- **Hunterian ligation** refers to one of the **oldest successful interventions** for **arterial aneurysms: Ligation of** the **femoral artery to treat a popliteal aneurysm**[Q] by **John Hunter** in 1785.

146. Ans. c. It is not superficial and does not cross prominent bone

- The **popliteal pulse** is **difficult to feel** because it is **not superficial** and **does not cross a prominent bone**[Q].

147. Ans. c. Myocardial infarction *(Ref: CSDT 11/e p822; Miller's Anesthesia 6/e p2053)*

- Miller says **"Myocardial performance** is the **single most important determinant** of **outcome following a major vascular operation**[Q]."
- **Non-fatal** and **fatal MIs** are the **most important** and **specific outcomes** that **determine perioperative cardiac morbidity** in patients for vascular surgery[Q].
- CSDT says **"MI and stroke** are **most common causes of death in vascular surgeries**[Q]."

148. Ans. d. Bifurcation of pulmonary artery *(Ref: Harrison 18/e p2171)*

Saddle Thrombus

- A **large thrombus lodged at** an **arterial bifurcation,** where blood flows from a large-bore vessel to a smaller one.
- The '**classic' saddle embolus,** which **occurs at the bifurcation of** the **pulmonary arteries** in **fatal pulmonary embolism** secondary to a centrally migrating venous embolus, is distinctly uncommon[Q]

149. Ans. b. Palmar arch insufficiency **150. Ans. c. Salmonella** **151. Ans. a. 1**

152. Ans. d. All of the above *(Ref: Harrison 18/e p2037; Schwartz 9/e p763-764)*

Stent Thrombosis

- **Clotting suppressant agents** and **anti-clotting agents** should be **continued after drug eluting stents to prevent stent thrombosis[Q].**
  - **Endothelialization** is a hallmark of vascular healing and is **important for the prevention of thrombus formation[Q].**
  - **For drug-eluting stents** (which, by design, delay formation of a new endothelium cover over the stent), **the incidence of clot formation** within the stent **may persist for a longer period of time[Q]**.
- **Drug eluting stents** have been associated with **delayed arterial healing** and the **prevalence of latent thrombus** after five years, suggesting that patients may continue to be risk for stent thrombosis for an extended period of time.
- Treatment with the **antiplatelet drugs** appears to be the **most important factor reducing this risk of thrombosis**, and **early cessation of these drugs** after drug-eluting stenting markedly **increases the risk of stent thrombosis** and **myocardial infarction[Q]**.

153. Ans. d. Accidental injury to major vessels in thigh or groin *(Ref: Bailey 18/e p69, 147)*

Butcher's Thigh

- Butchers thigh is **penetrating wound of femoral triangle** due to **knife slipping while boning meat**.
- Penetrating wound involving main veins in the thigh or groin are **potentially fatal**, as exsanguination may follow the first aid dressing which has apparently controlled the bleeding.

154. Ans. a. Direct pressure *(Ref: Advanced Assessment and Treatment of Trauma by Americans (2010)/71)*

External Bleeding

- Control of external hemorrhage during the early phase (circulation) of resuscitation is imperative.
- **External bleeding is best controlled by direct digital pressure.**
- **Direct pressure assists in** the process of **coagulation** by slowing the flow of blood out of the vessels and **giving clot time to form.**
- In most cases of external bleeding, if pressure is applied quickly to the area of hemorrhage **(direct pressure)** or to the blood vessel supplying the bleed **(indirect pressure)**, the volume of blood escaping will be greatly reduced.
- To be effective, direct pressure must be at least equal to the pressure of the blood attempting to escape.
- Arterial bleeding is often difficult to control and may require upto 5 minutes of firm direct pressure to be successful.

155. Ans. a. Giant cell arteritis *(Ref: Harrison 18/e p2795; Robbins 8/e p512, 513)*

Temporal arteritis is also known as Giant cell arteritis.

Giant Cell Arteritis (Temporal Arteritis)

- Predominantly afflicts patients **older than 50 years of age[Q]**, with a slight (2 : 1) **female preponderance.**
- The incidence **increases for each decade over age 50 years.**
- The **superficial temporal[Q], vertebral**, and **major aortic arch branches** may be involved.

Clinical Features

- Ischemic symptoms are common, including **claudication of facial** or **extremity muscles** and **retinal ischemia[Q]**.
- **Headache** is a common symptom.
- **Blindness, usually irreversible**, is a **dreaded complication[Q]**.

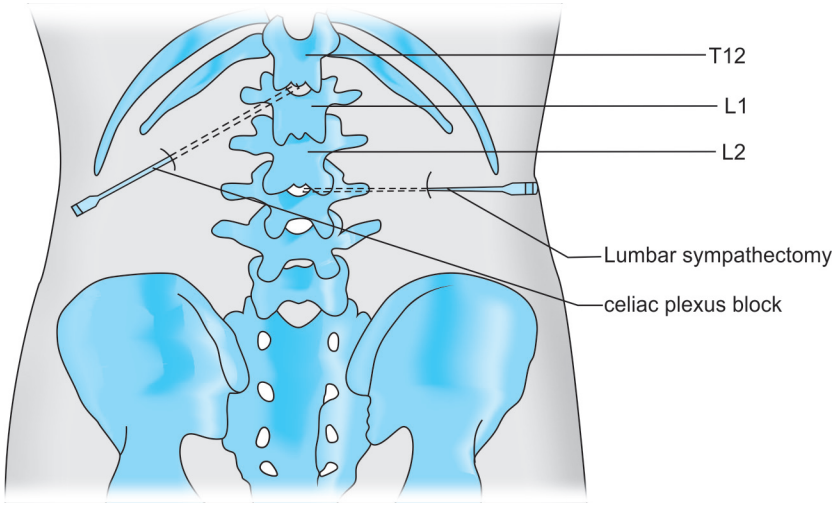
Treatment

- When the clinical diagnosis is suspected, **treatment** must be **prompt** and **consists of high-dose corticosteroid therapy[Q]**.
- **Surgery** is **rarely indicated** except in cases of major aortic branch involvement with ischemic symptoms.

156. Ans. d. Most common side effect is diarrhea and hypotension
(Ref: Anesthesiology Keyword Review by Raj K. Modak 2013/page 130; http://www.ncbi.nlm.nih.gov/pubmed/7818115)

Celiac Plexus Block

- Located retroperitoneally at the level of L1
- Usually done bilaterally
- Useful for the painful conditions of upper abdomen
- Most common side effect is diarrhea and hypotension



Celiac Plexus Block

- **Celiac plexus** also known as the **solar plexus** is located behind the stomach and omental bursa, and in front of the crura of the diaphragm
- **Location is at** the level of the **first lumbar vertebra.**
- Formed (in part) by the **greater** and **lesser splanchnic nerves** of both sides, and also parts of the **right vagus nerve.**
- **Supplies upper GI organs, lower esophagus, liver** and **pancreas**
- **Done usually bilaterally** using **alchol or phenol**

Indications:

- **Intractable pain** from cancers **(pancreatic cancer)**
- **Intractable pain** related to **chronic pancreatitis**

Side-Effects:

- Most common side effects include **hypotension** and **diarrhea**.
  - **Hypotension:** Because of the sympathetic blockade of splanchnic vasculature
  - **Diarrhea:** Unopposed parasympathetic activity following **celiac plexus block**

CHAPTER 27

Venous Disorders

MULTIPLE CHOICE QUESTIONS

HYPERCOAGULABLE STATES AND DVT RISK FACTORS

1. All the following disorders are inherited except: *(JIPMER 2010)*
a. Protein S deficiency
b. Antiphospholipid antibody syndrome
c. Protein C deficiency
d. Factor V Leiden mutation

2. Congenital cause of hypercoagulable states are all except: *(AIIMS Nov 2010)*
a. Protein C deficiency
b. Protein S deficiency
c. MTHFR mutation
d. Lupus anticoagulant

3. All of the following are acquired causes of hypercoagulability, except: *(All India 2009)*
a. Infection
b. Inflammatory bowel disease
c. Myeloproliferative disorders
d. Prolonged surgery

4. A patient is admitted with 3rd episode of deep venous thrombosis. There is no history of any associated medial illness. All of the following investigations are required for establishing the diagnosis except: *(AIIMS Nov 2004)*
a. Protein C deficiency
b. Antithrombin II deficiency
c. Antibodies to factor VIII
d. Antibodies to cardiolipin

5. The deficiency of all the following factors increases the incidence of thrombus formation except: *(DPG 2010)*
a. Lipoprotein A
b. Protein-C
c. Anti-thrombin III
d. Protein-S

6. All are risk factors for venous thrombosis except: *(Punjab 2009)*
a. Estrogen
b. Sickle cell anemia
c. PNH
d. Prolonged immobilization

7. All are hypercoagulable states, except: *(AIIMS June 98)*
a. Protein C resistance
b. Factor V Leiden deficiency
c. Antiphospholipid antibody
d. Polycythemia

8. All of the following conditions predispose to thrombosis except: *(AIIMS Dec 98)*
a. Paroxysmal nocturnal hemolgobinuria
b. Homocystinurea
c. Hypomagnesemia
d. Behcet's syndrome

9. Coagulation defects associated with increased coagulation are seen in: *(PGI Dec 2006)*
a. Increased Protein C
b. Increased Protein B
c. Increased Anti-thrombin III
d. Dysfibrinogenemia

10. Hypercoagulability due to defective factor V gene is called: *(AIIMS Nov 2003)*
a. Lisbon mutation
b. Leiden mutation
c. Antiphospholipid syndrome
d. Inducible thrombocytopenia syndrome

11. Most common inherited thrombotic disorder is: *(PGI Dec 2005)*
a. Protein C deficiency
b. Protein S deficiency
c. Factor V leiden mutation
d. Prothrombin gene mutation
e. t-PA deficiency

12. Which of these is not a risk factor for throm-boembolism? *(AIIMS Nov 2001)*
a. Myocardial infarction
b. Hypertension
c. Estrogen therapy
d. Superficial thrombophlebitis

13. Which one does not cause deep vein thrombosis? *(AIIMS Nov 95)*
a. Estrogen
b. Thrombocytosis
c. Paroxysmal nocturnal haemoglobinuria
d. Sickle cell anemia

14. Post operative pulmonary thromboembolism is seen in all, except: *(All India 2000)*
a. Tall and thin man
b. Obese male
c. Pregnant female
d. Estrogen therapy

15. All of the following conditions may predispose to pulmonary embolism except: *(All India 2003)*
a. Tall and thin man
b. Malignancy
c. Obesity
d. Progesterone therapy

16. Risk factors of pulmonary embolism: *(PGI Dec 2005)*
a. 30-years female on OCP's
b. Pregnancy
c. Leg paralysis
d. 50 years person with uncomplicated cholecystectomy
e. Behcet's disease

DEEP VENOUS THROMBOSIS

17. Which of the following is associated with Virchow's triad? *(MCI Sept 2005)*
a. Hypercoagulability
b. Disseminated malignancy
c. DVT
d. All of the above

18. DVT prophylaxis is indicated in all except: *(PGI May 2011)*
a. Abdominal surgery for malignant disease and high risk patient
b. All patients with age more than 40 years
c. Patient undergoing major orthopedics surgery
d. Systemic heparin is only method for DVT prophylaxis
e. 10% of patients of calf vein thrombosis progress to pulmonary embolism

19. Thromboembolism after pelvic surgery is usually from the veins: *(All India 89)*
a. Iliac
b. Calf
c. Femoral
d. Pelvic

20. In DVT all are seen except: *(CMC 2001)*
a. High fever
b. Increased temperature at site
c. Pain
d. Tenderenss

21. Virchow's triad includes all of the following, except: *(AIIMS June 2004)*
a. Venous stasis
b. Injury to veins
c. Blood hypercoagulability
d. Venous thrombosis

22. Deep vein thrombosis is seen in all except one: *(AIIMS Feb 97)*
a. Prolonged immobilization
b. Subuungual melanoma
c. Pregnancy
d. Major surgical operation

23. Deep vein thrombosis occurs most commonly after: *(AIIMS Feb 97)*
a. Total hip replacement
b. Gastrectomy
c. Prostatic operation
d. Brain surgery

24. Commonest cause of pulmonary embolism is: *(All India 99)*
a. Thrombosis of leg veins
b. Thrombosis of prostatic veins
c. IVC thrombosis
d. Thrombosis of internal pudendal artery

25. DVT, investigation of choice is: *(DNB 2005, 2001, PGI Dec 97, June 97)*
a. Doppler
b. Plethysmography
c. Venography
d. X-ray

26. Which of the following is the best way of preventing development of deep vein thrombosis (DVT) in post operative period?
a. Early ambulation
b. Physiotherapy
c. Prophylactic heparin
d. Low dose aspirin

27. For prophylaxis of deep vein thrombosis used is:
a. Warfarin
b. Heparin *(PGI June 97)*
c. Pneumatic shocks garment
d. Graded stocking

28. Earliest sign of deep vein thrombosis is: *(DNB 2005, 2001, 2000, AIIMS 87)*
a. Calf tenderness
b. Rise in temperature
c. Swelling of calf muscle
d. Homan's sign

29. White leg is due to: *(TN 90)*
a. Femoral vein thrombosis and lymphatic obstruction
b. Deep femoral vein thrombosis
c. Lymphatic obstruction only
d. None of the above

30. All of the following are seen in deep vein thrombosis except:
a. Pain
b. Discolouration *(All India 90)*
c. Swelling
d. Claudication

31. Which is not used in treatment of superficial venous thrombosis? *(AIIMS 92)*
a. Immediate anticoagulation
b. Rest and elevation
c. Analgesics
d. Treat associated malignancy

32. A 60-years old male has been operated for carcinoma of caecum and right hemicolectomy has been done. On the fourth post-oprative day, the patient develops fever and pain in the legs. The most important clinical entity one should look for is: *(UPSC 96)*
a. Urinary tract infection
b. Intravenous line infection
c. Chest infection
d. Deep vein thrombosis

33. The duration of heparin therapy in deep vein thrombosis is:
a. 7-10 days
b. 15-20 days *(UPPG 96)*
c. 3-4 days
d. 1 month

34. Most common site for venous thrombosis: *(JIPMER 98)*
a. Popliteal vein
b. Soleal vein
c. Femoral vein
d. Internal iliac vein

35. The most common vein to get thrombosed: *(AIIMS 99)*
a. Long saphenous
b. Short saphenous
c. Both
d. Posterior tibial

36. In DVT all are seen except: *(CMC 2001)*
a. High fever
b. Increased temperature at site
c. Pain
d. Tenderenss

37. In a patient on anticoagulant therapy, the INR is maintained at: *(UPSC 2002)*
a. 1.5-2.5 times the normal
b. 2.5-3.5 times the normal
c. 3.5-4.5 times the normal
d. 4.5-5.5 times the normal

38. The initial therapy of documented deep venous thrombosis in a post operative case is: *(NEET 2003, Karnataka 2003)*
a. Subcutaneous heparin therapy
b. Intravenous heparin therapy
c. Thrombolytic therapy with urokinase
d. Aspirin therapy

39. All are done for a case of deep vein thrombosis except:
a. Thrombolytic therapy
b. Bandage *(MAHE 07)*
c. Heparin
d. Bed rest

40. Which one of the following is the investigation of choice for suspected deep vein thrombosis of the lower extremity?
a. Radioactive labeled fibrinogen uptake *(UPSC 2007)*
b. Ascending contrast phlebography
c. D-dimer estimation
d. Duplex ultrasonography

41. All of the following are true regarding DVT except:
a. Pulmonary emboli is the immediate risk *(MCI March 2008)*
b. May lead to lung infarction
c. Associated with deficiency of protein C
d. Prior history of DVT is an important risk factor

VARICOSE VEINS

42. 'SEPS' is a procedure used for: *(All India 2009)*
a. Veins
b. Arteries
c. Lymphatics
d. AV fistula

43. The most common complication of varicose vein stripping is: *(DPG 2011)*
a. Infection
b. Hemorrhage
c. Ecchymosis
d. Thromboembolism

44. Drug used for sclerotherapy of varicose veins are the following except: *(MCI Sept 2007)*
a. Ethanolamine oleate
b. Polidocanol
c. Ethanol
d. Sodium tetradecyl sulfate

45. True about venous ulcer *(PGI Nov 2010)*
a. Always stripping done
b. Always examine deep venous system
c. Biopsy should be taken from chronic ulcer
d. Associated with Klippel-Trenunay syndrome

46. Treatment of a long-standing non-healing venous leg ulcer with venous leg ulcer with varicose veins in a patient unwilling for surgery or who is inoperable: *(MHPGMCET 2006)*
a. Antibiotic therapy
b. Bandaging
c. Surgical intervention
d. Haemorhilogogue therapy

47. TRIVEX is a percutaneous technique of: *(MHPGMCET 2009)*
a. Intravenous intraluminal destruction of vein by ablation catheter
b. Intravenous intraluminal injection of sclerosant like sodium tetradecyl sulphate
c. Removal of vein by suction following injection of fluid
d. Stripping of veins

48. In varicose veins the flow in incompetent perforators is:
a. From superficial to deep to *(MHSSMCET 2006)*
b. Form deep to superficial
c. No flow
d. Can be to and for

49. Varicose veins of size less than _____ can be best treated by sclerotherapy: *(MHSSMCET 2007)*
a. 2 mm b. 3 mm
c. 4 mm d. 6 mm

50. Amount of sclerosant used in treatment of varicose veins? *(MHSSMCET 2008)*
a. 0.5 ml b. 2 ml
c. 4 ml d. 8 ml

51. Varicose veins are seen in: *(PGI June 2002)*
a. DVT
b. Superficial venous thrombosis
c. AV fistula
d. Prolonged standing
e. Obesity

52. Brodie-Tredenlenburg test is positive in: *(PGI June 2002, MHPGMCET 2001)*
a. Sapheno-Femoral incompetence
b. Perforator competence above knee
c. Deep vein incompetence
d. Perforator competence below knee

53. Most commonly varicose veins are seen with:
a. Long saphenous vein *(AIIMS June 99)*
b. Short saphenous vein
c. Both
d. Popliteal and femoral vein

54. Regarding varicose veins, which one of the following statements is true: *(AIIMS Nov 2003)*
a. Over 20% are recurrent varicosities
b. The sural nerve is in danger during stripping of the long saphenous vein
c. The saphenous nerve is closely associated with the short saphenous vein
d. 5% oily phenol is an appropriate sclerosant for venous sclerotherapy

55. Surgery in varicose veins is not attempted in presence of:
a. Deep vein thrombosis *(AIIMS Nov 93, June 2000)*
b. Multiple incompetent perforators
c. Varicose veins with leg ulcer
d. All of the above

56. Which is true regarding Trendelenberg operation?
a. Stripping of the superficial varicose vein *(PGI Dec 2001)*
b. Flush ligation of the superficial varicose vein
c. Ligation of the perforators
d. Ligation of small tributaries at the distal end of superficial varicose vein
e. Ligation of short saphenous vein

57. First treatment of rupture of varicose veins at the ankle should be: *(All India 2004)*
a. Rest in prone position of patient
b. Application of a tourniquet proximally
c. Application of a tourniquet distally
d. Direct pressure and elevation

58. Perforators are not present at: *(AIIMS Nov 2007)*
a. Ankle b. Medial calf
c. Distal to calf d. Below inguinal ligament

59. Injection sclerotherapy for varicose veins is by using: *(PGI 88)*
a. Phenol b. Absolute alcohol
c. 70% alcohol d. Ethanolamine oleate

60. The following is the commonest site for venous ulcer:
a. Instep of foot *(AIIMS 91)*
b. Lower 1/3rd leg and ankle
c. Lower 2/3rd of leg
d. Middle 1/3rd of leg

61. The most important perforator of the lower limb is between:
a. Long saphenous and posterior tibial vein *(All India 92)*
b. Short saphenous and posterior tibial vein
c. Short saphenous and popliteal vein
d. Long saphenous and femoral vein

62. An operated case of varicose veins has a recurrence rate of: *(AIIMS 80, AP 89)*
a. About 10% b. About 25%
c. About 50% d. Over 60%

63. Operations for varicose veins are best accomplished by:
a. Stripping *(PGI 81, AIIMS 84, 86)*
b. Multiple subcutaneous ligatures
c. Subfascial ligatures
d. Division and ligation at the superficial venous system

64. Cocket and Dodd's operation is for: *(UPSC 2008, APPG 96)*
a. Saphenofemoral flush ligation
b. Subfascial ligation
c. Deep vein thrombosis
d. Diabetic foot

65. Which of the following test is used to detect perforator incompetence in varicose? *(JIPMER 2000)*
a. Trendelenberg test b. Fegan's test
c. Morissey's test d. Homan's test

66. Lipodermatosclerosis is most commonly seen at: *(DNB 2012)*
a. Anterior aspect of leg b. Medial aspect of leg
c. Anterior aspect of thigh d. Posterior aspect of thigh

67. An intern was doing saphenous cannulation for a burn patient. Then the patient developed sudden onset of pain along the medial border of the corresponding foot. Which nerve must have been accidentally ligated? *(AIIMS 2000)*
a. Sural nerve b. Deep peroneal nerve
c. Saphenous nerve d. Genicular nerve

68. Gold standard diagnostic test in varicose veins is:
a. Photoplethysmography *(JIPMER 2003)*
b. Duplex imaging
c. Ultrasonography
d. Radio-labeled fibrinogen study

69. Which one of the following reagents is not used as sclerosant in the treatment of bleeding varies? *(ICS 2005)*
a. Ethyl alcohol b. Ethanolamine oleate
c. Phenol d. Sodium morrhuate

70. Ligation of which nerve will lead to parasthesia and pain on the dorsum of foot during venesections of great saphenous vein: *(AIIMS June 2000)*
a. Sural nerve b. Geniculate
c. Saphenous nerve d. Deep peroneal nerve

71. Bisgard treatment is for: *(APPG 96)*
a. Arterial ulcer b. Venous ulcer
c. TAO d. Raynaud's phenomenon

72. For which of the following venous abnormality is surgery indicated? *(PGI Dec 2001)*
a. Deep vein incompetence with DVT
b. Deep vein competence without DVT
c. Varicosity >3mm in diameter
d. Varicosity <3mm in diameter
e. Saphenofemoral incompetence

73. Treatment of choice for a patient presenting with venous ulcer and incompetent perforators: *(DNB 2005)*
a. Stripping of saphenous vein
b. Subfascial ligation of perforators
c. Saphenofemoral ligation
d. Conservative

74. Patient presents with varicose vein with sapheno-femoral incompetence and normal perforator. Management options include all of the following except: *(AIIMS Nov 2012)*
a. Endovascular stripping
b. Sclerotherapy
c. Sapheno-femoral flush ligation
d. Saphenofemoral flush ligation with striping

AV MALFORMATIONS

75. A patient presented with pulsating varicose veins of the lower limb. Most probable diagnosis is: *(AIIMS Nov 2001)*
a. Klippel-Trenaunay syndrome
b. Tricuspid regurgitation
c. DVT
d. Right ventricular failure

76. True about Kasabach syndrome: *(PGI Nov 2009)*
a. May be due to complication of portwine stain
b. Coagulopathy occurs
c. Due to complication of hemangioma
d. Thrombocytopenia present

77. Pulsating varicose vein in young adult is due to: *(AIIMS 92)*
a. Arteriovenous fistula
b. Sapheno femoral incompetence
c. Deep vein thrombosis
d. Abdominal tumour

THROMBOPHLEBITIS

78. Migratory thrombophlebitis is seen most commonly with: *(PGI June 2002)*
a. Pancreatic carcinoma
b. Testicular carcinoma
c. Gastric carcinoma
d. Breast carcinoma
e. Liver carcinoma

79. The most common cause of superficial throm-bophlebitis is: *(AIIMS June 2004)*
a. Trauma
b. Infection
c. Varicosities
d. Intravenous infusion

80. The most common cause of superficial throm-bophlebitis is: *(All India 2009)*
a. Intravenous catheters/infusion
b. DVT
c. Varicose veins
d. Trauma

MISCELLANEOUS

81. All of the following are correct about axillary vein thrombosis except: *(All India 2001)*
a. May be caused by a cervical rib
b. Treated with IV anticoagulant
c. Embolectomy is done in all cases
d. May occur following excessive exercise

82. In obstruction of inferior vena cava there is? *(All India 97)*
a. Prominent thoraco epigastric vein
b. Caput medusa
c. Hemorrhoids
d. Esophageal varices

83. Calf compartment pressure rise to_____ on walking:
a. 20-30 mmHg *(MHSSMCET 2006)*
b. 60-80 mmHg
c. 80-100 mmHg
d. 200-300 mmHg

84. Harvey's sign is: *(DNB 2000)*
a. Transmitted pressure wave on coughing in a varicose vein
b. Related to the use of venous filling after emptying a length of vein
c. Loss of hairs from eyebrows
d. None of the above

85. May thurner or cockett syndrome involves:
a. Common iliac artery obstruction *(Recent Questions 2013)*
b. Internal iliac artery obstruction
c. Internal iliac vein obstruction
d. Left iliac vein compression

86. Venous air embolism is most common in which position in surgery: *(Recent Questions 2013)*
a. Sitting
b. Prone
c. Lateral
d. Lithotomy

EXPLANATIONS

HYPERCOAGULABLE STATES AND DVT RISK FACTORS

1. **Ans. b. Antiphospholipid antibody syndrome** *(Ref: Harrison 18/e p462; Sabiston 19/e p1813; Schwartz 10/e p761, 9/e p781; Bailey 26/e p914, 25/e p936)*

Risk Factors for Hypercoagulable States/Thrombosis	
Inherited	**Acquired**
• **Defective inhibition of coagulation factors:** – **Factor V Leiden**Q (resistant to inhibition by activated protein C) – **Antithrombin III deficiency**Q – **Protein C** or **S deficiency**Q – **Prothrombin gene mutation**Q (G20210A)	• **Diseases or syndromes:** – Lupus anticoagulant/anticardiolipin syndromeQ – **Malignancy**Q**, recent MI**Q**, infection**Q – **Myeloproliferative disorder** – **Thrombotic thrombocytopenic purpura**Q – **Estrogen**Q treatment – Hyperlipidemia, Diabetes mellitusQ – Hyperviscocity, **polycythemia**Q – **Nephrotic syndrome**Q – **Paroxysmal nocturnal hemoglobinuria**Q – **Inflammatory bowel disease**Q – **Behcet's syndrome**Q
• **Impaired clot lysis:** – Dysfibrinogenemia – **Plasminogen deficiency**Q – **t-PA deficiency**Q – **PAI-I excess**Q	
• **Uncertain mechanism:** – **Homocystinuria**Q – **High homocysteine** levels due to **MTHFR mutation**Q	• **Physiological states:** – **Pregnancy** (especially post-partumQ) – **Obesity**Q**, Immobilization**Q**, Old age**Q – **Post-operative state**Q

2. **Ans. d. Lupus anticoagulant**
3. **Ans. None**
4. **Ans. c. Antibodies to factor VIII**
5. **Ans. a. Lipoprotein A**
6. **Ans. b. Sickle cell anemia**
7. **Ans. b. Factor V Leiden deficiency** *(Ref: Harrison 18/e p462-463)*

- **Factors V Leiden mutation** or **increased factor V Leiden levels** are associated with **hypercoagulable state** (not the factor V Leiden deficiency)

- **MC genetic cause** for **thrombophilia**: **Factor V Leiden**
- **MC congenital cause** of **venous thrombosis**: **Factor V Leiden**
- **MC genetic hereditary blood coagulation disorder**: **Factor V Leiden**

8. **Ans. c. Hypomagnesemia**
9. **Ans. d. Dysfibrinogenemia**
10. **Ans. b. Leiden mutation**
11. **Ans. c. Factor V Leiden mutation**
12. **Ans. b. Hypertension**
13. **Ans. d. Sickle cell anemia**
14. **Ans. a. Tall and thin man**
15. **Ans. a. Tall and thin man**
16. **Ans. a. 30 years female on OCP's; b. Pregnancy; c. Leg paralysis; e. Behcet's disease**

DEEP VENOUS THROMBOSIS

17. **Ans. a. Hypercoagulability**
(Ref: Harrison 18/e p2171-2174; Sabiston 19/e p1812-1816; Schwartz 10/e p918-927, 9/e p781-789; Bailey 26/e p913-917, 25/e p935-939)

Deep Venous Thrombosis

- **DVT of** the **leg** is complicated by the **immediate risk of pulmonary embolus** and **sudden death**Q.
- Patients are at **risk of** developing a **post-thrombotic limb** and **venous ulceration**Q.

Virchow's Triad
• Three factors described by Virchow are important in the development of venous thrombosis. These are: – **Endothelial injury**Q (**vascular injury**) – **Stasis** or turbulence of blood flowQ – **Hypercoagulability** of bloodQ (**thrombophilia**)

- **Most important predisposing factor**: **Hospital admission**Q for the treatment of a medical or surgical condition.

Pathology

- A **thrombus develops in** the **soleal veins** of the calf, this is likely to **extend up** to the next large venous branch and is **more likely to break off** and **embolise**Q to the lung as a pulmonary embolism.
- **Acute right heart obstruction** may lead to **sudden collapse** and **death**Q.

> - **Lung infarction** is **rare**Q as the **lung** has a **dual blood supply** (**bronchial** and **pulmonary arteries**).

Clinical Features

- **MC presentation** of **DVT**: **Pain** and **swelling**, especially in the **calf** of one lower limbQ.
- **Bilateral DVT** is common, occurring in up to **30%**Q.
- **Many patients** have **no symptoms of thrombosis** and **may first present with** signs of a **pulmonary embolism**, e.g. pleuritic chest pain, hemoptysis and shortness of breathQ.
- **Physical signs**: **Mild pitting edema** of the ankle, **dilated surface veins**, a **stiff calf** and **tenderness** over the course of the deep veins.
- **Earliest sign of DVT: Calf tenderness**Q

> - **Low-grade fever** may be present, especially in a patient who is having **repeated pulmonary emboli**Q.

- **Homan's sign**: **Resistance** (not pain) **of** the **calf muscles to forcible dorsiflexion** is not discriminatory and should be abandoned.

Homan's sign	• **Resistance** (not pain) **of** the **calf muscles to forcible dorsiflexion**Q
Phlegmasia alba dolens	• **Painful white leg**Q • Obstruction of major **deep venous channel**Q
Phlegmasia cerulea dolens	• **Painful blue leg**Q • Obstruction of **both collaterals** and **deep venous channel**Q
Moses sign	• **Calf tenderness** on **direct pressure on** the **calf**Q
Pratt's sign	• **Calf tenderness** on **squeezing** the **calf** from the sidesQ

Diagnosis

- **D-dimer measurement**: **If normal, no indication for further investigation**Q but, if raised, a duplex ultrasound examination of the deep veins should be performed.
- **Duplex ultrasound**: **Investigation of choice** for diagnosis of **DVT** (**Filling defects** in flow and **lack of compressibility** indicate the presence of a thrombosisQ).
- **Ascending venography:** Shows **thrombus as a filling defect**, is now **rarely required**Q.

Treatment

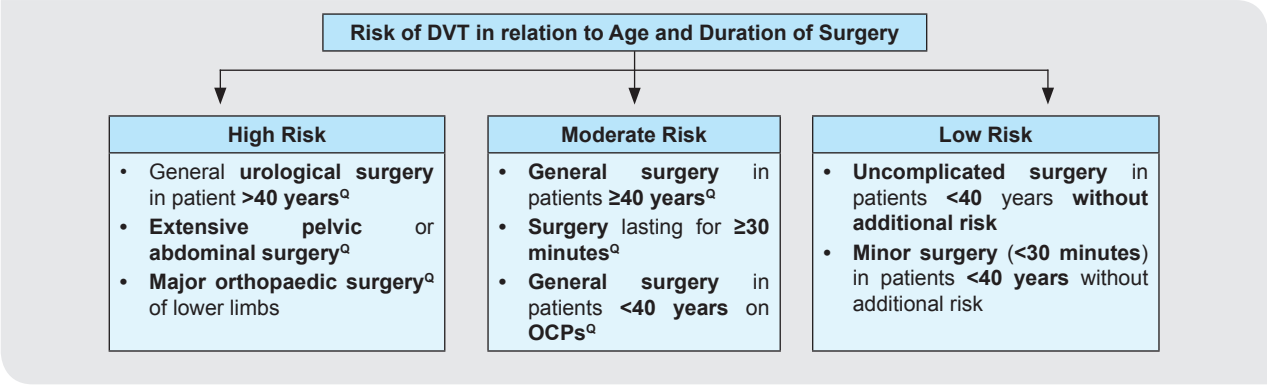
- **Confirmed DVT on duplex imaging:** Start **subcutaneous LMWH** and **rapid anticoagulation with warfarin** unless there is a specific contraindicationQ.

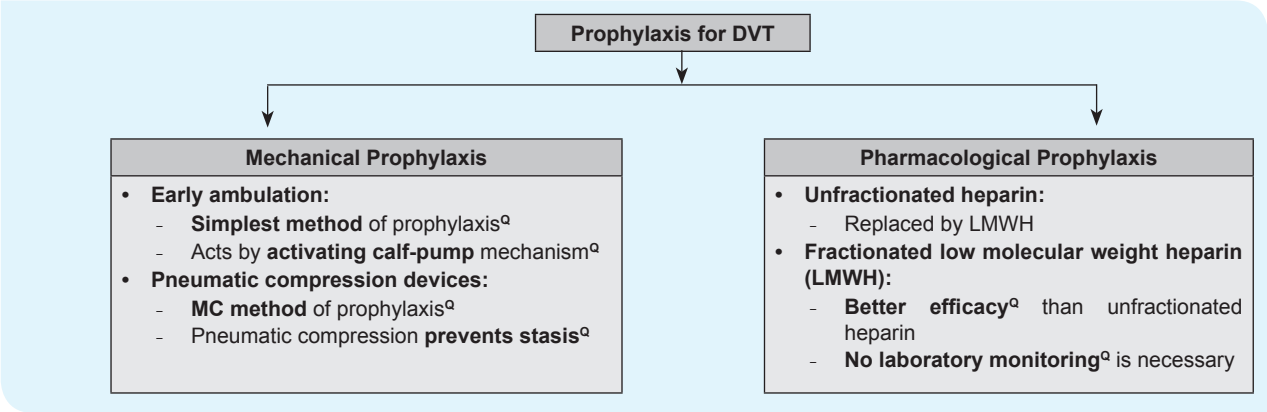
> - **Duration of heparin** should be **atleast 5 days**Q.
> - **Warfarin** is usually started at a dose of **10 mg** on **day one**, **10 mg** on **day two** and **5 mg** on **day three**Q.
> - **PT on day 3** guides the **maintenance dose** of warfarin.

- **Thrombolysis:** In **iliac vein thrombosis**, especially if **seen early** and limb is **extremely swollen**Q.
- A **minimum treatment time of anticoagulation** advocated **in DVT** is **3 months**Q.

18. **Ans. d. Systemic heparin is only method for DVT prophylaxis** *(Ref: Harrison 18/e p2171-2174; 17/e p1651-1655; Sabiston 19/e p1813-1816; Schwartz 10/e p918-927, 9/e p781-783; Bailey 26/e p916-917, 25/e p936-939)*

- The patients who has undergone either **major abdominal surgery** or **major orthopedic surgery**, has sustained **major trauma** or has **prolonged immobility** (>3 days) represents an **elevated risk for** the development of **venous thromboembolism**Q.
- Patients who have undergone **total hip replacement**, **total knee replacement**, or **cancer surgery** will benefit from **extended pharmacologic prophylaxis** for a total of **4-6 weeks**Q.
- If **untreated**, upto **25% of calf vein thrombosis** may progress to **proximal deep veins** of the leg, where the **incidence of chronic venous insufficiency** is **25%** and that of **pulmonary embolism** is **10%**Q**.**





- **Unfractionated heparin** and **warfarin** are **rarely used in** the **prophylaxis of DVT**[Q].

19. **Ans. c. Femoral** *(Ref: Sabiston 19/e p1812-1813; Schwartz 9/e p781; Bailey 26/e p915, 25/e p935-939)*

- **MC site of DVT: Calf veins (soleal veins)**[Q]
- **MC site thrombosis** for **pulmonary thromboembolism: Femoropopliteal veins**[Q]

- **Calf veins** are the **most common site of DVT** in **post-operative period,** but **risk of embolism** from **calf venous thrombosis** is **extremely low**[Q].
- **DVT** of **femoropopliteal** veins are the **most common site** of **pulmonary thromboembolism**[Q].

20. **Ans. a. High fever** 21. **Ans. d. Venous thrombosis** 22. **Ans. b. Subungual melanoma**
23. **Ans. a. Total hip replacement** 24. **Ans. a. Thrombosis of leg veins**
25. **Ans. a. Doppler** 26. **Ans. c. Prophylactic heparin**
27. **Ans. b. Heparin, c. Pneumatic shock garments, d. Graded stocking**
28. **Ans. a. Calf tenderness** 29. **Ans. b. Deep femoral vein thrombosis**
30. **Ans. d. Claudication** 31. **Ans. a. Immediate anticoagulation; b. Rest and elevation**
32. **Ans. d. Deep vein thrombosis** 33. **Ans. c. 3-4 days** 34. **Ans. b. Soleal vein**
35. **Ans. d. Posterior tibial** 36. **Ans. a. High fever**

37. **Ans. b. 2.5-3.5 times the normal** *(Ref: Sabiston 19/e p1815; Schwartz 9/e p784-786)*

Anticoagulant	**Parameter**	**Goal** (times control values)
Unfractionated heparin	**aPTT**[Q]	1.5-2.5[Q]
Warfarin	**PT** or **INR**[Q]	2.0-3.0[Q]

38. Ans. b. Intravenous heparin therapy
(Ref: Harrison 18/e p2174-2176; Sabiston 19/e p1815; Schwartz 10/e p199, 921-923, 9/e p784-786; Bailey 26/e p917, 25/e p938-939)

Antithrombotic Therapy in DVT

- **Any venous thrombosis** involving the **femoropopliteal system** is **treated with full anticoagulation**Q.
- Traditionally, the **treatment of DVT centers around heparin treatment** to maintain the PTT at 60 to 80 seconds, followed by **warfarin therapy** to obtain an **INR of 2.5 to 3.0**Q**.**
- This **initial therapy** usually is **continued for at least 5 days**Q, while oral vitamin K antagonists are being simultaneously administered.

Unfractionated Heparin
• **UFH therapy** is **most commonly administered** with an **initial IV bolus of 80 units/kg** or **5000 units**Q**.** • **Initial bolus** is **followed by a continuous IV drip**, initially at **18 units/kg per hour**Q or **1300 units per hour**Q. • The **half-life of IV UFH** ranges from **45-90 minutes** and is **dose dependent**Q. • **Level of antithrombotic therapy** should be **monitored every 6 hours using aPTT,** with the **goal range of 1.5 to 2.5 times control values**Q.

39. Ans. d. Bed rest **40. Ans. d. Duplex ultrasonography** **41. Ans. b. May lead to lung infarction**

VARICOSE VEINS

42. Ans. a. Veins *(Ref: Sabiston 19/e p1809; Schwartz 10/e p929-930, 9/e p791; Bailey 26/e p911, 25/e p931)*

Subfascial Endoscopic Perforator Vein Surgery (SEPS)

- **SEPS** is a **new endoscopic technique for** the management of **chronic venous insufficiency** due to **incompetent perforator veins**Q.
- SEPS involves **insertion of** a **rigid endoscope** through the skin and superficial fascia to a **plane above** the **muscle**, such that perforator veins are visible as they exit the muscles.
- These **perforator veins** are **dissected** free from surrounding tissue and **closed** with the help of metal clips.

43. Ans. c. Ecchymosis *(Ref: Sabiston 19/e p1803-1811; Schwartz 10/e p929-930, 9/e p790-792; Bailey 26/e p903-913, 25/e p927-932)*

Varicose Veins

- **Varicose veins** are **dilated, tortuous elongated superficial veins**Q ≥3 mm in diameter measured in upright position with demonstrable reflux.
- **Most develop in** the tributaries of the **greater** and **lesser saphenous veins**, which are **usually dilated** but rarely varicose themselves.
  - The **usual distribution** of **varicose veins** is **below** the **knee in branches of greater saphenous system**Q**.**
- **Varicosities in** the **thigh**: **Long saphenous** incompetenceQ
- **Varicosities on** the **back of** the **leg**: **Short saphenous** incompetenceQ

Primary Varicose Veins	Secondary Varicose Veins
• **More common**Q • Due to **congenital predisposition** with **occupational reinforcement**Q • **Decreased number or defective valves**Q	• Less common • Arises from **destruction** or **dysfunction of valves** caused by: – **Trauma**Q – **DVT**Q – **AV fistula**Q – Non-traumatic proximal venous obstruction (pregnancy, pelvic tumor)

Risk Factors for Varicose Veins	
• **Female sex**Q • **Pregnancy** (especially **multiparity**Q) • **Pelvic tumors**Q • **Family history**Q	• **AV fistula**Q • **DVT**Q • **Prolonged standing**Q • **Obesity**Q

Pathophysiology

- **Defective connective tissue** and **smooth muscle** in the **vein wall** leading to a **secondary incompetence** of the valvesQ

Clinical Features

- **MC symptom**: **Dull aching pain in** the **veins** at the **end of** the **day**, **after prolonged standing**[Q]
- Other symptoms: **Ankle swelling**, itching, bleeding, **superficial thrombophlebitis, eczema, lipodermatosclerosis** and **ulceration**[Q].

Diagnosis

- **Duplex ultrasound: Investigation of choice** for diagnosis of **varicose veins**[Q]
- **Varicography:** Useful investigation in **recurrent varicose veins** or **complex anatomy**[Q]
- **Venography:** Not used as a standard investigation in varicose veins, **useful if** the **duplex scan indicates, but cannot confirm**, the **presence of post-thrombotic change**[Q].

Treatment

- Patients **without symptoms** or **signs of lipodermatosclerosis** or **ulceration: Reassurance**[Q]
- **Elastic compression stockings:** For **varicose veins with post-thrombotic damage**[Q]

> - **Bisgard's Regime**: **Limb elevation** + **Compression stockings** + **Massage** for varicose ulcers[Q]

Indications for Varicose Vein Intervention	
• **Cosmesis**[Q] • Symptoms **refractory to conservative therapy**[Q] • **Bleeding** from a varix	• Superficial **thrombophlebitis**[Q] • **Lipodermatosclerosis**[Q] • Venous stasis **ulcer**[Q]

- A previous **DVT** usually **contraindicates varicose vein surgery**[Q]

> - **DVT** is a **contraindication for** the **treatment of varicose veins**[Q].
> - **Varicose vein surgery** should **never be attempted** in a case **where DVT exists along** with **varicose veins**, because in these cases, **superficial veins** are the **only valved venous pathway** and excising them will only aggravate the condition[Q].

- **Laser** and **radiofrequency ablation do not provide 'flush' occlusion** of the saphenous vein, often **leaving tributaries** that would always be **divided at surgery**.

Treatment of Varicose Veins	
Injection sclerotherapy	• **Sodium tetradecyl sulphate** is **most commonly used**[Q] • **Destroys lipid membranes** of endothelial cells causing them to shed, leading to **thrombosis, fibrosis** and **sclerosis**[Q]. • **Not effective** at **eradicating varicosities in** the presence of **major saphenous incompetence**[Q] • Useful for dealing with **minor varicosities** (**<3 mm**[Q]) and **recurrences** in the **calf** and **lower leg**
Surgical Treatment	• **Ligate** the **saphenofemoral** and/or **saphenopopliteal junctions** and **remove major part of** the **incompetent trunk**[Q]
Radiofrequency ablation	• **Destroy** the **endothelial lining**[Q]
Endovenous laser ablation	• Causes endothelial damage[Q]

Complications of varicose vein surgery

- **Recurrence (MC): Incidence of recurrence** after surgery is upto **10%**[Q].
- **Hematoma** or **Ecchymosis: MC cause of discomfort**[Q] after varicose vein surgery
- Sensory nerve injury

> - **Greater saphenous vein** should only be **stripped** to **just below the knee to avoid damage** to the accompanying **saphenous nerve**[Q]
> - **Sural nerve** must be **carefully dissected off** the **lesser saphenous vein** at the **ankle**[Q].

'CEAP' Classification of Chronic Lower Extremity Venous Disease	
C	• **Clinical signs** ($grade_{0-6}$), supplemented by **"A"** for **asymptomatic** and **"S"** for **symptomatic** presentation
E	• **Etiologic classification** (**c**ongenital, **p**rimary, **s**econdary)
A	• **Anatomic distribution** (**s**uperficial, **d**eep, or **p**erforator, alone or in combination)
P	• **Pathophysiologic dysfunction** (**r**eflux or **o**bstruction, alone or in combination)

44. Ans. c. Ethanol *(Ref: Sabiston 19/e p1809; Schwartz 9/e p791; Bailey 26/e p908-909, 25/e p929-930)*

Sclerosing Agents

- These are **irritants** causing **inflammation, coagulation** and ultimately **fibrosis,** when injected into **hemorrhoids** or **varicose veins**[Q].
- Used only for **local injection**

Sclerosing Agents	
• **Phenol**[Q] **(5%)** in **almond** oil or **peanut oil**[Q] • **Ethanolamine oleate**[Q] **(5%)** in 25% glycerin and 2% benzyl alcohol • **Polidocanol**[Q] **(3%)**	• **Sodium tetradecyl sulphate**[Q] (3%) with benzyl alcohol (2%) • **Hypertonic saline**[Q]

45. Ans. b. Always examine deep venous system; c. Biopsy should be taken from chronic ulcer d. Associated with Klippel-Trenaunay syndrome *(Ref: CSDT 11/e p874, 884; Sabiston 19/e p1806-1807; Schwartz 9/e p792-794; Bailey 26/e p917-919, 25/e p933-935)*

- SCC (**Marjolin's ulcer**) may occur **in long standing chronic ulcer**. So, **biopsy** should be taken **to rule out malignancy**[Q].
- **DVT** is one of the **main predisposing factors** for **development of venous ulcer**[Q].
- **Venous ulcer** is **not always associated with varicose veins**[Q].
- **Most venous ulcers improve with Bisgard's Regime**[Q] **(Limb elevation + Compression stockings + Massage)**
- **Klippel-Trenaunay syndrome** is associated with **varicose veins, limb hypertrophy** and a **cutaneous birthmark** (**port-wine stain** or **venous malformation**). **Deep venous system** is **anomalous** or **absent**, **saphenous vein stripping** can be **hazardous**[Q].

46. Ans. b. Bandaging *(Ref: Sabiston 19/e p1806-1807; Schwartz 9/e p792-794; Bailey 25/e p933-935)*

Venous Ulcers

- **Venous disease** is responsible for **60-70% of all ulcers** in the **lower leg**.

Causes of Leg Ulcers	
• **Venous disease**: Superficial incompetence; deep venous damage (post-thrombotic) • **Arterial ischemic ulcers** • Rheumatoid ulcers	• Traumatic ulcers • **Neuropathic ulcers** (diabetes) • Neoplastic ulcers (**SCC** and **BCC**)

Etiology

- **Fibrin cuff theory**: High venous pressure → Pericapillary infiltrate → Fibrin → Fibrosis → Cuffs → Diffusion block → Tissue damage[Q]
- **White cell trapping**: White cell 'trapping' → Reactive oxygen species → Free radicals → Tissue damage[Q].

> • At present, **ambulatory venous hypertension** is the **only accepted cause of ulceration**[Q].

Clinical features

- **Venous ulcer**: **Sloping edge, base** contains **granulation tissue**[Q] covered by slough and exudate.
- **Any elevation** of the **ulcer edge** should indicate the **need for a biopsy to exclude a carcinoma** (SCC or BCC).

> • Venous ulcer of the leg **characteristically develops in** the skin of the **gaiter region**[Q], the **area between** muscles of the calf and ankle
> • **Majority of ulcers** develop on the **medial side** of the **calf**[Q]
> • **Ulcers associated with lesser saphenous incompetence** often develop on the **lateral side** of the leg[Q].

- Almost **all venous ulcers have** surrounding **lipodermatosclerosis** (**thickening, pigmentation, inflammation** and **induration** of calf skin[Q])

- **Pigmentation** comes **from hemosiderin** and **melanin**

> - Presence of an **ankle flare suggests venous hypertension**Q.
> - **Champagne bottle leg** is seen in **varicose veins**Q.

Diagnosis

- **Duplex ultrasound**: Assess the state of the deep and superficial veins (**IOC**)Q
- **Bipedal ascending phlebography**: **Detect obstruction** and **post-thrombotic changes missed by** the **duplex scan**Q

Management

- **Probable venous ulcer**: Patients are initially treated by a **compression bandaging regimen**Q
- A **multilayered elastic compression bandaging system** has been shown to be effective (**Charing Cross four-layer bandage**), as has a **rigid multilayered system** (**Steripaste three layer bandage**)Q.

Prevention of recurrence

- **Elastic stockings** should be prescribed for all patients with evidence of **post-thrombotic deep vein damage** and these remain an **alternative treatment** for patients with **superficial venous disease who decline intervention**Q.

Prognosis

- There is a **20-30% incidence of re-ulceration** by 5 yearsQ.
- The **greatest risk of re-ulceration** is in the **post-thrombotic leg**Q.

47. Ans. a. Intravenous intraluminal destruction of vein by ablation catheter *(Ref: Sabiston 19/e p1809; Harrison 18/e p2074)*

Transilluminated Powered Phlebectomy (TIPP) using TRIVEX

- **TIPP** involves an **irrigated transilluminator**, passed deep to the varicosities, and a powered suction resector, each introduced through a skin incision.
- On activation, the **vein is sucked into** the **resector under direct vision**, morcellated and removed by suction.
- **Trivex system** uses two components.
- **First instrument illuminates** the **varicose veins** through the skin using advanced fiber optic technology and the **vein resector** is then **guided next to** the **vein** underneath the skinQ.
- **Suction draws** the **vein into tip of** the **vein resector** while a rotating blade effectively removes the leg veinQ.
- With this new varicose vein treatment, **large clusters of varicose veins** can be **accurately removed** through a **minimal number of small incisions** and is far more effective than other forms of varicose vein surgery.

48. Ans. b. Form deep to superficial *(Ref: Bailey 25/e p928)*

- In **varicose veins**, the **flow in** the **incompetent perforators** is **reversed** and goes **from deep to superficial veins**Q.

49. Ans. b. 3mm *(Ref: Sabiston 19/e p; Schwartz 9/e p791; Bailey 26/e p908-909, 25/e p929-930)*

- **Sclerotherapy** is useful for dealing with **minor varicosities** (**<3 mm**Q) and **recurrences** in the **calf** and **lower leg**Q.
- **Amount of sclerosant used** in treatment of varicose veins is **0.5 ml**Q.

50. Ans. a. 0.5 ml

51. Ans. a. DVT; c. AV fistula; d. Prolonged standing; e. Obesity

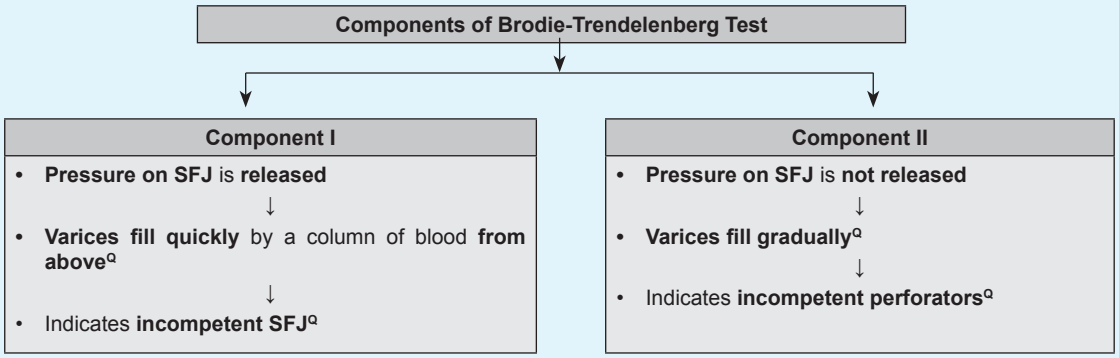
52. Ans. a. Sapheno-Femoral incompetence *(Ref: Sabiston 19/e p1805; Bailey 25/e p927-928)*

Brodie-Trendelenberg Test

- **Brodie-Trendelenberg test** is **positive** in:
  - Incompetent sapheno-femoral junction (SFJ)Q
  - **Incompetent perforators** or **communicating veins**Q

Procedure

- Test is performed in two ways.
- In both the methods the patient is first placed in the recumbent position and his legs are raised to empty the veins.
- The SFJ is now compressed with the thumb of the clinician and the patient is asked to stand up quickly.



Tests for Varicose Veins	
Morrissey's test	• Cough impulse test[Q]
Perthe's test	• Affected lower extremity is wrapped with elastic bandage and patient is instructed to move around and exercise. • **Increase in size** of the varices indicates **incompetence of deep venous system**[Q] • **Severe crampy pain** is suggestive of **deep venous obstruction**[Q]
Modified Perthe's test	• Tourniquet is applied around the upper part of the thigh and patient is asked to walk quickly with tourniquet in the place • **Severe crampy pain** is suggestive of **deep venous obstruction**[Q]
Schwartz test	• In long standing varicose veins if the **lower part of varicosity is tapped**, an **impulse is felt at** the **saphenous opening**[Q]
Fegan's test	• Palpation to find the **fascial defects** to **locate incompetent perforators**[Q]

53. Ans. a. Long saphenous vein *(Ref: Sabiston 19/e p; Schwartz 9/e p791; Bailey 26/e p901, 25/e p927)*

- The **usual distribution** of **varicose veins** is **below** the **knee in branches of greater saphenous system**[Q].

54. Ans. d. 5% oily phenol is an appropriate sclerosant for venous sclerotherapy

55. Ans. a. Deep vein thrombosis *(Ref: Sabiston 19/e p1809; Schwartz 9/e p791; Bailey 26/e p907, 25/e p933)*

- **DVT** is a **contraindication for** the **treatment of varicose veins**[Q].
- **Varicose vein surgery** should **never be attempted** in a case **where DVT exists along** with **varicose veins**, because in these cases, **superficial veins** are the **only valved venous pathway** and excising them will only aggravate the condition[Q].

56. Ans. b. Flush ligation of the superficial varicose vein

(Ref: Sabiston 19/e p1809-1811; Schwartz 10/e p917-918, 9/e p792; Bailey 26/e p910-911, 25/e p930-931)

Trendelenberg Operation

- Consists of **saphenofemoral junction flush ligation** and **greater saphenous vein** (GSV) **stripping**[Q]
  - **All four tributaries** (**superficial inferior epigastric**, **superficial circumflex iliac**, **deep** and **superficial external pudendal veins**) is **divided**[Q]
- **Ligate** the **GSV** deep to all tributaries **flush with** the **common femoral vein**[Q]
- **Greater saphenous vein** should only be **stripped** to **just below the knee to avoid damage** to the accompanying **saphenous nerve**[Q]

57. Ans. d. Direct pressure and elevation *(Ref: Oxford Textbook of Surgery 2/e p1000)*

- **Varicose veins** around the **ankle, foot** and **lower leg** especially **in elderly** are **highly vulnerable to hemorrhage**, which may **occur with minor trauma** or **spontaneously** when patients is up and about[Q].
  - The ensuing hemorrhage may be copious but is **easily stopped by finger pressure** or when patient **lies down with foot elevated** and a **firm pad** and **bandage** is **applied**[Q].
- The treatment must be completed by **elimination of affected varicosity** which may be achieved by **compression sclerotherapy**.

58. **Ans. d. Below inguinal ligament** *(Ref: Sabiston 19/e p1803; Schwartz 9/e p778; Bailey 26/e p902, 25/e p925-926)*

Perforators Location (In CBD Hunters)

- **Below** the **medial malleolus** (**Inframalleolar** perforators/ **May or Kuster**)
- In the **medial calf** (**Cockett's** perforators[Q])
- Just **below** the **knee** (**Boyd's** perforators[Q])
- Just **above** the **knee** (**Dodd's** perforators[Q])
- At the level of **adductor canal** (**Hunterian** perforators[Q])

59. **Ans. a. Phenol; d. Ethanolamine oleate**

60. **Ans. b. Lower 1/3rd leg and ankle**

61. **Ans. d. Long saphenous and femoral vein**

62. **Ans. a. About 10%**

63. **Ans. a. Stripping**

64. **Ans. b. Subfascial ligation** *(Ref: www.ncbi.nlm.nih.gov/pubmed/4855162)*

- **Cockett and Dodd Operation: Sub-fascial ligation** of perforators

65. **Ans. a. Trendelenberg test**

66. **Ans. b. Medial aspect of leg** *(Ref: Sabiston 19/e p1806-1807; Bailey 26/e p905)*

Lipodermatosclerosis

- Lipodermatosclerosis is the name given to the **skin changes seen in chronic venous insufficiency.**
- Components of lipodermatosclerosis:
  - **Pigmented skin**
  - **Inflamed subcutaneous tissue**
  - **Elevated venous pressure** facilitates the extravasation of the RBCs and fluid leading to inflammation
- The pigmentation is due to **fixation of hemosiderin** in the tissue
- It is most commonly seen **on gaiter area** (**above medial malleolus**)

67. **Ans. c. Saphenous nerve**

68. **Ans. b. Duplex imaging**

69. **Ans. a. Ethyl alcohol**

70. **Ans. c. Saphenous nerve**

71. **Ans. b. Venous ulcer**

72. **Ans. b. Deep vein competence without DVT; c. Varicosity >3 mm in diameter; e. Saphenofemoral incompetence** *(Ref: Sabiston 19/e p1809-1811; Schwartz 10/e p259,917,929, 9/e p791-792; Bailey 25/e p929-932)*

- **Surgery** is indicated **for SFJ incompetence**[Q].
- **Varicose vein surgery** is **contraindicated in** presence of **DVT**[Q]
- Varicosities with **diameter >3 mm: Surgery**[Q]
- Varicosities with **diameter <3 mm: Sclerotherapy**[Q]

73. **Ans. b. Subfascial ligation of perforators**

74. **Ans. b. Sclerotherapy** *(Ref: Sabiston 19/e p1803-1811; Schwartz 9/e p790-792; Bailey 25/e p927-932)*

Injection sclerotherapy is useful for dealing with **minor varicosities** (**<3 mm**[Q]) and **recurrences** in the **calf** and **lower leg.** Though it's a treatment option for varicose vein, but for a **patient of varicose vein with sapheno-femoral incompetence and normal perforator**, this will be least preferred amongst the given options.

Treatment of Varicose Veins

- **Saphenofemoral flush ligation** with **ligation of tributaries** and **stripping of major part of** the **incompetent trunk**[Q]

AV MALFORMATIONS

75. **Ans. a. Klippel-Trenaunay syndrome** *(Ref: Schwartz 10/e p1850, 9/e p1667; Bailey 26/e p919, 25/e p940)*

Klippel-Trenaunay syndrome

Characterized by	
• Congenital **AV fistula**[Q]	• **Hypertrophy** of involved **extremity**[Q]
• **Cutaneous hemangioma**[Q]	• **Absence of deep venous system**[Q]
• **Varicose veins**[Q]	

Management

- **Most patients** with Klippel-Trenaunay syndrome should **be treated conservatively with elastic compression** hosiery[Q]
- **Pathological superficial veins should not be removed**[Q] without evidence of an intact deep system.

- **Parkes Weber syndrome: Multiple AV fistulae** causing **venous hypertension, ulceration** and **high-output cardiac failure**[Q].

76. Ans. b. Coagulopathy occurs; c. Due to complication of hemangioma; d. Thrombocytopenia present *(Ref: Sabiston 19/e p1452; Schwartz 10/e p1850, 9/e p1667; Bailey 26/e p598, 25/e p617)*

Kasabach-Meritt Syndrome

- **Characterized by:**
  - **Thrombocytopenia**[Q]
  - **Consumptive coagulopathy**[Q]
  - **Microangiopathic hemolytic anemia**[Q]
  - **Enlarging vascular lesion (Hemangioma** or **AV malformation**[Q])

Pathology

- Vascular lesion (**Hemangioma** or **AV malformation**) **triggers** an **intravascular coagulation** with **platelet trapping** and consequent **thrombocytopenia,** and an **activation** and **consumption of coagulation factors**[Q].

Management

- Treatment options: **Embolization, external compression bandages**[Q]
- Drugs: Corticosteroids, vincristine

77. Ans. a. Arteriovenous fistula

THROMBOPHLEBITIS

78. Ans. a. Pancreatic carcinoma; c. Gastric carcinoma *(Ref: Sabiston 19/e p1816-1817; Schwartz 10/e p927, 9/e p789; Bailey 26/e p913, 25/e p939)*

Malignancies associated with Migratory Thrombophlebitis	
• **CA pancreas (MC)**[Q]	• **Prostate cancer**[Q]
• **CA lung**[Q]	• **Ovarian** cancer[Q]
• **GI malignancies**[Q]	• **Lymphoma**[Q]

79. Ans. d. Intravenous infusion *(Ref: Sabiston 19/e p1816-1817; Schwartz 10/e p927-928, 9/e p789; Bailey 26/e p913, 25/e p939)*

Superficial Thrombophlebitis

- This is a **superficial venous thrombosis**, most commonly caused by infusions of IV fluids

Causes of Superficial Thrombophlebitis	
• **Venepuncture** and **IV infusion** (**MC**)[Q]	• **Buerger's disease**[Q]
• **Trauma**[Q] (especially to varicose veins)	• **Malignancy (Pancreas**[Q]**)**

Clinical Features

- **Surface vein feels solid** and **tender** on palpation.
- **Overlying skin** may be **attached to** the **vein** and in the early stages may be **erythematous** before gradually turning brown.
- A **linear segment of vein** can be **palpated** once the inflammation has subsided[Q].

- The **acute inflammation strongly adhere** the **thrombus to the venous wall**, so **no thromboembolic episodes** are seen[Q].

Treatment

- Most patients are treated with **NSAIDs** and **condition resolves spontaneously**[Q].

80. Ans. a. Intravenous catheters/infusion

MISCELLANEOUS

81. Ans. c. Embolectomy is done in all cases *(Ref: Sabiston 19/e p1816; Schwartz 10/e p928-929, 9/e p790; Bailey 26/e p919-920, 25/e p940)*

Axillary-Subclavian Vein Thromboses (ASVT)

- **Upper extremity DVT** is **much less common** than its lower extremity counterpart
- It is a **serious problem**; **pulmonary embolism occurs in up to one third** of all patients with an **upper extremity DVT**[Q].
- Upper extremity DVT refers to **thrombosis of** the **axillary** or **subclavian veins**[Q].
- ASVT are classified into two forms.

Primary ASVT	Secondary ASVT
• Less common • **No clear cause for** the **thrombosis** is **readily identifiable** at initial evaluation[Q]. • **History of performing prolonged, repetitive motion activities**[Q], which results in **damage to** the **subclavian vein**, usually where it passes between the **head of** the **clavicle** and **1st rib**[Q]. • Also known as **venous thoracic outlet syndrome, effort thrombosis,** and **Paget-Schroetter syndrome**[Q].	• **More common**[Q] • Associated with an **easily identified cause** such as an **indwelling catheter** or a **hypercoagulable state**[Q]. • Over **30% of patients** with **tunneled subclavian vein access devices** develop **ASVT**[Q].

Clinical Features

- A patient with ASVT **may be asymptomatic** or may present with **varying degrees of upper extremity edema** and **tenderness**[Q].
- **Classic findings**: **Unilateral swelling, pain, extremity discomfort**, **erythema**, and a **palpable cord**[Q].

Diagnosis

- **Duplex ultrasonography confirms** the **diagnosis**[Q].

Treatment

- **Anticoagulation therapy** should **be initiated** once **ASVT** is **diagnosed to prevent PE** and **decrease symptoms**[Q].

> - Patients presenting with **acute symptomatic primary ASVT** may be candidates for **catheter-directed thrombolytic therapy**[Q].

- **Adjuvant procedures** after thrombolytic therapy may include **cervical** or **first rib resection** for **thoracic outlet abnormalities**, **surgical venous reconstruction**, and **balloon angioplasty** for **residual venous stenosis**[Q].

82. Ans. a. Prominent thoraco epigastric vein *(Ref: BDC 4/e vol II/197)*

- **Thoracoepigastric veins** are **important connection between** the **veins of upper and lower limbs** and these get **prominent in IVC obstruction**[Q].

83. Ans. d. 200-300 mmHg *(Ref: Bailey 25/e p925)*

- **On standing**, the **arterial blood pressure** at the **ankle** rises by **80-100 mm Hg**[Q].
- The **pressure within** the **calf compartment rises** to **200-300 mm Hg**[Q] **during walking**, which is more than enough to propel the blood in the direction of heart.

84. Ans. b. Related to the use of venous filling after emptying a length of vein

Harvey's Sign
• Related to the use of venous filling after emptying a length of vein • **Delayed venous refilling** is called **Harvey's Sign**

85. Ans. d. Left iliac vein compression

MAY-THURNER SYNDROME/COCKETT SYNDROME/ILIOCAVAL/ILIAC VEIN COMPRESSION SYNDROME.

- Occurs due to compression of left iliac vein by overriding right iliac artery.
- It result in left iliofemoral deep vein thrombosis.

86. Ans. a. Sitting *(Ref: ncbi.nlm.nih.gov/pmc/articles/PMC 2580000)*

- *Venous air embolism is a potential hazard whenever the operative site is above the level of patients heart.*
- *The 'sitting' position and its modification "beach chair" positions are associated with a greater incidence of venous air embolism.*

CHAPTER 28

Lymphatic System

MULTIPLE CHOICE QUESTIONS

LYMPHEDEMA

1. True about primary lymphedema: *(PGI Nov 2010)*
a. Lymphangiosarcoma may occur
b. Associated with Milroy's disease
c. Onset between 2-35 years indicates lymphedema tarda
d. Onset >35 years indicates praecox variety
e. Prevalence is 2%

2. Which of the following is not an operation of congenital lymphedema? *(MHPGMCET 2009)*
a. Homan's operation
b. Charles's operation
c. de Quervain's cross red operation
d. Sistrunk's operation

3. In Neibulowitz surgery what is done?
a. Skin bridge *(MHSSMCET 2006, 2008)*
b. Lymph node with vein anastomosis
c. Ileal mucosal patch
d. All of the above

4. Most common type of primary lymphedema is: *(DNB 2010)*
a. Lymphedema congenita b. Lymphedema precox
c. Lymphedema tarda d. None

5. In India, what is the most common cause of unilateral lymphedema of lower limb? *(UPSC 2007)*
a. Lymphedema trada
b. Carcinoma of penis with metastatic nodes
c. Filariasis
d. Tubercular lymphadenopathy

6. Hydrocele and edema in foot occur in: *(PGI Nov 2011)*
a. W. bancrofti b. B. malayi
c. B. timori d. Oncocerca volulus
e. Guinea worm

7. Chronic lymphedema of limb is predisposed to all of the following except: *(All India 2004)*
a. Thickening of the skin
b. Recurrent soft tissue infections
c. Marjolin's ulcer
d. Sarcoma

8. Lymphovenous anastomosis is done for: *(PGI Dec 97)*
a. Filarial lymphedema b. Lymphoid cyst
c. Cystic hygroma d. Malignant lymphedema

9. Commonest cause of unilateral pedal edema in India is: *(All India 90)*
a. Filariasis b. Post traumatic
c. Post irradiation d. Milroy's disease

10. All are true about congenital lymphedema except: *(All India 91)*
A. It is bilateral
b. Involve lower limb
c. Almost always manifests before puberty
d. Acute lymphangitis may occur

11. The commonest cause for lymphedema of upper limb is: *(All India 91, 92)*
a. Filariasis
b. Congenital
c. Neck surgery
d. Post mastectomy irradiation

12. Milroy's disease is: *(JIPMER 92)*
a. Edema due to filariasis
b. Post cellulitic lymphedema
c. Congenital lymphedema
d. Lymphedema following surgery

13. Most common bacterial infection in lymphedema is: *(DNB 2010)*
a. Staphylococcus b. Streptococcus
c. E. coli d. Pseudomonas

14. Lymphangiography of the leg is performed by:
a. An injection of sodium diatrizoate (Hypaque) subcutaneously between the toes
b. Injection sodium diatrizoate retrogradely under pressure into a small vein on the dorsum of the foot
c. Dissecting lymphatics through an incision on the dorsum of the foot
d. The use of an infusion pump

15. Finding the cause of unilateral lymphedema of the leg includes: *(JIPMER 78, 79, PGI 85)*
a. Taking a family history
b. Looking for chronic infection in the foot
c. Looking for early malignant disease of the testis
d. Looking for filariasis
e. Performing a Casoni's test

16. Treatment of acute lymphangitis requires:
a. Antibiotic and rest *(JIPMER 81, AMC 84)*
b. Immediate lymphangiography
c. Immediate multiple incisions
d. No special treatment

17. Grade I lymphedema means: *(JIPMER 2000)*
a. Pitting edema upto the ankle
b. Pitting edema upto the knee
c. Non-pitting edema
d. Edema disappearing after overnight rest

18. Chronically lymphedematous limb is predisposed to all of the following except: *(All India 2004)*
a. Thickening of the skin
b. Recurrent soft tissue infections
c. Marjolin's ulcer
d. Sarcoma

LYMPHOMA

19. Popcorn type of Reed-Sternberg cell is seen in the following type of Hodgkin's lymphoma: *(COMEDK 2007)*
a. Lymphocyte rich

b. Mixed cellularity
c. Lymphocyte predominance
d. Lymphocyte depletion

20. Carcinoma in which surgery is rarely indicated: *(PGI Nov 2009)*
a. Osteosarcoma
b. Wilm's tumor
c. Neuroblastoma
d. Rhabdomyosarcoma
e. Hodgkin's lymphoma

21. All are poor prognostic factor for Hodgkin's lymphoma except: *(PGI Nov 2011, Dec 2001)*
a. Young age
b. Involvement of stomach
c. Lymphocyte depletion
d. Extranodal metastasis
e. Large mediastinal mass

22. Commonest presentation of Hodgkin's lymphoma is: *(All India 99)*
a. Painless enlargement of lymph node
B. Pruritus
c. Fever
d. Leuocytosis

23. The most common site of enlargement of the lymph nodes in Hodgkin's lymphoma is: *(All India 95)*
a. Mediastinal b. Axillary
c. Cervical d. Abdominal

24. Malignant cell in Hodgkin's lymphoma is: *(AIIMS 85)*
a. Reed Sternberg cell b. Lymphocytes
c. Histiocyte d. Reticulum cells

25. Total dose of radiation in Hodgkin's disease is: *(JIPMER 95)*
a. 500-1000 rad b. 1000-2000 rad
c. 3000-5000 rad d. 5000-7000 rad

26. Diagnosis of Hodgkin's disease is confirmed by *(PGI 97)*
a. CT scan b. Bone marrow biopsy
c. Lymph node biopsy d. Lymphangiography

MISCELLANEOUS

27. A 45-years old man presents with progressive cervical lymph nodes enlargement, since 3 months: most diagnostic investigation is: *(All India 2001, 91)*
a. X-ray soft tissue b. FNAC
c. Lymph node biopsy c. None of the above

28. True about lymphangioma: *(PGI June 2003)*
a. It is a malignant tumor
b. It is a congenital sequestration of lymphatic channel
c. Cystic hygroma is a lymphangioma
d. Laser excision is done
e. Sclerotherapy is common done

29. True about lymphangioma is:
a. Common in puberty
b. Respond in low doses to radiotherapy
c. Lymphangioma progress slowly and may invade local tissue
d. Predisposes to cancer

30. The most common site of lymphangiosarcoma is:
a. Liver *(UPSC 2004)*
b. Spleen
c. Post-mastectomy edema of arm
d. Retroperitoneum

31. Lymphangiosarcoma occurs in: *(DNB 2010)*
a. Lymphangiomas b. Lymphomas
c. Lymphedema d. Serous cavity tumour

32. Investigation of choice in detecting small para-aortic lymph node is: *(JIPMER 92)*
a. Ultra sound scan b. CT scan
c. Lymphangiography d. Arteriography

33. In HIV infection, diffuse lymphadenopathy in a person who is clinically well is usually a sign of which of the following? *(COMEDK 2004)*
a. Lymphoma
b. Kaposi's sarcoma
c. Tuberculosis
d. Persistent generalized lymphadenopathy (PGL)

34. Necrotizing lymphadenitis is characteristically seen in: *(All India 2011)*
a. Kimura disease
b. Kikuchi disease
c. Hodgkin's disease
d. Castleman disease

35. Lethal midline granuloma is synonym of: *(DNB 2007)*
a. Wagner's granulomatosis
b. Extra nodal NK cell/T cell lymphoma nasal type
c. Syphilis of nasal septum
d. Tuberculosis of nasal septum

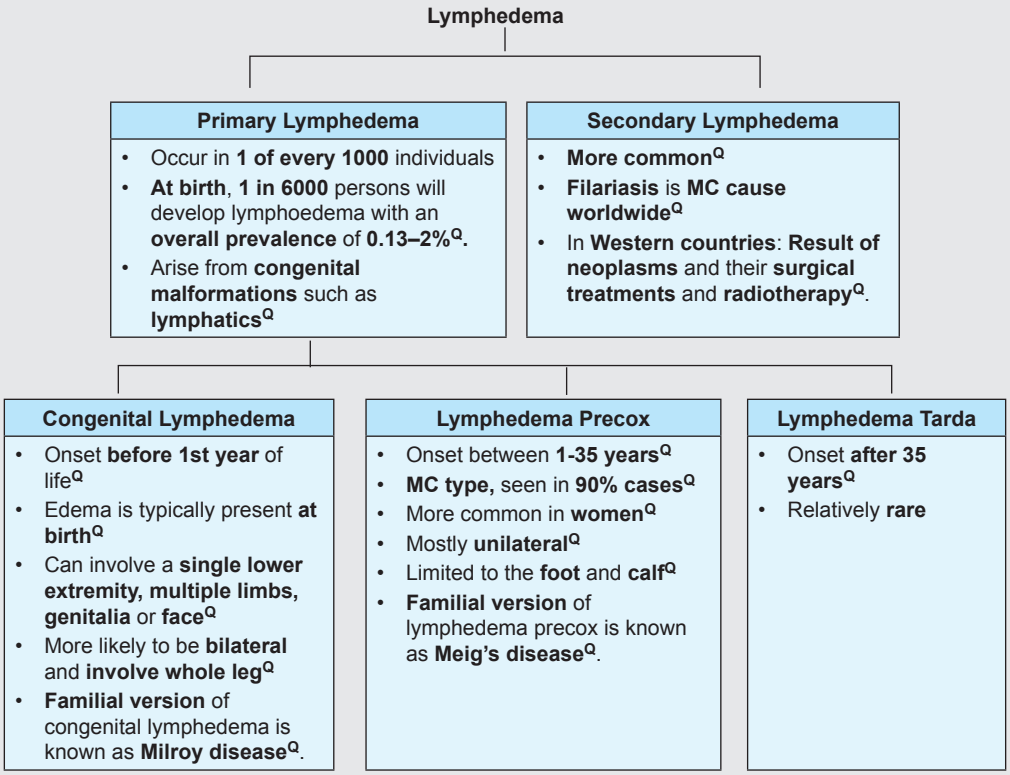
EXPLANATIONS

LYMPHEDEMA

1. **Ans. a Lymphangiosarcoma may occur, b. Associated with Milroy's disease, e. Prevalence is 2%**
(Ref: Sabiston 19/e p1820-1824; Schwartz 10/e p934-936, 1879-1880, 9/e p795-798; Bailey 26/e p928-930, 25/e p945-952)

Primary Lymphedema is uncommon, occurs in 1 of every 1000 individuals. At birth, 1 in 6000 persons will develop lymphoedema with an overall prevalence of 0.13–2%.

Lymphangiosarcoma is a rare tumor that develops as a complication of long standing (>10 years) lymphedema.



2. **Ans. c. de Quervain's cross red operation**
(Ref: Sabiston 19/e p1822-1824; Schwartz 10/e p934-936, 1879-1880, 9/e p797-798; Bailey 26/e p934-938, 25/e p954-958)

Treatment of Lymphoedema

- **Most** (95%) of patients can be **managed non-operatively**Q
- **Mainstay of treatment** is **nonsurgical measures:**
  - Use of **external compressive garments** and **devices**Q
  - **Limb elevation**Q
  - **Antibiotics** for episodes of cellulitisQ
  - Specialized complex **physical therapy**Q

  - **Efficacy** of **surgical options** is **generally poor**, and these are **reserved for** cases in which **aggressive nonsurgical measures** have **failed**Q.

- **Surgical treatment** may be considered in cases of **severe functional impairment**, **recurrent lymphangitis** or **severe pain** despite medical therapyQ.

Surgical Treatment of Lymphedema

Reconstructive Operations	Excisional Operations
• Indicated in patients with **proximal** (either primary or secondary) **obstruction** of the extremity, **lymphatic obstruction**, **dilated lymphatics distal to obstruction**[Q]. • **Bypass procedures:** – Omental pedicle – **Skin bridge (Gillies**[Q]**)** – Anastomosing **lymph nodes** to **veins (Neibulowitz**[Q]**)** – **Ileal mucosal patch (Kinmonth**[Q]**)** – Direct lymphovenous anastomosis with the aid of operating microscope	• Only viable option for patients **without residual lymphatics** of **adequate size** for reconstructive procedures • **Sistrunk**[Q]**:** – A **wedge of skin** and **subcutaneous tissue** is **excised** and wound **closed primarily**[Q] – **Most commonly carried out to reduce girth** of the thigh[Q]. • **Kontoleon's** or **Homan's**[Q]**:** – **Staged subcutaneous excision**[Q] underneath flaps • **Thompson**[Q]**:** – **Denuded skin flap** is **sutured to deep fascia** and buried beneath the second skin flap (‘**buried dermal flap’**[Q]) • **Charles Procedure**[Q]**:** – In **severe lymphedema** with **unhealthy** and **infected skin**[Q] – Involves **complete** and **circumferential excision** of **skin, subcutaneous tissue** and **deep fascia** of the involved leg and dorsum of the foot[Q].

3. **Ans. b. Lymph node with vein anastomosis**
4. **Ans. b. Lymphedema precox** 5. **Ans. c. Filariasis**
6. **Ans. a. W. bancrofti, b. B. malayi, c. B. timori** *(Ref: Sabiston 19/e p1820-1824; Schwartz 10/e p934,1879, 9/e p796-798; Bailey 26/e p930-931, 25/e p950-952)*

Secondary Lymphedema

- **Secondary lymphedema** is **far more common** than primary lymphedema[Q].
- Secondary lymphedema **develops as a result of lymphatic obstruction** or **disruption**[Q].
- **Axillary node dissection** leading to **lymphedema of the arm** is the **most common cause** of secondary lymphedema **in the United States**[Q].
- Other causes of secondary lymphedema include **radiation therapy, trauma, infection**, and **malignancy**[Q].
- **Globally, filariasis** (caused by **Wucheria bancrofti, Brugia malayi**, and **Brugia timori**) is the **most common cause** of **secondary lymphedema**[Q]

Filariasis

- **Filariasis**: **MC cause of lymphedema worldwide**[Q]
- Particularly **prevalent in Africa, India** and **South America**[Q] (affecting 5-10% of the population)
- **Viviparous nematode Wucheria bancrofti**, whose **only host is man**[Q], is responsible for **90% of cases** and is **spread by** the **mosquito (Culex)**[Q].
- Disease is associated with **poor sanitation**[Q].

Pathogenesis

- Parasite **enters lymphatics from** the **blood** and **lodges in lymph nodes**, where it **causes fibrosis** and **obstruction**, due partly to direct physical damage and partly to the immune response of the host[Q].
- **Proximal lymphatics** become **grossly dilated** with adult parasites[Q].
- The degree of edema is often massive **elephantiasis**[Q]**.**

Clinical Features

- **Acute: Fever,** headache, malaise, **inguinal** and **axillary lymphadenitis, lymphangitis,** cellulitis, abscess formation and ulceration, funiculo-epididymo-orchitis[Q]
- **Chronic: Lymphedema of legs** (arm, breast), **hydrocele**[Q], abdominal lymphatic varices, chyluria and lymphuria[Q]**.**

Diagnosis

- **Microfilariae enter the blood at night** and can be identified on a **blood smear,** in a centrifuged specimen of **urine** or in **lymph** itself[Q].
- A **complement fixation test**[Q] is also available and is positive in present or past infection. Eosinophilia is usually present.

Treatment

- **Diethylcarbamazine destroys** the **parasites**[Q] but does not reverse the lymphatic changes.
- Once the infection has been cleared, treatment is as for primary lymphoedema.

7. **Ans. c. Marjolin's ulcer** *(Ref: Sabiston 19/e p1820; Schwartz 10/e p934-936, 1879-1880, 9/e p797; Bailey 26/e p926-927, 25/e p947-948)*

Complications of Lymphedema

- **Limb swelling**: Cause discomfort and aching[Q]
- **Infections: Recurrent bacterial** and **fungal infections**, **recurrent cellulitis** or **lymphangitis** leading to **skin thickening**[Q]
- **Risk of malignancy**: **Lymphangiosarcoma (Stewart–Treves' syndrome**[Q]**)**

Malignancies associated with lymphedema	
• **Lymphangiosarcoma**[Q] **(Stewart–Treve's syndrome)** • **Kaposi's sarcoma** (HIV) • Squamous cell carcinoma • Liposarcoma	• Malignant melanoma • Malignant fibrous histiocytoma • Basal cell carcinoma • Lymphoma

Signs in Chronic Lymphedema	
Buffalo hump[Q]	• **Contour of** the **ankle is lost** through infilling of the submalleolar depressions, a '**buffalo hump**' forms **on the dorsum of the foot**
Square toes[Q]	• **Toes appear 'square'** because of **confinement of footwear**
Stemmer's sign[Q]	• **Skin on** the **dorsum** of the toes **cannot be pinched** because of **subcutaneous fibrosis**

8. **Ans. a. Filarial lymphedema**
9. **Ans. a. Filariasis**
10. **Ans. None**
11. **Ans. a. Filariasis**
12. **Ans. c. Congenital lymphedema**
13. **Ans. b. Streptococcus**

The **most common complication** of both **primary** and **secondary lymphedema is erysipelas** (**Acute Streptococcus bacterial infection** of the deep epidermis with lymphatic spread). Cellulites may occur concurrently in lymphedema because of **pooling of protein rich lymph fluid** makes it easier for the patient to develop an infection.

14. **Ans. c. Dissecting lymphatics through an incision on the dorsum of the foot**
(Ref: Sabiston 19/e p1822; Schwartz 10/e p935, 9/e p797; Bailey 26/e p933, 25/e p954)

Direct-contrast lymphangiography provides the **finest details** of the lymphatic anatomy. However, it is an invasive study that **involves exposure** and **cannulation of lymphatics** at the **dorsum of the forefoot**, followed by **slow injection of contrast medium** (ethiodized oil). The procedure is tedious, the **cannulation often necessitates aid of magnification optics** (frequently an operating microscope is needed), and the dissection requires some form of anesthetic. **After cannulation of a superficial lymph vessel, contrast material is slowly injected** into the **lymphatic system.**

Lymphangiography

Direct Lymphangiography	Indirect Lymphangiography
• Involves the **injection of contrast medium** (**Isosulfan blue**[Q]) into a **peripheral lymphatic vessel** and radiographic visualization of the vessels and nodes[Q]. • **Gold standard for** showing **structural abnormalities** of **larger lymphatics** and **nodes**[Q] • **Technically difficult**, **unpleasant** for the patient • May cause **lymphatic injury** • **Reserved for preoperative evaluation** of **megalymphatics** being considered for **bypass** or **fistula ligation**[Q].	• Indirect lymphangiography involves the **intradermal injection** of **water-soluble, non-ionic contrast** into **a web space**, from where it is taken up by lymphatics and then **followed radiographically**[Q]. • It will **show distal lymphatics** but **not normally proximal lymphatics** and **nodes**[Q].

15. **Ans. a. Taking a family history, b. Looking for chronic infection in the foot**
16. **Ans. a. Antibiotic and rest**
17. **Ans. d. Edema disappearing after overnight rest** *(Ref: Sabiston 19/e p1821; Bailey 26/e p926, 25/e p947)*

Brunner's Clinical Classification of Lymphedema	
Grade	**Clinical features**
Subclinical (latent)	**Excess interstitial fluid** and **histological abnormalities** in **lymphatics** and **lymph nodes, no clinically apparent lymphedema**[Q]
I	**Pitting edema**, largely or completely **disappears on elevation** and **bed rest**[Q]
II	**Non-pitting edema**, does not significantly reduce upon elevation[Q]
III	Edema associated with **irreversible skin changes**, i.e. **fibrosis, papillae**[Q]

18. Ans. c. Marjolin's ulcer

LYMPHOMA

19. Ans. c. Lymphocyte predominance *(Ref: Harrison 18/e p933-935)*

Hodgkin's Lymphoma

- Classified into four types according to **Rye's classification**:
  - **Nodular sclerosis (30-60%)**[Q]
  - Lymphocyte predominance (<10%)
  - **Mixed cellularity (20-40%)**
  - Lymphocyte depleted (<10%)

- **Prognosis**: **Lymphocytic predominant**[Q] **> Nodular sclerosis > Mixed cellularity > Lymphocyte depletion**
- **Nodular sclerosis** is **MC type all over the world**[Q] whereas **mixed cellularity** is **MC in India**[Q]
- **Nodular sclerosis** is **MC in females** and **mediastinal involvement**[Q] is particularly common.

Subtypes	Reed Sternberg cells variant
Nodular sclerosis	• **Lacunar cells**[Q]
Mixed cellularity	• **Classic Reed Sternberg cells**[Q]
Lymphocyte predominance	• **Popcorn cell**[Q]
Lymphocyte depleted	• **Reticular variant**[Q] (more cellular)

20. Ans. e. Hodgkin's lymphoma *(Ref: Harrison 18/e p933-935)*

- Treatment of **Hodgkin's disease** includes **multiagent combination chemotherapy,** either alone or with **low dose radiation**[Q].
- **Osteosarcoma:** Successful treatment of osteosarcoma requires **multiagent chemotherapy** with **complete surgical resection**.
- **Wilm's Tumor:** Immediate treatment is **nephroureterectomy.** Most of the times all the three modalities of treatment i.e. **surgery, chemotherapy** and **radiotherapy** may be required.
- **Rhabdomyosarcoma:** The optimal therapy of rhabdomyosarcoma involves **multimodality approach**, which includes **chemotherapy, surgery** and **radiotherapy**.
- **Neuroblastoma:** Three main modalities of treatment for neuroblastoma include **chemotherapy, surgery** and **radiation.**

21. Ans. a. Young age *(Ref: Harrison 18th/933-935; Anderson Manual of Medical Oncology 2007/248-258)*

Adverse Prognostic Factors for Hodgkin's Lymphoma

- **Advanced age**[Q]
- **Mixed cellularity** or **lymphocyte**[Q] **depletion** histologic type[Q]
- **'B' symptoms**[Q]
- **Large number** of **involved nodal regions**[Q]
- **Anemia**[Q]
- **Male** gender[Q]
- **Large mediastinal mass**[Q]
- **Raised ESR**[Q]
- **Low serum albumin**[Q]

22. Ans. a. Painless enlargement of lymph node *(Ref: Harrison 18/e p933-935)*

Hodgkin's Lymphoma

- **Most patients** present with **palpable lymphadenopathy** that is **non-tender**[Q].
- In most patients, these lymph nodes are in the neck, supraclavicular area and axilla.
- **More than half of the patients** will have **mediastinal adenopathy**[Q] at diagnosis and this is sometimes initial manifestation.
- **Diagnosis** is **confirmed by LN biopsy**[Q].

23. Ans. a. Mediastinal *(Ref: Harrison 18/e p934)*

- In **about 50% of patients** who have both **Hodgkin's** and **Non-Hodgkin's lymphoma**, the **mediastinum** may be the **primary site**[Q].

24. Ans. a. Reed Sternberg cell **25. Ans. c. 3000-5000 rad** *(Ref: Harrison 18/e p934-935)*

Moderate **doses** of **30-40 Gray** are usually quite sufficient to take care of localized Hodgkin's disease.

Treatment of Hodgkin's Disease

Stage I (A) and Stage II (A)	Stage III, Stage IV and patients with group 'B' symptoms
• **Treatment of choice** is **brief** course of **chemotherapy** followed by **radiotherapy** to sites of node involvement[Q].	• Cornerstone of treatment is combination chemotherapy. • Chemotherapy with **ABVD** is **first line treatment** and **superior to MOPP**[Q].

ABVD (**A**driamycin, **B**leomycin, **V**inblastine, **D**acarbazine)	• **First line treatment**[Q] • **Most popular regimen** in **United States**[Q] • **More effective** than MOPP[Q] • **Lesser incidence** of **sterility** and **secondary malignancies** than MOPP[Q]
MOPP (**M**echlorethamine, **V**incristine, **P**rocarbazine, **P**rednisone)	• **Less effective** and **more toxic**[Q] • **Higher incidence** of **sterility** and **secondary malignancies** than ABVD[Q]

26. Ans. c. Lymph node biopsy

MISCELLANEOUS

27. Ans. c. Lymph node biopsy *(Ref: Harrison 18th/467)*

Harrison says "In cases of **lymphadenopathy**, if the patient history and physical findings are **suggestive of malignancy**, then a **prompt lymph node biopsy** should be done. FNAC is not of much use, as it does not provide enough tissue to reach a diagnosis."

28. Ans. b. It is a congenital sequestration of lymphatic channel, c. Cystic hygroma is a lymphangioma
(Ref: Sabiston 19/e p1825; Schwartz 10/e p575, 598, 1602-1603, 9/e p1667; Bailey 26/e p927, 25/e p947-948)

Lymphangioma

- Lymphangiomas are the **lymphatic analogue of** the **hemangiomas** of blood vessels.
- **Divided into two types**:
  - Simple or **capillary lymphangioma**
  - **Cavernous lymphangioma** or **cystic hygroma**

Clinical Features

- Most of these **benign tumors** are **present at birth**, and **90%** of them can be **identified by the end of the first year of life.**[Q]
- **Site of cavernous lymphangiomas:** Mainly in **neck** or **axilla**[Q] (rarely in the retroperitoneum)
- **Site of simple capillary lymphangiomas: Subcutaneously** in the **head** and **neck** region and **axilla**.

> - Represent **isolated** and **sequestered segments of** the **lymphatic system**[Q] that retain the ability to produce lymph.
> - As the **volume of lymph inside** the **cystic tumor increases**, they **grow larger** within the surrounding tissues.

Treatment

- **Surgical excision**[Q], taking care to preserve all normal surrounding infiltrated structures.

29. Ans. c. Lymphangioma progress slowly and may invade local tissue

30. Ans. c. Post mastectomy edema of arm *(Ref: Sabiston 19/e p1825; Schwartz 10/e p493, 776, 1468, 1470, 9/e p1285; Bailey 26/e p931, 25/e p845)*

Angiosarcoma (Lymphangiosarcoma)

- Rare tumor that develops as a **complication** of **long-standing** (>10 years) **lymphoedema**[Q].
- Stewart and Treves described **lymphangiosarcoma** of the **upper extremity** in women with **ipsilateral lymphedema** after **radical mastectomy**. (**Stewart-Treves Syndrome**)[Q]

Clinical Features

- **Acute worsening** of **edema**[Q]
- Appearance of **sub-cutaneous nodules** with propensity towards **hemorrhage and ulceration**[Q]

Treatment

- Pre-operative **chemotherapy** and **radiotherapy** followed by **surgical excision (radical amputation)**[Q]
- Associated with **poor prognosis.**

31. **Ans. c. Lymphedema**

32. **Ans. b. CT scan** *(Ref: Sutton 7/e p515)*

- **Investigation of choice** in detecting **small para-aortic lymph node: CT scan**[Q]

33. **Ans. d. Persistent generalized lymphadenopathy (PGL)** *(Ref: Harrison 18/e p466, 1525)*

Persistent Generalized Lymphadenopathy (PGL)

- **HIV patients** develop **PGL** as an **early clinical manifestation** of HIV infection[Q].
- PGL is defined as presence of **>1 LN** in **two or three extra-inguinal sites** for **>3 months without an obvious cause**[Q].
- Enlargement is due to **follicular hyperplasia**[Q].

34. **Ans. b. Kikuchi disease** *(Ref: Nelson 18/e p2094)*

Kikuchi Disease

- Rare **subacute necrotizing lymphadenitis**[Q]
- Most commonly seen in **children** and **young adults** of **Asian heritage**[Q]
- **Etiology** is **unknown**

Pathology

- **Necrotizing** and **crescenteric plasmacytoid monocytes**[Q]
- Absence of neutrophils and eosinophils

Clinical Features

- **Most characteristic feature: Painful tender lymphadenopathy**[Q], most commonly **involving cervical LN**
- Less commonly involved LNs include axillary and inguinal LNs
- Deep LNs and extranodal sites are rarely involved
- **Lymphadenopathy** is associated with **fever** and **systemic signs**

Prognosis

- **Self-limiting disease, resolves spontaneously** within **6 months**[Q]

35. **Ans. b. Extranodal NK cell/T cell lymphoma nasal type**

NOTES

NOTES

CHAPTER 29

Thorax and Lung

MULTIPLE CHOICE QUESTIONS

MEDIASTINAL TUMORS

1. Middle mediastinal masses include all the following except: *(COMEDK 2004)*
a. Bronchogenic cyst
b. Ascending aortic aneurysm
c. Pericardial cyst
d. Ganglioneuroma

2. Middle mediastinal masses include all the following except: *(COMEDK 2005)*
a. Bronchogenic cyst
b. Lymphoma
c. Pericardial cyst
d. Ganglioneuroma

3. Following are the tumors of posterior mediastinum except: *(COMEDK 2006)*
a. Neuroblastoma
b. Ganglioneuroma
c. Paravertebral abscess
d. Thymic tumor

4. The commonest anterior mediastinal tumors is: *(COMEDK 2008)*
a. Aneurysm of descending aorta
b. Neurogenic tumour
c. Thymoma
d. Bronchogenic cyst

5. Common tumor of posterior mediastinum are: *(PGI Nov 2009)*
a. Lymphoma
b. Neuroblastoma
c. Neurogenic tumors
d. Thymoma
e. Bronchogenic cyst

6. D/D of anterior mediastinal mass includes: *(PGI May 2011)*
a. Teratoma
b. Thymoma
c. Lymphoma
d. Neurogenic tumor
e. Parathyroid carcinoma

7. Lymphoma most commonly affects which compartment of the mediastinum? *(MHPGMCET 2006)*
a. Anterior
b. Middle
c. Posterior
d. Inferior

8. Most common middle mediastinal tumor: *(MHSSMCET 2005)*
a. Thymoma
b. Lymphoma
c. Aneurysm
d. Mesenchymal tumor

9. The most common mediastinal tumor: *(MHSSMCET 2008)*
a. Thymoma
b. Lymphoma
c. Neurofibroma
d. Bronchogenic cyst

10. In thymoma, all are seen except: *(AIIMS June 2001)*
a. Hypogammaglobulinemia
b. Hyperalbuminemia
c. Red cell aplasia
d. Myasthenia gravis

11. Not a posterior mediastinal tumor: *(AIIMS Nov 98)*
a. Neurofibroma
b. Lymphoma
c. Thymoma
d. Gastroenteric cyst

12. Posterior mediastinal tumors: *(PGI June 2003)*
a. Neuroblastoma
b. Bronchogenic cyst
c. Neuroenteric cyst
d. Lymphoma
e. Anterior thoracic meningioma

13. Majority of lung cysts occur in: *(AIIMS Nov 94)*
a. Mediastinum
b. Near carina
c. Base of the lung
d. Peribronchial tissue

14. Which tumor among the following is not found in anterior mediastinum? *(AIIMS Nov 95)*
a. Retrosternal goitre
b. Thymoma
c. Teratomatous mass
d. Neurogenic tumour

15. Most common tumor in the posterior mediastinum is: *(DNB 2005, 2000, All India 2008, DPG 2008)*
a. Neurofibroma
b. Teratoma
c. Lymphoma
d. Bronchogenic cyst

16. Commonest posterior mediastinal tumour is: *(UPSC 85, AIIMS 87, Kerala 87)*
a. Lung cyst
b. Neurofibroma
c. Dermoid
d. Thyroid
e. Thymic tumour

17. Thymectomy causes: *(TN 98)*
a. Failure of rejection of transplanted organs
b. Myasthenia gravis
c. Autoimmune disorders
d. None of the above

18. The most common primary tumor of mediastinum:
a. Lymphoma
b. Teratoma
c. Neurogenic tumor
d. Thymoma

19. Tumors of anterior mediastinum include the following except: *(UPSC 2007)*
a. Thymoma
b. Lymphoma
c. Germ cell tumour
d. Schwannoma

PLEURAL EFFUSION

20. Most common site for putting chest drain in case of pleural effusion: *(AIIMS June 2000, All India 2002)*
a. 2nd intercostal space mid-clavicular line
b. 7th intercostal space mid-axillary line
c. 5th intercostal space mid clavicular line
d. 5th intercostal space just lateral to vertebral column

21. Meig's syndrome consist of the following except: *(Karnataka 94)*
a. Ascites
b. Hydrothorax
c. Benign ovarian tumor
d. Malignant ovarian tumor

22. Pseudochylous pleural effusion is most often seen in: *(AIIMS 78, PGI 81)*
a. T.B.
b. Lymphoma
c. CA lung
d. Filariasis

23. A rapidly filling hemorrhagic pleural effusion is suggestive of: *(COMEDK 2004)*
a. Pneumococcal infection
b. Tuberculosis
c. Bronchiectasis
d. Bronchogenic carcinoma

PNEUMOTHORAX

24. Spontaneous pneumothorax is commonly seen in: *(PGI June 2002)*
a. Smokers b. Young females
c. Old age d. Short statured men

25. Which of the following is a cause of unilateral hyperluscent lung on chest radiography? *(COMEDK 2009)*
a. Poland syndrome b. Asthma
c. Acute bronchiolitis d. Pleural effusion

26. Pneumothorax of what size generally needs operative treatment? *(MHSSMCET 2010)*
a. >10% b. >20%
c. >30% d. >40

27. In a patient with one episode of spontaneous pneumothorax, which is advised? *(Jharkhand 2003)*
a. Stop diving b. Stop smoking
c. Stop flying d. All

28. For open pneumothorax, which of the following is treatment of choice? *(AIIMS June 97)*
a. IPPV
b. ICD with underwater seal
c. Thoracostomy and close the rent
d. Wait and watch

29. A case of spontaneous pneumothorax comes to you. What will be earliest treatment of choice? *(AIIMS June 97)*
a. IPPV b. Needle aspiration
c. ICD d. Wait and watch

30. Spontaneous pneumothorax exceeding ….. % of chest cavity should have a chest tube inserted: *(AIIMS 84)*
a. 10 b. 25
c. 45 d. 60

31. In pneumothorax due to blunt injury, treatment of choice is: *(AIIMS 92)*
a. Observation b. Pneumonectomy
c. Thoracotomy d. Intercostal drainage

32. A patient presents with sudden onset of breath lessness after subclavian vein cannulation. On examination, breath sounds are absent while the chest is hyper-resonant on percussion on one side. Most likely cause is: *(All India 2012)*
a. Iatrogenic pnumothorax
b. Subclavian vein air embolus
c. Malposition of cannula
d. Cardiac arrhythmia

33. While inserting a central venous catheter, a patient develops respiratory distress. The most likely cause is: *(All India 2002)*
a. Hemothorax b. Pneumothorax
c. Pleural effusion d. Hypovolemia

34. All of the following are characteristic features of primary spontaneous pneumothorax except: *(AIIMS 92)*
a. Male gender b. Old age
c. Tall stature d. History smoking

35. Spontaneous pneumothorax is commonly seen in: *(PGI June 2002)*
a. Smokers b. Young females
c. Old age d. Short statured men

36. Which of the following statements about pneumothorax is true? *(AIIMS Dec 94)*
a. Breath sounds are increased
b. Percussion note is decreased
c. Always needs chest tube insertion
d. Often needs chest tube insertion

37. In left sided massive pneumothorax, ECG shows all except: *(AIIMS 94)*
a. Left axis deviation
b. Absent R wave
c. Peaked P wave
d. Precordial T wave inversion

38. Intrapleural pressure greater than atmospheric pressure is diagnostic of: *(MHPGMCET 2001)*
a. Valvular pneumothorax b. Closed pneumothorax
c. Open pneumothorax d. All

TENSION PNEUMOTHORAX

39. A 30-years old female comes acute breathlessness, neck vein distention, and absent breath sounds and mediastinal shift. Which of the following should be done immediately?
a. HRCT is the investigation of choice *(PGI June 2008)*
b. ABG analysis should be done
c. CXR
d. Large bore needle puncture of pleura

40. Tension pneumothorax due to fracture rib is treated by:
a. Strapping *(DPG 2011, PGI 96)*
b. Tube drainage
c. IPPV
d. Internal fixation with open reduction

41. Treatment of choice for tension pneumothorax is:
a. Immediate IC tube drainage *(SGPGI 2005)*
b. Continuous aspiration by needle
c. Intermittent aspiration by needle
d. Thoracotomy with repair of leakage

42. True regarding management of traumatic pneumothorax is
a. Immediate ICD tube insertion *(SGPGI 2005)*
b. CT-scan should be done to confirm pulmonary leak
c. Intermittent needle aspiration
d. Sealed

43. A patient after road traffic accident presented with tension pneumothorax. What is the first line of management?
a. Insert wide bore needle in 2nd intercostal space
b. Immediate chest X-ray *(AIIMS Nov 2013)*
c. CT scan
d. Emergency thoracotomy

44. Condition which builds within hemithorax resulting in collapsed lung, flattened diaphragm, contralateral mediastinal shift and compromised venous return to right side of heart is known as: *(MCI Sept 2007)*
a. Open pneumothorax
b. Flail chest
c. Massive pulmonary hemorrhage
d. Tension pneumothorax

45. Lung injury with bad prognosis is: *(DNB 2009)*
a. Open pneumothorax b. Closed pneumothorax
c. Tension pneumothorax d. All have same prognosis

46. What is the 1st thing to be done to a patient with tension pneumothorax? *(UPPG 96)*
a. Insertion of wide bore needle in the inter costal space
b. Water seal drainage
c. Leave the patient at rest for air to be absorbed
d. None

47. Tensions pneumothorax results in: *(ICS 98)*
a. Alkalosis b. Increased cardiac output
c. Decreased venous return d. All of the above

48. What is the emergent management of tension pneumothorax? *(AIIMS November 2014)*
a. Chest X-ray
b. Emergency room thoracotomy in unstable patients
c. Insert needle in 2nd intercostal space
d. Tube thoracostomy in 5th intercostal space

HEMOTHORAX

49. Decision regarding surgery in a case of hemothorax due to blunt trauma chest should be based on: *(All India 2008)*
a. Chest symptoms b. Hemodynamic status
c. Nature of chest tube output d. X-ray finding

50. The ideal treatment for hemothorax of blood loss greater than 500 ml/hour: *(PGI June 99)*
a. Wait and watch
b. Needle aspiration
c. Intercostal tube
d. Open thoracotomy with ligation of vessel

51. About hemothorax: *(PGI Dec 2002)*
a. Seen in choriocarcinoma
b. Supine posture is better than erect posture
c. Needle aspiration may be needed for diagnosis
d. Thoracotomy is always done

52. Excessive bleeding during hemothorax is caused usually by: *(AIIMS June 94)*
a. Vena cava b. Internal mammary artery
c. Heart d. Major artery

LUNG ABSCESS

53. A 80-years old male presented with lung abscess in left upper zone. Best treatment modality is: *(UPPG 2008)*
a. Antibiotics according to organisms
b. Surgical drainage
c. Tube thoracostomy
d. Wait and Watch

54. Management of a lung abscess refractory to prolonged antibiotic treatment includes all of the following except:
a. Lobectomy *(COMEDK 2004)*
b. Open drainage
c. Tube drainage
d. Intracavitary antibiotic instillation

55. Complication of empyema are all except: *(PGI Dec 99)*
a. Empyema necessitans b. Bronchopleural fistula
c. Osteomyelitis d. Pneumonia

56. Commonest cause of lung abscess: *(AIIMS Nov 96)*
a. Aspiration
b. Hematogenous spread from distant site
c. Direct contact
d. Lymphatic spread

57. Least common site of lung abscess is: *(PGI June 99)*
a. Left upper lobe b. Left lower lobe
c. Right upper lobe d. Right lower lobe

58. Most common cause of amoebic lung abscess is: *(AIIMS Nov 94)*
a. Direct extension from liver b. Hematogenous spread
c. Lymphatic spread d. By inhalation

59. Failure of adequate drainage in an empyema with a bronchopleural fistula is indicated by: *(JIPMER 81, AMC 85)*
a. Drainage less than 100 cc per day
b. Hemorrhagic drainage less than 100 cc per day
c. The development of haemoptysis
d. Continued productive cough with purulent material
e. All of the above

60. Most common cause of cold abscess of chest wall is: *(TN 95)*
a. Pott's spine b. TB abscesses of chest wall
c. TB of ribs d. Intercostal lymphadenitis

61. Empyema necessitans is defined as so when: *(UPSC 2002)*
a. Plural empyema is under pressure
b. Pleural empyema has ruptured into bronchus
c. Pleural empyema has ruptured into the pericardium
d. Pleural empyema is showing extension to the subcutaneous tissue

62. Empyema can be caused by the following parasites except: *(MHSSMCET 2008)*
a. E. granulosus b. Entamoeba coli
c. Paragonimus westermani d. Strongyloides stercoralis

PLEURAL COLLECTIONS

63. True about chylothorax: *(DPG 2007)*
a. Left side more common
b. Clear fluid
c. Immediate thoracotomy should be done
d. TOC is excision and ligation of thoracic duct

64. Chyluria is caused by all except: *(MCI Sept 2009)*
a. Pregnancy b. Childbirth
c. Filariasis d. Bile duct stones

SEQUESTRATION OF LUNGS

65. Intralobar sequestration of lungs takes its blood supply from: *(AIIMS Nov 94)*
a. Internal mammary artery
b. Descending abdominal aorta
c. Pulmonary artery
d. None of the above

66. Lung sequestration occurs most commonly seen in which lobe? *(AIIMS June 93)*
a. Apical b. Left posterior basal
c. Left porterosuperior d. Right lateral basal

67. All of the following statements regarding bronchial cysts are true except: *(MAHE 2005)*
a. Seen in mediastinum b. 50-70% occur in lung
c. Are commonly infected d. Multilocular

68. True about bronchogenic cyst: *(Punjab 2007)*
a. Most of them are located at base of lung
b. They arise from anomalous development of foregut
c. They usually communicate with lung
d. They are lined by pseudostratified epithelium

69. Intralobar sequestration of lung is commonest in the:
a. Apical segment of upper lobe *(JIPMER 81, UPSC 89)*
b. Medial segment of middle lobe
c. Lateral basal segment of lower lobe
d. Posterior basal segment of lower lobe

70. Extralobar bronchogenic cysts may communicate with the following except: *(JIPMER 80, AMU 89)*
a. Esophagus b. Stomach
c. Bronchus d. None of the above

71. Sequestrated lung is supplied most commonly by: *(Kerala 98)*
a. Bronchial arteries b. Descending aorta
c. Subclavian artery d. Intercostal arteries

72. Diagnosis of lung sequestration by: *(JIPMER 2000)*
a. CT b. Angiography
c. MRI d. X-ray

TRACHEOBRONCHIAL FOREIGN BODY

73. In erect posture, commonest site of foreign body in bronchus: *(AIIMS June 99)*
a. Right posterior basal b. Right anterior basal
c. Lateral basal d. Medial basal

74. Foreign body aspiration in supine position causes which of the following parts of the lung commonly to be affected? *(AIIMS June 2002)*
a. Apical left lobe
b. Apical lobe of right lung
c. Apical part of the lower lobe
d. Posterobasal segment of left lung

75. A foreign body completely obstructing the right main bronchus causes: *(PGI June 99)*
a. Decreased ventilation perfusion ratio
b. Increased ventilation in left lung
c. Perfusion doubles in right lung
d. Increased VP ratio in right lung

VATS

76. In Video assisted thoracoscooic surgery for better vision, the space in the operative field is created by: *(AIIMS June 2002)*
a. Self retaining retractor
b. CO2 insufflations
c. Collapse of ipsilateral lung
d. Rib spacing

77. VATS refers to: *(Orissa 2011)*
a. Vacuum assisted thoracic surgery
b. Video assisted thoracoscopic surgery
c. Video assisted transplant surgery
d. None of the above

THORACOTOMY

78. The following are indications for performing thoracotomy after blunt injury of the chest, except: *(UPSC 2008)*
a. 1000 ml drainage after placing an intercoastal tube
b. Continuous bleeding through intercoastal tube of more than 200 ml/hour for three or more hours
c. Cardiac tamponade
d. Rib fracture

79. Thoracotomy is indicated in all the following except:
a. Penetrating chest injuries *(MHPGMCET 2003)*
b. Rapidly accumulating hemothorax
c. Massive air leak
d. Pulmonary contusion

80. Surgical indication in the treatment of hemoptysis:
a. Profuse uncontrolled bleeding *(PGI Dec 2006)*
b. Bronchiectasis
c. Bronchial adenoma
d. Bronchial fistula

81. Muscle not cut in posterolateral thoracotomy is: *(PGI Dec 98)*
a. Serratus anterior b. Latissimus dorsi
c. Rhomboides major d. Pectoralis major

82. Which is not an indication of thoracotomy? *(AIIMS Nov 98)*
a. Massive pneumothorax
b. Pulmonary contusion
c. Bleeding more than 200 ml/hour in thoracotomy tube
d. Esophageal rupture

83. During emergency thoracotomy, the incision is made > 1 cm lateral to sternal margin to preserve: *(All India 2012)*
a. Intercoastal artery b. Superior epigastric artery
c. Internal mammary artery d. Intercostal vein

BENIGN LUNG TUMORS

84. The most common benign tumor of the lung is: *(COMEDK 2008)*
a. Hamartoma b. Alveolar adenoma
c. Teratoma d. Fibroma

85. Most common symptom of bronchial adenoma is:
a. Chest pain b. Cough *(All India 96)*
c. Recurrent hemoptysis d. Weight loss

86. True about bronchial adenoma: *(All India 98)*
a. 10-15% of all lung tumour b. Mostly malignant
c. Recurrent hemoptysis d. Peripherally located

87. The following is true about bronchial carcinoids:
a. Highly radiosensitive *(JIPMER 2011)*
b. Metastasis common
c. Carcinoid syndrome does not manifest
d. Commonly arises from terminal bronchioles

88. Blood stained sputum may be the only symptom in:
a. Bronchiectasis b. Carcinoma bronchus
c. Adenoma bronchus d. Pulmonary T.b. *(Kerala 90)*

MESOTHELIOMA

89. All are true regarding mesothelioma except?
a. Bilaterally symmetrical *(AIIMS May 2011)*
b. Associated with asbestos exposure
c. Histopathology shows biphasic pattern
d. Occurs in late middle age

90. Pleural mesothelioma is associated with: *(PGI Dec 2005)*
a. Asbestosis b. Berylliosis
c. Silicosis d. Baggasosis

91. In a patient of mesothelioma, one often finds:
a. Hypoglycemia *(PGI 79, 80, AIIMS 84)*
b. An association with asbestosis
c. Hemorrhagic pleural effusion
d. Clubbing of fingers
e. All of the above

SQUAMOUS CELL CARCINOMA

92. Cavity formation in bronchogenic carcinoma occurs in: *(AIIMS 89)*
a. Oat cell carcinoma b. Squamous cell carcinoma
c. Adenocarcinoma d. Brobchoalveolar

ADENOCARCINOMA

93. True statement about adenocarcinoma lung are:
a. Common in females *(PGI June 2005)*
b. Not associated with smoking
c. Central cavitation is a characteristic feature
d. Peripheral involvement is common
e. Upper lobe involvement is common

94. A patient presented with 1cm coin lesion over right upper lobe of lung on X-ray not suggestive of metastasis. FNAC revealed adenocarcinoma, no lymphadenopathy. Treatment is:
a. Surgery *(JIPMER 2010)*
b. Surgery + chemotherapy
c. Surgery + Radiotherapy
d. Surgery + chemo-radio therapy

95. What is true regarding adenocarcinoma lung? *(AIIMS Dec 94)*
a. Causes 50% of lung cancers
b. Unlikely histological variant in young patients
c. Associated with subcutaneous angiomyolipoma
d. Peripheral location

96. Commonest type of lung carcinoma in nonsmokers is: *(AIIMS Dec 94)*
a. Squamous cell carcinoma b. Adenocarcinoma
c. Alveolar cell carcinoma d. Small cell carcinoma

97. Lung to lung metastasis is seen in:
a. Adenocarcinoma of lung
b. Squamous cell carcinoma
c. Small cell carcinoma
d. Neuroendocrine tumor of lung

SMALL CELL CARCINOMA

98. Which of the following statements about small cell carcinoma is true? *(All India 2009)*
a. Bone metastasis is uncommon
b. Peripheral in location
c. Chemosensitive tumor
d. Paraneoplastic syndrome with PTH is common

99. Poorest prognosis in lung cancer is associated with: *(COMEDK 2005)*
a. Small cell carcinoma b. Adenocarcinoma
c. Squamous cell carcinoma d. Adenosquamous cancer

100. Marker of small cell cancer of lung is: *(DNB 2011)*
a. Synaptobrevin b. Chromagranin
c. Cytokeratin d. Vimentin

101. All are elaborated by small cell carcinoma lung, except:
a. ADH b. ACTH *(PGI June 2000)*
c. 5-HT d. Noradrenaline

102. The lung tumour responding best to radio-therapy: *(UPPG 96)*
a. Small cell anaplastic b. Squamous cell carcinoma
c. Adenocarcinoma d. All respond equally well

103. In small cell carcinoma of the lung, one of the following is not seen: *(Kerala 97)*
a. Hypercalcemia b. Hyponatremia
c. Watery diarrhea d. Hypokalemia

104. All of the following statements about small cell carcinomas are true, except: *(PGI June 2006)*
a. Commonest malignancy of lung
b. Associated with paraneoplastic syndrome
c. Cause SVC obstruction
d. Chemosensitive
e. Commonly metastasizes to brain

105. Which of the following statements about small cell carcinoma is true? *(All India 2009)*
a. Bone metastasis is uncommon
b. Peripheral in location
c. Chemosensitive tumor
d. Paraneoplastic syndrome with increase PTH is common

106. In a chronic smoker, a highly malignant aggressive and metastatic lung carcinoma is: *(AIIMS May 2001)*
a. Squamous cell carcinoma b. Small cell carcinoma
c. Adenocarcinoma d. Large cell carcinoma

107. Following hormonal levels are increased in small cell carcinoma of lung except: *(All India 97)*
a. ACTH b. Growth hormone
c. ANF d. AVP

108. Carcinoma lung responding best to chemo-therapy:
a. Squamous cell carcinoma b. Oat cell type
c. Adenocarcinoma d. All respond equally

109. Clubbing is least common in: *(AIIMS Dec 97)*
a. Squamous cell carcinoma
b. Adenocarcinoma
c. Small cell carcinoma of lung
d. Mesothelioma

110. Most cases of paraneoplastic syndrome are associated with which type of lung carcinoma: *(JIPMER 2013)*
a. Small cell carcinoma
b. Bronchogenic carcinoma
c. Bronchoalveolar carcinoma
d. Adenocarcinoma

CARCINOMA LUNG

111. Which of the following statements about lung carcinoma is true? *(All India 2010)*
a. Squamous cell variant accounts for 70% of all lung cancers
b. Oat cell variant typically present with cavitation
c. Oat cell variant is typically associated with hilar adenopathy
d. Adenocarcinoma variant is typically central in location

112. All of the following statements about non-small cell carcinoma of lung (NSCCL) are true except: *(All India 2012)*
a. Contralateral mediastinal nodes are contraindication to surgical resection
b. Single agent chemotherapy is preferred for patients >70 years with advanced disease
c. Squamous cell carcinoma is the most common NSCCL among Asian population
d. Geftinib is most effective for female smokers with adenocarcinoma histology

113. Ramesh, 40-years male patient presenting with polyuria, pain abdomen, nausea, vomiting, altered sensorium was found to have bronchogenic carcinoma. The electrolyte abnormality seen in him would be: *(AIIMS May 2002)*
a. Hypokalemia b. Hyperkalemia
c. Hypocalcaemia d. Hypercalcemia

114. A 60-years old male presented to the emergency with breathlessness, facial swelling and dilated veins on the chest wall. The most common cause is: *(All India 2003)*
a. Thymoma
b. Lung cancer
c. Hodgkin's lymphoma
d. Superior vena caval obstruction

115. Which of the following tumor is most commonly associated with superior vena cava syndrome? *(All India 2011)*
a. Lymphoma b. Small cell carcinoma
c. Non small cell carcinoma d. Metastasis

116. In a 56-years old chronic smoker there was a mass in bronchus which is successfully resected. This mass is most likely to be positive for: *(AIIMS Nov 2009)*
a. Cytokeratin b. Vimentin
c. Epithelial membrane cadherin
d. Leukocyte

117. A 60-year-old male presents to the clinic with complaints of abdominal pain, constipation and coin pain radiating to the groin of over a week duration. He has 25-pack year smoking history and is currently being evaluated for a hicar mass picked UP on chest radiography. As part of this laboratory work-up, the serving calcium was found to be elevated. The elevated serum calcium level is most likely linked to: *(COMEDK 2014)*
a. Paratharoid adenoma
b. Parathoroid hyperplasia
c. Vitamin D intoxication
d. Secretion of PTH-related peptic

118. Which of the following has no infectious etiology? *(AIIMS Nov 2009)*
a. Nasopharyngeal carcinoma
b. Hepatocellular carcinoma
c. Non-small cell lung carcinoma
d. Gastric carcinoma

119. Most common site of metastasis in lung carcinoma: *(AIIMS May 2007)*
a. Liver b. Adrenal
c. Bone d. Brain

120. True about lung carcinoma: *(PGI June 2009)*
a. Adenocarcinoma most common
b. Squamous cell carcinoma is most common
c. Originates for type-II pneumocytes
d. Oat cell (Neuroendocrine cells)
e. Squamous cell carcinoma peripherally located

121. Histological variants of bronchoalveolar carcinoma includes: *(PGI Nov 2011)*
a. Clara cells b. Adenosquamous
c. Mucin secreting cells d. Type II pneumocytes
e. Neuroendocrine cell

122. Superior sulcus tumor of the lungs characteristically present with: *(JIPMER 2011)*
a. Horner syndrome b. Breathlessness
c. Hemoptysis d. Pancoast syndrome

123. Superior vena cava syndrome is caused most commonly by: *(MCI Sept 2009, AIIMS Nov 95)*
a. Adenocarcinoma b. Squamous cell carcinoma
c. Small cell carcinoma d. Large cell carcinoma

124. A 60-years old male was diagnosed as carcinoma right lung. On CECT chest there was tumour of 5 × 5 cm in upper lobe and another 2 × 2 cm size tumour nodule in middle lobe. The primary modality of treatment is: *(DPG 2010, All India 2004)*
a. Radiotherapy b. Chemotherapy
c. Surgery d. Supportive treatment

125. A 65-years old miner has lost 7 kg weight within two months, has presented with cough, and blood streaked sputum. He was treated for pulmonary tuberculosis 10 years ago. He also has drooping of his left eyelid for one month. On physical examination, there is ptosis of the left eye and papillary miosis. Chest X-ray revealed round opacification in the left upper apical lobe. What is the most probable diagnosis? *(AIIMS May 2006)*
a. Secondary tuberculosis b. Adenocarcinoma
c. Squamous cell carcinoma d. Asbestosis

126. Hoarseness secondary to bronchogenic carcinoma is usually due to extension of the tumor into: *(UPSC 2002)*
a. Vocal cord
b. Superior laryngeal nerve
c. Left recurrent laryngeal nerve
d. Right vagus nerve

127. All seen in pancoast syndrome except: *(HPU 2005)*
a. Brachial plexus involvement
b. Dyspnoea
c. Clubbing
d. Myasthenia gravis

128. Most common site of metastasis of carcinoma bronchi: *(HPU 2005)*
a. Liver + Bones b. Prostate
c. Kidney d. Breast

129. Clinical manifestations of bronchogenic carcinoma include of the following except: *(ICS 2005)*
a. Hoarseness of voice due to involvement of left recurrent laryngeal nerve
b. Horner's syndrome
c. Diaphragmatic palsy due to infiltration of phrenic nerve
d. Gastroparesis due to vagal involvement

130. The site of temporal bone metastasis is most commonly seen with: *(UPPG 2010)*
a. Carcinoma breast b. Carcinoma bronchus
c. Carcinoma kidney d. Carcinoma prostate

131. Carcinoma responding maximally to radiotherapy is: *(MCI Sept 2006)*
a. Squamous cell carcinoma b. Adenocarcinoma
c. Small cell carcinoma d. Large cell carcinoma

132. Most common type of carcinoma lung is: *(AIIMS May 93)*
a. Small cell carcinoma b. Adenocarcinoma
c. Squamous cell carcinoma d. Large cell carcinoma

133. All of the following are true regarding oat cell carcinoma of lung, except: *(AIIMS June 99)*
a. Variant of large cell anaplastic carcinoma
b. Chemotherapy is effective
c. Paraneoplastic syndrome may be present
d. Causes SIADH

134. In pancoast tumor, following is seen except: *(PGI June 98)*
a. Horner's syndrome b. Rib erosion
c. Hemoptysis d. Pain in shoulder and arm

135. In case of CA lung, which among the following will be contraindication for surgical resection? *(AIIMS Nov 2000)*
a. Malignant pleural effusion
b. Hilar lymphadenopathy
c. Consolidation of one lobe
d. Involvement of visceral pleura

136. A 50-years old smoker male presents with pain along the left arm and ptosis. His chest radiograph shows a soft tissue opacity at the left lung apex with destruction of adjacent ribs. The picture is suggestive: *(AIIMS Nov 2003)*
a. Adenocarcinoma lung
b. Bronchial carcinoid
c. Pancoast tumour
d. Bronchoalveolar carcinoma

137. Commonest symptom of carcinoma bronchus is: *(AP 84, Kerala 87)*
a. Hemoptysis b. Dyspnoea
c. Cough d. Wheezing
e. Pain

138. The first step when doing a penumononectomy for cancer of the bronchus is to: *(UPPG 97)*
a. Ligate the pulmonary vein
b. Ligate pulmonary artery
c. Divide the bronchus
d. Perform lymph node clearance

139. A 60-years old man presents with non productive cough and haemoptysis for 4 weeks; He has grade III clubbing, and a lesion in the apical lobe on X-ray most likely diagnosis here is: *(All India 2001, AIIMS June 2000)*
a. Small cell carcinoma b. Non-small cell carcinoma
c. Fungal infection d. Tuberculosis

140. A patient presents with secondaries to the adrenals. The most common site of primary is: *(WBPG 2012)(All India 2000)*
a. Lung b. Kidney
c. Breast d. Stomach

141. Most common symptom of lung carcinoma: *(AIIMS 90)*
a. Cough b. Dyspnea
c. Weight loss d. Chest pain

142. The commonest intra-bronchial cause of hemoptysis is: *(AIIMS May 95)*
a. Carcinoma lung b. Adenoma lung
c. Emphysema d. Bronchiectasis

143. A 60-years old chronic smoker presents with complaints of hemoptysis. Her chest X-ray appears to be normal. What is the next best investigation? *(All India 2001)*
a. Bronchoscopy
b. High resolution CT
c. Sputum cytology
d. Pulmonary function test

144. A 60-years old man is suspected of having bronchogenic carcinoma. TB has been ruled out in this patient. What should be the next investigation? *(All India 2001)*
a. CT guided FNAC
b. Bronchoscopy and biopsy
c. Sputum cytology
d. X-ray chest

145. A patient presents with a cavitatory lesion in right upper lobe of lung. The best investigation is: *(All India 2000)*
a. Bronchoscopy, lavage and brushing
b. CT Scan
c. X ray
d. FNAC

PULMONARY EMBOLISM

146. All of the following conditions may predispose to pulmonary embolism except: *(All India 2003)*
a. Protein S deficiency
b. Malignancy
c. Obesity
d. Progesterone therapy

147. In acute pulmonary embolism, the most frequent ECG finding is: *(AIIMS May 2006)*
a. S1Q3T3 pattern
b. 'P' pulmonale
c. Sinus tachycardia
d. Right axis deviation

148. Most common symptom in pulmonary embolism: *(MCI Sept 2007)*
a. Dyspnea
b. Pleuritic chest pain
c. Cyanosis
d. Hemoptysis

149. Ventilation perfusion imaging is most useful for the diagnosis of: *(COMEDK 2004)*
a. Pulmonary thromboembolism
b. Asthma
c. Interstitial lung disease
d. Hypersensitivity pneumonitis

150. Which of the following diagnostic techniques is most specific for pulmonary embolism? *(COMEDK 2007)*
a. Pulmonary angiography
b. Ventilation lung scanning
c. Perfusion lung scanning
d. Arterial blood gas analysis

151. Early and reliable indication of air embolisms during anesthesia can be obtained by continuous monitoring of: *(COMEDK 2008)*
a. ECG
b. Blood pressure
c. End-tidal CO2
d. Oxygen saturation

152. A mill-wheel type of murmur during laparoscopy suggests: *(COMEDK 2009)*
a. Tension pneumothorax
b. Intra-abdominal bleeding
c. Gas embolism
d. Pre-existing valvular disease

153. Radiographic features of pulmonary embolism include all except: *(COMEDK 2011)*
a. Westermarck's sign
b. The Fleischner sign
c. Hampton's hump
d. Virchow sign

154. CT angiographic finding of acute pulmonary thromboembolism includes: *(PGI Nov 2011)*
a. Filling defect of main pulmonary artery
b. Pleural fibrosis
c. Lobar and segmental oligemia
d. Pleural effusion
e. Peripheral, wedge-shaped consolidations

155. Patient admitted with fracture shaft of femur in a few days developed respiratory distress, ↓SPO2 and petechial rashes. Diagnosis: *(JIPMER 2011)*
a. Fat embolism
b. Pulmonary embolism
c. Hemolytic anemia
d. Crush syndrome

156. Investigation of choice in pulmonary embolism: *(JIPMER 2010)*
a. Ventilation perfusion scan
b. MRI
c. CECT
d. X-ray

157. A patient with fracture pelvis is admitted in ICU after surgery. Post operatively he develops sudden dyspnea and chest. The likely cause is: *(AIIMS Nov 99)*
a. Pulmonary thromboembolism
b. Shock
c. Respiratory infection
d. ARDS

158. All are true about pulmonary embolism, except:
a. Chest pain is the most common symptom
b. Most commonly presents within 2 weeks *(AIIMS May 94)*
c. More is the survival time, more is the chance of recovery
d. Arises from leg veins

159. The most common source of pulmonary embolism is: *(AIIMS May 95)*
a. Amniotic fluid embolism
b. Calf vein thrombi
c. Large veins of leg
d. Cardio thoracic surgery

160. A 55-years man who has been on bed rest for the past 10 days complains of breathlessness and chest investigation should be: *(All India 2004, 2003)*
a. Lung ventilation-perfusion scan
b. Pulmonary arteriography
c. Pulmonary venous angiography
d. Echocardigraphy

161. The most definitive method of diagnosing pulmonary embolism is: *(AIIMS Nov 2005)*
a. Pulmonary arteriography
b. Radioistope perfusion pulmonary scintigraphy
c. EKG
d. Venography

162. A young patient presents to the emergency with acute pulmonary embolism. Patients blood pressure is normal but echocardiography reveals right ventricular hypokinesia and compromised cardiac output. The treatment of choice in this patient is: *(AIIMS Nov 2001)*
a. Thrombolytic therapy
b. Anticoagulation with low molecular weight heparin
c. Anticoagulation with warfarin
d. Inferior vena cava filters

163. In pulmonary embolism, fibrinolytic therapy is responsible for: *(PGI Dec 97)*
a. Risk of hemorrhage
b. Prognosis good
c. Massive emboli
d. All of the above

164. IVC filter is used in following except: *(PGI Dec 97)*
a. Massive emboli
b. Negligible size of emboli
c. Repeated emboli
d. None

165. D-Dimer is the most sensitive diagnostic test for:
a. Pulmonary embolism *(DPG 2011)*
b. Acute pulmonary edema
c. Cardiac tamponade
d. Acute myocardial infarction

166. The sequence of symptoms in pulmonary embolism is:
a. Fever, pain, dyspnoea *(JIPMER 89, DNB 90)*
b. Fever, dyspnoea
c. Dysponea, pain, hemoptysis
d. Dysponea, cough, purulent sputum

167. The commonest site of lodgment of pulmonary embolus is in the territory of: *(UPSC 95)*
a. Right lower lobe b. Right upper lobe
c. Left Lower lobe d. Left upper lobe

168. A young male presented with dyspnea, bleeding and petchial hemorrhage in the chest after 2 days following fracture shaft of the femur right side. Most likely cause is: *(UPPG 2008)*
a. Air embolism
b. Fat embolism
c. Pulmonary thrombo-embolism
d. Amniotic fluid embolism

THORACIC INJURY

169. True regarding presentation(s) of thoracic duct injury: *(PGI June 2009)*
a. Electrolyte imbalance b. Lymphopenia
c. Dehydration d. Lymphedema
e. Chylothorax may be present

170. True about chest trauma: *(PGI June 2008)*
a. ECG done in all cases associated with sternal fracture
b. Under water seal drainage if associated with pneumothorax
c. X-ray chest investigation of choice
d. Urgent surgery needed in all cases

171. Interstitial emphysema may be found in the following conditions: *(Kerala 98)*
a. Chest injury b. Tracheostomy
c. Surgical wound d. All

ADULT RESPIRATORY DISTRESS SYNDROME

172. Most common abnormality associated with ARDS: *(JIPMER 2011)*
a. Hypoxemia b. Hypercapnea
c. Diffuse alveolar damage d. Bilateral alveolar infiltrates

173. The ideal tidal volume in a patient ventilated for ARDS is:
a. 6 mL/kg b. 10 mL/kg *(COMEDK 2010)*
c. 14 mL/kg d. 20 mL/kg

174. Adult respiratory distress syndrome is defined by all except: *(COMEDK 2005)*
a. PCWP >18mm Hg
b. PaO2 /FiO2 <200
c. Diffuse bilateral air space edema on chest X-ray
d. All the above

175. Which of the following is most characteristic feature of ARDS? *(All India 2012)*
a. Diffuse alveolar damage b. Hypoxia and hypoxemia
c. Surfactant deficiency d. Hypocapnia

176. ARDS is associated with: *(PGI Dec 2004)*
a. Acute pancreatitis b. Trauma
c. Severe falciparum malaria d. All of the above

177. Acute lung injury is characterized by all, except: *(PGI Dec 2004)*
a. Alveolar infiltrates b. Hypoxemia
c. Pulmonary shunting d. PaO2/FiO2 <200mm of Hg
e. None of the above

178. All are seen in ARDS, except: *(AIIMS May 95)*
a. Pulmonary edema b. Decreased tidal volume
c. Hypercapnia d. Decreased compliance

179. All of the following features can be seen in ARDS except:
a. Pulmonary shunting b. Reduced compliance
c. Hypoxemia d. Hypercapnia

180. Which of the following is not seen in ARDS? *(All India 96)*
a. Pulmonary edema b. Hypoxemia
c. Stiff lung d. Hypercapnia

181. In ARDS, not true is: *(PGI June 99)*
a. Decreased pulmonary compliance
b. Increased pulmonary artery pressure
c. Increased left atrial pressure
d. Severe hypoxemia

182. Acute lung injury (ALI)is characterized by all except:
a. PaO2/FiO2 <200mm Hg
b. Bilateral interstitial infiltrates
c. PCWP <18 mm Hg
d. Normal left atrial pressure

PULMONARY TUBERCULOSIS

183. A young man with pulmonary tuberculosis presents with massive recurrent hemoptysis. For angiographic treatment, which vascular structure should be evaluated first: *(All India 2004)*
a. Pulmonary artery b. Bronchial artery
c. Pulmonary vein d. Superior vena cava

184. Indications of surgery in pulmonary TB: *(PGI Dec 2006)*
a. Suspicion of malignancy
b. Cavitary lesion with aspergilloma
c. Massive hemoptysis
d. All of the above

CARDIAC TUMORS

185. The most common primary cardiac tumor is: *(COMEDK 2004)*
a. Rhabdomyoma b. Myxoma
c. Leiomyoma d. Lipoma

HEART TRANSPLANTATION

186. Absolute contraindications of heart transplantation:
a. HIV infection *(PGI Dec 2000)*
b. Age >60 years
c. Irreversible pulmonary hypertension
d. Significant pulmonary vascular disease
e. Malignancy

PECTUS EXCAVATUM AND CARINATUM

187. Regarding pectus excavatum all are true except: *(PGI Dec 97)*
a. Gross CVS dysfunction b. Decrease in lung capacity
c. Cosmetic deformity d. Depression in chest

MISCELLANEOUS

188. CABG is done for all of the following indications except:
a. To reduces symptoms *(All India 99)*
b. To prevent further catastrophics
c. To prolong life
d. To prevent progress of native blood vessel disease

189. Valvoplasty is done in following except: *(PGI Dec 97)*
a. Coarctation of aorta b. PS
c. MS d. AS

190. Treatment of choice in postoperative lung collapse is all except: *(AIIMS June 95)*
a. Needle drainage b. Corticosteroids
c. Pulmonary resection d. Endoscopic suction

191. Following is true of eventration of diaphragm: *(AIIMS 84)*
a. It is a development defect
b. Early surgery is treatment
c. Defect is usually muscular
d. Diagnosed mostly clinically

192. Broncholithiasis means: *(Kerala 96)*
a. Calcified lymph nodes eroding into bronchus
b. Foreign body calcified in bronchus
c. Lithium deposition in bronchial wall
d. A hamartoma

193. Complication to PEEP include all except: *(PGI 81, UPSC 87)*
a. Pulmonary edema
b. Emphysema
c. Cardiogenic shock
d. Pneumonia

194. The greatest incidence of bronchopleural fistula is following: *(PGI 80, DPG 88)*
a. Segmental resection
b. Lobectomies
c. Pneumonectomies
d. Thorocotomy

195. The most important consideration in a patient with borderline pulmonary function requiring lung resection is: *(Karnataka 2003)*
a. The amount of nonfunctioning lung tissue to be removed
b. The amount of functioning lung tissue to be removed
c. Experience of the surgical team
d. Elevated pulmonary artery pressure

196. Which needle is used for pleural biopsy? *(COMEDK 2007)*
a. Vin silvermann's
b. Abram's
c. Abraham's
d. Osgood's

197. Heimlich valve is used for drainage of: *(COMEDK 2008)*
a. Pneumothorax
b. Hemothorax
c. Emphysema
d. Malignant pleural effusion

198. The organism most frequently related to mediastinal fibrosis is: *(DPG 2010)*
a. Actinomycosis
b. Histoplasma
c. Hansen's bacillus
d. Staphylococcus

199. Which is true regarding hydatid cyst of lung? *(AIIMS June 2002)*
a. Never ruptures
b. Calcification is common
c. Always associated with cyst in the liver
d. More common in lower lobes

200. The commonest site for extragonadal germ cell tumour is: *(COMEDK 2009)*
a. Retroperitoneum
b. Sacrococcygeal region
c. Pineal gland
d. Mediastinum

201. The most popular incision for open general thoracic surgical procedures is: *(COMEDK 2010)*
a. Anterior thoracotomy
b. Median sternotomy
c. Lateral thoracotomy
d. Transverse thoracosternotomy

202. Pleura ends at which level in the posterior axillary line: *(Punjab 2007)*
a. Medial border of 11th rib
b. Lateral border of 11th rib
c. Medial border of 12th rib
d. Lateral border of 12th rib

203. All are indications for surgery in bronchiectasis except: *(JIPMER 2010)*
a. Hemoptysis
b. Copious symptoms
c. Bleeding
d. Recurrent infections

204. Bastio surgery for refractory LV hypertrophy is: *(MHSSMCET 2006)*
a. Patch repair
b. MR repair
c. Ventriculectomy
d. Ventriculoplasty

205. Resting intrapleural pressure: *(MHSSMCET 2007)*
a. -2 to -6 mmHg
b. +2 to +6 mmHg
c. -5 to -10 mmHg
d. -10 to +10 mmHg

206. Topical application of mitomyin C is recommended for: *(All India 2012)*
a. Endoscopic treatment of angiofibroma
b. Sturge-Weber syndrome
c. Skull bone osteomyelitis
d. Laryngotracheal stenosis

207. CXR of industrial worker exposed to asbestos over 20 years shows an ill-defined round opacity in the lower lobe with a comet tail appearance on PA-view. Which of the following is the most likely diagnosis? *(All India 2012)*
a. Mesothelioma
b. Bronchogenic carcinoma
c. Round atelectasis
d. Pulmonary infarct

208. Coronary graft is most commonly taken from: *(DNB 2012)*
a. Femoral vein
b. Saphenous vein
c. Axillary vein
d. Cubital vein

209. Patient can safely undergo major lung resection without increased risk of post operative complication if: *(DNB 2006)*
a. FEV1 > 1L, Normal DLCO
b. FEV1 > 1L, Decreased DLCO
c. FEV1 > 2L, Normal DLCO
d. FEV1 > 2L, Decreased DLCO

210. Which of the following is false about hemoptysis? *(AIIMS Nov 2013)*
a. Massive hemoptysis is bleeding >600 ml in 24 hours
b. In 90% cases, bleeding from bronchial arteries
c. CT chest is the first investigation done
d. In an unstable patient, rigid bronchoscopy is done to identify the lesion

EXPLANATIONS

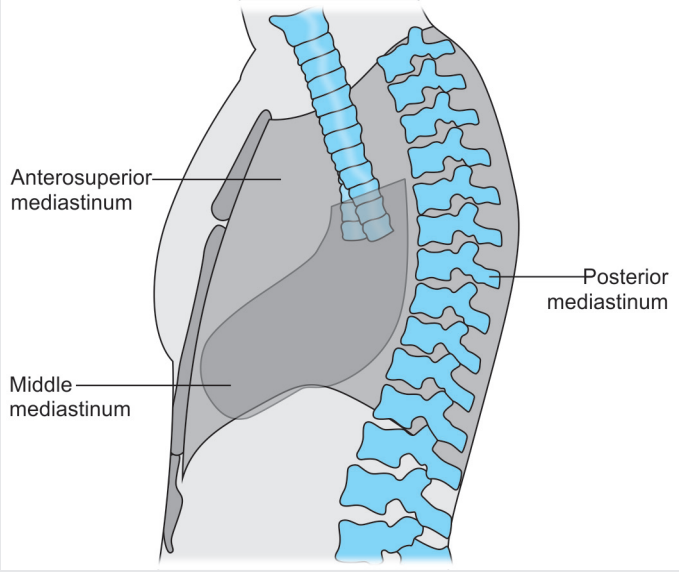
MEDIASTINAL TUMORS

1. **Ans. d. Ganglioneuroma** *(Ref: Sabiston 19/e p1600-1606; Schwartz 10/e p670-680, 9/e p569-576; Bailey 26/e p868-869; 25/e p892; Devita 9/e p871-881)*

MEDIASTINUM

Mediastinum is situated **between** the **lungs in** the **center of** the **thorax.**

Mediastinum is divided into 3 compartments		
Anterior or **Anterosuperior**	**Middle** or **Visceral compartment**	**Posterior** or **Paravertebral sulci**
Lies **in front of anterior pericardium** and **trachea**[Q]	Lies **within pericardial cavity**[Q] including trachea	Lies **posterior to posterior pericardium** and **trachea**[Q].



Locations of the Common Mediastinal Masses		
Anterior Mediastinum	**Middle Mediastinum**	**Posterior Mediastinum**
• **Thymoma**[Q] (**MC** in anterior mediastinum) • **Lymphoma**[Q] • **Germ cell tumors**[Q] • **Thyroid** and **parathyroid masses**[Q] • **Bronchogenic cyst**[Q] • **Aneurysm**[Q]	• **Cysts** (**MC** in middle mediastinum): – **Pericardial (MC)**[Q] – **Bronchogenic**[Q] – Enterogenous – **Neuroenteric**[Q] • Vascular masses (**aneurysm**[Q]) • LN enlargement and **lymphoma**[Q] • Mesenchymal tumors • Pheochromocytoma	• **Neurogenic tumors (MC overall**[Q]**)** • **Meningoceles**[Q] • Mesenchymal tumors • Pheochromocytoma • **Lymphoma**[Q] • **Bochdalek hernia**[Q] • **Bronchogenic cyst**[Q] • **Enterogenous cyst**[Q]

2. **Ans. d. Ganglioneuroma**
3. **Ans. d. Thymic tumor**
4. **Ans. c. Thymoma**
5. **Ans. a. Lymphoma, b. Neuroblastoma, c. Neurogenic tumors, e. Bronchogenic cyst**
6. **Ans. a. Teratoma, b. Thymoma, c. Lymphoma, e. Parathyroid carcinoma**

7. **Ans. a. Anterior** *(Ref: Sabiston 19/e p1605-1606; Schwartz 10/e p1259, 9/e p575; Bailey 25/e p892)*

Lymphoma

- **Anterior mediastinum** is **MC site**[Q]
- Occasional involvement of middle compartment and rare involvement of posterior mediastinum
- **Chemotherapy** and/or **radiotherapy** results in a **cure rate of up to 90%** for **early-stage** Hodgkin's disease and up to **60% for** more **advanced stages**[Q].

- **MC tumor** of **middle mediastinum**: **Lymphoma**[Q]
- **MC mass** of **middle mediastinum**: **Pericardial cyst**[Q]

8. **Ans. b. Lymphoma**

9. **Ans. c. Neurofibroma** *(Ref: Schwartz 10/e p677-678, 9/e p570)*

Mediastinal Tumors in Adults		
Tumor Type	**Percentage of Total**	**Location**
Neurogenic tumors[Q]	**21**	**Posterior**
Cysts[Q]	**20**	**All**
Thymomas[Q]	**19**	**Anterior**
Lymphomas[Q]	**13**	**Anterior/middle**
Germ cell tumors	11	**Anterior**
Mesenchymal tumors	7	**All**
Endocrine tumors	6	Anterior/middle

Mediastinal Tumors in Children		
Tumor Type	**Percentage of Total**	**Location**
Neurogenic tumors	**40**	**Posterior**
Lymphomas	**18**	Anterior/middle
Cysts	**18**	**All**
Germ cell tumors	**11**	**Anterior**
Mesenchymal tumors	9	**All**
Thymomas	Rare	Anterior

10. **Ans. b. Hyperalbuminemia**
(Ref: Sabiston 19/e p1603-1604; Schwartz 10/e p675-676, 9/e p572-573; Bailey 26/e p868, 25/e p892)

Thymoma

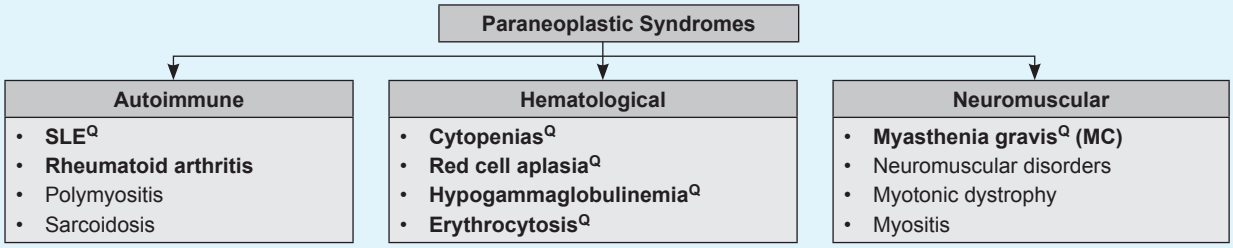
- **MC neoplasm of thymus; MC site: Anterior mediastinum**[Q]
- Most frequently seen in **40-60 years** of age
- Most thymomas are **completely surrounded by** a **fibrous capsule**[Q]
- On the basis of cell types, divided into:
  - **Lymphocytic (25%)**
  - **Epithelial (25%)**
  - **Lymphoepithelial (50%)**[Q]

Clinical Features

- **Mostly asymptomatic**[Q], detected incidentally on chest X-ray
- May cause **dysphagia, dyspnea, SVC syndrome** and **paraneoplastic syndromes**[Q]

Paraneoplastic Syndromes

Autoimmune	Hematological	Neuromuscular
• **SLE**[Q]	• **Cytopenias**[Q]	• **Myasthenia gravis**[Q] **(MC)**
• **Rheumatoid arthritis**	• **Red cell aplasia**[Q]	• Neuromuscular disorders
• Polymyositis	• **Hypogammaglobulinemia**[Q]	• Myotonic dystrophy
• Sarcoidosis	• **Erythrocytosis**[Q]	• Myositis



Diagnosis

- **CT: Investigation of choice** for diagnosis of **thymoma**[Q].
- **Definitive diagnosis** is made on **histological study**[Q].
  - **Cytokeratin**[Q] is the **marker** that **best distinguishes thymomas** from lymphomas.
  - **CT scan**: **Most lymphomas** are associated with **marked lymphadenopathy** and **thymomas** most frequently appear as a **solitary encapsulated mass**[Q].

Staging

- **Masoaka staging**[Q] system is used.

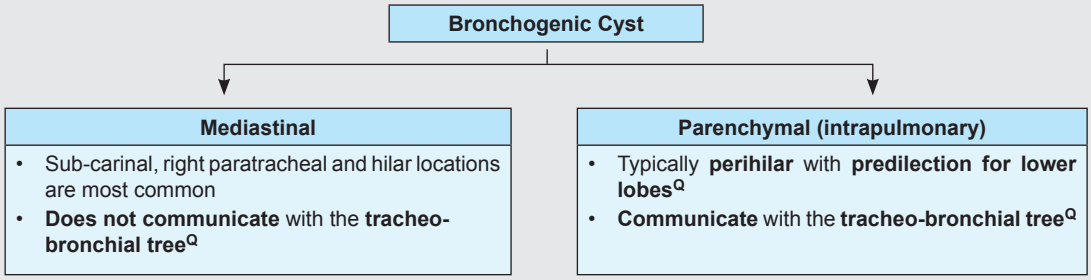
Treatment

- **Treatment of choice: Total thymectomy** performed through **median sternotomy**[Q]
- **Large thymoma (>5 cm) with evidence of invasion: Thymectomy + Chemotherapy**[Q]
- **Myasthenia gravis** is treated with **thymectomy** and **anticholinesterase drugs**[Q].

11. **Ans. c. Thymoma**
12. **Ans. a. Neuroblastoma, b. Bronchogenic cyst, c. Neuroenteric cyst, d. Lymphoma**
13. **Ans. a. Mediastinum** *(Ref: Sabiston 19/e p1602-1603; Schwartz 10/e p679, 1018, 1607, 9/e p1419-1420)*

Bronchogenic Cyst

- **Bronchogenic cysts** originate as **sequestrations from** the **ventral foregut**[Q], the antecedent of the tracheobronchial tree.
- **Cyst wall** is composed **pathognomonic inner layer of ciliated respiratory epithelium**[Q].
- **MC location**: **Middle mediastinum**[Q] (**65-90%**)



Clinical Features

- **Two thirds** are **asymptomatic**[Q]
- May produce **symptoms** that **depend on** their **anatomic location**.
- **Paratracheal region**: Airway **compression** and **respiratory distress**
- **Lung parenchyma:** Become infected, present with **fever** and **cough.**

Diagnosis

- **Chest X-ray**: Shows a **dense mass**
- **CT scan** or **MRI:** Delineates the **precise anatomic location**

Treatment

- **Surgical excision** is recommended **in all patients** to **provide definitive histologic diagnosis**[Q], alleviate symptoms, and prevent the development of associated complications.

14. **Ans. d. Neurogenic tumour** 15. **Ans. a. Neurofibroma** 16. **Ans. b. Neurofibroma**

17. **Ans. a. Failure of rejection of transplanted organs** *(Ref: www.ncbi.nlm.nih.gov/pmc/articles/PMC2974301)*

- In **adult life, thymectomy has no demonstrable effect on antibody response** or **upon homograft survival**.
- However, it has been shown that **thymectomy in adult mice, combined with total body irradiation**, can **result in homograft tolerance of a high degree**.
- This finding suggests that the **thymus gland may resume its perceptor function in adult life** under circumstances in which there is **temporary suppression of the lymphopoietic system**.

18. **Ans. c. Neurogenic tumor** 19. **Ans. d. Schwannoma**

PLEURAL EFFUSION

20. **Ans. None >b. 7th intercostal space mid-axillary line** *(Ref: Sabiston 19/e p1595-1596; PJ Mehta 13th/361)*

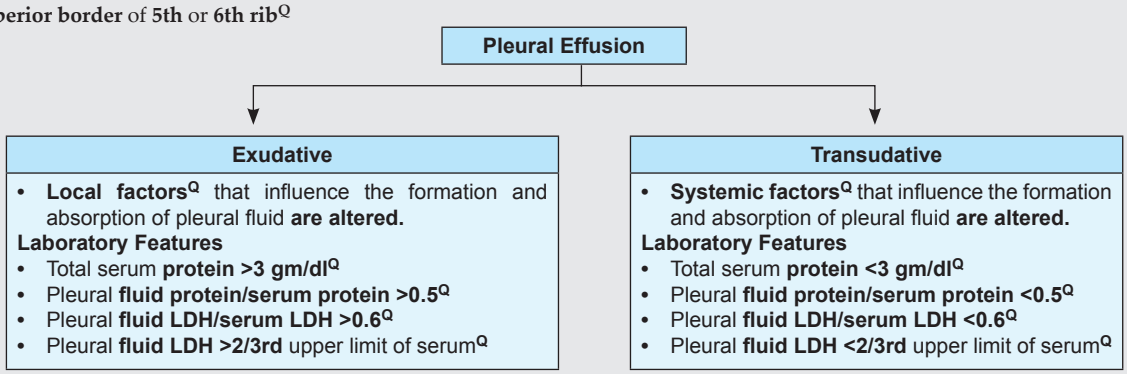
Pleural Effusion

- About **300 mL**[Q] of fluid is **required for** the development **of costophrenic angle blunting** seen on an upright chest X-ray.
- At least **500 mL**[Q] of effusion is necessary **for detection on clinical examination**.
- **Chest tube insertion** is carried out in such a way (angled chest tube, **low insertion site**) that **drainage is as complete as possible.**
- **Chest tube insertion is done in 5th ICS in midaxillary line.**

> - Ideally **chest tube insertion** should be done **through triangle of safety (4th** to **6th intercostal space, anterior to mid-axillary line**[Q]**)**

Boundaries of Triangle of Safety

- **Lateral border** of **pectoralis major**[Q]
- **Anterior border** of **Lattisimus dorsi**[Q]
- **Superior border** of **5th** or **6th rib**[Q]



21. **Ans. d. Malignant ovarian tumour** *(Ref: Harrison 18/e p2181)*

Meig's Syndrome

- Triad of **ascites, pleural effusion** and **benign ovarian tumor** (**fibroma**)[Q]
- It **resolves after the resection of** the **tumor**[Q].
- Because the **transdiaphragmatic lymphatic channels** are **larger in diameter on** the **right**, the **pleural effusion** is **classically on** the **right side**[Q].

22. **Ans. a. T.B.** *(Ref: http://radiology.rsna.org/content/216/2/478.long)*

Most common cause of **pseudochylous pleural effusion** is **tuberculous pleurisy**.

Chyliform Pleural Effusion (Pseudochylous or Cholesterol Effusion)

- Chyliform pleural effusion, often called **pseudochylous** or cholesterol effusion, is a **high-lipid effusion** that is not chylous.
- The **most common cause** of this pleural reaction is **tuberculous pleurisy**[Q], but it has **also been described in** association with **rheumatoid arthritis**.
- The presence of a **fat-fluid level within the pleural space** is **unique to pseudochylous effusion**[Q].

23. **Ans. d. Bronchogenic carcinoma** *(Ref: Sabiston 19/e p1596-1597; Schwartz 10/e p680, 9/e p579; Bailey 26/e p859, 856, 25/e p881)*

A **rapidly filling hemorrhagic pleural effusion** is suggestive of **malignancy,** most commonly **bronchogenic carcinoma**.

Malignant Pleural Effusion

- Malignancy is a common cause of pleural effusion.
- **Most malignant pleural effusions** are **exudative**[Q].
- They are the **second most common exudative effusive process**.
- **Metastatic breast** and **lung cancers** are the **most common malignancies**[Q] that cause malignant effusions.

PNEUMOTHORAX

24. Ans. a. Smokers *(Ref: Harrison 18/e p2181; Sabiston 19/e p1599; Schwartz 10/e p649-650, 9/e p562; Bailey 26/e p853-854, 25/e p879)*

Primary Spontaneous Pneumothorax

- Usually **due to rupture of apical pleural blebs**, small cystic spaces that lie within or immediately under the visceral pleura.
- Primary spontaneous pneumothorax commonly occurs in **tall, thin, adolescent men**[Q].
- Occur **almost exclusively in smokers**[Q]
- Approximately **one-half of patients** with an initial primary spontaneous pneumothorax will have a **recurrence**[Q].

Treatment

- **Initial** recommended **treatment**: **Simple needle aspiration**[Q]
- If the **lung does not expand with aspiration** or if the patient has a **recurrent pneumothorax**, **thoracoscopy with stapling of blebs** and **pleural abrasion** is indicated[Q].
- **Thoracoscopy** or **thoracotomy with pleural abrasion** is almost **100% successful in preventing recurrences**[Q].

- **Small pneumothoraces** (**<20%**) that are stable **may be monitored** if the patient has few symptoms[Q].
- **Moderate** (**20%-40%**) and **large** (**>40%**) **pneumothoraces** nearly **always** are **associated with persistent symptoms** that cause physical limitations and **require intervention**[Q].

25. Ans. a. Poland syndrome *(Ref: Wolfgang Radiology/271)*

Hyperlucent Lung

Unilateral	Bilateral
Chest wall defects: • Mastectomy • **Poland syndrome**[Q] (absent pectoralis muscle) • **Endobronchial obstruction** **Pulmonary vascular causes:** • Pulmonary arterial hyperplasia • Pulmonary embolism • Congenital lobar emphysema	**Decreased soft tissue:** • Thin body habitus • **Bilateral mastectomy** **Cardiac causes** of decreased pulmonary blood flow: • Right to left shunt • **Eisenmenger's syndrome** **Pulmonary causes** of decreased pulmonary blood flow: • **Pulmonary embolism** • **Emphysema** • Bulla or bleb • **Interstitial emphysema**

26. Ans. b. >20%

27. Ans. d. All *(Ref: http://en.wikipedia.org/wiki/Pneumothorax)*

Aftercare of Pneumothorax

- **Smoking cessation**[Q]
- **Air travel** is **discouraged for** up to **7 days**[Q] after complete resolution of a pneumothorax if recurrence does not occur.
- **Underwater diving** is **considered unsafe**[Q] after an episode of pneumothorax unless a preventative procedure has been performed.

28. Ans. c. Thoracostomy and close the rent *(Ref: Bailey 26/e p355, 25/e p342-343)*

Open Pneumothorax ('Sucking Chest Wound')

- This is due to a **large open defect** in the chest (**>3 cm**), leading to equilibration between intrathoracic and atmospheric pressure.
- **Air accumulates** in the **hemithorax** (rather than in the lung) with each inspiration, leading to **profound hypoventilation** on the affected side and **hypoxia**[Q].

Clinical Features

- Signs and symptoms are usually **proportionate to the size of the defect**.
- If there is a **valvular effect**, increasing amounts of air will result in a **tension pneumothorax**[Q]

Management

- **Initial management**: **Promptly close the defect**[Q]
- A **chest tube** is **inserted as soon as possible** in a site remote from the injury site[Q].
- **Definitive treatment**: **Formal debridement** and **closure**[Q]

29. **Ans. b. Needle aspiration** 30. **Ans. b. 25** 31. **Ans. d. Intercostal drainage**

32. **Ans. a. Iatrogenic pneumothorax** *(Ref: Complications in Anesthesiology by Kirby (2007)/169)*

Common causes of Iatrogenic Pneumothorax (in decreasing order)	
• **Transthoracic needle lung biopsy**[Q] • **Subclavian vein cannulation**[Q] • Thoracentesis[Q]	• Pleural biopsy[Q] • Positive pressure ventilation[Q]

Iatrogenic Pneumothorax

History	Bilateral
• **History of procedure**[Q] known to cause iatrogenic pneumothorax (subclavian vein cannulation) • **Sudden onset breathlessness**[Q] • **Chest discomfort** or pain[Q]	**Inspection/palpation:** • **Reduced movements** of affected side[Q] • **Mediastinal shift** to opposite side[Q] • **Decreased vocal fermitus**[Q] **Percussion**: • **Hyper-resonant**[Q] **Auscultation**: • **Diminished** or **absent breath sounds**[Q]

33. **Ans. b. Pneumothorax** 34. **Ans. b. Old age** 35. **Ans. a. Smokers**

36. **Ans. d. Often needs chest tube insertion**

37. **Ans. a. Left axis deviation** *(Ref: http://www.ncbi.nlm.nih.gov/pubmed/21320674)*

Common ECG changes Associated with Left-sided Pneumothorax	
• **Right axis deviation**[Q] • **Reduced R-wave amplitude**[Q] in precordial leads	• **QRS alterations**[Q] (amplitude changes) • **T-wave inversions**[Q]

38. **Ans. a. Valvular pneumothorax** *(Ref: Sabiston 19/e p1599; Schwartz 10/e p163-164, 9/e p138; Bailey 25/e p342)*

Tension Pneumothorax

- **Tension pneumothorax** occurs when the **opening** that allows **air to enter** the pleural space **functions as** a **one-way valve**, allowing more **air to enter** with every breath but **none to escape**[Q].
- There is **built up of positive pressure within hemithorax**, to the extent that **intrapleural pressure is greater the atmospheric pressure** causing lung to collapse[Q].

TENSION PNEUMOTHORAX

39. **Ans. d. Large bore needle puncture of pleura** *(Ref: Sabiston 19/e p1599; Schwartz 10/e p163-164, 9/e p138; Bailey 26/e p354, 25/e p342)*

Tension Pneumothorax

- A tension pneumothorax develops when a **'one-way valve' air leak** occurs either **from** the **lung** or **through** the **chest wall**[Q].
- **Air** is **forced into thoracic cavity** without any means of escape, **completely collapsing** the **affected lung**[Q].
  - **Mediastinum** is **displaced to** the **opposite side**, **decreasing venous return** and **compressing** the **opposite lung**[Q].

Common Causes of Tension Pneumothorax	
• **Penetrating chest trauma**[Q] • **Blunt chest trauma**[Q] (with **parenchymal injury** and **air leak** that did not spontaneously close)	• **Iatrogenic lung punctures** (e.g. due to **subclavian central venepuncture**) • Mechanical **positive pressure ventilation**[Q]

Clinical Features

- **Clinical presentation** is **dramatic.**
- The patient is panicky with **tachypnoea, dyspnoea** and **distended neck veins** (similar to pericardial tamponade)[Q].
- **Clinical examination** can reveal **tracheal deviation** (a **late finding** – not necessary to clinically confirm diagnosis), **hyperresonance** and **absent breath sounds over** the **affected hemithorax**[Q].

Diagnosis

- Tension pneumothorax is a **clinical diagnosis** and **treatment should not be delayed**[Q] by waiting for radiological confirmation.

Treatment

- Treatment consists of **immediate decompression** by **rapid insertion** of a **large-bore needle** into the **2nd intercostal space** in the **mid-clavicular line**[Q] of the affected hemithorax.
- This is **immediately followed** by **insertion of a chest tube** through the **5th intercostal space** in the **anterior axillary line**[Q].

> - If the **tension in** the **pleural space is not relieved**, the **patient** is likely to **die from inadequate cardiac output** or **marked hypoxemia**[Q].

40. Ans. b. Tube drainage

41. Ans. a. Immediate IC tube drainage

42. Ans. b. CT-scan should be done to confirm pulmonary leak *(Ref: Bailey 26/e p304, 25/e p341)*

Traumatic Pneumothorax

- Traumatic pneumothoraxes can result **from penetrating** and **nonpenetrating chest trauma**.
- Traumatic pneumothoraxes should be **treated with tube thoracostomy** unless they are very small.

> - **Iatrogenic pneumothorax** is a **type of traumatic pneumothorax** that is becoming more common.
> - **Leading causes** are **transthoracic needle aspiration, thoracentesis**, and the **insertion of central intravenous catheters**[Q].
> - **Most** can be **managed with supplemental oxygen** or **aspiration**[Q], but if these measures are unsuccessful, a tube thoracostomy should be performed.

43. Ans. a. Insert wide bore needle in 2nd intercostal space *(Ref: Sabiston 19/e p1599; Schwartz 9/e p138; Bailey 25/e p342)*

- First line of management in tension pneumothorax: Insert wide bore needle in 2nd intercostal space.
- "Treatment of tension pneumothorax consists of immediate decompression by rapid insertion of a large-bore needle into the 2nd intercostal space in the mid-clavicular line[Q] of the affected hemithorax."

44. Ans. d. Tension pneumothorax **45. Ans. c. Tension pneumothorax**

46. Ans. a. Insertion of wide bore needle in the inter costal space

47. Ans. c. Decreased venous return

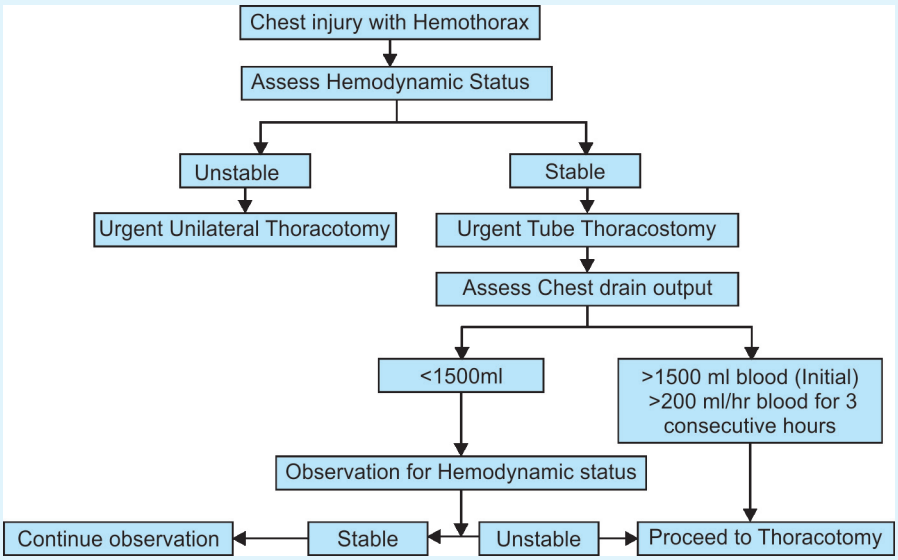
48. Ans. c. Insert needle in 2nd intercostal space

HEMOTHORAX

49. Ans. b. >c. Hemodynamic status >Nature of chest tube output *(Ref: Bailey 26/e p355, 357, 25/e p345; Trauma Manual: Companion to trauma 4th/165)*

- Nature of chest tube drainage and Hemodynamic status both provide vital clues that may form an indication of surgery (Thoracotomy). However a deteriorating **hemodynamic status despite adequate volume resuscitation** should form the **most important guide, for urgent emergency thoracotomy** and is the **single best answer of choice.**

> - Bailey says "If the patient is **in extremis** with a **falling systolic blood pressure**, despite volume resuscitation, there is no choice but to proceed **immediately with** a **left anterolateral thoracotomy".**



Indications of Thoracotomy	
• Initial tube thoracostomy drainage of **>1000 ml (penetrating injury)**[Q] or **>1500 ml (blunt injury)**[Q] • Ongoing tube thoracostomy drainage of **>200 ml/hr** for **3 consecutive hours**[Q] in non-coagulopathic patients • **Caked hemothorax**[Q] despite of placement of two chest tubes • **Tracheo-bronchial injury**[Q]	• Selected **descending torn aorta** or **great vessel injury**[Q] • **Pericardial tamponade**[Q] • **Cardiac herniation**[Q] • **Massive air leak**[Q] from chest tube with inadequate ventilation • **Open pneumothorax**[Q] • **Esophageal perforation**[Q]

50. Ans. d. Open thoracotomy with ligation of vessel

51. Ans. a. Seen in choriocarcinoma, b. Supine posture is better than erect posture, c. Needle aspiration may be needed for diagnosis *(Ref: Harrison 18/e p2180; Schwartz 10/e p200, 9/e p771; Bailey 26/e p355, 25/e p345)*

Hemothorax

- **Causes: Trauma (MC), tumor, tuberculosis**[Q]
- **Massive hemothorax** is usually the **result of major pulmonary vascular injuries** or **major arterial wounds** while minor injuries can cause small hemothorax.

Diagnosis

- Diagnosis is made by **needle aspiration of pleural fluid**[Q].
- **Chest X-ray: To assess the presence and extent of pleural cavity collection**[Q]

- A **supine position** with **horizontal X-ray beam** (**decubitus position**) is **better than erect film,** as about **400-500 ml** of **blood** may be **hidden by diaphragm** on **upright chest X-ray**[Q].

Management

- **Most patients** with hemothorax should be treated with **tube thoracostomy**, which allows **continuous quantification of bleeding**[Q].
- In **most of** the **cases bleeding stops** as the **lung re-expands**[Q].
- **Thoracoscopy** or **thoracotomy: Pleural hemorrhage >200** mL/hour[Q]

52. Ans. d. Major artery

LUNG ABSCESS

53. Ans. a. Antibiotics according to organisms *(Ref: Harrison 18/e p2145-2146; Sabiston 19/e p1586; Schwartz 10/e p650-651, 9/e p549-551; Bailey 26/e p870, 25/e p893)*

Lung Abscess

- **Lung abscess** refers to a **microbial infection** of the **lung** that results in necrosis of the pulmonary parenchyma.
- **MC cause** of **primary lung abscess**: **Anaerobic bacteria**[Q]
- **Etiology** of anaerobic lung abscess: **Aspiration**[Q]

Routes of Infection

- **Aspiration of organisms** that colonize oropharynx (**MC**)[Q]
- **Inhalation** of infection or aerosols
- **Hematogenous** dissemination from extra-pulmonary site
- **Direct inoculation** (as in tracheal intubation or stab wounds)
- **Contiguous spread** from an adjacent site of infection

Clinical Features

- **Classic presentation**: An **indolent infection** that **evolves over several days or weeks**, usually in a host who has a **predisposition to aspiration**[Q].
- A **common feature** is **periodontal infection** with **pyorrhea** or **gingivitis.**
- **Symptoms**: **Fatigue, cough, sputum production**, and **fever**[Q] Chills are uncommon.

Diagnosis

- Lung abscess can be detected by **chest X-ray** and **CT**
- **CT scan**: **Investigation of choice** for **lung abscess**[Q]

Treatment

- **Treatment** depends on the **presumed** or **established etiology**.
- Infections caused by **anaerobic bacteria**: **Clindamycin**[Q]

> - **Persistence of fever beyond 5–7 days** or **progression of the infiltrate** suggests **failure of therapy** and a need to **exclude** factors such as **obstruction, complicating empyema**, and **involvement of antibiotic-resistant bacteria**[Q].

- Lung abscess due to **S. aureus**: **Vancomycin**[Q]
- **Indications for surgery: Failure to respond** to medical management, **suspected neoplasm**, and **hemorrhage**[Q].

Causes of Failures of Medical Management	
• **Failure to drain** pleural collections[Q]	• **Giant abscess**[Q]
• **Inappropriate antimicrobial therapy**[Q]	• **Resistant pathogen**[Q]
• **Obstructed bronchus**[Q]	• **Refractory lesions**[Q]

54. Ans. d. Intracavitary antibiotic instillation *(Ref: Harrison 18/e p2146; Sabiston 19/e p1586; Schwartz Schwartz 10/e p650-651, 9/e p550-551; Bailey 26/e p870, 25/e p893)*

Treatment of Lung Abscess

- Patients who **do not respond to initial regimen** and who **do not have surgical indications, early percutaneous drainage** is done[Q].
- When surgery is indicated, **lobectomy** is the **preferred choice**[Q].
- **Tube thoracotomy** and **open pleural drainage** is **also done for lung abscess**[Q].

55. Ans. d. Pneumonia *(Ref: Sabiston 19/e p1597-1598; Bailey 26/e p856, 25/e p881-882)*

Complications of Empyema	
• **Empyema necessitans** (**spontaneous decompression** of pus **through** the **chest wall**[Q])	• **Osteomyelitis** or **chondritis** of the ribs or vertebrae
• **Chronic empyema** (with entrapped lung and pulmonary restrictive disease)	• **Mediastinitis**[Q]
• **Pericarditis**[Q]	• **Bronchopleural fistula**[Q]
	• Disseminated infection of CNS

56. Ans. a. Aspiration

57. Ans. a. Left upper lobe *(Ref: Schwartz 9/e p549)*

Lung Abscess

- **Right upper** and **lower lobes** are **most commonly affected** followed by **left lower lobe** and **right middle lobe**[Q].

58. Ans. a. Direct extension from liver *(Ref: Harrison 18/e p2145; Sabiston 19/e p1586; Schwartz 9/e p550)*

Amebic Lung Abscess

- **Amebic lung abscess** is a result of **direct spread of infection from liver to lung**[Q].
- **Infection spread** directly **through** the **diaphragm**[Q].
- **MC area of lung** involved: **Right lower lobe**[Q]

59. Ans. d. Continued productive cough with purulent material

- The **clinical sign** of **getting BPF** is outlined as **continued productive cough** with **purulent material**, especially **when a patient is rolled** on the **side having Fistula**[Q].

60. Ans. a. Pott's spine **61. Ans. d. Pleural empyema is showing extension to the subcutaneous tissue**

62. Ans. d. Strongyloides strecoralis *(Ref: Bailey 24/e p117)*

Parasitic Causes of Empyema	
• **Paragonimus wetermani**[Q]	• **Entamoeba coli**[Q]
• **E. granulosus**[Q]	

PLEURAL COLLECTIONS

63. Ans. d. TOC is excision and ligation of thoracic duct *(Ref: Sabiston 19/e p1598-1599; Schwartz Schwartz 10/e p685-687, 9/e p580-582; Bailey 26/e p938, 25/e p958)*

Chylothorax

- A chylothorax occurs **when the thoracic duct is disrupted** and **chyle accumulates** in the pleural space.
- **MC cause of chylothorax: Trauma** (most frequently **thoracic surgery**[Q])
- **More common** on **right side**[Q]

Clinical features

- Patients with chylothorax present with **dyspnea,** chest pain, fatigue

  - **Thoracentesis** reveals **milky fluid**[Q]
  - **TG level >1.2 mmol/L (110 mg/dL**[Q]**).**

Diagnosis

- **Chest X-ray**: **Large pleural effusion**[Q]
- Patients with chylothorax and no obvious trauma should have a **lymphangiogram** and a **mediastinal CT scan** to assess the **mediastinum for lymph nodes**[Q].

Treatment

- **Treatment of choice**: **Chest tube insertion** + Administration of **octreotide** and **Medium chain triglycerides**[Q].
- If these modalities fail, a **pleuroperitoneal shunt** should be placed unless the patient has chylous ascites.
- **An alternative treatment** is **ligation of the thoracic duct**[Q].
- Patients with chylothoraxes **should not undergo prolonged tube thoracostomy** with chest tube drainage because this will lead to **malnutrition** and **immunologic incompetence**[Q].

64. Ans. d. Bile duct stones *(Ref: http://en.wikipedia.org/wiki/Chyluria; Bailey 26/e p938, 25/e p958)*

Chyluria

- **Filariasis** is the **MC cause**, with chyluria occurring in 1–2% of cases 10–20 years after initial infestation.

Causes of Chyluria	
• **Filariasis**[Q]	• **Tuberculosis**[Q]
• **Ascariasis**	• **Pregnancy**[Q]
• **Malaria**	• **Childbirth**[Q]
• **Tumour**	

Clinical Features

- It usually presents as **painless passage** of **milky white urine**, particularly **after a fatty meal**.
- The **chyle may clot**, leading to **renal colic**, and **hypoproteinaemia** may result.

Diagnosis

- **Intravenous urography** and/or **lymphangiography** will often demonstrate the **lymphourinary fistula.**

Treatment

- Treatment includes a **low-fat** and **high protein diet**, **increased oral fluids** to prevent clot colic, and **laparotomy** and **ligation of the dilated lymphatics**.
- Attempts have also been made to **sclerose the lymphatics** either **directly** or **via instrumentation** of the bladder, ureter and renal pelvis.

SEQUESTRATION OF LUNGS

65. Ans. b. Descending abdominal aorta *(Ref: Sabiston 19/e p1836-1837; Schwartz Schwartz 10/e p1607, 9/e p1418; Bailey 26/e p870, 25/e p894)*

Pulmonary Sequestration

- **Malformations** of the lung **without bronchial communication** with an **aberrant systemic blood supply**[Q].
- **MC site**: **Posterobasal segment** of **left lower lobe**[Q]
- **Presentation** is with **recurrent chest infection**[Q].

Pulmonary Sequestration

Intralobar	Extralobar
• Reside **within lung parenchyma**[Q] • **Infrequently associated with** other **anomalies**[Q] • Found within the **medial** or **posterior segments** of the **lower lobes** • **Two thirds** occurring **on left side**[Q]. • In 85% of cases supplied by an **anomalous systemic vessel** arising from the **infradiaphragmatic aorta**[Q], **located within** the **inferior pulmonary ligament**. • **Venous drainage** through the **inferior pulmonary vein**. • Because of the **risk for infection** and **bleeding**, **usually removed**, either by **segmentectomy** or **lobectomy**[Q].	• Surrounded by a **separate pleural covering**[Q] • Occur predominantly in **males**[Q] • More common on the **left side**[Q]. • In 40%, **multiple other anomalies**[Q] are encountered. • **Usually asymptomatic**[Q] • Because there is **usually no bronchial communication**, the **risk for infection is low**. • Many of these malformations may be **observed**[Q].

Diagnosis

- **CT** is **preferred modality** for diagnosis of **pulmonary sequestration**[Q].
  - Historically, angiography was considered an important preoperative study before embarking on resection of a sequestration.
  - More recently, **CT** and **MRI** have **replaced the need for angiography** and **provide excellent mapping of the blood supply**[Q].

66. Ans. b. Left posterior basal

67. Ans. b. 50-70% occur in lung, c. Are commonly infected, d. Multilocular

68. Ans. b. They arise from anomalous development of foregut)

69. Ans. d. Posterior basal segment of lower lobe

70. Ans. c. Bronchus **71. Ans. b. Descending aorta** **72. Ans. a. CT**

TRACHEOBRONCHIAL FOREIGN BODY

73. Ans. a. Right posterior basal *(Ref: Schwartz 9/e p1420; Bailey 26/e p859, 25/e p884)*

Tracheobronchial Foreign Body

- **Aspiration of foreign bodies most commonly** occurs **in** the **toddler age**[Q] group.
- **Peanuts** are the object **most frequently aspirated**[Q].
- **MC anatomic location** for a foreign body is the **right main stem bronchus** or the **right lower lobe**[Q].

Clinical Features

- The child usually will **cough** or **choke while eating** but **may then become asymptomatic**.
- **Total respiratory obstruction** may occur **with a tracheal foreign body**; however, respiratory distress is usually mild if present at all.
- **A unilateral wheeze** is often heard **on auscultation**[Q].

Diagnosis

- **Chest X-ray**: **Radiopaque foreign body**
  - **Bronchoscopy (rigid) confirms** the **diagnosis** and **allows removal of** the **foreign body**[Q].

Complications

- A **solid foreign body** often will cause **air trapping**, with **hyperlucency** of the affected lobe or lung seen especially on expiration.
- **Delay in diagnosis** can lead to **atelectasis** and **infection**[Q].

74. Ans. c. Apical part of the lower lobe **75. Ans. a. Decreased ventilation perfusion ratio**

VATS

76. Ans. c. Collapse of ipsilateral lung *(Ref: Sabiston 19/e p1570; Schwartz Schwartz 10/e p704, 9/e p522; Bailey 26/e p957, 25/e p881-883)*

Video Assisted Thoracoscopic Surgery (VATS)

- In contrast to most laparoscopic techniques, the **working space for VATS** is created not by adding an insufflating gas but rather by **removing air from the ipsilateral lung parenchyma** causing **collapse of the ipsilateral lung**[Q].
- **Used for pulmonary decortication, pleurodesis,** and **lung** or **pleural biopsies**

77. Ans. b. Video assisted thoracoscopic surgery

THORACOTOMY

78. Ans. d. Rib fracture *(Ref: Sabiston 19/e p438; Schwartz 9/e p159; Bailey 26/e p357, 25/e p345-346, 888-891)*

Indications of Thoracotomy	
• Initial tube thoracostomy drainage of **>1000 ml (penetrating injury)**[Q] or **>1500 ml (blunt injury)**[Q] • Ongoing tube thoracostomy drainage of **>200 ml/hr** for **3 consecutive hours**[Q] in non-coagulopathic patients	• Selected **descending torn aorta** or **great vessel injury**[Q] • **Pericardial tamponade**[Q] • **Cardiac herniation**[Q] • **Massive air leak**[Q] from chest tube with inadequate ventilation
• **Caked hemothorax**[Q] despite of placement of two chest tubes • **Tracheo-bronchial injury**[Q]	• **Open pneumothorax**[Q] • **Esophageal perforation**[Q]

79. Ans. d. Pulmonary contusion

80. Ans. a. Profuse uncontrolled bleeding, c. Bronchial adenoma, d. Bronchial fistula *(Ref: Tuberculosis by William N. Rom/519; Harrison 18/e p1371-1373)*

Indications of Pulmonary Resection in TB (Hemoptysis)

Absolute	Relative
• **Massive hemoptysis**[Q] (**600 ml**/24 hours) • Destroyed lung, positive sputum • **Bronchopleural fistula**[Q] • **Suspicion of carcinoma**[Q]	• Hemoptysis • Bronchial stenosis • Persistent positive sputum • Open, negative cavity • TB empyema • Atypical tubercular infection • **Aspergillosis (fungal balls)**

81. Ans. c. Rhomboides major *(Ref: Sabiston 19/e p1570; Farquharson's Operative Surgery 9/e p132)*

Posterolateral Thoracotomy

- **Posterolateral thoracotomy** is the **most frequently used operation** to **access** the **thorax**[Q].
- **Incision** is made through **5th intercostal space**[Q].

Following muscles may be cut in Posterolateral Thoracotomy	
• **Lattisimus dorsi**[Q] • **Serratus anterior**[Q]	• **Trapezius**[Q] • **Intercostal muscles**[Q]

82. Ans. b. Pulmonary contusion **83. Ans. a. Internal mammary artery**

BENIGN LUNG TUMORS

84. Ans. a. Hamartoma *(Ref: Schwartz 9/e p526; Bailey 26/e p867, 25/e p891)*

Pulmonary Hamartoma

- **MC benign tumor of lung: Hamartoma**[Q]
- Most commonly, **hamartomas** are manifested by **overgrowth of cartilage**.
- Typically seen in **40-60 years** of age, **more common** in **males.**
- **Usually peripheral**, **grow slowly** in the lung.
- **Chest X-ray**: **Popcorn calcification** is **diagnostic**[Q].

85. Ans. c. Recurrent hemoptysis *(Ref: Harrison 18/e p753)*

Bronchial Adenoma

- **Centrally located slow-growing endobronchial lesions** that are **generally carcinoid tumors** (80%), **adenocystic tumors** (so called cylindromas, 10–15%), or **mucoepidermoid tumors** (2–3%).
- **Mean age at presentation** is **45 years** (range 15–60).

Clinical Features

- **MC symptom: Recurrent Hemoptysis**[Q]
- History of **chronic cough, intermittent hemoptysis**[Q], or **repeated episodes of airway obstruction** with **atelectasis**, or **pneumonias with abscess formation** due to endobronchial lesions obstructing the airway.

Diagnosis

- Usually **visible at bronchoscopy** but are **highly vascular** and may **bleed profusely after a bronchoscopic biopsy**[Q].

Treatment

- They are **largely curable by surgical resection (local excision)**, but they **may recur locally** or **become invasive** and **metastasize**[Q].
- **Five-year survival after resection** is **95%** for localized **disease**.

86. Ans. c. Recurrent hemoptysis

87. Ans. c. Carcinoid syndrome does not manifest *(Ref: Robbins 8/e p729; Harrison 18/e p3061-3062)*

Bronchial Carcinoid

- **Bronchial carcinoids** (**least malignant**) are the **most indolent** of the spectrum of pulmonary **neuroendocrine tumors**
- Most patients are **<40 years; Not related to smoking**[Q]

  - **Lower respiratory tract (Bronchus, lung, trachea)** is the **MC site of carcinoid tumor**[Q]
  - **Carcinoid syndrome** is **uncommon**[Q]

Pathology

- **Most tumors** are **confined to main stem bronchus**, commonly **projects into** the **lumen**[Q]
- Some tumors penetrate the bronchial wall to fan out in the peri-bronchial tissue producing the **collar-button lesion**[Q]

Most bronchial carcinoids
• **Do not have secretary activity**[Q]
• **Do not metastasize** to distant sites[Q]
• Are **amenable to resection**[Q]

88. Ans. c. Adenoma bronchus

MESOTHELIOMA

89. Ans. a. Bilaterally symmetrical *(Ref: Sabiston 19/e p1599; Schwartz 10/e p688, 9/e p582-584; Bailey 25/e p881)*

Malignant Mesothelioma

- **Malignant mesothelioma** is **MC tumor of** the **pleura**[Q]
- In **20%** of malignant mesotheliomas, the **tumor arises from peritoneum**[Q]
- **Exposure to asbestos**[Q] is the **major known risk factor**
- More common in **males**[Q], most common **after 40 years** of age.

  - Three types: **Epithelial, sarcomatous**, and **biphasic**[Q]
  - **Epithelial types** are **associated with** a more **favorable prognosis**[Q]

Pathophysiology

- Physical characteristics of **specific fibers** (referred to as **serpentine** or **amphibol**e) have been shown to be important.

  - **Serpentine fibers**: Large and curly, **not able to travel beyond larger airways**.
  - **Straight amphibole fibers:** In particular the **crocidolite**[Q] **fibers navigate distally** into the pulmonary parenchyma, **most clearly associated with mesotheliomas**.

- **Latency period** between asbestos exposure and the development of mesothelioma is **at least 20 years**.

  - **Multicentric tumor** with **multiple pleura-based nodules** coalescing to form sheets of tumor (but **not bilaterally symmetrical**[Q])

- Natural history of the disease in **untreated patients culminates in death** due to **local extension**.

Clinical Features

- Most patients present with **dyspnea** and **chest pain**[Q].
- Over **90%** have a **pleural effusion**[Q].

Diagnosis

- Results of **thoracentesis** are **diagnostic in <10%** of patients.
- **Chest X-ray: Pleural effusion**, generalized **pleural thickening** and **shrunken hemithorax**[Q].
- **Thoracoscopy** or **open pleural biopsy** with **special staining** of tumor samples is **required to differentiate mesotheliomas from adenocarcinomas**[Q].

Management

- **No effective therapy**[Q]
- **Treatment option**s: Supportive care only, surgical resection, and multimodality approaches (using a combination of surgery, chemotherapy, and radiation therapy).

Differentiation of Mesothelioma from Adenocarcinoma		
	Mesothelioma	**Adenocarcinoma**
CEA	Negative	**Positive**[Q]
Vimentin	**Positive**[Q]	Negative
Low molecular weight **cytokeratins**	**Positive**[Q]	Negative
Electron microscopic features	**Long, sinuous villi**	**Short, straight villi with fuzzy glycocalyx**

90. Ans. a. Asbestosis **91. Ans. e. All of the above**

SQUAMOUS CELL CARCINOMA

92. Ans. b. Squamous cell carcinoma

ADENOCARCINOMA

93. Ans. a. Common in females, d. Peripheral involvement is common *(Ref: Harrison 18/e p738-751; Sabiston 19/e p1573-1582; Schwartz 10/e p679,1018,1607, 9/e p529-538; Bailey 26/e p859-867, 25/e p884-888; Devita 9/e p799-812)*

Bronchogenic Carcinoma

- **MC type** of **lung neoplasm**[Q]
- **Arises from respiratory epithelium** of bronchi, bronchioles and alveoli
  - **MC visceral malignancy** and leading cancer **causing death**: **CA lung**[Q]
- **Mostly arise from lung hilum** except bronchoalveolar carcinoma and some adenocarcinoma[Q].
- **Mucinous bronchoalveolar carcinoma** tends to **spread aerogenously** forming **satellite tumors**[Q].

Etiology and Risk factors	
• **Smoking**[Q] (both active and passive) • Air pollution (**Radon**[Q]) • Exposure to **asbestos**, **uranium** and **nickel**[Q]	• **Old infarct** and **lung scars** (most progress to **adenocarcinoma**[Q]) • Ionizing **radiation** exposure[Q]

Oncogenic abnormality	
Small Cell Carcinoma	**Non-small Cell Carcinoma**
• Over expression of **bcl-2**, **myc** and **telomerase**[Q]	• Over expression of **bcl-2** and **telomerase** with abnormal **ras** gene[Q] • **K-ras** mutation is **MC mutation** (90%) in **adenocarcinoma**[Q]

Clinical Features

- **MC symptoms** are **cough**[Q] (**MC**) > dyspnea > chest pain>hemoptysis.
- Slightly **more common** on **right side,** more frequently occurs in **upper lobes**[Q]
- **Major source** of **hemoptysis** are **bronchial arteries**[Q]
- Endobronchial growth of central tumors cause cough, stridor, wheeze and dyspnoea
- **Peripheral tumors** present as **pain** due to pleural or chest wall involvement

Symptoms due to regional spread	
• Tracheal obstruction, esophageal compression, **RLN paralysis**[Q] • **Pancoast syndrome**[Q] (involvement of **C8T1 nerves** by pancoast tumor causing pain in **ipsilateral shoulder** and **arm**[Q])	• Horner's syndrome • **SVC syndrome** (MC cause is **small cell carcinoma** >SCC)[Q] • **Malignant pleural effusion**[Q]

Metastases

- **MC site** of **metastases** are **adrenal**[Q] **> liver > brain**
- **CA lung** is **MC primary** for metastasis to **K**idney, **E**sophagus, **P**ancreas, **S**pleen, **L**iver, **A**drenal, **B**rain, **S**kin **(KEPS LABS**[Q]**)**

Paraneoplastic syndromes	
• **CVS:** Thrombophlebitis, non-bacterial thrombotic endocarditis • **Metabolic**: – Inappropriate **ACTH** and **ADH** secretion (**small cell**)[Q] – **Hypercalcemia** (**SCC**)[Q] • Acanthosis nigricans (adenocarcinoma), dermatomyositis, icthyosis, erythema gyretum repens	• **GIT:** Carcinoid syndrome • Erythrocytosis • **Neuromuscular:** – Dementia, optic neuritis, retinopathy, limbic encephalitis – **Autonomic neuropathy (small cell)**[Q] – **Lambert-Eaton syndrome**[Q] **(small cell)** – Polymyositis, **cerebellar degeneration**[Q]

Diagnosis and Staging

- **Tissue diagnosis**: Tumor tissue can be obtained by **bronchial** or **transbronchial biopsy**[Q] through **fiberoptic bronchoscopy**[Q]; by percutaneous biopsy of enlarge node
- **Integrated PET-CT** scan is the **best imaging modality**[Q] for diagnosis and staging

94. Ans. a. Surgery *(Ref: Harrison 18/e p745-747; Sabiston 19/e p1577-1582; Devita 9/e p808-822)*

7TH AJCC TNM CLASSIFICATION OF LUNG CANCER

Tis: Carcinoma in situ

T1a: Tumor **≤2 cm** in greatest dimension

T1b: Tumor **>2 cm** but **≤3 cm** in greatest dimension

T2: Tumor **>3 cm** but **≤7 cm** or tumor with any of the following features:

- Involves **main bronchus**, **≥2 cm distal** to the carina
- Invades **visceral pleura**
- Associated with **atelectasis** or **obstructive pneumonitis** that extends to the hilar region but does not involve the entire lung

T2a: Tumor **>3 cm** but **≤5 cm** in greatest dimension

T2b: Tumor **>5 cm** but **≤7 cm** in greatest dimension

T3: **Tumor >7 cm** or one that **directly invades any of the following**: **chest wall** (including superior sulcus tumors), **diaphragm, phrenic nerve, mediastinal pleura, parietal pericardium**; or:

- Tumor in the **main bronchus <2 cm distal to the carina** but without involvement of the carina; or
- **Associated atelectasis** or **obstructive pneumonitis** of the **entire lung** or
- **Separate tumor nodule**(s) in the **same lobe.**

T4: Tumor of any size that **invades any** of the following: **mediastinum, heart, great vessels, trachea, recurrent laryngeal nerve, esophagus, vertebral body, carina**; or

- **Separate tumor nodule(s)** in a **different ipsilateral lobe**

N1: Metastasis in **ipsilateral peribronchial** and/or **ipsilateral hilar lymph nodes** and **intrapulmonary nodes**, including involvement by direct extension
N2: Metastasis in **ipsilateral mediastinal** and/or **subcarinal lymph node(s)**
N3: Metastasis in **contralateral mediastinal, contralateral hilar, ipsilateral or contralateral scalene**, or **supraclavicular lymph node(s)**
M1a: Separate tumor nodule(s) in a **contralateral lobe**; tumor with **pleural nodules** or **malignant pleural (or pericardial) effusion**
M1b: **Distant metastasis**

AJCC 7th Edition TNM Stage Groupings			
Stage	**T**	**N**	**M**
Occult cancer	TX	N0	M0
0	**Tis**	N0	M0
IA	**T1a/b**	N0	M0
IB	**T2a**	N0	M0
IIA	**T2b** **T1a/b; T2a**	N0 **N1**	M0 M0
IIB	**T2b** **T3**	**N1** N0	M0 M0
IIIA	**Any T1; T2** **T3** **T4**	**N2** **N1/N2** **N0/N1**	M0 M0 M0
IIIB	**T4** Any T	**N2** **N3**	M0 M0
IV	Any T	Any N	**M1a/b**

Treatment of Operable NSCCL

- Stage **IA, IB, IIA, IIB**: **Surgical resection**[Q]
- **Adjuvant chemotherapy** is given in **stage II**[Q]
- Stage **IIIA** with **minimal N2 involvement**: **Neoadjuvant chemotherapy** followed by **surgical resection** with **complete mediastinal LN dissection**[Q]
- **Postoperative radiotherapy** for patients found to have **N2 disease**[Q]

95. **Ans. d. Peripheral location**
96. **Ans. b. Adenocarcinoma**
97. **Ans. a. Adenocarcinoma of lung**

SMALL CELL CARCINOMA

98. **Ans. c. (Chemosensitive tumor** *(Ref: Harrison 18/e p738, 751; 17/e p551-554)*

Small cell carcinomas are **highly chemosensitive** with an overall **90% regression rate with chemotherapy.**

Property	Small cell Carcinoma	Non small cell Carcinoma
Location	• **Central** location[Q]	• **Peripheral** location[Q]
Metastasis	• **Highly metastatic** lesion with widespread metastasis at time of diagnosis. • **Common site** of metastasis include **brain, bone, liver** and **adrenals**[Q]	• Less metastatic than small cell carcinoma
Paraneoplastic syndrome	• **ACTH**[Q] • **AVP** (Vasopression)[Q] • **Calcitonin**[Q] • **ANF**[Q] • Gastrin Releasing peptide	• **PTH-rp**[Q]
Response to chemotherapy	• **Superior response**[Q] • Overall **regression rate 90%**[Q] • Rate complete regression in 30%	• **Inferior response** • Objective shrinkage in 30-50% • Complete response: uncommon

99. **Ans. a. Small cell carcinoma**
100. **Ans. b. Chromagranin**
101. **Ans. d. Noradrenaline**
102. **Ans. a. Small cell anaplastic**
103. **Ans. a. Hypercalcemia, c. Watery diarrhea**
104. **Ans. a. Commonest malignancy of lung**
105. **Ans. c. Chemosensitive tumor**
106. **Ans. b. Small cell carcinoma**
107. **Ans. b. Growth hormone**
108. **Ans. b. Oat cell type**
109. **Ans. c. Small cell carcinoma of lung**
110. **Ans.** a. **Small cell carcinoma**

CARCINOMA LUNG

111. **Ans. c. Oat cell variant is typically associated with hilar adenopathy** *(Ref: Sabiston 19/e p1573-1582; Schwartz 10/e p623-645, 9/e p529-538; Bailey 26/e p859-867, 25/e p884-888; Devita 9/e p799-812; Harrison 18/e p738-751)*

- Small cell carcinoma or oat cell variant is associated with **massive hilar** or **mediastinal lymphadenopathy**, **mediastinal invasion** and **perihilar mass**

WHO Classification of Carcinoma Lung

Adenocarcinoma	Squamous Cell Carcinoma	Small Cell Carcinoma	Large Cell Carcinoma
• **MC** histological **type**[Q] • MC in **non-smokers**, **young** patients, **females**[Q] • Located **peripherally**[Q] • **Slow growth** and propensity to **metastasize** to **opposite lung**[Q] • **Metastasize** more frequently to **CNS**[Q] • Most cells contain **mucin**[Q] • **Noguchi classification**[Q] is used for adenocarcinoma	• **MC** in **smokers**[Q] • MC type in **India** • MC variety associated with **hypercalcemia** (produces **PTH-rp**)[Q] • **Central**[Q] in distribution • Prone to undergo **central necrosis** and **cavitation**[Q] • **Pancoast** tumor is histologically **SCC**[Q] • Associated with **best prognosis**[Q]	• **Most malignant**, **central**Q in distribution, strongly related to **smoking**[Q] • Cells are small with little cytoplasm called "**oat cell**"[Q] • Associated with **massive hilar** or **mediastinal lymphadenopathy**, **mediastinal invasion** and **perihilar mass**[Q] • **MC variety** associated with **paraneoplastic syndrome**, **hypokalemia** and **SVC syndrome**[Q] • Most responsive to **chemotherapy** (cisplatin + etoposide) • Shows response to **radiotherapy**[Q] • Hormones produced by small cell carcinoma: **ACTH**, **AVP** (vasopressin), **calcitonin**, **ANF**, gastrin releasing peptide[Q]	• Highly **undifferentiated** with **cavitating nature** • **Metastasize early** with **poor prognosis**

112. Ans. d. Geftinib is most effective for female smokers with adenocarcinoma histology *(Ref: Harrison 18/e p751; Davidson 21st/703)*

- **Geftinib** is an oral small molecule tyrosine kinase inhibitor **approved for treatment of** patients with **NSCCL.** Data to support the use of Geftinib in NSCCL are however diminishing and **Geftinib is most effective in females** who have **never smoked** with **adenocarcinoma histology**.
- **Single agent chemotherapy** is **preferred** for **elderly patients (>70 years).**

Contraindication to Surgical Resection in NSCCL	
• **Distant metastasis** (M1)[Q] • **Invasion** of **central mediastinal structures** including **heart, great vessels, trachea** and **esophagus** (**T4**)[Q] • **Malignant pleural effusion** (**M1**)[Q]	• **Contralateral mediastinal nodes** (**N3**)[Q] • **FEV1 <0.8 L**[Q] • Severe or **unstable cardiac** or other **medical conditions**[Q]

113. Ans. d. Hypercalcemia

114. Ans. d. Superior vena caval obstruction *(Ref: Harrison 18/e p2266; 17/e p554)*

Superior Vena Cava (SVC) Syndrome

- Clinical manifestation of SVC obstruction, with severe reduction in venous return from head, neck and upper extremities.
- **MC cause** is **Lung cancer (small cell** and **squamous cell carcinoma)**[Q], alongwith **lymphoma** and **metastatic tumors** responsible for more than 90% of all SVC syndrome.
- **In young adults**, **malignant lymphoma** is the **leading cause** of SVC syndrome[Q].

Clinical Features

- Patients present with **neck and facial swelling** (especially around the eyes), **dyspnoea,** and **cough**[Q]**.**
- Other symptoms include hoarseness, tongue swelling, headache, nasal congestion, epistaxis, dysphagia, pain, dizziness, syncope.
- **Characteristic physical findings are dilated neck veins, increased number of collateral veins covering the anterior chest wall, cyanosis, and edema of the face, arms and chest**[Q]**.**

Diagnosis

- Most significant chest radiographic finding is **widening of the superior mediastinum** (**MC right side**)[Q]
- **CT scan: Investigation of choice**[Q].

Treatment

- Potentially life threatening complication of **superior mediastinal mass** is **tracheal obstruction**[Q].

- Diuretics with low salt diet, head elevation and oxygen may produce temporary symptomatic relief.

Treatment	Underlying cause
Radiation Therapy[Q]	**Non-small cell lung cancer,** Metastatic solid tumors
Chemotherapy[Q]	**Small cell carcinoma or lymphoma**
Surgery[Q]	All other cases

115. Ans. b. Small cell carcinoma

116. Ans. a. Cytokeratin *(Ref: Fishman Pulmonary Disease 4th/848)*

- **Cytokeratin positivity** is seen in **almost all NSCCL** (Non small cell carcinoma lung) due to their **epithelial origin.**
- **Chromagranin and synaptophysin positivity** is seen in **small cell carcinoma.**

117. Ans. d. Secretion of PTH-related peptic

118. Ans. c. Non-small cell lung carcinoma

119. Ans. b. Adrenal

120. Ans. a. Adenocarcinoma most common, d. Oat Cell (Neuroendocrine cells)

121. Ans. a. Clara cells, c. Mucin secreting cells, d. Type II pneumocytes *(Ref: Robbins 8/e p725)*

Bronchioloalveolar Carcinoma (BAC)

- BAC occurs in the **pulmonary parenchyma** in the **terminal bronchioloalveolar regions**[Q].

Histologically

- Characterized by a **pure bronchioloalveolar growth pattern** with **no evidence of stromal, vascular,** or **pleural invasion**[Q]**.**
- **Key feature**: **Growth along preexisting structures**[Q] without destruction of alveolar architecture. This growth pattern has been termed **"lepidic",** and allusion to the neoplastic cells resembling butterflies sitting on a fence.

Two subtypes

- **Nonmucinous**: Columnar, **peg-shaped**, or cuboidal cells
- **Mucinous:** Distinctive**, tall, columnar cells** with cytoplasmic and **intra-alveolar mucin**, growing along the alveolar septa.

Ultra-structurally

- BAC are a heterogeneous group, consisting of **mucin-screting bronchiolar cells**[Q], **Clara cells**[Q], or, rarely, **type II pneumocytes**[Q]

122. Ans. d. Pancoast syndrome *(Ref: Harrison 18/e p742; Sabiston 19/e p1582; Schwartz 10/e p623, 641-642, 9/e p534, 544-545; Bailey 26/e p859, 25/e p885; Devita 9/e p2136)*

Pancoast Tumor (Superior Sulcus Tumor)

- Pancoast's (or superior sulcus tumor) syndrome results **from local extension of** a **tumor growing in** the **apex of** the **lung** with **involvement of eighth cervical** and **1st** and **2nd thoracic nerves,** with **shoulder pain characteristically radiates in** the **ulnar distribution of** the **arm,** often with **radiologic destruction of 1st** and **2nd ribs**[Q]**.**
- Often **Horner's syndrome** and Pancoast's syndrome co-exist

Treatment

- **Preoperative RT** followed by **En bloc resection** of lung and **chest wall** with consideration of **postoperative RT** or **intra-operative brachytherapy**[Q].

123. Ans. c. Small cell carcinoma

124. Ans. None > c. Surgery *(Ref: Sabiston 19/e p1582)*

Best treatment is induction chemoradiotherapy followed by surgery.

125. Ans. c. Squamous cell carcinoma

Squamous Cell Carcinoma	
• **MC** in **smokers**, MC type in **India**[Q] • MC variety associated with **hypercalcemia**[Q] (produces PTH-rp) • **Pancoast** tumor is histologically **SCC**[Q]	• **Central** in distribution and prone to undergo **central necrosis** and **cavitation**[Q] • Associated with **best prognosis**[Q]

126. Ans. c. Left recurrent laryngeal nerve

127. Ans. d. Myasthenia gravis

128. Ans. a. Liver + Bones

129. Ans. d. Gastroparesis due to vagal involvement

130. Ans. b. Carcinoma bronchus *(Ref: www.ncbi.nlm.nih.gov ... v.63(Suppl 1); Jul 2011)*

Temporal Bone Metastasis

- **Metastatic tumors** to the temporal bone are **uncommon**
- **Usually** seeded by the **hematogenous route**
  - **MC metastatic lesion** in the temporal bone: **CA Breast**[Q]
- **Lung, prostate** and **renal carcinomas** are all well **documented for** their **metastatic potential to** the **temporal bone**[Q].

131. Ans. c. Small cell carcinoma

132. Ans. b. Adenocarcinoma

Adenocarcinoma	
• **MC** histological **type**, MC in **non-smokers**, **young** patients, **females**[Q] • Located **peripherally** with slow growth and propensity to **metastasize** to **opposite lung**[Q]	• **Metastasize** more frequently to **CNS** • Most cells contain **mucin**[Q] • **Noguchi classification** is used for **adenocarcinoma**[Q]

133. Ans. a. Variant of large cell anaplastic carcinoma

134. Ans. c. Hemoptysis

135. Ans. a. Malignant pleural effusion

136. Ans. c. Pancoast tumour

137. Ans. c. Cough

138. Ans. b. Ligate pulmonary artery *(Ref: Bailey 25/e p890)*

Pneumonectomy

- **Pneumonectomy** is anatomically **more straightforward than lobectomy** (in carcinoma bronchus):
- The **pulmonary artery** is **first dissected**, **divided** and **sutured**[Q].
- The **pulmonary veins** are then isolated, **divided** and sutured.
- The **main bronchus** is **divided** so that no blind stump remains. The technique of **stump closure** is important if a bronchopleural fistula is to be avoided. The tissues are carefully handled and the **stump** is **usually stapled**.

139. Ans. b. Non-small cell carcinoma

140. Ans. a. Lung

141. Ans. a. Cough

142. Ans. a. Carcinoma lung

143. Ans. a. Bronchoscopy

144. Ans. b. Bronchoscopy and biopsy

145. Ans. a. Bronchoscopy, lavage and brushing *(Ref: Bailey 26/e p862, 25/e p883)*

Uses of Bronchoscopy	
Diagnostic	**Confirmation of disease:** • **Carcinoma** of the **bronchus**[Q] • Inflammatory and Infective process
Investigative	• **Tissue biopsy**[Q]
Preoperative assessment	• **Before lung resection**[Q] • Before esophageal resection • **Persistent hemoptysis**[Q]
Therapeutic	• Removal of secretions • **Removal of foreign bodies**[Q] • Stent placement, endobronchial resection

PULMONARY EMBOLISM

146. Ans. d. Progesterone therapy *(Ref: Harrison 18/e p2170-2177; Sabiston 19/e p295-297; Schwartz 10/e p924-925, 9/e p787-789; Bailey 26/e p917, 25/e p939)*

- **Estrogen, not the progesterone** therapy **predisposes to thrombosis** and **pulmonary embolism**.

Pulmonary Embolism

- Risk factors for pulmonary embolism are the **risk factors for thrombi formation** within **venous circulation.**
- **Calf venous thrombosis: Low risk** for **embolism**
- **Thrombosis of larger veins**: **High risk** for **embolism** (due to **loosely attached thrombus** to **venous wall**)
  - **MC site for DVT: Calf veins**[Q]
  - **MC source for pulmonary emboli: Proximal vein of lower extremity**[Q] **(femoro-popliteal** and **iliac vein)**

Risk Factors for Pulmonary Thromboembolism	
• **Age (Increasing age)**[Q] • **Obesity**[Q] • **Immobility (bed rest >4 days)**[Q] • **PregnancyQ** and **Puerperium**[Q] • **High dose estrogen therapy**[Q] • **Surgery/trauma** (especially of **pelvis, hip or lower limb**)[Q] • Malignancy (especially **pelvis, abdominal**, **metastatic**)	• Heart failure/Recent MI[Q] • **Nephrotic syndrome**[Q] • Inflammatory bowel disease[Q] • **Polycythemia**[Q] • **PNHQ** or **Lupus anticoagulant** • **Behcet's syndrome**[Q] • **Homocystinuria**[Q] • **Paralysis** of lower limb • Varicose veins, **Infection**

Clinical features

- **Symptoms: Dyspnea (MC)**[Q]**, chest pain, hemoptysis** and **cough**
- **Signs: Tachypnea (MC)**[Q]**, fever, unilateral leg swelling**, wheeze, **pleural friction rub**

- Any patient with **high likelihood** of pulmonary embolism on clinical evaluation **straightaway undergoes imaging tests**, while a patient with **low clinical likelihood** should **first undergo D-dimer test.**

Factors for Clinical Assessment of Pulmonary Embolism	
• Clinical **signs** and **symptoms of DVT**[Q] • An alternative diagnosis is less likely than pulmonary embolism • **Heart rate >100/min**[Q] • **Hemoptysis**[Q]	• **Immobilization** or **previous surgery in 4 weeks**[Q] • **Previous DVT/PE**[Q] • **Malignancy**[Q] (on treatment, treatment in past 6 months)

ECG Changes in Pulmonary Embolism (Sinus tachycardia: MC and non-specific finding on ECG[Q])	
Features of Acute Right Heart Strain	**Highly predictive of PE**
• Acute **right axis deviation** • **P pulmonale** • **Right bundle branch block** • **Inverted T waves** • ST segment change	• **$S_1Q_3T_3$**[Q]**:** Seen in **<12%** patients – **S** wave in lead **I** – **Q** wave in lead **III** – Inverted **T** wave in lead **III** – S wave in lead I, II, and III ($S_1S_2S_3$)

Diagnosis

- **D-dimer**: **Excellent screening test for** the **diagnosis of PE**[Q]**.**
- **Best investigation** in clinical suspicion of PE: **Multidetector CT**[Q]
- **Lung scanning** is now a **2nd line** diagnostic test for PE.
- **Pulmonary angiography**: **Gold standard** for **diagnosis of PE**[Q] (but expensive and cumbersome)

147. Ans. c. Sinus tachycardia **148. Ans. a. Dyspnea**

149. Ans. a. Pulmonary thromboembolism **150. Ans. a. Pulmonary angiography**

151. Ans. c. End-tidal CO_2

Capnography

- It is the **continuous measurement** of **end tidal CO_2** and its waveforms.
- It works on the **principle** that **infrared light** is **absorbed by CO_2.**
- Useful in **diagnosing pulmonary embolism** by **air, fat** or **thrombus** (**sudden fall in End-tidal CO_2** occurs). It **may become zero** if the **embolus** is **large enough to block pulmonary circulation**[Q]**.**

152. Ans. c. Gas embolism **153. Ans. d. Virchow sign**

154. Ans. a. Filling defect of main pulmonary artery, c. Lobar and segmental oligemia, d. Pleural effusion, e. Peripheral, wedge-shaped consolidations *(Ref: Harrison 18/e p2174; Danhert Radiology 5th/51; Bhadury radiology 2nd/32)*

- Harrison says "A **definitive diagnosis of PE** depends on **visualization of an intraluminal filling defect in more than one projection**. **Secondary signs** of PE include **abrupt occlusion ("cut-off")** of vessels, **segmental oligemia** or **avascularity,** a **prolonged arterial phase** with **slow filling**, and **tortuous, tapering peripheral vessels**[Q]."

CT-Angiographic Findings of Pulmonary Embolism	
• **Intraluminal filling defect** in pulmonary artery (**most specific finding**[Q])	• **Oligemia**[Q]
• **Expanded unopacified vessel**[Q]	• **Pleural effusion**[Q]
• **Eccentric filling defects**[Q]	• **Abrup cut-off**[Q] of pulmonary artery
• Peripheral **wedge shaped consolidation**	• **Tapering peripheral vessel**[Q]

155. Ans. a. Fat embolism *(Ref: Apley's 8/e p 535-536, Rockwood 6th/553)*

Fat Embolism Syndrome

Pathophysiology

- Fat embolism is a common phenomenon, more commonly seen in **multiple fracture and in fractures involving lower limbs especially femur**[Q].
- Circulating **fat globules>10 micron**[Q] in diameter occur in most adults after **close fracture of long bones**[Q] and histological traces of fat can be found in the lungs and other internal organs.

Clinical presentation

- Usually manifests itself **within 24-48 hours**[Q].
- Early **warning signs** (within 72 hours of injury): Slight rise in temperature (**pyrexia**) and pulse rate (**tachycardia**)[Q]
  - In more pronounced cases there is **breathlessness**, mild mental confusion or restlessness, **petechiae on chest, axillae, retina and conjunctival folds**[Q]; progressive to **marked respiratory distress** and coma in severe cases.

Diagnosis

- In addition to the classic clinical features, signs of **retinal artery emboli (Striate hemorrhage** and **exudates**[Q]**)** may be present.
- **Sputum and urine**: **Presence of fat globules**[Q].
- Chest X-ray: **Patchy pulmonary infiltration (Snow storm appearance)**[Q]

Laboratory Tests	
No characteristic laboratory test, suggestive findings are:	
• **Thrombocytopenia**[Q] **(platelets <1.5 lacks)**	• **Tachycardia**[Q]
• **PO2 <60 mm Hg**[Q]	• **Pyrexia**[Q]
	• **Fall in hemoglobin value**[Q]

Management

- **Supportive pulmonary care**, **definitive fracture management** and **effective treatment of shock** are the **corner stones** of current fat embolism management.

Respiratory support	Treatment of shock	Fracture stabilization
• Ranges from **oxygen administration** to **full respiratory support** with mechanical ventilation	• Maintain adequate intravascular volume	• **Maintain adequate intravascular volume**
• **Oxygen** is the **only therapeutic tool** of **proven use**[Q]	• **Aggressive fluid resuscitation**	• Since **movement at** the **fracture site** has been shown to **increase** the **fat emboli** in circulation, **early immobilization of lower extremity fractures**[Q] is advocated
	• **Appropriate CVP monitoring** to avoid fluid overload.	
	• **Albumin** for **fluid resuscitation** along **with** a **balanced electrolyte solution** because it not only restores blood volume but also binds free fatty acids.	

Additional Therapies	
• **Steroids**: Prophylactic corticosteroids **benefit high risk patients**	• **Dextran**[Q]: To **reduce red cell aggregation**, **expand plasma volume**, **decrease blood viscosity** and **reduce platelet adherence**
• **Heparin**: **Increase** serum **lipase activity** and decrease number of circulating fat globules	• **Aprotinin**: Decrease platelet aggregation and serotonin release
• **Hypertonic glucose**: Metabolically **decrease production** of **free fatty acids**	• **Alcohol**: Reduces serum lipase activity

156. Ans. c. Contrast-CT

157. Ans. a. Pulmonary thromboembolism

158. Ans. a. Chest pain is the most common symptom

159. Ans. c. Large veins of leg

160. Ans. a. Lung ventilation-perfusion scan

161. Ans. a. Pulmonary arteriography

162. Ans. a. Thrombolytic therapy *(Ref: Harrison 18/e p2174; Sabiston 19/e p297; Schwartz 10/e p924-925, 9/e p787-789; Bailey 26/e p917, 25/e p939)*

Treatment of Pulmonary Embolus

- **Most pulmonary emboli** can be **treated by anticoagulation** and **observation**
- **Severe right heart strain** and **shortness of breath** indicates the need for **fibrinolytic treatment**[Q].

> - **Thrombolysis** (or **embolectomy**) is **treatment of choice** in **massive PE** or **high risk (hypotension ± Right ventricular dysfunction)**[Q]

Prophylaxis Against Pulmonary Embolism

- In patients who are considered at **high risk of embolism** or **when anticoagulants are contraindicated**, a **vena cava filter** may be inserted to prevent the onward passage of any emboli.
- **Filters** can also be placed **in patients** who **continue to have pulmonary emboli** despite **adequate anticoagulation**[Q].
- **Greenfield filter**: **Most commonly used**[Q]

163. Ans. a. Risk of hemorrhage **164. Ans. b. Negligible size of emboli** **165. Ans. a. Pulmonary embolism**

166. Ans. c. Dyspnea, pain, hemoptysis **167. Ans. d. Left upper lobe**

168. Ans. b. Fat embolism

THORACIC INJURY

169. Ans. a. Electrolyte imbalance, b. Lymphopenia, c. Dehydration, e. Chylothorax may be present *(Ref: Sabiston 19/e p1598; Schwartz 10/e p177-179, 200-203, 9/e p580-582; Bailey 26/e p702, 25/e p958; CSDT 12th/226)*

Thoracic Duct Injury

- **Causes: Iatrogenic trauma**[Q] **(MC), penetrating** and **blunt trauma**
- **Iatrogenic chylothorax** is a well-known **complication of thoracic operations**[Q]

Clinical presentation

- Most of the patient presents with **chylothorax**
- In **iatrogenic injuries, chylous fluid** coming **from drain site**

Complications of Thoracic Duct Injury	
• **Dehydration**[Q] • **Electrolyte losses**[Q] • **Loss of fat** and **fat-soluble vitamins**[Q]	• **Protein loss**[Q] • **Impaired immunity**[Q] secondary to loss of circulating lymphocytes (**lymphopenia**[Q])

Management

- **Conservative management: Low-fat diet** with **medium chain triglycerides**[Q], **TPN**, correction of electrolyte imbalance and **adequate drainage** by **chest tube** or **neck drain**[Q]
- **Octreotide** and recently, **Etilefrine** (an adrenergic agent that acts by causing smooth muscle contraction of the thoracic duct) **are effective**[Q].

> - **Iatrogenic thoracic duct injury** shows **higher rate of spontaneous closure with conservative treatment**[Q] than traumatic injury.

- **Surgery**: Surgery is indicated **after 5 days of conservative treatment,** if **chyle loss exceeds 1500ml** or if **leak persist after 2 weeks**[Q].

> - **VATS guided thoracic duct ligation** is **surgical treatment of choice**[Q].

Poirier's Triangle

- **Thoracic duct** is **readily identified within** the confines of **Poirier's triangle**[Q] via left posterolateral thoracotomy.
- **Boundaries: Arch of aorta, Left subclavian artery** and **Vertebral column**
- The thoracic duct traverses the triangle on **esophagus** that **forms the floor** of the triangle.

170. Ans. a. ECG done in all cases associated with sternal fracture, b. Under water seal drainage if associated with pneumothorax, c. X-ray chest investigation of choice *(Ref: Bailey 26/e p353-355, 25/e p341-345)*

Chest Trauma

- **Sternal fracture** also constitute a **marker for serious associated injuries**, including **myocardial contusion, myocardial rupture,** esophageal perforation, airway injuries and thoracic aortic rupture.
- In **blunt cardiac injuries, ECG** is the **first diagnostic test**[Q].
- **Routine investigation** in the **emergency department** of **injury to** the **chest** is based on **clinical examination, supplemented by chest radiography**.
- In the **unstable patient, chest radiography** is the **investigation of first choice**[Q], provided that it does not interfere with resuscitation.

171. Ans. d. All

ADULT RESPIRATORY DISTRESS SYNDROME

172. Ans. a. Hypoxemia *(Ref: Harrison 18/e p2205-2207; Sabiston 19/e p578)*

Acute Respiratory Distress Syndrome

- ARDS is a clinical syndrome of **severe dyspnea** of **rapid onset**, **hypoxemia**, and **diffuse pulmonary infiltrates** leading to **respiratory failure**[Q].
- ARDS is caused by **diffuse lung injury** from many underlying medical and surgical disorders.
  - **Diffuse alveolar damage** is the **most characteristic feature** of **ARDS**[Q].

Clinical Disorders Associated with ARDS

Direct Lung Injury	Indirect Lung Injury
• **Pneumonia**[Q] • **Aspiration** of gastric contents[Q] • **Pulmonary contusion**[Q] • Near-drowning[Q] • Toxic inhalation injury[Q]	• **Sepsis**[Q] • **Severe trauma**: Multiple bone fractures, **Flail chest**, Head trauma, **Burns**[Q] • **Multiple transfusions,** Drug overdose • **Pancreatitis**[Q] • **Postcardiopulmonary bypass**[Q]

Clinical Course and Pathophysiology

Exudative Phase	Proliferative Phase	Fibrotic Phase
• **Alveolar capillary endothelial cells** and **type I pneumocytes** are **injured**[Q] • **Edema** rich in protein accumulates in **interstitial** and **alveolar spaces**[Q] • **Neutrophils** traffic into the **pulmonary interstitium** and **alveoli**[Q] • **Condensed plasma proteins aggregate in** the **air spaces**[Q] with cellular debris and dysfunctional pulmonary surfactant to **form hyaline membrane whorls.** • **Alveolar edema** in **dependent portions** of the **lung** • **Diminished aeration** and **atelectasis**[Q] • **Intrapulmonary shunting** and **hypoxemia**[Q] develop • **Tachypnea** and **increased work of breathing** frequently result in **respiratory fatigue** and **respiratory failure**[Q]	• Lasts from **day 7** to **day 21**[Q] • **Most patients recover rapidly** and are **liberated from mechanical ventilation** during this phase[Q]. • **Some patients** develop **progressive lung injury** and early changes of **pulmonary fibrosis**[Q]. • **First signs of resolution** are evident with **initiation of lung repair**, **organization of alveolar exudates**, and **lymphocyte-predominant** pulmonary infiltrate[Q]. • **Proliferation** of **type II pneumocytes** along alveolar basement membranes[Q]. • Presence of **alveolar type III procollagen peptide**, a **marker of pulmonary fibrosis**, is associated with a **protracted clinical course** and **increased mortality from ARDS**[Q]	• Require **long-term support** on **mechanical ventilators** and/or **supplemental oxygen**. • **Alveolar edema** and **inflammatory exudates** converted to **extensive alveolar duct** and **interstitial fibrosis**[Q]. • **Acinar architecture** is **markedly disrupted**, leading to **emphysema-like changes** with large bullae[Q]. • **Progressive vascular occlusion** and **pulmonary hypertension**. • Increased risk of **pneumothorax**, reductions in lung compliance, and **increased pulmonary dead space**[Q].

173. Ans. a. 6 mL/Kg *(Ref: Harrison 18/e p2207)*

Management of ARDS

- A large-scale, randomized controlled trial sponsored by the National Institutes of Health and conducted by the ARDS Network compared **low VT** (**6 mL/kg**[Q] predicted body weight) ventilation to conventional VT (12 mL/kg predicted body weight) ventilation.
- **Mortality** was **significantly lower** in the **low VT patients** (31%) compared to the conventional VT patients (40%).
- This improvement in survival represents the **most substantial benefit in ARDS mortality**[Q] demonstrated for any therapeutic intervention in ARDS to date.

174. **Ans. a. PCWP >18mm Hg** *(Ref: Harrison 18/e p2205)*

Diagnostic Criteria	Acute Lung Injury (ALI)	ARDS
PaO_2/FiO_2	• **≤300** mm Hg[Q]	• **≤200** mm Hg[Q]
Onset	• **Acute**[Q]	• **Acute**[Q]
Chest X-ray	• **Bilateral** alveolar or interstitial infiltrates[Q]	• **Bilateral** alveolar or interstitial infiltrates[Q]
Absence of Left Atrial Hypertension	• **PCWP ≤18** mm Hg[Q] • **No** clinical **evidence** of **increased left atrial pressure**[Q]	• **PCWP ≤18** mm Hg[Q] • **No** clinical **evidence** of **increased left atrial pressure**[Q]

175. **Ans. a. Diffuse alveolar damage**

176. **Ans. d. All of the above**

177. **Ans. d. (PaO_2/FiO_2 <200 mm of Hg)**

178. **Ans. c. Hypercapnia**

179. **Ans. d. Hypercapnia**

180. **Ans. d. Hypercapnia**

181. **Ans. c. Increased left atrial pressure**

182. **Ans. a. PaO_2/FiO_2 <200 mm Hg**

PULMONARY TUBERCULOSIS

183. **Ans. b. Bronchial artery** *(Ref: Grainger Radiology 4th/609)*

Brochial arteries are the **major source of hemoptysis**.

184. **Ans. d. All of the above** *(Ref: Tuberculosis by William N. Rom/519; Harrison 18/e p1371-1373)*

Indications of Pulmonary Resection in TB (Hemoptysis)

Absolute	Relative
• **Massive hemoptysis**[Q] **(600 ml**/24 hours)	• Hemoptysis
• Destroyed lung, positive sputum	• Bronchial stenosis
• **Bronchopleural fistula**[Q]	• Persistent positive sputum
• **Suspicion of carcinoma**[Q]	• Open, negative cavity; TB empyema
	• Atypical tubercular infection
	• **Aspergillosis (fungal balls)**

CARDIAC TUMORS

185. **Ans. b. Myxoma** *(Ref: Harrison 18/e p1979)*

Myxoma

- **MC type** of **primary cardiac tumor** in all age groups: **Myxoma**[Q]
- Occur at all ages, **most commonly in 3rd** to **6th decades**, with a **female predilection**.
- Approximately **90%** are **sporadic**
- Remainder are **familial** with **autosomal dominant transmission** (NAME and LAMB syndrome)

Pathology

- Myxomas are **gelatinous structures**, consist of **myxoma cells** embedded in a stroma **rich in glycosaminoglycans.**
  - Most are **solitary,** are located in the atria (**particularly the left atrium**, where they usually arise **from** the **interatrial septum** in the vicinity of the fossa ovalis), and are **often pedunculated** on a fibrovascular stalk.
- In contrast to sporadic tumors, **familial** or **syndromic tumors** tend to **occur in younger individuals**, are often **multiple,** may be **ventricular** in location, and are **more likely to recur** after initial resection.

Clinical Features

- **MC clinical presentation** mimics that of **mitral valve disease**: either **stenosis** owing to tumor prolapse into the mitral orifice or **regurgitation** resulting from tumor-induced valvular trauma.
- A characteristic **low-pitched sound**, a **"tumor plop,"** may be appreciated on auscultation during early or mid-diastole
- **Constitutional signs** and **symptoms**: Fever, weight loss, cachexia, malaise

Diagnosis

- 2-D **transthoracic** or **transesophageal echocardiography** is **investigation of choice**[Q].
- **CT** and **MRI**: Information regarding **size, shape, composition** and **surface characteristics**

- Cardiac catheterization and angiography are **no longer considered mandatory**

Treatment

- **Surgical excision** utilizing cardiopulmonary bypass is **curative**[Q].
- **Recur** in **12–22%** of **familial cases** but in only 1–2% of sporadic cases.

> - **Tumor recurrence** most likely is **due to multifocal lesions** in the **former** and **inadequate resection in the latter**[Q].

HEART TRANSPLANTATION

186. Ans. a. HIV infection, c. Irreversible pulmonary hypertension, e. Malignancy *(Ref: Bailey 25/e p1428, 24/e p918; Harrison 18/e p1916)*

Contraindications of Heart Transplantation

Absolute	Relative
• **Active infection** (or **HIV positive**)[Q] • **Irreversible pulmonary hypertension**[Q] • **Malignancy**[Q] • Another life threatening illness	• Age >60 years • Significant pulmonary vascular disease • Active duodenal ulceration • Creatinine clearance <30 µmol/litre • Drug or alcohol abuse • Psychiatric illness

PECTUS EXCAVATUM AND CARINATUM

187. Ans. a. Gross CVS dysfunction *(Ref: Sabiston 19/e p1856; Bailey 26/e p872, 25/e p895)*

Pectus Excavatum

- **Pectus excavatum** (also called **funnel chest**) is the **MC chest wall deformity**[Q]
- Incidence: **1 of 400** children.
- **More common** in **males**
- Arises from **excessive growth** of the **lower costal cartilages**, causing **posterior sternal depression**[Q].

Clinical Features

- **Most patients** are **asymptomatic** at the time of presentation
- **Decrease in respiratory reserve**[Q] or pain along the costal cartilages with exercise.

Diagnosis

- **PFT**: Evaluation of **baseline pulmonary function**[Q]
- **ECHO: Cardiovascular assessment**

> - **In severe cases, decreased stroke volume** and **cardiac output** with a **restrictive pattern** (decreased maximal breathing capacity) on PFT[Q].

Treatment

- **Early repair** with **best results** between **2-8 years** of age.

Indications for operative intervention	
• **Cosmesis**[Q] • **Psychosocial factors**[Q]	• Presence of **respiratory** or **cardiovascular insufficiency**[Q]

MISCELLANEOUS

188. Ans. d. To prevent progress of native blood vessel disease *(Ref: Sabiston 19/e p1667-1668)*

- A successful **CABG reduces symptoms, prevents catastrophies** and **prolongs survival.**
- It **does not prevent progress of native blood vessel disease**. Infact Restenosis of the grafted vessel is noted with the time.

189. Ans. a. Coarctation of aorta

Valvoplasty is done in valvular disease like MS, MR, AS or AR. It is not done in coarctation of aorta.

190. Ans. d. Endoscopic suction *(Ref: Sabiston 19/e p292-293)*

Endoscopic suction is not used in post-operative lung collapse.

Post-operative Lung Collapse (Atelectasis)

- **MC postoperative respiratory complication**: **Atelectasis**[Q]

- As a result of the **anesthetic**, **abdominal incision**, and **postoperative narcotics**, the **alveoli in** the **periphery collapse** and a pulmonary shunt may occur.
- **Aggressive pulmonary toilet** to prevent buildup of secretions and secondary infection **High risk** in **heavy smokers**, **obese** patients[Q]

Clinical Features

- **MC cause** of a **postoperative fever in** the **first 48 hours**: **Atelectasis**[Q]
- **Symptoms: Low-grade fever**, **malaise** and **diminished breath sounds** in the lower lung fields.

Management

- **Prevention of atelectasis**: **Pain control**, **deep breaths (spirometry)** and cough[Q]
- Rarely, intermittent positive pressure breathing and **chest physiotherapy** may be required.

> - **Encouraging** the patient **to breathe deeply** and **cough** is the **single most valuable management** approach **in preventing** and **resolving atelectasis** and **pneumonia**[Q].

- **Pneumonia**: Managed with **aggressive pulmonary toilet**, induced **sputum for culture** and **sensitivity** testing, **IV antibiotic therapy**.

191. Ans. a. It is a development defect, c. Defect is usually muscular *(Ref: www.ncbi.nlm.nih.gov › ... Lung India › v.26(2); Apr-Jun 2009 by AP Kansal)*

Eventration of the Diaphragm

- **Abnormally elevated position** of diaphragm **from paralysis** or **atrophy of** the **muscle fibers**.
- May be **congenital anomaly**[Q] caused by **failure of muscularization**[Q] **of** the **dome** of hemidiaphragm, or it may be **acquired** as a result of **dysfunction of** the **phrenic nerve** related to the neuromuscular disease or trauma including operative trauma.
- **Birth trauma**: **MC cause** of **acquired** diaphragmatic **eventration**, usually related to **breech** presentation.

> - **Most commonly** diagnosed **in pediatric patients**[Q]
> - **More common in males** and affect **left hemidiaphragm** more frequently.

Treatment

- **Diaphragmatic plication** is **preferred over resection**[Q].
- **Surgery to fix** the **diaphragm in inspiration**[Q] so the paradoxical movement and mediastinal shift are minimized.

192. Ans. a. Calcified lymph nodes eroding into bronchus *(Ref: www.ncbi.nlm.nih.gov/pubmed/12376611)*

Broncholithiasis

- **Calcified** or **ossified material** is **present within** the **bronchial lumen**[Q]
- **Radiographic findings**: **Airway obstruction**[Q] such as atelectasis, mucoid impaction, bronchiectasis, and expiratory air trapping.
- Broncholithiasis is **strongly suggested at CT** (when an **endobronchial** or **peribronchial calcified nodule** is associated with bronchial obstruction)

193. Ans. b. Emphysema **194. Ans. b. Lobectomies** **195. Ans. d. Elevated pulmonary artery pressure**

196. Ans. b. Abram's *(Ref: Bailey 26/e p856, 25/e p881)*

Needles for Pleural Biopsy

- **Abrams' needle**
- **Cope's needle**

197. Ans. a. Pneumothorax *(Ref: thorax.bmj.com ›Volume 58, Issue suppl 2)*

Heimlich Valve

- **Heimlich chest drain valve** is a specially designed flutter valve used to replace underwater bottles in chest drainage.
- The valve allows **unidirectional flow**[Q].
- In clinical situations like **spontaneous pneumothorax**, **open thoracotomy, recurrent pleural effusion**[Q], chest drainage can be simplified with Heimlich chest drain valve.

198. Ans. b. Histoplasma *(Ref: Sabiston 19/e p1587; Schwartz 10/e p679-680, 9/e p577)*

The organism most frequently related to mediastinal fibrosis is Histoplasma.

CHRONIC (FIBROSING) MEDIASTINITIS

- The spectrum of chronic mediastinitis ranges from **granulomatous inflammation** of the **lymph nodes** in the mediastinum **to fibrosing mediastinitis**.
- **Most cases** are due to **TB** or **histoplasmosis**[Q], but sarcoidosis, silicosis, and other fungal diseases are at times causative.

Clinical Features

- Patients are **usually asymptomatic**.
- Those with fibrosing mediastinitis usually have **signs of compression of** some **mediastinal structure** such as the **SVC** or **large airways**, **phrenic** or **RLN** paralysis, or obstruction of the pulmonary artery or proximal pulmonary veins.

Treatment

- Other than **ATT for tuberculous mediastinitis**, **no medical** or **surgical therapy** has been demonstrated to be **effective for mediastinal fibrosis**[Q].

199. Ans. d. More common in lower lobes **200. Ans. d. Mediastinum** **201. Ans. c. Lateral thoracotomy** *(Ref: Bailey 25/e p888)*

The **standard route into thoracic cavity** is through a **posterolateral thoracotomy**.

202. Ans. d. Lateral border of 12th rib *(Ref: BDC 4th/vol-I/220)*

Level of
↓

	Inferior margin of pleural reflection	Lung lower border (Pleural level-2)
Mid-clavicular line	8th rib[Q]	6th rib[Q]
Mid-axillary line	10th rib[Q]	8th rib[Q]
Posterior axillary line (Lateral border of sacrospinalis/erector spinae)	12th rib[Q]	10th rib[Q]

203. Ans. a. Hemoptysis *(Ref: Bailey 26/e p869, 25/e p893)*

BRONCHIECTASIS

- **Chronic irreversible dilatation** of the **medium-sized bronchi**[Q], which may occur following a suppurative pneumonia or bronchial obstruction.
  - **If generalized** it is **almost never considered for surgical resection**[Q].

Treatment

- **Removal of** the **bronchiectatic part** of the lung for symptoms of **bleeding**[Q], **recurrent infection**[Q] or **copious symptoms**[Q] can be **very effective** when the **disease is localized.**

204. Ans. c. Ventriculectomy

Bentall's operation	For **aortic root aneurysm repair** **Reimplantation of coronary ostia** into composite graft
Bastio surgery	For **Left ventricular hypertrophy** **Ventriculectomy** is done[Q]

205. Ans. a. -2 to -6mm Hg

206. Ans. d. Laryngotracheal stenosis *(Ref: Dhillon 3rd/67)*

- **Topical Mitomycin C** is the **drug of choice** used to aid the treatment of **laryngeal stenosis**[Q].
- **Topical Mitomycin C** can **inhibit fibroblast activity** and **restenosis**[Q].

207. Ans. c. Round atelectasis *(Ref: Thoracic Imaging by Golanski (Thieme) 2010/Atelectasis/Chapter 2)*

ROUND ATELECTASIS

- **Rounded subpleural opacity**, most commonly in **lower lobes**[Q]
- **Comet tail sign positive**[Q]
- **Typical history of asbestos exposure**[Q] is often present

208. Ans. b. Saphenous vein *(Ref: Bailey 26/e p828)*

Saphenous vein are the **most commonly employed conduits in coronary vascularization**.

209. Ans. c. FEV1 >22, normal DLCO *(Ref: Bailey 26/e p851-852)*

Pulmonary Function Test

- Pulmonary function studies are routinely performed when any resection greater than a wedge resection will be performed.
- Of all the measurements available, the **two most valuable are FEV1 and DLCO.**
- For every 10% decline in patients DLCO, the risk of any pulmonary complications (As estimated by odd ratio) increased by 42%.
- Patients with **FEV1 >2.0L can tolerate pneumonectomy**, and those with an **FEV1 of >1.5L can tolerate lobectomy.**

210. Ans. c. CT chest is the first investigation done *(Ref: Harrison 18/e p285; Sabiston 19/e p1589)*

- "**Massive hemoptysis** may be defined as **greater than 500 to 600 mL of blood loss from the lungs in 24 hours**."-Sabiston 19/e p1589
- "Massive hemoptysis is one of the most dreaded of all respiratory emergencies and can have a variety of underlying causes. **In 90% of cases,** the **source of massive hemoptysis** is the **bronchial circulation."**
- "For most patients, the **next step in evaluation of hemoptysis** should be a **standard chest radiograph**. If a **source of bleeding** is **not identified** on plain film, a **CT of the chest** should be obtained."- Harrison 18/e p285
- "If all of these studies are unrevealing, **bronchoscopy should be considered. Rigid bronchoscopy** with an 8.5-mm or larger bronchoscope is needed."- Harrison 18/e p285
- "As most **large-volume hemoptysis arises from an airway lesion**, it is ideal if the site of the bleeding can be identified either by **chest imaging or bronchoscopy** (**more commonly rigid than flexible**)."- Harrison 18/e p285

Massive Hemoptysis

- Hemoptysis of **>200-600 cc in 24 hours**[Q]
- Massive hemoptysis should be considered a **medical emergency**.

Diagnostic Evaluation

- For most patients, the **next step in evaluation of hemoptysis** should be a **standard chest radiograph**[Q].
- If a **source of bleeding** is **not identified** on plain film, a **CT of the chest**[Q] should be obtained.

  - If all of these studies are unrevealing, **bronchoscopy should be considered.**
  - **Rigid bronchoscopy** with an 8.5-mm or larger bronchoscope is needed.

Treatment

- Large-volume, life-threatening hemoptysis generally requires **immediate intervention regardless of the cause**[Q].
- The first step is to establish a **patent airway** usually by endotracheal intubation and subsequent **mechanical ventilation**[Q].

  - As most **large-volume hemoptysis arises from an airway lesion**, it is ideal if the site of the bleeding can be identified either by **chest imaging or bronchoscopy** (**more commonly rigid than flexible**)[Q].

  - If the bleeding does not stop with therapies of the underlying cause and passage of time, **severe hemoptysis from bronchial arteries can be treated with angiographic embolization of the culprit bronchial artery**[Q].

SECTION 6

PLASTIC SURGERY

CHAPTERS

- Chapter 30 Burns
- Chapter 31 Plastic Surgery and Skin Lesions
- Chapter 32 Wound Healing, Tissue Repair and Scar

CHAPTER 30

Burns

MULTIPLE CHOICE QUESTIONS

BURNS: % BSA

1. **According to "rule of nines", burns involving perineum are:** *(MCI March 2009)*
   a. 1% b. 9%
   c. 18% d. 27%

2. **A five-years old child presents to the emergency department with burns. The burn area corresponding to the size of his palm is equal to:** *(All India 2011)*
   a. 1% BSA b. 5% BSA
   c. 10% BSA D. 20%

3. **Head and neck involvement in burns in infant is:** *(PGI June 2000)*
   a. 9% b. 18%
   c. 27% d. 32%

4. **An adult whose both lower limbs are charred along with genitalia has……..burns.** *(DPG 2010)*
   a. 18% b. 19%
   c. 36% d. 37%

5. **In a 6-years old child with burns involving the whole of head and trunk, estimated body surface area of burns is:** *(COMEDK 2008)*
   a. 44% b. 52%
   c. 55% d. 58%

6. **Rule of nine of estimate surface area of a burnt patient was introduced by:** *(AIIMS 84)*
   a. Mortix Kaposi b. Alexander Wallace
   c. Joseph Lister d. Thomas Barclay

7. **Calculate the percentage of burns on the head, neck and face in a child of one year:** *(All India 88)*
   a. 10% B. 16%
   c. 13% d. 15%

8. **Best method to assess burns in 5 years old child caused by boiling water:** *(AIIMS May 2013)*
   a. Palm method b. Rule of 9
   c. Lund and Browder chart d. Rule of one

9. **A child has circumferential burn of both of thighs and buttocks, face and scalp with singeing of hairs. Calculate the percentage of burns:** *(JIPMER 2014, AIIMS May 2013)*
   a. 24 b. 27
   c. 37 d. 45

10. **Head and face burn in infant is:** *(Recent Questions 2013)*
    a. 15% b. 18%
    c. 12% d. 32%

11. **Percentage of burn in children is best assessed by?**
    a. Rule of 9 b. Rule of palm = 1%
    c. Lund and Browder chart d. Wallace rule *(DNB 2014)*

BURNS

12. **A burn patient is referred when:** *(PGI June 2004)*
    a. 10% superficial burn in child
    b. Scald in face
    c. 25% superficial burn in adult
    d. 25% deep burn in adult
    e. Burn in palm

13. **In burns heat loss is by/due to:** *(PGI 80, DPG 80, 92)*
    a. Dilatation of veins b. Shock
    c. Exposed area by evaporation d. None of the above

14. **Metabolic derangements in severe burns are all except:** *(PGI June 2000)*
    a. ↑corticosteroid secretion b. Hyperglycemia
    c. ↑secretion of HCl d. Neutrophil dysfunction

15. **Pus in burns form in:** *(PGI 79, DPG 89)*
    a. 2-3 days b. 3-5 days
    c. 2-3 weeks d. 4 weeks

16. **Fever in burnt patient is caused by:**
    a. Septicemia *(PGI Nov 2009, June 2009)*
    b. Due to hypermetabolism
    c. Decreased sweating
    d. Release of pyrogens from dead product
    e. Dehydration

17. **True about thermal burn injury:** *(PGI June 2009)*
    a. Outermost layer is zone of stasis
    b. Middle layer is zone of hyperemia
    c. Inner layer is zone of coagulation
    d. Hyperemia is due to vasodilatation
    e. Zone of stasis is associated with vascular damage

18. **Undue restlessness in a patient during the immediate post burn period is often a manifestation of:** *(Karnataka 95)*
    a. Hypoxia b. Hypovolemia
    c. Hyperkalemia d. Anxiety

19. **All require hospitalization except:** *(DNB 2002,All India 91)*
    a. 5% burns in children b. 10% scalds in children
    c. Electrocution d. 15% deep burns in adults

20. **True about burns:** *(PGI 2000)*
    a. Hyperglycemia is seen in early burns
    b. Child with burns should have damp dressing
    c. Chemical powder burns should be kept dry
    d. 3rd degree burns are painfull

BURNS DEPTH

21. **True regarding burns:** *(PGI Dec 2007)*
    a. Only 2nd and 3rd degree is considered in the classification
    b. 2nd degree-Epidermis + papillary dermis
    c. Blisters-2nd degree
    d. Curling ulcer can occur
    e. Classified according to depth of invasion

22. In a patient with the burn wound extending into the superficial epidermis without involving the dermis would present all of the following except: *(SGPGI 2005)*
a. Healing of the wound spontaneously without scar formation
b. Anesthesia at the site of burn
c. Blister formation
d. Painful

23. A third degree circumferential burn in the arm and forearm region, which of the following is most important for monitoring? *(UPPG 2004)*
a. Blood gases
b. Carboxy-oxygen level
c. Macroglobinuria cryoglobinuria
d. Peripheral pulse and circulation

24. In 3rd degree burns, all are seen except:
a. Vesicles are absent *(PGI Dec 99, UPPG 2004)*
b. Painful
c. Leathery skin
d. Reddish due to Hb infiltration

25. True statement regarding 2nd degree deep burn:
a. Blanch on pressure b. Erythema *(PGI Dec 2008)*
c. Dry white colour d. Painless
e. Predispose to hypothermia

26. Degree of burns in a patient with prominent vessels with decreased needle prick sensation and dryness:
a. Superficial partial thickness burns
b. Deep partial thickness burns *(MHSSMCET 2006)*
c. Electric burns
d. Full thickness burns

27. Burn involving epidermis and full thickness of dermis:
a. First degree burns *(MHSSMCET 2008)*
b. Partial-thickness second degree burns
c. Full-thickness second degree burns
d. Third degree burns

28. True about burn is: *(UPPG 2010)*
a. Full thickness burn feels, leathery, painless
b. Electric burn are superficial
c. IV fluid formula used Curreri and Brooke
d. Skin grafting done after 48 hours
e. 1 year of age in head and neck region covers 18%

29. Which of the following is not seen in 3rd degree burns? *(MCI March 2009)*
a. Loss of skin appendages b. No vesicles
c. Red color d. Extremely painful

30. In second degree burns, re-epithelialisation occurs around:
a. 1 week b. 2 weeks *(MCI Sept 2009)*
c. 3 weeks d. 4 weeks

31. Which of the following is false regarding deep 2nd degree burns? *(MCI Sept 2009)*
a. Heal by scar deposition b. Painless
c. Damage to deeper dermis d. Less blanching

32. Superficial burns; true is/are: *(PGI June 2001)*
a. Always requires skin grafting
b. Dry and inelastic c. Blister formation
d. Painless e. Can be healed within 7-10 days

33. Not a feature of deep burn is: *(AIIMS Nov 93)*
a. Black charred skin b. White leathery skin
c. Loss of pain sensation d. Blisters

34. Burns with vesiculation, destruction of the epidermis and upper dermis is: *(PGI June 99)*
a. 1st degree b. 2nd degree
c. 3rd degree d. 4th degree

35. Blisters are seen in which type of burns? *(DNB 2009)*
a. Superficial first degree b. Superficial second degree
c. Third degree d. Deep first degree

36. All may be seen in deep burns except: *(All India 98)*
a. Hyperthermia
b. Increase vascular permeability
c. Fluid loss by evaporation
d. Vasodilation

37. 2nd degree burns indicate involvement of: *(JIPMER 2013)*
a. Epidermis b. Dermis
c. Subcutaneous tissue d. Deep fascia

TREATMENT OF BURNS

38. Parkland formula is: *(JIPMER 2010)*
a. Percentage of burns × weight (kg) × 4 = volume in ml
b. Percentage of burns × weight (kg)/2 = 1 volume in ml
c. Percentage of burns × weight (kg) × 9 = volume in ml
d. 500 ml/m2 BSA + 1500 ml/m2 = volume in ml

39. IV formula for burn is: *(UPPG 2009)*
a. Total % body surface area x weight x 4 = volume in ml
b. Total % body surface area x weight x 5 = volume in ml
c. Total % body surface area x weight x 6 = volume in ml
d. Total % body surface area x weight x 7 = volume in ml

40. Which of the following formula for fluid administration in a patient with burns is not correct? *(MHSSMCET 2008)*
a. Parkland: 4 ml Kg/%TBSA burn of RL
b. Brooks: 1.5 ml Kg/%TBSA burn of RL + 0.5ml kg % burn+2000 ml D5W
c. Shrine: 5000 ml m2 TBSA burn + 2000 ml m2 TBSA)
d. Evans: 8ml Kg/% TBSA burn of RL

41. Treatment of burns includes: *(PGI June 2008)*
a. No bandage to head and neck
b. Immediate application of ice cold water
c. Superficial burns without blister-no need of dressing
d. Escharotomy done for peripheral circumscribed lesions

42. The ideal temperature of water to cool the burnt surface is:
a. 15°C b. 10°C *(UPSC 2002)*
c. 8°C d. 6°C

43. What should be the ideal temperature of the cool water to be applied over burns? *(MHPGMCET 2006)*
a. Ice cold b. 3-4ºC
c. 8-10ºC d. 14-15ºC

44. Safest strategy of treatment for a patient of inhalational burn injury who has presented within 4-5 hours:
a. Binasal catheter O2 inhalation *(MHPGMCET 2007)*
b. O2 therapy with well-fitting face mask
c. Elective cricothyroidotomy
d. Elective endotracheal intubation

45. In burns management, which of the following is the fluid of choice? *(DNB 2012, 2005, MCI March 2010, Sept 2010)*
a. Dextrose 5% b. Normal saline
c. Ringer lactate d. Isolyte-M

46. A 50 kg female has second degree deep burn involving 45% total body surface area (TBSA). Regarding her management which of the following statement (s) is/are true:
a. Give rapid normal saline infusion *(PGI Dec 2008)*
b. Half of the calculated fluid should be given in initial 8 hours
c. 9 liters of Ringer's lactate should be given in first 24 hours
d. Urine output should be maintained at 25–30 ml/hour
e. CVP line should be inserted

47. All of the following are true regarding fluid resuscitation in burn patients except: *(MCI March 2008)*
a. Consider intravenous resuscitation in children with burns greater than 15% TBSA
b. Oral fluids must contain salts
c. Most preferred fluid is Ringer's lactate
d. Half of the calculated volume of fluid should be given in first 8 hours

48. What is the most important aspect of management of burn injury in the first 24 hours? *(UPSC 2007)*
a. Fluid resuscitation b. Dressing
c. Escharotomy d. Antibiotics

49. In excessive burns, least useful is: *(AIIMS June 94)*
a. Blood b. Dextran
c. Ringer lactate d. Nasogastric intubation

50. True statement about burn resuscitation: *(PGI Dec 2003)*
a. Colloid preferred in initial 24 hours
b. Colloid preferred if burnt area is >15% of total BSA
c. Half of the calculated fluid given in initial 8 hours
d. Urine output should be maintained at 50-60 mL/hour
e. Diuretics should be given to all patients of electric burn

51. Which of the following is true about burns? *(PGI Dec 2005)*
a. 3rd generation cephalosporin is drug of choice
b. S. aureus is most common infection of burn
c. Toxic shock syndrome is most common in burns patients
d. Pseudomonas is most common infection in dry wound
e. Moist dressing is done

52. Which of the following is true about burn management?
a. Intravenous access fluid is done and antibiotics is not given in children *(PGI Dec 2005)*
b. Escharotomy should be done for peripheral circumscribed lesion
c. Moist dressing is done
d. Parkland formula is used with 8ml/kg body weight
e. Prognosis depend on the time of resuscitation of the patient

53. Exposure treatment is done for burns of the: *(JIPMER 87)*
a. Upper limb b. Lower limbs
c. Thorax d. Abdomen
e. Head and neck

54. Deep skin burn is treated with: *(AIIMS 91)*
a. Split thickness graft
b. Full thickness graft
c. Amniotic membrane
d. Synthetic skin derivatives

55. The cold water treatment of burns has the disadvantage that it increase the chances of: *(PGI 81, AIIMS 83)*
a. Pain
b. Exudation
c. Infection
d. None of the above

56. The best guide to adequate tissue perfusion in the fluid management of a patient with burns, is to ensure a minimum hourly urine output of: *(Karnataka 2004)*
a. 10-30 ml b. 30-50 ml
c. 50-70 ml d. 70-100 ml

57. Burns in which part of body are nursed without occlusive dressing? *(DPG 2005)*
a. Hands b. Legs
c. Head and Neck d. Chest

58. Which of the following is effected against Pseudomonas and is used in burns patients? *(DNB 2009)*
a. Silver sulphadiazine b. Silver sulphazine
c. Sulphamethoxazole d. Sulphadoxine

COMPLICATIONS OF BURNS

59. Late deaths in burns is due to: *(PGI Dec 99)*
a. Sepsis b. Hypovolemia
c. Contractures d. Neurogenic

60. Most common cause of death due to burns in early period is:
a. Sepsis b. Hypovolemic shock
c. Both d. None *(APPG 2008)*

61. Most common carcinoma after burns is: *(DPG 2008)*
a. Squamous cell carcinoma b. Adenocarcinoma
c. Melanoma d. Mucoid carcinoma

62. Most common cause of death in burns is: *(Punjab 2008)*
a. Primary shock b. Secondary shock
c. Hemorrhagic shock d. Septicemic shock

63. Burns shock is: *(Punjab 2011)*
a. Hypovolemic b. Neurogenic
c. Endotoxic d. Cardiogenic

64. Which of the following statement(s) is/are true about post-burn neck contracture? *(PGI June 2009)*
a. Occur because of conservative management of deep burn
b. Treated by flaps
c. Obliteration of cervicomental angle
d. Dental abnormalities may be present
e. Never develop in deep dermal burn

65. Death from burns in first 10 days is due to all except:
a. Shock b. Infection *(DNB 2005)*
c. Renal failure d. Respiratory distress

MISCELLANEOUS

66. Domestic low-voltage electric supply can cause all the following except: *(MHPGMCET 2007)*
a. Contact wound b. Cardiac arrest
c. Cardiac fibrillation
d. Deep subcutaneous tissue damage

67. Main danger with low tension (Domestic) electric AC current: *(MHPGMCET 2009)*
a. Renal injury (ARF) b. Cardiac arrest
c. Muscle necrosis d. Paralysis

68. Operation theatre fire is most commonly due to: *(DNB 2010)*
a. Argon beam coagulators b. Lasers
c. Fibre optic illumination d. Electrosurgical equipment

69. Myoglobinuria is seen in which type of burn? *(DNB 2012)*
a. Flame burn b. Scald burn
c. Electric burn d. Contact burn

EXPLANATIONS

BURNS: % BSA

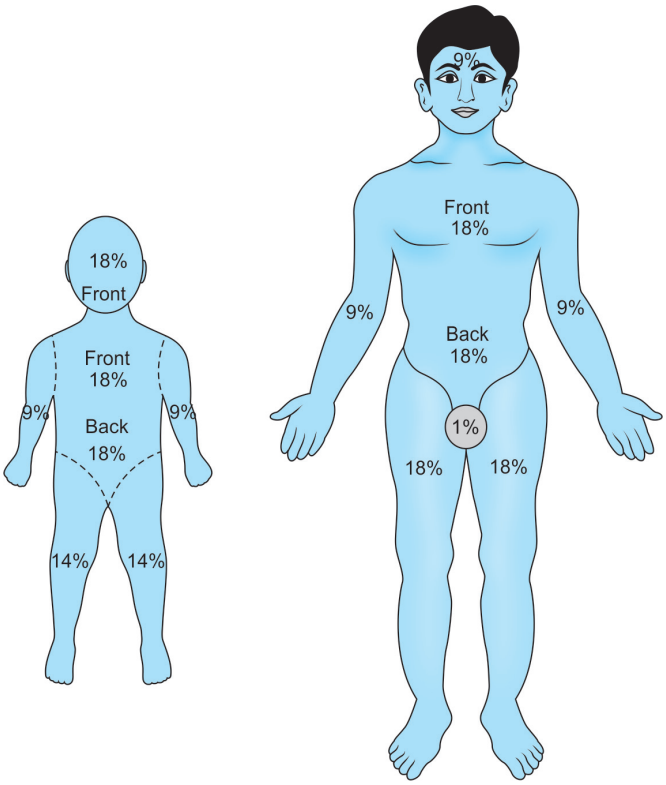
1. Ans. a. 1% *(Ref: Sabiston 19/e p523; Schwartz 10/e p227-236, 1820-1822, 19/e p199-200; Bailey 26/e p389, 25/e p381)*

Burn Size (% Bsa)

- Determination of **burn size estimates** the **extent of injury**.
- **Burn size** is assessed by **Wallace rule of nines** (By **Alfred Russel Wallace**[Q])

Wallace Rule of Nines
• **In adults:** – Each **upper extremity: 9%**[Q] – **Head and neck: 9%**[Q] – **Lower extremities: 18%**[Q] – **Anterior** and **posterior** aspects of the **trunk: 18%**[Q] – **Perineum** and genitalia: **1%**[Q]

- **Children** have a relatively **larger proportion** of body surface area **in** their **head** and **neck**, which is compensated for by a relatively smaller surface area in the lower extremities.
  - **In infants: Head** and **neck- 21%**[Q] **; Each leg- 13%**[Q]
- **Berkow formula**[Q] is used to **accurately determine burn size** in **children.**
- **For estimating smaller burns: Area of open hand**[Q] (including palm and extended fingers) of the patient is approximately **1%**[Q] of TBSA
- This method is helpful in **evaluating splash burns** and burns of **mixed distribution.**



Estimation of burn size using the rule of nine

2. Ans. a. 1% BSA **3. Ans. b. 18%** **4. Ans. d. 37%**

5. **Ans. a. 44%** *(Ref: Sabiston 19/e p524)*

Berkow Formula to Estimate Burn Size (%)			
Body Part	**0-1 year**	**1-4 years**	**5-9 years**
Head	**19[Q]**	**17[Q]**	**13[Q]**
Neck	2	2	2
Anterior trunk	13	13	13
Posterior trunk	13	13	13

6. **Ans. b. Alexander Wallace** 7. **Ans. None** 8. **Ans. c. Lund and Browder chart** *(Ref: Schwartz 19/e p199-200)*

"In children younger than 3 years old, the head accounts for a larger relative surface area and should be taken into account when estimating burn size. Diagrams such as the **Lund and Browder chart** give a **more accurate accounting of the true burn size in children**."- Schwartz 19/e p199

"For children and infants, the Lund-Browder chart is used to assess the burned body surface area. Different percentages are used because the ratio of the combined surface area of the head and neck to the surface area of the limbs is typically larger in children than that of an adult." http://en.wikipedia.org/wiki/Total_body_surface_area

9. **Ans. c. 37** *(Ref: Sabiston 19/e p524)*

10. **Ans. b. 18%** *(Ref: Sabiston 19/e p524)*

A Child Has

- **Circumferential burn of both of thighs = 6.5 + 6.5 = 13**
- **Buttocks = 2.5 + 2.5 = 5**
- **Face and scalp with singeing of hairs = 17**

Total burn = 13 + 5 + 17 = 35%

Berkow Diagram to Estimate Burn Size (%) Based on Area of Burn in an Isolated Body Part						
BODY PART	**0-1 yr**	**1-4 yr**	**5-9 yr**	**10-14 yr**	**15-18 yr**	**ADULT**
Head	19	**17**	**13**	11	9	7
Neck	2	2	2	2	2	2
Anterior trunk	13	13	13	13	13	13
Posterior trunk	13	13	13	13	13	13
Right buttock	2.5	**2.5**	**2.5**	2.5	2.5	2.5
Left buttock	2.5	**2.5**	**2.5**	2.5	2.5	2.5
Genitalia	1	1	1	1	1	1
Right upper arm	4	4	4	4	4	4
Left upper arm	4	4	4	4	4	4
Right lower arm	3	3	3	3	3	3
Left lower arm	3	3	3	3	3	3
Right hand	2.5	2.5	2.5	2.5	2.5	2.5
Left hand	2.5	2.5	2.5	2.5	2.5	2.5
Right thigh	5.5	**6.5**	**8**	8.5	9	9.5
Left thigh	5.5	**6.5**	**8**	8.5	9	9.5
Right leg	5	5	5.5	6	6.5	7
Left leg	5	5	5.5	6	6.5	7
Right foot	3.5	3.5	3.5	3.5	3.5	3.5
Left foot	3.5	3.5	3.5	3.5	3.5	3.5

11. **Ans. c. Lund and Browder chart**

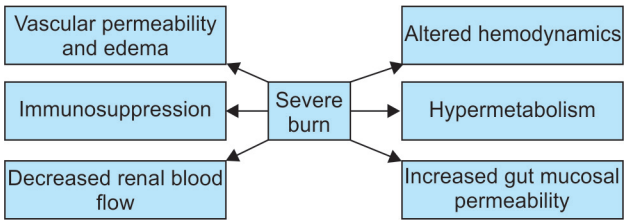
BURNS

12. Ans. a. 10% superficial burn in child, b. Scald in face, c. 25% superficial burn in adult, d. 25% deep burn in adult, e. Burn in palm
(Ref: Sabiston 19/e p521-522; Schwartz 10/e p227-236, 19/e p198; Bailey 26/e p388, 25/e p380-381)

Patients with the following criteria are referred to a designated burn center

- Partial-thickness **burns >10% TBSA**Q
- Burns involving the **face, hands, feet, genitalia, perineum,** or **major joints**Q
- Any **full-thickness burn**Q
- **Electrical burns,** including **lightning injury**Q
- **Chemical burns**Q
- **Inhalation injury**Q
- Burns in patients with **preexisting medical disorders**Q that could complicate management, prolong recovery, or affect outcome
- Any patient with burns and **concomitant trauma**Q (e.g., **fractures**) in which the burn injury poses the greater immediate risk for morbidity and mortality.
- **Burned children in hospitals without qualified personnel** or equipment to care for children
- Burns in patients who will **require special social, emotional**, or long-term rehabilitative intervention

13. Ans. c. Exposed area by evaporation *(Ref: Sabiston 19/e p521-522; Schwartz 19/e p197-199; Bailey 26/e p386-387, 25/e p378-379)*



Pathophysiology of burns

- **Radiant heat loss** is increased from the burn wound **secondary to increased blood flow** and **integumentary loss**Q**.**
- Heat loss also occurs because of **evaporation of water from** the **burn wounds**Q. This leads to significant fluid loss also.
  - **Significant burns** are associated with **massive release of inflammatory mediators**, both in wound and in other tissues.
  - These mediators produce vasoconstriction and **vasodilatation, increased capillary permeability** and **edema** locally and in distant organs.
- **Immune System: Global depression in immune function (Depressed cellular function** in all parts of the immune system, including activation and activity of neutrophils, macrophages, B and T lymphocytes.
- **Metabolism: Increased release of** catabolic hormones like **catecholamines, corticosteroids** and **glucagon** leads to **hypermetabolic state**Q**.**
  - Stress ulcers **(Curling ulcers**Q**)** of burns are due to **decrease in mucosal defenses**Q **(acid secretion is not increased**Q**)**

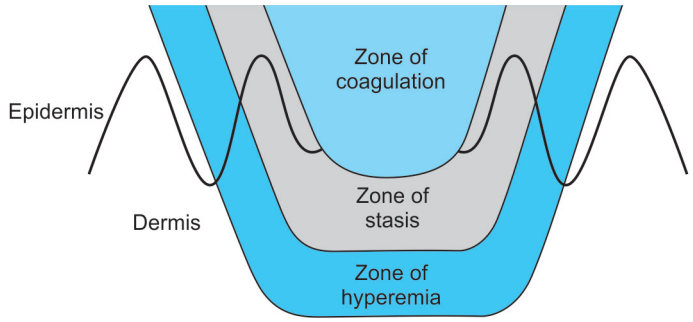
14. Ans. c. ↑secretion of HCl **15. Ans. b. 3-5 days**

16. Ans. a. Septicemia, B Due to hypermetabolism *(Ref: Total Burn Care by David N. Herndon 3/e p158; Sabiston 19/e p524-526; Schwartz 19/e p204; Bailey 26/e p386-387, 25/e p378-379)*

Fever in Burn Patients

- Many of the **physiological criteria** that has been **claimed to reflect sepsis** are **non-infectious manifestations** of **post injury hypermetabolism**Q**.**
  - **Hyperthermia** (39°C or greater) is occasionally **a febrile** a **response to infection,** particularly in **children,** but **episodic elevation in temperature** are **common in uninfected burn patients**Q**.**
- The **hypermetabolic phase**Q mediated by greatly **increased levels of catecholamines, prostaglandins, glucagon** and **cortisol** occurs after the **acute phase** and also produces pathophysiological changes.
- Burn patients exhibit **increased blood flow** to organs and tissues, **an increased internal core temperature, hypoproteinemia** and **edema formation**Q**.**

17. Ans. c. Inner zone is zone of coagulation, d. Hyperemia is due to vasodilatation, e. Zone of stasis is associated with vascular damage: *(Ref: Sabiston 19/e p521-522; Schwartz 19/e p197-199; Bailey 26/e p386-387, 25/e p378-379)*



Pathophysiology of Burns

Area of cutaneous injury

Zone of coagulation	Zone of stasis	Zone of hyperemia
• **Necrotic area** of a burn where **cells** have been **disrupted**[Q] • **Tissue** is **irreversibly damaged**[Q] at the time of injury.	• Area **immediately surrounding** the **necrotic zone**[Q] • **Moderate degree of insult** with **decreased tissue perfusion**[Q]. • Depending on the wound environment, **can either survive** or **progress to coagulative necrosis**[Q]. • Associated with **vascular damage** and **vessel leakage**[Q].	• Lies beyond the zone of stasis • Characterized by **vasodilation**[Q] from inflammation surrounding the burn wound. • Contains **clearly viable tissue from which** the **healing process begins**[Q] • Generally, **not at risk for further necrosis**[Q].

18. Ans. d. Anxiety **19. Ans. a. 5% burns in children** **20. Ans. a. Hyperglycemia is seen in early burns**

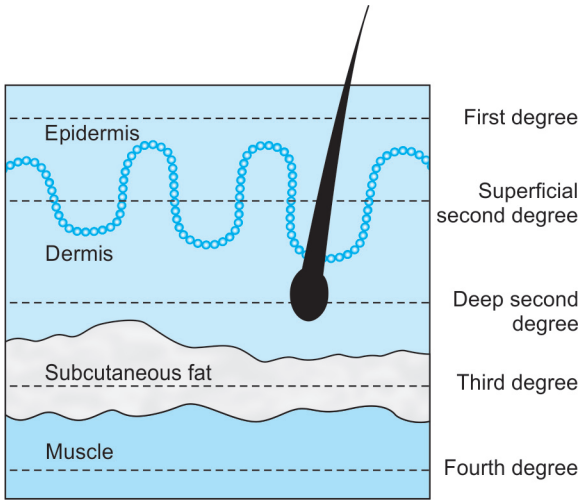
BURNS DEPTH

21. Ans. b. 2nd degree- Epidermis + papillary dermis, c. Blisters-2nd degree, d. Curling ulcer can occur, e. Classified according to depth of invasion *(Ref: Sabiston 19/e p522-523; Schwartz 10/e p229, 19/e p199-200; Bailey 26/e p389-390, 25/e p381-382)*

Burns Depth

First Degree	Second Degree	Third Degree	Fourth Degree
• **Epidermal burn**[Q] • Involve **only epidermis**[Q] • **Do not blister**[Q] • **Erythematous**[Q] because of dermal vasodilatation • **Painful**[Q] • **Heal without scarring** in **5-10 days**[Q]	• **Partial thickness**[Q] burn • Involve **epidermis** and some **part of dermis**[Q] • **Divided into: Superficial and Deep** second degree	• **Full thickness burn**[Q] • Involve **all layers of dermis**[Q] • Characterized by **hard leathery eschar,** that is **painless** and **black, white** or **cherry red**[Q] • **No capillary refilling** or **pin-prick sensation**[Q] • **All dermal** and **epidermal components** are **lost**[Q] • **Heals** only **by wound contracture**[Q] • Require **excision with skin grafting** to heal[Q]	• Involve **other organs** beneath the skin, such as **muscle, bone** and **brain**[Q].

Superficial Second Degree	Deep Second Degree
• Involve **upper layer of dermis (papillary dermis)**[Q] • **Erythematous**[Q] • **Blanch to touch**[Q] • **Blisters** are **seen**[Q] • **Painful**[Q] • **Heals without scarring** in **7-14 days**[Q]	• Also known as **deep partial thickness burn**[Q] • Injury extends to **reticular layer of dermis**[Q] • **Don't blanch**[Q] • **Mottled pink** and **white color** of wound surface[Q] • **Capillary refilling** is **absent** or occurs slowly[Q] • **Pain** is **absent**[Q] • **Pin-prick sensation** is **preserved**[Q] • **Heals in 3-9 weeks** with **scar formation**[Q]



22. **Ans. b. Anesthesia at the site of burn, c. Blister formation**

23. **Ans. d. Peripheral pulse and circulation** *(Ref: Sabiston 19/e p531; Schwartz 10/e p234, 1820, 19/e p204; Bailey 26/e p392, 25/e p385)*

ESCHAROTOMIES

- When deep **second-** and **third-degree burn wounds** encompass the **circumference** of an **extremity**, **peripheral circulation** to the limb can be **compromised**Q.
  - Development of **generalized edema** beneath a non-yielding eschar **impedes venous outflow** and **affects arterial inflow** to the distal beds.
  - This can be **recognized by numbness** and **tingling** in the limb and **increased pain in digits**Q.
- **Arterial flow** can be **assessed by determination** of **Doppler signals** in the digital arteries and the palmar and plantar arches in affected extremities.
- **Capillary refill** can also be **assessed.**
  - **Extremities at risk** are identified either **on clinical examination** or by measurement of **tissue pressures >40 mm Hg**Q.
  - These extremities **require escharotomies (release of** the **burn eschar** by **incising** the **lateral** and **medial aspects** of the extremity)Q

24. **Ans. b. Painful**
25. **Ans. c. Dry white colour, d. Painless, e. Predispose to hypothermia**
26. **Ans. b. Deep partial thickness burns**
27. **Ans. d. Third degree burns**
28. **Ans. a. Full thickness burn feels, leathery, painless, e. 1 year of age in head and neck region covers 18%** *(Ref: Bailey 25/e p382, 387; CSDT 11/e p/273)*
    - **Electric burns** are both **superficial** and **deep**, depending upon the thickness involved.
    - **Curreri, Sutherland and Davies formulas** are **feeding formulas of burn patients**Q.
29. **Ans. d. Extremely painful**
30. **Ans. b. 2 weeks**
31. **Ans. d. Less blanching**
32. **Ans. c. Blister formation, e. Can be healed within 7-10 days**
33. **Ans. d. Blisters**
34. **Ans. b. 2nd degree**
35. **Ans. b. Superficial second degree**
36. **Ans. a. Hyperthermia**
37. **Ans. b. Dermis**

TREATMENT OF BURNS

38. **Ans. a. Percentage of burns × weight (kg) × 4 = volume in ml** *(Ref: Sabiston 19/e p530; Schwartz 10/e p232, 19/e p199; Bailey 26/e p390-391, 25/e p384-385)*

Resuscitation Formulas			
Formula	**Crystalloid Volume**	**Colloid Volume**	**Free water**
ParklandQ	**4 mL/kg** per % TBSA burn	None	None
BrookeQ	**1.5 mL/kg** per % TBSA burn	**0.5 mL/kg** per % TBSA burn	**2.0 L**
GalvestonQ **(pediatric)**	**5000 mL/m² burned** area + **1500 mL/m² total** area	None	None

- **Half of fluid** is given in **first 8 hours** and **other half** in **next 16 hours**Q

Fluid Resuscitation

- **IV fluid resuscitation:** In **children** with burn **>10%**Q TBSA and **adult** with burn **>15%**Q TBSA
- **Regimen** of **fluid resuscitation follows** the **fluid loss**, which is at its **maximum in first 8 hours** and slows such that by 2-36 hours the patient can be maintained on her/his normal daily requirement.

Fluids used in Resuscitation
• **Ringer Lactate** is **most commonly used**Q.
• Some centers use **human albumin, FFP** or **hypertonic saline**Q

- If **oral resuscitation** is to be commenced, it is important that the **water given is not salt free. Hyponatremia** and **water intoxication can be fatal**Q.
- In **children, maintenance fluid** must be given, usually **dextrose-saline.**Q
- **Simplest** and **most widely used formula: Parkland formula**Q

  - **Hypertonic saline** has been **effective in treating burn shock**Q.
  - It produces **hyperosmolarity** and **hypernatremia.**
  - This reduces the shift of intracellular water to the extracellular space.
  - Advantage includes **less tissue edema** and a resultant **decrease in escharotomies** and **intubation**Q.

- **Protein** should be given **after the first 12 hours** of burn.
- The commonest **colloid based formula** is **Muir** and **Barclay formula**Q.

Monitoring of Resuscitation

- The key to monitoring is **urine output**Q.

  - **Urine output** should be **0.5-1.0 ml/kg/hour**Q (i.e. 30-60 ml per hourQ).

- **Other measures for monitoring:**
  - Acid base balance and Hematocrit
  - In **cardiac dysfunction: Transesophageal USG** and **Central line**Q

Venous Access for Infusion

- **In adults: Ideal sites** are **veins in hand, antecubital fossa** or **neck.**
- **Saphenous vein cut down** is useful **in patient with difficult access** and is **used in preference to central venous cannulation.**
- **CVP line** is used for **CVP monitoring,** helps in **estimating fluid overload**Q.

39. **Ans. a. Total % body surface area x weight x 4 = volume in ml**
40. **Ans. c. Shrine: 5000 ml m2 TBSA burn + 2000 ml m2 TBSA, d. Evans: 8ml Kg/% TBSA burn of RL**
41. **Ans. a. No bandage to head and neck, c. Superficial burns without blister-no need of dressing, d. Escharotomy done for peripheral circumscribed lesions** *(Ref: Sabiston 19/e p529-530; Schwartz 19/e p200-204; Bailey 26/e p387, 25/e p380)*

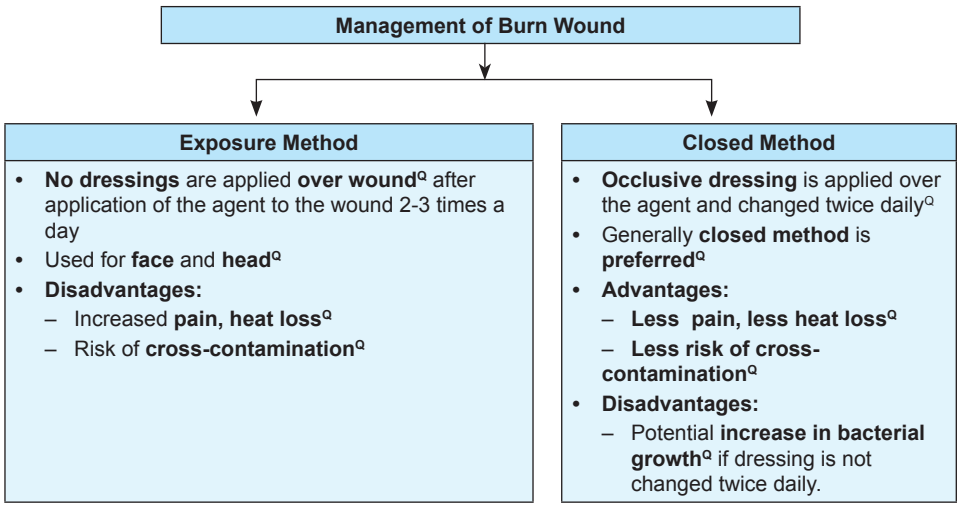
Care of Burn Patients

Cool the burn wound
• This **provides analgesia** and **slows the delayed microvascular damage** that can occur after a burn injury.
• Cooling should occur **for a minimum of 10 min** and is **effective up to 1 hour after** the **burn injury.**
• It is a **particularly important first aid step in partial-thickness burns,** especially **scalds.**
• In temperate climates, cooling should be at **about 15°C,** and hypothermia must be avoided.

- **Room temperature water** can be **poured** on the wound **within 15 minutes of injury** to decrease the depth of wound, but **any subsequent measures to cool** the **wound** are **avoided to prevent hypothermia**Q.

  - Iced water should never be used, even on the smallest of burnsQ.
  - If ice or cold water is used on larger burns, systemic hypothermia often follows, and the associated cutaneous vasoconstriction can extend the thermal damage.

- The **entire constricting eschar** must be **incised longitudinally**Q to completely relieve the impediment to blood flow.
- **Superficial partial thickness burn** with blisters **heals without residual scarring in 2 weeks** irrespective of the dressing. Treatment is **non-surgical**. The simplest method of **treating superficial burn** is **by exposure**Q.



42. Ans. a. 15°C

43. Ans. d. 14-15°C

44. Ans. d. Elective endotracheal intubation *(Ref: Bailey 26/e p388, 25/e p381)*

Initial Management of the Burned Airway

- **Early elective intubation** is **safest**Q
- **Delay** can make **intubation very difficult** because of **swelling**Q
- Be ready to **perform** an **emergency cricothyroidotomy** if **intubation** is **delayed**Q

45. Ans. c. Ringer lactate

46. Ans. b. Half of the calculated fluid should be given in initial 8 hours, c. 9 liters of Ringer's lactate should be given in first 24 hours, e. CVP line should be inserted

47. Ans. a. Consider intravenous resuscitation in children with burns greater than 15% TBSA

- **IV fluid resuscitation:** In **children** with burn **>10%** TBSA and **adult** with burn **>15%** TBSA

48. Ans. a. Fluid resuscitation

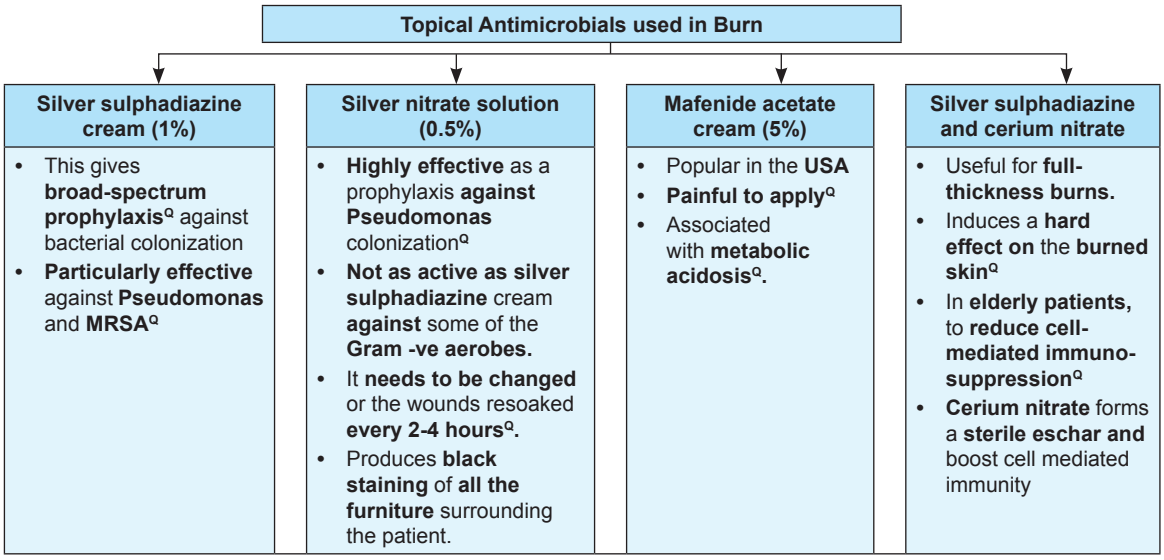
49. Ans. a. Blood *(Ref: Sabiston 19/e p529-531; Schwartz 10/e p230, 19/e p200-201; Bailey 26/e p392, 25/e p384)*

- **RL** is **preferred agent for resuscitation** for the initial 24 hoursQ.
- **Nasogastric intubation** is done to **decrease the risk of emesis** and **possible aspiration** (as paralytic ileus develops in the patients of burn).
- **Dextran** is a **colloid** and **can be used after 24 hours** however, **albumin** is the **preferred** and **most widely used colloid**Q.

50. Ans. c. Half of the calculated fluid given in initial 8 hours, d. Urine output should be maintained at 50-60 mL/hour

51. Ans. d. Pseudomonas is most common infection in dry wound *(Ref: Sabiston 19/e p533-534; Schwartz 19/e p202; Bailey 26/e p392-393, 25/e p384-386)*

- In **burn management, topical antimicrobials** are used.
- **Pseudomonas** is the **most common infection**Q in burn patients. It has replaced streptococci and staphylococci because of availability of good antibiotics.
- **Toxic shock syndrome** is most commonly associated with **tampon use** in **menstruating females**. It is caused by **Staphylococcus** infection producing **TSST-1.**
- **Damp dressing** should **not be used.**



52. Ans. b. Escharotomy should be done for peripheral circumscribed lesion, e. Prognosis depend on the time of resuscitation of the patient

53. Ans. e. Head and neck **54. Ans. a. Split thickness graft** **55. Ans. c. Infection** *(Ref: CSDT 11/e p1272)*

56. Ans. b. 30-50 ml **57. Ans. c. Head and Neck** **58. Ans. a. Silver sulphadiazine**

COMPLICATIONS OF BURNS

59. Ans. a. Sepsis *(Ref: Sabiston 19/e p534-536; Schwartz 10/e p233, 19/e p204; Bailey 26/e p394-395, 25/e p387-390)*

- **Following successful resuscitation, most acute morbidity and virtually all mortality in severely burned patients are related to infection[Q].**
- **This is because thermal injury causes profound immunosuppression that is proportional to the TBSA of the burn[Q].**
- **Inspite of burn patients at significant risk to infection, prophylactic systemic antibiotics are not part of modern care, as they do not reduce septic complications and only lead to increased bacterial resistance[Q].**

- **MC cause** of **death** in **burns: Septicemia[Q]**
- **MC cause** of **early death** in **burns: Hypovolemic shock[Q]**
- **MC cause** of **late death** in **burns: Septicemia[Q]**

60. Ans. b. Hypovolemic shock

61. Ans. a. Squamous cell carcinoma

62. Ans. d. Septicemic shock

Carcinoma in Burns

- **Squamous cell carcinoma** is **MC carcinoma** in **burns[Q].**
- SCC commonly occurs in **long standing (Marjolin's ulcer), old scar** or **keloid[Q].**
- Both **Marjolin's ulcer** and **keloid** are **complications** that arise **after burns[Q].**

63. Ans. a. Hypovolemic *(Ref: Sabiston 19/e p521-522; Schwartz 19/e p204; Bailey 26/e p390-391, 25/e p384-386)*

- **Proper fluid management** is **critical to survival[Q]** in burn patient.
- The **hypovolemic shock[Q]** in burn patient is special in the sense that total body water remains unchanged in a burn patient.
- The **thermal injury** leads to a **massive shift from** the **intravascular compartment** to the **extravascular compartment** leading to **edema formation[Q].**

64. Ans. a. Occur because of conservative management of deep burn, b. Treated by flaps, c. Obliteration of cervicomental angle, d. Dental abnormalities may be present *(Ref: Total Burn Care by David N. Herndon 3/e p714-715; Sabiston 19/e p534-535; Schwartz 10/e p182, 19/e p204; Bailey 26/e p396, 25/e p388)*

Post Burn Neck Contracture

- **Cervical contractures** are major problems in **burns involving** the **chest, neck** and **face[Q].**

- **Severe neck flexion contracture** in the acute phase often **require early reconstruction**[Q] to aid in airway management
- **Neck contractures** should usually be **dealt with prior to facial burn reconstruction**[Q] as the extrinsic contractile forces from the neck can cause facial deformities and can adversely affect the maturation of scars on the face.

  - When **split-thickness skin grafting** is **unsuccessful** because of recurrent contracture or does not provide a satisfactory aesthetic result, **local flap reconstruction of anterior neck** is an **excellent technique**[Q].

- **Perioral Deformities: Microstomia, macrostomia, irreversible damage to dentition** and **loss of jawline definition**[Q]
- **Anterior neck contractures** in the acute period are **best prevented by aggressive splinting** and **incisional releases** and **grafting**[Q] when indicated.

  - **Deep second** and **third degree burns do not heal** in timely fashion **without autografting**[Q]
  - **Escharotomies** is done in case of **deep second** and **third degree buns** wounds **to decrease constriction of eschar**[Q]

65. Ans. c. Renal failure

MISCELLANEOUS

66. Ans. d. Deep subcutaneous tissue damage *(Ref: Bailey 26/e p399, 25/e p391)*

Low-tension injuries

- **Low-tension** or **domestic appliance injuries do not have enough energy to cause destruction** to significant amounts **of subcutaneous tissues**[Q] when the current passes through the body.
- **Resistance** is **too great.**
- **Entry** and **exit points,** normally **in** the **fingers,** suffer **small deep burns**; these may cause underlying **tendon** and **nerve damage**, but there will be little damage between.
- The **alternating current creates a tetany** within the muscles, and thus patients often describe how they were **unable to release the device** until the power was turned off.
- A common finding in patients with electric burns is **myoglobinuria** manifested as **highly concentrated** and **pigmented urine.**

  - **Main danger** with these injuries is from the **alternating current interfering with normal cardiac pacing.** This can cause **cardiac arrest**[Q].
  - The **electricity** itself **does not** usually **cause significant underlying myocardial damage**, so **resuscitation, if successful, should be lasting.**

67. Ans. b. Cardiac arrest

68. Ans. d. Electrosurgical equipment *(Ref: British Journal of Anesthesia, vol 50, Issue 7, Page 659-664)*

Operation Theatre Fire

- The **two most common source of operation theatre fire** is **electrosurgical unit (ESU)** and **lasers.**
- ECRI's analysis of case reports show that the **most common ignition sources** are **electrosurgical instruments (68%)** and **lasers (13%).**
- **Most common fire location is airway (35%),** head or face (28%), and elsewhere on or inside the patient (38%).
- An oxygen-enriched atmosphere was a contribution factor in 74% of all cases.

69. Ans. c. Electric burn

CHAPTER 31

Plastic Surgery and Skin Lesions

MULTIPLE CHOICE QUESTIONS

SKIN GRAFTING

1. 'Take in' of split skin graft occurs when? *(PGI Dec 2008)*
a. Tight dressing is applied
b. Excessive discharge from wound
c. β-hemolytic streptococcus infection is present
d. Wound bed not vascularised

2. Thiersch graft is which type of graft? *(JIPMER 2012, MHPGMCET 2008, 2001, DPG 2005)*
a. Partial thickness
b. Full thickness
c. Pedicle
d. Patch

3. Partial thickness graft is: *(MHPGMCET 2008)*
a. Wolffian graft
b. Thiersch graft
c. Pedicle graft
d. Patch graft

4. Which of the following statements about mesh skin grafts is not correct? *(UPSC 2006)*
a. They permit coverage of large areas
b. They allow egress of fluid collections under the graft
c. They contract to the same degree as a grafted sheet of skin
d. They "take" satisfactorily on a granulating bed

5. Split skin grafts in young children should be harvested from: *(UPSC 2007)*
a. Buttocks
b. Thigh
c. Trunk
d. Upper limb

6. Which of the following is not a wound closure technique? *(UPSC 2008)*
a. Partial thickness skin graft
b. Composite graft
c. Vascular graft
d. Musculocutaneous graft

7. Who said: "Skin is the best dressing"? *(Karnataka 2004)*
a. Joseph Lister
b. John Hunter
c. James Paget
d. Mc Neill Love

8. Within 48 hours of transplantation, skin graft survives due to: *(AIIMS Nov 2000, AIIMS Nov 99)*
a. Amount of saline in graft
b. Plasma imbibition
c. New vessels growing from the donor tissue
d. Connection between donor and recipient capillaries

9. Ideal graft for leg injury with 10 × 10 cm exposed bone: *(AIIMS Nov 99)*
a. Amniotic membrane graft
b. Pedicle graft
c. Full thickness graft
d. Split thickness skin graft

10. Which of the following graft is known as Wolfe's graft? *(AIIMS Nov 97)*
a. Split thickness graft
b. Full thickness graft
c. Partial thickness graft
d. Myocutaneous graft

11. Wolfe Graft is: *(APPG 2015)*
a. Thin split thickness graft
b. Thick split thickness skin graft
c. Medium thickness split thickness skin graft
d. Full thickness skin graft

12. Skin grafting is absolutely contraindicated in which skin infection? *(AIIMS June 97)*
a. Staphylococcus
b. Pseudomonas
c. Streptococcus
d. Proteus

13. What does "Take in" means in case of skin grafting? *(AIIMS June 97)*
a. Revascularization of the graft
b. Return of the sensation
c. When the graft becomes adherent to recipient site
d. Non adherent graft is shed off

14. All can take split thickness graft except: *(MCI March 2005, AIIMS Sept 96)*
a. Fat
b. Muscle
c. Skull bone
d. Deep fascia

15. All are true about skin grafting, except: *(All India 2000)*
a. Partial thickness graft involves epidermis and part of dermis
b. Full thickness graft includes epidermis, dermis, without subcutaneous tissue
c. For large areas, full thickness graft is used
d. Full thickness graft has cosmetic value

16. Split skin graft can be applied over: *(PGI June 99)*
a. Muscle
b. Bone
c. Cartilage
d. Eyelid

17. Skin graft for facial wounds is taken from: *(AIIMS 92)*
a. Medial aspect of thigh
b. Cubital fossa
c. Groin
d. Postauricular region

18. Full thickness skin graft can be taken from the following sites except: *(AIIMS 87)*
a. Elbow
b. Back to neck
c. Supraclavicular area
d. Upper eyelids

19. Skin graft stored at 4 °C can survive up to: *(DNB 2009)*
a. 1 week
b. 2 weeks
c. 3 weeks
d. 4 weeks

20. The best skin graft for open wounds is: *(All India 93)*
a. Isograft
b. Homograft
c. Allograft
d. Autograft

21. All are advantages of split thickness skin grafting except: *(Recent Questions 2013)*
a. Good uptake
b. Reusable donor site
c. Less contraction
d. Large grafts can be harvested

FLAPS

22. True statement for axial flap is: *(All India 97)*
a. Carries its own vessels within it
b. Kept in limb
c. Transverse flap
d. Carries its own nerve in it

23. Best procedure to be done after an injury to leg associated with exposure of underlying bone and skin loss: *(AIIMS Nov 98)*
a. Pedicle flap
b. Split skin grafting
c. Full thickness grafting
d. Skin flap

24. Abbe-Estlander flap is used for: *(All India 2008)*
a. Lip
b. Tongue
c. Eyelid
d. Ears

25. Skin flap is used in all except: *(AIIMS 89)*
a. Bone
b. Tendon
c. Burn wound
d. Cartilage

26. The subdermal plexus forms the vascular basis for: *(JIPMER 2002)*
a. Randomised flaps
b. Axial flaps
c. Mucocutaneous flaps
d. Fasciocutaneous flaps

27. Myocutaneous flap includes which tissues? *(DPG 2007)*
a. Muscle only
b. Muscle and vascular pedicle
c. Muscle and skin
d. Skin, muscle and vascular pedicle

MARJOLIN'S ULCER

28. The most common malignancy found in Marjolin's ulcer is: *(DPG 2009 Feb)*
a. Basal cell carcinoma
b. Squamous cell carcinoma
c. Malignant fibrous histiocytoma
d. Neutrophic malignant melanoma

29. True about Marjolin's ulcer: *(PGI June 2007)*
a. The associated cancer is squamous cell carcinoma
b. May occur due to chronic venous insufficiency
c. Progress to basal cell carcinoma
d. Arise from base of the ulcer

30. A tumour arising in a burns scar is likely to be: *(COMEDK 2009, PGI June 2006, June 97)*
a. Basal cell carcinoma
b. Squamous cell carcinoma
c. Malignant melanoma
d. Fibrosarcoma

31. Which of the following is true about Marjolin's ulcer? *(Orissa 2011, PGI Dec 97)*
a. Ulcer over scar
b. Rapid growth
c. Rodent ulcer
d. Painful

32. True about Marjolin's ulcer: *(PGI Dec 2003, June 2007)*
a. Develops in long standing scar
b. Squamous cell carcinoma develops
c. Slow growing lesion
d. Also known as Baghdad sore
e. Common in Black races

PREMALIGNANT LESIONS OF SKIN

33. Bowen's disease is: *(DPG 2005)*
a. Mimics chronic dermatosis
b. Premalignant condition
c. Presents with pruritus
d. All of the above

34. Premalignant conditions of the skin include: *(JIPMER 86)*
a. Bowen disease
b. Paget's disease of nipple
c. Leukoplakia
d. Presence of malignancy
e. All of the above

35. All the following are premalignant conditions except: *(MHSSMCET 2008)*
a. Actinic Keratosis
b. Steatoma multiplex
c. Erythroplakia of Queyrat
d. Keratosis of lip

SQUAMOUS CELL CARCINOMA

36. Squamous cell carcinoma can arise from: *(PGI 88)*
a. Long standing venous ulcers
b. Chronic lupus vulgaris
c. Rodent ulcer
d. All of the above

37. Margins of squamous cell carcinoma is: *(JIPMER 81, DPG 86)*
a. Inverted
b. Everted
c. Rolled
d. Undermined

38. Buschke-Lowenstein tumor is: *(TN 2003)*
a. Molluscum contagiosum
b. Condyloma lata
c. Giant condyloma accuminata
d. Metastasis

BASAL CELL CARCINOMA

39. The commonest clinical pattern of basal cell carcinoma is: *(COMEDK 2008, MCI March 2005)*
a. Nodular
b. Morpheaform
c. Superficial
d. Keratotic

40. Most common site of basal cell carcinoma is: *(All India 94, MHPGMCET 2001)*
a. Face
b. Trunk
c. Neck
d. Extremities

41. A 48 years old sports photographer has noticed a small nodule over the upper lip from four months. The nodule is pearly white with central necrosis, telangiectasia. The most likely diagnosis would be:
a. Basal cell carcinoma
b. Squamous cell carcinoma
c. Atypical melanoma
d. Kaposi sarcoma

42. Which of the following cutaneous malignancies do not metastasize through the lymphatics? *(All India 94)*
a. Squamous cell carcinoma
b. Basal cell carcinoma
c. Melanoma
d. Kaposi's sarcoma

43. Diagnostic procedure for basal cell carcinoma: *(PGI June 98)*
a. Wedge biopsy
b. Shave
c. Incisional biopsy
d. Punch biopsy

44. All of the following are true about basal cell carcinoma except: *(DNB 2009)*
a. Most common site is upper eyelid
b. Locally invasive
c. Rarely metastasizes
d. Associated with exposure to sun

45. In pigmented basal cell carcinoma, treatment of choice is:
a. Chemotherapy
b. Radiotherapy *(PGI 98)*
c. Cryosurgery
d. Excision

46. Moh's micrographic excision for basal cell carcinoma is used for all of the following except: *(Karnataka 2006)*
a. Recurrent Tumor
b. Tumor less than 2 cm in diameter
c. Tumors with aggressive histology
d. Tumors with perineural invasion

47. Basal cell carcinoma spreads by: *(MAHE 2007)*
a. Lymphatics b. Hematogenous
c. Direct spread d. None of the above

48. About basal cell carcinoma, false is: *(DPG 2006)*
a. Spreads to local lymph nodes
b. Seen on face
c. Seen on exposure of sunlight to skin
d. Responds well to radiation

49. Characteristic feature of basal cell carcinoma is: *(AIIMS May 2012)*
a. Keratin pearls b. Foam cells
c. Nuclear palisading d. Psammoma bodies

50. Reconstruction of tip of nose after excision of basal cell carcinoma is done by? *(DNB 2014)*
a. Bipedicled flap b. Bilobed flap
c. Full thickness skin graft d. Split skin graft

MALIGNANT MELANOMA

51. In the Clarke's level of tumor invasion for malignant melanoma level 3 refers to: *(COMEDK 2006)*
a. All tumor cells above basement membrane
b. Invasion into reticular dermis
c. Invasion into loose connective tissue of papillary dermis
d. Tumors cell at junction of papillary and reticular dermis

52. True about malignant melanoma: *(PGI June 2008)*
a. Lymphatic spread
b. Lymph node biopsy is always done
c. Biopsy to be done when sentinel node is involved
d. Microsatellitism

53. Common features of melanoma, which of the following is not the part of mnemonic ABCDE? *(MHSSMCET 2009)*
a. Elevation b. Asymmetric outline
c. Variation in color d. Diameter < 6 mm

54. In malignant melanoma, change seen is all except:
a. Ulceration b. Bleeding *(DPG 2006)*
c. Satellite lesions d. Hair in mole

55. Treatment of choice for melanoma is: *(DPG 2006)*
a. Chemotherapy
b. Surgical excision
c. Radiotherapy
d. Surgery and chemotherapy

56. Most common origin of melanoma is from: *(AIIMS Nov 2001)*
a. Junctional melanocytes b. Epidermal cells
c. Basal cells d. Follicular cells

57. Most common type of malignant melanoma is:
a. Superficial spreading *(AIIMS Nov 2001, UPPG 2009)*
b. Lentigo maligna melanoma *(JIPMER 2014, 2012)*
c. Nodular
d. Acral lentiginous

58. Most common site of lentigo maligna melanoma is: *(DNB 2013, AIIMS Nov 2001)*
a. Face b. Legs
c. Trunks d. Soles

59. The most malignant form of malignant melanoma is:
a. Nodular *(PGI June 99)*
b. Hutchinson's melanotic freckle
c. Acral lentiginous type
d. Superficial spreading

60. Prognosis of melanoma depends on: *(PGI June 98)*
a. Stage
b. Depth of melanoma of biopsy
c. Duration of growth
d. Site

61. All of the following statements about malignant melanoma are true except: *(All India 97)*
a. Prognosis is better in female than in male
b. Acral lentiginous melanoma carries a good prognosis
c. Stage IIa shows statelite deposits
d. Most common type is superficial spreading melanoma

62. Biopsy from a mole on the foot shows cytologic atypia of melancytes and diffuse epidermal infiltration by anaplastic cells, which are also present in the papillary and reticular dermis. The most likely diagnosis is: *(All India 2004)*
a. Melanoma, Clark level IV
b. Congential melanocytic nevus
c. Dysplastic nevus
d. Melanoma, Clark level III

63. A 35 years old premenopausal patient as recently developed a 1.5 cm sized pigmented lesion on her back. Which of the following forms of tissue diagnosis will you recommended for her?
a. Needle biopsy b. True-cut biopsy
c. Excision biopsy d. Incisional biopsy

64. Which of the following is true about melanoma?
a. Amelanotic melanoma is associated with worst prognosis
b. Complete excisional biopsy is the management
c. Thinner melanoma has good prognosis
d. Back in MC site is females *(PGI Dec 2005)*
e. Congenital giant nevus is associated with minimal risk of malignancy

65. Melanoma should be excised with a margin of: *(UPSC 88)*
a. 2 cm b. 5 cm
c. 7 cm d. 10 cm

66. Most severe form of malignant melanoma is: *(Kerala 94)*
a. Superficially spreading
b. Nodular infiltrating type
c. Those arising in lower type
d. Those in choroid

67. Melanoma staging is based on which classification?
a. Breslow b. Clark's *(DNB 2009)*
c. Both d. Bethesda

68. Worst prognosis in melanoma is seen in the subtype:
a. Superficial spreading *(Kerala 2001)*
b. Nodular melanoma
c. Lentigo maligna melanoma
d. Amelanotic melanoma

69. Least common site for spread of melanomas: *(DNB 2012)*
a. GIT b. Lungs
c. Liver d. Renal

70. Which one of the following is not included in the treatment of malignant melanoma? *(UPSC 2005)*
a. Radiation b. Surgical excision
c. Chemotherapy d. Immunotherapy

71. A 40 years old man presented with al flat 1 cm × 1 cm scaly, itchy black mole on the front of thigh. Examination did not reveal any inguinal lymphadenopathy. The best course of management would be: *(UPSC 2007)*
a. FNAC of the lesion
b. Incision biopsy
c. Excisional biopsy
d. Wide excision with inguinal lymphadenectomy

72. Inguinal lymph node enlargement is seen in: *(MPPG 97)*
a. Seminoma testis
b. Malignant melanoma foot
c. CA cervix
d. None

73. Risk factor for malignant melanoma all the following are risk factors foe malignant melanoma except: *(DNB 2014)*
a. Giant congenital nevi
b. Family history melanoma
c. Exposure to UV light
d. HPV infection

74. Marker of Melanoma: *(JIPMER 2014)*
a. S-100
b. CK-20
c. MTLF
d. VIMENIN

SKIN PATCH/ STAIN/ HEMANGIOMA

75. Which of the following is a regressing tumor? *(DPG 2011)*
a. Portwine stain
b. Strawberry angioma
c. Venous angioma
d. Plexiform angioma

76. True about congenital hemangioma:
a. Congenital variety stops growing after birth
b. Fully mature at birth *(PGI June 2007, Dec 2007)*
c. NICH variety persists
d. RICH variety involutes
e. Calcification can occur

77. Following is regressive tumor: *(MHPGMCET 2007)*
a. Venous angioma
b. Strawberry angioma
c. Port-wine stain
d. Juvenile angioma

78. Treatment for strawberry angioma: *(MHSSMCET 2006, JIPMER 95)*
a. Steroids
b. Local excision
c. Masterly inactivity
d. Antibiotic coverage

79. The best results in treatment of capillary nevus have been achieved by: *(AIIMS 84)*
a. Full thickness skin graft
b. Dermabrasion
c. Tatooing
d. Argon laser treatment

80. Spontaneous regression is seen in all except: *(All India 93)*
a. Salmon patch
b. Small cavernous hemangioma
c. Portwine stain
d. Strawberry angioma

81. Salmon patch usually disappears by age: *(PGI 80, 81, UPSC 89)*
a. One month
b. One year
c. Puberty
d. None of the above

82. Eleven months old child presents with erythematous lesion with central clearing which has been decreasing in size:
a. Strawberry angioma *(All India 97)*
b. Nevus
c. Portwine stain
d. Cavernous hemangioma

83. Regarding hemangiomas following are true:
a. Salmon patch disappears after the age of one
b. Port wine stain present throughout life
c. Salmon patch-on forehead midline and over occiput
d. All are correct

84. The best cosmetic results for large capillary (port wine) hemangiomas are achieved by: *(UPSC 2005)*
a. Excision and split-thickness skin
b. Laser ablation
c. Chemotherapy
d. Immunotherapy

85. Best method to treat a large port-wine hemangiomas:
a. Radiotherapy *(DNB 2010)*
b. Tatooing
c. Excision with skjn grafting
d. Pulsed eye laser

86. Which is not true about Sturge Weber syndrome? *(AIIMS Sept 96)*
a. Portwine stain
b. Calcification in brain
c. Cortical atrophy
d. Intracranial hamartoma

87. Which of these does not change or remains same throughout life? *(AIIMS Nov 2001)*
a. Salmon patch
b. Strawberry angiomas
c. Portwine stain
d. Capillary hemangiomas

88. Spontaneous regression is seen in: *(All India 98, All India 97)*
a. Portwine hemangioma
b. Strawberry hemangioma
c. Cavernous hemangioma
d. Arterial angioma

SEBACEOUS CYST

89. Sebaceous cyst does not occur in the: *(PGI 88)*
a. Scalp
b. Scrotum
c. Back
d. Sole

90. True about epidermoid cyst: *(PGI Dec 2005)*
a. Punctum is present
b. Keratin is present
c. Sebaceous material present
d. Autosomal inheritance
e. May turn malignant

91. Sebaceous cyst is: *(DNB 2004)*
a. Distention cyst
b. Retention cyst
c. Implantation dermoid
d. Mucus cyst

92. Cock's peculiar tumor is: *(DNB 2009, MCI Sept 2007)*
a. Infected sebaceous cyst
b. Osteomyelitis of skull
c. Cyst in the skull
d. Tumor of the skull

93. Cock's peculiar tumor is: *(AIIMS Nov 2010)*
a. Basal cell carcinoma
b. Squamous cell carcinoma
c. Ulcerated sebaceous cyst
d. Cylindroma

LIPOMA

94. The term universal tumor refers to: *(PGI 88)*
a. Adenoma
b. Papilloma
c. Fibroma
d. Lipoma

95. Dercum's disease is commonest in the: *(JIPMER 81, DPG 86)*
a. Face
b. Arm
c. Back
d. Thigh

96. Lipoma becomes malignant commonly at which site: *(JIPMER 88)*
a. Subcutaneous
b. Retro-pertioneal
c. Sub-aponeurotic
d. Intermuscular

97. Dercum's disease is characterized by: *(DNB 2008)*
a. Lipodermatosclerosis
b. Tender subcutaneous lipoma
c. Morbid obesity
d. None

98. Myxomatous degeneration is lipoma is seen in those occurring in: *(MHSSMCET 2006)*
a. Breast b. Pancreas
c. Intramuscular d. Retroperitoneum

HIDRADENITIS SUPPURATIVA

99. Hidradenitis suppurativa is found to occur in: *(JIPMER 86, AIIMS 87)*
a. Axilla b. Circumanal
c. Scalp d. Groin

KERATOCANTHOMA

100. Keratocanthoma is: *(AIIMS 85)*
a. A type of basal cell carcinoma
b. Infected sebaceous cyst
c. Self healing nodular lesion with central ulceration
d. Pre-malignant disease

101. True about keratocanthoma: *(PGI 2000)*
a. Benign tumor
b. Malignant skin tumor like squamous cell carcinoma
c. Treatment same as for squamous cell carcinoma
d. Easy to differentiate from squamous cell carcinoma histologically
e. Treatment is masterly inactivity

MISCELLANEOUS

102. Cause of persistence of a sinus or fistulae includes: *(JIPMER 86)*
a. Foreign body b. Non dependent drainage
c. Unrelieved obstruction d. Presence of malignancy
e. All of the above

103. The best dressing is: *(PGI 88)*
a. Opsitie b. Amnion
c. Tulle grass d. Skin

104. Hydrocele is a type of ……cyst: *(PGI 88)*
a. Retention b. Distension
c. Exudation d. Traumatic

105. Calcifying epithelioma is seen in: *(JIPMER 95)*
a. Dermatofibroma b. Adenoma sebaceum
c. Pyogenic granuloma d. Pilomatrixoma

106. Boil can occur at all sites except: *(TN 95)*
a. Pinna b. Skin
c. Scalp d. Palm

107. Frost bite is treated by: *(AMC 2000)*
a. Rapid rewarming b. Slow rewarming
c. IV pentoxyphyllin d. Amputation

108. Treatment for pyoderma gangrenosum is: *(Jharkhand 2003)*
a. Steroids b. I.V. antibiotics
c. Surgery + antibiotics d. Surgery alone

109. Which of the following materials for implants will evoke least inflammatory tissue response?
a. Polypropylene b. Bovine collagen
c. Polyaglactin d. Cotton

110. Cylindroma is *(DPG 2007)*
a. Appendage tumor b. Acinic cell carcinoma
c. Pleomorphic adenoma d. Warthin's tumour

111. Pyogenic granuloma, true statements is/are: *(PGI June 2007)*
a. Vascular pathology b. Bleeds rarely
c. Increased in pregnancy d. Local excision
e. Recurrent and malignant

112. Lines of Blaschko represent: *(All India 2011)*
a. Lines along lymphatics b. Lines along blood vessels
c. Lines along nerves d. Lines of development

113. Bedsore is an example of: *(All India 99)*
a. Tropical ulcer b. Trophic ulcer
c. Venous ulcer d. Post thrombotic ulcer

114. Ainhum is seen in: *(All India 99)*
a. Base of great toe b. Base of fingers tips
c. Base of toe d. Ankle

115. In hand injury, first structure to be repaired should be: *(All India 98, All India 95)*
a. Skin b. Nerve
c. Muscle d. Bone

116. Trophic ulcers are caused by: *(PGI June 2002)*
a. Leprosy b. Buerger's disease
c. Syringomyelia d. DVT
e. Varicose veins

117. Which of the following is true? *(PGI Dec 2005)*
a. Viral warts spontaneously resolve
b. Plantar warts should not be excised
c. Callosity are formed occupationally
d. Corns are viral in etiology

118. Ulcer with undermined edges is seen in: *(MHPGMET 2005)*
a. Malignant ulcer b. Tubercular ulcer
c. Venous ulcer d. Trophic ulcer

119. Which of the following is not a true cyst? *(MHPGMCET 2006)*
a. Sebaceous cyst b. Dermoid cyst
c. Bone cyst d. Apoplectic cyst

120. Pilomatrixoma is: *(MHPGMCET 2006)*
a. A fleshy skin mass b. A type of skin tag
c. A benign epithelial tumor d. A malignant skin neoplasm

121. Sinus is lined by: *(MHPGMCET 2007)*
a. Simple squamous epithelium b. Columnar epithelium
c. Granulation tissue d. Fibrous tissue

122. A swelling which is variable in consistency with diffuse margins is likely to be: *(MHSSMCET 2005)*
a. Inflammatory b. Benign
c. Malignant d. Non-specific

123. Zadek's procedure is: *(MHSSMCET 2005)*
a. Resection of part of nail with nail bed
b. Resection of complete nail with part of nail bed
c. Injection phenol at base of toe nail
d. Wide excision of nail

124. Which of the following is a compressible swelling:
a. Lipoma b. Hernia *(DNB 2013, 2010)*
c. Hemangioma d. Sebaceous cyst

125. Which of the following flap is used for eye lid surgery? *(MHSSMCET 2010)*
a. Bilope flap b. Rhomboid flap
c. Bipedicle flap d. Transposition flap

126. Radiotherapy is the treatment of choice of which one of the following tumors? *(UPSC 2008)*
a. Verrucous carcinoma b. Malignant melanoma
c. Marjolin's ulcer d. Rodent ulcer

127. Calcifying epithelioma is also known as: *(AIIMS 86)*
a. Pilomatrixoma b. Myoblastoma
c. Calcinosis cutis d. Dermatofibroma lenticulare

128. Pott's Puffy MMR refers to: *(COMEDK 2014)*
a. Osteo myelitis of the frontal bone
b. Tuberculosis of the spine
c. Actionomycosis of manlla
d. Osontosenic tumor of Jaw

EXPLANATIONS

SKIN GRAFTING

1. **Ans. None** *(Ref: Sabiston 19/e p1916-1917; Schwartz 10/e p264-265, 266, 9/e p1651; Bailey 26/e p402-403, 25/e p395-396)*

Light compression wraps favor 'take in' of split skin graft, not the tight dressing.

Graft Take

- Skin graft take occurs in three phases, imbibition, inosculation, and revascularization.

Graft Take

Plasma Imbibition	Inosculation	Revascularization
• Graft survives upto **first 48 hours**[Q] because of plasma imbibition • Involves **free absorption of nutrients** into the graft	• **Donor** and **recipient capillaries are aligned** during inosculation[Q] • Inosculation **completes by 4–5 days**[Q]	• **After 5 days**[Q], revascularization occurs • Graft demonstrates **both arterial and venous outflow**[Q]

- During these initial few days the graft is most susceptible to deleterious factors such as **infection, mechanical shear forces and hematoma or seroma**[Q].

Partial Thickness (Thiersch) or Split Skin Graft

- Consist of **epidermis** and **variable portion of dermis**[Q]
- **Large size of graft can be taken**[Q]
- **Site: Thigh (MC)**[Q] upper arm, flexor aspect of forearm and abdominal wall
- Grafts are **hairless** and **do not sweat**[Q] (these structures are not transferred)

> • Skin graft must be **applied to a well-vascularized recipient wound bed**. It will **not adhere to exposed bone, cartilage, or tendon** devoid of periosteum, perichondrium, or peritenon, respectively, or devoid of its vascularized perimembranous envelope.

- **MC causes** of **skin graft failure**: **Hematoma** (or seroma), **infection**, and **movement** (shear).
- **Pie crusting: Stab incisions** in the graft preemptively **to create small outlets for fluid to drain** from beneath the graft

> • **Beta hemolytic Streptococci** can **destroy split skin grafts completely, presence** of this organism is a **contraindication** to **grafting**[Q].

- **Graft immobilization** is **critical to the graft take** and can be accomplished with bolster dressing, light compression wraps or a vacuum assisted closure device.

2. **Ans. a. Partial thickness** *(Ref: Sabiston 19/e p916-917; Schwartz 10/e p264-265, 266, 9/e p1651; Bailey 26/e p407-408, 25/e p395-396)*

Skin Grafts

Partial Thickness (Thiersch) Graft	Full Thickness (Wolfes) Graft
• It includes **all epidermis and part of dermis**[Q]. • Partial thickness **grafts are thin, uptake of graft** is **easy (easy survival)**[Q]. • **Large grafts could be taken** as the donor site is left with a **part of dermis** which will cause **easy regeneration of epidermis**[Q]. • **Contract upto 40%, not useful** for **cosmetic surgeries**[Q]. • **Donor site** will **heal well**[Q] without any contraction, and is reusable.	• It includes **all epidermis** and **dermis**[Q]. • **Uptake** is **difficult** because of thickness • Less chances of survival • **Small grafts** could be **taken**[Q] as the donor site does not have epidermal or dermal remnants to allow epithelialization • **Very minimal contraction** making it **suitable** for **cosmetic surgeries** on **face**[Q]. • **Donor site** will have to be **closed primarily** or **left open to granulate** and contract[Q].

Contraction of Graft

- **Primary :** Occurs when the graft is harvested, **depends upon** amount of **dermis** present, **more in full thickness graft**
- **Secondary :** Occurs after the surgery, **more in partial thickness graft**

3. **Ans. b. Thiersch graft**
4. **Ans. c. They contract to the same degree as a grafted sheet of skin** *(Ref: Sabiston 19/e p1917; Schwartz 10/e p264-265, 9/e p1651; Bailey 26/e p404-405, 25/e p401)*

MESHED SKIN GRAFTS

- **Split grafts** may be **meshed to expand** the **surface area** that can be covered[Q].
- This technique is **particularly useful** when a **large area must be resurfaced**, as **in major burns**.
  - **Meshed grafts** usually also have **enhanced reliability of engraftment**, because the **fenestrations allow for egress of wound fluid** and **excellent contour matching** of the wound bed by the graft[Q].
- **Fenestrations** in meshed grafts **re-epithelialize by secondary intention** from the surrounding graft skin.
  - **Major drawbacks** of meshed grafts are **poor cosmetic appearance** and **high secondary contraction**[Q].
- **Meshing ratios** used usually range from **1:1.5 to 1:6**, with higher ratios associated with magnified drawbacks.

5. **Ans. b. Thigh**
6. **Ans. c. Vascular graft**
7. **Ans. a. Joseph Lister: en.wikipedia.org/wiki/Joseph_Lister**
   - **Joseph Lister said "Skin is the best dressing".**
8. **Ans. b. Plasma imbibition**
9. **Ans. b. Pedicle graft** *(Ref. Sabiston 19/e p1917; Schwartz 9/e p1651; Bailey 25/e p397-399)*
   - Skin graft must be **applied to a well-vascularized recipient wound bed**. It will **not adhere to exposed bone**[Q], **cartilage**[Q], **or tendon**[Q] devoid of periosteum, perichondrium, or peritenon, respectively, or devoid of its vascularized perimembranous envelope.
   - Radiation damaged tissues are poor recipient sites.
   - So an exposed bone surface is covered by a graft which has its own blood supply. Such grafts are known as flaps or pedicle grafts.

PEDICEL GRAFT OR FLAP

- Flap: **Partially** or **completely isolated segment** of tissue with its **own blood supply**[Q]

Absolute Indications for Flaps

• **Exposed bone**[Q] • **Radiated vessel**[Q] • **Brain**[Q]	• **Open joint** or **non-biological**[Q] **implant materials**[Q] • **Pressure sores** at bony prominences

10. **Ans. b. Full thickness graft**
11. **Ans. d. Full thickness skin graft**
12. **Ans. c. Streptococcus**
13. **Ans. a. Revascularization of the graft**
14. **Ans. c. Skull bone**
15. **Ans. c. For large areas, full thickness graft is used**
16. **Ans. a. Muscle** *(Ref: CSDT 12/e p1211)*

    For **critical** and **small areas** such as an **eyelid**, a **full thickness graft** is selected, so that contraction of the grafted material is minimum.
17. **Ans. d. Postauricular region** *(Ref: CSDT 12/e p1211)*

Donor Sites for Full Thickness Grafts	
• **Eyelids**[Q] • **Postauricular skin**[Q] • **Supraclavicular skin**[Q] • **Antecubital skin**[Q]	• **Inguinal area**[Q] • **Genital area**[Q] • **Submammary skin**[Q] • **Subgluteal skin**[Q]

18. **Ans. b. Back to neck**
19. **Ans. b. 2 weeks** *(Ref. Facial Plastic and Reconstructive Surgery by Ira D. Papel/44)*

    Excess split-skin autografts harvested and meshed during a surgical session are often stored at short-term for later burn surgery or graft failure.

    The current procedure in **skin storage involves wrapping the meshed autograft** on a piece of **ringer lactate** or **normal saline moistened gauze**, transferring it into a sterile container and **storing it in a 40 C for 2 weeks.** The graft should never be totally immersed in saline because it will become macerated. After 14 days of storage the respiratory activity of skin graft reduced by 50%.

20. **Ans. d. Autograft** 21. **Ans. c. Less contraction**

FLAPS

22. **Ans. a. Carries its own vessels within it** *(Ref. Sabiston 19/e p1917-1919; Schwartz 9/e p1651-1654; Bailey 26/e p404-405, 25/e p397-398)*

Type of Flaps on the basis of source of Vascular Supply

Random	Axial	Free
• Random flaps **rely on** the **low perfusion pressures** found in **subdermal plexus**[Q] to sustain the flap • Used to **reconstruct relatively small, full-thickness defects** that are not amenable to skin grafting.	• Axial flap is **based on** a **named blood vessel**[Q] • Provide a **reproducible** and **stable skin** or **skin-muscle** (**myocutaneous**) **flap**[Q]. • Can be used to provide much needed length and bulk • **Axial flap** that **remains attached to its proximal blood supply** and **transposed to a defect** is known as a **pedicled flap**[Q].	• **Autogenous transplantation**[Q] of vascularized tissues. • **Complete detachment** of the **flap**, with **devascularization, from the donor site**[Q] • **Revascularization** of the flap with **anastomoses to blood vessels** in the **recipient site**[Q]

23. **Ans. a. Pedicle flap** 24. **Ans. a. Lip** 25. **Ans. c. Burn wound**

26. **Ans. a. Randomised flaps** 27. **Ans. d. Skin, muscle and vascular pedicle**

MARJOLIN'S ULCER

28. **Ans. b. Squamous cell carcinoma** *(Ref. Schwartz 10/e p259, 1817, 9/e p224, 414; Bailey 26/e p548, 25/e p611, 935)*

Marjolin's Ulcer

- **Low grade SCC**[Q], which develops on a **chronic benign ulcer** or a **long standing scar** tissue.
- **Arises from** the **edge**[Q] of the ulcer

Marjolin's ulcer may develop in	
• **Post burn scar**[Q] • Long standing **venous ulcer**[Q] • **Chronic ulcer**[Q] due to trauma	• Chronically **discharging osteomyelitis sinus**[Q] • **Post-radiation ulcer**

Characteristic Features

- **Slow growing**[Q] as scar tissue is **relatively avascular**
- **Painless** as there **no nerves in** the **scar tissue**[Q]
- **No secondary deposits**[Q] in regional lymph node, as there are **no lymphatic vessels** in scar tissue
- If the ulcer invades the normal tissue, then only lymph node may be involved by lymphatic spread
- **Radioresistant**[Q] due to **avascularity**

29. **Ans. a. The associated cancer is squamous cell carcinoma, b. May occur due to chronic venous insufficiency**

30. **Ans. b. Squamous cell carcinoma** 31. **Ans. a. Ulcer over scar**

32. **Ans. a. Develops in long standing scar, b. Squamous cell carcinoma develops, c. Slow growing lesion**

PREMALIGNANT LESIONS OF SKIN

33. **Ans. d. All of the above** *(Ref. Sabiston 19/e p762; Schwartz 10/e p847, 1217-1218, 9/e p413; Bailey 26/e p589, 25/e p607)*

Bowen's disease

- This is an **SCC in situ**[Q], of which 3–11% progress to SCC.
- **Etiological agents: Chronic solar damage, inorganic arsenic** and **HPV16**[Q]
- This is rare, **slow-growing intraepidermal SCC** that often **mimics a chronic dermatosis**[Q].
- It should now be considered as a **form of AIN III** (Anal intraepithelial neoplasia).

Clinical Features

- It usually **presents with pruritus**[Q] and on examination looks like **psoriasis** or **senile keratosis**.
- Presents as a **slowly enlarging, erythematous, scaly patch** or **plaque**[Q].

Treatment

- **Topical therapy** with **5-fluorouracil** or **imiquimod** is an effective treatment[Q].
- Alternatives: **Surgical excision** with a 4-mm margin or **Mohs' micrographic surgery**[Q] for larger or recurrent lesions.

34. **Ans. e. All of the above**

35. **Ans. b. Steatoma multiplex** *(Ref. Sabiston 19/e p761-763; Schwartz 9/e p413; Bailey 26/e p588-589, 25/e p607-609)*

Premalignant skin Lesions	
• **Senile** or **actinic keratosis**[Q]	• **Chronic scars**[Q]
• **Bowen's disease**[Q]	• Radiodermatitis[Q]
• **Erythroplasia of Queyrat**[Q]	• Prokeratosis[Q]

SQUAMOUS CELL CARCINOMA

36. **Ans. a. Long standing venous ulcers, b. Chronic lupus vulgaris** *(Ref. Sabiston 19/e p761-764; Schwartz 10/e p1218, 9/e p413-414; Bailey 26/e p593-594, 25/e p610-612)*

Squamous Cell Carcinoma (Epithelioma or Epidermoid Carcinoma)

- It is a carcinoma of the cells of epidermis that usually migrate outwards to the surface.
- Originate from **prickle cell layer**[Q]; **Seen in > 40 years of** age

- **MC skin cancer** in **darkly pigmented races**[Q]
- 2nd MC skin cancer in light skinned races[Q]
- **MC causative factor**: **Sunlight**[Q]
- **MC site:** Ears, cheeks, lower lip and back of hands[Q]

Predisposing Factors for SCC	
• **Senile** or **actinic keratosis**[Q]	• Contact with **tars** and **hydrocarbons**[Q]
• **Chronic skin lesions (lupus vulgaris**[Q], cutaneous TB)	• **Erythroplasia of Queyrat**[Q]
• **Sunlight** or **irradiation**[Q]	• **Immunosuppression**[Q]
• **Chronic irritation; HIV, HPV-16**[Q]	• **Psoralens, Arsenic exposure**[Q]

Pathology

- Microscopically mass of keratin is surrounded by normal looking squamous cells, presenting with characteristic **prickle cell appearance**[Q], which are arranged in concentric manner as seen in **'onion skin'**. This whole appearance is called "**cell nest** or **epithelial pearl**[Q]".
- **MC type of SCC: Ulcerative** type[Q]

Clinical Features

- **MC symptom: Nodule** or **ulcer**[Q]
- **Edge** of ulcer: **Raised** and **everted** with **indurated base (pathognomonic)**[Q]

Diagnosis

- **Diagnosis** is made by **wedge biopsy**[Q] (taken from **edge of ulcer**)

Treatment

- **Small (< 1 cm) or non-invasive SCC: Excision** with **1 cm margin**[Q]
- **Large, aggressive,** located at **vital areas** or **recurrent: Moh's micrographic surgery**[Q]

37. **Ans. b. Everted**

38. **Ans. c. Giant condyloma accuminata** *(Ref. Bailey 26/e p1375, 25/e p1375)*

Giant Condyloma Acuminatum

- **Giant condyloma acuminatum** (also known as a **Buschke-Löwenstein tumor)**[Q]
- Rare cutaneous condition characterized by an **aggressive, wart-like growth** that is a **verrucous carcinoma**[Q].
- It is attributed to **HPV**[Q].

BASAL CELL CARCINOMA

39. Ans. a. Nodular *(Ref. Sabiston 19/e p761-764; Schwartz 10/e p486-487, 9/e p413; Bailey 26/e p591-592, 25/e p609-610)*

Basal Cell Carcinoma (Rodent Ulcer)

- **Locally invasive** carcinoma, **arises from** the **basal layer**[Q] of the epidermis
- **MC type of skin cancer**[Q]
- **90%** of **BCC** are seen **in** the **face**[Q], above a **line from** the **corner of mouth to lobule of ear**.
- **MC site: Nose >Inner canthus**[Q] **of** the **eye**, also known as **Tear cancer**[Q].

Types of BCC

- **Nodular: MC type of BCC**[Q], characterized by small slow growing **pearly nodules**, often with **telengiectatic vessels** on its surface. **Central depression** with **umbilication**[Q] is a classic sign.
- **Pigmented:** Mimic malignant melanoma
- **Cystic**
- **Superficial**

Characteristic Features of BCC	
• **Low grade malignancy**[Q] • **More common in fair** and **dry skinned** people • **Nuclear palisading**[Q] on histology	• **Exposure to sunlight**[Q] is an important etiological factor • Has been seen following prolonged administration of **Arsenic**[Q]

Spread

- BCC usually spreads by **local invasion**[Q], rarely metastasizes
- **Rodent ulcer:** It gradually **destroys the tissues**, it comes **in contact with**.
- **Lymphatic spread** is **not seen**[Q] (Regional lymph nodes are not enlarged)
- Blood spread is extremely rare.

Diagnosis

- Diagnostic procedure for BCC is **wedge biopsy**[Q].

Treatment

- **Non-aggressive tumor** on **trunk** or **extremities**: **Excision** or **Electrodissection and curettage**[Q]
- **Large, aggressive,** located at **vital areas** or **recurrent: Moh's micrographic surgery**[Q]

40. Ans. a. Face

41. Ans. a. Basal cell carcinoma

42. Ans. b. Basal cell carcinoma

43. Ans. a. Wedge biopsy

44. Ans. a. Most common site is upper eyelid

45. Ans. d. Excision

46. Ans. b. Tumor less than 2 cm in diameter *(Ref. Sabiston 19/e p763-764; Schwartz 10/e p486-487, 9/e p414; Bailey 26/e p592, 25/e p610)*

Moh's Micrographic Surgery for SCC and BCC

- **Mohs' technique** uses **serial excision** in small increments coupled with **immediate microscopic analysis to ensure tumor removal**, yet **limit resection of aesthetically valuable tissue**[Q].
- **Advantage: All specimen margins** are **evaluated**[Q].

- **Major benefit**: Ability to remove a tumor with **minimal sacrifice** of **uninvolved tissue**[Q].
- **Particular value** in managing tumors of the **eyelid, nose,** or **cheek**[Q]
- **Indicated in large, aggressive tumors** located at **vital areas** or **recurrent tumors**[Q]

- **Major drawback: Procedure length** (Total lesion excision may require multiple attempts at resection, and many procedures may be carried out over several days)
- **Recurrence** and **metastases rates** are **comparable to** those of **wide local excision**[Q].

47. Ans. c. Direct spread

48. Ans. a. Spreads to local lymph nodes

49. Ans. c. Nuclear Palisading

50. Ans. b. Bilobed flap *(Ref. Bailey 25/e p402)*

Bilobed flap is used to cover a convex defect as on tip of nose. The bilobed flap is widely used for small nasal defects because it allows one to distribute tensions further from he primary defect, thus controlling the degree of tension along the alar margin

MALIGNANT MELANOMA

51. Ans. d. Tumors cell at junction of papillary and reticular dermis *(Ref. Sabiston 19/e p742-760; Schwartz 10/e p488-492, 9/e p414-417; Bailey 26/e p594-596, 25/e p612-616)*

Malignant Melanoma

- Melanoma is neoplastic disorder produced by **malignant transformation of normal melanocytes**[Q].

> - **Site most commonly associated** with melanocytic transformation in the skin, where **melanocytes** reside **at the dermo-epidermal junction (Junctional melanocytes)**[Q].
> - **MC site** of MM **in men: Back and trunk**[Q]
> - **MC site** of MM **in women: Lower extremity**[Q]

- **Most susceptible individuals: Fair** complexions, **red** or **blonde hair, blue eyes** and **freckles** and who **tan poorly** and **sunburn easily**.
- **MM is positive** for **S-100, HMB-45, vimentin** but **negative for cytokeratin-20**[Q].

Risk factors for Malignant Melanoma	
• **Xeroderma pigmentosum**[Q] • **Actinic damage (UVR)**[Q] • **Family history** of melanoma[Q] • Presence of **dysplastic naevus**[Q]	• **Giant** congenital melanocytic nevus • **Increased number** of **ordinary melanocytic naevi** • **History** of **sunburn**[Q]

Types of Malignant Melanoma: (In order of decreasing frequency)	
Superficial spreading	• **MC type** of MM[Q] • **MC site: Torso**
Nodular	• **Most malignant**[Q] • **MC site: Head, neck** and **trunk** • Vertical growth phase only
Lentigo maligna	• **Least malignant**[Q] • **MC site: Face**
Acral lentiginous	• **Least common, worst prognosis**[Q], • **MC site: Sole, under great toe nail**

Characteristic Features

- **Classic appearance of melanoma: ABCD** (**A**symmetry, **B**order irregularity, **C**olor variation, **D**iameter >6 mm)[Q]
- **MC route** of **metastasis:** Through **Lymphatics**[Q]
- **MC site** of **systemic metastasis: Liver**[Q]
- Other common visceral sites of metastasis: Lung, brain, GIT (small intestine), bone, adrenal.

> - **Microsatellites:** Discrete tumor nests **> 0.05 mm** in diameter, **separated from main body** of tumor **by normal dermal collagen** or **subcutaneous fat**[Q].
> - **Microsatellites** are associated with **increased risk** of **regional LN metastasis**[Q].

Diagnosis

- Confirmed by **'full thickness excisional biopsy'**[Q]
- Incisional biopsy for large lesions and lesions in proximity to important structures (eye, nose, ear)

Treatment

- Treatment: **Surgical excision**[Q] with **sentinel LN biopsy** (Margin: **1 cm** for **< 1 mm** thickness, **2 cm** for **1–4 mm** thickness, **2–3 cm** for **> 4 mm** thickness)
- **LN dissection** if LN is palpable or positive on sentinel LN biopsy
- MM is **radioresistant tumor; Chemotherapy**: **IFN-alpha 2b**

Clark's levels[Q] (on the basis of **depth of invasion**): **EPIRS**	
I	• Melanoma restricting to **Epidermis** and appendages[Q]
II	• Invading **Papillary dermis** without filling it[Q]
III	• Reach **Interface** of papillary and reticular dermis[Q]
IV	• **Invading reticular dermis**[Q]
V	• **Invading subcutaneous tissue**[Q]

- MM is **sub-classified into 5 Clark levels**, to indicate their **depth of invasion** and **prognosis**[Q].
- **Breslow's depth of invasion: Actual measurement of** the **deepest invasion from** the **granular layer**[Q].

Breslow's Thickness	
Stage I	• < 0.75 mm[Q]
Stage II	• 0.75–1.5 mm[Q]
Stage III	• 1.6–4.0 mm[Q]
Stage IV	• > 4.0 mm[Q]

Prognostic Factors (Depends most importantly on staging[Q])	
• **Depth of invasion (most important prognostic factor)**[Q] • **Ulceration**[Q] (presence of ulceration carries worst prognosis)	• **Lymph node status**[Q] • **Satellite lesion**[Q] • **Distant metastasis**[Q]

52. Ans. a. Lymphatic spread, b. Lymph node biopsy is always done, c. Biopsy to be done when sentinel node is involved, d. Microsatellitism

53. Ans. d. Diameter < 6 mm **54. Ans. d. Hair in mole** **55. Ans. b. Surgical excision**

56. Ans. a. Junctional melanocytes **57. Ans. a. Superficial spreading** **58. Ans. a. Face**

59. Ans. a. Nodular **60. Ans. a. Stage, b. Depth of melanoma of biopsy, d. Site**

61. Ans. b. Acral lentiginous melanoma carries a good prognosis, c. Stage IIa shows statelite deposits

According to latest staging, presence of satellites is included in stage III.

62. Ans. a. Melanoma, Clark level IV **63. Ans. c. Excision biopsy**

64. Ans. a. Amelanotic melanoma is associated with worst prognosis, b. Complete excisional biopsy is the management, c. Thinner melanoma has good prognosis *(Ref. Bailey 26/e p596, 25/e p615)*

Amelanotic Melanoma

- **Amelanotic melanoma** is a type of skin cancer in which the **cells do not make melanin.**
- They can be **pink, red, purple** or of **normal skin color,** hence **difficult to recognize**[Q].

- It has an **asymmetrical shape** and an **irregular faintly pigmented border**[Q].
- **Atypical appearance** leads to **delay in diagnosis**, the **prognosis is bad**[Q].
- **Recurrence rate** is **high**[Q].

Desmoplastic Melanoma

- **Desmoplastic melanoma** is **mostly found** on the **head** and **neck region**[Q].
- It has a **propensity for perineural infiltration**[Q] and often **recurs locally**[Q] if not widely excised.
- It may be **amelanotic clinically**[Q].

65. Ans. a. 2 cm **66. Ans. b. Nodular infiltrating type** **67. Ans. c. Both**

68. Ans. d. Amelanotic melanoma **69. Ans. d. Renal** **70. Ans. a. Radiation**

71. Ans. c. Excisional biopsy **72. Ans. b. Malignant melanoma foot**

73. Ans. d. HPV infection **74. Ans. S-100**

SKIN PATCH/ STAIN/ HEMANGIOMA

75. Ans. b. Strawberry angioma *(Ref. Schwartz 10/e p485, 9/e p411-412; Bailey 25/e p616-618)*

Vascular Anomalies

Port-wine Stain	Strawberry Angiomas	Salmon Patch
• A vascular malformation • **Present at birth**[Q] • **Grows along with** the **child**[Q] • **Do not regress**[Q] • **Face involvement** in areas supplied by **5th cranial nerve**[Q]	• Type of **capillary hemangioma** • **Baby** is **normal at birth**[Q] • **Appears at** the age of **1–3 weeks**[Q] • **Grows with** the **child upto 1 year** of age and then cease to grow[Q] • By the age of **9 years, 90%** demonstrate **complete involution**[Q] • **Emptying sign**[Q] is demonstrable	• Also known as **Macular stain** or **stork bite**[Q] • **Present at birth**[Q] • Seen over **forehead in** the **midline** and **over** the **occiput**[Q] • **Disappears by** the age **1 year**[Q]

76. Ans. a. Congenital variety stops growing after birth), b. Fully mature at birth, c. NICH variety persists, d. RICH variety involutes, e. Calcification can occur *(Ref. Schwartz 10/e p485, 9/e p411-412; Bailey 26/e p598-599, 25/e p616-618)*

Hemangioma

- Benign, abnormally dense collections of dilated small blood vessels
- Occurs in the skin or internal organs
- Hemangioma is a compressible swelling

- **Calcification** is seen **in congenital hemangioma** and **GLUT-1** is **negative**[Q]

Clinical Types of Hemangioma

According to Depth of Invasion	According to Rate of Involution
• **Capillary hemangioma:** – **Best cosmetic results** obtained **by laser ablation**[Q] • **Cavernous hemangioma**	• Rapidly Involuting Congenital Hemangioma **(RICH):** – **Grow** at a **rapid rate for 4–6 months,** then growth ceases[Q] – **Spontaneous involution** begin and **completed by 5–7 years** of age[Q] • Non-Involuting Congenital Hemangioma (**NICH**): – Mostly **present at birth**[Q] – Undergo **rapid growth** during **first 4–6 months**[Q] – **Grow in proportion to** the **growth of the child**[Q]

Treatment

- Treatment of hemangiomas: Observation with reassurance[Q] of parents that regression and involution will occur.
- Local wound care, topical application of lidocaine for pain and laser cauterization may be beneficial treatment modalities.

- **Laser therapy** has been **effective in lightening affected skin**[Q].

77. Ans. b. Strawberry angioma **78. Ans. c. Masterly inactivity** **79. Ans. d. Argon laser treatment**
80. Ans. c. Portwine stain **81. Ans. b. One year** **82. Ans. a. Strawberry angioma**
83. Ans. d. All are correct **84. Ans. b. Laser ablation**

85. Ans. d. Pulsed eye laser *(Ref. (Roxburgh 17/e p194, 205)*

Selective photothermolysis or pulsed eye laser is the treatment of choice for portwine hemangioma.

Excellent results have been obtained with careful and time-consuming treatment with a 585-nm flash lamp-pumped pulsed eye laser. Treatment sessions can begin in babies and anesthesia is not always necessary.

86. Ans. d. Intracranial hamartoma *(Ref. Bailey 26/e p599, 25/e p618)*

Sturge-Weber Syndrome / Encephalotrigeminal Syndrome

- Usually sporadic, characterized by:
  - Large **unilateral cutaneous angioma**[Q] **(port-wine stain)**
  - **Angiomas** in **brain** involving **ipsilateral cerebral hemisphere** and **meninges**
  - **Focal seizures**[Q] typically occurs **opposite to** the **side of lesion**[Q]
  - Adrenal **pheochromocytoma**
  - Cerebral angiomas lead to **cortical atrophy**[Q]

- Angiomas are visible radiologically as **Tram-track** or **rail track calcification** mainly in **occipital region**[Q]

87. Ans. c. Portwine stain **88. Ans. b. Strawberry hemangioma**

SEBACEOUS CYST

89. Ans. d. Sole *(Ref. Schwartz 10/e p1218, 9/e p411; Bailey 25/e p1390, 25/e p602, 647)*

Epidermoid Cyst (Sebaceous or Epidermal cyst)

- Epidermoid cyst results from **proliferation of epidermal cells** within a circumscribed space of dermis (which had got **implanted within** the **dermis**[Q])
- **Sebaceous cyst** is a **misnomer** as the cysts are **not of sebaceous origin** and the **white creamy material** filled within is not sebum, but is **keratin (desquamated epithelial cells**[Q]**)**
- **Type of retention cyst** (secretions are pent up in a gland owing to blockage of the duct)

Pathology

- **Cyst wall** consist of a **layer of epidermis** oriented with the basal layer superficial and more matured layers are deep.
- **Desquamated cells (keratin)** collect in the centre and form creamy substance of the cyst.

Clinical Features

- **Usually asymptomatic**[Q], unless get infected or inflamed and become painful
- **Firm, round, flesh colored** to yellow or white subcutaneous nodules of variable size.
- **Central punctum**[Q] may teether the cyst to the overlying epidermis, from which the white creamy material can be expressed.
- **Rarely malignancies**[Q] **(BCC, SCC)** can develop in epidermoid cyst.

- **No punctum** in **scrotal** and **scalp sebaceous cyst**[Q]**.**

Treatment

- **Excision with** the **wall** is treatment of choice[Q].
- **Infected cyst: Incision and drainage** (After resolution of the abscess, **cyst wall** must be **excised to prevent recurrence)**[Q]

90. Ans. a. Punctum is present, b. Keratin is present, e. May turn malignant

91. Ans. b. Retention cyst **92. Ans. a. Infected sebaceous cyst** **93. Ans. c. Ulcerated sebaceous cyst**

LIPOMA

94. Ans. d. Lipoma *(Ref. Sabiston 19/e p1258; Schwartz 10/e p486, 9/e p413; Bailey 26/e p536, 985, 25/e p503, 1007)*

Lipoma

- **MC subcutaneous neoplasm: Lipomas**[Q]
- Also known as **universal tumor**[Q]
- **MC site: Trunk**[Q] (may appear anywhere)
- Other sites: Subcutaneous, Subfascial, subsynovial, intra-articular, intramuscular, subserous, submucous, CNS, intraglandular and reteroperitoneal
- Can be **encapsulated** or **diffuse**

Pathology

- **Lobulated tumor** composed of **normal fat cells**

Clinical Features

- Typically **soft** and **fleshy** on palpation
- May grow to a **large size** and become substantially deforming.

- Bracket calcification is seen in lipoma of corpus callosum[Q]

Treatment:

- **Surgical excision**[Q] is required for tumor removal

95. Ans. c. Back *(Ref. http://en.wikipedia.org/wiki/Adiposis_dolorosa)*

Adiposis Dolorosa (Dercum's Disease)

- A **rare condition** characterized by **multiple, painful lipomas**[Q]**.**
- These lipomas **mainly occur on** the **trunk, upper arms** and upper legs.
- Mostly occur between **35–50 years,** more common in **women**

Clinical Features

- **Multiple lipomas** and **neuropathic pain** are the **cardinal symptoms**[Q]

Treatment

- Treatment is usually targeted towards **pain relief**[Q] rather than lipoma removal.

96. Ans. b. Retro-pertioneal *(Ref. Sabiston 19/e p1258; Schwartz 9/e p413; Bailey 26/e p985, 25/e p1007)*

Retroperitoneal Lipoma

- These swellings sometimes reach an **immense size**[Q].
- **Retroperitoneal lipoma** is **often malignant** (liposarcoma) and **may increase rapidly in size**[Q]**.**

- A **retroperitoneal lipoma** sometimes undergoes **myxomatous degeneration**[Q]
- A complication that **does not occur in** a **lipoma in any other part of** the **body**[Q]

Clinical Features

- **Swelling** or **indefinite abdominal pain**
- **More common** in **women**

Diagnosis

- Diagnosis is usually by ultrasound and **CT scanning.**

97. Ans. b. Tender subcutaneous lipomas **98. Ans. d. Retroperitoneum**

HIDRADENITIS SUPPURATIVA

99. a. Axilla, b. Circumanal, d. Groin *(Ref. Sabiston 19/e p1398-1399; Schwartz 10/e p476,506,1233, 9/e p409-410; Bailey 26/e p582, 25/e p597-598)*

Hidradenitis Suppurativa

- **Hidradenitis suppurativa** is a **defect of** the **terminal follicular epithelium**[Q]
- Follicular defect **results in apocrine gland blockage, obstructed infection** leads to **abscess formation** throughout affected **axillary**[Q], **inguinal**[Q] and **perianal regions**[Q].
- Following spontaneous rupture of these localized collections, **foul-smelling sinuses** form and **repeated infections** create a **wide area of inflamed, painful tissue**[Q].

Treatment

- **Acute infections**: Application of **warm compresses, antibiotics** and **open drainage**[Q]
- **Chronic Hidradenitis: Wide excision** and **skin grafting**[Q]

KERATOACANTHOMA

100. Ans. c. Self healing nodular lesion with central ulceration *(Ref. Bailey 26/e p590, 25/e p607)*

Keratoacanthoma

- **Keratoacanthoma** is **self healing nodular lesion** with **central ulceration**[Q]
- More common in **men,** usually found **on the face** of **50–70 years** old.
- Lesions can **grow to 1–3 cm over 6 weeks** and typically **resolve spontaneously** over the **subsequent 6 months**[Q].

Etiopathogenesis

- Classically a **cup-shaped growth** that exhibits symmetry about its middle.
- **Central crater** is **filled with** a **plug of keratin**[Q].
- **Unclear etiology** (may be caused by **HPV infecting a hair follicle**)
- Associated with smoking and **chemical carcinogen exposure**).

Treatment

- **Removal of central keratin plug** may **speed resolution**[Q].
- **Excision** is recommended **for persistent lesions**[Q]
- **Excision scar** is often **better** than that which remains after resolution.

101. Ans. a. Benign tumor, e. Treatment is masterly inactivity

MISCELLANEOUS

102. Ans. e. All of the above **103. Ans. d. Skin** **104. Ans. c. Exudation**

105. Ans. d. Pilomatrixoma **106. Ans. d. Palm**

107. Ans. b. Slow rewarming *(Ref. Bailey 25/e p393; http://en.wikipedia.org/wiki/frostbite)*

Frostbite

- **Frostbite** injuries **affect** the **peripheries in cold climates.**
- **The initial treatment** is with **slow rewarming**[Q] **in a bath at 42 °C.**
- The cold injury produces **delayed microvascular damage.**
- Level of damage is difficult to assess.
- **Surgery** usually **does not play a role** in its management, until there is absolute demarcation of the level of injury.

108. Ans. a. Steroids *(Ref. Bailey 25/e p598; http://en.wikipedia.org/wiki/Pyoderma_gangrenosum)*

Pyoderma Gangrenosum

- Relatively uncommon **destructive cutaneous lesion.**
- Clinically, a **rapidly enlarging, necrotic lesion** with **undermined border** and **surrounding erythema** characterize this disease.
- Commonly associated with **IBD, rheumatoid arthritis, hematologic malignancy** and **monoclonal immunoglobulin A gammapathy.**

Treatment

- **First-line therapy:** Systemic treatment by **corticosteroids and cyclosporine**[Q]**.**
- **If ineffective, alternative therapeutic procedures** include systemic treatment with **corticosteroids** and **mycophenolate mofetil;** mycophenolate mofetil and cyclosporine.

109. Ans. a. Polypropylene **110. Ans. a. Appendage tumor**

111. Ans. a. Vascular pathology, c. Increased in pregnancy, d. Local excision *(Ref. Bailey 25/e p618; Roxburgh 17/e p197)*

Pyogenic granuloma

- Relatively common **vascular lesion of skin** and **mucosa**
- The name is **misnomer** (it is neither a granuloma, nor pyogenic in origin)
- Most are **small** (0.5–1.5 cm), **raised, pedunculated, soft, red nodular lesions** showing **superficial ulceration** and a tendency to **bleed after trivial trauma**[Q].
- Often arise in **pregnancy** particularly **on gingiva**[Q] or elsewhere in oral mucosa

Treatment

- Local excision with a minimal margin.

112. Ans. d. Lines of development *(Ref. Neurocutaneous Disorders by Ruggieri (2008)/364)*
Lines of Blaschko represents random line of development of skin.

113. Ans. b. Trophic ulcer **114. Ans. c. Base of toe** *(Ref. Bailey 25/e p914)*

Ainhum

- Ainhum is a disease of **unknown etiology**
- Usually **affects black men**[Q] (and occasionally women) who have **run barefoot in childhood**[Q]**.**
- It is recorded in **central Africa, central America** and the **Orient.**
- A **fissure appears** at the level of the **interphalangeal joint of a toe,** usually of the **little toe**[Q]**.**
- **Fissure is followed by** a **fibrous band** that **encircles** the **digit** and **causes necrosis**[Q]**.**

Treatment

- **Early stage: Z-plasty**[Q]**; Later stage: Amputation**[Q]

115. Ans. d. Bone *(Ref. Master Techniques in Orthopedic Surgery Series by Moran and Cooney (2008)/487)*
Bone is the first structure to be fixed in hand injuries.

Sequence of Repair in Hand Injuries (BE FAN of VeinS)

1. Bone shortening and stabilization/fixation[Q]
2. Extensor tendon repair[Q]
3. Flexor tendon repair[Q]
4. Arterial anastomoses[Q]
5. Nerve repair[Q]
6. Venous anastomosis[Q]
7. Skin/wound closure[Q]

116. Ans. a. Leprosy, c. Syringomyelia *(Ref. Sabiston 19/e p1943-1945; Bailey 26/e p80, 25/e p537)*

Neuropathic foot/Trophic ulcers

- Also called **Trophic ulcers** or **penetrating ulcers**[Q]
- Presence of neuropathic ulcer **on the sole** or **heel of** the **foot**[Q]**.**

Basic Defect

- **Loss of sensation** due to **neurological disorder**[Q]**.**
- Ulcer occurs due to **repeated injury** or **pressure**[Q]**.**

Causes of Trophic ulcers	
• **Diabetes**[Q]	• **Syringomyelia**[Q]
• **Leprosy**[Q]	• **Paraplegia**[Q]
• **Tabes dorsalis**[Q]	• **Infection**
• **Atherosclerosis**	

Clinical Features

- Presence of neuropathic **ulcer on the sole** or **heel of** the **foot**[Q].
- **Painless** and **non-tender ulcer**[Q]
- **Surrounding tissues** are **healthy** and have a **normal circulation** but are **unable to appreciate pain**[Q].
- **Evidence of neurological deficits** is present, e.g. loss of diminution of sensation, weakness of the muscles, claw foot.
- **Peripheral pulses** are usually **present. Peripheries** are **cold** and **dry.**

117. Ans. a. Viral warts spontaneously resolve, c. Callosity are formed occupationally *(Ref. Sabiston 19/e p1402; Schwartz 10/e p485, 1233, 9/e p410; Bailey 25/e p1266)*

Corn and callosities are hyperkeratosis due to chronic excessive pressure or friction on the skin.

Warts

- Warts are epidermal growths associated with **HPV infection**[Q]
- Histologically characterized by: **Hyperkeratosis, acanthosis, papillomatosis** and **koilocytes**
- **Recurrences** are common
- Some **warts** are **risk factors for SCC**[Q].

Treatment

- Removed by number of chemical including **formalin, podophyllin** etc[Q].
- **Surgical excision** or **curettage with electrodissection**[Q] can also be done.
- Treatment of extensive areas of skin requires surgical excision under GA.

118. Ans. b. Tubercular ulcer

119. Ans. d. Apoplectic cyst *(Ref. Bailey 24/e p209)*

Cyst

- Cyst is a sac that is filled with a fluid or semi-fluid material.
- Two of the most common types of cyst that occur under the skin surface are **sebaceous cyst** and **dermoid cyst**. These are **true cyst, line by epithelium**.
- **Pseudocyst of pancreas** and **apoplectic cyst** are **not lined by epithelium,** and are **not true cyst**[Q].

120. Ans. c. A benign epithelial tumor

121. Ans. c. Granulation tissue *(Ref. Bailey 26/e p580, 25/e p595-596)*

- A **sinus** is **a blind-ending tract** that **connects a cavity lined with granulation tissue** (often an abscess cavity) with an epithelial surface.

122. Ans. c. Malignant

123. Ans. b. Resection of complete nail with part of nail bed *(Ref. Orthopedics and Fractures by T. Duckworth, C. M. Blundell (2010)/215)*

Zadek's procedure is resection of complete nail with part of nail bed in ingrowing toe-nail.

Zadek's Procedure

- **For recurrent problems** in ingrowing toe-nail, the **toenail** and its **growing point removed** so that the **nail does not ever re-grow (Zadek's procedure)**[Q].

124. Ans. c. Hemangioma

125. Ans. c. Bipedicle flap *(Ref. Bailey 26/e p408, 25/e p403)*

Local Flaps

- A local flap is raised next to a tissue defect in order to reconstruct it.

Basic patterns of Local Flaps	
Transposition flap	• **Most basic design,** leaving a graftable donor site
Z-plasty	• **For lengthening scars** or **tissues**
Rhomboid flap	• For **cheek, temple, back** and **flat surface defects**
Rotation flap	• For **convex surfaces**
Advancement flap	• For **flexor surfaces;** may need triangles excised at the base to make it work (commonly called **Burrow's triangles)**
V-to-Y advancement	• Commonly used for **fingertips** and **extremities**
Bilobed flap	• For convex surfaces, especially the **nose**[Q]
Bipedicle flap	• For **eyelids,** rarely elsewhere[Q].

126. Ans. d. Rodent ulcer *(Ref. http://emedicine.medscape.com/article/276624-treatment#aw2aab6b6b4)*

- **Among the given options, only rodent ulcer (BCC) is radiosensitive, rest all are not responsive to radiotherapy.**

127. Ans. a. Pilomatrixoma

128. Ans. a. Osteo myelitis of the frontal bone

CHAPTER 32

Wound Healing, Tissue Repair and Scar

MULTIPLE CHOICE QUESTIONS

WOUND HEALING

1. Wound healing is affected by: *(PGI Dec 2007)*
a. Age
b. Nutrition
c. Dryness or wetness of wound
d. Drugs
e. Temperature

2. Prevention of wound infection is done by: *(PGI June 2005)*
a. Pre-op shaving
b. Pre-op antibiotic therapy
c. Monofilament suture
d. Wound apposition

3. True about wound healing: *(PGI June 2009)*
a. Infected wound heal by primary intention
b. Deep dermal wound heal by scar formation
c. Wound contraction is found in healing by secondary intention
d. More intense inflammatory response in primary intention

4. True about chronic wound: *(PGI Nov 2009)*
a. Found in DM
b. Always require surgical treatment
c. May be associated with vascular compromise
d. Monofilament sutures prevent infection
e. Any wound that does not heal within 3 month

5. Cell not involved in healing of clean wound: *(PGI Nov 2011)*
a. Macrophages
b. Platelet
c. Fibroblasts
d. Polymorphonuclear leukocytes
e. Myofibroblasts

6. Management of an open wound seen 12 hours after the injury: *(DPG 2011)*
a. Suturing
b. Debridement and suture
c. Secondary suturing
d. Heal by granulation

7. The vitamin which has inhibitory effect on wound healing is: *(MAHE 2005)*
a. Vitamin A
b. Vitamin E
c. Vitamin C
d. Vitamin B-complex

8. The tensile strength of the wound starts and increases after: *(WBPG 2012, MAHE 2005)*
a. Immediate suture of the wound
b. 3–4 days
c. 7–10 days
d. 6 months

9. In a sutured surgical wound, the process of epithelialization is completed within: *(UPSC 2007)*
a. 24 hours
b. 48 hours
c. 72 hours
d. 96 hours

10. Factors that may adversely affect the healing of wounds include all the following except:
a. Exposure to UV light
b. Exposure to radiation
c. Obstructive jaundice
d. Advanced neoplasia

11. Primary closure of incised wounds must be done within: *(Kerala 87)*
a. 2 hours
b. 4 hours
c. 6 hours
d. 12 hours
e. 16 hours

12. The tensile strength of wound reaches that of normal tissue by: *(PGI 88)*
a. 6 weeks
b. 2 months
c. 4 months
d. 6 months

13. Following are required for wound healing except: *(All India 93)*
a. Zinc
b. Copper
c. Vitamin C
d. Calcium

14. Patient has lacerated untidy wound of the leg and attended the casualty after 2 hours. His wound should be: *(AIIMS 84)*
a. Sutured immediately
b. Debrided and sutured immediately
c. Debrided and sutured secondarily
d. Cleaned and dressed

15. When is the maximum collagen content of wound tissue? *(PGI 81, Rohtak 87)*
a. Between 3rd to 5th day
b. Between 6th to 17th day
c. Between 17th to 21st day
d. None of the above

16. A patient with grossly contaminated wound presents 12 hours after an accident, his wound should be managed by:
a. Thorough cleaning and primary repair *(UPSC 96)*
b. Thorough cleaning with debridement of all dead and devitalized tissue without primary closure
c. Primary closure over a drain
d. Covering the defect with split skin graft after cleaning

17. Delayed wound healing is seen in all except: *(APPG 96)*
a. Malignancy
b. Hypertension
c. Diabetes
d. Infection

18. In the healing of clean wound the maximum immediate strength of the wound is reached by:
a. 2–3 days
b. 4–7 days
c. 10–12 days
d. 13–18 days

19. A clean incised wound heals by: *(DPG 92)*
a. Primary intention
b. Secondary intention
c. Excessive scaring
d. None of the above

20. Which one of the following surgical procedures is considered to a have a clean-contaminated wound?
a. Elective open cholecystectomy for cholelithiasis
b. Herniorrhaphy with mesh repair
c. Lumpectomy with axillary node dissection
d. Appendectomy with walled off abscess

21. Fibroblasts in healing wound are derived from: *(UPSC 2008, PGI 98)*
a. Local mesechyme
b. Epithelium
c. Endothelium
d. Vascular fibrosis

22. Tensile strength of wound becomes normal after: *(Recent Questions 2013)*
a. 6 weeks
b. Never
c. 4 months
d. 6 months

KELOID AND HYPERTROPHIC SCAR

23. True statement(s) regarding hypertrophic scar: *(PGI Dec 2008)*
a. Grow beyond wound margin
b. More common in female
c. Not familial
d. Rarely subsides
e. Not race related

24. All are true about keloid except: *(PGI Dec 2007)*
a. Grows beyond would margin
b. Excess collagen deposition
c. Precancerous leading to cancer
d. More common in female
e. Whites are at high risk

25. Most common site of hypertrophic keloid is: *(AIIMS Nov 93)*
a. Face
b. Leg
c. Presternal area
d. Arm

26. First line treatment for keloid is: *(AIIMS Dec 94)*
a. Intralesional injection of keloid
b. Local steroid
c. Radiotherapy
d. Wide excision

27. Drug used for intralesional injection of keloid is: *(AIIMS June 95)*
a. Prednisolone
b. Triamcinolone
c. Androgen
d. Hydrocortisone

28. Keloid scar is made up:
a. Dense collagen
b. Loose fibrous tissue
c. Granulamatous tissue
d. Loose areolar tissue

29. What is true about keloids? *(JIPMER 95)*
a. It appears immediately after surgery
b. It appears a few days after surgery
c. It is limited in its distribution
d. It is common in old people

30. Keloid is best treated: *(UPSC 95, 2001)*
a. Intralesional injection of trimacinolone
b. Wide excision and grafting
c. Wide excision and suturing
d. Deep X-ray therapy

31. The following statement about keloid is true:
a. They do not extend into normal skin
b. Local recurrence is common after excision
c. They often undergo malignant change
d. They are more common in whites than in blacks

32. The worst position for scars is: *(PGI 88)*
a. Back
b. Shoulder
c. Sternum
d. Abdomen

33. Keloid fornation is not seen over: *(DNB 2004, 2001)*
a. Ear
b. Face
c. Eyelids
d. Neck

MISCELLANEOUS

34. The best scars are seen in: *(PGI 88)*
a. Infants
b. Children
c. Adults
d. Very old people

35. If suture marks are to be avoided, skin sutures should be removed by: *(JIPMER 81, AMC 89)*
a. 72 hours
b. 1 week
c. 2 weeks
d. 3 weeks

36. Degloving injury is: *(Kerala 2000)*
a. Surgeon made wound
b. Lacerated wound
c. Blunt injury
d. Avulsion injury
e. Abrasive wound

37. In treatment of hand injuries, the greatest priority is:
a. Repair of tendons *(All India 96)*
b. Restoration of skin cover
c. Repair of nerves
d. Repair of blood vessels

38. During the surgical procedure: *(AIIMS 83)*
a. Tendons should be repaired before nerves
b. Nerves should be repaired before tendons
c. Tendons should not be repaired at the same time
d. None is true

39. 'Lims salvage' primarily depends on: *(AIIMS 97)*
a. Vascular injury
b. Skin cover
c. Bone injury
d. Nerve injury

40. In an open injury during toileting and debridement, muscle viability is detected by: *(PGI June 2003)*
a. Colour of the muscle
b. Muscle size
c. Muscle function
d. Muscle contractility
e. Punctate bleeding spots on cut edge

EXPLANATIONS

WOUND HEALING

1. **Ans. a. Age, b. Nutrition, d. Drugs, e. Temperature** *(Ref: Sabiston 19/e p151-164; Schwartz 10/e p241-268, 9/e p219; Bailey 26/e p24, 25/e p24; Robbins 8/e p106)*

Factors that inhibit Wound Healing

Local Factors	Systemic Factors
• **Infection**[Q]	• **Diabetes mellitus**[Q]
• **Ischemia**[Q]	• **Ionizing radiation**[Q]**, temperature**[Q]
• **Foreign body**[Q]	• **Advanced age**[Q]**, Malnutrition**[Q]
• **Hematoma**[Q]	• Vitamin **C** and **A deficiency**[Q]
• Movement	• Mineral **(Zinc** and **Iron**[Q]**)** deficiencies
• Mechanical stress	• Drugs **(Steroids**[Q]**, Doxorubicin)**
• Necrotic tissue	• **Jaundice**[Q]**, Uremia**[Q]**, Malignancy**[Q]

2. **Ans. b. Pre-op antibiotic therapy, c. Monofilament suture, d. Wound apposition** *(Ref: Bailey 26/e p62, 25/e p42)*

- Bailey says **"Preoperative shaving should be avoided except for aesthetic reasons** or to **prevent adherence of dressings**[Q]**.** If it is to be undertaken, it **should be undertaken immediately before surgery** as the **SSI rate** after clean wound surgery may be **doubled if it is performed the night before**, because **minor skin injury enhances superficial bacterial colonization**[Q]**.** Cream depilation is messy and **hair clipping is best**, with the **lowest rate of infection**[Q]**."**

Avoiding Surgical Site Infections

- **Staff** should always **wash** their **hands between patients**[Q]
- Length of **patient stay** should be **kept** to a **minimum**[Q]
- **Preoperative shaving** should be **avoided if possible**[Q]
- **Antiseptic skin preparation**[Q] should be standardized
- **Bowel preparation for intra-abdominal surgeries**[Q]
- **Pre-operative antibiotics** given **IV at** the time of **induction**[Q]
- Attention to theatre technique and discipline
- **Avoid hypothermia** perioperatively and **ensure supplemental oxygenation** in recovery[Q]
- **Monofilament sutures** are used over polyfilament sutures to **prevent infection**[Q]
- **Proper apposition** of the wound and **prevention of** any **dead space** and **hematoma**[Q]

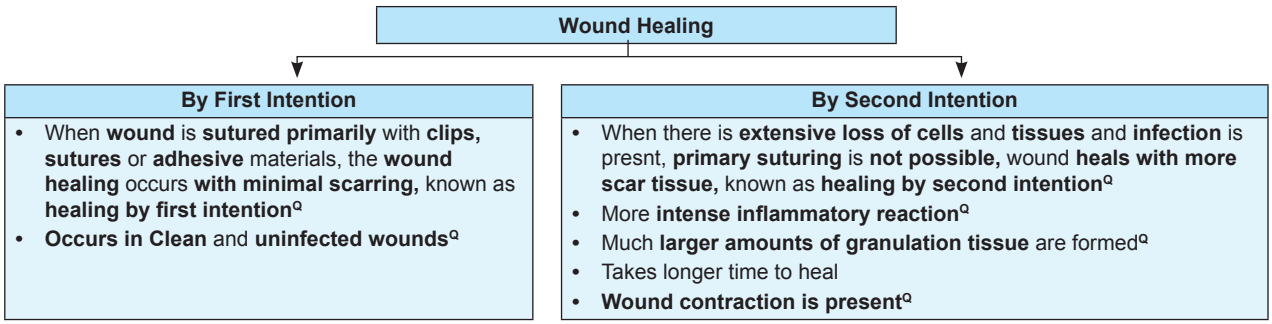
3. **Ans. b. Deep dermal wound heal by scar formation, c. Wound contraction is found in healing by secondary intention:** *(Ref: Sabiston 19/e p151-164; Schwartz 10/e p234, 1820, 9/e p210-214; Bailey 26/e p24-25, 25/e p24-25; Robbins 8/e p102-106)*

Cutaneous Wound Healing

- **Epidermal appendages do not regenerate**[Q]
- There remains a **connective tissue scar** in place of the mechanically efficient meshwork of collagen in the unwounded dermis.
- **Very superficial wounds: Little scar formation**[Q]**.**
- In marked contrast with wound healing in adults, **fetal cutaneous wounds heal without scar formation**[Q], up to mid-gestation age in some animals. These wounds show **little inflammation** and **practically no fibrosis**[Q]**.**

Cutaneous wound healing is divided into three phases

- **Inflammation** (early and late)
- **Granulation tissue formation** and **re-epithelialization**
- **Wound contraction, ECM deposition** and **remodeling**



4. Ans. a. Found in DM, c. May be associated with vascular compromise, d. Monofilament sutures prevent infection, e. Any wound that does not heal within 3 month: *(Ref: Bailey 26/e p28, 25/e p28)*

Chronic Wound

- Wounds that **do not heal within 3 months**Q are often considered chronic.
- **Surgical treatment is only indicated if non-operative treatment has failed** or if the **patient suffers from intractable pain**Q

5. Ans. b. Platelet, e. Myofibroblasts: *(Ref: Sabiston 19/e p151-164; Schwartz 10/e p234,1820, 9/e p210-214; Bailey 26/e p24-25, 25/e p24-25; Robbins 8/e p102-106)*

Cutaneous Wound Healing

- **Wound contraction:** Most clearly **differentiates primary from secondary healing**Q
- **Permanent wound contraction** requires the **action of myofibroblasts, altered fibroblasts** that have the ultrastructural characteristics of smooth muscle cellsQ.
- **Contraction of these cells** at the wound site **decreases the gap** between the dermal edges of the wound.

Healing by First Intention (wounds with opposed edges)

- Healing of a **clean, uninfected surgical incision approximated by surgical sutures** is referred as **primary union** or **healing by first intention**Q.
- **Narrow incisional space** immediately **fills with clotted blood** containing **fibrin** and **blood cells;** dehydration of the surface clot forms the well-known scab that covers the wound.
  - **Within 24 hours, neutrophils appear** at the margins of the incision, moving toward the fibrin clot.
  - In **24–48 hours,** spurs of **epithelial cells move from** the **wound edges**Q along the cut margins of the dermis, depositing basement membrane components as they move.
  - By **day 3,** the **neutrophils** have been largely **replaced by macrophages**Q. Granulation tissue progressively invades the incision space.
- By **day 5,** the **incisional space** is **filled with granulation tissue**Q. **Neovascularization** is maximal
- During the **second week,** there is **continued accumulation** of **collagen** and **proliferation of fibroblasts**Q**.** The leukocytic infiltrate, edema, and increased vascularity have largely disappeared.
- By the **end of the first month,** the **scar** is made up of a **cellular connective tissue** devoid of inflammatory infiltrate, **covered** now **by intact epidermis**Q**.**

6. Ans. b. Debridement and suture *(Ref: Sabiston 19/e p245; Schwartz 10/e p234,1820, 9/e p219; Bailey 25/e p25-27; Robbins 8/e p102)*

- If the **blood supply to** the **wound** is **adequate** and **bacterial invasion** is **absent, wound** can be **safely closed anytime following proper debridement** and **irrigation**Q**.**
  - If there is **established infection** and **tissue** is **of doubtful viability** has been left in-situ, then the **wound is left open** and **re-explored after 48 hours**Q**.**
  - If there is **infection**, and the **doubtful viable tissue** is **now healthy,** the **deep tissues can be repaired** and the **wound is closed**Q**.**
  - If however there is **further necrosis** and **infection,** the wound is **again debrided** and **left open**Q**.**

7. Ans. b. Vitamin-E **8. Ans. b. 3–4 days** **9. Ans. b. 48 hours**

10. Ans. a. Exposure to UV light

11. Ans. c. 6 hours *(Ref: Sabiston 19/e p245; Schwartz 9/e p219; Bailey 26/e p25-27, 25/e p25-27; Robbins 8/e p102-104)*

WOUNDS CAN BE CLOSED BY

- **Primary suture:**
  - **Clean wounds**[Q]
  - **Selected contaminated wounds** after thorough **wound toileting** and **debridement**[Q]
- **Delayed primary suture:**
  - **Heavily contaminated wounds**[Q]
  - Wounds in which **wound toileting** has been **delayed for 6–8 hours**[Q]
- **Left open to heal by secondary closure**

12. Ans. None: *(Ref: Sabiston 19/e p163-164; Schwartz 9/e p214; Bailey 25/e p24; Robbins 8/e p105-106)*

The tensile strength of wound never equals that of unwounded skin.

WOUND STRENGTH

- **At the end of** the **1st week, wound strength** is approximately **10%** of that unwounded skin[Q].
- **Strength increases rapidly over** the **next 4 weeks**[Q].
  - This rate of increase then slows at approximately the **third month** after the original incision, and reaches a plateau at about **70–80%** of the **tensile strength**[Q] of unwounded skin, a condition that may persist for life.
- The **recovery of tensile strength** results from the **excess of collagen synthesis** over collagen degradation during the first two months of healing and later from **structural modification of collagen fibres**[Q] (cross linking, increased fiber size) after collagen synthesis ceases.

13. Ans. None

14. Ans. b. Debrided and sutured immediately

15. Ans. c. Between 17th - 21st day

- Over the **first three weeks, strength** and **collagen content both increases** but **after 21 days collagen content** remain **static and only wound strength increases**[Q].

16. Ans. b. Thorough cleaning with debridement of all dead and devitalized tissue without primary closure

17. Ans. b. Hypertension

18. Ans. d. 13–18 days

19. Ans. a. Primary intention

20. Ans. a. Elective open cholecystectomy for cholelithiasis

21. Ans. a. Local mesechyme

22. Ans. b. Never

KELOID AND HYPERTROPHIC SCAR

23. Ans. c. Not familial, e. Not race related *(Ref: Sabiston 19/e p164-165; Schwartz 10/e p261-263, 9/e p225-227; Bailey 26/e p30, 25/e p30-31; Robbins 8/e p106-107)*

Feature	Hypertrophic scar	Keloid
Genetic	**Not familial**[Q]	May be **familial**[Q]
Race	**Not race related**[Q]	**Black**[Q] >white
Sex	Female =male	**Female**[Q] >male
Age	**Children**[Q]	**10–30 years**[Q]
Border	Remains **within wound**[Q]	**Outgrows** wound area
Natural History	**Subsides** with time	**Rarely subsides**
Site	**Flexor surfaces**[Q]	**Sternum (MC**[Q]**),** shoulder, face
Etiology	Related to **tension**[Q]	Unknown
Develop	Within 4 weeks	3 months to year after trauma

24. Ans. c. Precancerous leading to cancer, e. Whites are at high risk *(Ref: Sabiston 19/e p164-165; Schwartz 10/e p261-263, 9/e p225-227; Bailey 26/e p30, 25/e p30-31; Robbins 8/e p106-107)*

KELOIDS

- Keloids: **Scars** that **grow beyond** the **borders** of the **original wounds,** and **rarely regress** with time.
- More prevalent **in blacks**Q
- Keloids appear to have a **genetic predisposition**Q.
- Keloid scars **tend to occur above** the **clavicles**, on the **trunk**, on the **upper extremities**, and on the **face.**

- Keloids have **thicker, more abundant collagen bundles** that form **acellular node like structures** in the deep dermal portion of the keloid lesionQ.
- Often **refractory to medical** and **surgical intervention**Q.

25. Ans. c. Presternal area

26. Ans. a. Intralesional injection of keloid *(Ref: Bailey 26/e p30, 25/e p30)*

TREATMENT OF HYPERTROPHIC AND KELOID SCARS

- **Pressure:** local moulds or elasticated garmentsQ
- **Intralesional** steroid injection **(triamcinoloneQ)**
- **Excision** and **postoperative radiation**Q (external beam or brachytherapy)
- **Intralesional excision (keloids onlyQ)**
- **Laser:** To **reduce redness** (which may resolve in any event)
- **Vitamin E** or **palm oil massage** (unproven)
- **Silicone gel sheeting**
- **Excision** and **steroid injection**Q
- (All **excisions** have **high rates of recurrence**Q**)**

27. Ans. b. Triamcinolone

28. Ans. a. Dense collagen

29. Ans. b. It appears a few days after surgery

30. Ans. a. Intralesional injection of triamcinolone

31. Ans. b. Local recurrence is common after excision

32. Ans. c. Sternum

33. Ans. c. Eyelids

MISCELLANEOUS

34. Ans. d. Very old people

35. Ans. b. 1 week *(Ref: Bailey 26/e p31, 25/e p31)*

- **Suture marks** may be **minimised by** using **monofilament sutures** that are **removed** early **(3–5 days)**Q.
- Sutures **inserted under tension** will **leave marks**Q.
- The wound can be strengthened post suture removal by the use of sticky strips.
- **Fine sutures** (6/0 or smaller) placed **close to** the **wound margins** tend to **leave less scarring**Q.
- **Subcuticular suturing avoids suture marks** either side of the wound or incisionQ.

36. Ans. d. Avulsion injury *(Ref: Bailey 26/e p27, 25/e p27)*

- **Degloving** occurs when the **skin** and **subcutaneous fat** are **stripped by avulsion** from its underlying fascia, leaving **neurovascular structures, tendon** or **bone exposed**Q.

37. Ans. d. Repair of blood vessels

38. Ans. a. Tendons should be repaired before nerves *(Ref: Master Techniques in Orthopedic Surgery Series by Moran and Cooney (2008)/487)*

SEQUENCE OF REPAIR IN HAND INJURIES (BE FAN OF VEINS)

- Bone shortening and stabilization/fixationQ
- Arterial anastomosesQ
- Skin/wound closureQ
- Extensor tendon repairQ
- Nerve repairQ
- Flexor tendon repairQ
- Venous anastomosisQ

39. Ans. a. Vascular injury

40. Ans. a. Colour of the muscle, d. Muscle contractility, e. Punctate bleeding spots on cut edge *(Ref: Bailey 25/e p354-356)*

MUSCLE VIABILITY IS DETECTED BY '4C'

- **ColourQ: Dead muscle** has **dark unhealthy colour,** has **lost its sheen**
- **ContractilityQ: Dead muscles do not twitch** when held by forceps.
- **ConsistencyQ: Dead muscle** has **lost** its **turgor** and is **mushy** in consistency
- **Capillary bleedingQ: Dead muscle does not bleed** at cut ends.

SECTION 7

NEUROSURGERY

CHAPTERS

- Chapter 33 Cerebrovascular Diseases
- Chapter 34 CNS Tumors

CHAPTER 33

Cerebrovascular Diseases

MULTIPLE CHOICE QUESTIONS

BERRY ANEURYSM

1. **The most common site of Berry aneurysm is:** *(All India 94)*
   a. Junction of anterior communication a0rtery with anterior cerebral artery
   b. Junction of posterior communicating artery with internal carotid artery
   c. Bifurcation of middle cerebral artery
   d. Vertebral artery

2. **All are common sites of berry aneurysm, except:** *(AIIMS June 93)*
   a. Posterior cerebral artery b. Vertebral artery
   c. Anterior cerebral artery d. Middle cerebral artery

3. **True about berry-aneurysm is following except:**
   a. Associated with familial syndrome *(PGI June 2000)*
   b. Most common site of rupture is apex which causes SAH
   c. Wall contains smooth muscle fibroblasts
   d. 90% occurs at anterior part of circulation at branching point

4. **Most common presentation of intracranial aneurysm is:** *(PGI June 98)*
   a. Coarctation of aorta b. Systemic hypertension
   c. Hypotension d. Intracranial hemorrhage

5. **Which is least common site of Berry aneurysm?** *(AIIMS Dec 95)*
   a. Basilar artery b. Vertebral artery
   c. Anterior cerebral artery d. Posterior cerebral artery

CEREBROVASCULAR STROKE (CVA)

6. **All are predisposing causes of cerebral venous thrombosis except:** *(ComedK 2005)*
   a. Hypotension b. Oral contraceptives
   c. Pregnancy d. Aplastic anemia

7. **The most common site of hypertensive intracranial hemorrhage is:** *(ComedK 2010)*
   a. Putamen b. Midbrain
   c. Medulla d. Cerebrum

8. **Most common cause of cerebrovascular accident is:** *(AIIMS 96, All India 98)*
   a. Embolism b. Arterial thrombosis
   c. Venous thrombosis d. Hemorrhage

9. **Most common cause of stroke young women in India among OCP users:** *(PGI Dec 98)*
   a. Cortical vein thrombosis b. Moyamoya disease
   c. Atherosclerosis d. HT

10. **Most common cause of intracranial hemorrhage is:**
    a. Subarachnoid hemorrhage *(AIIMS Nov 98)*
    b. Intracerebral hemorrhage
    c. Subdural hemorrhage
    d. Extradural hemorrhage

11. **The commonest cause of intracerebral bleed is:**
    a. Thrombocytopenia b. Diabetes *(All India 95)*
    c. Hypertension d. Berry aneurysm

12. **Which of the following is the most common location of hypertensive hemorrhage?** *(All Indian 2003, 94, AIIMS Nov 2002)*
    a. Pons b. Thalamus
    c. Putamen/external capsule d. Subcotrical white matter

13. **The most common location of hypertensive intracranial hemorrhage is:** *(AIIMS May 2007, All India 2006)*
    a. Subarachnoid b. Basal ganglia
    c. Cerebellum d. Hippocampus

14. **Commonest cause of subarachnoid hemorrhage is:**
    a. Rupture of circle of Willis aneurysm *(All India 98)*
    b. Rupture of vertebral artery aneurysm
    c. Rupture of venecomitants of corpus striatum
    d. Rupture of dural sinuses

15. **Which of the following is the most common cause of late neurological deterioration in case of cerebrovascular accident:** *(AIIMS Nov 2000)*
    a. Rebleeding b. Vasospasm
    c. Embolism d. Hydrocephalus

16. **A patient known to have mitral stenosis and arterial fibrillation presents with acute onset of weakness in the left upper limb which recovered completely in two weeks .The most likely diagnosis is:** *(All India 2010)*
    a. Transient ischemic attack b. Ischemic stroke
    c. Hemorrhagic stroke d. Vasculitis

17. **'Duret hemorrhages' are seen in:** *(AIIMS May 2008)*
    a. Brain b. Kidney
    c. Heart d. Lung

EDH AND SDH

18. **Which of the following vessels is involved in extradural hematoma?** *(MHPGMCET 2002)*
    a. Middle meningeal artery b. Venous sinuses
    c. Bridging veins d. Middle cerebral artery

19. **Lucid interval is classically seen in:** *(DNB 2010, ComedK 2007, PGI Dec 97)*
    a. Intracerebral hematoma
    b. Acute subdural hematoma
    c. Chronic subdural hematoma
    d. Extradural hematoma

20. **Middle meningeal vessel damage results in:** *(ComedK 2011)*
    a. Subdural hemorrhage b. Subarachnoid hemorrhage
    c. Intracerebral hemorrhage d. Epidural hemorrhage

21. Common site for extradural hemorrhage: *(DNB 2012)*
a. Frontal b. Temporo-parietal
c. Occipital d. Brainstem

22. A 15 days duration SDH is? *(MHSSMCET 2009)*
a. Hyperacute b. Acute
c. Subacute d. Chronic

23. For chronic SDH the duration should be more than: *(MHSSMCET 2010)*
a. 3 days b. 7 days
c. 15 days d. 1 months

24. Best treatment of subdural hematoma in a deteriorating patient: *(HPU 2005)*
a. By I/V Mannitol b. Oxygenation
c. Use of steroids d. Surgical evacuation

25. Chronic subdural hematoma refers to collection present for a period of: *(Karnataka 2006)*
a. 7 days b. 6 months
c. 1 year d. 21 days

26. Extradural hematoma is associated with what % of severe trauma? *(PGI Dec 98)*
a. 36% b. 10%
c. 77% d. 96%

27. A person has been brought in casualty with history of road accident. He had lost consciousness transiently and gained consciousness but again became unconscious. Most likely, he is having brain hemorrhage of: *(AIIMS Nov 2005)*
a. Intracerebal b. Subarachnoid
c. Subdural d. Extradural

28. Management of extradural hemorrhage is: *(AIIMS 93)*
a. Antibiotics b. Immediate evacuation
c. Evacuation after 24 hours d. Observation

29. Features of extradural hemorrhage include in all except:
a. Severe hypotension *(AIIMS 82, APPG 87)*
b. Deteriorating consciousness
c. Fixed dilated pupil on the same side
d. Fracture line crossing the temporal bone

30. An elderly man who has had a trivial history of head injury three months ago, develops headache and turns unconscious. On examination, he is found to have fixed left dilated pupil and right hemiplegia. What is the most likely diagnosis?
a. Contusio-cerberi *(UPSC 96)*
b. Extradural hematoma
c. Chronic subdural hematoma
d. Brain abscess

31. Most common cause of sub-dural hematoma: *(SCTIMS 98)*
a. Middle meningeal artery tear
b. Rupture of superior cerebral vein
c. Internal carotid artery tear
d. None of the above

32. A patient presents with sudden headache and vomiting and unconsciousness. The diagnosis is: *(DPG 2009 Feb)*
a. Subarachnoid hemorrhage b. Intracerebral hemorrhage
c. Subdural hemorrhage d. Extradural hemorrhage

33. Lucid interval is seen in: *(DPG 2005)*
a. Subdural hemorrhage b. Extradural hemorrhage
c. Parenchymal hemorrhage d. None of the above

34. A 20-years old male come to causality with head injury, examination reveals normal consciousness, clinically normal and blood in the tympanic membrane. Most likely cause is:
a. Extradural hemorrhage *(UPPG 2008)*
b. Subdural hemorrhage
c. Intraventricular hemorrhage
d. Complete basilar fracture

35. Subdural hematoma most commonly results from:
a. Rupture of intracranial aneurysm *(AIIMS May 2004)*
b. Rupture of cerebral AVM
c. Injury to cortical bridging veins
d. Hemophilia

36. Which of the following will manifest as "pachymeningitis heamorrhagica interna"? *(MAHE 2006)*
a. Epidural hematoma b. Subdural hematoma
c. Subarachnoid hemorrhage d. Brain infraction

37. Immediate surgery is indicated in: *(Kerala 95)*
a. Extradural hemorrhage b. Subdural hemorrhage
c. Intracerebral hemorrhage d. Brain laceration

38. A 62-years old diabetic female patient presented with history of progressive right-sided weakness of one month duration. The patient was also having speech difficulty. Fundus examination showed papilledema. Two months ago, she also had a fall in her bathroom and struck her head against a wall. The most likely clinical diagnosis is: *(AIIMS Nov 2004)*
a. Alzheimer's disease
b. Left parietal glioma
c. Left MCA territory stroke
d. Left chronic subdural hematoma

39. An elderly female presented with history of progressive right- sided weakness and speech difficulty. She gives a history of a fall in her bathroom two months back. The most likely clinical diagnosis is: *(All India 91)*
a. Progressive supranuclear palsy
b. Left cerebral tumor
c. Left sided stroke
d. Left chronic subdural hematoma

40. You are a surgeon posted at CHC. A patient of head injury comes to you with rapidly deteriorating sensorium and progressive dilatation and fixation of pupil. Neurosurgeon and CT scan is not available. You decide to make a burr hole to emergently relieve the intracranial pressure. Which of the following sites will you choose? *(AIIMS November 2014)*
a. In the temporal region contralateral to the side of pupillary dilatation
b. In the midline if both pupils are equal or it is not known which side dilated first
c. In the left temporal region if no localizing sign is found
d. Refer to higher centre if both pupils are equal or it is not known which side dilated first

SUBARACHNOID AND INTRACRANIAL HEMORRHAGE

41. The common cause of subarachnoid hemorrhage is:
a. Arterio-venous malformation *(All India 2006)*
b. Cavernous angioma
c. Aneurysm
d. Hippocampus

42. Most common cause of subarachnoid hemorrhage is: *(AIIMS Nov 98, All India 1999)*
a. Hypertension b. AV malformation
c. Berry aneurysm d. Tumors

43. A female presented with severe headache of sudden onset. On CT scan a diagnosis of subarachnoid hemorrhage is made. The most common site of subarachnoid hemorrhage is: *(AIIMS June 2001)*
a. Middle meningeal artery b. Berry aneurysm rupture
c. Basilar artery d. Subdural venous sinuses

44. Which of the following grading methods is used to evaluate the prognosis/outcome after subarachnoid hemorrhage? *(All India 2010)*
a. Glasgow coma scale
b. Hess and Hunt scale
c. Glasgow - Blatchford bleeding score
d. Intracerebral hemorrhage score

45. A 45-years old hypertensive male presented with sudden onset most severe headache, vomiting and neck stiffness. On examination he didn't have any focal neurological deficit. His CT scan shoed blood in the Sylvain fissure. The probable diagnosis is: *(AIIMS May 2003)*
a. Meningitis b. Ruptured aneurysm
c. Hypertensive bleed d. Stroke

46. A 45-years old male patient presented in the casualty with two hours history of sudden onset of severe headache associated with nausea and vomiting, on clinical examination the patient had necks stiffness and right sided ptosis. Rest of the neurological examination was normal. What is the clinical diagnosis? *(AIIMS Nov 2003)*
a. Hypertensive brain hemorrhage
b. Migraine
c. Aneurysmal subarachnoid hemorrhage
d. Arteriovenous malformation

47. An adult hypertensive male presented with sudden onset severe headache and vomiting. On examination, their is marked neck rigidity and no neurological deficit was found. The symptoms are most likely due to:
a. Intracranial parenchymal hemorrhage
b. Ischemic stroke *(AIIMS May 2013, AIIMS May 2012)*
c. Meningitis
d. Subarachnoid hemorrhage

48. A young female presents with severe headache and neck stiffness of abrupt onset. She says, she has never had such severe headache before. She also complains of associated nausea and photophobia. Likely diagnosis is: *(AIIMS May 2009)*
a. Subarachnoid hemorrhage (SAH) b. Migraine
c. Viral encephalitis d. Hydrocephalus

49. Sudden excruciating headache is most characteristic of:
a. SAH *(PGI Dec 2001)*
b. Aneurysmal bleeding
c. Epilepsy
d. Intracerebral hemorrhage
e. Hysteria

50. A patient presented with thunder clap headache followed by unconsciousness and progressive III cranial nerve pasty. Which of the following is the most likely diagnosis:
a. Extradural hemorrhage *(AIIMS Nov 2010)*
b. Aneurysmal subarachnoid hemorrhage
c. Basilar migraine
d. Cluster headache

51. A 25-years old male had severe headache followed by unconsciousness. CSF tap revealed red blood cells. Most likely diagnosis is: *(AIIMS Dec 94)*
a. Subdural hematoma b. Embolism
c. Tumour d. Ruptured aneurysm

52. Triple H therapy for subarachnoid hemorrhage consists of all except: *(DNB 2014)*
a. Hypertension b. Hypervolaemia
c. Hemodilution d. Hypothermia

HEAD INJURY

53. In a head injury patient, mannitol should not be used for control of increase intracranial pressure when:
a. Serum osmolality >320 mOsmol/kg *(ComedK 2010)*
b. Arterial PaCO2 <35 mm Hg
c. Arterial PaO2 >100 mm Hg
d. Arterial pH 7.4

54. Cerebral edema is not caused by: *(Punjab 2011)*
a. Lead toxicity
b. Craniosynostosis
c. Corticosteroids administration
d. Vitamin A intoxication

55. Not a primary brain injury: *(Punjab 2011)*
a. Diffuse axonal injury b. Contusion
c. Concussion d. Intracerebral hematoma

56. Which among the following is a not a primary brain injury? *(JIPMER 2010)*
a. Cortical lacerations b. Brainstem herniation
c. Diffuse axonal injury d. Brainstem contusion

57. Duret hemorrhage is/are seen in: *(PGI May 2011, Nov 2010, Dec 2008)*
a. Conjunctiva b. Middle ear
c. Endothelium of heart d. Brain
e. Lung

58. About cranial trauma false is: *(AIIMS Nov 2010)*
a. Raccoon eyes seen in subgaleal hemorrhage
b. Depressed skull fracture is associated with brain injury at the immediate area of impact
c. Caroticocavernous fistula occur in base skull fracture
d. Post traumatic epilepsy seen in 15%

59. Which is an ominous sign in case of severe head injury?
a. Development of diabetes insipidus *(PGI Nov 2010)*
b. Anisocoria c. New focal deficit
d. Depressed skull fracture e. Decorticate posturing

60. Battle's sign is present in: *(MHSSMCET 2006, 2005)*
a. Anterior cranial fossa fracture
b. Middle cranial fossa fracture
c. Posterior cranial fossa fracture
d. Fracture lesser wing of sphenoid

61. In a vehicular accident, extensive contusions of brain due to acceleration and deceleration injury indicate what kind of injury? *(MHSSMCET 2006)*
a. Penetrating injury b. Coup-Countercoup injury
c. Second impact syndrome d. Crush injury

62. The most common neurologic abnormality that occurs with head injury is: *(Karnataka 2005)*
a. Hemiplegia b. Ocular nerve palsy
c. Altered consciousness d. Convulsion

63. Cushing reflex is: *(UPPG 2007)*
a. ↑Mean arterial pressure with increased intracranial pressure
b. ↑Mean arterial pressure with decreased intracranial pressure

c. ↓Mean arterial pressure with increased intracranial pressure
d. ↓Mean arterial pressure with decreased intracranial pressure

64. What is not found in head injury? *(MCI March 2007)*
a. Confusion
b. Loss of consciousness
c. Lucid interval
d. GCS score of 0

65. Raised intracranial pressure will cause: *(MCI March 2007)*
a. Tachycardia
b. Hypotension
c. Papilloedema
d. Normal looking anterior fontenalle in infants

66. True statement regarding fracture base of the skull are all of the following except:
a. Prophylactic antibiotics are usually not required
b. Associated with 8th cranial nerve palsy
c. Early surgery is indicated for optimal outcome
d. May present with CSF otorrhoea

67. The cause of systemic secondary insult to injured brain include all of the following except: *(AIIMS May 2006)*
a. Hypercapnia
b. Hypoxemia
c. Hypotension
d. Hypothermia

68. In a patient with head injury damage in the brain is aggravated by: *(All India 2010)*
a. Hyperglycemia
b. Hypothermia
c. Hypocapnia
d. Serum osmolality

69. Best prognostic factor for head injury is: *(All India 2007)*
a. Glasgow coma scale
b. Age
c. Mode of injury
d. CT

70. The earliest manifestations of increased intracranial pressure following head injury is: *(All India 2005)*
a. Ipsilateral papillary dilatation
b. Contralateral papillary dilatation
c. Altered mental status
d. Hemiparesis

71. Transtentorial uncal herniation causes all except:
a. Ipsilateral dilated pupils *(AIIMS May 2001)*
b. Ipsilateral hemiplegia
c. Cheyne stokes respiration
d. Decorticate rigidity

72. A patient present with unilateral painful ophthalmoplegia. Imaging revealed an enlargement of cavernous sinus on the affected side. The likely diagnosis is: *(AIIMS May 2008)*
a. Gradenigo syndrome
b. Cavernous sinus thrombosis
c. Tolosa -Hunt Syndrome
d. Orbital Pseudotumor

73. Non-noxious stimuli perceived as pain is termed as: *(AIIMS May 2008)*
a. Allodynia
b. Hyperalgesia
c. Hyperesthesia
d. Hyperpathia

74. Spontaneous CSF leaks may be associated with all except:
a. Increased Intracranial Tension *(AIIMS Nov 2008)*
b. Pseudotumor cerebri
c. Empty Sella Syndrome
d. Encephalocele

75. All of the following statements about Diffuse Axonal Injury (DAI) are true except: *(All India 2008)*
a. Caused by shearing force
b. Predominant white matter hemorrhages, in basal ganglion and corpus callosum
c. Increased intracranial tension is seen in all cases
d. Most common at junction of grey and white matter

76. Neurosurgery is indicated for all except: *(Recent Questions 2013)*
a. SDH
b. EDH
c. Depressed fracture
d. Diffuse axonal injury

77. A 24-years old man falls on the ground when he is struck in the right temple by a baseball. While being driven to the hospital, he lapses into coma. He is unresponsive with the dilated right pupil when be reaches the emergency department. The most important step in initial management is: *(All India 2002)*
a. Craniotomy
b. CT scan of the head
c. X-ray of the skull and cervical spine
d. Doppler ultrasound examination of the neck

78. All of the following lower intracranial pressure except:
a. Mannitol
b. Furosemide *(All India 98)*
c. Corticosteroids
d. Hyperventilation

79. In skull fracture, the condition in which an operation is not done immediately is: *(All India 96)*
a. Depressed fracture
b. Compound fracture
c. CSF leak
d. Increased size of head

80. Surgery is not useful in: *(JIPMER 81, DNB 89)*
a. Cerebral edema
b. Depressed fracture
c. Extradural hemorrhage
d. Subdural hemorrhage

81. In a patient with head injury black eye associated with subconjunctival hemorrhage occurs when there is:
a. Fracture of floor of anterior cranial fossa *(UPSC 87)*
b. Bleeding between the skin and galea aponeurotica
c. Hemorrhage between galea aponeurotica and pericranium
d. Fracture of greater wing of sphenoid bone

82. Patient with a history of fall presents weeks later with headache and progressive neurological deterioration. The diagnosis is: *(All India 89)*
a. Acute subdural hemorrhage
b. Extradural hemorrhage
c. Chronic subdural hemorrhage
d. Fracture skull

83. The treatment of post traumatic epilepsy is: *(AIIMS 84)*
a. Mannitol infusion
b. Immediate corticosteroids
c. Long term anticonvulsants
d. Long term corticosteroids

84. Following are the features of raised intracranial tension except: *(AIIMS 84)*
a. Altered sensorium
b. Papilloedma
c. Convulsions
d. Tachycardia

85. Facial nerve palsy is seen in the following fracture: *(AIIMS 84)*
a. Anterior cranial fossa
b. Middle cranial fossa
c. Cranial vault
d. Posterior cranial fossa

86. The most important clinical finding in a case of head injury is: *(JIPMER 91)*
a. Pupillary dilatation
b. Level of consciousness
c. Focal neurological deficit
d. Fracture skull

87. Signs of cerebral compression are all except: *(UPSC 86, Kerala 87, JIPMER 88)*
a. Bradycardia
b. Hypotension
c. Papilloedma
d. Vomiting

88. In patient of head injury with rapidly increasing intracranial tension without hematoma, the drug of choice for initial management would be: *(UPSC 2000)*
a. Lasix
b. Steroids
c. 20% Mannitol
d. Glycine

89. Battle's sign is seen in: *(JIPMER 90)*
a. Fracture middle cranial fossa
b. Fracture base of skull
c. Fracture anterior cranial fossa
d. All of the above

90. All of the following are indications of CT scan in head injured patient except: *(DNB 2014)*
a. GCS < 13
b. Vomiting 1 episode
c. Focal neurological deficit
d. Mild head injury in patient Age > 65 years

GLASGOW COMA SCALE

91. True about Glasgow coma scale: *(JIPMER 2011)*
a. Includes verbal response
b. Includes papillary reflex
c. High score means poor prognosis
d. Includes measurement of intracranial pressure

92. A patient with head injury opens eyes to painful stimulus, uses inappropriate words, and localizes pain, what is his GCS score? *(All India 2011)*
a. 8
b. 10
c. 12
d. 14

93. Minimal Glasgow coma scale is: *(DNB 2012, UPPG 2010, MCI March 2007)*
a. 0
b. 1
c. 2
d. 3
e. 4

94. Mild head injury is having Glasgow coma scale of:
a. 3-5
b. 5-8 *(SGPGI 2005)*
c. 8-10
d. 13-15

95. Which of the following is not a component of Glasgow coma scale? *(DNB 2009, All India 2006)*
a. Eye opening
b. Motor response
c. Pupil size
d. Verbal response

96. Total score in Glasgow coma scale of a conscious person is:
a. 8
b. 3 *(All India 2006)*
c. 15
d. 10

97. Regarding Glasgow coma scale, which is not true?
a. Ranges from 6-12 *(AIIMS Nov 94)*
b. Low score indicates deteriorating brain function
c. Based on eye opening, verbal response and motor response
d. Score below 5 shows poor prognosis

98. All are true about Glasgow coma scale, except:
a. Score between 3-15 *(AIIMS June 94)*
b. Obeying motor command is given maximum score
c. Consists of eye opening, motor and verbal response
d. Increased score indicates poor prognosis

99. A person with inappropriate words evaluated by GCS will have a verbal score of: *(All India 2012)*
a. 4
b. 3
c. 2
d. 1

100. Prognostic factor in head injury: *(Recent Questions 2013)*
a. Age of patient
b. Glasgow coma scale
c. Mode of injury
d. Presence of facial trauma

BRAIN ABSCESS

101. Management of epidural abscess is: *(DNB 2011)*
a. Immediate surgical evaluation
b. Conservative management
c. Antibiotics
d. Aggressive debridement

102. Brain abscess in cyanotic heart disease is commonly located in: *(All India 2006)*
a. Cerebellar hemisphere
b. Thalamus
c. Temporal lobe
d. Parietal lobe

103. Brain abscess may be due to the following:
a. Chronic suppurative otitis media *(AIIMS 81, AMC 85)*
b. Chronic lung abscess
c. Trauma
d. Any of the above

104. Subdural collection of pus in a head injury patients after 3 days, the responsible organism is: *(UPPG 2009)*
a. Staph aureus
b. B hemolytic streptococcus
c. H. influenza
d. Pneumococcus

105. A young female patient with long history of sinusitis presented with frequent fever along with personality changes and headache of recent origin. The fundus examination revealed papilledema. The most likely diagnosis is:
a. Frontal lobe abscess *(AIIMS Nov 2004)*
b. Meningitis
c. Encephalitis
d. Frontal bone ostemomyelitis

CNS CONGENITAL ANOMALIES

106. Meningomyelocele patient after being operated developed hydrocephalus due to: *(PGI Dec 98)*
a. Arnold Chiari malformation
b. Injury to absorptive surface
c. Central canal injury
d. Arachnoidal block

107. Commonest site of meningocele is: *(DNB 2005, 2001, All India 89)*
a. Lumbosacral
b. Occipital
c. Frontal
d. Thoracic

108. Not true regarding Dandy-Walker cyst: *(AIIMS June 98)*
a. Cerebellar vermis hypoplasia
b. Hydrocephalus
c. Arachnoid cyst
d. Posterior fossa cyst

109. What will be the diagnosis of the child with pulsatile swelling on medial side of the nose? *(AIIMS June 98)*
a. Teratoma
b. Meningocele
c. Dermoid cyst
d. Carcinoma of ethmoid bone

110. A new born presents with swelling in base of the spine in which meninges herniates through bony defect cause is: *(UPPG 2009)*
a. Defect in pedicle
b. Defect in body
c. Defect in fusion of vertebral arches
d. Defect is transverse process

111. A new born with meningomyelocele has been posted for surgery. The defect should be immediately covered with: *(AIIMS May 2013, All India 2012)*
a. Normal saline guaze
b. Povidone iodine guaze
c. Tincture benzoin guaze
d. Methylene blue guaze

HYDROCEPHALUS

112. In normal pressure hydrocephalus, all are seen except: *(PGI Dec 97)*
a. Convulsion
b. Ataxia
c. Dementia
d. Incontinence

NERVE COMPRESSION SYNDROME

113. Carpal tunnel syndrome is due to the compression of: *(JIPMER 2011, ComedK 2006)*
a. Median nerve
b. Anterior interosseous nerve
c. Radial nerve
d. Ulnar nerve

114. Carpel tunnel syndrome is caused by all except: *(AIIMS May 2011)*
a. Amyloidosis
b. Hypothyroidism
c. Addison's disease
d. Diabetes mellitus

115. In causalgia, the nerve most commonly affected are: *(AIIMS 86, 88)*
a. Radial and ulnar
b. Median and sciatic
c. Radial and peroneal
d. Ilioinguinal and sural

116. Commonest cause of carpal tunnel syndrome is: *(All India 95)*
a. Malunited Colle's fracture
b. Rheumatoid arthritis involving flexor retinaculum
c. Myxedema
d. Pregnancy

117. All produce carpal tunnel syndrome except: *(Kerala 98)*
a. Colle's fracture
b. Acromegaly
c. Addison's disease
d. Hypothyroidism

NERVE INJURIES

118. Tinnel's sign indicates: *(Kerala 91)*
a. Atrophy of nerves
b. Neuroma
c. Injury to nerve
d. Regeneration of nerves

119. Bilateral phrenic nerve palsy is caused by: *(PGI 80, DPG 79, 93)*
a. Carcinoma bronchus
b. Polio
c. Medullary carcinoma thyroid
d. Paget's disease

120. After an open injury, the optimum time for nerve suture is: *(AIIMS 78, 79, PGI 85)*
a. Immediately
b. Within one moth
c. 1-2 month
d. 2-4 month
e. When wound is free from infection

121. In Erb-Duchene paralysis, the injury is limited to the: *(Comed-K 2008)*
a. 2nd and 3rd cervical nerves
b. 3rd and 4th cervical nerves
c. 4th and 5th cervical nerves
d. 5th and 6th cervical nerves

122. Peripheral nerves can withstand ischemia upto: *(JIPMER 93)*
a. 30 minutes
b. 1 hour
c. 2 hours
d. 4 hours

MISCELLANEOUS

123. Which of the following is the most common location of intracranial neurocysticercosis? *(AIIMS Nov 2005)*
a. Brain parenchyma
b. Subarachnoid space
c. Spinal cord
d. Orbit

124. The nerve of Kuntz is an important landmark in:
a. Lumbar sympathectomy *(PGI 79, DPG 84)*
b. Cervicodorsal sympathectomy
c. Obturator neurectomy
d. Splanchnicectomy
e. Herniorraphy

125. A dome shaped skull with a high forehead in the infant with slight hydrocephalus (Olympian brow) is seen in: *(JIPMER 81, AMU 88)*
a. Marasmus
b. Congenital syphilis
c. Rickets
d. Arnold Chiari syndrome

126. The parasitic infection capable of producing spinal cord compression is /are: *(AIIMS 81, DPG 83)*
a. Leishmaniasis
b. Wuchereriasis
c. Echinococcosis
d. Amoebiasis

127. The following are CNS findings of CO2 narcosis: *(PGI 90)*
a. Excitement
b. Increased pH of CSF
c. Decreased pH of CSF
d. Papilledema

128. All of the following conditions are known to cause diabetes insipidus except: *(AIIMS 2004)*
a. Multiple sclerosis
b. Head injury
c. Histiocytosis
d. Viral encephalitis

129. Cells from the neural crest are involved in all except:
a. Hirschprung's disease *(AIIMS June 2003)*
b. Neuroblastoma
c. Primitive neuroectodermal tumour
d. Wilm's tumour

130. All can commonly occur in a patient who suffered decelerating injury in which pituitary stalk was damaged. except one: *(AIIMS Nov 2000)*
a. Diabetes mellitus
b. Thyroid insufficiency
c. Adrenocortical insufficiency
d. Diabetes insipidus

131. The defective migration of neural crest cells results in:
a. Congenital megacolon *(PGI June 2006)*
b. Albinism
c. Adrenogenital hypoplasia
d. Dentinogenesis imperfect

132. Hemostasis in scalp wound is best achieved by: *(DPG 2011)*
a. Direct pressure over the wound
b. Catching and crushing the bleeders by hemostasis
c. Eversion of galea aponeurotica
d. Coagulation of bleeders

133. Premature filling of veins is a manifestation in cerebral angiography of: *(AIIMS 78, AMU 85)*
a. Trauma
b. Brain tumour
c. Arteriovenous malformation
d. Arterial occlusion

134. Neurosurgical treatment of epilepsy usually involves, removal of epileptic focus from which lobe: *(Karnataka 2003)*

a. Frontal lobe
b. Temporal lobe
c. Occipital lobe
d. Parietal lobe

135. Blow out fracture refers to: *(JIPMER 2011)*

a. Fracture of orbit
b. Fracture of nasal septum
c. Fracture base of skull
d. Fracture of mandible

136. The 'Phenomenon of Kernohan's notch' is associated with: *(MHSSMCET 2006)*

a. Third nerve palsy with contralateral hemiplegia
b. Subfalacine herniation
c. Transtentorial herniation
d. Foramen magnum fracture

137. Signs of base of skull fracture are following except: *(MHSSMCET 2011)*

a. Raccoon eyes
b. Battle's sign
c. Constricted pupil
d. aemotympanum

138. A newborn present with congestive heart failure. On examination has bulging anterior fontenalle with a bruit on auscultation. Trans-fontenallar USG shows a hypoechoic midline mass with dilated lateral ventricles. Most likely diagnosis: *(AIIMS Nov 2011, May 2010, Nov 2006)*

a. Medullloblastoma
b. Encephalocele
c. Vein of Galen malformation
d. Arachnoid cyst

EXPLANATIONS

BERRY ANEURYSM

1. **Ans. a. Junction of anterior communication artery with anterior cerebral artery** *(Ref: Harrison 18/e p2262-2264; Sabiston 19/e p1879-1883; Schwartz 9/e p1534; Bailey 26/e p311, 25/e p635-637).*

Berry Aneurysm

- **Berry aneurysms: MC intracranial aneurysm[Q], saccular** in appearance, arising at the **bifurcation of intracranial arteries**.
- About **85%** aneurysms occur in the **anterior circulation**, on the **circle of willis[Q]**.

Occurrence of Berry aneurysm in order of frequency
Anterior communicating artery- Anterior Cerebral junction (29%)[Q]
Posterior communicating artery-Internal carotid junction (28%)
Middle cerebral bifurcation (18%)
Intracranial carotid bifurcation (8%)
Vertebrobasilar or basilar bifurcation (3%)

2. **Ans. b. Vertebral artery.**

3. **Ans. c. Wall contains smooth muscle fibroblasts** *(Ref: Harrison 18/e p2262-2264)*

Berry Aneurysm (Saccular or Congenital Aneurysm)

- **MC type of intra-cranial aneurysm[Q]; Multiple** in **20-30%** cases
- **Predisposing factors: Smoking** and **hypertension[Q]**
- **Wall of Berry aneurysm** is made up of **thickened hyalinized intima[Q]**. The adventitia covering the sac is continuous with that of parent artery.

Increased Risk of Berry Aneurysm in	
ADPKD[Q]	Marfan's syndrome
Ehlers-Danlos syndrome	Fibromuscular dysplasia
NF-1[Q]	Coarctation of aorta

- **Rupture of aneurysm** usually occurs **at** the **apex[Q] (dome)** resulting in **subarachnoid hemorrhage[Q]** or **intraparenchymal hemorrhage** or **both[Q].**
- Unruptured aneurysms are **usually completely asymptomatic[Q].**

4. **Ans. d. Intracranial hemorrhage**

5. **Ans. b. Vertebral artery**

CEREBROVASCULAR STROKE (CVA)

6. **Ans d. Aplastic anemia**

7. **Ans. a. Putamen** *(Ref: Harrison 18/e p2262-2264)*

Intracerebral (Parenchymal) Hemorrhage	Subarachnoid Hemorrhage
MC type of **intracranial hemorrhage[Q]** **MC cause is hypertension[Q]**, causing rupture of small perforating arteries or arterioles[Q] **MC site: Basal ganglia (Putamen[Q])**	**2nd MC cause** of intracranial hemorrhage[Q] **MC cause: Trauma >**Spontaneous rupture of **Berry aneurysm[Q]** **MC site** of Berry aneurysm is **anterior circulation** of **"circle of willis"[Q]**

8. **Ans. a. Embolism** *(Ref: Harrison 18/e p3271, 3274)*

Causes of Cerebrovascular Accidents

Ischemic (85%)	Hemorrhage (15%)
Embolic (75%)[Q]	**Parenchymal (10%)[Q]**
Thrombotic (25%)	**Subarachnoid (1-2%)**
	Epidural (<1%)
	Subdural (<1%)

9. **Ans. a. Cortical vein thrombosis** *(Ref: Harrison 18/e p3278)*

- **Young women on OCPs** are **predisposed to stroke** due to **venous thrombosis** of **lateral saggital sinus** or **small cortical veins (cortical vein thrombosis)**[Q].

10. **Ans. b. Intracerebral hemorrhage**
11. **Ans. c. Hypertension**
12. **Ans. c. Putamen/external capsule**
13. **Ans. b. Basal ganglia**
14. **Ans. a. Rupture of circle of Willis aneurysm**
15. **Ans. b. Vasospasm** *(Ref: Harrison 18/e p2263)*

Vasospasm

- **Narrowing of** the **arteries at** the **base of** the **brain following SAH** occurs regularly.
- This **vasospasm** causes **symptomatic ischemia** and **infarction in** approximately **30%** patients and is the **major cause** of **delayed morbidity** or **death**[Q].
- **Sign of ischemia** appear 4-14 days after the hemorrhage, **most frequently at** about **7 days**[Q].

Major causes of Delayed Neurological deficit after CVA	
Re-rupture[Q]	**Vasospasm**[Q]
Hydrocephalus[Q]	**Hyponatremia**[Q]

16. **Ans. b. Ischemic stroke**
17. **Ans. a. Brain** *(Ref: Robbins 8/e p1283-1284)*

Duret Hemorrhage

- In case of **increased ICP down ward herniation of brainstem** occur, which cause **stretching of perforators** of **basilar artery** and may results in **bleed (Duret hemorrhage)**[Q].
- Duret hemorrhage is **small area of bleeding** in **ventral** and **paramedian part** of **upper brainstem** (midbrain and pons)[Q].
- It usually indicates a fatal outcome, however survival has been reported.
- Diagnosis is made on **CT** or **MRI.**

EDH AND SDH

18. **Ans. a. Middle meningeal artery** *(Ref: Harrison 18/e p3379-3380; Sabiston 19/e p439-441; Schwartz 10/e p174,1719-1720, 9/e p1525; Bailey 26/e p315-316, 25/e p303-304*

Extradural Hematoma	Subdural Hematoma (Acute)
• EDH is a **neurosurgical emergency**[Q]. • Nearly always **associated with** a **skull fracture**[Q] • More common in **young male patients**[Q]. • Associated with **tearing of a meningeal artery**[Q] • Hematoma accumulates in the space between **bone** and **dura**. • **MC site: Temporal**[Q] (**pterion** is **thinnest part** of skull and **overlies middle meningeal artery**) • **Not always arterial**: disruption of a major dural venous sinus can result in an EDH. • Force required to sustain a skull fracture can be surprisingly small[Q] – a fall from standing or a single blow to the head. • **Classical presentation**: Initial injury followed by a **lucid interval**[Q] (occurring in <1/3rd of cases) • **Early recognition** and **treatment** is likely to result in **full recovery** • Delays in diagnosis and treatment can result in **death** from secondary brain injury. • **EDH on CT scan**: **Lentiform** (**lens shaped** or **biconvex**[Q]) **hyperdense lesion** between the skull and brain. • **Treatment of EDH: Immediate surgical evacuation**[Q] via a craniotomy. • **Overall mortality** for all cases of EDH is about **18%** but for **isolated EDH** it is about **2%**.	• **SDH** accumulates in the space **between dura** and **arachnoid**[Q]. • • **Disruption of** a **cortical vessel** or **brain laceration**[Q] • Nearly **always associated with** a **significant primary brain injury**[Q]. • Patients present with an **impaired conscious level** from the time of injury, but further deterioration can occur as the hematoma expands. • **CT appearance** of SDH: **Hyperdense** (acute blood) **concave appearance**[Q]. • **Treatment** of SDH: **Evacuation** via craniotomy. • **Small hematomas** with little mass effect may be **managed conservatively** in neurosurgical centers. • **Mortality rate** from **SDH** is **much higher** than for EDH and is as high as **40%** in some series[Q].

19. **Ans. d. Extradural hematoma**
20. **Ans. d. Epidural hemorrhage**
21. **Ans. b. Temporo-parietal**

22. Ans. c. Subacute *(Ref: Bailey 24/e p598-599; Schwartz 10/e p1719-1720, 9/e p1525-1526)*

Classification of SDH

- **Acute SDH**: **<3 days**[Q]
- **Subacute SDH**: **4-21 days**[Q]
- **Chronic SDH**: **>21 days**[Q]

23. Ans. c. 15 days

24. Ans. d. Surgical evacuation

25. Ans. d. 21 days *(Ref: Harrison 18/e p3379-3380; Sabiston 19/e p439-441; Schwartz 10/e p1719-1720, 9/e p1525; Bailey 26/e p316, 25/e p305)*

Chronic Subdural Hematoma

- Chronic SDH: Collection of blood breakdown products that is **at least 2-3 weeks old**[Q].
- Chronic SDHs often occur in patients without a clear history of head trauma, as they may arise from minor trauma[Q].

Clinical Features

- **Alcoholics**, the **elderly**, and **patients on anticoagulation** are at **higher risk** for developing **chronic SDH**[Q].
- Patients may present with **headache, seizure, confusion**, **contralateral hemiparesis**, or **coma**[Q].

Treatment

- A chronic SDH >1 cm or any symptomatic SDH should be surgically drained.
- **Chronic SDH** typically consists of a **viscous fluid**, with a texture and **dark brown color** reminiscent of **motor oil.**
- A simple **burr hole** can effectively **drain most chronic SDHs**.
  - The procedure is **converted to open craniotomy** if the **SDH** is **too congealed for irrigation drainage**, the complex of membranes **prevents effective drainage**, or **persistent hemorrhage** occurs that cannot be reached with bipolar cautery through the burr hole[Q].
- **Follow-up head CT scans**: Approximately **1 month later** to document resolution.

26. Ans. b. 10% *(Ref: Harrison 18/e p3379)*

- Harrison says "**Epidural hematomas** occur in **upto 10% of severe head injury** cases and are **less often associated with** underlying **cortical damage than subdural hematomas**."[Q]

27. Ans. d. Extradural

28. Ans. b. Immediate evacuation

29. Ans. a. Severe hypotension

30. Ans. c. Chronic subdural hematoma

31. Ans. b. Rupture of superior cerebral vein

32. Ans. a. Subarachnoid hemorrhage *(Ref: Harrison 18/e p2262-2263; Sabiston 19/e p1880-1882; Schwartz 10/e p1730-1731, 9/e p1534-1536; Bailey 26/e p317, 25/e p30*

Subarachnoid Hemorrhage

- **MC cause: Trauma** >Spontaneous rupture of **Berry aneurysm**[Q]

Clinical Features

- **Sudden transient loss of consciousness**[Q] (occurs in nearly half of the patients)
- **Excruciating severe headache**[Q]: presenting complaint in 45% of cases (worst headache of patients life) more common upon regaining consciousness when loss of consciousness is associated
  - **Neck stiffness** and **vomiting**[Q]: are common associations
  - **Focal neurological deficit**: **uncommon.**
  - **Sudden headache** in the **absence of focal neurological deficit** is the **hallmark of aneurysmal rupture**.[Q]
- Associated prodromal symptoms (suggest **location** of progressively enlarging unruptured aneurysm):
  - **Third cranial nerve palsy**[Q]: Aneurysm at junction of **PCA** and **ICA**
  - **Sixth nerve palsy**[Q]: Aneurysm in **cavernous sinus**
  - Occipital and posterior cervical pain: **Inferior cerebellar artery aneurysm**
  - **Pain** in or **behind the eye**[Q]: **MCA aneurysm**

Diagnosis

- **Non contrast CT scan**: **Investigation of choice** (Lumbar puncture is not indicated prior to an imaging procedure)
- **CSF picture**: **Hallmark** of aneurysmal rupture is **blood in CSF (Xanthochromic spinal fluid**[Q]**)**

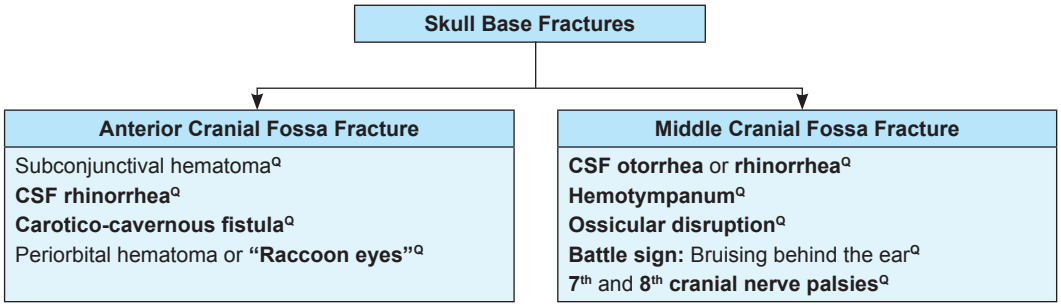
- **Lumbar puncture** should be performed **if the CT scan fails to establish the diagnosis of SAH** and **no mass lesion** or **obstructive hydrocephalus** is found to establish the presence of subarachnoid blood[Q]

Treatment

- **Traumatic subarachnoid hemorrhage** is **managed conservatively**[Q].

33. **Ans. b. Extradural hemorrhage**

34. **Ans. d. Complete basilar fracture** *(Ref: Bailey 26/e p314, 25/e p302; 24/e p595-599)*



35. **Ans. c. Injury to cortical bridging veins**

36. **Ans. b. Subdural hematoma** *(Ref: www.ncbi.nlm.nih.gov/pubmed/11915757 by M Guénot - 2001)*

Chronic Subdural Hematoma

- Virchow, in 1857, denied a traumatic origin, and gave the name of **"pachymeningitis hemorrhagica interna"**[Q] to this pathology which he explained by inflammatory processes.
- The traumatic etiology of chronic subdural hematoma was recognized in the 20th century, especially by Trotter in 1914.

37. **Ans. a. Extradural hemorrhage** 38. **Ans. d. Left chronic subdural hematoma** 39. **Ans. d. Left chronic subdural hematoma**

40. **Ans. c. In the left temporal region if no localizing sign is found** *(Ref: Ramamurthi and PN Tandon's Textbook of Neurosurgery 3/e Vol-1/ p442)*

Burr hole to emergently relieve the intracranial pressure should be done in the left temporal region if no localizing sign is found, to evaluate and decompress the dominant hemisphere.

Choice of Side for Initial Burr Hole

Start with a temporal burr hole on the side:

- **Ipsilateral to a blown pupil:** This will be on the **correct side in >85% of epidural hemorrhages** and **other extra- axial mass lesions.**
- **If both pupils are dilated, use the side of the first dilating pupil** (If known).
- **If pupils are equal**, or it is **not known which side dilated first**, place on **side of obvious external trauma.**
- **If no localization clues, place hole on left side (to evaluate and decompress the dominant hemisphere).**

SUBARACHNOID AND INTRACRANIAL HEMORRHAGE

41. **Ans. c. Aneurysm** 42. **Ans. c. Berry aneurysm** 43. **Ans. b. Berry aneurysm rupture**

44. **Ans. b. Hess and Hunt scale** *(Ref: Harrison 18/e p2262)*

- **Hess and Hunt Scale**: **Most widely used scale** to **grade the severity** of **subarachnoid hemorrhage**, **predict** the **prognosis / outcome** of hemorrhage and thereby **plan further intervention**[Q].

Grading Scale for Subarachnoid Hemorrhage	
Grade	**Hunt – Hess Scale**
1	**Mild headache**, normal mental status, no cranial nerve or motor findings
2	**Severe headache**, normal mental status, may have cranial nerve deficit
3	**Somnolent, confused**, may have cranial nerve or **mild motor deficit**
4	**Stupor, moderate to severe motor deficit**, may have intermittent reflex posturing
5	Coma, reflex posturing or flaccid
Good grade: Grade 1, 2 and 3; **Poor grade:** Grade 4 and 5	

45. **Ans. b. Ruptured aneurysm**
46. **Ans. c. Aneurysmal subarachnoid hemorrhage**
47. **Ans. d. Subarachnoid hemorrhage**
48. **Ans. a. Subarachnoid hemorrhage (SAH)**
49. **Ans. a. SAH, b. Aneurysmal bleeding**
50. **Ans. b. Aneurysmal subarachnoid hemorrhage**
51. **Ans. d. Ruptured aneurysm**
52. **Ans. d. Hypothermia** *(Ref: Comprehensive Board Review in Neurology by Mark K. Borsody (Thieme) p63)*

Triple H Therapy

- Triple H therapy of subarachnoid hemorrhage used to ameliorate cerebral perfusion, consists of:
  1. **Hypervolemia**
  2. **Hypertension**
  3. **Haemodilution**

HEAD INJURY

53. **Ans. a. Serum osmolality >320 mOsmol/kg** *(Ref: Harrison 18/e p2257; Schwartz 10/e p195-197, 575-578, 1715-1721, 9/e p1521; Bailey 26/e p318, 25/e p306; KDT 6/e p572)*

Mannitol

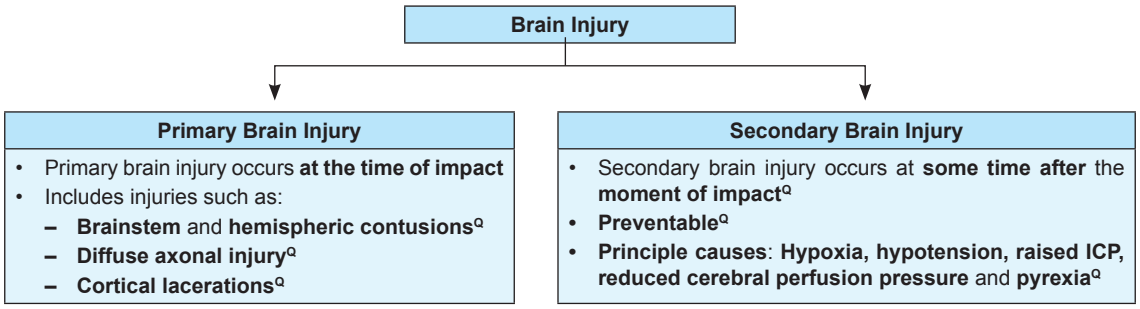
- Mannitol is widely used to **reduce ICP**[Q]
- Commonly used preparation: 20% solution, 0.25-1 gm/kg is given IV as bolus[Q]
- **Serum osmolality** should **not** be **allowed to go >320 mOsm/L**, to **avoid systemic acidosis** and **renal failure**[Q].

Uses of Mannitol

- **Increased ICT** or **intraocular tension**[Q]
- **To maintain GFR** and **urine flow in impending renal failure**[Q]
- **Forced diuresis** in **hypnotic** or **other poisoning**[Q]
- **To counteract low osmolality of plasma/ECF**[Q] due to rapid hemodialysis or peritoneal dialysis

Contraindication of Mannitol	
Acute tubular necrosis[Q]	**Acute left ventricular failure**[Q]
Anuria[Q]	**CHF**[Q]
pulmonary edema[Q]	**Cerebral hemorrhage**[Q]

54. **Ans. c. Corticosteroids administration**
Steroids are used in treatment of cerebral edema
55. **Ans. d. Intracerebral hematoma** *(Ref: Bailey 26/e p314, 25/e p299-300)*



56. **Ans. b. Brainstem herniation**
57. **Ans. d. Brain**
58. **Ans. a. Raccoon eyes seen in subgaleal hemorrhage** *(Ref: Schwartz 9/e p148)*

- **Otorrhea, rhinorrhea, raccoon eyes and Battle's sign** suggest a **basilar skull fracture**[Q].

59. **Ans. b. Anisocoria, e. Decorticate posturing** *(Ref: Harrison 18/e p2249-2251)*

Head Injury

- A **sudden enlargement** (**dilation**) of **one pupil** (**anisocoria**) is an **ominous sign**[Q].
- **Abnormal posturing** (**decorticate posturing**) a characteristic positioning of the limbs **caused by severe diffuse injury** or **high ICP**, is an **ominous sign**[Q].

60. **Ans. b. Middle cranial fossa fracture**

61. **Ans. b. Coup-Countercoup injury** *(Ref: Bailey 26/e p317, 25/e p305)*

Cerebral Contusions

- **Cerebral contusions** result from the **brain being damaged by:**
  - **Impacting against** the **skull** either **at** the **point of impact** (the **'coup'**) or on the **other side of** the **head** (**'contre-coup'**)Q
  - As the **brain slides forwards** and **backwards over** the **ridged cranial fossa floor** (most often affecting the **inferior frontal lobes** and **temporal poles**) Q

Diagnosis

- **CT scan**: **Heterogeneous** with **mixed areas of high** and **low density**Q.
  There may be an associated mass effect. Contusion appears uniformly hyperdense.

Treatment

- Cerebral contusions **rarely require immediate surgical treatment**.

> - Patient with **cerebral contusions** must be **admitted for observation** as these lesions will **tend to mature** and **expand for 48–72 hours** following injuryQ.

- **Small proportion** of cerebral contusions will require **delayed surgical evacuation to reduce** the **mass effect**Q.

62. **Ans. c. Altered consciousness**

63. **Ans. a. ↑Mean arterial pressure with increased intracranial pressure** *(Ref: Schwartz 10/e p1580-1583, 9/e p1521; Bailey 25/e p483)*

Cushing Reflex

- The **Cushing reflex** classically presents as an **increase in systolic blood pressure, reduction of the heart rate** (**bradycardia**), and **irregular respiration**Q.
- It is **caused by increased intracranial pressure**Q.
- These symptoms can be **indicative of insufficient blood flow** to the **brain (ischemia)** as well as **compression of arterioles**Q.

64. **Ans. d. GCS score of 0**

65. **Ans. c. Papilloedema**

66. **Ans. c. Early surgery is indicated for optimal outcome** *(Ref: Bailey 26/e p314, 25/e p308)*

Base of Skull Fractures

- **Base of skull fractures** may be associated with **7th** or **8th nerve palsies**Q.
- **CSF otorrhoea** or **rhinorrhoea often resolves spontaneously**Q.
- **Antibiotics are not required prophylactically unless for concomitant facial fractures**Q.
- A **delayed craniotomy**Q and **anterior fossa dural repair** is **occasionally required**Q for persistent CSF leak to prevent meningitis.

67. **Ans. d. Hypothermia** *(Ref: Bailey 25/e p299-300; Harrison 18/e p2257)*

Causes of Secondary Brain Injury	
HypoxiaQ: PO_2 <8 kPa	**Hypercapnia**Q
HypotensionQ: **SBP< 90** mmHg	**Pyrexia (hyperthermia)**Q
Raised ICPQ: **ICP >20** mmHg	**Seizures**Q
Low cerebral perfusion pressureQ: **CPP <65** mmHg	**Metabolic disturbance (Hypergycemia**Q**)**

68. **Ans. a. Hyperglycemia** *(Ref: Harrison 18/e p2257)*

- **Hyperglycemia** is **associated with a poor outcome after traumatic brain injury** and has been shown to be **associated with increased mortality**Q.
- **Hyperglycemia injures** the **microvasculature** and **worsens ischemia**Q.

69. **Ans. a. Glasgow coma scale**

70. **Ans. c. Altered mental status**

71. **Ans. d. Decorticate rigidity** *(Ref: Harrison 18/e p2248; Sabiston 19/e p1874-1875; Schwartz 10/e p1713, 9/e p1521; Bailey 26/e p312, 25/e p300)*

Decorticate rigidity is seen in central herniation, not in uncal herniation.

Brain Herniation

Uncal Herniation	Central Herniation
• **Uncus** and **temporal lobes** are **forced through** the **cerebellar tentorium**[Q] • Sequential **compression of ipsilateral 3rd nerve**, contralateral **brainstem** (later) and whole brainstem (eventually) occurs[Q]. • **Physical Signs:** – **Early: ipsilateral dilated pupils,** signs of supratentorial mass lesion[Q] – **Late: Ipsilateral hemiplegia,** progressive **ptosis** and **3rd nerve palsy, Cheyne-stokes respiration**[Q] – **Very late: Quadriparesis, bilateral fixed** and **dilated pupils,** erratic respiration and death	• **Diencephalon** (**thalamus** and related structures that lie between upper brainstem and cerebral hemispheres) are **forced through** the **tentorium**[Q] • Sequential **compression of upper midbrain (first), pons (later) and medulla (finally)**[Q] • **Physical Signs:** – **Early: Erratic respiration, small reactive pupils,** increased limb tone and **bilateral extensor plantar**[Q] – **Late: Cheyne-stokes respiration, decorticate rigidity**[Q] – **Very late: fixed** and **dilated pupils, decerebrate posturing**[Q]

72. Ans. c. Tolosa –Hunt Syndrome *(Ref: Harrison 18/e p1662-1663)*

TOLOSA-HUNT SYNDROME/ ORBITAL APEX SYNDROME

- One of the **lesion of orbital apex**[Q]
- Characterized by **painful, acute ophthalmoplegia**, with or without **involvement of** the **optic nerve** and **ophthalmic division (V_1) of trigeminal nerve**[Q]
- Responds promptly to **steroid treatment**[Q]

> • Tolosa described a case in which a **mass of granulation material** was found **around the carotid artery in** the **cavernous sinus** and **asymmetrical enlargement of cavernous sinus**, now referred as **Tolosa-Hunt syndrome**[Q].

73. Ans. a. Allodynia *(Ref: Harrison 18/e p96, 186)*

Terminology	Sensory Disturbance
Allodynia	Situation in which a **non-painful stimulus**, once perceived, is **experienced as painful, even excruciating**[Q]. An example is elicitation of a painful sensation by application of a vibrating tuning fork.
Hyperalgesia	**Severe pain** in response to a **mildly noxious stimulus**
Hyperpathia	**Threshold for a sensory stimulus is increased** and **perception is delayed**, but once felt, it is **unduly painful.** Broad term **encompasses all** the phenomena described by **hyperesthesia, allodynia, and hyperalgesia.**

74. Ans. none. *(Ref: Diagnostic Nuclear Medicine 4/e p838)*

Spontaneous (Non-Traumatic) CSF Leaks

High Pressure Leaks	Normal Pressure Leaks
• **Elevated intracranial pressure:** - **Hydrocephalus** - **Intracranial tumors** • Benign intracranial hypertension **(Pseudotumor cerebri)**	• **Empty sella syndrome**[Q] • **Congenital Anomalies:** - **Encephalocele** - Meningocele - Focal olfactory atrophy - Cribiform plate defects • **Osteomyelitis (skull base)** • **Connective tissue disorder:** - Marfan's syndrome - Ehler-Danlos syndrome - Osteogenesis imperfect

75. Ans. c. Increased intracranial tension is seen in all cases *(Ref: Harrison 18/e p3378; Sabiston 19/e p1893)*

Diffuse Axonal Injuries (DAI)

- **DAI** represents the **presence of widespread axonal damage** (**white matter**) in **both hemispheres secondary to severe head injury**[Q].
- Results from application of **severe acceleration/deceleration** or **angular strain** to the brain (**injuries to axons by shearing force**[Q])
- **MC location: Lobar white matter** at the **junction of grey and white matter**[Q] **>Corpus callosum >Brain stem**

Pathology

- **Hemorrhagic** or **non-hemorrhagic white matter tears** in both hemispheres

Clinical Features

- Clinical presentation vary from concussion to coma
- **Loss of consciousness** is a common finding[Q]
- **DAI**: **MC cause** of **post-traumatic vegetative state**[Q]
- **Raised ICT may** or **may not be associated**[Q]

Diagnosis

- **MRI** is **IOC for DAI**[Q] (better than CT scan)

Prognosis

- **DAI** carries an **extremely poor prognosis**[Q].

76. Ans. d. Diffuse axonal injury

77. Ans. a Craniotomy

78. Ans. b. Furosemide *(Ref: Harrison 18/e p2257; Sabiston 19/e p1895)*

Stepwise Approach to Treatment of Elevated Intracranial Pressure

- Insert **ICP monitor—ventriculostomy**[Q] versus parenchymal device
- **General goals**: maintain **ICP <20 mmHg** and **CPP 60 mmHg**[Q]
- **For ICP >20–25 mmHg for >5 min:**
  - Drain CSF via **ventriculostomy**[Q] (if in place)
  - **Elevate head of the bed**[Q]; midline head position
  - Osmotherapy—**mannitol**[Q] 25–100 g q4h as needed (maintain serum osmolality <320[Q] mosmol) or hypertonic saline[Q] (30 mL, 23.4% NaCl bolus)
  - **Glucocorticoids**—dexamethasone 4 mg q6h for vasogenic edema from tumor, abscess[Q] (**avoid glucocorticoids** in head **trauma**, **ischemic** and **hemorrhagic stroke**[Q])
  - **Sedation**[Q] (e.g., morphine, propofol, or midazolam); add neuromuscular paralysis if necessary (patient will require endotracheal intubation and mechanical ventilation at this point, if not before)
  - **Hyperventilation**[Q]—to PaCO2 30–35 mmHg
  - **Pressor therapy**[Q]—phenylephrine, dopamine, or norepinephrine to maintain adequate MAP to ensure CPP 60 mmHg (maintain euvolemia to minimize deleterious systemic effects of pressors)
  - Consider **second-tier therapies** for **refractory elevated ICP:**
    a. High-dose barbiturate therapy **("pentobarb coma")**[Q]
    b. **Aggressive hyperventilation** to PaCO2 <30 mmHg[Q]
    c. **Hypothermia**[Q]
    d. **Hemicraniectomy**[Q]

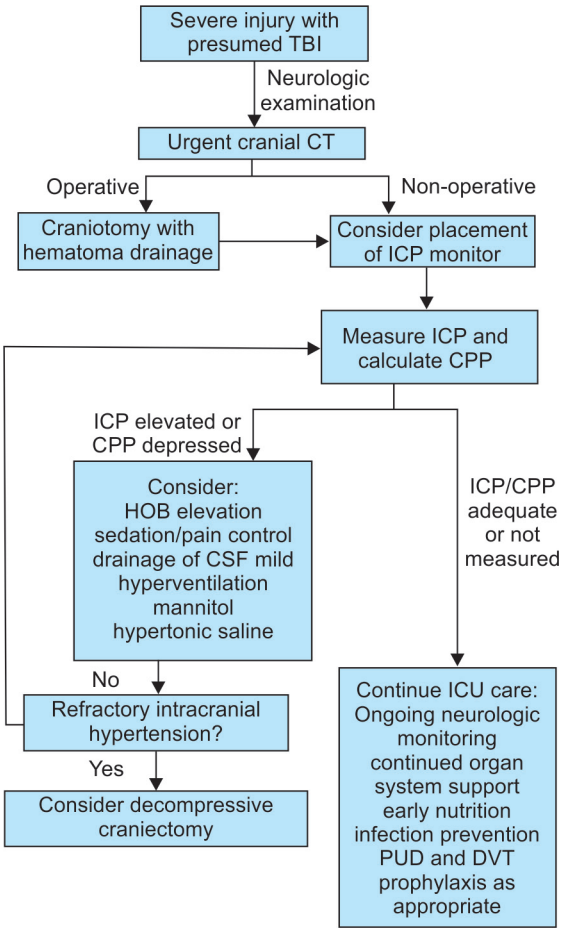


Fig. Traumatic brain injury (TBI)

79. **Ans. c. CSF leak**
80. **Ans. a. Cerebral edema**
81. **Ans. a. Fracture of floor of anterior cranial fossa**
82. **Ans. c. Chronic subdural hemorrhage**
83. **Ans. c. Long-term anticonvulsants**
84. **Ans. d. Tachycardia**
85. **Ans. b. Middle cranial fossa**
86. **Ans. b. Level of consciousness**
87. **Ans. b. Hypotension**
88. **Ans. c. 20% Mannitol**
89. **Ans. a. Fracture middle cranial fossa, b. Fracture base of skull**
90. **Ans. b. Vomiting 1 episode** *(Ref: Bailey 25/e p278, 303)*

NICE Guidelines for CT in Head Injury	
1. GCS < 13 at any point	4. Suspected open, depressed or basal skull fracture
2. GCS 13 or 14 at 2 hours	5. Seizures
3. Focal neurological deficit	6. Vomiting > one episode

Urgent CT scan if none of the above but:	
1. Age > 65 years	3. Dangerous mechanism of injury (CT within 8 hours)
2. Coagulopathy (e.g. on warfarin)	4. Antegrade amnesia > 30 min (CT within 8 hours)

GLASGOW COMA SCALE

91. Ans. a. Includes verbal response *(Ref: Harrison 18/e p3381-3382; Sabiston 19/e p1894; Schwartz 10/e p168,1711, 9/e p1522; Bailey 26/e p312, 25/e p301-302)*

Glasgow Coma Scale (GCS)					
Eye Opening		**Verbal response**		**Best Motor response**	
Spontaneous	**4**	Oriented	**5**	Obeys commands	**6**
To loud voice	**3**	Confused, disoriented	**4**	Localizes pain	**5**
To pain	**2**	Inappropriate words	**3**	Flexion (withdrawal) to pain)	**4**
No response	**1**	Incomprehensible sounds	**2**	Abnormal flexion posturing	**3**
		No response	**1**	Extension posturing	**2**
				No response	**1**

- **Maximum score-15, minimum score-3.**
- **Best predictor of outcome: Motor response**[Q]
- Patients scoring **3 or 4** have an **85% chance of dying** or **remaining vegetative**, while scores above **11** indicate only a **5-10% likelihood of death**.

92. Ans. b. 10 **93. Ans. d. 3** **94. Ans. d. 13-15** **95. Ans. c. Pupil size** **96. Ans. c. 15**

97. Ans. a. Ranges from 6-12 **98. Ans. d. Increased score indicates poor prognosis** **99. Ans. b. 3**

100. Ans. b. Glasgow coma scale

BRAIN ABSCESS

101. Ans. a. Immediate surgical evacuation *(Ref: Bailey 25/e p474)*

102. Ans. d. Parietal lobe *(Ref: Harrison 18/e p3428; Sabiston 19/e p1913; Schwartz 10/e p1745, 9/e p1550; Bailey 26/e p609-610, 25/e p628-629)*

Brain abscess in congenital heart diseases occur due to hematogenous seeding of blood borne bacteria. These blood borne bacteria bypass the capillary bed due to right to left shunt. They commonly infect parietal and frontal lobes (territory of middle cerebral artery).

Brain Abscess

- Intracerebral abscess may occur as a result of **direct spread from air sinus infection**, following **surgery** or from **hematogenous spread** especially associated with **respiratory infection, endocarditis** or **dental infection**[Q].
- **Increased risk** of abscess in: **Cyanotic heart disease**, **immunocompromised** (diabetes, solid organ transplant, hematological malignancy or long-term steroids)[Q]

Etiology	Location
Otitis media, mastoiditis	**Temporal lobe**[Q] **>Cerebellum**
Paranasal sinusitis, dental infections	**Frontal lobes**[Q]
Hematogenous	**Parietal lobe**[Q]

Clinical Features

- Presentation is with **focal signs, seizures** and **raised ICP**, as with other mass lesions, but the **time course is often short**[Q]
- Patients may be febrile or have a raised peripheral white cell count or inflammatory markers.

Diagnosis

- **CT scan**: **Ring-enhancing mass lesion** (may be **multiple** in case of **hematogenous spread**)[Q]

Treatment

- **Surgical drainage + IV antibiotics** for at least 6 weeks[Q].
- **Multiple small abscesses** may be **treated medically** with antibiotics targeted against organisms
- **Steroids** are **reserved for** cases with **significant edema** or **mass effect**[Q]
- Owing to the **high risk of seizures**, patients should also be **treated with anticonvulsants**.

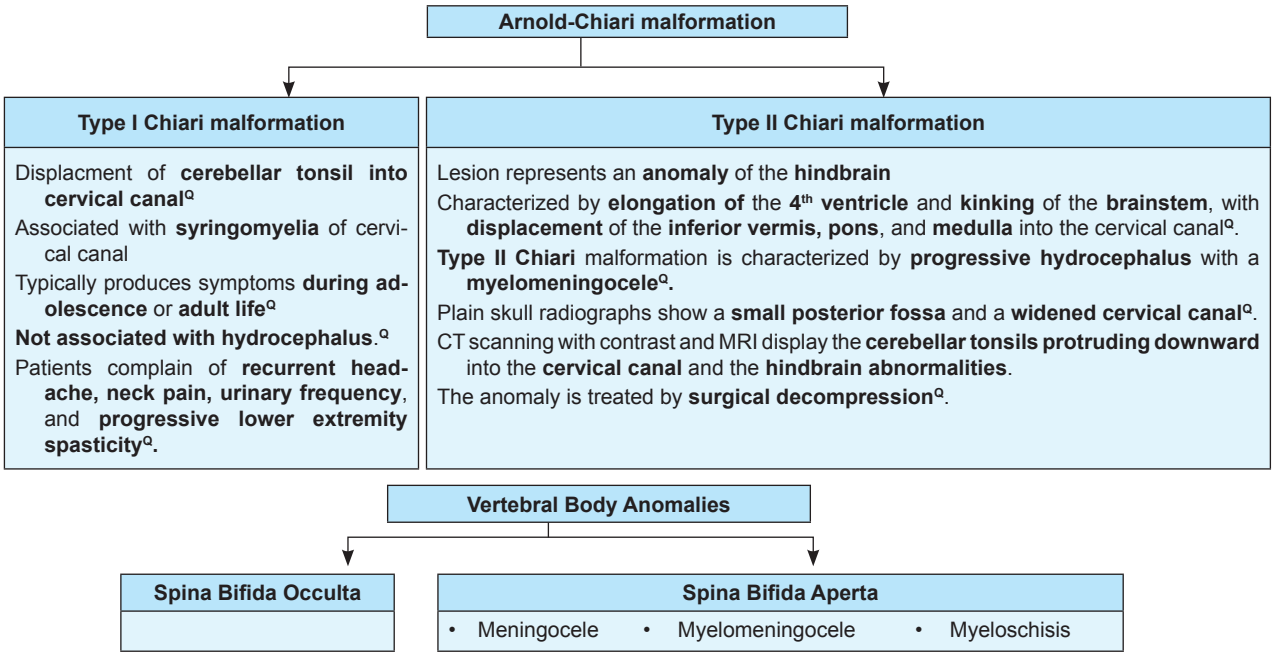
103. Ans. d. Any of the above

104. Ans. a. Staph aureus **105. Ans. a. Frontal lobe abscess**

CNS CONGENITAL ANOMALIES

106. Ans. a. Arnold Chiari malformation *(Ref: Sabiston 19/e p1911; Schwartz 10/e p1745, 9/e p1554; Bailey 26/e p484, 25/e p483)*

Type II Chiari malformation is characterized by progressive hydrocephalus with a myelomeningocele.



107. Ans. a. Lumbosacral *(Ref: Sabiston 19/e p1911; Schwartz 10/e p1750, 9/e p1553; Bailey 26/e p617, 25/e p483)*

Meningocele

- **Herniation** of **meninges** through a **defect** in the **posterior vertebral arches**Q.
- **Spinal cord** is **usually normal** and assumes a **normal position** in the spinal canal
- There may be tethering, syringomyelia, or diastematomyelia.

Clinical Features

- A **fluctuant midline mass,** that may transilluminate occurs along the vertebral column, in the **lower back**Q.
- Most meningoceles are **well covered with skin** and pose no threat to the patient.

> - **Anterior meningocele:** Projects into **pelvis** through a **defect in** the **sacrum**Q.
> - Symptoms of **constipation** and **bladder dysfunction** develop due to the increasing size of the lesionQ.

Diagnosis

- **Plain roentgenograms** demonstrate a defectQ.

Treatment

- **Asymptomatic children** with **normal neurologic findings** and **full-thickness skin** covering the meningocele may have **surgery delayed**Q.
- Patients with **leaking CSF** or a **thin skin** covering should undergo **immediate surgical treatment** to prevent meningitisQ.

108. Ans. c. Arachnoid cyst *(Ref: Sabiston 19/e p1911; Schwartz 9/e p1553)*

Dandy-Walker malformation

- **Dandy-Walker malformation** consists of a **cystic expansion** of the **4th ventricle** in the posterior fossa and **midline cerebellar hypoplasia**Q
- Results from a **developmental failure** of the **roof** of the **4th ventricle**Q during embryogenesis.

> - Approximately **90%** of patients have **hydrocephalus**Q
> - Other **associated anomalies**: **Agenesis** of the **posterior cerebellar vermis** and **corpus callosum**Q.

Clinical features

- Infants present with a **rapid increase** in **head size** and **prominent occiput**Q.
- Transillumination of the skull may be positive.
- Most children have evidence of **long-tract signs**, **cerebellar ataxia**, and **delayed motor** and **cognitive milestones**, probably due to the **associated structural anomalies**Q.

Treatment

- Managed by **shunting** the **cystic cavity**Q (and on occasion the ventricles as well) in the presence of hydrocephalus.

109. Ans. b. Meningocele

110. Ans. c. Defect in fusion of vertebral arches

111. Ans. a. Normal saline guaze *(Ref: Sabiston 19/e p1910; Schwartz 10/e p1645, 9/e p1553; Bailey 26/e p611, 25/e p483, 641)*

Meningomyelocele should be covered with a non-sticking sterile saline soaked guaze and plastic shield wrap to maintain moisture.

Myelomeningocele

- **Most severe form of dysraphism** involving the vertebral column
- **Incidence**: **1/4,000** live births[Q]
- **MC site** of myelomeningocele: **Lumbosacral region (75%)**[Q]

Etiology

- **Genetic predisposition** exists; the risk of recurrence after **one affected child** increases to **3-4%** and increases to **10%** with **two** previous abnormal pregnancies.

> - **Nutritional** and **environmental factors: Folate**[Q] is intricately involved in the prevention and etiology of NTDs.
> - **Maternal peri-conceptional use** of folic acid supplementation **reduces** the **incidence** of **neural tube defects** in pregnancies at risk by at least **50%**[Q].
> - To be effective, folic acid supplementation should be **initiated before conception** and **continued until** at least the **12th week of gestation** when neurulation is complete[Q].

Prevention

- All women of childbearing age and who are capable of becoming pregnant take 0.4 mg of folic acid daily.

Drugs increasing the risk of myelomeningocele	
Trimethoprim[Q]	**Phenobarbital**[Q]
Carbamazepine[Q]	**Primidone**[Q]
Phenytoin[Q]	**Valproic acid**[Q]

Clinical Features

- Produces **dysfunction of skeleton, skin, gastrointestinal** and **genitourinary tracts**, in addition to the **peripheral nervous system** and **CNS**[Q].
- **Extent** and **degree** of the **neurologic deficit** depend on the **location** of the myelomeningocele, as well as the **associated lesions**.

Location	Manifestation
Low sacral region	**Bowel** and **bladder incontinence** associated with **anesthesia** in the **perineal area** but with no impairment of motor function.
Midlumbar region	Flaccid paralysis of lower extremity, absence of deep tendon reflexes, lack of response to touch and pain
Thoracic region	**Increasing neurologic deficit** as the myelomeningocele **extends higher** into the thoracic region.
Upper thoracic and **cervical region**	**Very minimal neurological deficit and no hydrocephalus**

HYDROCEPHALUS

112. Ans. a. Convulsion *(Ref: Harrison 18/e p3312-3313; Sabiston 19/e p1909)*

Normal-Pressure Hydrocephalus (NPH)

- Characterized by the **clinical triad** of:
  - **Abnormal gait** (**ataxic** or apractic)[Q]
  - **Dementia**[Q] (usually **mild to moderate**, with an emphasis on executive impairment)
  - **Urinary urgency** or **incontinence**[Q]
- This syndrome is a **communicating hydrocephalus**[Q] with a patent aqueduct of Sylvius

> - NPH may be caused by **obstruction to normal CSF flow over the cerebral convexities** and **delayed resorption** into the venous system.
> - The indolent nature of the process results in **enlarged lateral ventricles** with relatively **little increase in CSF pressure**[Q].

Diagnosis

- **MRI: Enlarged lateral ventricles (hydrocephalus)** with little or **no cortical atrophy**[Q]
- **Lumbar puncture opening pressure** falls in the **high normal range**[Q]
- **CSF protein, glucose** and **cell counts** are **normal**.

NERVE COMPRESSION SYNDROME

113. Ans a. Median nerve *(Ref: Harrison 18/e p59-60; Sabiston 19/e p1983; Schwartz 10/e p1791, 9/e p1627-1628; Bailey 26/e p503, 25/e p511-512)*

Carpal Tunnel Syndrome

- **Carpal tunnel syndrome** is an **entrapment median neuropathy**[Q]
- Causing **paresthesia, pain, numbness** in the distribution of the median nerve due to its **compression** at the wrist **in** the **carpal tunnel.**[Q]

Risk factors for Carpal Tunnel Syndrome	
Pregnancy[Q]	**Rheumatoid arthritis**[Q]
Diabetes[Q]	**Colle's fractures**[Q]
Obesity[Q]	**Amyloidosis**[Q]
Hypothyroidism[Q]	**Acromegaly**[Q]
Heavy manual work or work with vibrating tools[Q]	Use of **steroids** and **estrogens**[Q]

Clinical Features

- **Main symptom**: **Intermittent numbness** of the **thumb, index, long** and **radial half** of the **ring finger**. **Numbness** often occurs **at night**[Q].
- **Long-standing CTS** leads to **permanent nerve damage** with **constant numbness, atrophy** of some of the muscles of the **thenar eminence and weakness of palmar abduction.**[Q]
- **Pain** is **primarily numbness** that is **so intense** that it **wakes one from sleep**[Q].

Diagnosis

- **Specific clinical tests include:**
  - Tinel'sQ percussion over the carpal tunnel
  - Phalen's testQ (reproduction of paraesthesia with full wrist flexion)
  - Carpal tunnel compression with full wrist flexion

> - **Rarely** does **electrophysiological testing add to** the **clinical tests**, but it is a good tool for tracking changes.

Treatment

- **Conservative treatments:** Use of **night splints** and **corticosteroid injection**[Q].
- Disease modifying treatment: **Surgery to cut** the **transverse carpal ligament**[Q] (creating space for the nerve)

114. Ans. c. Addison's disease

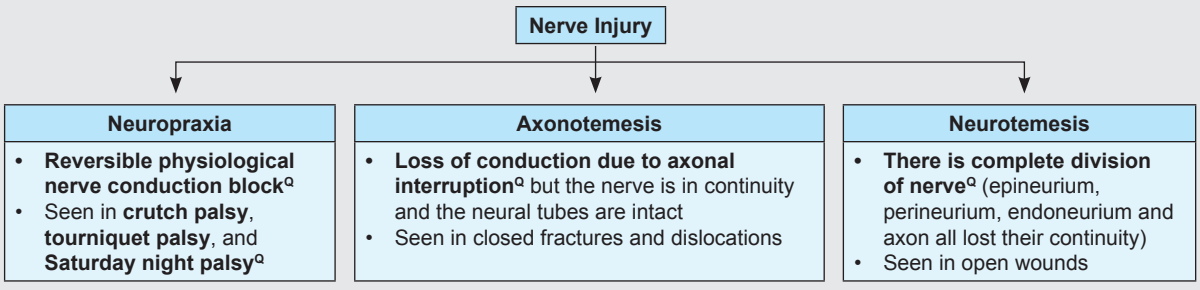
115. Ans. b. Median and sciatic *(Ref: Schwartz 7/e p1906)*

116. Ans. d. Pregnancy

117. Ans. c. Addison's disease

NERVE INJURIES

118. Ans. d. Regeneration of nerves *(Ref: Schwartz 10/e p1798-1799,1805, 9/e p1532; Bailey 25/e p355)*



Nerve Repair

- A **clean cut nerve** is **best repaired as soon as** this **can be done safely**[Q].

- The **higher (proximal)** the **lesion,** the **worse the prognosis**Q.
- Pure motor or pure sensory nerves recover better than mixed, because there is less chances of axonal confusion.

- **Tinel's sign** indicate **regeneration of nerve**Q.
- **Rate of regeneration of nerve** is **1 mm/day**Q.

Prognosis after Nerve Suturing

- **Radial nerve (best)**Q **>Median nerve >Ulnar nerve >Peroneal nerve >Sciatic and femoral nerve (worst prognosis)**Q

119. Ans. b. Polio

120. Ans. e. When wound is free from infection

121. Ans. d. 5th and 6th cervical nerves

122. Ans. d. 4 hours

MISCELLANEOUS

123. Ans. a. Brain parenchyma

124. Ans. b. Cervicodorsal sympathectomy *(Ref: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1468385/)*

Nerve of Kuntz

- **Nerve of Kuntz: Thoracic origin** of a **sympathetic supply to** the **upper limb**Q
- An **inconstant intrathoracic ramus** which joined the 2nd intercostal nerve to the ventral ramus of the 1st thoracic nerve, proximal to the point where the latter gave a large branch to the brachial plexus, has become known as the 'nerve of Kuntz'
- These **variant sympathetic pathways** may be **responsible for** the **recurrence of symptoms after sympathectomy surgery**Q.

125. Ans. b. Congenital syphilis

126. Ans. c. Echinococcosis

127. Ans. c. Decreased pH of CSF

128. Ans. a. Multiple sclerosis

129. Ans. d. Wilm's tumour

130. Ans. a. Diabetes mellitus

131. Ans. a. Congenital megacolon, b. Albinism

Defective migration of neural crest results in Hirschprung's disease (congenital megacolon), albinism, melanoma and oropharyngeal teratoma.

132. Ans. c. Eversion of galea aponeurotica *(Ref: en.wikipedia.org/wiki/Galea_aponeurotica)*

Eversion of the Galea Aponeurotica

- **Eversion of the galea aponeurotica** in other words known as **suturing the scalp** wherein the galea will automatically get eversed, is the best way to control the bleeding from scalp.
- Blood vessels in the scalp will not be able to contract and retract due to its firm attachment to galeal fibres. So they bleed profusely until the galea are approximated.

133. Ans. c. Arteriovenous malformation

- **Diagnosis of AVM** is made **by conventional catheter cerebral angiography**Q
- **Diagnosis** is based on **demonstration of arteries** and **veins** on the same conventional angiographic image, proving the **high-flow shunting of blood (leading to early filling of veins**Q**)** through the **nidus network** or **fistulous vessels**.
- In the **typical AVM**, there is a **cloudlike nidus**, or **network of smaller vessels**, well seen **on angiography**.

134. Ans. b. Temporal lobe *(Ref: Harrison 18/e p3298; Sabiston 19/e p1904; Schwartz 10/e p1746-1747, 9/e p1551)*

Neurosurgical Treatment of Epilepsy

- The **most common surgical procedures** performed **for epilepsy** are **anterior temporal lobectomy**Q, **focal cortical resection, multiple subpial transection, hemispherectomy**, and **corpus callosotomy.**

135. Ans. a. Fracture of orbit

136. Ans. c. Transtentorial herniation *(Ref: Harrison 18/e p2248; Bailey 25/e p624)*

Kernohan's Notch Phenomenon

- **Kernohan's notch** is a **cerebral peduncle indentation** associated with some forms of **transtentorial herniation (uncal herniation)**Q.
- **Compression of** the **contralateral cerebral peduncle** against the **free edge of** the **tentorium** (**Kernohan's notch**) causes an **ipsilateral hemiparesis** with **ipsilateral 3rd nerve palsy**Q.

Kernohan-Woltman sign

- **Lateral displacement of** the **midbrain** may **compress** the **opposite cerebral peduncle**, producing a **Babinski's sign** and **hemiparesis contralateral to** the **original hemiparesis** (the **Kernohan-Woltman sign**Q).

137. Ans. c. Constricted pupil

138. Ans. c. Vein of Galen malformation *(Ref: Sabiston 19/e p1876)*

Diagnosis of **Vein of Galen malformation** should be suspected in any **newborn** presenting **with unexplained congestive heart failure** and **hydrocephalus.**

- **Vein of Galen** is **formed by** the confluence of the **two internal cerebral veins** and receives the **entire deep venous drainage** of the **cerebrum**.
- Vein of Galen then **joins the inferior saggital sinus** and **empties** the **venous drainage into** the **straight sinus.**

Vein of Galen Malformation

- Vein of Galen malformation is characterized by **aneurysmal dilatation** and **arteriovenous malformation** of Galen[Q].
- **Most commonly presents in** the **neonatal period**[Q]

Clinical Features

- **High output failure, bounding carotid pulse, hydrocephalus**[Q]
- Increased intra-cranial pressure, intraventricular hemorrhage from rupture.
- **Cerebral ischemia** from **intracranial 'steal' phenomenon** and **CHF**[Q]**.**
- **Marked continuous cranial bruit**[Q]

Diagnosis

- **Cranial ultrasonography: Initial investigation of choice**[Q]
- MRI and Angiography: Used to define the lesion better

CHAPTER 34

CNS Tumors

MULTIPLE CHOICE QUESTIONS

CNS TUMORS PREDISPOSING FACTORS

1. **All of the following hereditary conditions predispose to CNS tumors, except:** *(DPG 2010, AIIMS 2005)*
   a. Neurofibromatosis 1 and 2
   b. Tuberous sclerosis
   c. Von-Hippel-Lindau syndrome
   d. Xeroderma pigmentosum

2. **All of the following statements about Neurofibromatosis are true, except:** *(All India 2009)*
   a. Autosomal recessive inheritance
   b. Cutaneous neurofibromas
   c. Cataract
   d. Scoliosis

3. **Which of the following is the most common tumor associated with type-1 neurofibromatosis?** *(AIIMS Nov 2007, May 2003)*
   a. Optic nerve glioma
   b. Meningioma
   c. Acoustic schwannoma
   d. Low grade astrocytoma

4. **Neurofibromatosis type-2 is associated with:** *(PGI Dec 2000)*
   a. Bilateral acoustic schwannoma
   b. Multiple care-au-lait spots
   c. Chromosome-22
   d. Lisch nodule
   e. Posterior subcapsular lenticular cataract

5. **Widened neural foramina is frequently seen in:** *(All India 2012)*
   a. Neurofibromatosis
   b. Tuberous sclerosis
   c. Sturge-Weber syndrome
   d. Klippel-Fiel syndrome

6. **All of the following may be associated with Von-Hippel Lindau syndrome, except:** *(All India 2009)*
   a. Retinal and cerebella hemangioblastomas
   b. Gastric carcinoma
   c. Pheochromocytoma
   d. Renal cell carcinoma

7. **In Von-Hippel Lindau syndrome, the retinal vascular tumours are often associated with intracranial hemangioblastoma. Which one of the following regions is associated with such vascular abnormalities in this syndrome?** *(All India 2005)*
   a. Optic radiation
   b. Optic tract
   c. Cerebellum
   d. Pulvinar

8. **Which of the following statement about VHL syndrome is true?** *(All India 2012)*
   a. Multiple tumors are rarely seen
   b. Craniospinal hemangioblastoma are common
   c. Supratentorial tumors are common
   d. Tumors of Schwann cells are common

9. **Neurofibromatosis-2 is/are associated with:** *(PGI Nov 2011)*
   a. Meningioma
   b. Schwannoma
   c. Glioma
   d. Lisch nodule
   e. Hearing loss

10. **A child presents to the clinic with history of seizures and mental retardation. Clinical examination reveals multiple hypopigmented macules. What is the likely diagnosis?** *(All India 2010)*
    a. Tuberous Sclerosis
    b. Neurofibromatosis
    c. Sturge Weber Syndrome
    d. Linear epidermal nevus syndrome

11. **The diagnosis of a patient presenting with seizures, mental retardation and sebaceous adenoma is:** *(All India 95)*
    a. Hypothyroidism
    b. Tuberous sclerosis
    c. Toxoplasmosis
    d. Down syndrome

12. **Triad of tuberous sclerosis includes all, except:** *(All India 2009)*
    a. Epilepsy
    b. Adenoma sebacium
    c. Low intelligence
    d. Hydrocephalus

13. **Adenoma sebacium is a feature of:** *(AIIMS 2005)*
    a. Neurofibromatosis
    b. Tuberous sclerosis
    c. Xanthomatosis
    d. Incontinentia pigmenti

14. **CNS tumor seen in Von Hippel Lindau syndrome is:**
    a. Meningioma *(PGI Dec 99)*
    b. Cerebellar hemangioblastoma
    c. CNS lymphoma
    d. Glioma

15. **Neurofibromatosis is associated with:** *(PGI Dec 98)*
    a. Papillary carcinoma
    b. Islet cell tumour
    c. Pheochromocytoma
    d. Glucagonoma

16. **Plexiform neurofibromatosis commonly affects:** *(JIPMER 87)*
    a. Facial nerve
    b. Trigeminal nerve
    c. Peripheral nerve
    d. Glossopharyngeal nerve

17. **Musculoskeletal abnormality in neurofibromatosis is:**
    a. Hypertrophy of limb
    b. Scoliosis *(PGI 86)*
    c. Café au lait spots
    d. Pseudo arthrosis
    e. All

18. **Neurofibromatosis presents as all of the following except:**
    a. Elephantiasis neuromatosa *(UPSC 2001)*
    b. Plexiform neuroma
    c. Von Recklinghausen's disease
    d. Lymphadenovarix

19. **Brain tumor is associated with all except:** *(PGI Dec 99)*
    a. Tuberous sclerosis
    b. Von Hippel landau syndrome
    c. Neurofibromatosis
    d. Sturge-Weber syndrome

20. **What is not a feature of Sturge-Weber syndrome?**
    a. Rail track appearance
    b. Hemiatrophy of the brain
    c. Convulsion
    d. Empty sella

CNS TUMORS: CLINICAL FEATURES AND TREATMENT

21. A 55-years old female presents with grade I Ependymoma extending from C7-T1 with no neural defect. Surgery is done, next management is: *(DPG 2008)*
a. Post-op chemotherapy
b. Post-op chemoradiation
c. Imaging, regular follow up, chemotherapy if required
d. Imaging, regular follow up, radiotherapy if required

22. Psychiatrics symptoms, true except: *(PGI 2000)*
a. More common with supra than infra tentorial tumors
b. More common with slow growing
c. More with temporal than frontal lobe tumours
d. More with brain stem lesions

23. Which of the following tumor is not known to increase in pregnancy? *(All India 2006)*
a. Glioma b. Pituitary adenoma
c. Meningioma d. Neurofibroma

24. Which one of the following tumors shows calcification on CT scan? *(All India 2005)*
a. Ependymoma b. Medulloblastoma
c. Meningioma d. CNS lymphoma

25. Stereotactic radiosurgery is done for: *(JIPMER 2002)*
a. Glioblastoma multiforme
b. Medulloblastoma spinal cord
c. Ependymoma
d. AV malformation of brain

26. Which of the following brain tumors doesn't spread via CSF? *(DPG 2011, All India 2004)*
a. Germ cell tumor b. Medulloblastoma
c. CNS Lymphoma d. Craniopharyngioma

27. The characteristic feature of a frontal lobe tumor is: *(All India 94)*
a. Abnormal gait b. Aphasia
c. Distractibility d. Antisocial behavior

28. Prophylactic craniospinal irradiation is recommended in:
a. Gemistocytic astrocytoma *(PGI 2007)*
b. Posterior fossa ependymoma
c. Meningioma
d. Medulloblastoma

29. All of the following tumors may be malignant except: *(All India 97)*
a. Glioma b. Astrocytoma
c. Hemangioblastoma d. Ependymoma

30. The CNS tumor present with calcification: *(PGI June 99)*
a. Oligodendroglioma b. Astrocytoma
c. Medulloblastoma d. Pheochromocytoma

31. Lowest incidence of cerebral tumours is seen in: *(AIIMS 85)*
a. Occipital b. Frontal
c. Temporal d. Parietal

32. Cerebellar hemangioblastoma and retinal tumours are seen in: *(JIMPER 2012)*
a. VHL syndrome b. NF-1
c. Tuberous selerosis d. NF-2

BRAIN METASTASIS

33. Which of the following carcinoma most frequently metastasizes to brain? *(AIIMS 2005)*
a. Small cell carcinoma lung b. Prostate cancer
c. Rectal carcinoma d. Endometrial cancer

34. Most common site of brain metastasis: *(DNB 2011)*
a. Brainstem b. Cerebellum
c. Cerebral cortex d. Thalamous

ASTROCYTOMA

35. Which of the following is the most common type of glial tumors? *(All India 2006)*
a. Astrocytomas b. Medulloblastomas
c. Neurofibromas d. Ependymomas

36 In children most common posterior fossa tumour is: *(AIIMS Dec 95)*
a. Meningiomas b. Astrocytoma
c. Medulloblastoma d. Glioblastoma multiforme

37. Glioblastoma multiforme may occur in the following except: *(DPG 93)*
a. Cerebrum of adult b. Brain stem of child
c. Spinal cord of adult d. Adrenal medulla of child

38. Which of the following brain tumors is highly vascular in nature? *(AIIMS May 2006)*
a. Glioblastoma b. Meningiomas
c. CP angle epidermoid d. Pituitary adenomas

39. Most common intracranial neoplasm in adults is: *(AIIMS May 93, May 94)*
a. Meningioma b. Astrocytoma
c. Posterior fossa tumor d. Ganglioneuroma

40. Which of the following statements about cerebellar astrocytomas in pediatric age group is false? *(All India 2008)*
a. These are usually low grade tumors
b. These are more commonly seen in the 1st and 2nd decades
c. These tumors have a good prognosis
d. These tumors are more common in females

41. Most common site of sub ependymal astrocytoma (Giant cell): *(AIIMS Nov 2007)*
a. Trigone of lateral ventricle
b. Foramen of Monro
c. Temporal horn of lateral ventricle
d. 4th ventricle

42. Glioblastoma multiforme is a variant of: *(COMEDK 2005)*
a. Medulloblastoma b. Meningioma
c. Astrocytoma d. Neuroblastoma

43. All are true regarding pilocytic astrocytoma, except:
a. Seen in elderly above 80 years *(AIIMS May 2009)*
b. Seen in posterior fossa
c. Good prognosis
d. Most common primary brain tumor in children

44. A child present with raised ICT. On CT scan, a lesion is seen around foramen of Monroe and multiple periventricular calcific foci. What is the most probable diagnosis?
a. Central neurocytoma *(AIIMS Nov 2011)*
b. Ependymoma
c. Subependymal giant cell astrocytoma
d. Ganglioganglioma

MEDULLOBLASTOMA

45. Which of the following is true about medulloblastoma?
a. Radiosensitive tumor *(PGI Dec 2005)*
b. Spreads through CSF
c. Surgical treatment is not done
d. Occurs in young age group
e. It is a supratentorial tumor

46. Chang staging is used for? *(AIIMS May 2010)*
a. Retinoblastoma b. Medulloblastoma
c. Ewing's sarcoma d. Rhabdomyosarcoma

47. Long term effect of craniospinal irradiation for medulloblastoma is: *(JIPMER 2011)*
a. Secondary malignancy
b. Neuro endocrine abnormalities
c. Neurocognitive effects
d. Hearing loss

48. Most radiosensitive brain tumor is: *(AIIMS Sept 96)*
a. Ependymoma
b. Medulloblastoma
c. Glioblastoma multiforme
d. Astrocytoma

49. True about medulloblastoma is: *(AIIMS Nov 95)*
a. Highly radiosensitive
b. Surgery is the only treatment
c. Occurs in adult age group
d. Chemotherapy is useful

MENINGIOMA

50. A 45-years old female complains of progressive lower limb weakness, spasticity, urinary hesitancy. MRI shows intradural enhancing mass lesion. Most likely diagnosis is: *(AIIMS Nov 2011, Nov 2006, All India 2007)*
a. Dermoid cyst b. Intradural lipoma
c. Neuroepithelial cyst d. Meningioma

51. Radiological features of meningioma: *(PGI 2009)*
a. Calcification b. Erosion
c. Sutural diastasis d. Osteosclerosis
e. Vascular erosion

52. A 48-years old woman comes with bilateral progressive weakness of both lower limbs, spasticity and mild impairment of respiratory movements. MRI shows an intradural mid-dorsal midline enhancing lesion. What is the diagnosis? *(AIIMS May 2010)*
a. Intradural lipoma b. Meningioma
c. Neuroenteric cyst d. Dermoid cyst

53. Best prognosis among following is seen in: *(DNB 2007)*
a. Astrocytoma b. Oligodendroglioma
c. Meningioma d. Medulloblastoma

54. Extra-axial intracranial lesion showing contrast enhancement on MRI: *(All India 2012)*
a. Meningioma b. Ependymoma
c. Arachnoid cyst d. Astrocytoma

55. A lady had meningioma with inflammatory edematous lesion. She was planned for surgery. Junior resident mistake in writing pre-op notes is: *(AIIMS May 2012)*
a. Stop steroids b. Wash head with shampoo
c. Antibiotic sensitivity d. Continue antiepileptics

CRANIOPHARYNGIOMA

56. Suprasellar calcification with polyuria seen in:
a. Langerhan cell histocytosis *(PGI Dec 2002)*
b. Medulloblastoma
c. Pinealoma
d. Craniopharyngioma
e. Astrocytoma

57. A 6-years old boy has been complaining of headache, ignoring to see the objects on the sides for four months. On examination, he is not mentally retarded, his grades at school are good, and visual acuity is diminished in both the eyes. Visual charting showed significant field defect. CT scan of the head showed suprasellar mass with calcification. Which of the following is the most probable diagnosis? *(AIIMS Nov 2004, 2005)*
a. Astrocytoma b. Craniopharyngioma
c. Pituitary adenoma d. Meningioma

58. A six year old child managed by complete surgical removal of craniopharyngioma developed multiple endocrinopathies. Which of following hormones should be replaced first? *(All India 2011)*
a. Hydrocortisone b. Growth Hormone
c. Thyroxine d. Prolactin

59. Which of the following is the most common cause of a mixed cystic and solid suprasellar mass seen on cranial MR scan of a 10 years old child? *(AIIMS 2005)*
a. Pituitary adenoma b. Craniopharyngioma
c. Optic chiasmal glioma d. Germinoma

60. All the following are true of craniopharyngioma except: *(All India 94)*
a. Derived from Rathke's pouch
b. Contains epithelial cells
c. Present in sella or infra-sellar location
d. Causes visual disturbances

PITUITARY ADENOMA

61. Which of the following is true about pituitary adenoma?
a. Accounts for 10% of brain tumors *(PGI Dec 2005)*
b. Erodes the sellar and extends into surrounding area
c. Prolactinoma is least common
d. It is differentiated by reticulin stain

62. The most preferred approach for pituitary surgery at the present time is: *(All India 2006)*
a. Transcranial b. Transethmoidal
c. Transphenoidal d. Transcallosal

63. A 35 years old female with amenorrhea, galactorrhea has bitemporal hemianopia. The most probable diagnosis is:
a. GnRH adenoma *(JIPMER 2010)*
b. Sellar chordoma
c. Craniopharyngioma
d. Prolactin secreting pituitary microadenoma

64. A 30 years old male complains of loss of erection; he has low testosterone and high prolactin level in blood; what is the likely diagnosis? *(All India 2001)*
a. Pituitary adenoma b. Testicular failure
c. Craniopharyngioma d. Cushing's syndrome

65. Most common cause of hypersecreting pituitary tumour is: *(DNB 2009)*
a. Pituitary adenoma
b. Pituitary carcinoma
c. Autoimmue disease of pituitary
d. Transection of stalk

SPINAL TUMORS

66. The commonest extradural spinal tumour is: *(NIMHANS 86)*
a. Neurofibroma b. Glioma
c. Meningioma d. Metastasis

67. Commonest spinal tumour is: *(SCTIMS 98)*
a. Meningioma b. Ependymoma
c. Neurofibroma d. Neuroblastomas

68. Most common location of spinal tumors: *(AIIMS Nov 2007)*
a. Intramedullary
b. Intradural extramedullary
c. Extradural
d. Equally distributed

CNS LYMPHOMA

69. True about primary CNS lymphoma: *(PGI 2009)*
a. Reticulin staining done
b. Essentially B-cell type
c. Associated with EBV
d. Indolent disease with good prognosis
e. Chemotherapy highly effective

70. All are true regarding Primary CNS lymphoma except:
a. Radiotherapy and chemotherapy is of no value
b. Occurs in AIDS patients *(AIIMS Feb 97)*
c. Commonly occurs in immune-compromised persons
d. EBV may be a cause

SCHWANNOMA AND NEUROFIBROMA

71. Dumbbell tumor is seen in: *(GB Pant 2011)*
a. Meningioma
b. Neurofibroma
c. Ependymoma
d. Thymoma

72. Vestibular schwannoma arises most frequently from: *(All India 2011)*
a. Superior vestibular nerve
b. Inferior vestibular nerve
c. Cochlear nerve
d. Facial nerve

MISCELLANEOUS

73. Commonest orbital tumour causing exophthalmos is:
a. Glioma
b. Meningioma *(AIIMS 87)*
c. Hemangioma
d. Neuroblastoma

74. Which of the following is primary neurogenic tumour? *(JIPMER 90)*
a. Meningioma
b. Glioblastoma
c. Acoustic neuroma
d. Neuroblastoma

75. Witzelsucht syndrome (i.e. "Pathological Joking") is seen in: *(JIPMER 88, All India 90)*
a. Frontal lobe tumours
b. Parietal lobe tumours
c. Temporal lobe tumours
d. Intra Ventricular tumours

76. MRI is the investigation of choice in all of the following except: *(COMEDK 2007, 2004)*
a. Syringomyelia
b. Brain stem tumors
c. Skull bone tumors
d. Multiple sclerosis

77. All of the following are neuronal tumors, except: *(All India 2011)*
a. Gangliocytoma
b. Ganglioglioma
c. Neurocytoma
d. Ependymoma

78. A 20-years female patient with 6th cranial nerve palsy on T2 weighted MRI shows a hyperintense lesion in cavernous sinus which shows homogenous contrast enhancement. Most probable diagnosis is: *(AIIMS Nov 2010)*
a. Schwannoma
b. Meningioma
c. Cavernous sinus hemangioma
d. Astrocytoma

79. Imaging modality of choice for detecting radiation induced cerebral necrosis: *(AIIMS Nov 2009, 2005)*
a. PET scan
b. Biopsy
c. MRI
d. CT

80. Not a neuroglial tumor: *(Kerala 95)*
a. Shwannoma
b. Astrocytoma
c. Medulloblastoma
d. Ependymoma

81. Investigation of choice for leptomeningeal carcinomatosis:
a. PET Scan
b. SPECT *(AIIMS Nov 2011)*
c. Gd enhanced MRI
d. CT scan

82. A patient was diagnosed with intracranial cavernous angioma on MRI. MRI finding chracteristic of this lesion is: *(AIIMS Nov 2011)*
a. Well defined nidus
b. Definite arterial feeders
c. Phlebectasis
d. Popcorn like lesion

83. All of the following are true about long terms sequel of cranio spinal radiothreapy for children with CNS tumors except:
a. Neurocognitive dysfunction *(All India 2012)*
b. Endocrinologic dysfunction
c. Musculoskeletan hypoplasia
d. Neuropscychological sequel are independent of radiation dose

84. Enlargement of pituitary tumour after adrenalectomy is called as: *(DNB 2009)*
a. Nelson syndrome
b. Steel-Richardson syndrome
c. Hamman-Rich syndrome
d. Job's syndrome

85. Stereotactic surgery is used for treatment of: *(AIIMS Nov 2012)*
a. Brain tumor
b. Lungs carcinoma
c. Cervix cancer
d. Renal carcinoma

86. Highly vascular tumor of brain and spinal cord in adults: *(AIIMS May 2013)*
a. Metastasis
b. Pilocytic astrocytoma
c. Hemangioblastoma
d. Cavernous malformation

EXPLANATIONS

CNS TUMORS PREDISPOSING FACTORS

1. **Ans. d. Xeroderma pigmentosum** *(Ref: Harrison 18/e p3384; Bailey 26/e p612, 25/e p631)*

Hereditary syndromes associated with Brain tumours		
Syndrome	**Gene** (locus)	**CNS neoplasm**
• **von Hippel-Lindau**	VHL **(3p)**Q	**Hemangioblastoma** of retina, cerebellum, and spinal cord; pheochromocytomaQ
• Li-Fraumeni	p53 **(17p)**Q	Malignant glioma
• Retinoblastoma	Rb **(13q)**Q	Retinoblastoma, pineoblastoma, malignant gliomaQ
• **Neurofibromatosis type 1** (Von Recklinghausen's disease)	NF1 **(17q)**Q	Neuroma, Schwannoma, meningioma, optic gliomaQ
• **MEN 1** (Wermer syndrome)	MEN1 **(11q)**Q	Pituitary adenoma, **malignant schwannomaQ**
• Turcot's syndrome	APC **(5q)**Q	**Medulloblastoma, malignant gliomaQ**
• **Gorlin** (basal cell nevus)	PTCH **(9q)**	Medulloblastoma
• **Tuberous sclerosis**	TSC1 **(9q)**	
	TSC2 **(16p)**	**AstrocytomaQ**
• **Neurofibromatosis 2**	NF2 **(22q)**Q	**Schwannoma, glioma, ependymomaQ**

2. **Ans. a. Autosomal recessive inheritance** *(Ref: Harrison 18/e p3389-3390; Sabiston 19/e p705; Schwartz 10/e p677, 1468, 9/e p1285; Bailey 26/e p612, 25/e p631, 597)*

Neurofibromatosis

Neurofibromatosis-1	Neurofibromatosis-2
• Also known as **peripheral** neurofibromatosis or **von-Recklinghausen's syndromeQ** • **Most prevalent** type (**90%**Q) • **NF-1 gene**: Chromosome **17**Q • **Autosomal dominant**Q • **Diagnostic Criteria for NF-1** (Diagnosed when **any two** of the following are present): 1. **≥6 *café-au-lait* maculesQ** >5 mm in greatest diameter in prepubertal individuals and >15mm in greatest diameter in post-pubertal individuals. 2. **Axillary** or **inguinal freckling**Q 3. **≥2 iris Lisch nodules**Q 4. **≥2 neurofibromas** or **one plexiform neurofibroma**Q 5. Sphenoid dysplasia or cortical thinning of long bone, with or without pseudoarthrosis 6. **Optic gliomas**Q 7. A **first degree relative** with NF-1 whose diagnosis was based on the aforementioned criteria.	• Also known as **central** neurofibromatosis or **bilateral acoustic neurofibromatosis**Q • Less prevalent (10%) • **NF-2 gene**: Chromosome **22**Q • **Autosomal dominant**Q • **Diagnostic Criteria for NF-2**Q (Diagnosed when **any one** of the following is present): 1. **Bilateral 8th nerve masses** consistent with **acoustic neuromas**Q 2. A parent, sibling, or child with NF-2 and either 3. **Unilateral 8th nerve mass** or **any two** of the following: - **Neurofibroma**Q - **Meningioma**Q - **Glioma**Q - **Schwannoma**Q • Bilateral acoustic neuromas are the most distinctive tumors in patients with NF-2Q.

3. **Ans. a. Optic nerve glioma**
4. **Ans. a. Bilateral acoustic schwannoma, c. Chromosome -22, e. Posterior subcapsular lenticular cataract**
5. **Ans. a. Neurofibromatosis** (Ref: Differential Diagnosis in Conventional Radiology (Thieme) 2007/260)
   - **Widened neural foramina (wide intervertebral foramina)** are frequently associated with **NF-1**Q.

6. **Ans. b. Gastric carcinoma** *(Ref: Harrison 18/e p3384; Sabiston 19/e p705; Schwartz 9/e p247; Bailey 25/e p95)*

Von Hippel Lindau Syndrome (AD)	
Characteristic Tumors/Cysts	**Other tumors/Cysts**
• **Hemangioblastomas:** – **Cerebellar** hemangioblastoma[Q] – **Retinal** hemangioblastoma[Q] – **Spinal** hemangioblastoma[Q]	• **RCC**[Q] • **Pheochromocytoma**[Q] • Pancreatic endocrine tumors • Adrenal carcinomas • **Benign cysts** in **kidney, epididymis, liver** or **pancreas**[Q]

- **Polycythemia** is a **characteristic feature in VHL** due to **erythropoietin production** by **hemangioblastoma** and/or **RCC**[Q].

7. **c. Cerebellum**
8. **Ans. b. Craniospinal hemangioblastoma are common**
9. **Ans. a. Meningioma, b. Schwannoma, c. Glioma, e. Hearing loss**
10. **Ans. a. Tuberous Sclerosis** *(Ref: Roxburgh's 17/e p201; Harrison 18/e p3390)*

TUBEROUS SCLEROSIS / EPILOIA / BOURNEVILLE'S DISEASE

Skin lesion	Neurological	Benign Neoplasm
• **Adenoma sebacium**[Q] (facial angiofibroma) • **Ash leaf** shaped hypopigmentd **macules**[Q] • **Shagreen Patch**[Q]- yellow thickening of lumbosacral skin • Depigmented nevi	• **Seizure**[Q] • **Mental retardation**[Q] • **Subependymal nodules**[Q] which may calcify • **Hydrocephalus**[Q]	• **Rhabdomyoma**[Q] • **Angiomyoma**[Q] of liver, kidney, pancreas etc. • **Ependymoma**[Q] • **Astrocytoma**[Q]

11. **Ans. b. Tuberous sclerosis**
12. **Ans. d. Hydrocephalus**
13. **Ans. b. Tuberous sclerosis**
14. **Ans. b. Cerebellar hemangioblastoma**
15. **Ans. c. Pheochromocytoma**
16. **Ans. b. Trigeminal nerve**
17. **Ans. e. All**
18. **Ans. d. Lymphadenovarix**

- Elephantiasis neuromatosa is the most impressive manifestation of NF-1.

19. **Ans. d. Sturge-Weber syndrome**
20. **Ans. d. Empty sella** *(Ref: Bailey 26/e p599, 25/e p618)*

Sturge-Weber syndrome / Encephalotrigeminal syndrome

- Usually sporadic, characterized by:
  - Large unilateral cutaneous angioma[Q] **(port-wine stain)**
  - **Angiomas** in brain involving **ipsilateral cerebral hemisphere** and **meninges**
  - **Focal seizures**[Q] typically occurs **opposite to the side of lesion**[Q]
  - **Adrenal pheochromocytoma**
  - Cerebral angiomas lead to **cortical atrophy**[Q]
    - Angiomas are visible radiologically as **Tram-track** or **rail track calcification** mainly in **occipital region**[Q]

CNS TUMORS CLINICAL FEATURES AND TREATMENT

21. **Ans. d. Imaging, regular follow up, radiotherapy if required** *(Ref: Harrison 18/e p3387; Sabiston 19/e p1888; Schwartz 10/e p1734, 1738, 9/e p1540; Bailey 25/e p474)*
    - Harrison says **"**Following the gross total excision of an Ependymoma, the prognosis is excellent**.** The five year disease free survival is >80%. However, **many ependymoma cannot be totally excised,** and **postoperative focal external beam radiation** or **stereotactic radiosurgery is used."**

Ependymoma

- Arise from the **ependymal lining** of the **cerebral hemispheres** and remnants of the **central canal** of the **spinal cord**.
- Manifest predominantly in **children** (within the **fourth ventricle**) and **young adults**.

- **MC histologic type** in **adults: Myxopapillary ependymoma**[Q], which typically **arises from the filum terminale**[Q] of the spinal cord and appears in the **lumbosacral region**[Q].

Diagnosis

- **On CT or MRI**, ependymomas typically appear as **diffusely enhancing masses**[Q] relatively well demarcated from adjacent neural tissue.
- **MRI findings** include a **well-circumscribed** lesion with varying degrees of enhancement. **Ventricular** or **brainstem displacement** and **hydrocephalus** are frequent features.

Treatment

- Optimal treatment includes **maximal possible resection** without causing neurological deficits followed by **EBRT**.
- Ependymomas have the potential to **spread through** the **neuraxis** by **seeding** of the **CSF**; **craniospinal radiation**[Q] is recommended in this case.

22. Ans. b. More common with slow growing, c. More with temporal than frontal lobe tumours *(Ref: Kaplan and Sadock's Concise Textbook of Clinical **Psychiatry** (2008)/74)*

Psychiatric Symptoms in Brain Tumors

- **Mental changes** are likely to occur in patients with **supratentorial tumors**, and more commonly among patients with tumors of the **frontal** and **temporal lobes**.
  - **Psychiatric symptoms** are **more common in frontal lobe tumors**[Q].
  - **Depression**: **More common in frontal lobe tumors**[Q]
  - **Psychosis**: More common in **temporal lobe tumors**[Q]
- **Left sided frontal tumors** are more commonly associated with **akinesia** and **depression**, while **right sided lesions** are more often associated with **euphoria**.
- **Delirium** is most often a component of **rapidly growing**[Q], **large, or metastatic tumors**.

23. Ans. a. Glioma *(Ref: CGDT 9/e p429)*

- Although brain tumors are not specifically related to gestation, **meningiomas**, **angiomas**, and **neurofibromas** are thought to **grow more rapidly with pregnancy**[Q].

24. Ans. c. Meningioma *(Ref: Sutton Radiology 7/e p1739)*

- **Meningioma** range from **firm** and **fibrous to finely gritty** or they may be **extremely calcified** with **Psammoma bodies**[Q].
- **Calcification** is also **seen in ependymoma**, but **more common in meningioma**[Q].

25. Ans. d. AV malformation of brain *(Ref: Sabiston 19/e p1900-1902; Schwartz 10/e p1749, 9/e p1552-1553)*

Stereotactic Radiosurgery

- Stereotactic radiosurgery involves the delivery of a **concentrated dose of radiation to a defined volume** in the **brain**[Q].

Two methods of frame-based stereotactic radiosurgery are currently widely used.

- **Gamma knife uses cobalt-201**[Q] radiation sources focused on one point.
- **Modified linear accelerators**[Q] deliver the radiation dose in multiple arcs, thereby minimizing the effect on surrounding brain tissue.

- **Primary risks** of stereotactic radiosurgery are **radiation necrosis** and **radiation injury** to surrounding structures.

Common uses of Stereotactic Radiosurgery	
• **Metastatic tumors**	• **Arteriovenous malformations**[Q]
• Benign lesions of the cranial nerves	• **Trigeminal neuralgia**

26. Ans. d. Craniopharyngioma *(Ref: Harrison 18/e p3382-3388)*

Tumors that spread through CSF	
• **Medulloblastoma**[Q]	• Primitive neuroectodermal tumors
• **Pinealoblastomas**[Q]	• Anaplastic ependymomas
• **Germ cell tumors**[Q]	• Choroid plexus carcinoma
• **CNS Lymphomas**[Q]	

27 Ans. d. Antisocial behavior *(Ref: en.wikipedia.org/wiki/Witzelsucht)*

Frontal Lobe Tumors

- **Personality changes** are **common symptom** of frontal lobe tumor.
- **Frontal lobe controls behavior** and **judgment**[Q].
- Patients may be **socially disinhibited, display antisocial behavior**, shows **severe impairment of judgment, insight** and **foresight**[Q].

> - **Witzelsucht syndrome: Self amusement** from poor jokes and puns, also known as **pathological joking**, is seen in **frontal lobe tumors**[Q]

28. Ans. d. Medulloblastoma (Ref: Harrison 18/e p3388)

Prophylactic Craniospinal Irradiation

- Prophylactic craniospinal irradiation is useful in **CNS malignancy** which **disseminate via CSF** or any **malignancy** with **high risk** of **CNS spread**[Q].

Common Manifestations	Less Common Manifestation
• **Medulloblastoma**[Q] • **Glioblastoma**[Q] • **Germinoma**[Q] • **Small cell Ca of lung**[Q]	• **ALL**[Q] • **Non hodgkin's lymphoma**[Q] • **Leptomeningeal Rhabdomyosarcoma**[Q]

29. Ans. c. Hemangioblastoma *(Ref: Harrison 18/e p793; Sabiston 19/e p1888; Schwartz 10/e p1735-1736, 9/e p1541)*

Hemangioblastoma

- Hemangioblastoma represents the **MC primary intra-axial tumor** in the **adult posterior fossa**[Q]
- Occur almost **exclusively** in the **posterior fossa** (**cerebellum**[Q])
- **Solid** or **cystic** with a **mural nodule**[Q]

> - May occur sporadically, and **20%** of cases may be associated with **von Hippel-Lindau disease (hemangioblastomas, retinal angiomas, RCC, pheochromocytoma, renal** and **pancreatic cysts)**[Q].

Pathology

- Histologically **benign**[Q], and may be associated with **erythrocytosis**[Q].
- Appear as **cystic tumors** with an enhancing tumor on the cyst wall known as the **mural nodule**
- Pathology reveals **abundant thin-walled vascular channels**[Q]

Treatment

- **Surgical resection** is **curative** for sporadic (non-VHL associated) tumors[Q].
- **En-bloc resection** of the **mural nodule alone**, leaving the cyst wall, is **sufficient**[Q].

30. Ans. a. Oligodendroglioma *(Ref: Harrison 18/e p3386; Sabiston 19/e p1887; Schwartz 10/e p1733, 9/e p1539; Bailey 26/e p613, 25/e p632)*

Oligodendroglioma (ODG)

- **ODG** accounts for approximately **10%** of **gliomas**
- Predilection for the **cortex** and **white matter** of the **cerebral hemispheres** (**frontal lobe** in **50–65%**)
- **MC genetic alterations** include **loss of heterozygosity** on chromosome **19q >1p**[Q]. These alterations are usually associated with a **better prognosis**.

> - **Characterized by** classic histologic feature of **"fried egg" cytoplasm, "chicken wire" vasculature,** and **microscopic calcifications**[Q].

Clinical Features

- This tumor frequently presents with **seizures**

Diagnosis

- **Calcifications** and **hemorrhage** on CT or MRI **suggest** the **diagnosis**[Q].
- **Calcifications** is seen in **28-60%** in ODGs on **plain radiographs**, and on **90%** of **CT**[Q].

Treatment

- Primary modality of treatment: **Surgical resection + Chemotherapy**[Q]
- Respond to **p**rocarbazine, lomustine (**C**CNU), **v**incristine (**PCV**) **chemotherapy.**
- Chromosomal deletion, **1p** and **19q**, has been associated with **robust response** to **temozolomide**[Q].

Prognosis

- **Median survival time** ranges from **3–5 years**

31. **Ans. a. Occipital**

32. **Ans. a. VHL syndrome**

BRAIN METASTASIS

33. **Ans. a. Small cell carcinoma lung** *(Ref: Harrison 18/e p3390)*

Metastatic Brain Tumors

- **Metastatic brain tumors** are the **MC tumors** of the **brain**[Q].
- They outnumber primary brain tumors by **10 to 1.**
  - **Location: Cerebral hemispheres (80%)** mainly the **frontal lobes**[Q], cerebellum (**15%**) and brainstem (**5%**).
  - **MC primary sites: CA lung**[Q] **(50%) >breast cancer**[Q] **(15-20%)**
- Metastases to the brain are **multiple** in **>70%** of cases.

Diagnosis

- **IOC**: **MRI** with **gadolinium** enhancement[Q]
- Lesions are at the **gray-matter** and **white-matter junction**, **well circumscribed**, surrounded by **edema**[Q].

Treatment

- **Surgery** is recommended for accessible lesions (**up to 3**) causing mass effect followed by **whole-brain radiation therapy** (WBRT) **to eradicate micrometastases**[Q].
- **Stereotactic radiosurgery** followed by **WBRT** has also been shown to be as effective as surgery in the management of metastatic brain tumors (**<3 cm**).
- **Chemotherapy** is not useful in most brain metastases except **small cell lung cancer** and **seminomas**.

Prognosis

- **Median survival time** with optimal treatment: **7–12 months**

34. **Ans. c. Cerebral cortex**

ASTROCYTOMA

35. **Ans. a. Astrocytomas** *(Ref: Harrison 18/e p3384-3386; Sabiston 19/e p1886; Schwartz 10/e p1733, 1738-1739, 9/e p1539; Bailey 26/e p613, 25/e p632)*

Glioma

- **Astrocytoma (MC)**[Q]
- **Oligodendroglioma**[Q]
- **Ependymoma**[Q]
- **Astrocytoma** (type of glial tumor) is **MC primary brain tumor** in **both children** and **adults**[Q].
- **Astrocytoma** is mostly **supratentorial in adults** and **infratentorial in children**[Q]
  - **Astrocytoma is MC posterior fossa tumor in children**[Q]
- **Majority of astrocytomas** are **low-grade in children** and **high grade in adulthood**[Q].
- In **children**, **pilocytic astrocytoma** is **most common**[Q].
- In **adults**, **diffuse astrocytoma** is **most common**[Q].

36. **Ans. b. Astrocytoma**

37. **Ans. d. Adrenal medulla of child**

38. **Ans. a. Glioblastoma** *(Ref: Harrison 18/e p3384-3386; Osborn Neuroradiology (1994)/541, 591)*
    - Osborn says "**Glioblastoma** is **highly vascular,** sometimes so vascular that it **resembles an AV malformation on angiography**."

WHO Classification of Astrocytoma

Grade I or Pilocytic Astrocytoma	Low-grade, or grade II astrocytomas	Grade III or Anaplastic	Grade IV or Glioblastoma multiforme
• **Discrete** appearing, **contrast enhancing** and often **cystic** with a **mural nodule**[Q]. • **Mean age**: **First two decades** of life. • Curable by **radical resection**[Q] (no infiltration of surrounding brain) • **Radiation therapy** and **chemotherapy** have **no role** • **Median survival** time: **8-10 years**.	• Occur in **children** and **young adults**[Q]. • Most patients present with **seizures**[Q]. • Typically demonstrate **nuclear atypia**; have a **low degree of cellularity** • **Treatment: Observation** and follow-up, **radiation** with or without **chemotherapy**, and **surgery**. • **Surgery** is **not curative** because most of these tumors are **infiltrative** with **no clear margins**[Q]. • The **median survival** time is **7–8 years**.	• **Irregular enhancement** on **MRI** • **Treatment: Cytoreductive surgery** followed by **EBRT**[Q]. • **Median survival** time for anaplastic astrocytoma: **2–3 years**	• **MC primary brain tumor**[Q] • **Endothelial proliferation** or **necrosis**[Q] on histology makes the tumor **grade IV**. • Seen in **older patients** (**>50 years**). • GBMs: **Ring enhancement** with **central necrosis** on **MRI**[Q]. • **Treatment**: **Cytoreductive surgery** followed by **EBRT**[Q]. • The **extent of tumor resection** has a **significant effect** on time to tumor **progression** and median **survival**[Q]. • **Carmustine** and **cisplatin** have been the primary agents used against **malignant gliomas**[Q]. • **Temozolomide**[Q] has shown some promise in the management of **newly diagnosed** and **recurrent GBM**, with an overall survival time of 13.6 months. • **Median survival** time for **GBM** is **<1 year**.

Astrocytoma

- **Astrocytomas** arise from **astrocytes** and account for **50%** of **all primary brain tumors**[Q].
- **Astrocytomas** represent the **MC glioma** in **children**, representing 10% of cerebral and **85%** of **cerebellar astrocytomas**[Q].
- Majority of **astrocytomas infiltrate** adjacent **brain**. **Juvenile pilocytic astrocytomas** and **pleomorphic xanthoastrocytomas** are **exceptions**[Q].
  - Histologic features associated with higher grade include **hypercellularity, nuclear atypia**, and **endovascular hyperplasia.**
  - **Necrosis** is present **only with GBMs**; it is required for the diagnosis.

39. Ans. b. Astrocytoma

40. Ans. d. These tumors are more common in females *(Ref: Nelsons 18/e p2130, 2131)*

Cerebellar astrocytomas do not show any clear gender predilection and are **equally common** in **both males** and **females**.

Cerebellar Astrocytomas

- **MC astrocytomas in childhood** are **low grade astrocytomas**
- **Juvenile Pilocytic Astrocytoma** (JPA) is MC astrocytoma in children[Q]
- **Cerebellar astrocytomas (JPA) do not show** any **clear gender predeliction**[Q]
- **Cerebellar astrocytomas** (JPA) **most commonly** develop **during first two decades** of life
- **Cerebellar astrocytomas** have a **good prognosis**
- With **complete surgical resection** the **overall survival for JPA** approaches **80% - 100%**

41. Ans. b. Foramen of Monro *(Ref: Neurology in Clinical Practice 4/e p428; Sutton Radiology 7/e p1735)*

Subependymal Giant Cell astrocytoma

- **Most common site** of **subependymal giant cell astrocytoma** is the **ependymal wall of lateral ventricle near** the **foramen of Monro**[Q].
- Causes **obstruction at** the **foramen of Monro** leading to **ventricular enlargement** and **raised ICT.**
  - Presence of **multiple periventricular calcific foci (calcified subependymal nodules)** suggest the diagnosis of **Tuberous sclerosis** with **subependymal giant cell astrocytoma**[Q]

42. Ans. c. Astrocytoma

43. Ans. a. Seen in elderly above 80 years

44. Ans. c. Subependymal giant cell astrocytoma

MEDULLOBLASTOMA

45. Ans. a. Radiosensitive tumor, b. Spreads through CSF, d. Occurs in young age group *(Ref: Harrison 18/e p3388; Sabiston 19/e p1888; Schwartz 10/e p1734, 9/e p1540)*

Medulloblastoma

- **Highly malignant tumor** found in **cerebellum**[Q] and **infratentorial** location
- Occur predominantly in **children**[Q] (peak incidence at **3-4 years**[Q])
- **Medulloblastoma** is **most radiosensitive brain tumor**[Q]

• **MC site: Vermis** (75%)	• **MC site** in **adults: Lateral cerebellar hemisphere**

Clinical Characteristics

- **Child** usually presents with features of **increased intracranial tension**[Q].
- **Adults** present with **ataxia** and **unilateral dysmetria** as lateral origin is more common[Q].

Metastasis

- **Dissemination through CSF** is common leading to **drop metastasis**[Q].
- **Metastasis outside CNS**[Q] affects **bone, lymph node** and **liver.**
- **Tumor dissemination** is **most important prognostic factor**[Q]**.**

Treatment

- Despite of extreme radiosensitivity, it should be **surgically excised**[Q].
- Surgical excision should be **followed by radiotherapy** and **chemotherapy**[Q].

> • **(Carmustine BCNU)** and **vincristine** are **primarily used for recurrences**, in **poor-risk patients**, and in **children <3 years to avoid radiation therapy**[Q].

Prognosis

- Patients **without** a **residual tumor** and **negative CSF seeding** have **5-year survival rate >75%.**

46. Ans. b. Medulloblastoma

47. Ans. c. Neurocognitive effect *(Ref: www.ncbi.nlm.nih.gov/pubmed/9121399)*

Craniospinal Irradiation (CSI)

- **Hypothyroidism**: One of the **earliest late side effects of CSI** and **2nd MC** (**after GH disturbance**[Q])
- **Prevalence of hypothyroidism is 40–80% after CSI**[Q]
- Significantly increased risk of development of **benign thyroid nodules** and **papillary carcinoma of the thyroid** many years later[Q].

48. Ans. b. Medulloblastoma

49. Ans. a. Highly radiosensitive

MENINGIOMA

50. Ans. d. Meningioma *(Ref: Harrison 18/e p3388; Chapman 4/e p 431; Sabiston 19/e p1888-1889; Schwartz 10/e p1735,1738, 9/e p1540-1541; Bailey 26/e p614, 25/e p633)*

Meningioma

- **Meningiomas** are the **MC intracranial, extra-axial dural-based neoplasm**[Q].
- Predominantly benign tumors of **adults**[Q]**, more common** in **women**[Q]**.**

> • Derived from **meningomesothelial cells** of **arachnoid**[Q]
> • Mostly occur **along** the **superior sagittal sinus**[Q]
> • **Most** are **slow growing** and **encapsulated**[Q]

Pathology:

- **Round encapsulated mass** showing characteristic **enplaque pattern of growth**[Q]
- Tumor may range from firm to fibrous to finely gritty and may show extreme **calcification** and **psammoma bodies**[Q]

Clinical Presentation:

- **Motor deficit** in **90%** (spasticity and lower limb weakness), **sensory deficit** in **60%** or **sphincter dysfunction** of **bladder**[Q].

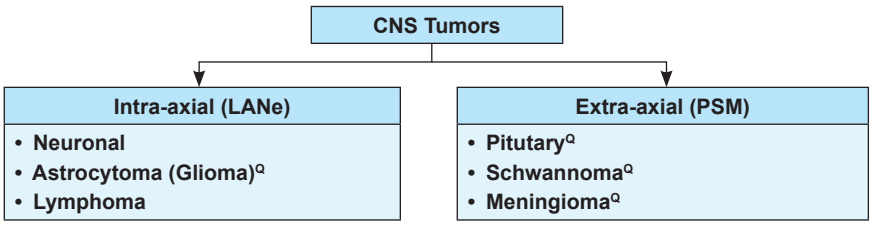
Radiological Findings in Meningioma	
• Nearly all meningiomas **enhance intensely**[Q] following contrast administration. • **Abnormal vascular markings**[Q] • **Enlarged foramen spinosum**[Q] on the side of lesion • **Dural tail** • **Calcification in the tumor**[Q]	• Invasion of bone cause localized **bony hyperostosis**/mixed osteoblastic and osteolytic response less commonly. It may show **'sun ray spicules'** and local bone expansion with pneumatization so called **'blistering'** • **Signs of increased intracranial tension**[Q]

Treatment:

- **Surgery** is the **treatment of choice** for **symptomatic meningiomas**.
- **Extent of resection** is the **most important factor** in the prevention of **recurrence**.
- **Recurrence** after gross total resection occurs in **11-15%** of cases.

51. Ans. a. Calcification, d. Osteosclerosis, e. Vascular erosion

52. Ans. b. Meningioma



53. Ans. c. Meningioma

- Meningioma is slow growing and encapsulated tumor having best prognosis among the given options.

54. Ans. a. Meningioma **55. Ans. a. Stop steroids**

- **Sudden withdrawal of steroids** may lead to **adrenal insufficiency,** particularly during period of stress such as surgery.

CRANIOPHARYNGIOMA

56. Ans. a. Craniopharyngioma *(Ref: Harrison 18/e p3389; Schwartz 10/e p1736-1737, 9/e p1542)*

Craniopharyngioma

- Craniopharyngiomas are **benign cystic lesions** that occur **most frequently** in **children**[Q].
- There is a **second peak** of incidence around **50 years** of age.
- Derived from **Rathke's pouch**[Q] and arise near the pituitary stalk, commonly extending into the suprasellar cistern.
  - Craniopharyngiomas are often **large, cystic**, and **locally invasive**[Q].

Clinical Features

- **More than half** of all patients present **before 20 years**[Q]
- Presents with signs of **increased intracranial pressure**[Q], including headache, vomiting, papilledema, and hydrocephalus.
- Associated symptoms include **visual field abnormalities**[Q], personality changes and cognitive deterioration, cranial nerve damage, sleep difficulties, and weight gain.
  - Associated with **hypopituitarism (90%)** and **diabetes insipidus (10%)** and **growth retardation (50%)**[Q]

Diagnosis

- **Calcification** occurs in **all pediatric** and roughly **half** of **adult** craniopharyngiomas[Q].
- **MRI** is superior to CT for **evaluating cystic structure** and **tissue components** of craniopharyngiomas[Q].
- **CT** is useful to define **calcifications** and evaluate **invasion** into surrounding **bony structures** and **sinuses**.

Treatment

- Treatment involves transcranial or **transsphenoidal**[Q] **surgical resection** followed by **postoperative radiation** of residual tumor.

- **Surgery alone** is **curative** in **less than half** of patients because of **recurrences** due to **adherence to vital structures** or because of **small tumor deposits in hypothalamus** or **brain parenchyma**Q.
- In the **absence** of **radiotherapy**, about **75%** of **craniopharyngiomas recur**, and 10-year survival is <50%Q.

- In patients with **incomplete resection, radiotherapy improves** 10-year **survival** to 70–90% but is associated with **increased risk** of **secondary malignancies**Q.
- Most patients require **lifelong pituitary hormone replacement**Q.

- **Cortisol (hydrocortisone)** is the **first hormone to be replaced**Q in patients with **panhypopituitarism after craniopharyngioma surgery.**

57. **Ans. a. Craniopharyngioma**
58. **Ans. a. Hydrocortisone**
59. **Ans. b. Craniopharyngioma**
60. **Ans. c. Present in sella or infra-sellar location**

PITUITARY ADENOMA

61. **Ans. a. Accounts for 10% of brain tumors, b. Erodes the sellar and extends into surrounding area, d. It is differentiated by reticulin stain** *(Ref: Harrison 18/e p2880; Sabiston 19/e p1890; Schwartz 10/e p1735, 9/e p1541; Bailey 26/e p614-616, 25/e p633)*

PITUITARY ADENOMA

- Pituitary adenomas arise primarily from the **anterior pituitary gland**Q
- **MC cause** of **hyperpituitarism: Pituitary adenoma**Q
- Classified as either **functional** (secreting) or **nonfunctional** (nonsecreting) tumors
- Former presenting **earlier with symptoms** caused **by physiologic effects** and the latter presenting when of **sufficient size** to cause **neurologic deficits** by **mass effect** on the **chiasm** with consequent **bitemporal hemianopsia**Q**.**
- Incidence is increased in **MEN-1**Q

- **Pituitary adenoma** can be **differentiated from hyperplasia by reticulin stain**Q
- **Absence of reticulin stain** in **pituitary adenoma**Q

Clinical Features

- Occur commonly in the **third** and **fourth decades** and affect **both sexes equally**Q**.**
- **MC functional tumor** is **prolactinoma**Q, which causes **amenorrhea** and **galactorrhea** in women.

Diagnosis

- **MRI** is **IOC for pituitary tumors**Q
- Typically, the **pituitary gland enhances rapidly** owing to lack of blood-brain barrier.
- **Microadenoma** may appear as a **nonenhancing area within the gland**.
- Diagnostic workup includes a **full endocrinologic profile** and a **formal visual fields test**Q.

Treatment

- **Dopamine agonist, bromocriptine**Q, can **shrink prolactinomas** in **75%** of patients with **macroadenomas** in **6-8 weeks**, but only as long as therapy is maintained.
- Bromocriptine may also work on **GH-secreting tumors** with tumor **shrinkage** in **<20%.**
- **Octreotide**Q can **reduce GH levels** in 71% of patients, with a **significant reduction** in tumor **volume** in **30%** of cases.

Indications of Surgery as an initial treatment	
• **GH-secreting tumors**Q • **Primary Cushing's disease**Q • Any **adenoma** causing **acute visual deterioration**Q	• **Nonprolactin-secreting macroadenomas** causing symptoms by **mass effect**Q

- **Surgical approach** of choice: **Sublabial** or **intranasal trans-sphenoidal**Q approach
- **Recurrence rate: 12%** (**most** recurrences occur **4-8 years after surgery**)
- **Radiosurgery** can also be used either as **primary therapy**, as an **adjuvant therapy** after subtotal resection, or **for recurrent disease**.
- The **main dose-limiting structure** is proximity to the **optic chiasm** and **optic nerves** (within 3-5 mm). In this case, **fractionated EBRT** may be indicated as an adjuvant therapy

- **MC suprasellar mass** in **children: Craniopharyngioma**Q
- **MC suprasellar mass** in **adults: Pituitary adenoma**Q

Cushing disease

- **Pituitary dependent cause** of **Cushing syndrome (pituitary adenoma** secreting **excessive ACTH)**

62. **Ans. c. Transphenoidal**
63. **Ans. d. Prolactin secreting pituitary microadenoma**
64. **Ans. a. Pituitary adenoma**
65. **Ans. a. Pituitary adenoma**

SPINAL TUMORS

66. **Ans. d. Metastasisc** *(Ref: Scott Atlas, MRI of the Brain and Spine 3rd/1742; Sabiston 19/e p1890; Schwartz 10/e p1737-1739, 9/e p1543-1544)*

Spinal Tumors

- **MC spinal tumor: Metastasis**Q
- **MC primary spinal tumor: Nerve sheath tumor**Q
- **MC intramedullary tumor: Astrocytoma**Q
- **MC site of primary spinal tumor: Intradural extramedullary**Q

67. **Ans. c. Neurofibroma**
68. **Ans. c. Extradural**

CNS LYMPHOMA

69. **Ans. a. Reticulin staining done, b. Essentially B-cell type, c. Associated with EBV** *(Ref: Harrison 18/e p3387-3388; Sabiston 19/e p1888; Schwartz 10/e p1736, 9/e p1542; Bailey 25/e p630)*

Primary CNS Lymphoma

- PCNSL is a rare **non-Hodgkin's lymphoma**Q accounting for **<3%** of primary brain tumors.
- The **incidence** is **rising** due to the **high frequency** of CNS lymphoma in **AIDS** patients and **transplant recipients**Q.

> - PCNSL in **immunocompetent patients** usually consists of **diffuse large B-cell lymphomas**Q**.**
> - PCNSL in **immunocompromised patients** is typically **large cell** with **immunoblastic** and more **aggressive features**Q**.**
> - Also known as **ghost-cell tumor** because of its tendency for **partial** to **complete resolution on CT** after the administration of **steroids**Q.

- **Epstein-Barr virus** frequently plays an **important role** in the pathogenesis of **HIV-related PCNSL**Q**.**
- A **stereotactic needle biopsy** is indicated when the index of suspicion for CNS lymphoma is high because these lesions are **highly sensitive** to **radiation**Q.

Clinical Features

- PCNSL usually presents as a **mass lesion**, with **neuropsychiatric symptoms**, symptoms of **increased intracranial pressure**, lateralizing signs, or **seizures**Q**.**
- Median age at diagnosis: **52 years** (younger in the immunocompromised).

Diagnosis

- On **contrast-enhanced MRI**: **Densely enhancing tumor**Q
- **Immunocompetent** patients have **solitary lesions** more often than immunosuppressed patients.
- Frequent **involvement** of the **basal ganglia, corpus callosum**, or **periventricular region**Q.
- **Stereotactic biopsy** is necessary for **histologic diagnosis**Q**.**

> - **Glucocorticoids** should be **withheld** before **biopsy** due to **cytolytic effect** on **lymphoma cells** leading to nondiagnostic tissue (**Ghost cell tumor**)Q

Treatment

- PCNSL is relatively sensitive to glucocorticoids, chemotherapy and radiotherapy.
- **High-dose methotrexate**Q produces **response rates** of **35-80%** and median survival up to 50 months.
- Combination of **methotrexate** with other chemotherapeutic agents such as **cytarabine**, as well as **whole-brain radiotherapy**, increases the **response rate** to **70–100%**Q**.**

> - In **non-AIDS cases**, **chemotherapy + EBRT** prolongs survival compared with EBRT alone.
> - **AIDS patients** are treated with **whole-brain radiotherapy, high-dose methotrexate,** and initiation of **highly active antiretroviral therapy**Q**.**

Prognosis

- **Without therapy**, median survival time is **1.8–3.3 months.**
- **With radiation**, median survival time is **10 months.**
- In **AIDS-related cases**, the median survival time is only **3–5 months.**

70. Ans. a. Radiotherapy and chemotherapy is of no value

SCHWANNOMA AND NEUROFIBROMA

71. Ans. b. Neurofibroma

- The term **"dumbbell"** lesion is used to describe **neurofibroma.**

72. Ans. a. Superior vestibular nerve *(Ref: Harrison 18/e p3388-3389; Sabiston 19/e p1889; Schwartz 9/e p1541; Bailey 26/e p616, 25/e p700)*

Acoustic Neuroma

- Acoustic neuroma is a **benign, encapsulated**, extremely **slow growing** tumor of **8th nerve.**
- **MC site of origin: Schwann cells superior vestibular nerve >Inferior vestibular (rarely cochlear)**Q
- Age group of **40-60 years**. (M:F=1:1)

Clinical features

- Presenting symptom: **Progressive unilateral sensorineural hearing loss**Q accompanied by **tinnitus**
- **Cochleo-vestibular symptoms** are the **earliest symptoms**Q**.**

Cranial nerve involvement		
V	VII	IX and X
• **Reduced corneal sensitivity** and **numbness of face**Q	• **Hypoasthesia** of **posterior meatal wall**Q • **Loss of taste**Q • **Decreased lacrimation**Q	• Dysphagia/**hoarseness**Q

- Brainstem involvement, Cerebellar involvement, Raised intracranial tension

Diagnosis

- **MRI with gadolinium contrast** is the **gold standard** for diagnosis of acoustic neuromaQ.

> - Acoustic neuroma **can arise from any nerve except Optic** and **Olfactory** because they are **myelinated by oligodendroglia** rather than Schwann cellsQ.

MISCELLANEOUS

73. Ans. a. Glioma **74. Ans. d. Neuroblastoma** **75. Ans. a. Frontal lobe tumours**

76. Ans. c. Skull bone tumors *(Ref: Bailey 25/e p133-135)*

Magnetic Resonance Imaging

- MRI was discovered by **Lauterbeur**Q in 1973.
- MRI is **best for soft tissues**Q**.**

77. Ans. d. Ependymoma *(Ref: Robbins 8/e p1330, 1335)*

- **Ependymomas** are **glial tumors**, derived from the **ependymal cells** that line the ventricular surface. These tumors **do not originate from neurons**Q.

78. Ans. a. Schwannoma *(Ref: Osborn Radiology/501)*

- **Schwannoma** is **hypointense** on **T1** and **hyperintense** on **T2**.

79. Ans. a. PET scan

80. Ans. c. Medulloblastoma

81. Ans. c. Gd enhanced MRI

82. Ans. d. Popcorn like lesion *(Ref: Osborn Neuroradiology/313)*

MRI appearance of cavernous angioma is highly characteristic, showing **"popcorn like lesion"** Q**.**

83. Ans. d. Neuropsychological sequelae are independent of radiation dose *(Ref: Tumors of Pediatric CNS (Thieme) 2001/141)*

- **Total radiation dose** is the **strongest factor** determining the **magnitude of white matter changes** as well as **neuropsychological effects**Q.

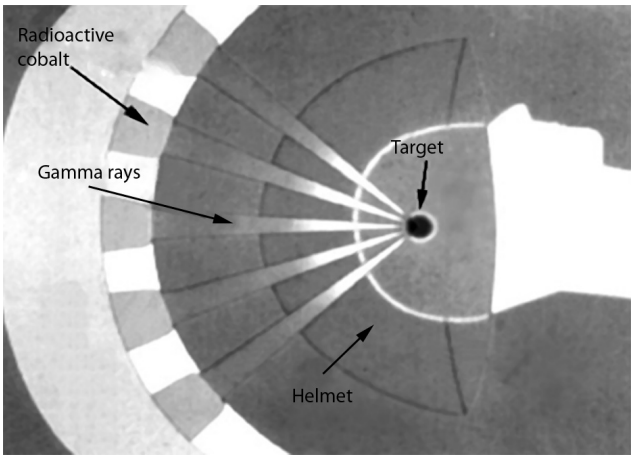
84. Ans. a. Nelson syndrome

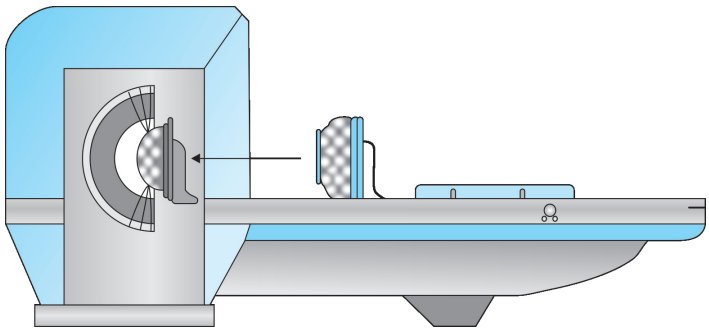
Nelson Syndrome

- Nelson syndrome refers to a spectrum of symptoms and signs arising from an **adrenocorticotropin (ACTH)–secreting pituitary macroadenoma after a therapeutic bilateral adrenalectomy.**
- The spectrum of clinical features observed relates to the **local effects of the tumor on surrounding structures**, the **secondary loss of other pituitary hormones**, and the **effects of the high serum concentrations of ACTH on the skin**.

85. Ans. a. Brain tumor *(Ref: Sabiston 19/e p1900-1902; Schwartz 10/e p1749, 9/e p1552-1553)*

STEREOTACTIC SURGERY IS USED FOR TREATMENT OF BRAIN TUMORS





Stereotactic Radiosurgery

- Stereotactic radiosurgery involves the delivery of a **concentrated dose of radiation to a defined volume in the brain**Q.

Two methods of frame-based stereotactic radiosurgery are currently widely used.

- **Gamma knife uses cobalt-201**Q radiation sources focused on one point.
- **Modified linear accelerators**Q deliver the radiation dose in multiple arcs, thereby minimizing the effect on surrounding brain tissue.

- **Primary risks** of stereotactic radiosurgery are **radiation necrosis** and **radiation injury** to surrounding structures.

Common uses of Stereotactic Radiosurgery	
• **Metastatic tumors**	• **Arteriovenous malformations**Q
• Benign lesions of the cranial nerves	• **Trigeminal neuralgia**

86. Ans. c. Hemangioblastoma *(Ref: Harrison 18/e p793; Sabiston 19/e p1888; Schwartz 10/e p1735-1736, 9/e p1541)*

- *Highly vascular tumor of brain and spinal cord in adults Hemangioblastoma.*

SECTION 8

HEAD AND NECK

CHAPTERS

- Chapter 35 Oral Cavity
- Chapter 36 Salivary Glands
- Chapter 37 Neck
- Chapter 38 Facial Injuries and Abnormalities

CHAPTER 35

Oral Cavity

MULTIPLE CHOICE QUESTIONS

CARCINOMA ORAL CAVITY PREDISPOSING FACTORS

1. Regarding premalignant oral lesions: *(COMEDK 2005)*
a. Leukoplakia should be proved by biopsy
b. Leukoplakia does not disappear after cessation of smoking
c. Erythroplakia has a higher risk for malignancy
d. Oral submucous fibrosis is seen in all parts of the world

2. The most strongly implicated premalignant condition of the oral cavity is: *(COMEDK 2010)*
a. Fordyce spots
b. Erythroplakia
c. Median rhomboid glossitis
d. Erythema multiforme

3. Treatment of leukoplakia: *(JIPMER 2011)*
a. Local excision
b. Excision and radiotherapy
c. Topical chemotherapy
d. Repositioning of ill fitting dentures

4. Risk factor for oropharyngeal carcinoma: *(PGI May 2011)*
a. Sideropenic dysphagia
b. Oral submucous fibrosis
c. Erythroplakia
d. Leukoplakia
e. Chronic hypertrophic candidiasis

5. Treatment of Erythroplakia? *(MHSSMCET 2007)*
a. Excision
b. Stoppage of alcohol and tobacco
c. Vitamin supplementation
d. Laser ablation

6. All of the following predisposes to oral cancer, except: *(Orissa 2011, PGI Dec 99)*
a. Erythroplakia
b. Leukoplakia
c. Submucosal fibrosis
d. Lichen planus

7. Saroj, a 32-years old female, from rural background presented with a history of chronic tobacco chewing since 14 year of age. Now she has difficulty in opening her mouth. On oral examination, no ulcers are seen. Most probable diagnosis is: *(AIIMS June 2001)*
a. Submucous oral fibrosis
b. Carcinoma of buccal mucosa
c. TM joint arthritis
d. Trigeminal nerve paralysis

8. Virus causing head and neck cancer: *(PGI Nov 2011)*
a. EBV
b. HSV
c. HPV
d. HBV
e. HCV

9. All of the following predispose to squamous cell carcinoma, except: *(AIIMS June 93)*
a. Lichen planus of mouth
b. Bowen's disease
c. nverted papilloma of nose
d. Chronic irritation of oral mucosa by jagged teeth

10. The pre-malignant condition with the highest probability of progression to malignancy is: *(All India 2002)*
a. Dysplasia
b. Hyperplasia
c. Leukoplakia
d. Erythroplakia

11. The commonest pre-malignant condition of oral cancer is: *(All India 95)*
a. Leukoplakia
b. Aphthous ulcer
c. Lichen planus
d. Erthro-leukoplakia

12. Predisposing factors for development of oral carcinoma is:
a. Smoking
b. Alcohol *(JIPMER 88)*
c. Syphilis
d. All of the above

13. Not a carcinogenic for cancer of Head and Neck: *(PGI 96)*
a. Alcohol
b. Smoking
c. Tobacco
d. Unflourinated water

14. A 70-years old male presented with asymptomatic white patch on oral cavity following application of the denture. Treatment of choice is: *(UPPG 2008)*
a. Low does radiotherapy
b. Biopsy of the all the tissues
c. Ascertaining that denture is fitted properly
d. Antibiotics

CARCINOMA ORAL CAVITY

15. Second primary tumor of head and neck is most commonly seen in malignancy of: *(AIIMS May 2012)*
a. Oral cavity
b. Larynx
c. Hypopharynx
d. Paranasal sinuses

16. The commonest site of oral cancer among Indian population is: *(All India 2004)*
a. Tongue
b. Floor of mouth
c. Alveobuccal complex
d. Lip

17. Most common site of oral cavity carcinoma is: *(All India 96)*
a. Lip
b. Cheek
c. Tongue
d. Palate

18. Areas of carcinoma of oral mucosa can be identified by staining with: *(PGI 79, BHU 85)*
a. 1% zinc chloride
b. 2% silver nitrate
c. Gentian violet
d. 2% toluidine blue

CARCINOMA LIP

19. Abbe-Estlander flap is used for: *(All India 2008)*
a. Lip
b. Tongue
c. Eyelid
d. Ears

20. Abbey Estlander flap is based on: *(AIIMS May 2008)*
a. Lingual artery
b. Facial artery
c. Labial artery
d. Internal maxillary artery

21. Carcinoma of lip is characterized by the following except that: *(UPSC 2007)*
a. 90% of the lip cancers occurs on the lower lip
b. The most common site of origin is the vermillion border
c. 2 cm x 2 cm cell carcinomas can be treated by V shaped excision and primary closure
d. Since lymph node metastases are common after a radical dissection of neck is mandatory

22. Stain used to diagnose premalignant lesions of lip is: *(DNB 2011, 2006)*
a. Crystal violet b. H and E
c. Toluidine blue d. Giemsa

23. Treatment of choice for carcinoma of lip of less than 1 cm is: *(Kerala 87, All India 90)*
a. Radiation
b. Chemotherapy
c. Excision
d. Radiation and Chemotherapy

CARCINOMA BUCCAL MUCOSA AND CHEEK

24. True statement (s) about oral cancer is/are: *(PGI June 2004)*
a. Most common in buccal mucosa
b. Metastasis uncommon
c. Respond to radiotherapy
d. Surgery done
e. Syphilis and dental irritation predisposes

25. Metastasis of CA buccal mucosa goes to: *(AIIMS Nov 96, All India 97)*
a. Regional lymph node b. Liver
c. Heart d. Brain

26. In carcinoma cheek, what is the best drug for single drug chemotherapy? *(AIIMS June 93)*
a. Vincristine b. Cyclophosphamide
c. Cisplatin d. Daunorubicin

27. An old man who is edentulous developed squamous cell carcinoma in buccal mucosa that has infiltrated to the alveolus. Following is not indicted in treatment: *(All India 2002)*
a. Radiotherapy
b. Segmental mandibulectomy
c. Marginal mandibulectomy involving removal of the outer table only
d. Marginal mandibulectomy involving removal of upper half of mandible

28. A patient with cheek cancer has a tumour of 2.5 cm located close to and involving the lower alveolus. A single mobile ipsilateral lymph node measuring 6 cm is palpable. The TNM stage is: *(NEET 2013, COMEDK 2008)*
a. T1N1M0 b. T2N2M0
c. T2N1M0 d. T4N2M0

29. In the reconstruction following excision of previously irradiated cheek cancer, the flap will be: *(DNB 2013, AIIMS 85)*
a. Local tongue
b. Cervical
c. Forehead
d. Pectoralis major myocutaneous

CARCINOMA PALATE

30. All are true about carcinoma palate, except: *(AIIMS June 94, Nov 93)*
a. Slow growing b. Bilateral lymphatic spread
c. Adenocarcinoma d. Presents with pain

CARCINOMA TONGUE

31. A patient has carcinoma of tongue in the right lateral aspect with lymph node of 4 cm size in level 3 on the left side of neck, what is the stage? *(AIIMS Nov 2006)*
a. N0 b. N1
c. N2 d. N3

32. A patient presented with a 1 X 1.5 cms growth on the lateral border of the tongue. The treatment indicated would be: *(AIIMS June 2002)*
a. Laser ablation
b. Interstitial brachytherapy
c. External beam radiotherapy
d. Chemotherapy

33. A patient with CA tongue is found to have lymph nodes in the lower neck. The treatment of choice for the lymph nodes is: *(All India 2005)*
a. Lower cervical neck dissection
b. Suprahyoid neck dissection
c. Tele radiotherapy
d. Radical neck dissection

34. Carcinoma of tongue most commonly occur at: *(MCI March 2009)*
a. Dorsum
b. Lateral border of anterior 2/3rd
c. Lateral border of posterior 1/3rd
d. Tip

35. Most common histological type of carcinoma of base of tongue: *(MCI March 2007)*
a. Squamous cell carcinoma b. Adenocarcinoma
c. Basal cell carcinoma d. Transitional cell carcinoma

36. Tongue ulcer with everted edges is: *(MHPGMCET 2005, 2001)*
a. Aphthous ulcer b. Tubercular
c. Malignant d. Dental

37. Commonest site of carcinoma tongue is: *(TN 89)*
a. Dorsum b. Ventral aspects
c. Anterior 2/3rd lateral aspect d. Tip

38. Carcinoma tongue less than 2 cm is treated by: *(JIPMER 87)*
a. Excision b. Radiotherapy
c. Chemotherapy d. Excision and Radiotherapy
e. Excision and Chemotherapy

39. A 60-years old man presents with an ulcer on lateral margin of tongue also complains of ear pain, most probable diagnosis is: *(PGI 96)*
a. Dental ulcer b. Carcinomatous ulcer
c. Tuberculosis ulcer d. Syphilitic ulcer

40. Carcinoma of the tongue: *(JIPMER 81, UPSC 85)*
a. Occurs most commonly on the lateral border of the middle third of tongue
b. Metastasize readily to cervical lymph nodes
c. Is usually radiosensitive
d. Treated surgically should include homolateral neck dissection except for very small lesion
e. All of the above

41. Which is not true of carcinoma tongue?
a. Lateral border is involved *(DPG 2010, AIIMS 92)*
b. Cervical lymph node involvement
c. Commonly adenocarcinoma
d. Tobacco chewing is a risk factor

42. The commando operation is: *(JIPMER 80, 81)*
a. Abdomino-perineal resection of the rectum for carcinoma
b. Disarticulation of the hip for gas gangrene of the leg
c. Extended radical mastectomy
d. Excision of carcinoma of the jaw and lymph nodes en-bloc

43. Commando's operation is for: *(Recent Questions 2013)*
a. Mandible b. Radical mastectomy
c. Leg amputation d. Oral cancer

44. Carcinoma tongue is most common at: *(Recent Questions 2013)*
a. Lateral border b. Dorsum
c. Posterior 1/3rd d. Tip of tongue

CARCINOMA MAXILLA

45. Treatment for stage T3N1 of carcinoma maxilla is: *(DNB 2012, AIIMS June 94)*
a. Radiation therapy only
b. Chemotherapy only
c. Surgery and radiation
d. Chemotherapy and radiation

46. The lymph not to be involved first in maxillary carcinoma: *(DNB 2007)*
a. Superior deep cervical nodes
b. Jugulodiagastric nodes
c. Submandibular
d. Subdiagastric nodes

MANDIBLE AND MANDIBULECTOMY

47. A 80-years old patient presents with a midline tumor of the lower jaw, involving the alveolar margin. He is endentulous. Treatment of choice is: *(All India 2001)*
a. Hemimandibulectomy
b. Commando operation
c. Segmental mandibulectomy
d. Marginal mandibulectomy

TRISMUS

48. Trismus in oral cancer patients is severe in those treated with: *(Karnataka 99)*
a. Surgery and Radiotherapy b. Chemotherapy alone
c. Surgery alone d. Not related to treatment

CANCRUM ORIS

49. All are true about cancrum oris except: *(PGI Dec 97)*
a. Associated with malnutrition and vitamin deficiency
b. Follows chronic infection
c. Involves jaw
d. Treatment is excision and skin grafting with tubed pedicle graft

LUDWIG'S ANGINA

50. Which of the following statements best represent Ludwig's angina? *(AIIMS May 2005)*
a. A type of coronary artery spasm
b. An infection of the cellular tissues around submandibular salivary gland
c. Esophageal spasm
d. Retropharyngeal infection

DENTAL CYST AND ABNORMALITIES

51. The most frequent tooth to be impacted is: *(UPSC 2007, Karnataka 98)*
a. Lower third molar b. Lower canine
c. Upper third molar d. Upper premolar

52. Impacted wisdom teeth may produce referred pain via:
a. Lingual nerve *(Orissa 99)*
b. Facial nerve
c. Branch of the auriculotemporal nerve
d. None of the above

53. Radiographic finding of floating teeth can be seen in: *(Karnataka 2002)*
a. Ectodermal dysplasis b. Cleidocranial dysplasia
c. Osteopetrosis d. Histiocytosis-X

54. The most common cyst of the oral region is: *(DPG 2008)*
a. Dentigerous cyst b. Keratosis cyst
c. Dermoid cyst d. Periapical cyst

55. Dentigerous cyst arises from: *(DPG 2009 Feb, MHPGMCET 2003)*
a. The root of a caries tooth
b. The periosteum of the fractured mandible
c. An unerupted permanent tooth
d. The sequestrum of osteomyelitis of mandible

56. Which jaw cyst is premalignant? *(AIIMS May 2012)*
a. Nasopalatine cyst b. Radicular cyst
c. Odontogenic keratocyst d. Dentigerous cyst

57. What are Rushton bodies? *(DNB 2012)*
a. Hyaline bodies of odontogenic cyst
b. Refractile bodies of radicular cyst
c. Bodies seen in ameloblastoma
d. Hyaline bodies seen in dentigerous cyst

MISCELLANEOUS

58. Asymptomatic hemangioma on ventral surface of the tongue in a 10 years old boy is treated by:
a. Watchful expectancy b. Surgical Excision
c. Radiotherapy d. Laser

59. Pharyngocutaneous fistula is seen in all except:
a. Chemotherapy b. Surgery *(AIIMS June 99)*
c. No wound care d. Radiotherapy

60. Gum tumour with 2 contralateral mobile lymph nodes in neck come under: *(PGI Dec 99)*
a. T3 N2 M0 b. T2 N2 M0
c. T4 N2 M0 d. T3 N3 M0

61. Epulis arises from: *(NEET 2013, PGI Dec 99)*
a. Enamel b. Root of teeth
c. Gingiva d. Pulp

62. Epulis is? *(DNB 2014)*
a. Benign b. Malignant
c. Reactive process d. Precancerous

63. A patient has small, oval multiple ulcers in oral cavity with red erythematous margins. The diagnosis is: *(AIIMS Nov 93)*
a. Carcinoma b. Aphthous ulcer
c. Tubercular ulcer d. Syphilitic ulcer

64. Multiple painful ulcers on tongue are seen in all except: *(All India 96)*
a. Aphthous ulcer b. Tuberculous ulcers
c. Herpes ulcers d. Carcinomatous ulcers

65. Painless ulcer of the tongue is due to: *(PGI 79, 80, UPSC 87)*
a. Dyspepsia b. Syphilis
c. Tuberculosis d. None of the above

66. Reparative granuloma of jaw is treated by: *(DPG 2009 Feb)*
a. Antibiotics
b. Wedge resection
c. Resection and bone grafting
d. Curettage

67. Treatment of T4N0M0 stage of head and neck carcinoma is: *(DNB 2009)*
a. Surgery alone b. Radiotherapy alone
c. Chemoradiation d. Surgery and radiotherapy

EXPLANATIONS

CARCINOMA ORAL CAVITY PREDISPOSING FACTORS

1. **Ans. c. Erythroplakia has a higher risk for malignancy** *(Ref: Bailey 26/e p707-708, 25/e p735-737; Devita 9/e p564; Cancer of the Head and Neck by Suen and Myer 4/e p284-285)*

- **Oral submucous fibrosis** is almost **entirely confined to** the **Asian population** and is characterized pathologically by **epithelial fibrosis** with associated **atrophy** and **hyperplasia** of the overlying **epithelium.**

Leukoplakia	Erythroplakia
• **White keratotic plaque** or patch that **cannot be rubbed off**[Q] and cannot be given another diagnostic name • **Risk factors: Smoking, alcohol, ill-fitting dentures, jagged tooth**[Q] • **Key pathologic features: Hyperkeratosis, parakeratosis, acanthosis**[Q] • In **most cases,** lesions **regress spontaneously** after stopping alcohol or tobacco consumption or correction of underlying cause**Q.** • **Baseline biopsy** should be done[Q] • Lesions with **moderate to severe dysplasia** should be **excised**[Q]. • Oral leukoplakia has **low potential for malignancy**[Q].	• **Red mucosal plaque,** most commonly found on the **soft palate** and **tonsillar pillars**[Q] • Does not arise from an obvious mechanical or inflammatory cause • Cannot be ascribed to another clinical or pathological condition • **Key pathologic features: severe cellular dysplasia**[Q] • Because of **increased malignant potential, all erythoplakic lesions** must be **biopsied**[Q]. • **Higher risk (17 times)** of **malignant transformation than leukoplakia**[Q].

2. **Ans. b. Erythroplakia**

3. **Ans. d. Repositioning of ill fitting dentures**

Leukoplakia

- In **most cases,** lesions **regress spontaneously after stopping alcohol or tobacco** consumption or **correction of underlying cause**[Q].

4. **Ans. a. Sideropenic dysphagia, b. Oral submucous fibrosis, c. Erythroplakia, d. Leukoplakia, e. Chronic hypertrophic candidiasis** *(Ref: Bailey 26/e p708-709, 25/e p734; Devita 9/e p729; Cancer of the Head and Neck by Suen and Myer 4/e p281-283)*

Risk Factors for Cancer of Oral Cavity		
• **Tobacco**[Q] • **Alcohol**[Q] • **Areca nut/pan masala**[Q] • **Sharp** or **jagged tooth**[Q]	• **Ill-fitting dentures**[Q] • **Syphilitic glossitis**[Q] • **Human papilloma virus**[Q]	• **Epstein-Barr virus**[Q] • **Plummer-Vinson syndrome**[Q] • Poor nutrition

Conditions Associated with Malignant Transformation

High-risk Lesions	Medium-risk Lesions	Low-risk or Equivocal-risk Lesions
• **Erythroplakia**[Q] • **Speckled Erythroplakia**[Q] • **Chronic hyperplastic candidiasis**[Q]	• **Oral submucous fibrosis**[Q] • **Syphilitic glossitis**[Q] • **Sideropenic dysphagia**[Q] (Paterson-Kelly syndrome)	• Oral lichen planus • Discoid lupus erythematosus • Discoid keratosis congenita

5. **Ans. a. Excision**

6. **Ans. d. Lichen planus**

7. **Ans. a. Submucous oral fibrosis** *(Ref: Bailey 26/e p708, 25/e p737; Devita 9/e p729)*

Oral Submucous Fibrosis

- Oral submucous fibrosis is a **progressive disease** in which **fibrous bands form beneath** the **oral mucosa**[Q].
- Almost **entirely confined to** the **Asian population**[Q]
- **Risk factor** for **oral cavity malignancies** (squamous cell carcinoma[Q])

Risk Factors

- Research strongly indicates that oral submucous fibrosis is **significantly associated with** the use of **pan masala areca nut, with or without concurrent alcohol use**[Q].
- **Tobacco smoking alone** is **not associated** with oral submucous fibrosis.

Pathology

- Characterised by **epithelial fibrosis** with **associated atrophy** and **hyperplasia** of the overlying **epithelium**Q.
- **Epithelium** shows changes of **epithelial dysplasia**Q.

Clinical Features

- **Scarring produces contracture,** resulting in **limited mouth opening** and **restricted tongue movement**Q.

Treatment

- **Restricted mouth opening** can be treated with either **intralesional steroids** or **surgical excision** and **skin grafts**Q.

8. **Ans. a. EBV, c. HPV**
9. **Ans. a. Lichen planus of mouth**
10. **Ans. d. Erythroplakia**
11. **Ans. a. Leukoplakia**
12. **Ans. d. All of the above**
13. **Ans. d. Unflourinated water**
14. **Ans. c. Ascertaining that denture is fitted properly**

CARCINOMA ORAL CAVITY

15. **Ans. a. Oral cavity** *(Ref: Second primary malignancies in patients with head and neck cancers by Sandeep Samant, Head and Neck 2005; 27; 1042)*

- "The site of index cancer influences the most likely site of a second primary malignancy, as an example, in a series of 1257 patients with SCC of the head and neck, patients with an index malignancy arising in the **larynx** were more like to develop a **second primary cancer in the lung**, while those arising in the **oral cavity** were more likely to develop a **second primary in** the **head and neck** or **esophagus**. This relationship has been observed in other studies as well."

- Patients with **head and neck SCC** are at **increased risk for** the **development of second primary malignancies** compared with general population**Q**.
- These second primary malignancies **typically develop in** the **aerodigestive tract** (lung, head and neck, esophagus)**Q**.
- **MC second primary malignancy: Lung cancer**Q
- **Highest** relative **increase in risk** is for a **second head and neck cancer**Q.

16. **Ans. c. Alveobuccal complex** *(Ref: Bailey 26/e p709-710, 25/e p734, 738; Devita 9/e p729; Cancer of the Head and Neck by Suen and Myer 4/e p297-304)*

- **MC site** of **CA oral cavity: Tongue >Lip**Q
- **MC histological type** of **CA oral cavity: Squamous cell carcinoma**Q
- **MC type** of **cancer in India: CA oral cavity**Q
- **MC site** of **CA oral cavity in India: Buccal mucosa**Q (38%) > Anterior tongue (16%) >Lower alveolus (15.7%)
- **LN metastasis** is **most common in: CA tongue**Q >Floor of mouth >Lower alveolus >Buccal mucosa >Upper alveolus >**Hard palate >Lip**Q.
- **Bilateral lymphatic spread** is common in: **Lower lip**Q, **supraglottis**Q **and soft palate**Q.

- **Edge biopsy** is recommended for **diagnosis** of **oral cavity malignancies**Q.
- **MRI: IOC** for **staging of head** and **neck malignancies**Q.

7th AJCC TNM Classification of Carcinoma Lip and Oral Cavity			
	Primary Tumor (T)		**Regional Lymph Nodes (N)**
Tis	Carcinoma in situ.	**N1**	Metastasis in a **single ipsilateral LN, ≤3 cm** in greatest dimension.
T1	Tumor **≤2 cm** in greatest dimension.	**N2a**	Metastasis in **single ipsilateral LN, >3 cm** but **≤6 cm** in greatest dimension.
T2	Tumor **>2 cm** but **≤4 cm** in greatest dimension.	**N2b**	Metastases in **multiple ipsilateral LN**, none >6 cm in greatest dimension.
T3	Tumor **>4 cm** in greatest dimension.	**N2c**	Metastases in **bilateral** or **contralateral LN**, none >6 cm in greatest dimension.
T4a	**Lip:** Tumor invades through **cortical bone, inferior alveolar nerve, floor** of mouth, or **skin of face**, that is, chin or nose. **Oral cavity:** Tumor invades adjacent structures only (e.g., through **cortical bone** [mandible or maxilla] into **deep muscle of tongue, maxillary sinus,** or **skin of face**).	**N3**	Metastasis in a **LN >6 cm** in greatest dimension.
			Distant Metastasis

T4b	Tumor invades **masticator space, pterygoid plates**, or **skull base** and/or encases **internal carotid artery.**	M0	No distant metastasis.
		M1	Distant metastasis.

Stage Grouping						
0	**I**	**II**	**III**	**IVA**	**IVB**	**IVC**
Tis N0M0	**T1** N0M0	**T2** N0M0	**T3** N0M0 **T1-3 N1** M0	**T4a** N0M0 **T4a N1** M0 **T1-4a N2** M0	Any T **N3** M0 **T4b** Any N M0	Any N Any T **M1**

17. **Ans. c. Tongue**

18. **Ans. d. 2% toluidine blue** *(Ref: www.headandneckoncology.org/content/1/1/5)*

Toluidine Blue

- Toluidine blue is a **basic metachromatic dye** with **high affinity for acidic tissue** components, thereby **staining tissues rich in DNA** and **RNA**[Q].
- **Wide applications** both as **vital staining in living tissues** and as a **special stain** used in vivo to **identify dysplasia** and **carcinoma of** the **oral cavity**[Q].

CARCINOMA LIP

19. **Ans. a Lip:** *(Ref: Bailey 26/e p712-713, 25/e p740-741; Devita 9/e p744-745; Cancer of the Head and Neck by Suen and Myer 4/e p301-302)*

Carcinoma Lip

- **MC site** of CA lip: **Vermillion** of **lower lip**[Q]
- Typically seen in **males** of **40-70 years**[Q]
- Definite correlation between **CA lip** and **exposure to sunlight** (UV radiations[Q])
- **MC presentation: Non-healing ulcer** or growth[Q]
- **LN metastasis** is **rare** and **develops late**, mainly to **submental** and **submandibular** LNs[Q].
- **Bilateral lymphatic spread** is seen in **CA lower lip**[Q].

Treatment of Carcinoma Lip	
T1 and **T2**	• **Surgery is TOC**[Q] • **If 1/3rd or less of lip is involved:** 'V' or 'W' shaped **full thickness excision** with lateral margin of 5 mm + **Primary closure**[Q] • **If more than 1/3rd of lip is involved:** Flap reconstruction **(Abbe, Estlander's** flap)[Q]
T3 and **T4**	• **Combined radiation** and **surgery**[Q] (vermillionectomy or lip shave)

Prognosis

- CA lip has the **best prognosis**[Q] in CA oral cavity.

20. **Ans. c. Labial artery** *(Ref: Bailey 26/e p713, 25/e p741; Devita 9/e p744; Cancer of the Head and Neck by Suen and Myer 4/e p301-302)*

Lip Reconstruction	
Cross-lip Flaps	**Circumoral Advancement Flaps**
• **Lip-Switch (Abbe-Estlander) flap**[Q] used to repair defects of either upper or lower lip, based on **labial artery**[Q]	• **Karapandzic flap**[Q]**:** Uses a sensate, **neuromuscular flap** based on **labial artery**[Q]. • **Webster-Bernard repair**[Q]**:** Use lateral nasolabial flap with buccal advancement

21. **Ans. d. Since lymph node metastases are common after a radical dissection of neck is mandatory**

22. **Ans. c. Toluidine blue** *(Ref: Indian Journal od Dental Research 2007; vol-18; Issue 3; p103-105)*
    - **Toluidine blue detects efficiently and rapidly mitotic figures** in sections of paraffin embedded human tissues **especially in oral cavity.**

23. **Ans. c. Excision**

CARCINOMA BUCCAL MUCOSA AND CHEEK

24. **Ans. b. Metastasis uncommon, c. Respond to radiotherapy, d. Surgery done, e. Syphilis and dental irritation predisposes** *(Ref: Bailey 26/e p716, 25/e p744; Devita 9/e p749; Cancer of the Head and Neck by Suen and Myer 4/e p302-305)*

Carcinoma Buccal Mucosa (Cheek)

- **MC site** of **CA oral cavity in India**: **Buccal mucosa**[Q]
- Related to chewing a combination of **tobacco mixed with betel leaves**, **areca nut** and **lime shell**[Q]
- Most malignant tumors are **low grade SCC**[Q]
- Frequently appearing on background of leukoplakia
- **Lymphatic spread** is first to **level I** and **II LNs**[Q].

Clinical Features

- **Pain is minimal**, obstruction of Stenson's duct can lead to parotid enlargement.

Treatment

- **T1**: **Excision** with primary closure[Q]
- **T2**: **Surgery ± Radiotherapy**[Q]
- **T3 and T4**: **Surgery + Radiotherapy** or **chemoradiation**[Q]

25. Ans. a. Regional lymph node

26. Ans. c. Cisplatin *(Ref: Bailey 26/e p720, 25/e p748; Devita 9/e p749; Cancer of the Head and Neck by Suen and Myer 4/e p291-292)*

Chemotherapy in Cancers of Oral Cavity, Head and Neck

- Adjuvant **chemotherapy** has been reported to **improve the rate of organ preservation** with **no change in overall survival**[Q].
- Chemotherapy is often **employed in palliative setting** in patients with **recurrent, unresectable** or **distant metastases**[Q].
- **Drugs used**: **Cisplatin**[Q], **Methotrexate**, 5-FU, Docetaxel and Paclitaxel

> - **Cisplatin** is the **cornerstone drug** in the modern management of head and neck cancer[Q].
> - **Most beneficial** is **concurrent chemotherapy**[Q].

- The addition of **concurrent chemotherapy** (**cisplatin**) to conventional radiation **significantly improved survival over radiation alone**[Q].
- **Concurrent chemoradiation** protocols have **improved locoregional control** and **reduce** the **development of distant disease**[Q].

27. Ans. c. Marginal mandibulectomy involving removal of the outer table only

- Whenever **SCC of oral cavity involve** the **mandible** (or **within 1 cm** of mandible), **mandibulectomy** becomes necessary[Q].
- In **marginal mandibulectomy**, **inner cortical surface** and a portion of **underlying medullary cavity** is **excised** (not only the outer table)[Q].

28. Ans. d. $T_4N_2M_0$

29. Ans. d. Pectoralis major myocutaneous *(Ref: Bailey 26/e p716, 25/e p744; Devita 9/e p749; Cancer of the Head and Neck by Suen and Myer 4/e p302-305)*

Reconstruction of Cheek

- For cheek reconstruction, **mucosal flaps** are used.
- **PMMC** (**pectoralis major myocutaneous**) **flap**: **Most widely used flap** for **head and neck reconstruction**[Q].

Males	Females
• **Forehead flap** based on **anterior branch** of **superficial temporal artery** can be used[Q].	• **Deltopectoral flap** based on **perforating branch** of **internal mammary artery** is used[Q].

CARCINOMA PALATE

30. Ans. d. Presents with pain *(Ref: Bailey 26/e p718, 25/e p746-747; Devita 9/e p750; Cancer of the Head and Neck by Suen and Myer 4/e p311-313)*

Cancer of Hard Palate

- SCC of hard palate is **rare**
- Minor salivary gland tumors occur in the hard palate.
- Most cancers are **well differentiated** and of **ulcerative variety**[Q]

Clinical Features

- Presents as **painless mass**Q in the **roof of the mouth**
- **Lymphatic metastasis** is **uncommon**, mainly to level I and II.

Treatment

- **Smaller tumors**: **Excision** with underlying bone.
- **Larger tumors**: **Maxillectomy**
- **Radiotherapy** is used in advanced lesions.

CARCINOMA TONGUE

31. Ans. c. N2

32. Ans. b. Interstitial brachytherapy: *(Ref: Bailey 26/e p713-714, 25/e p741-743; Devita 9/e p747-749, 752-754; Cancer of the Head and Neck by Suen and Myer 4/e p297-301)*

- Suen and Myer says "**Radiation therapy** may be **curative in early cancer** (**T1** and some T2) and may **preserve maximal normal anatomy** and **function**. **Brachytherapy** allows delivery of a **large radiation boost** to the **primary tumor bed**."

Carcinoma Tongue

- **MC site** is **middle of lateral border**Q or ventral aspect of the tongue.
- **MC histological type** is **squamous cell carcinoma**Q.
- **MC associated risk factors** are **tobacco** and **alcohol**Q.
- **MC variety** is **ulcerative**Q.
- **30% patients** presents with **cervical node metastasis**Q.

Carcinoma oral tongue

- The intrinsic tongue musculature provide little restriction to tumour growth, thus it may enlarge considerably before producing symptoms.
- Presents as **painless mass** or **ulcer** that **fails to heal** after minor trauma Q
- **MC complaint**: **Mid-irritation of tongue**Q.
- **MC** site: **Lateral border** of the **junction of middle** and **posterior third**Q.
- **Primary basin** for **cervical metastasis** is **superior deep jugular nodes (Level II)** Q.
- For diagnosis, **wedge biopsy** is taken **from** the **edge of ulcer** but in **proliferative growth, punch biopsy** is taken Q.

Treatment of Carcinoma Oral Tongue	
T1	• **Partial glossectomy** with primary closureQ
T2	• **Hemiglossectomy** for **small well-circumscribed** and **well differentiated** lesionQ • **Radiotherapy** for **large, poorly differentiated lesion**Q
T3	• **Total glossectomy** followed by **radiation**Q
T4	• **Surgery** (Total glossectomy , mandibulectomy, **MRND**, laryngectomy) + **Post-operative radiation**Q

Management of Recurrence

- **Most recurrences** occur within **2 years.**
- **Radiation failure** is managed by **glossectomy**Q.
- **Surgical failure** is managed by **radiation**Q.
- If **recurrence** is **limited to mucosa**, it is best managed by **surgery**
- If **recurrence** is in the **soft tissue of** the **neck, palliation** is indicated

Carcinoma of Posterior Third or Base of Tongue

- Remains **asymptomatic for long time** and patient **present with metastasis in cervical nodes**Q.
- **First node involved** is **superior deep jugular nodes (Level II),** spread is then along the jugular chain to the mid-jugular (Level III) and lower jugular (Level IV) Q.

Clinical Features

- **Early symptoms**: **Sore throat, feeling of lump in throat**, and slight discomfort on swallowing
- Because many **lesions** are **silent, level II neck mass** is often the **first sign**Q.

33. Ans. d. Radical neck dissection *(Ref: Bailey 26/e p709, 25/e p740; Devita 9/e p748; Cancer of the Head and Neck by Suen and Myer 4/e p299)*

Lymph Node Metastasis in CA Tongue

- **Elective or therapeutic treatment** of the **cervical lymphatics** is recommended for virtually all patients with cancer of the oral tongue.
- It is recommended that patients with **bulky metastatic deposits** undergo **standard radical dissection** or **MRND**Q.

34. Ans. b. Lateral border of anterior 2/3rd **35. Ans. a. Squamous cell carcinoma** **36. Ans. c. Malignant** *(Ref: Bailey 25/e p595)*

Type of Ulcer	Edge
Septic ulcer	• **Sloping** edgesQ
Tuberculous ulcer	• **Undermined** edgesQ
Carcinomatous ulcer	• **Everted hard** edgesQ
Rodent ulcer	• Barely visible **pearly edges**Q
Syphilitic ulcer	• **Punched-out** appearance with **raised indurated edges**Q

37. Ans. c. Anterior 2/3rd lateral aspect **38. Ans. a. Excision** **39. Ans. b. Carcinomatous ulcer**

40. Ans. e. All of the above **41. Ans. c. Commonly adenocarcinoma**

42. Ans. d. Excision of carcinoma of the jaw and lymph nodes en-bloc *(Ref: Cancer of the Head and Neck by Suen and Myer 4/e p291)*

Commando's Operation (Combined Mandibulectomy and Neck Dissection Operation)

- **Commando's operation**: **Total glossectomy hemimandibulectomy + Removal of floor of mouth + Radical lymph node dissection**Q
- Indicated when **carcinoma** is **fixed to mandible** with **infiltration of floor of mouth**Q.

Radiotherapy in Cancers of Oral Cavity

- **SCC** is **vascularized** and **well oxygenated** tends to be **most radiosensitive**Q.
- Deep invasion of muscle or bone tends to decrease the response to radiotherapy
- **Large cervical metastatic nodes** are **best managed by** a combination of surgery and **radiation therapy** rather than by radiation alone**Q**.
- Mostly given as **EBRT** (External Beam Radiotherapy), **60 Gray** over **6 weeks**Q.

Complications of Radiotherapy

1. Xerostomia (MC)Q
2. MucositisQ
3. Temporary or permanent dysguesia
4. Osteoradionecrosis (ORN)Q:
   - Related to **carries tooth** in the radiation fieldQ
   - Results from **decreased production of saliva** and **damage to microvasculature** of mandible and maxillaQ
   - Best managed with **prophylactic dental care**Q
   - ORN may require daily **hyperbaric oxygen treatments** for 4-6 weeks, either alone or in conjunction with surgical interventionQ

43. Ans. d. Oral cancer **44. Ans. a. Lateral border**

CARCINOMA MAXILLA

45. Ans. c. Surgery and radiation: *(Bailey 26/e p718, 25/e p746-747; Devita 9/e p768-771; Cancer of the Head and Neck by Suen and Myer 4/e p179)*

Malignant Neoplasms of Paranasal Sinuses

- **Most frequently involved**: **Maxillary sinuses**Q >Ethmoids >Frontal >Sphenoid.
- **Ethmoidal tumors** mainly spread to **jugulodiagastric** and **subdiagastric nodes**Q.
- **Maxillary tumors** mainly spread to **mandibular nodes**Q.

- People working in **hardwood furniture industry, nickel refining, leather work and manufacture of mustard gas** have shown **higher incidence of sinonasal cancer**Q.
- **Cancer of the maxillary sinus** is common in **Bantus of South Africa** where locally made **snuff** is used, which is found **rich in nickel and chromium**Q.

- Workers of **furniture industry** develop **adenocarcinoma of the ethmoids** and upper nasal cavity[Q]
- Those engaged in **nickel refining develop SCC** and **anaplastic carcinoma[Q].**
- **More than 80%** of the malignant tumors are of **SCC** variety[Q].

Carcinoma of Maxillary sinus

- Common in **40-60** years of age, more common in **males**[Q]
- Systemic metastasis are **rare**, may be seen in **lungs (MC)**[Q] and occasionally in bone.

Clinical Features

- Early features of maxillary sinus malignancy are **nasal stuffiness, blood stained discharge, facial paraesthesia, or pain and epiphora[Q].**
- Nodal metastasis is **uncommon** and occurs only in the late stage of disease.
- **Maxillary tumors** mainly spread to **mandibular nodes**[Q].

Diagnosis:

- **CT scan:** Best non-invasive method to find the extent of disease.

Treatment

- **For SCC, combination of radiotherapy** and **surgery**[Q] gives better results than either alone.
- Radiotherapy can be given before or after surgery.

46. Ans. c. Submandibular nodes *(Ref: Grays 39/e p577)*

MANDIBLE AND MANDIBULECTOMY

47. Ans. c. Segmental mandibulectomy *(Ref: Devita 9/e p746; Cancer of the Head and Neck by Suen and Myer 4/e p293-294)*

Mandibulectomy

Marginal Mandibulectomy

- **Conservative mandibulectomy**[Q]
- Refers to **partial excision** of the **superior portion** of mandible in vertical phase[Q]
- **Inner cortical surface** and a portion of **underlying medullary cavity** is **excised**[Q]
- **Preserve mandibular continuity**[Q]
- Indicated **when tumor lies within 1 cm** of the mandible or **abuts the periosteum** without evidence of direct bony invasion[Q]

Segmental Mandibulectomy

- **Entire through and through segment of mandible is resected.**
- Results in **mandibular discontinuity**[Q]
- Requires **major reconstructive procedure** for cosmetic and functional purposes[Q]
- **Indications:**
  1. **Invasion of** the **medullary space** of the mandible[Q]
  2. **Tumor fixation to** the **occlusal surface** of the mandible in the **edentulous patient**[Q]
  3. **Invasion** of tumor into the mandible **via** the **mandibular** or **mental foramen**[Q]
  4. **Tumor fixed** to the mandible[Q]

TRISMUS

48. Ans. a. Surgery and Radiotherapy: *(Ref: Bailey 25/e p750; en.wilkipedia.org/wiki/trismus)*

Trismus

- **Restriction to mouth opening**, including **restrictions caused by trauma**, **surgery** or **radiation**[Q].
- **Implications: Reduced nutrition** due to impaired mastication, **difficulty in speaking**, and **compromised oral hygiene**[Q].
- Often observed in **persons** who have **received radiation** to the **head and neck**, in conjunction with difficulty in swallowing[Q].
- **Limited jaw mobility** can result from **trauma, surgery, radiation treatment**, or **even TMJ problems**[Q].

- **Radiation**[Q] that affects the **temporomandibular joint**, the **pterygoid muscles**, or the **masseter** muscle, is **most likely to result in trismus**.
- Some patients who have not received radiation treatment may develop **trismus secondary to scarring** and **edema after surgery[Q].**

CANCRUM ORIS

49. Ans. b. Follows chronic infection *(Ref: www.ncbi.nlm.nih.gov)*

Cancrum Oris (Noma Disease or Gangrenous Stomatitis)

- Cancrum oris or gangrenous stomatitis, is a **gangrenous disease** leading to **tissue destruction** of the **face**, especially the **mouth** and **cheek**Q
- **Rapidly progressive, polymicrobial, opportunistic infection** that occurs during periods of **compromised immune function**Q.
- **Main organisms implicated**: **Fusobacterium** , **Prevotella** and **Borrelia vincentii**Q

Predisposing Factors	
• **Malnutrition** or **dehydration**Q	• **Recent illness**Q
• **Poor oral hygiene**Q	• **Malignancy**Q
• **Poor sanitation**Q	• Immunodeficiency disorder, (**AIDS**)Q
• Unsafe drinking water	

Clinical Features

- Mainly affects **children <12 years** in the **poorest countries** of **Africa** Q.
- **Most children** are between **2-6 years**
- Mucous membranes of the **mouth develop ulcers**
- **Rapid, painless tissue degeneration**, can **degrade tissues** of the **bones** in the **face**.
- Associated with **high morbidity** and **mortality** Q

Treatment

- Improvement in **hygiene** and **nutrition** Q
- Progression can be halted by **antibiotics** and improved nutrition Q
- **Reconstructive plastic surgery** Q to repair its permanent physical effects

LUDWIG'S ANGINA

50. Ans. b. An infection of the cellular tissues around submandibular salivary gland: *(Ref: Bailey 26/e p703, 25/e p731)*

Ludwig's Angina

- Ludwig's angina is **infection of submandibular space**Q.
- **Bacteriology**: **Mixed infections**Q involving **both aerobes and anaerobes**Q are common.

Etiology:

- **Dental infections** are responsible for **80%** of cases Q.

Clinical Features:

- Marked difficulty in swallowing (**odynophagia**)Q, with varying degree of **trismus.**

Treatment:

- **Systemic antibiotics**Q with **incision** and **drainage of abscess**Q.

DENTAL CYST AND ABNORMALITIES

51. Ans. a. Lower third molar *(Ref: Scott-Brown's Otorhinolaryngology 7/e p1924-1925)*

Impacted Tooth

- Tooth that has failed to erupt completely or partially to its correct position in the dental arch and its eruption potential has been lost.
- **MC affected tooth**: **Lower 3rd molar**Q **>Upper 3rd molar** >Upper canine

52. Ans. c. Branch of the auriculotemporal nerve: *(Ref: Scott-Brown's Otorhinolaryngology 7/e p1924-1925)*

- **Unerupted wisdom teeth**, **erupting teeth**, and **malocclusion** can cause **ear pain** secondary to direct impingement of the **auriculotemporal nerve**Q.

53. Ans. d. Histiocytosis-X *(Ref: Sutton 7/e p1542)*

Floating Tooth Sign

- On radiographic examination of mandible, **erosion of the bony alveoli around** the **teeth**, so that they seem to be floating in spaceQ
- Seen in **histiocytosis X**Q

54. Ans. d. Periapical cyst *(Ref: Scott-Brown's Otorhinolaryngology 7/e p1924-1925)*

PERIAPICAL CYST (RADICULAR CYST)

- MC type of jaw cyst[Q]
- Periapical cyst is **inflammatory in origin**[Q].
- Extremely common lesions found at the **apex of teeth**[Q].
- Develop as a result of **long-standing pulpitis**, caused by advanced carious lesions or by trauma to the tooth.
- **Periapical inflammatory lesions** persist as a result of the **continued presence** of **bacteria** or other offensive agents in the area.
- **Treatment**: Complete removal of offending material and appropriate restoration of the tooth or extraction.

55. Ans. c. An unerupted permanent tooth *(Ref: Scott-Brown's Otorhinolaryngology 7/e p1924-1925)*

- Dentigerous cyst arises from an unerupted permanent tooth.

Dental Abnormalities

Dental Cyst	Dentigerous Cyst	Ameloblastoma
• Develops at the **apices of caries tooth**[Q] with necrotic pulp • More common in **upper jaw**[Q] **X-rays shows:** • **Circular radioluscent area**[Q] in relation to root of normally erupted tooth • **Margins** may be **sclerotic**[Q]	• Arises from **unerupted teeth**[Q] • **MC** in **lower 3rd molars** • **Cyst** also **contain unerupted teeth**[Q] **X-ray shows:** • **Unilocular cyst** or **soap bubble appearance**[Q]	• Benign neoplasm **arising** from **ameloblast (odontogenic epithelium)**[Q] • Most ameloblastoma occur in mandible **near angle** and **ramus** of **mandible**[Q]

56. Ans. c. Odontogenic keratocyst *(Ref: Scott-Brown's Otorhinolaryngology 7/e p1924, 1925)*

ODONTOGENIC KERATOCYST

- Odontogenic keratocyst is **locally aggressive** and has a **high rate of recurrence**[Q].
- Most often diagnosed in patients between 10-40 years.
- Occur most commonly **in males** within the **posterior mandible**, particularly in the region of **3rd molar tooth**[Q].
- Radiographically present as **well-defined unilocular** or **multilocular radiolucencies**.

> - Odontogenic keratocysts are characterized by an epithelial lining that is parakeratinized and stratified.
> - It is characterized by basal layer of neatly arranged, palisaded, columnar and cuboidal cells above which are several layers of squamous epithelium. This **lining** has a **high mitotic rate** and **rarely** may **become dysplastic** and **develop into squamous cell carcinoma**[Q].

Treatment:

- **Aggressive** and **complete removal** of the lesion
- **Recurrence rates** for **inadequately removed lesions** can reach **60%**[Q].

57. Ans. a. Hyaline bodies of odontogenic cyst *(Ref: Shafers 6/e p268)*

RUSHTON BODIES

- **Rushton bodies** or **hyaline bodies of odontogenic cysts** feature as **eosinophilic, straight or curved, irregular or rounded structure within the epithelial lining of odontogenic cyst.**
- Rushton bodies occur almost **exclusively within odontogenic cyst.**

MISCELLANEOUS

58. Ans. a. Watchful expectancy *(Ref: Bailey 25/e p716, 717)*

Asymptomatic hemangioma on ventral surface of the tongue in 10 years old boy is treated by watchful expectancy.

HEMANGIOMA

- Mucosal hemangiomas can occur in **oral cavity** or **oropharynx**[Q].
- **Mostly** seen in **children**[Q]
- When hemangiomas are **present at birth** or **in young children,** they should be **only observed** for some period as **spontaneous regression can occur**[Q].

59. Ans. a. Chemotherapy *(Ref: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2640019/)*

Pharyngocutaneous Fistula

- **Pharyngocutaneous fistula (PCF)** is the **MC complication after total laryngectomy**[Q].
- Reported incidence: **3-65%**
- Appears in the **early post-operative period** after total laryngectomy[Q] (3^{rd}- 8^{th} post-operative day).
- **Risk Factors**:
  - **Wound closure under tension**[Q]
  - Concurrent neck dissection[Q]
  - **Prior radiation therapy**[Q]

60. Asn. a. $T_3N_2M_0$, b. $T_2N_2M_0$, c. $T_4N_2M_0$, d. $T_3N_3M_0$

61. Ans. c. Gingiva

Epulis

- **Epulis** is any **benign lesion** situated on the **gingiva**.
- Three types: fibromatous, ossifying and acanthomatous.

62. Ans. a. Benign

63. Ans. b. Aphthous ulcer *(Ref: Robbins 8/e p724)*

Aphthous Ulcer

- Also known as a **canker sore**[Q]
- A type of mouth ulcer that presents as a **painful open sore** inside the **mouth** or **upper throat characterized by** a **break in** the **mucous membrane**[Q].
- Its **cause is unknown**, but they are **not contagious**.
- Also known as **aphthous stomatitis** and alternatively as **Sutton's Disease**, especially in the case of **major, multiple**, or **recurring ulcers**[Q].

Types of Aphthous Ulcer		
Minor ulceration	**Major Ulcerations**	**Herpetiform Ulcerations**
• Size **3-10 mm** • **MC aphthous ulcers**[Q] • Appear as **erythematous halo**[Q] with yellowish or grayish color. • **Pain**[Q] is the characteristic symptom • May last about **2 weeks**	• Size **>10 mm**[Q] • Appearance similar to minor ulcerations • More painful • Take **>1 month to heal** and **leave a scar**[Q]. • Typically develop **after puberty** with **frequent recurrences**[Q].	• Characterized by **small, numerous, 1-3 mm lesions** that **form clusters**. • Most severe form[Q] • Occurs more frequently in **females** • Onset is often **in adulthood**. • Typically **heal in <1 month without scarring**[Q].

Etiology

- **Exact cause** is **unknown**[Q]
- Citrus fruits, physical trauma, lack of sleep, sudden weight loss, food allergies, immune system reactions, and deficiencies in vitamin B_{12}, iron, and folic acid may contribute to their development.
- **MC trigger**: **Trauma to** the **mouth**[Q]

64. Ans. d. Carcinomatous ulcer

Aphthous ulcers, tubercular and herpetic ulcers are painful.

Carcinomatous Ulcer

- Carcinomatous ulcers are **painless** but may become painful in advanced stages, with extension into surrounding tissues.

65. Ans. b. Syphilis *(Ref: Robbins 8/e p374)*

- **Syphilis** chancres can occur in the mouth and they are **painless.**

66. Ans. d. Curettage *(Ref: medind.nic.in/ibn/t06/i4/ibnt06i4p677)*

- Reparative granuloma of Jaw is treated by curettage.

Giant Cell Reparative Granuloma

- Giant cell reparative granuloma is an apparently **reactive intraosseous lesion** of the **mandible** and **maxilla** following **trauma induced intraosseous hemorrhage**[Q] and containing prominent giant cells.
- Also known as **Central giant cell granuloma**[Q]
- **MC site**: **Anterior part** of **mandible**[Q] (2/3rd of cases) between the **2nd premolar** and **2nd molar**[Q] with extension across the midline.
- **2nd MC site: Small bones** of **hands** and **feet**[Q]

Clinical Features

- It is a **disease of the young** presenting as a **painless swelling** in the anterior jaw and
- Radiographically appearing as a **lytic expansile lesion** with a characteristic **tendency of resorbing the root tips** of adjacent unerupted teeth.

Treatment

- **Curettage** or **local excision**[Q]
- **Recurrence rate: 22-50%**
- Lesion eradication typically **does not require >2 excisions**.
- **Chemical cautery, electrocautery, cryotherapy**, calcitonin, Interferon alpha and intralesional steroids are used **for more aggressive** and **recurrent lesions**.

67. Ans. d. Surgery + Radiotherapy *(Ref: Mastery of Surgery 5/e p308; Bailey 26/e p716, 25/e p740)*

CHAPTER 36

Salivary Glands

MULTIPLE CHOICE QUESTIONS

SALIVARY GLAND TUMORS

1. Which among the following is most common neoplasm of salivary gland? *(WBPG 2012, AIIMS June 98, All India 2002)*
a. Pleomorphic adenoma
b. Adenoid cystic carcinoma
c. Mucoepidermoid carcinoma
d. Mixed tumour

2. Most common tumor of parotid gland is:
a. Squamous cell carcinoma
b. Pleomorphic adenoma *(DNB 2008, 2000 , AIIMS June 93)*
c. Adenolymphoma
d. None of the above

3. Best diagnostic modality for parotid swelling is:
a. Enucleation b. FNAC *(AIIMS Nov 94)*
c. Superficial parotidectomy d. Excisional biopsy

4. Swelling of deep lobe of parotid gland presents as swelling in: *(DNB 2001)*
a. Parapharyngeal space
b. Cheek
c. Temporal region
d. Below the ear

5. True about parotid tumor: *(PGI Nov 2010)*
a. Facial nerve involvement indicates malignancy
b. Pleomorphic adenoma is MC variety
c. Malignant disease is MC variety
d. Superficial parotidectomy is the treatment of choice

6. About 50% the tumors are benign and even malignant tumors of this salivary gland are slow growing:
a. Parotid gland b. Sublingual gland
c. Submandibular gland d. All of the above

7. Most common site of minor salivary gland tumor: *(MHSSMCET 2005)*
a. Cheek b. Palate
c. Sub-lingual gland d. Tongue

PLEOMORPHIC ADENOMA

8. Regarding pleomorphic adenoma of salivary gland true statement(s) is/are: *(PGI Dec 2008)*
a. Parotid gland is most commonly involved
b. Malignant transformation does not occur
c. Also called mixed tumour
d. More commonly found in men than women
e. Superficial parotidectomy is treatment of choice

9. True regarding benign mixed parotid tumour is: *(DNB 2005)*
a. Slow growing and lobular
b. Firm and capsulated
c. 50% of parotid tumour
d. All of the above

10. Most common tumor of parotid gland? *(MHPGMCET 2007)*
a. Warthin's tumor b. Pleomorphic adenoma
c. Adenocarcinoma d. Hemangioma

11. Treatment of choice for pleomorphic adenoma: *(DNB 2008, DPG 2008, MCI Sept 2010, 2007, AIIMS Nov 2001, Nov 95, All India 97, PGI Dec 99)*
a. Superficial parotidectomy b. Radical parotidectomy
c. Enucleation d. Radiotherapy

12. Ramavati, a 40-years old female presented with a progressively increasing lump in the parotid region. On oral examination, the tonsil was pushed medially, Biopsy showed it to be pleomorphic adenoma. The appropriate treatment is:
a. Superficial parotidectomy *(AIIMS June 2001)*
b. Lumpectomy
c. Conservative total parotidectomy
d. Enucleation

13. All are true for pleomorphic adenoma except: *(PGI Dec 99)*
a. Arises from parotid
b. May turn into malignant
c. Minor salivary glands involved
d. None

14. Mixed tumors of the salivary glands are: *(All India 2006)*
a. Most common in submandibular gland
b. Usually malignant
c. Most common in parotid gland
d. Associated with calculi

15. Which of the following is an indication of radiotherapy in pleomorphic adenoma of parotid? *(All India 2004)*
a. Involvement of deep lobe
b. 2nd histologically benign recurrence
c. Microscopically positive margins
d. Malignant transformation

16. Mixed parotid tumour arises from: *(PGI 80, DPG 87, 88)*
a. Epithelium b. Epithelium + Mesenchymal
c. Mesenchymal d. None of the above

17. All are true about pleomorphic adenoma except: *(DNB 2014)*
a. Malignant transformation risk is high
b. Mixed tumor
c. Benign tumour
d. Encapsulated

WARTHIN'S TUMOR

18. True statement regarding Warthin's tumor:
a. Common in females *(JIPMER 2010)*
b. Most malignant
c. Hot spots on Tc-99 scan
d. Most common tumor of minor salivary gland

19. Exclusively found in parotid gland: *(PGI May 2011)*
a. Warthin's tumor b. Acinic cell
c. Pleomorphic d. Adenocarcinoma
e. Mucoepidermoid

20. Warthin's tumour is: *(DNB 2012, AIIMS May 2005, June 2003)*
a. An adenolymphoma of parotid gland
b. A pleomorphic adenoma of parotid
c. A carcinoma of the parotid
d. A carcinoma of submandibular salivary gland

21. Treatment of choice for Warthin's tumour:
a. Superficial parotidectomy
b. Enucleation *(AIIMS Nov 2001, All India 98, 96)*
c. Radiotherapy
d. Injection of a sclerosant agent

22. Hot spot on Tc-99 is seen in which parotid tumour? *(JIPMER 2014, 2010; AIIMS May 2013)*
a. Adenolymphoma b. Adenoid cystic carcinoma
c. Acinic cell tumour d. Adenocarcinoma

23. Cystic spaces lined by double layer of neoplastic epithelial cells resting on dense lymphoid tissue is a feature of: *(APPG 2015)*
a. Dermoid cyst b. Warthin tumor
c. Aneurysmal bone cyst d. Hashimoto's thyroiditis

MUCOEPIDERMOID CARCINOMA

24. Most common malignant tumour of parotid is:
a. Epidermoid carcinoma *(DNB 2011, 2010, DPG 2008)*
b. Mucoepidermoid carcinoma
c. Squamous cell carcinoma
d. Adenocarcinoma

25. Mucoepidermoid carcinoma of parotid arises from: *(PGI June 99)*
a. Secretory cells b. Excretory cells
c. Myoepithelial cells d. Myofibril

26. Mucoepidermoid carcinoma is seen in: *(MHSSMCET 2005)*
a. Sebaceous gland b. Pancreas
c. Parotid gland d. All

ADENOID CYSTIC CARCINOMA

27. The most common tumour of the minor salivary gland is: *(DNB 2013,WBPG 2012, COMEDK 2008)*
a. Mucoepidermoid carcinoma
b. Acinic cell carcinoma
c. Adenoid cystic carcinoma
d. Pleomorphic adenocarcinoma

28. Tumor with perineural invasion: *(DNB 2009, AIIMS Nov 2010, MHSSMCET 2007)*
a. Adenocarcinoma b. Adenoid cystic carcinoma
c. Basal cell carcinoma d. Squamous cell carcinoma

29. All the following tumors can spread perineurally except:
a. Adenoid cystic carcinoma of salivary gland
b. Carcinoma gallbladder *(MHSSMCET 2007)*
c. Hilar cholangiocarcinoma
d. None of the above

30. Which among the following parotid tumor spreads through neural sheath? *(Karnataka 2013, NEET Pattern, DNB 2013, AIIMS June 97, 96)*
a. Mixed parotid tumor b. Adenoid cystic carcinoma
c. Squamous Cell carcinoma d. Oxyphillic lymphoma

31. The most common tumor of the minor salivary gland is:
a. Mucoepidermoid carcinoma *(COMEDK 2008)*
b. Acinic cell carcinoma
c. Adenoid cystic carcinoma
d. Pleomorphic adenocarcinoma

32. Swiss cheese pattern is seen in: *(DPG 2007)*
a. Warthin's tumor
b. Adenoid cystic carcinoma
c. Pleomorphic adenoma
d. Mucoepidermoid carcinoma

33. Adenoid cystic carcinoma of parotid gland all are true except:
a. Most common malignant tumour of minor salivary gland
b. Most common submandibular gland tumour
c. Spreads perineurally *(UPPG 2010)*
d. Local recurrence is common
e. Radiotherapy is the treatment of choice

ACINIC CELL CARCINOMA

34. Acinic cell tumor is tumor of: *(MHPGMCET 2002)*
a. Parotid gland b. Breast
c. Parathyroid d. Thyroid

35. Acinic cell carcinomas of the salivary gland arise most often in the: *(All India 2006)*
a. Parotid gland b. Minor salivary glands
c. Submandibular gland d. Sublingual gland

CARCINOMA PAROTID

36. Which of the following is false about salivary gland tumors?
a. Pleomorphic adenoma is MC tumor of parotid
b. Adenoid cystic carcinoma MC occurs in minor salivary glands *(DPG 2008, 2007)*
c. Warthin's tumor is MC malignant tumor of salivary glands
d. Perineural invasion is seen is adenoid cystic carcinoma

37. True statement (s) about salivary gland tumors:
a. Pleomorphic adenoma can arise in submandibular gland
b. Warthin's tumour arises from submandibular gland
c. Pleomorphic adenoma is most common tumour of submandibular gland *(PGI June 2004)*
d. Acinic cell carcinoma is most malignant
e. Frey's syndrome is due to injury of auriculotemporal nerve

38. All of the following statements about lymphoe-pithelioma of the parotid gland are true, except:
a. Parotid gland is the most common site of lymphoepithelioma in the head and neck region
b. It is associated with EBV infection *(All India 2009)*
c. It is highly radiosensitive
d. It is a type of squamous cell carcinoma

39. Most of the parotid tumor are managed by: *(All India 97)*
a. Total parotidectomy
b. Radical parotidectomy
c. Superficial parotidectomy
d. Radical parotidectomy and neck dissection

40. All of the following are true regarding malignant salivary gland tumours except: *(DNB 2010)*
a. Painful
b. Present with skin ulceration
c. Cervical lymphadenopathy
d. Simple enucleation is treatment of choice

SALIVARY GLAND STONES

41. Commonest salivary gland to get stones: *(NEET 2013, DNB 2011, 2003, DPG 2006, MCI March 2005, 2007, AIIMS Nov 99, June 99)*
a. Parotid b. Submandibular
c. Minor salivary gland d. Sublingual

42. In which one of the following conditions the sialography is contraindicated? *(All India 2005)*
a. Ductal calculus
b. Chronic parotitis
c. Acute parotitis
d. Recurrent sialedenitis

43. Treatment of submandibular salivary gland duct calculi is: *(TN 90)*
a. Excision of submandibular gland
b. Opening the duct at the frenulum
c. Opening the duct and removal of calculus
d. Excision of gland and duct

44. All of the following statement regarding stones in the submandibular gland are true except: *(MCI March 2007)*
a. 80% of stones occur in the submandibular gland
b. Majority of submandibular stones are radioluscent
c. Stones are the most common cause of obstruction within the submandibular gland
d. Patient presents with acute swelling in the region of the submandibular gland

45. Investigation using dye to find out stone in salivary gland: *(Recent Questions 2013)*
a. Sialography
b. Mammography
c. MR angiography
d. USG

46. Salivary calculi are commonly seen in ___ gland: *(APPG 2015)*
a. Submandibular
b. Sublingual
c. Parotid
d. Minor salivary glands

PAROTIDECTOMY AND COMPLICATIONS

47. After removal of parotid gland, patient is having sweating on the cheeks while eating. In this complication seen after parotidectomy, the auriculotemporal nerve which contains parasympathetic secretomotor fibers to parotid gland is fused with which nerve? *(AIIMS May 2012)*
a. Greater petrosal nerve
b. Facial nerve
c. Greater auricular nerve
d. Buccal nerve

48. Management of Frey's syndrome include following except? *(MHSSMCET 2010, 2008)*
a. Botulinum toxin
b. Temporal fascial graft
c. Aluminum chloride
d. Antiperspirants

49. The 'Starch iodine test' is useful to diagnose?
a. Wegener's granulomatosis *(MHSSMCET 2011)*
b. Cat scratch disease
c. Sarcoidosis
d. Frey's syndrome

50. Which of the following is not true regarding radical parotidectomy? *(MHSSMCET 2009)*
a. In radical parotidectomy the facial nerve is preserved
b. Anesthesia of the ear lobe due to sectioning of the great auricular nerve can occur
c. Gustatory sweating (Frey's syndrome) can occur
d. None

51. Which of the following group constitute Frey's syndrome?
a. Hyperhydrosis, enophthalmos and miosis
b. Anhidrosis, enophthalmos and miosis *(Karnataka 94)*
c. Redness and sweating over the auriculotemporal during meal
d. Pain over the distribution of the auriculotemporal nerve during meal

52. The nerve sacrificed in parotid surgery: *(DNB 2013, APPG 98)*
a. Auriculotemporal
b. Facial
c. Buccal
d. Cervico facial

PAROTID FISTULA

53. Newman and Seabrook's operation is used for:
a. Repair of parotid fistula *(PGI 79, AIIMS 84)*
b. For parotid calculi
c. For carcinoma of tongue
d. For treatment of recurrent chronic parotitis

54. Seabrook's operation is done for: *(MHSSMCET 2006)*
a. Parotid duct fistula
b. Thyroglossal fistula
c. Thyroglossal cyst
d. Branchial fistula

RANULA

55. Which of the following best represents 'ranula'?
a. A type of epulis *(AIIMS May 2005)*
b. A thyroglossal cyst
c. Cystic swelling in the floor of mouth
d. Forked uvula

56. What is ranula? *(DNB 2007, 2005, TN 91)*
a. Retention cyst of sublingual gland
b. Retention cyst of submandibular gland
c. Extravasation cyst of sublingual glands
d. Extravasation cyst of submandibular glands

57. Ranula arises from which gland? *(MHSSMCET 2010)*
a. Sublingual
b. Submandibular
c. Parotid
d. Minor salivary gland

58. Which of the following is not true about ranula?
a. Arises from sublingual salivary glands
b. Pseudocyst *(MHSSMCET 2010)*
c. Appearance is like "Frog's belly"
d. None

59. Excision of ranula is associated with injury to: *(DNB 2010, MHSSMCET 2007, PGI 96)*
a. Lingual nerve
b. Lingual artery
c. Parotid gland
d. Submandibular duct

60. Which of the following statements about 'ranula' is most correct? *(All India 2011)*
a. It is type of epulis
b. It is a cystic swelling in the floor of mouth
c. It is a type of thyroglossal cyst
d. It is a type of mucus retention cyst

SALIVARY GLANDS ANATOMY AND PHYSIOLOGY

61. True about salivary gland: *(PGI Dec 2006)*
a. There are more than 400 minor glands
b. 90% of all parotid tumors are malignant
c. 90% of minor salivary tumors are malignant
d. Superficial parotidectomy done in parotid tumors
e. Warthin's tumor common in parotid

62. Which of the following is not a landmark for facial nerve during parotid surgery? *(All India 2008)*
a. Digastric muscle
b. Inferior belly of omohyoid
c. Tragal pointer
d. Retrograde dissection of distal branch

63. The parotid duct is known as: *(APPG 84)*
a. Wharton's duct
b. Stenson's duct
c. Duct of Santorini
d. Duct of Wirsung

64. Nerve which lies in association to Wharton's duct is:
a. Hypoglossal
b. Lingual *(AIIMS 87)*
c. Facial
d. Spinal accessory

65. Inflammatory enlargement of deep lobe of parotid gland is seen in: *(PGI 81, DPG 92)*
a. Posterior pharyngeal wall
b. Supratonsillar area
c. Anterior tonsillar pillar
d. Tonsillar fossa/bed

66. Which of the following nerves lies closest of the Whartson's duct? (COMEDK 2007)
a. Hypoglossal b. Lingual
c. Chorda tympani d. Facial

67. Structure exposed after parotid surgery is: *(DPG 2008)*
a. Internal jugular vein b. Facial nerve
c. Muscles d. Facial artery

68. All of the following are anatomical markers for localization of facial nerve during parotid surgery, except: (DPG 2008)
a. Posterior belly of digastric
b. Mastoid process
c. Inferior belly of omohyoid
d. Bony external auditory meatus

69. In submandibular gland surgery, the nerve least likely to be injured is: *(DPG 2011, JIPMER 93)*
a. Inferior alveolar nerve
b. Hypoglossal nerve
c. Lingual nerve
d. Mandibular branch of facial nerve

70. Most common location of ectopic submandibular salivary gland tissue is: *(MCI Sept 2009, UPPG 2002)*
a. Cheek b. Palate
c. Angle of mandible d. Tongue

71. In surgery of submandibular salivary gland, nerve often involved: *(PGI June 97)*
a. Hypoglossal b. Glossopharyngeal
c. Facial d. Lingual

SJOGREN'S SYNDROME

72. True regarding Sjogren's syndrome are all of the following except: *(MCI Sept 2009)*
a. Autoimmune condition
b. Males are commonly affected
c. Progressive destruction of lacrimal and salivary gland
d. No single laboratory investigation is pathognomonic

73. Sjogren's syndrome refers to disease of: *(AIIMS 85)*
a. Parotid glands
b. Thyroid disease
c. Parathyroid glands
d. Multiple endocrine neoplasia

74. Biopsy of the parotid gland in a patient with Sjogren's disease shows: *(JIPMER 2011)*
a. Neutrophils b. Lymphocytes
c. Eosinophils d. Basophils

MISCELLANEOUS

75. Bacterial pyogenic parotitis affecting the parotid gland is most common after: *(MCI March 2008)*
a. Uveo-parotid fever
b. Mumps
c. Debilitation after major surgery
d. After administration of iodine

76. Bilateral parotid enlargement does not occur in: *(AIIMS Nov 96)*
a. Sjogren's syndrome b. Sarcoidosis
c. SLE d. Chronic pancreatitis

77. A bacterial pyogenic parotitis is found most commonly in which of the following? *(Orissa 99)*
a. Mumps
b. Debilitation after major surgery
c. Drug reaction (iodine mumps)
d. Uveoparotid fever

78. Sialosis refers to: *(Karnataka 2006)*
a. Bilateral parotitis
b. Sjogren's syndrome
c. Non-inflammatory parotid enlargement
d. Bilateral salivary duct ectasia

79. Ackerman's tumour is: *(DPG 2008)*
a. Mucoepidermoid carcinoma
b. Epidermoid carcinoma
c. Squamous cell carcinoma
d. Adenocarcinoma

80. Bilateral parotid enlargement is seen in: *(DNB 2008)*
a. Wegner's granulomatosis b. Sjogren's syndrome
c. Kimura's disease d. All of the above

EXPLANATIONS

SALIVARY GLAND TUMORS

1. **Ans. a. Pleomorphic adenoma** *(Ref: Bailey 26/e p732-733, 25/e p757, 761; Devita 9/e p774; Cancer of the Head and Neck by Suen and Myer 4/e p480-490)*

- **MC neoplasm** of **salivary gland: Pleomorphic adenoma**Q
- **MC malignant tumor** of salivary gland: **Mucoepidermoid carcinoma**Q
- **MC neoplasm** of salivary gland **in children: Hemangioma**Q
- **MC malignant tumor** of salivary gland **in children: Mucoepidermoid carcinoma**Q
- **MC malignant tumor** of **minor salivary glands: Adenoid cystic carcinoma**Q

- **Best diagnostic modality** for **parotid swelling: FNAC**Q
- **Open incisional biopsy** is **contraindicated**Q due to **tumor cell implantation** and formation of **parotid fistula**Q.
- **Best imaging investigation** for **salivary gland neoplasms: MRI**Q

ALL SALIVARY GLAND TUMORS ARE MOST COMMON IN PAROTID EXCEPT

- **Adenoid cystic carcinoma: MC malignant tumor** of **minor salivary glands**Q
- **Squamous cell carcinoma:** Mostly seen in **submandibular gland**Q

ETIOLOGY OF SALIVARY GLAND TUMORS

- **Radiotherapy** to head and neck (for mucoepidermoid carcinoma)Q
- **EBV** infection (for lymphoepithelial carcinoma)Q
- Exposure to **silica dust, nitrosamines**Q
- Increased risk in females with **early menarche** and **nulliparity**Q
- **Trisomy 5** in primary mucoepidermoid carcinoma of **minor** salivary glands
- Polysomy of **3 and 17** especially in **adenoid cystic carcinoma**
- **Translocation** involving chromosome **11** in mucoepidermoid carcinoma

2. **Ans. b. Pleomorphic adenoma** 3. **Ans. b. FNAC** 4. **Ans. a. Parapharygeal space**

5. **Ans. a. Facial nerve involvement indicates malignancy, b. Pleomorphic adenoma is MC variety, d. Superficial parotidectomy is the treatment of choice**

In parotid tumors, rapid growth, pain, paraesthesia, **enlarged cervical LN** and restriction of jaw movements, **facial weakness** or skin invasion and **fixation of mastoid tip** is suggestive of malignant transformation.

6. **Ans. a. Parotid gland** *(Ref: Bailey 26/e p723, 732-733, 25/e p757, 761; Devita 9/e p774-778; Cancer of the Head and Neck by Suen and Myer 4/e p480-490)*

IN SALIVARY GLAND TUMORS

- **MC site** of **minor salivary gland tumors** are oral cavity (**hard palate**)Q
- There are no minor salivary glands in the anterior half of the palate, so tumors arise on **posterolateral hard palate** and all of the **soft palate**Q
- **Malignancy varies inversely with** the **size of gland**Q (most of minor salivary gland tumors are malignant)
  - **Parotid** gland: **25%**Q malignant, **Submandibular and Sublingual gland: 50%**Q malignant, **Minor salivary glands: 75%**Q malignant
- **Open** surgical **biopsy** is **contraindicated**Q, as it can cause **tumor seeding** of the track
  - Most salivary gland tumors are **radioresistant**Q
  - **Neutron therapy** has been used in the management of **unresectable** salivary gland **tumors**Q
  - Name of incision for parotidectomy: **Sistrunk incision**Q

7. **Ans. b. Palate** *(Ref: Bailey 25/e p752; Devita 9/e p777-778; Cancer of the Head and Neck by Suen and Myer 4/e p487-489)*

- **MC malignant tumor** of **minor salivary glands: Adenoid cystic carcinoma**Q
- **MC site of origin** is in **minor salivary glands** located in **oral cavity (hard palate)** followed by **sinonasal tract**Q

PLEOMORPHIC ADENOMA

8. **Ans. a. Parotid gland is most commonly involved, c. Also called mixed tumour, e. Superficial parotidectomy is treatment of choice** *(Ref: Bailey 26/e p732, 25/e p761; Devita 9/e p774; Cancer of the Head and Neck by Suen and Myer 4/e p414)*

Pleomorphic Adenoma

- It is **MC benign** salivary gland tumor and **MC tumor** of **major salivary glands**Q.
- **MC site** is **parotid tail (superficial lobe)**Q
- Less common in the submandibular glands and sublingual glands, relatively rare in minor salivary glands.

> - Known as **mixed tumor**Q as it is composed of both **epithelial** and **mesenchymal** components
> - Encapsulated but sends **pseudopodia (finger-like projections)**Q into surrounding glands, **enucleation** is **not done** to avoid recurrence.

- Pleomorphic adenoma is **unicentric** but **recurrences are multicentric**Q
- Usually **not involve** the **facial nerve.**

Clinical Features

- Presents as **painless swelling** without any appreciable change in size, with typical site at **below, in front** and **behind** the **ear lobule**Q.
- Slow growing lobular tumor affecting **women** around **40 years.**
- Pleomorphic adenoma involving deep lobe may push the tonsil and pillars of fauces towards midline and known as **dumbbell tumor**Q with component both in neck and oral cavity.

Diagnosis

- **FNAC** is diagnosticQ

Treatment

- Superficial parotidectomy (**Patey's operation**)Q
- Excision of whole gland in cases of pleomorphic adenoma of submandibular gland

Complications

- **Malignant change (3-5%)**
  - Known as **carcinoma ex pleomorphic adenoma** or **malignant mixed tumor**
  - **Rapid growth, pain,** paraesthesia, **enlarged cervical LN** and restriction of jaw movements, **facial weakness** or skin invasion and **fixation of mastoid tip** is suggestive of malignant transformation
  - Histological findings suggestive of malignant change are microscopic foci of **necrosis, hemorrhage, calcification** and **excessive hyalinization**Q
  - Prognosis for invasive carcinoma depends on degree of local infiltration
- **Recurrence**Q, particularly after enucleation

9. **Ans. d. All of the above**
10. **Ans. b. Pleomorphic adenoma**
11. **Ans. a. Superficial parotidectomy**
12. **Ans. c. Conservative total parotidectomy**
13. **Ans. d. None** *(Ref: Robbins 8/e p758)*

- Pleomorphic adenoma arises most commonly from the parotid glandQ.
- **Pleomorphic adenoma** is **less common in** the **submandibular gland** and **sublingual glands; relatively rare in** the **minor glands**Q.

14. **Ans. c. Most common in parotid gland**
15. **Ans. c. Microscopically positive margins** *(Ref: Devita 9/e p776; Cancer of the Head and Neck by Suen and Myer 4/e p499-501)*

Indications of radiotherapy in Salivary Gland Tumors	
• **High grade** tumorsQ	• **Bone invasion**Q
• **Large** primary lesionsQ	• Cervical **LN metastasis**Q
• **Perineural invasion**Q	• **Positive surgical margins**Q

16. **Ans. b. Epithelium + Mesenchymal**
17. **Ans. a. Malignant transformation risk is high**

WARTHIN'S TUMOR

18. **Ans. c. Hot spots on Tc-99 scan** *(Ref: Bailey 25/e p761; Devita 9/e p774; Cancer of the Head and Neck by Suen and Myer 4/e p414)*

Warthin's Tumor (Papillary cystadenoma lymphomatosum)

- **Second MC benign tumor** of the **parotid gland**Q
- Derived from **salivary tissues inclusion** in **lymph nodes**Q (so can arise from cervical nodes)
- Occurs **exclusively in parotid gland**Q and almost always occur in the **lower portion of parotid**Q overlying the angle of mandible.

Warthin's Tumor (Papillary cystadenoma Lymphomatosum)

- **Second MC benign tumor** of the **parotid gland**Q
- Derived from **salivary tissues inclusion** in **lymph nodes**Q (so can arise from cervical nodes)
- Occurs **exclusively in parotid gland**Q and almost always occur in the **lower portion of parotid**Q overlying the angle of mandible.
  - Consists of **both epithelial and lymphoid elements**Q thus known as **adenolymphoma** (probably arises from remnants of parotid tissue trapped in lymph nodes within the parotid gland)
  - More common in **males**Q, in **5th to 7th decade**Q.
  - Associated with **smoking**Q, **bilateral** in **10%**Q cases, never involves facial nerve.
  - It is **well encapsulated, cystic**, extremely slow growing tumo, **never turns malignant**Q.
- Peculiar feature of Warthin's tumor: **'hot' spot in 99m Tc-pertechnate scan**Q. (Other tumors of the parotid show 'cold' spot)

Histopathology

- **Papillary cystic pattern** lined with columnar oncocytes and cuboidal cells with **marked lymphoid component**Q
- **Lined by a double layer of neoplastic epithelial cells**Q resting on a dense lymphoid stroma sometimes bearing germinal centers.
  - **The double layer of lining cells distinctive**Q, with a surface palisade of columnar cells resting on a layer of cuboidal to polygonal cells

Diagnosis

- **FNAC** is **best diagnostic modality**

Treatment

- **Superficial parotidectomy**Q

19. **Ans. a. Warthin's tumor, b. Acinic cell**
20. **Ans. a. An adenolymphoma of parotid gland**
21. **Ans. a. Superficial parotidectomy**
22. **Ans. c. Acinic cell tumour**
23. **Ans. b. Warthin tumor**

MUCOEPIDERMOID CARCINOMA

24. **Ans. b. Mucoepidermoid carcinoma** *(Ref: Bailey 26/e p732, 25/e p761; Devita 9/e p774-777; Cancer of the Head and Neck by Suen and Myer 4/e p489)*

Mucoepidermoid Carcinoma

- **MC malignant tumor** of **parotid, MC radiation induced neoplasm**Q of parotid
- **MC malignant** salivary gland tumor in children**Q**
  - Consist of admixture of **squamous cells, mucous secreting cells, intermediate cells** and **clear** or **hydropic cells**Q
  - Include two major elements- **mucin producing cells** and **epithelial cells**Q of epidermoid variety
- Greater the epidermoid content, more malignant is the behavior
- Usually **not causes facial paralysis**Q
- Of two types: Low grade and high grade

Low Grade type	High Grade Type
• Well circumscribed mass having **cystic mucinous**Q material • **Mucin producing**Q cells predominate • **Well differentiated** • More common in **children** • **TOC: Superficial** or **total** parotidectomyQ	• Grossly **infiltrative** and has less tendency to cyst formation (**hard tumor**) • **Squamous cells** predominate • **Poorly differentiated**Q • Less common • **TOC: Total parotidectomy** +/- **radical neck dissection**

25. **Ans. a. Secretory cells**
26. **Ans. c. Parotid gland**

ADENOID CYSTIC CARCINOMA

27. **Ans. c. Adenoid cystic carcinoma** *(Ref: Bailey 26/e p723, 25/e p752; Devita 9/e p777-778; Cancer of the Head and Neck by Suen and Myer 4/e p487-489)*

Adenoid Cystic Carcinoma

- **Second MC malignant tumor** after mucoepidermoid carcinoma[Q]
- **MC malignant tumor** in **submandibular, sublingual and minor salivary glands**[Q]
  - **MC site of origin** is in **minor salivary glands** located in **oral cavity (hard palate)** followed by **sinonasal tract**[Q]
  - MC type is **Cribiform pattern**[Q], and is characterized by "**Swiss-Cheese**" **appearance**[Q]
  - It has **neurotropic properties**, MC involved nerves are **facial nerve**[Q], mandibular (V3) and maxillary branches of trigeminal nerve.
- **Skip lesions**[Q] along nerves are common, leading to treatment failure, because of difficulty in treating full extent of invasion.
- May grow along **haversian system** of bone without showing bone destruction
- It is **tracherous tumor** as it appears benign even when it is malignant

Clinical Features

- Characterized by its **tendency to invade perineural tissues** and **lymphatics**, thus causes **pain** (which may be prominent and early symptom) and **facial nerve paralysis**[Q]
- High incidence of **distant metastasis** but **indolent growth**[Q]
  - Incidence of **distant metastasis** is correlated with **stage of disease** (size of primary tumor and status of LNs)
  - MC site of metastasis is **lung**, lung metastasis are **usually multiple** and **prolonged survival** without treatment is **not unusual**[Q]

Diagnosis

- Best diagnostic modality is **FNAC**[Q]
- **MRI** is **radiological IOC** as it detects **early perineural spread** and **intracranial extension**[Q]

Treatment

- **Radical excision** (irrespective of benign appearance) with **largest cuff of normal tissues** around the boundaries of tumor (poorly incapsulated with infiltrating nature)[Q].
- **Post-op radiotherapy** should be given if **margins are positive**[Q].

28. **Ans. b. Adenoid cystic carcinoma**
29. **Ans. d. None of the above** *(Ref: Bailey 25/e p752; Devita 9/e p778, 1021, 1037; Cancer of the Head and Neck by Suen and Myer 4/e p488)*

Perineural Spread is seen in	
• **Adenoid cystic carcinoma**[Q] • **CA GB**[Q] • **Cholangiocarcinoma**[Q]	• **Ductal adenocarcinoma** of pancreas[Q]

30. **Ans. b. Adenoid cystic carcinoma**
31. **Ans. c. Adenoid cystic carcinoma**
32. **Ans. b. Adenoid cystic carcinoma**
33. **Ans. b. Most common submandibular gland tumour**

ACINIC CELL CARCINOMA

34. **Ans. a. Parotid gland**
35. **Ans. a. Parotid gland** *(Ref: Devita 9/e p774; Cancer of the Head and Neck by Suen and Myer 4/e p489-490)*

Acinic Cell Carcinoma

- Rare tumors composed of cells resembling the normal **serous acinar cells**[Q] of salivary glands
- Occur almost **exclusively** in **parotid glands**[Q]
  - **Low grade** malignancy, mostly affecting **women**
  - Present as round or ovoid solitary **encapsulated** tumor
- Histologically tumor is characterized by **highly cellular structure** with relative a**bsence** of **stroma**
- Tumor tends to involve the regional **lymph nodes**
- Treatment: **Radical excision**[Q]

CARCINOMA PAROTID

36. **Ans. c. Warthin's tumor is MC malignant tumor of salivary glands**
37. **Ans. a. Pleomorphic adenoma can arise in submandibular gland, c. Pleomorphic adenoma is most common tumour of sub mandibular gland, e. Frey's syndrome is due to injury of auriculotemporal nerve**

38. Ans. a. Parotid gland is the most common site of Lymphoepethelioma in the Head and Neck region *(Ref: Devita 9/e p729, 752, 774)*

- The **most common site** of **lymphoepethelioma** is the **nasopharynx**[Q]. **Lymphoepethelioma** occurs **rarely in** the **parotid** and **submandibular glands.**

LYMPHOEPETHELIOMA

- Lymphoepethelioma: Undifferentiated carcinoma of the nasopharyngeal type
- Lymphoepethelioma is a **variant of squamous cell carcinoma**[Q] that arises in lymphoid bearing areas
- Found **most commonly in** the **nasopharynx**[Q]
- **Rarely occur** in **parotid** and **submandibular glands**[Q]

Common sites of Lymphoepethelioma in Head and Neck
• **Nasopharynx (MC site)**[Q]
• **Faucial tonsils**
• **Lingual tonsils (base of tongue)**

- Histologically the squamous component is highly undifferentiated while the lymphoid component is essentially benign (non-neoplastic lymphocytes)
- **EBV** is **commonly linked** when this tumor is located in the **nasopharynx**[Q]
- **High tendency to metastasize** and is **exquisitely radiosensitive**[Q]

Important characteristic features
• **High tendency to metastasize**[Q]
• **Extreme radiosensitivity**[Q]

39. Ans. c. Superficial parotidectomy *(Ref: Bailey 26/e p733, 25/e p762; Devita 9/e p775-777; Cancer of the Head and Neck by Suen and Myer 4/e p494-501)*

TREATMENT OF CHOICE FOR PLEOMORPHIC ADENOMA

- **In parotid gland: superficial parotidectomy**[Q]
- **In other salivary glands: excision of the affected gland**[Q]

TREATMENT OF SALIVARY GLAND TUMORS

- **Surgery**
  - Principal treatment of cancer of salivary glands is **surgical excision,** used either as a single modality or **in most cases,** in conjunction **with adjuvant radiation therapy.**

Parotid malignancies	• **Superficial parotidectomy**[Q] with preservation of facial nerve • **Total parotidectomy**[Q] with nerve preservation if **deep lobe** is **involved**
Other salivary glands	• **En-bloc excision**[Q] of tumor (involved gland)

- **Neck dissection for lymph nodes:** In clinically palpable nodes and High grade malignancies
- **Radiotherapy**

Indications of radiotherapy in Salivary Gland Tumors	
• **High grade** tumors[Q]	• **Bone invasion**[Q]
• **Large primary** lesions[Q]	• Cervical **LN metastasis**[Q]
• **Perineural invasion**[Q]	• **Positive surgical margins**[Q]

- **No role of chemotherapy** in salivary gland tumors due to **incomplete** and **short lived response without** any **survival advantage.**

40. Ans. d. Simple enucleation is treatment of choice

SALIVARY GLAND STONES

41. Ans. b. Submandibular *(Ref: Bailey 26/e p732, 25/e p755)*

SIALOLITHIASIS

- **80% of all salivary gland stones occur in submandibular gland**[Q], 10% occur in parotid, 7% in sublingual and the remainder in minor salivary glands.

• **MC site** is **Whartson's duct**[Q]> submandibular gland substance

- **Composition of stone: Calcium and magnesium phosphate** or **carbonate**[Q]
- Due to deposition of **calcium salts**, stones are **radio opaque**[Q]

Submandibular salivary gland calculi are **more common** than parotid because
• **Whartson's duct** has **long, curved and upward course** and is **hooked** by **lingual nerve** leading to **inadequate drainage**[Q] • Secretion is **more viscid**[Q] than parotid gland secretion

Clinical Features

- **Pain** and **swelling**[Q] of submandibular region, aggregated by food, classically by sucking a lemon
- **Stone impacted** in the **duct** may produce the referred **pain** in the **tongue** due to irritation of **lingual nerve,** as it hooks around the submandibular duct[Q]

Treatment

- Stone in the duct is removed by giving **incision directly over** the **stone**[Q] in long axis
- **Excision** of **submandibular gland**[Q] when stone is in the gland substance

42. **Ans. c. Acute parotitis** *(Ref: Bailey 25/e p755)*

Sialography (Ptyalography)

- Contrast X-ray examination of salivary glands and duct

Indications	Contraindications
• Salivary duct **stones** and **strictures**[Q] • **Chronic sialedenitis**[Q] • **Tumors** of salivary glands	• **Contrast allergy**[Q] • **Acute sialedenitis**[Q]

43. **Ans. c. Opening the duct and removal of calculus**

44. **Ans. b. Majority of submandibular stones are radioluscent**

45. **Ans. a. Sialography** *(Ref: Sutton's radiology 7/e p535, Bailey & Love 25/e p760)*

46. **Ans. a. Submandibular**

PAROTIDECTOMY AND COMPLICATIONS

47. **Ans. c. Greater auricular nerve** *(Ref: Grays 40th/436; Bailey 26/e p734, 25/e p763-764)*

- **"Cross innervation** between **somatic sensory supply** (**greater auricular**) and **parasympathetic secretomotor fibers** to the parotid is considered to be part of the anatomical basis for the phenomenon of **gustatory sweating** (**Frey's syndrome**) seen after parotid surgery, when the nerve is at risk of injury."

Complications of Parotidectomy

- **Facial nerve paresis or paralysis**[Q]
- **Sensory abnormalities** associated with sacrifice of **greater auricular nerve**[Q]
- **Frey's syndrome**[Q]
- **Salivary fistula**[Q]

48. **Ans. b. Temporal fascial graft** *(Ref: Bailey 25/e p763-764; Cancer of the Head and Neck by Suen and Myer 4/e p498)*

Frey's syndrome or Auriculotemporal syndrome (Gustatory sweating)

- It results from **damage** of the **auriculotemporal**[Q] nerve during dissection in parotidectomy
- **Aberrant cross innervations** between **secretomotor parasympathetic fibers** of the parotid gland and **sympathetic fibers** supplying the **sweat gland**[Q]

Clinical Features

- **Sweating** and **erythema** over the region of the parotid glands as a consequence of autonomic stimulation of salivation by smell or taste of food.

Diagnosis

- **Minor's starch iodine test**[Q]

Treatment

- **Antiperspirant** (**aluminium chloride**) application
- **Botulinum toxin** treatment is used for symptomatic **Frey's syndrome**
- **Surgical interruption** of secretary fibers by **tympanic neurectomy, in non-responding cases**

49. **Ans. d. Frey's syndrome**

50. **Ans. a. In radical parotidectomy the facial nerve is preserved** *(Ref: Bailey 26/e p734, 25/e p763; Cancer of the Head and Neck by Suen and Myer 4/e p495)*
    - **Radical parotidectomy: Facial nerve is sacrificed,** particularly if there is a reasonable prospect of cure.

RADICAL PAROTIDECTOMY

- **Radical parotidectomy** envolves **resection of all parotid gland tissue** and **elective sectioning of facial nerve** usually through the main trunk.

51. **Ans. c. Redness and sweating over the auriculotemporal during meal**

52. **Ans. b. Facial**

PAROTID FISTULA

53. **Ans. a. Repair of parotid fistula**

54. **Ans. a. Parotid duct fistula** *(Ref: Cancer of the Head and Neck by Suen and Myer 4/e p498)*

Parotid Fistula

- Internal fistula opens inside the mouth and doesn't give rise to symptoms
- **External fistula:** gland fistula or duct fistula

Causes

- **Rupture of parotid abscess**Q
- **Inadvertent incision** during **drainage of parotid abscess**Q
- Penetrating injury
- After **superficial parotidectomy**Q

Clinical Presentation

- When the external fistula is **connected** to the **gland, external opening** is **pinpoint**, though discharge is present for several months, usually **closes spontaneously.**
- When external fistula is **connected** with **major duct**, there is **outpouring** of **parotid secretions** onto cheek during meals with **excoriation** of surrounding skin

Diagnosis

- **Sialography** or **sialogram**

Treatment

- **Newman** and **Seabrock's operationQ** (in cases of fistula connected with main duct, this operation reconstructs the duct)

RANULA

55. **Ans. c. Cystic swelling in the floor of mouth** *(Ref: Bailey 25/e p754)*

Ranula

- A **cystic swelling in** the **floor of mouth** that resembles a **frog belly**Q**.**
- Term ranula should only be applied to a **mucous extravasation cyst** that arises from the **sublingual gland**Q

Etiology

- **Commonly** the lesion is induced by **local trauma** and **duct rupture,** followed by mucin spillage into the surrounding soft tissues (**mucous extravasation phenomenon**)Q
- Uncommonly, it is due to **obstruction**, probably caused by mucous plug or a sialolith

Histopathology

- Mucin accumulation surrounded by granulation and fibrous tissue (**mucous extravasation phenomenon**)Q
- A cyst cavity, filled with mucin and lining by the ductal epithelium (mucous retention cyst)Q
- Chronic inflammation of the cyst wall is present. Infiltration by numerous neutrophils, histiocytes, and plasma cells are commonQ.

Clinical Features

- **Exclusively** present on the **floor of mouth**Q
- **Usually unilateral**, lateral to midlineQ
- **Smooth, dome shape, fluctuating** and **painless** swellingQ

- The color is usually **bluish**, but deep lesions may have a normal color.
- The size varies from a few to several centimeters in diameter. Very large lesions which may occupy the floor of mouth can also occur.

Diagnosis

- Diagnosis is usually made **clinically**Q.

Treatment

- **Surgical removal** or **marsupialization**Q**.**

Plunging ranula

- **Intraoral ranula** with **cervical prolongation**Q**.**
- Plunging ranula **extends from** the **floor** of the mouth below the mylohyoid **into** the **neck**.
- This is nearly always an **extravasation pseudocyst.**
- Presents as **soft painless, ballottable mass** with **cross fluctation**Q**.**

56. Ans. c. Extravasation cyst of sublingual gland

57. Ans. a. Sublingual

58. Ans. d. None

59. Ans. d. Submandibular duct *(Ref: Clinical Surgery by Rob's and Smith vol-9/56)*

The **treatment of ranula** constitutes a problem, owing to technical **difficulty of complete excision without damage to adjacent structures such as submandibular duct.**

60. Ans. b. It is a cystic swelling in the floor of mouth

SALIVARY GLANDS ANATOMY AND PHYSIOLOGY

61. Ans. a. There are more than 400 minor glands, c. 90% of minor salivary glands are malignant, d. Superficial parotidectomy done in parotid tumors, e. Warthin's tumor common in parotid *(Ref: Bailey 26/e p723, 25/e p752)*

Minor salivary glands

- The mucosa of the oral cavity contains approximately **450 minor salivary glands**Q**.**
- They are distributed in the mucosa of the **lips, cheeks, palate, floor of the mouth** and **retromolar area**Q**.**
- These minor salivary glands also appear in other areas of the **upper aerodigestive tract**Q including the oropharynx, larynx and trachea as well as the sinuses.
- Overall, they **contribute to 10%** of the **total salivary volume**
- Their **secretion is mainly mucous**Q in nature and has many functions such as coating the oral cavity with saliva.

62. Ans. b. Inferior belly of omohyoid *(Ref: Bailey 26/e p734, 25/e p763)*

Major Surgical Landmarks to the Facial Nerve

- **Tympanomastoid suture line (most constant** landmark)Q
- **Tragal pointer**Q
- **Posterior belly of digastric**Q
- **Retromandibular vein**Q
- **Styloid process**Q

63. Ans. b. Stenson's duct *(Ref: Bailey 26/e p723, 726, 729, 25/e p752-754; Cancer of the Head and Neck by Suen and Myer 4/e p495)*

Salivary Glands Anatomical Features

- Parotid gland: **Serous acini**Q
- Submandibular gland: **Mucus + Serous acini**Q
- Sublingual + minor salivary glands: **Mucinous acini**Q

  - **Parotid gland: Stenson's duct**Q (opens at upper **2nd molar** tooth**Q**)
  - **Submandibular gland: Wharton's duct**Q (opens into the papilla just **lateral** to the **frenulum**Q)
  - **Sublingual gland: Ducts of Rivinus**Q**, Bartholin duct**Q

- Sublingual gland secretes via tiny openings, **ducts of Rivinus** directly into the floor of mouth or via several ducts which unite to form the common **sublingual duct of Bartholin**, which then **merges with Wharton's duct.**

64. Ans. b. Lingual *(Ref: Bailey 26/e p726, 25/e p755)*

Lingual nerve lies in a **close association with submandibular duct** and **most prone to damage during submandibular gland surgery.**

Submandibular Gland

- The **deep part** of the gland **lies on** the **hyoglossus muscle closely related to the lingual nerve** and **inferior** to **the hypoglossal nerve**Q.
- **Submandibular duct lies between** the **lingual** and **hypoglossal nerves** on hyoglossus, but, at the **anterior border** of the muscle, it is **crossed laterally by the lingual nerve**Q, terminal branches of which ascend on its medial side.

Management of Sialolithiasis

- If the **stone is lying within** the **submandibular duct** in the **floor of the mouth** anterior to the point at which the **duct crosses the lingual nerve** (second molar region), the **stone** can be **removed** by **incising longitudinally over** the **duct**Q.
- Once the stone has been delivered, the wall of the duct should be left open to promote free drainage of saliva.
- Suturing the duct will lead to stricture formation and the recurrence of obstructive symptoms.
- Where the **stone** is **proximal to the lingual nerve**, i.e. at the hilum of the gland, **stone retrieval via an intraoral approach** should be **avoided** as there is a **high risk of damage** to the **lingual nerve**Q during exploration in the posterior lingual gutter. **Treatment** is by **simultaneous submandibular gland excision** and **removal of the stone** and **ligation of the submandibular duct** under direct visionQ.

65. Ans. d. Tonsillar fossa/bed *(Ref: BDC 4/e pvol III/136, 217)*

- Parotid gland is related to lateral pharyngeal wall. Tonsillar fossa is present in lateral pharyngeal wall.

66. Ans. b. Lingual

67. Ans. b. Facial nerve *(Ref: Bailey 26/e p734, 25/e p758)*

Structure exposed after parotid surgery is facial nerve.

- **Superficial parotidectomy**: The dissection is made in the **Patey's facio-venous plane** and commenced at the **postero-inferior border of the parotid gland**, where the **main trunk of the facial nerve is found out**Q.
  - **Radical parotidectomy: Facial nerve is sacrificed**, particularly if there is a reasonable prospect of cureQ.

68. Ans. c. Inferior belly of Omohyoid

69. Ans. a. Inferior alveolar nerve *(Ref: Bailey 25/e p755)*

Important anatomical relationships of the submandibular glands	
• **Lingual nerve**Q • **Hypoglossal nerve**Q • Anterior **facial vein**Q	• **Facial artery**Q • **Marginal mandibular branch** of the **facial nerve**

70. Ans. c. Angle of mandible *(Ref: Bailey 26/e p726, 25/e p755)*

Ectopic/Aberrant Salivary Gland Tissue

- **MC ectopic salivary tissue** is the **Stafne bone cyst.**
- This presents as an **asymptomatic, clearly demarcated radiolucency** of the **angle of the mandible**, characteristically **below the inferior dental neurovascular bundle**Q.
- It is formed by **invagination into the bone** on the lingual aspect of the mandible **of an ectopic lobe** of the **juxtaposed submandibular gland**Q.
- **No treatment** is requiredQ.

71. Ans. a. Hypoglossal, c. Facial, d. Lingual

SJOGREN'S SYNDROME

72. Ans. b. Males are commonly affected *(Ref: Robbins 8/e p222; Bailey 26/e p737, 25/e p766; Harrison 18/e p2770-2772)*

Sjögren Syndrome

- Chronic disease characterized by **dry eyes (keratoconjunctivitis sicca)** and **dry mouth (xerostomia)** resulting from **immunologically mediated destruction** of the **lacrimal** and **salivary glands**Q.
- It occurs as an **isolated disorder** (**primary form**), also known as the **sicca syndrome** or more often **in association with another autoimmune disease (secondary form)**Q.
- **Rheumatoid arthritis** is the **MC** associated disorderQ

Pathology

- Characterized by **lymphocytic infiltration** and **fibrosis** of the **lacrimal** and **salivary glands**Q.
- **Earliest histologic finding** in both the major and minor salivary glands is **periductal** and **perivascular lymphocytic infiltration**Q.

> - **Most important antibodies:** Directed against **SS-A (Ro)** and **SS-B (La)**Q, which can be detected in 90% of patients (**serologic markers**Q of the disease)
> - Patients with **high titers of antibodies to SS-A** are **more likely to have early disease onset, longer disease duration,** and **extraglandular manifestations**Q.

Clinical Features

- Occurs **most commonly in women**Q between the ages of **50** and **60**.
- **Characteristic symptoms: Keratoconjunctivitis** and **xerostomia**Q
- **Parotid gland enlargement** is present in **half of** the **patients**Q
- **Extraglandular disease** are seen **in one third** of patients

Diagnosis

- **Biopsy of** the **lip (to examine minor salivary glands)** is **essential for** the **diagnosis of Sjögren syndrome**Q.

73. Ans. a. Parotid glands **74. Ans. b. Lymphocytes**

MISCELLANEOUS

75. Ans. c. Debilitation after major surgery *(Ref: Bailey 26/e p730, 25/e p759-760)*

Acute Suppurative Parotitis

- Characterized by **presence of pus** and seen in **debilitated/ dehydrated/** or in **patients with poor oral hygiene**Q.
- **MC organism** (responsible for): **Staph. aureus**Q

Treatment

- Initial treatment is **proper hydration/ antibiotics/ improving oral hygiene**Q.
- If **abscess** develops then it is **drained**Q by giving a J shaped incision.

76. Ans. c. SLE *(Ref: Harrison 18/e p2108)*

Causes of Bilateral Parotid Enlargement	
• **Viral infections:** – **Mumps**Q – Influenza – **Epstein-Barr virus**Q – **Coxsackie virus A**Q – **Cytomegalovirus**Q – **HIV**Q • **Sarcoidosis**Q • **Amyloidosis**Q • **Kimura's disease**	• **Wagner's Granulomatosis** • **Sjögren's syndrome**Q • **Metabolic:** – **Diabetes mellitus**Q – Hyperlipoproteinemias – **Chronic pancreatitis**Q – **Hepatic cirrhosis**Q • **Endocrine:** – **Acromegaly**Q – Gonadal hypofunction

77. Ans. b. Debilitation after major surgery

78. Ans. c. Non-inflammatory parotid enlargement *(Ref: Bailey 25/e p766)*

Sialosis

- **Sialosis** is an uncommon **non-neoplastic** and **non-inflammatory disorder** causing **bilateral non-painful enlargement of** the **major salivary glands**Q.

79. Ans. c. Squamous cell carcinoma *(Ref: Oxford textbook of oncology, Vol. I/1995/1046)*

Ackerman's tumour is a distinct variant of well-differentiated squamous cell carcinoma.

Ackerman's Tumour

- Ackerman's tumour is a **distinct variant** of **well-differentiated SCC** that may develop **in any mucosal surface in** the **upper respiratory** and **digestive tract**Q.
- It is also called as **verrucous carcinoma**Q.

- **Most verrucous carcinoma** are reported within the **oral cavity**[Q] but they make up 1-2% of malignant laryngeal tumours within the larynx.
- Verrucous carcinomas occur **mainly in the elderly patients**[Q].
- Verrucous carcinomas may be **multifocal** and **warty** in their **appearance**[Q].

- The **pushing infiltrating margins** are characteristic of verrucous carcinomas.
- Lymphatic spread is rare.

Risk Factors for Verrucous Carcinoma

- Frequent use of **tobacco (MC)**[Q]
- **HPV infection**[Q]

Histology

- Well-differentiated, keratinising epithelium, with few mitotic figures and no cellular atypia.

Treatment

- **Surgery** is the **treatment of choice.**

80. Ans. d. All of the above

CHAPTER 37

Neck

MULTIPLE CHOICE QUESTIONS

CAROTID BODY TUMOR

1. True about carotid body tumour is: *(UPPG 2010)*
a. Origin from non chromaffin tissue
b. Most commonly is seen with people live at high altitude
c. Family history positive
d. FNAC is diagnostic
e. Painful non mobile lump in the neck

2. A 40-years old patient is suffering from carotid body tumor. Which of the following is the best choice of treatment for him? *(AIIMS Nov 2004)*
a. Excision of tumor
b. Radiotherapy
c. Chemotherapy
d. Carotid artery ligation both proximal and distal to the tumor

3. True about carotid body tumor: *(PGI June 2004)*
a. Arises from pharyngeal wall
b. Arises from baroreceptor cells
c. Commonly seen in high altitude habitants
d. 10% have family history
e. FNAC is diagnostic

4. True statement about carotid body tumor is: *(PGI June 2002)*
a. Non-chromaffin paraganglioma
b. Good prognosis
c. Rarely metastasizes
d. Similar to mixed parotid tumor

5. Carotid body tumour: *(PGI Dec 2005)*
a. Arises from the endothelial cells
b. Originates from the schwann cells
c. Radiotherapy is the treatment of choice
d. May metastasize

6. True about carotid body tumour is: *(DPG 2006)*
a. Arises from schwann cell
b. Causes hypertension
c. Arises from endothelial cell
d. None of the above

7. Main problem associated with carotid body tumor operation is: *(MHPGMCET 2001)*
a. The tumor blends with jugular vein
b. The tumor blends with bifurcation of carotid artery
c. Recurrence
d. Vasovagal shock

8. Which one is not true regarding carotid body tumour?
a. Unilateral *(AIIMS June 97)*
b. Surgical resection is the treatment
c. Non-chromaffin paraganglioma
d. Middle age group is affected

CYSTIC HYGROMA

9. Cystic hygroma may be associated with: *(MCI March 2005)*
a. Turner's syndrome
b. Klinefelter's syndrome
c. Down's syndrome
d. All of the above

10. Brilliantly translucent swelling in the neck region in a 2 years child diagnosis is: *(UPPG 2009)*
a. Lipoma
b. Teratoma
c. Cystic hygroma
d. Thyroglossal cyst

11. Which is incorrect about cystic hygroma? *(APPG 2008)*
a. Brilliantly translucent
b. Radiotherapy
c. Sclerotherapy with bleomycin
d. Sclerotherapy with actinomycin

12. All are true about cystic hygroma except:
a. Pulsatile *(AMU 95, DPG 2010)*
b. May cause respiratory obstruction
c. Common in neck
d. Present in birth

13. True about cystic hygroma: *(DPG 2008)*
a. Present in anterior triangle of neck
b. Sclerosing agents are not useful
c. Pre-operative MRI is crucial
d. Surgery is always indicated

14. Treatment of cystic hygroma includes: *(PGI May 2011)*
a. Complete excision
b. Marsupialization
c. Repeated aspiration
d. Injection of sclerosing agents
e. Observation or regular follow up

15. Cystic hygroma is known to occur in all except: *(Karnataka 2005, MHPGMCET 2002)*
a. Calf
b. Neck
c. Axilla
d. Mediastinum

16. Treatment of choice for cystic hygroma: *(DNB 2013, MHPGMCET 2007)*
a. Percutaneous aspiration
b. Intralesional sclerosant injection
c. En-bloc resection
d. Surgical excision

17. Which of the following is false regarding cystic hygroma?
a. Brilliantly translucent lesion *(MHPGMCET 2008)*
b. Surgical excision is treatment of choice
c. Recurrence is common with percutaneous Picibanil therapy
d. A cystic lesion containing blood filled spaces

18. True regarding cystic hygroma is: *(AIIMS Nov 93)*
a. Non transilluminant
b. Lined by columnar epithelium
c. Lined by stratified squamous epithelium
d. Develops from jugular lymphatic sequestration

19. All are true about cystic hygroma except:
a. Aspiration is diagnostic *(Punjab 2009, PGI Dec 99)*
b. 50% present at birth
c. Presents as posterior cervical swelling
d. Sequestration of lymphatic tissue

20. True about cystic hygroma: *(PGI Dec 2000)*
a. Congenital sequestration of lymphatics
b. Resolves spontaneously by 5 years of age
c. Common in upper 1/3rd of lateral neck
d. Surgery is the treatment of choice

21. Cystic compressible, translucent swelling in the posterior triangle of neck: *(DNB 2008, All India 89)*
a. Cystic hygroma b. Branchial cyst
c. Thyroglossal cyst d. Dermoid cyst

22. Cystic hygroma: *(SCTIMS 98)*
a. Should be left alone
b. Excision of cyst at an early age
c. Spontaneous regression
d. Manifests in 2nd - 3rd decade

23. Earliest tumour to appear after birth is: *(JIPMER 87)*
a. Sternomastoid tumour b. Cystic hygroma
c. Branchial cyst d. Lymphoma

BRANCHIAL CYST AND FISTULA

24. True about branchial cyst: *(PGI Nov 2011)*
a. Arise from lower third of sternocleidomastoid
b. Peak age of presentation is 3rd decade
c. Cyst wall consists of lymphoid tissue
d. Fluid contains cholesterol crystal
e. Lined by squamous epithelium

25. Most frequent site of branchial cyst is at: *(MHSSMCET 2005)*
a. Upper third of posterior border of Sternocleidoma-stoid
b. Lower third of anterior border of Sternocleidoma-stoid
c. Upper third of anteromedial border of Sternocleidomastoid
d. Supraclavicular fossa

26. True about branchial anomaly: *(AIIMS Nov 2006)*
a. Cysts are more common than sinuses
b. For sinuses surgery is not always indicated
c. Cysts present with dysphagia and hoarseness of voice
d. Most commonly due to 2nd branchial remnant

27. True about branchial cyst: *(PGI June 2007)*
a. Seen deep to lower 1/3rd of sternocleidomastoid
b. Wall consists of lymphoid tissue
c. Filled with straw colored fluid with cholesterol crystals
d. Presents at birth

28. What is true about branchial cyst? *(DPG 2007)*
a. Present in anterior triangle of neck
b. Cauterization is done
c. Arises from 2nd cleft
d. Present in lower 3rd of neck

29. Branchial cyst arises from which branchial cleft?
a. First b. Second *(MCI Sept 2009)*
c. Third d. Fourth

30. The commonest site of branchial cysts is: *(All India 94)*
a. Upper 1/3rd of the SCM
b. Lower 1/3rd of the SCM
c. Upper 2/3rd of the SCM
d. Lower 2/3rd of the SCM

31. The most common site of the internal opening of a branchial fistula is at the: *(UPSC 95)*
a. Lateral nasopharyngeal wall
b. Fossa of Rosenmuller
c. Gingivo-labial sulcus
d. Tonsillar fossa

32. Commonest treatment of branchial cyst: *(HPU 2005)*
a. Cystectomy b. Aspiration
c. Excision d. Nothing done

THYROGLOSSAL CYST AND FISTULA

33. Excision of the hyoid bone is done in: *(HPU 2005)*
a. Branchial cyst b. Branchial fistula
c. Thyroglossal cyst d. Sublingual dermoids

34. Which is never a cause of thyroglossal fistula?
a. Infection of thyroglossal cyst *(PGI 81, AIIMS 85)*
b. Inadequate removal of thyroglossal cyst
c. Congenital
d. None of the above

35. Thyroglossal fistula develops due to: *(Kerala 91)*
a. Developmental anomaly
b. Injury
c. Incomplete removal of thyroglossal cyst
d. Inflammatory disorder

CERVICAL RIB

36. Regarding cervical rib, which statement is correct? *(AIIMS 81, PGI 82)*
a. It always connects to the scalene tubercle by a fibrous band
b. It passes through the apex of the supraclavicular triangle
c. It causes pressure on the ulnar nerve
d. Pain is often located in the forearm

37. Adson's test is positive in: *(Kerala 89)*
a. Cervical rib b. Cervical spondylosis
c. Cervical fracture d. Cervical dislocation

NECK DISSECTION

38. Structures not removed in radical neck dissection:
a. X nerve *(PGI June 2007)*
b. XI nerve
c. Tail of parotid
d. Parotid and post-auricular nerve

39. Structures preserved in radical neck dissection is: *(All India 2000)*
a. Vagus nerve b. Submandibular gland
c. Sternocleidomastoid d. Internal Jugular Vein

40. Which structure is preserved during modified radical neck dissection? *(DNB 2004)*
a. Phrenic nerve b. Submandibular gland
c. Sternocleidomastoid d. Thoracic duct

41. In Post radical neck dissection shoulder syndrome, all are seen except: *(AIIMS Nov 2008)*
a. Restricted range of movement
b. Pain
c. Shoulder drooping
d. Normal electromyographic finding

42. Modified radical dissection of neck all structures are preserved except: *(UPPG 2010)*
a. Sternomastoid b. External jugular vein
c. Internal jugular d. Spinal accessory

43. Level V cervical nodes includes: *(MCI Sept 2007)*
a. Upper jugular nodes b. Middle jugular nodes
c. Lower jugular nodes d. Posterior triangle nodes

44. In radical neck dissection, which structure is not removed?
a. Cervical group of lymph nodes *(MCI March 2005)*
b. Sternocleidomastoid muscle
c. Internal jugular vein
d. None of the above

45. Radical neck dissection included all except: *(MHSSMCET 2005)*
a. Sternocleidomastoid
b. Accessory nerve
c. Level III lymph nodes
d. Jugular vein

46. Posterior triangle LN is what level? *(MHSSMCET 2009)*
a. Level I
b. Level II
c. Level V
d. Level IV

47. In extended supraomohyoid neck dissection, lymph lode dissection is done upto: *(MHSSMCET 2010)*
a. 2
b. 3
c. 4
d. 5

48. Structures preserved in modified radical neck dissection: *(PGI May 2011)*
a. Accessory nerve
b. Sternocleidomastoid muscle
c. Submandibular gland
d. Internal jugular vein
e. Omohyoid muscle

49. Structures not removed in functional neck dissection is: *(AIIMS Nov 93)*
a. Carotid artery, vagus nerve
b. Sternomastoid muscle, internal jugular vein
c. Spinal accessory nerve, submandibular salivary gland
d. Neck nodes

50. Structures preserved in functional radical dissection of the neck: *(AIIMS 87)*
a. Internal jugular vein
b. Sternomastoid
c. Lymph nodes
d. Accessory nerve

51. Radical dissection of neck includes all except: *(JIPMER 80, DPG 89)*
a. Cervical lymph nodes
b. Sternocleidomastoid
c. Phrenic nerves
d. Internal jugular vein

52. A nerve injured in radical neck dissection leads to loss of sensation in medial side of the arm, nerve injured is: *(DNB 2014)*
a. Long thoracic nerve
b. Thoracodorsal nerve
c. Dorsal scapular nerve
d. Medial cutaneous nerve of arm

CA LARYNX

53. Precancerous lesion of the larynx include: *(PGI 87)*
a. Keratosis laryngis
b. Pachydermia laryngis
c. Laryngis sicca
d. Sclerma

CA NASOPHARYNX

54. Trotters triad is seen in: *(PGI 85)*
a. Angiofibroma
b. Nasopharyngeal carcinoma
c. Laryngeal carcinoma
d. Growth in fossa of Rosenmuller

55. Which of the following is the most common tumour to produce metastasis to cervical lymph nodes? *(UPSC 2008)*
a. Glottic carcinoma
b. Nasopharyngeal carcinoma
c. Carcinoma base of tongue
d. Carcinoma lip

56. Secondaries in the neck with no obvious primary malignancy is most often due to: *(JIPMER 93)*
a. CA Stomach
b. CA Larynx
c. CA Nasopharynx
d. CA Thyroid

MISCELLANEOUS

57. True about superior sulcus tumor: *(DPG 2007)*
a. Anhidrosis in thoracic region
b. Pain in upper aspect of arm
c. Flexor atrophy
d. 2nd and 3rd rib erosion

58. In which of the following head and neck cancers, is lymph node metastasis least common? *(AIIMS May 2008)*
a. Tongue
b. Buccal mucosa
c. Hard palate
d. Lower alveolus

59. Blow out carotid is characteristically seen with: *(AIIMS Nov 98)*
a. Thyroidectomy
b. Radical neck dissection
c. Flap necrosis
d. Sistrunk operation

60. Which of the following does not move on deglutition? *(All India 91)*
a. Subligual dermoid
b. Thyroid nodule
c. Pretracheal lymph node
d. Thyroglossal cyst

61. An elderly male presents with 4 × 5 cm lump in right neck. FNAC revealed it to be squamous cell carcinoma. No primary was found. A diagnosis of unknown primary was made. According to AJCC system or classification, the TNM staging of tumour would be: *(JIPMER 2014, AIIMS May 2013)*
a. T1N2M0
b. T0N2aM1
c. T1N2cM0
d. T0N2aMx

EXPLANATIONS

CAROTID BODY TUMOR

1. **b. Most commonly is seen with people live at high altitude; c. Family history positive** *(Ref: Sabiston 19/e p814-815; Schwartz 10/e 678, 849, 9/e p721-723; Bailey 26/e p704, 25/e p732; Devita 9/e p772-773)*

Carotid body tumor (Chemodectoma)

- Arises from the **chemoreceptor cells**[Q] on the **medial side** of carotid bulb
- Histologically it is a **non-chromaffin paraganlioma**[Q]
- Usually **benign, unifocal** and **nonhereditary, Schamblin classify is used for carotid body tumour**
- Associated with **pheochromocytoma**[Q]
  - **Higher incidence** in areas where **people live at high altitudes** because of **chronic hypoxia** leading to **carotid body hyperplasia**.

Clinical features

- Present most commonly in the **5th decade**[Q]
- Approximately **10%** have **family history**[Q].
- Patient presents with a **long history** of several years of a **slowly enlarging painless lump** at the **carotid bifurcation**.
- Mass is **firm, rubbery, pulsatile** and is **mobile from side to side** but not up and down
- A **bruit**[Q] may also be present

Diagnosis

- Doppler study
- **Carotid angiogram**: **Lyre sign**[Q] (**splaying** of the **internal** and **external** carotid arteries)
- **FNAC** and **biopsy** are **contraindicated**[Q] because of their **highly vascular nature**

Treatment

- Because these tumors **rarely metastasize**[Q] and their **overall rate of growth** is **slow**, the need for **surgical removal** must be **considered carefully** as complication of surgery are potentially serious.
- **Operation** is **best avoided in elderly patients**[Q].
- **Preoperative embolization** is performed for tumors **>3 cm**.
- Tumors **>5 cm** are associated with a need for **concurrent carotid artery replacement**.

Complications

- **Most frequent sequela from resection: Cranial nerve injury (MC-superior laryngeal nerve**[Q])
- **First-bite syndrome**[Q]**: Pain** with the **initiation of mastication**
- **Excision of bilateral carotid body tumors** may lead to **baroreceptor failure**, with **wide fluctuations in BP.**

2. **Ans. a. Excision of tumor**
3. **Ans. c. Commonly seen in high altitude habitants; d. 10% have family history**
4. **Ans. a. Non-chromaffin paraganglioma; b. Good prognosis; c. Rarely metastasizes**
5. **Ans. d. May metastasize**
6. **Ans. d. None of the above**
7. **Ans. b. The tumor blends with bifurcation of carotid artery**
8. **Ans. None**

CYSTIC HYGROMA

9. **Ans. a. Turner's syndrome** *(Ref: Sabiston 19/e p1819; Schwartz 10/e 598, 1852, 9/e p1415; Bailey 26/e p701, 25/e p729)*

Cystic hygroma

- Cystic hygromas are **multiloculated cystic spaces**[Q] lined by endothelial cells
- It results due to **sequestration of** a portion of the **jugular lymph sac from** the **lymphatic system**[Q]**.**
- **Cysts** are **filled with clear lymph** and are **lined by endothelium**[Q].
- **Turner's syndrome** is associated with cystic hygroma[Q].
- **Most** cystic hygromas **involve** the **lymphatic jugular sacs**

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- **Cysts** are **filled with clear lymph** and are **lined by endothelium**[Q].
- **Turner's syndrome** is associated with cystic hygroma[Q].
- **Most** cystic hygromas **involve** the **lymphatic jugular sacs**

> - **MC site: Posterior neck region**[Q]
> - Other **common sites**: **Axilla, mediastinum, inguinal** and **retroperitoneal regions**[Q]
> - Approximately **50%** of them **present at birth**[Q]
> - It may show **spontaneous regression**[Q]

Clinical Features

- Usually present as **soft cystic masses** that distort the surrounding anatomy, can result in acute airway obstruction.
- Usually **manifests in** the **neonates** or in **early infancy**[Q] (**50%** present **at birth**).
- Prone to **infection** and **hemorrhage** within the mass.
- Swelling is **soft** and **partially compressible** and invariably increases in size when the child coughs or cries.

> - **Characteristic features: Brilliantly translucent**[Q]

Diagnosis

- **MRI** play a **crucial role in preoperative planning**[Q]

Treatment

- **Complete surgical excision** is the **preferred treatment**[Q].
- **Injection of sclerosing agents**[Q] such as **bleomycin** or **OK-432 (Picibanil)**, derived from **Streptococcus pyogenes** may eradicate the cystic hygroma.

10. **Ans. c. Cystic hygroma**
11. **Ans. b. Radiotherapy**
12. **Ans. a. Pulsatile**
13. **Ans. c. Pre-operative MRI is crucial**
14. **Ans. a. Complete excision, d. Injection of sclerosing agents**
15. **Ans. a. Calf**
16. **Ans. d. Surgical excision**
17. **Ans. d. A cystic lesion containing blood filled spaces**
18. **Ans. d. Develops from jugular lymphatic sequestration**
19. **Ans. a. Aspiration is diagnostic**
20. **Ans. a. Congenital sequestration of lymphatics), d. Surgery is the treatment of choice**
21. **Ans. a. Cystic hygroma**
22. **Ans. b. Excision of cyst at an early age**
23. **Ans. b. Cystic hygroma**

BRANCHIAL CYST AND FISTULA

24. **Ans. b. Peak age of presentation is 3rd decade; c. Cyst wall consists of lymphoid tissue; d. Fluid contains cholesterol crystal; e. Lined by squamous epithelium** *(Ref: Sabiston 19/e p834; Schwartz 10/e 1602,598,1602, 9/e p1414-1415; Bailey 26/e p700-701, 25/e p727-729)*

Branchial Cleft Remnants

- **Branchial cleft remnants** typically present as a **lateral neck mass**[Q] on a toddler.
- Structures of the head and neck are derived from **6 pairs of branchial arches**, their intervening **clefts** and **pouches.**
- **Congenital cysts, sinuses,** or **fistulas** result from **failure of these structures to regress**, **persisting in** an **aberrant location**.

> - **All branchial remnants** are **present at the time of birth**; however, they are **often not recognized** until later in life.
> - These lesions may present as **sinuses, fistulas**, or **cartilaginous rests in infants**[Q].
> - They occur **more commonly as cysts** in **older children** and **adolescents**[Q].

- Clinical presentation may range from a continuous mucoid drainage from a fistula or sinus to the development of a cystic mass[Q] that may become infected.
- **Branchial remnants** may also be palpable as **cartilaginous lumps** or **cords**[Q] corresponding with a fistulous tract. Dermal pits or skin tags may also be evident.

Branchial Abnormalities

Branchial Cyst

- Develops from the **vestigial remnants of 2nd branchial cleft**[Q]
- Lined by **squamous epithelium**[Q]
- Contains **thick, turbid fluid** full of **cholesterol crystals**[Q].
- Cyst usually **presents in** the **upper neck** in **early** or **middle adulthood**[Q]
- Found at the **junction of upper third** and **middle third** of the **SCM muscle** at its **anterior border**[Q].
- **Fluctuant swelling** that may transilluminate and is often **soft** in its early stages[Q].
- **USG** and **FNAC aid diagnosis**
- **Treatment** is by **complete excision**[Q]

Branchial Fistula

- Branchial fistula may be **unilateral** or **bilateral**[Q]
- Thought to represent a **persistent 2nd branchial cleft**[Q].
- Tract is **lined by ciliated columnar epithelium**[Q]
- There may be a small amount of **recurrent mucous** or **mucopurulent discharge** onto the neck[Q].
- **External orifice** is nearly **always situated** in the **lower third** of the **neck near** the anterior border of the SCM[Q]
- **Internal orifice** is located on the **anterior aspect** of the **posterior faucial pillar** just **behind the tonsil**[Q].
- **Internal aspect** of the tract **may end blindly** at or close to the lateral pharyngeal wall, constituting a sinus rather than a fistula.
- The **tract follows the same path** as a branchial cyst and **requires complete excision**, often by **more than one transverse incision** in the neck[Q].

25. Ans. c. Upper third of anteromedial border of Sternocleidomastoid

26. Ans. d. Most commonly due to 2nd branchial remnant *(Ref: Sabiston 19/e p834; Schwartz 10/e 1602,598,1602, 9/e p1414-1415; Bailey 26/e p700-701, 25/e p727-729)*

Branchial Cleft Remnants

First Branchial Cleft Remnants

- Typically located in the **front** or **back of** the **ear** or in the **upper neck near** the **mandible**[Q].
- **Fistulas** typically **course through** the **parotid gland**, deep or **through branches of** the **facial nerve**, and **end in** the **external auditory canal**[Q].

Second Branchial Cleft Remnants

- **Most common**[Q]
- **External ostium** is **located along** the **anterior border** of the **SCM muscle**, in the vicinity of the **upper half to lower third** of the muscle[Q].
- **Stepladder counterincisions** are **often necessary** to **excise** the **fistula completely**[Q].
- Typically, the **fistula penetrates** the **platysma, ascends along** the **carotid sheath** to the level of the **hyoid bone**, and **turns medially** to **extend between** the **carotid artery bifurcation**[Q].
- The fistula then **courses behind** the **posterior belly of digastric** and **stylohyoid muscles** to **end in** the **tonsillar fossa**[Q].

Third Branchial Cleft Remnants

- Third branchial cleft remnants usually **do not have associated sinuses** or **fistulas**
- **Located in** the **suprasternal notch** or **clavicular region**[Q].
- **Most often contain cartilage**[Q]
- **Present** clinically as a **firm mass** or **subcutaneous abscess**[Q].

27. Ans. b. Wall consists of lymphoid tissue; c. Filled with straw colored fluid with cholesterol crystals

28. Ans. c. Arises from 2nd cleft

29. Ans. b. Second

30. Ans. a. Upper 1/3rd of the SCM

31. Ans. d. Tonsillar fossa

32. Ans. c. Excision

THYROGLOSSAL CYST AND FISTULA

33. Ans. c. Thyroglossal cyst

34. Ans. c. Congenital *(Ref: Sabiston 19/e p814; Schwartz 10/e 1521,598,1521-1522,1602, 9/e p1414; Bailey 25/e p730)*

Thyroglossal Fistula

- A thyroglossal fistula usually presents as **discharging sinus in** the **midline**[Q] of the neck in the line of thyroid descent.
- It is **never congenital** but **follows infection** or **inadequate removal** of a **thyroglossal cyst**[Q]
- **Acquired condition**[Q]

Clinical Features

- Presentation is with a **fistulous opening near to** the **midline** of the **neck**[Q]
- The fistula may become **infected** and **discharge pus**[Q]

Treatment

- The fistula should be **excised along with** the **thyroglossal tract upto** the **base of** the **tongue.**
- This requires **removing the central** (**middle one third**) of the **hyoid bone**[Q].

35. **Ans. c. Incomplete removal of thyroglossal cyst**

CERVICAL RIB

36. **Ans. c. It causes pressure on the ulnar nerve; d. Pain is often located in the forearm** *(Ref: Sabiston 19/e p1595; Bailey 26/e p872, 25/e p895)*

Cervical Rib

- This rib is usually represented by a **fibrous band originating from** the **7th cervical vertebra** and **inserting onto** the **1st thoracic rib**[Q].
- It **may be asymptomatic**, but because the subclavian artery and brachial plexus course over it a variety of symptoms may occur.
  - The **lower trunk of the plexus** (**mainly T1**) is **compressed,** leading to **wasting of the interossei** and **altered sensation** in the T1 distribution[Q].
  - **Pain, paraesthesia and numbness** is often located in the **forearm** in the **region of ulnar nerve distribution**[Q].
- Compression of the subclavian artery may result in a post-stenotic dilatation with thrombus and embolus formation[Q].

37. **Ans. a. Cervical rib**

NECK DISSECTION

38. **Ans. a. X nerve; c. Tail of parotid; d. Parotid and post-auricular nerve** *(Ref: Sabiston 19/e p796-797; Schwartz 9/e p503-505; Bailey 26/e p720, 25/e p748-749; Cancer of the Head and Neck by Suen and Myer 4/e p416-418)*

Radical Neck Dissection	Modified Radical Neck Dissection
• Removal of lymph nodes **I-V** + **spinal accessory nerve** + **internal jugular vein** + **sternocleidomastoid muscle**[Q]	• Removal of level **I-V lymph nodes** with (Mnemonic: **SISm**): - **Type I: preserves** only **spinal accessory nerve**[Q] - **Type II:** preserves both **spinal accessory nerve** and **internal jugular vein**[Q] - **Type III:** preserves **spinal accessory nerve, internal jugular vein and sternocleidomastoid muscle**[Q]

39. **Ans. a. Vagus nerve**

40. **Ans. c. Sternocleidomastoid**

41. **Ans. d. Normal electromyographic finding** *(Ref: Surgical Management of Neck Metastasis by Jack L Gluckman, Jonas T Johnson/53)*

Shoulder Syndrome

- In **radical neck dissection**, the **most crippling complication** is the **"Shoulder syndrome"** arising from **denervation** and **atrophy of** the **trapezius** muscle due to **sacrifice of** the **spinal** accessory nerve[Q].

Shoulder syndrome is characterized by
• **Inability to abduct** the shoulder **beyond 90**^{0} cephalad[Q] • **Long standing pain** in the shoulder[Q] • **Deformity** of the shoulder girdle (**drooping** of the shoulder with **abduction** and external **rotation**)[Q]

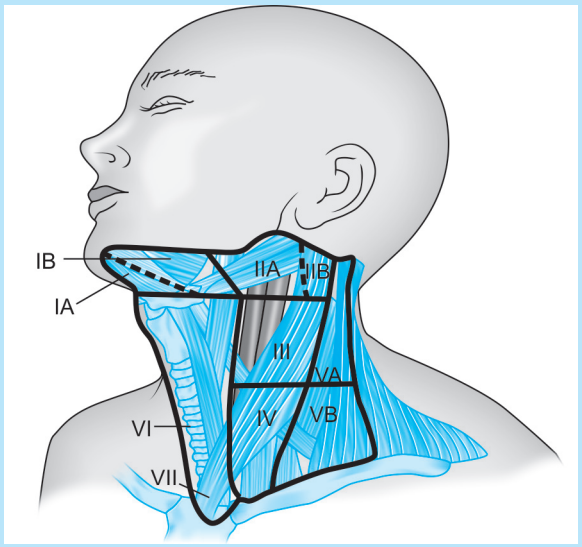
42. **Ans. b. External jugular vein**

43. **Ans. d. Posterior triangle nodes** *(Ref: Sabiston 19/e p796-797; Schwartz 10/e p595-597, 9/e p503; Bailey 25/e p738)*

Cervical Lymph Nodes

- **Cervical lymphatic nodal basins** contain **50-70 lymph nodes per side**
- **Virchow or left supraclavicular nodes** are included in **level IV**[Q].
- Divided into seven levels

Level	Lymph Node
IA IB	• **Submental**[Q] • **Submandibular**[Q]
II	• **Upper**[Q] jugular
III	• **Middle**[Q] jugular
IV	• **Lower**[Q] jugular
V	• **Posterior triangular**[Q]
VI	• **Anterior compartmental or central**[Q]
VII	• **Superior mediastinal**[Q]



Cervical lymph node levels

44. Ans. d. None of the above **45. Ans. None** **46. Ans. c. Level V**

47. Ans. c. 4 *(Ref: Sabiston 19/e p796-797; Schwartz 10/e p595, 9/e p503-505; Bailey 26/e p720, 25/e p748-749; Cancer of the Head and Neck by Suen and Myer 4/e p416-418)*

Neck Dissection

Comprehensive Neck Dissection

- **Radical Neck Dissection:** Removal of lymph nodes **I-V** + **spinal accessory nerve** + **internal jugular vein** + **sternocleidomastoid muscle**[Q]
- **Extended Radical Neck Dissection**: Radical Neck Dissection + removal of **one or more groups** of lymph nodes, **non-lymphatic structures** or both
- **Bilateral Radical Neck Dissection**
- **Modified Radical Neck Dissection**: Removal of level **I-V lymph nodes** with- (Mnemonic: **SISm**)
- **Type I: preserves** only **spinal accessory nerve**[Q]
- **Type II:** preserves both **spinal accessory nerve** and **internal jugular vein**[Q]
- **Type III:** preserves **spinal accessory nerve, internal jugular vein and sternocleidomastoid muscle**[Q]

Selective Neck Dissection

- **Supra omohyoid Neck Dissection:** Removal of level **I-III** LNs[Q]
- **Posterolateral Neck Dissection:** Removal of level **II-V** LNs + **suboccipital** LNs + **retroauricular** LNs
- **Lateral Neck Dissection:** Removal of level **II-V** LNs + **internal jugular vein**
- **Central Compartment Neck Dissection:** Removal of **level VI** LNs

48. Ans. a. Accessory nerve; b. Sternocleidomastoid muscle; d. Internal jugular vein

49. Ans. a. Carotid artery, vagus nerve; b. Sternomastoid muscle, internal jugular vein

50. Ans. a. Internal jugular vein; b. Sternomastoid; d. Accessory nerve

51. Ans. c. Phrenic nerves

52. Ans. d. Medial cutaneous nerve of arm *(Ref: Bailey 25/e p733)*

CA LARYNX

53. Ans. a. Keratosis laryngis; b. Pachydermia laryngis *(Ref: Schwartz 10/e p589-591, 9/e p498; Scott-Brown 5/e p106)*

- **Localized area** of **thickening** of the epithelium which appear as **single** or **multiple chalky white elevations** on the upper surface and edge of one or both the cords usually with **involvement of the membranous portion** are not uncommon.
- These have been designated as **keratosis**, hyperkeratosis, leukoplakia, **pachydermia laryngis** or by other terms by laryngologist and pathologist.
- **Laryngeal keratosis** or **pachydermia laryngis** is a **precursor of laryngeal cancer** that **bears great similarity to oral leukoplakia**[Q].

Carcinoma Larynx

- More common in **males**[Q], seen in **40-70 years**[Q]
- **Tobacco**[Q] and **alcohol**[Q] are well established risk factor
- **Cigarette smoke: Benzopyrene** and **hydrocarbons** are **carcinogenic** in man.
- About **90-95%** of laryngeal malignancies are **squamous cell carcinoma**[Q] with various grades of differentiation.
- **Cordal lesions** are often **well-differentiated**[Q] while **supraglottic ones** are **Anaplastic**.

Carcinoma Larynx

Supraglottic Cancer	Glottic Cancer	Subglottic Cancer
• Supraglottic cancer is **less frequent than glottic cancer**[Q]. • **Nodal metastases occur early**[Q], upper and middle jugular nodes are often involved. • Bilateral metastases may be seen in cases of epiglottic cancer. • **Pain on swallowing is the most frequent initial symptom**[Q]. • **Mass** in the neck may be the **first sign**. • **Hoarseness** is a **late symptom.** • **Pain** may be **referred to ear** by way of **vagus nerve** and **auricular nerve of Arnold**[Q].	• **MC site of CA Larynx**[Q]. • Mostly originates from **free edge and upper surface of anterior 1/3rd of true vocal cord**[Q] followed by middle third 1/3rd. • Spread locally to anterior commissure than to opposite cord (**conus elasticus** initially **acts as barrier** for **subglottic spread**[Q]). • **Fixation** of vocal cord **indicates spread of disease to thyroaretenoid** muscle and is a **bad prognostic sign**[Q]. • As **vocal cord** is **free of lymphatics**, **nodal metastases** is **never seen** in **cordal cancer**[Q], unless the disease spread beyond membranous cord. • **Hoarseness is MC and the earliest symptom**[Q] because of this glottic cancer is **detected early**.	• **Least common site**[Q]**.** • Subglottic region extends from glottic area to lower border of cricoid cartilage. • Spreads locally around anterior wall to opposite side or down wards to trachea, upward spread to vocal cord is late and **hoarseness is not an early symptom**[Q]. • Lymphatic metastases to prelaryngeal, pretracheal (**Delphian node**[Q]) and lower jugular nodes. • **Earliest** and **most prominent symptom is stridor**[Q], but it appears only in advanced stage. • **Hoarseness** is **late feature.**

Treatment of CA Larynx

Stage	Site	Treatment
T_1	**All site**	• **External beam radiotherapy**[Q]
T_2	**Glottic and Subglottic lesion** **Supraglottic lesion**	• **Radiotherapy**[Q] • **Supraglottic laryngectomy**[Q]
T_3 and T_4	**All sites**	• **Total laryngectomy with neck dissection**[Q] for clinically positive nodes with post-operative radiotherapy if nodes are not palpable

CA NASOPHARYNX

54. Ans. b. Nasopharyngeal carcinoma *(Ref: Sabiston 19/e p808-810; Schwartz 10/e p580, 593-594, 9/e p502; Bailey 26/e p681-683, 25/e p709-710; Devita 9/e p764-766)*

Nasopharyngeal Carcinoma

- Nasopharyngeal cancer is **most common in China** particularly in **southern states** and **Taiwan**[Q]**.**
- People in **Southern China, Taiwan and Indonesia** are more prone to this cancer[Q].
- **MC tumor** to produce **cervical LN metastasis**[Q]
- **MC tumor** responsible for **secondaries in the neck** with **no obvious primary malignancy**[Q]

> • **Burning of incense** or **wood (Polycyclic hydrocarbon),** use of **preserved salted fish (Nitosamines)** along with **vitamin C deficient diet** (vitamin C blocks nitrosification of amines and is thus protective) may be other factors operative in China[Q].

Etiology

- Exact etiology is not known. The **factors responsible are**:
  - **Genetic**: **Chinese**
  - **Viral**: **Epstein-Barr virus**[Q]
  - **Environmental**: **Air pollution**, **smoking** of tobacco and opium, **nitrosamines** from **dry salted fish**, **smoke from burning** of **incense** and **wood**

Pathology

- **Squamous cell carcinoma**Q in various grades of its differentiation or its variants as transitional cell carcinoma and **lymphoepithelioma**, is the most common.

  - **MC site of origin**: **Fossa of Rosenmuller** in the lateral wall of **Nasopharynx**Q.
  - **LN involvement** is **common** because of **rich lymphatic network in** the **nasopharynx**Q.

Clinical features

- **Age**: It is mostly seen in **fifth to seventh decades** but may involve younger age groups.
- **Sex**: **Males** are three times more prone than females.
- **Cervical lymphadenopathy** is **MC presenting symptom** (60-90%)Q.

  - **Nasal**: Nasal obstruction, nasal discharge, denasal speech (rhinolalia clausa) and epistaxis.Q
  - Otologic: Due to obstruction of Eustachian tube , there is conductive hearing loss, serous or suppurative otitis media.Q

- Presence of **unilateral serous otitis media** in an **adult** should raise suspicion of nasopharyngeal growth.
- Involvement of **IX , X** and **XI cranial nerves** may occur, constituting **jugular foramen syndrome**.

  - Can cause **conductive deafness** (Eustachian tube blockage), **ipsilateral temporoparietal neuralgia** (involvement of CN V) and **palatal paralysis** (CN X)-collectively called **Trotter's triad**.

- **Cervical nodal metastases** may be the **only manifestation** of **nasopharyngeal cancer**Q.
- **Nodal metastases** are seen **in 75%** of the patients, when first seen, **about half of them** with **bilateral nodes.**
- **Distant metastases** involve **bone, lung, liver** and other sites.

  - **Jaccods's triad**: Ipsilateral **ophthalmoplegia + Amaurosis** + Ipsilateral **neuralgia**Q

Diagnosis

- **CT scan**: Demonstrate **erosion of bone** at the base of skull and the **extent of tumor**.
- **Biopsy** is **essential** to show the **exact histology** of the malignancy.

  - In **absence of nasopharyngeal lesion** but with **strong suspicion of malignancy, nasopharynx** is **exposed by transpalatal approach** and a **strip of mucosa** and **submucosa** from the region of **fossa of Rosenmuller** should be **taken** and subjected to **histology.**

Treatment

- **Irradiation**Q is treatment of choice.
- **Chemo therapy** for stage **III** and **IV** cancers

55. **Ans. b. Nasopharyngeal carcinoma** 56. **Ans. c. CA Nasopharynx**

MISCELLANEOUS

57. **Ans. d. 2nd and 3rd rib erosion** *(Ref: Sabiston 19/e p1582; Schwartz 10/e p623, 641-642, 9/e p534)*

PANCOAST TUMOR (SUPERIOR SULCUS TUMOR)

- Pancoast's or superior sulcus tumor results **from local extension** of a **tumor growing in the apex of** the **lung** with **involvement of 8th cervical** and **1st** and **2nd thoracic nerves,** with **shoulder pain characteristically radiates in** the **ulnar distribution of** the **arm,** often with **radiologic destruction of 1st** and **2nd ribs**Q.
- Often **Horner's syndrome** and Pancoast's syndrome co-exist

Treatment

- **Preoperative RT** followed by **En-bloc resection** of **lung** and **chest wall**Q with consideration of postoperative RT or intra operative brachytherapy.

58. **Ans. c. Hard palate** *(Ref: Bailey 25/e p734, 738; Devita 9/e p750; Cancer of the Head and Neck by Suen and Myer 4/e p288-289)*

- **LN metastasis** is **most common in**: **CA tongue**Q >Floor of mouth >Lower alveolus >Buccal mucosa >Upper alveolus >**Hard palate** >**Lip**Q.

59. **Ans. b. Radical neck dissection** *(Ref: www.ajnr.org/content/28/1/181)*

History of **radiation exposure** followed by **radical neck dissection** increases the **risk of carotid blowout** in **head and neck cancers.**

CAROTID BLOWOUT

- Carotid blowout refers to **rupture of** the **carotid** and its **branches**
- It is **one of the most devastating complications** associated with **therapy for head and neck cancers**Q

- **Carotid blowout** tends to occur **in head and neck cancer**[Q], **radiation induced necrosis**[Q], **recurrent tumors**[Q] or **pharynocutaneous fistulas**[Q].

- The **clinical signs** and **symptoms** related to rupture of carotid artery have been referred as **carotid blowout syndrome**
- Reported **morbidity** and **mortality rates** are **40%** and **60%** respectively.

60. Ans. a. Subligual dermoid *(Ref: Schwartz 9/e p1344-1345)*

Structures Moving with Deglutition	
• **Thyroid gland**[Q]	• **Pre and paratracheal nodes**[Q]
• **Thyroglossal cyst**[Q]	• **Sub-hyoid bursa**[Q]

61. Ans d. T0N2aMx

CHAPTER 38

Facial Injuries and Abnormalities

MULTIPLE CHOICE QUESTIONS

CLEFT LIP AND PALATE

1. True about cleft palate: *(PGI Nov 2010)*
a. Surgery should be done at 1 year
b. 50% recover speech after operation
c. Associated with hearing loss
d. Associated with cleft lip in 45%

2. Surgical correction in cleft palate primarily aims at all of the following except: *(MCI March 2010)*
a. Control of regurgitation
b. To promote normal dentition and facial growth
c. To get a normal speech
d. Normal appearance of lips, nose and face

3. Ideal time for cleft lip repair surgery: *(MHPGMCET 2006, JIPMER 97)*
a. 3-6 weeks b. 6-12 weeks
c. 1-1.5 years d. 3-4 years

4. Ideal time for surgery in case of unilateral cleft lip? *(MHPGMCET 2008)*
a. <3 months b. 3 to 6 months
c. 6 to 9 months d. >12 months

5. All are do about submucosal cleft palate except: *(DNB 2012)*
a. Bifid uvula b. Notched hard palate
c. Lip pits d. Zonapellucida

6. Which is the appropriate age for repair of cleft palate? *(All India 98, 94, AIIMS June 98)*
a. 6 months to 1 year b. 12-15 months
c. At puberty d. Just after birth

7. With respect to repair of cleft palate, the soft palate is first repaired, ideal time for which is?
a. 12 months b. 9 months
c. 6 months d. 3 months

8. Commonest type of cleft lip is: *(AIIMS 91)*
a. Bilateral
b. Midline
c. Combined with cleft palate
d. Unilateral

9. In cleft lip operation all the stitches are removed on: *(PGI 81, 82, AIIMS 85)*
a. 2nd day b. 4th day
c. 10th day d. 14th day

10. Unilateral clefts are most common on: *(PGI 80)*
a. Left side b. Right side
c. Median d. None of the above

11. The following is the method for operating cleft lip except: *(JIPMER 81, AIIMS 86)*
a. Le Mesurier's method b. Tennison's method
c. Millard's method d. Wardill's method

12. Cleft lip is due to non fusion of: *(PGI 2001)*
a. Maxillary process with lateral nasal process
b. Maxillary process with medial nasal process
c. Maxillary process with mandibular process
d. All of the above

13. Unilateral cleft lip is associated with: *(PGI 99)*
a. Posterior displacement of alar cartilage
b. Columella elongated
c. Always cleft palate
d. Defective sucking

14. Most common congenital anomaly of the face is: *(MCI March 2008)*
a. Cleft lip alone b. Isolated cleft palate
c. Cleft lip and cleft palate d. All have equal incidence

15. Millards 'Rule of Ten' includes all except: *(AMU 95)*
a. 10 lbs b. 10 weeks of age
c. 10 gm% hemoglobin d. 10 months of age

16. In LAHSHAL terminology for cleft lip and cleft palate, LAHSHAL denotes: *(Recent Questions 2013)*
a. Bilateral cleft palate only
b. Bilateral cleft lip only
c. Bilateral cleft lip and palate
d. No cleft

17. Which of the following is the ideal time for the repair of cleft palate? *(AIIMS November 2014)*
a. 9-12 months b. 18-24 months
c. 2-3 years d. 5-6 years

18. Pierre Robbin's Sequence includes: *(PGI Dec 2008)*
a. Glossoptosis b. Airway obstruction
c. Cleft lip d. Micrognathia
e. Heart anomaly

19. Which one of the following is the primary defect in Pierre Robbin's syndrome? *(UPSC 2006)*
a. Micrognathia b. Glossoptosis
c. High arched palate d. Cleft palate

20. Pierre Robbin's syndrome is: *(AIIMS 85)*
a. Cleft palate with syndactyly
b. Cleft palate with mandibular hypoplasia and respiratory obstruction
c. Cleft lip with mandibular hypoplasia
d. Cleft lip

21. Hynes pharyngoplasty is used to improve a child's: *(JIPMER 81, AMU 89)*
a. Appearance b. Teething
c. Speech d. Feeding

22. Rhinoplasty is usually done at the age (years) of until the nose is fully grown: *(JIPMER 81, AIIMS 86)*
a. 6 years b. 12 years
c. 16 years d. 25 years

23. Rhtidectomy operation involves: *(JIPMER 92)*
a. Correction of nasal defects
b. Removal of wrinkles in forehead
c. Straightening of curved penis
d. Correction of protruding lips

MAXILLOFACIAL INJURY

24. Fracture mandible with edentulous jaw is best treated with: *(UPPG 2004)*
a. External fixator
b. Minerva-plaster
c. Interdental wiring
d. Intermaxillary elastic traction

25. Best view for mandible is: *(UPPG 2007)*
a. Antero-posterior
b. Lateral
c. Oblique
d. Orthopentomogram

26. A man sustained injury and presented with fluid coming out through nose. What could be the possible fracture? *(MCI March 2007)*
a. Fracture base of skull
b. Fracture of mandible
c. Fracture of maxilla
d. None of the above

27. A 20-years old man is hit on the eye with a ball. On examination there is restriction of lateral and upward gaze and diplopia. There is no obvious visible sign of enophthalmos, the likely diagnosis is: *(DPG 2011, AIIMS 85)*
a. Zygoma fracture
b. Maxillary fracture
c. Blow out fracture of the orbit
d. Injury to lateral rectus

28. Best treatment of above condition will be: *(AIIMS 85)*
a. Do nothing and assurance
b. Explore the orbit
c. Ophthalmic exercise to correct diplopia
d. Reinsertion of lateral rectus muscle

29. Clinical feature of fracture of zygomatic bone include all of the following except: *(All India 97)*
a. Diplopia
b. Trismus
c. Bleeding
d. CSF rhinorrhea

30. Mandible is commonly fractured: *(JIPMER 87)*
a. At the neck of the condyle
b. Through the angle
c. Through the cannine fossa
d. At the middle

31. Le Forte II facial fracture implies: *(AIIMS 84)*
a. Fracture running through alveolar ridge
b. Fracture running through midline of the palate and zygomatico maxillary suture
c. Fracture running through zygomatic process of the maxilla, floor of orbit, root of nose on one side only
d. Similar to C but on both sides

32. Tripod fracture is seen in: *(DNB 2010)*
a. Zygomatic bone
b. Temporomandibular joint
c. Maxilla
d. Frontal bone

33. Costen's syndrome refers to neurological pain associated with: *(DNB 2010)*
a. Sphenopalatin ganglion
b. Temporomandibular joint
c. Glosso pharyngeal nerve
d. Lingual nerve

EXPLANATIONS

CLEFT LIP AND PALATE

1. **Ans. a. Surgery should be done at 1 year, c. Associated with hearing loss, d. Associated with cleft lip in 45%** *(Ref. Sabiston 19/e p1923-1924; Schwartz 10/e p1840-1844, 9/e p1658-1663; Bailey 26/e p634-648, 25/e p657-668)*

Cleft Lip and Palate

- **Clefts** of the **lip, alveolus** and **hard** and **soft palate** are the **MC congenital abnormalities** of the **orofacial structures**[Q].
- Frequently **occur as isolated deformities** but **can be associated with** other medical conditions, particularly **congenital heart disease**[Q].

- **Incomplete clefts** affect only a portion of the lip and contain a **bridge of tissue connecting** the **central** and **lateral lip elements**, referred to as **Simonart's band**[Q].
- **Cleft lip** is due to **non-fusion of maxillary process** with **medial nasal process**[Q].
- **Unilateral cleft lip** is associated with **posterior displacement** of **alar cartilage**[Q]

Incidence

- **Highest incidence** reported for **cleft lip and palate** occurs in the **Indian tribes of Montana**, USA (1:276).
- **Cleft lip/palate** predominates **in males**[Q]
- **Cleft palate alone** appears to be **more common in females**[Q].

- **Incidence of cleft lip** and **palate** is **1:600 live births**[Q]
- **Incidence of isolated cleft palate** is **1:1000 live births**[Q].

Distribution

- In **unilateral cleft lip** the deformity affects the **left side**[Q] **in 60%** of cases.

Typical distribution of cleft types		
• **Cleft lip alone: 15%**	• **Cleft lip** and **palate: 45% (MC)**[Q]	• **Isolated cleft palate: 40%**

Etiology of cleft lip and palate

- **Etiology of cleft lip and palate: Genetic predisposition** and a **contributory environmental component**[Q].
- **Environmental factors: Maternal epilepsy**[Q] and drugs (**steroids, diazepam** and **phenytoin**[Q]).

Associated syndromes

- Although most clefts of the lip and palate occur as an isolated deformity, **Pierre Robin sequence** remains the **most common syndrome**[Q].
- Other associated syndromes**: Stickler's** (ophthalmic and musculoskeletal abnormalities), **Shprintzen's** (cardiac anomalies), **Down's, Apert's** and **Treacher-Collins' syndromes**.

Types of Cleft lip	Types of Cleft palate
• **Unilateral** cleft lip • **Bilateral** cleft lip	• **Incomplete: Cleft of** the **hard palate** remains **attached to** the **nasal septum** and **vomer**[Q] • **Complete: Nasal septum** and **vomer** are **completely separated from** the **palatine processes**[Q]

Antenatal diagnosis:

- All but **isolated cleft palate** can be **diagnosed by ultrasound** after **18 weeks**[Q] gestation

Problems immediately after birth

- Some babies are able to feed normally but **some** will **need assistance**
- **Breathing problems** in **Pierre Robin sequence** may be **life threatening**

Management

- **Surgical techniques** are aimed at **restoring normal anatomy**.

Cleft lip	Repaired between **3-6 months** of age[Q]
Cleft palate	Repaired between **6-18 months** of age[Q]

Principles of Surgery

- **Cleft lip surgery attaches** and **reconnects** the **muscles around** the **oral sphincter**[Q]
- **Cleft palate surgery** aims to **bring together mucosa** and **muscles** with **minimal scarring**[Q]
- **Two-stage procedures** attempt to **minimize dissection**[Q]

Secondary Management

- Following primary surgery, **regular review by** a **multidisciplinary team** is essential[Q].
- Many aspects of cleft care require long-term review: **Hearing, speech, dental development, facial growth[Q].**

2. **Ans. d. Normal appearance of lips, nose and face** *(Ref. Sabiston 19/e p1923-1924; Schwartz 10/e p1840-1844, 9/e p1658-1663; Bailey 25/e p662-668)*

Objectives of the Cleft Palate Repair

- To produce **anatomical closure** of the defect[Q].
- To create an apparatus for **development** and **production** of **normal speech[Q]**.
- To **minimize** the **maxillary growth disturbances** and **dento-alveolar deformities[Q]**.

3. **Ans. b. 6-12 weeks**
4. **Ans. b. 3 to 6 months**
5. **Ans. c. Lip pits** *(Ref. Cleft Palate and Craniofacial abnormalities by Ann W. Kummer/51)*

Submucosal Cleft Palate

- A congenital defect that affects the underlying structure of the palate, while the **oral surface mucosa is intact**
- Most children with submucosal cleft palate are asymptomatic and this is often not diagnosed until later
- Identification of submucosal cleft palate requires intraoral examination for:
  1. Bifid uvula
  2. **Zona pellucida** (submucosal absence of muscularis uvulae)
  3. **Notching of posterior border of hard palate**
  4. **Nasopharyngeal regurgitation during feeding** (only finding of occult submucosal cleft palate)

6. **Ans. a. 6 months to 1 year**
7. **Ans. c. 6 months** *(Ref. Bailey 25/e p661)*

Timing of Primary Cleft Lip and Palate Procedures (after Delaire)

Cleft lip alone	Cleft palate alone	Cleft lip and palate
• **Unilateral** (one side): One operation at **5-6 months** • **Bilateral** (both sides): One operation at **4-5 months**	• **Soft palate only**: One operation at **6 months[Q]** • **Soft and hard palate**: Two operations • **Soft palate** at **6 months[Q]** • **Hard palate** at **15-18** months	• **Unilateral**: Two operations • **Cleft lip** and **soft palate** at **5-6 months** • **Hard palate and gum pad** with or without lip revision at **15-18 months** • **Bilateral:** Two operations • **Cleft lip and soft palate** at **4-5 months** • **Hard palate and gum pad** with or without lip revision at **15-18 months**

8. **Ans. c. Combined with cleft palate**
9. **Ans. b. 4th day** *(Ref. Sabiston 18/e p2134)*

Guidelines for Day of Suture Removal by Area

Body Regions	Removal	Body Regions	Removal
Eyelid	**3-4**	Chest, abdomen	8-10
Eyebrow	**3-5**	Ear	10-14
Nose	**3-5**	**Back**	**12-14**
Lip	**3-4[Q]**	**Extremities**	**12-14**
Face (other)	**3-4[Q]**	**Hand**	**10-14**
Scalp	6-8 days	**Foot, sole**	**12-14**

10. **Ans. a. Left side**
11. **Ans. d. Wardill's method** *(Ref. Sabiston 19/e p1924; Schwartz 10/e p1840-1844, 9/e p1661; Bailey 25/e p661-662)*

Cleft lip Repair Techniques

- **Millard Rotation Advancement Technique: Most widely used[Q]**
- **Le Muserier[Q]**
- **Thompson[Q]**
- **Tennison-Rendall[Q]**

12. **Ans. b. Maxillary process with medial nasal process**
13. **Ans. a. Posterior displacement of alar cartilage**
14. **Ans. c. Cleft lip and cleft palate**
15. **Ans. d. 10 months of age** *(Ref. http://en.wikipedia.org/wiki/Cleft_lip_and_palate)*

"Rule of 10s" by surgeons Wilhelmmesen and Musgrave

Surgery is done in cleft lip in a child when

- Age ≥10 weeks[Q]
- Weight ≥10 pounds[Q]
- Hemoglobin ≥10 gm[Q]

16. **Ans. c. Bilateral cleft lip and palate**
17. **Ans. a. 9-12 months**
18. **Ans. a. Glossoptosis, b. Airway obstruction, d. Micrognathia** *(Ref. Schwartz 10/e p1848, 9/e p1665; Bailey 25/e p657; Nelson 18/e p1534)*

Pierre Robin Sequence

- **Pierre Robin sequence** remains the **most common syndrome** in clefts of the lip and palate
- **Pierre Robin** sequence is **characterized by three pathognomonic findings**:
  1. Microretrognathia (primary defect)[Q]
  2. Glossoptosis[Q]
  3. Respiratory distress[Q]

  - **Pierre Robin** sequence **may** or **may not be associated with** a **palatal cleft**[Q].

- **Micrognathia prevents** the **natural caudal migration of** the **tongue** resulting in the deformity[Q].
- Functional consequences include **intermittent respiratory obstruction** and **obstructive sleep apnea** that may **affect feeding, growth**, and **safety of** the **airway**[Q].

  - **Posteriorly displaced tongue (glossoptosis)**, which is associated with **early respiratory** and **feeding difficulties**[Q].
  - **Treatment: Beverly-Douglas procedure** (**Tongue** is **fixed anteriorly**[Q])

19. **Ans. a. Micrognathia**
20. **Ans. b. Cleft palate with mandibular hypoplasia and respiratory obstruction**
21. **Ans. c. Speech** *(Ref. Bailey 25/e p663; www.ncbi.nlm.nih.gov/pubmed/3547432)*

Hynes Pharyngoplasty

- Used for the treatment of **Velopharyngeal incompetence** leading to **speech problems**[Q]

22. **Ans. c. 16 years** *(Ref. Bailey 26/e p645, 25/e p669; http://en.wikipedia.org/wiki/Rhinoplasty)*

Orthognathic Surgery

- **Orthognathic surgery** is to correct conditions of the jaw and face related to structure, growth
- Orthognathic surgery is **usually performed** when **facial growth is complete** (**16 years** in **female patients**, **19 years** in **male patients**[Q]).
- It's suggested to get **rhinoplasty** (correcting and reconstructing the form, restoring the functions, and aesthetically enhancing the nose) done after **16 years**[Q] of age, when **natural bone structure** is **"settled".**

23. **Ans. b. Removal of wrinkles in forehead** *(Ref. Dorland's Dictionary 28/e p1463)*

Rhytidectomy

- A **facelift operation** by **surgical removal of wrinkles**[Q]
- Type of **cosmetic surgery** procedure used to **give a more youthful facial appearance**.

MAXILLOFACIAL INJURY

24. **Ans. a. External fixator** *(Ref. Sabiston 19/e p1925-1927; Schwartz 10/e p197, 9/e p487; Bailey 26/e p346, 25/e p331-332)*

Fractures of the Mandible

- **Condylar neck**[Q] is the **weakest part** of the mandible and **MC site** of **fracture**[Q]

  - Mandible **may fracture directly** at the **point of** the **blow**[Q]
  - **Indirectly** where the **force from** the **blow is transmitted** and the **mandible fractures at** a **point of weakness distant from** the **original blow**, known as **'guardsman' fracture**[Q].

- **'Butterfly' fracture** of the mandible: A **segment of mandible** is **detached from** the **rest of** the **mandible** in the canine regions[Q].

Diagnosis

- Recommended radiographic evaluation of a **mandible fracture**: **Panoramic radiograph** (**Panorex**) and **Towne's view x-ray**[Q].

Treatment

- As in midface fractures, **restoration of dental occlusion forms** the **foundation for fracture management**[Q].
  - **Intermaxillary fixation before fracture exposure** and **plating is necessary**[Q].
- **Condylar** and **subcondylar mandible fractures** are most often **treated by IMF alone**[Q].
- **Medical management** of mandibular fractures involves a **purée-type diet, interdental fixation** for several weeks, **1% chlorhexidine** mouth rinses, and **antibiotics**[Q].

25. Ans. d. Orthopentomogram

26. Ans. a. Fracture base of skull *(Ref. Sabiston 19/e p1890; Schwartz 10/e p576, 9/e p1523-1524; Bailey 26/e p314, 25/e p302,308)*

Basilar skull fracture

- **Fracture** of **the base of the skull**, typically involving the **temporal** bone, **occipital** bone, **sphenoid bone**, and/or **ethmoid** bone[Q].
- **Such fractures** can cause **tears in the** meninges, with resultant **leakage of** the CSF[Q].
  - **Leaking fluid** may accumulate in the **middle ear space**, and **dribble out through** a **perforated eardrum** (**CSF otorrhea**[Q]) or into the **nasopharynx via** the **eustachian tub**e, causing a **salty taste**.
  - **CSF** may also **drip from the nose** (**CSF rhinorrhea**[Q]) in fractures of the **anterior skull base**, yielding a **halo sign**[Q].
  - These signs are **pathognomonic for basilar skull fracture**[Q].

27. Ans. c. Blow out fracture of the orbit *(Ref. Sabiston 19/e p1925-1927; Schwartz 10/e p577, 9/e p486; Bailey 26/e p627, 25/e p650)*

Blow-out Fractures of the Orbit

- **Direct trauma to** the **globe of the eye** may push it back within the orbit.
- Occur when a **blunt object strikes** the **globe**[Q].
- **Weakest plate of bone**, most commonly the **orbital floor**, **fractures**, and the **orbital contents herniate down into** the **maxillary antrum**[Q].
- **Tear-drop sign**[Q] is seen
  - **Soft-tissue herniation** lead to **muscular dysfunction**, particularly the **inferior oblique** and **inferior rectus**, leading to **failure of** the **eye to rotate upwards**.
  - **Enophthalmos** and **diplopia** can follow[Q]
  - **Paraesthesia** in the distribution of the **infraorbital nerve** is an important clue to the blow-out fracture[Q].

Treatment

- Significant **delay in treatment** may be associated with **less success** than early diagnosis and planned treatment.
- **Orbital floor exploration** allows for **release of displaced** or **entrapped soft tissue**, **correcting** any **extra-ocular motility disturbances**[Q].

28. Ans. b. Explore the orbit

29. Ans. d. CSF rhinorrhea *(Ref. Sabiston 19/e p1925-1927; Schwartz 10/e p577, 1854-1855, 9/e p487; Bailey 25/e p330)*

Zygomatic Bone Fracture

- **MC fracture** of the **middle third of the face**: **Nose > zygomatic bone**[Q]
- Also known as **Tripod fracture**[Q], because the zygoma is fractured at its 3 processes:
  1. **Zygomatico-frontal** fracture[Q]
  2. **Zygomatico-temporal** fracture[Q]
  3. **Infraorbital** fracture[Q]

Clinical Features of Zygomatic Bone Fracture

- **Flattening** of **malar prominence**[Q]
- **Step-deformity** of infraorbital margin
- **Epistaxis**[Q]
- **Restricted ocular movements** due to entrapment of **inferior rectus muscle**[Q] (may lead to **diplopia**[Q])
- **Anesthesia** in the distribution of **infraorbital nerve**[Q]
- **Oblique palpebral fissure**, due to entrapment of lateral palpebral ligament
- **Periorbital emphysema** due to escape of air from the maxillary sinus

Diagnosis

- **X-ray Water's view**[Q]
- **CT scan: Best for diagnosis** of zygomatic bone fracture[Q]

Treatment

- Only **displaced fractures** require **treatment**[Q]
- **Treatment of choice: Open reduction** and **internal fixation**[Q]

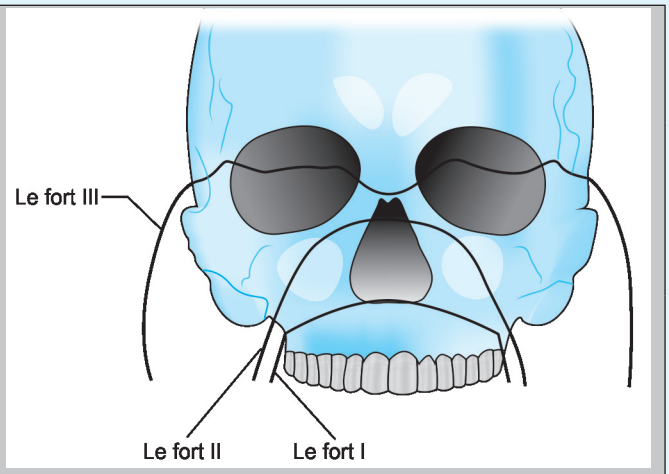
30. **Ans. a. At the neck of the condyle**

31. **Ans. d. Similar to C but on both sides** *(Ref. Sabiston 19/e p1927; Schwartz 9/e p487-488; Bailey 26/e p344-345, 25/e p329-330)*

Midface Fractures

- **Midface fractures** involving the **maxilla** can be classified by fracture patterns know as **Le Fort I, II,** and **III.**

Le Fort I	• **Fracture line runs above and parallel to palate**[Q] • Effectively **separates alveolus** and **palate from** the **facial skeleton** above[Q]
Le Fort II	• **Pyramidal** in shape[Q] • Passes through the **root of nose, lacrimal bone, floor of orbit, upper part** of **maxillary sinus** and **pterygoid plate**[Q] • **Orbital floor** is **always involved**[Q]
Le Fort III	• **Complete disjunction** of the **facial skeleton from** the **skull base**[Q] • **Fracture line** runs **high** through the **nasal bridge, septum** and **ethmoids,** and through the **bones of orbit to** the **frontozygomatic suture**[Q].



Management:

- **Interdental** or **intermaxillary fixation** is **necessary to reestablish** the **proper dentoskeletal relationships, immobilize the fractured bones,** and **ensure normal postoperative occlusion**[Q].

32. **Ans. a. Zygomatic bone**

33. **Ans. b. Temporomandibular joint** *(Ref. Dhingra 4/e p400)*

Costen's Syndrome

- **Abnormality of temporomandibular joint due to defective bite**
- Characterized by **otalgia, feeling of blocked ear, tinnitus** and sometimes vertigo
- **Pain also radiates to frontal, parietal and occipital regio**n

NOTES

SECTION 9

ONCOLOGY

CHAPTERS

- Chapter 39 Oncology
- Chapter 40 Sarcoma

CHAPTER 39

Oncology

MULTIPLE CHOICE QUESTIONS

TUMOR MARKERS

1. The following is a marker of Paget's disease of the mammary gland: *(All India 2007)*
a. S-100 b. HMB-45
c. CEA d. Neuron specific enolase

2. In which of the following tumors alpha-feto protein is elevated? *(AIIMS Nov 2005)*
a. Choriocarcinoma b. Neuroblastoma
c. Hepatocellular carcinoma d. Seminoma

3. Which of the following tumor secretes erythropoietin? *(PGI June 2010)*
a. Pheochromocytoma b. Hepatoma
c. RCC d. Adrenal adenoma
e. Breast cancer

4. Uses of tumor marker are: *(PGI June 2001)*
a. Screening of a cancer
b. Follow-up a cancer patient, especially for knowing about recurrence
c. Confirmation of a diagnosed cancer
d. For monitoring the treatment of a cancer

5. Erythropoietin secreting tumor: *(PGI June 2001)*
a. Cerebellar hemangioblastoma
b. Hepatoma
c. Renal cell carcinoma
d. Adrenal adenoma
e. Fibromyoma of uterus

6. CA-125 is associated with: *(PGI June 2002)*
a. Colon carcinoma b. Breast carcinoma
c. Ovarian carcinoma d. Bronchogenic carcinoma
e. Pancreatic carcinoma

7. CA-125 is associated with: *(PGI Dec 2007)*
a. Pregnancy b. Breast carcinoma
c. TB d. Endometrial carcinoma
e. Endometriosis

8. CEA is associated with: *(PGI June 2002)*
a. Adenocarcinoma of colon b. Pancreatic carcinoma
c. Neuroblastoma d. Ovarian carcinoma
e. Prostatic carcinoma

9. AFP is raised in: *(PGI Dec 2003)*
a. CA Prostate b. HCC
c. CA Lung d. CA Breast
e. CA Colon

10. Which one of the following is frequent cause of serum alpha-fetoprotein level greater than 10 times the normal upper limit? *(UPSC 2004)*
a. Seminoma
b. Metastatic carcinoma of liver
c. Cirrhosis of liver
d. Oat cell tumour of lung

11. Which of the following is marker for carcinoma? *(All India 2012)*
a. Cytokeratin b. Vimentin
c. Calcitonin d. CD-45

12. α- Fetoprotein increase in all the following except: *(All India 94)*
a. Hepatocellular carcinoma b. Seminoma of the testes
c. GI neoplasms d. Embryonal cell carcinoma

13. All are recognized tumour markers except: *(PGI Dec 99)*
a. Beta HCG b. Beta-2 microglobulin
c. Alpha fetoprotein d. Acid phosphatase

14. CEA is increased in all except: *(AIIMS May 2007)*
a. Lung cancer b. Breast cancer
c. Colon cancer d. Osteogenic sarcoma

15. Regarding CEA-false is: *(AIIMS 97)*
a. Prognostic indicator
b. Glycoprotein
c. Elevated in colorectal carcinoma
d. Elevated only when there is hepatic metastasis

SCREENING IN MALIGNANCY

16. In which of the following disease, the overall survival is increased by screening procedure? *(All India 2005)*
a. Prostate cancer b. Lung cancer
c. Colon cancer d. Ovarian cancer

17. Screening increase life span in which of the following carcinoma? *(PGI June 2007)*
a. Breast b. Colon
c. Prostate d. Lung

18. Screening is useful for: *(PGI Nov 2011)*
a. Carcinoma Lung b. Carcinoma Breast
c. Carcinoma Skin d. Carcinoma Cervix
e. Carcinoma Ovary

19. Least amenable to screening is: *(AIIMS June 94)*
a. Breast b. Cervix
c. Oral cavity d. Lung

LYMPH NODE METASTASIS

20. Which one of the following is the most common tumor to produce metastasis to cervical lymph nodes? *(UPSC 2008, AIIMS June 2002)*
a. Glottic carcinoma
b. Nasopharyngeal carcinoma
c. Carcinoma base of tongue
d. Carcinoma lip

21. In which of the following head and neck cancers, is lymph node metastasis least common? *(AIIMS May 2008)*
a. Tongue b. Buccal mucosa
c. Hard palate d. Lower alveolus

22. Delphian nodes are: *(COMEDK 2008)*
a. Pretracheal
b. Paratracheal
c. Supraclavicular
d. Posterior triangle

23. A 55 years old chronic smoker presents with complaints of hoarseness of voice, and single enlarged painless lymph node in left supraclavicular region. Next step to be done: *(AIIMS Nov 2000)*
a. CT Scan of chest
b. Sputum examination for AFB
c. Laryngoscopy and chest X-ray
d. Excision biopsy of the node

24. A patient comes with stony hard, painless lymph node in left supraclavicular fossa. A biopsy report states squamous cell carcinoma. What is the diagnosis? *(AIIMS Nov 99)*
a. Stomach carcinoma
b. Breast carcinoma
c. Lung carcinoma
d. Pancreatic carcinoma

25. A 65 years old smoker presents with hoarseness, hemoptysis and a hard painless lump in the left supraclavicular fossa. Which of the following is the most appropriate diagnostic step? *(AIIMS June 2004)*
a. Undertake an open biopsy of the neck lump
b. Undertake a radical neck dissection
c. Do fine needle aspiration cytology
d. Give a trial of Anti tuberculous therapy

26. Which carcinoma most commonly metastasizes to cervical lymph nodes? *(AIIMS June 93)*
a. Maxillary sinus
b. Posterior tongue
c. Cheek
d. Hard palate

27. Lymph node metastasis is a common feature with the following variant of soft tissue sarcoma: *(All India 97)*
a. Fibrosarcoma
b. Angiosarcoma
c. Liposarcoma
d. Neurofibrosarcoma

BONE METASTASIS

28. Most common cause of skeletal metastasis is: *(UPPG 2009)*
a. Kidney
b. Prostate
c. Breast
d. Thyroid

29. Treatment of bony metastasis is by: *(JIPMER 2011)*
a. Samarium-153
b. I-131 with tositumumab
c. P-32
d. Yttrium

30. Best investigation for bone metastasis is: *(All India 2012, 2011)*
a. MRI
b. CT
c. Bone scan
d. X-ray

31. Bony metastasis is common with all of the following except: *(All India 98)*
a. CA breast
b. CA lung
c. CA testis
d. CA prostate

32. Not true about bone metastasis: *(AIIMS June 98)*
a. Uncommon distal to elbow and knee
b. Breast secondary may be osteoblastic
c. Renal cell carcinoma secondary are expansile
d. Soft tissue sarcoma causes bony metastasis

33. Secondaries of all following cause osteolytic lesions except: *(All India 95)*
a. Prostate
b. Kidney
c. Bronchus
d. Thyroid

34. Expansile lytic osseous metastases are characteristic of primary malignancy of:
a. Kidney
b. Bronchus
c. Breast
d. Prostate

35. A malignant tumor of childhood, that metastasizes to bones most often is: *(All India 2006)*
a. Wilm's tumor
b. Neuroblastoma
c. Adrenal gland tumors
d. Granulosa cell tumor of ovary

36. All of the following produce osteoblastic secondaries except: *(DNB 2012, All India 94)*
a. CA Prostate
b. Carcinoid tumors
c. CA Breast
d. Multiple myeloma

37. Which of the following is rare site for metastasis?
a. Vertebrae
b. Skull *(SGPGI 2004)*
c. Pelvis
d. Forearm and leg bones

38. Pulsating tumors include all except: *(PGI 88)*
a. Bone sarcoma
b. Osteoclastoma
c. Secondaries from hypernephromas
d. Secondary from prostate

39. Most common primary of metastatic bone tumour in a male is: *(DNB 2009)*
a. Lung
b. Liver
c. Bone
d. Brain

ONCOLOGICAL EMERGENCIES

40. Feature of tumor lysis syndrome are: *(PGI Dec 2000)*
a. Hypocalcemia
b. Hypophosphatemia
c. Alkalosis
d. Hypokalemia

41. Features of tumor lysis syndrome: *(PGI May 2011, PGI Dec 2006)*
a. Hyperuricemia
b. Hypercalcemia
c. Hypophosphatemia
d. Hyperphosphatemia
e. Hyperkalemia

42. True about tumor lysis syndrome are all except: *(JIMPER 2013, PGI Dec 2003)*
a. Hyperkalemia
b. Hypercalcemia
c. Hyperuricemia
d. Hyperphosphatemia

43. Tumor lysis syndrome is associated with all of the following laboratory feature except: *(DNB 2012, AIIMS Nov 2003)*
a. Hyperkalemia
b. Hypercalcemia
c. Hyperuricemia
d. Hyperphosphatemia

44. Hypercalcemia associated with malignancy is most often mediated by: *(All India 2005)*
a. PTH
b. PTH-rp
c. IL-6
d. Calcitonin

45. Hypercalcemia of malignancy treatment consist of all except: *(PGI May 2011)*
a. Dexamethasone
b. Saline infusion
c. Pamidronate
d. Furosemide
e. Phosphate

46. A patient with leukemia on chemo therapy develops acute lower abdominal pain associated with anaemia, thrombocytopenia and leucopenia. Which of the following is clinical diagnosis? *(All India 2006)*
a. Appendicitis
b. Leukemic colitis
c. Perforation peritonitis
d. Neutropenic colitis

47. Which of the following are features of tumor lysis syndrome? *(PGI 2006)*
a. Hyperuricemia
b. Hyperkalemia
c. Hypercalcemia
d. Hypophosphatemia
e. Hyperphosphatemia

48. **Which of the following tumor is most commonly associated with superior vena cava syndrome?** *(WBPG 2012, All India 2011)*
a. Lymphoma b. Small cell carcinoma
c. Non small cell carcinoma d. Metastasis

49. **Which of the following is not an oncological emergency?** *(AIIMS June 2003)*
a. Spinal cord compression
b. Superior vena cava syndrome
c. Tumor lysis syndrome
d. CA cervix stage IIIb with pyometra

LYMPHOMA

50. **Commonest site for lymphoma in GIT is:** *(AIIMS Nov 98)*
a. Stomach b. Duodenum
c. Ileum d. Rectum

51. **The commonest site of lymphoma in the gastrointestinal system is:** *(COMEDK 2007)*
a. Small bowel b. Stomach
c. Large intestine d. Esophagus

52. **In neuroblastoma the most common presentation is:**
a. Lytic lesion in skull with suture diastasis *(All India 98)*
b. Lung metastasis
c. Renal invasion
d. Secondaries in brain

53. **Commonest tumour of lumbar region in children is:** *(AIIMS June 98)*
a. Dermoid cyst b. Neuroblastoma
c. Wilm's tumour d. Appendix

SENTINEL LYMPH NODE BIOPSY

54. **Sentinel lymph node biopsy is an important part of the management of which of the following conditions?** *(All India 2002)*
a. Carcinoma prostate b. Carcinoma breast
c. Carcinoma lung d. Carcinoma nasopharynx

55. **True about sentinel lymph node biopsy:** *(PGI June 2004)*
a. Special OT is required
b. Blue dyes injected
c. Contraindicated if axillary LN is involved biopsy
d. It is done to avoid inadvertent axillary LN biopsy
d. Radioactive dye is used

56. **Sentinel lymph node biopsy is done in all except:**
a. CA breast b. CA penis *(DNB 2012)*
c. Malignant melanoma d. CA colon

GI MALIGNANCY

57. **Upper GI endoscopy and biopsy from lower esophagus in a 48 years old lady with chromic heart burn shows presence of columnar epithelium with goblet cells. The feature is most likely consistent with:** *(AIIMS June 2003)*
a. Dysplasia b. Hyperplasia
c. Carcinoma in-situ d. Metaplasia

58. **By mucosal resection which carcinoma can be diagnosed early:** *(AIIMS June 98)*
a. Esophageal carcinoma b. Anal carcinoma
c. Colon carcinoma d. Pancreatic carcinoma

59. **In which case immunoguided surgery is done?** *(AIIMS June 98)*
a. CA colon b. CA pancreas
c. CA jejunum d. CA anal canal

SPONTANEOUS REGRESSION

60. **In which case spontaneous regression is not seen?** *(AIIMS Sept 96, All India 98)*
a. Malignant melanoma b. Osteosarcoma
c. Neuroblastoma d. Choriocarcinoma

61. **Spontaneously regressing tumors are:** *(PGI June 2006)*
a. Malignant melanoma b. Neuroblastoma
c. Ewing's sarcoma d. Wilm's tumour

62. **Spontaneous regression of malignant tumor is feature of:** *(AIIMS June 93)*
a. Neuroblastoma b. Renal cell carcinoma
c. Burkitt's lymphoma d. Wilm's tumor

63. **Tumor known to regress is:** *(PGI Dec 97)*
a. Neuroblastoma b. Retinoblastoma
c. Adenocarcinoma d. CA breast

RADIOTHERAPY

64. **Most radio resistant phase in cell cycle:** *(JIPMER 2011)*
a. G_1 b. Early S
c. Late S d. G_2

65. **All of the following are pure beta emitters except:** *(AIIMS May 2011)*
a. Yttrium-90 b. Phosphorus-32
c. Strontium-90 d. Samarium-153

66. **All of the following radioisotopes are used as systemic radionuclide, except:** *(All India 2006)*
a. Phosphorus-32 b. Strontioum-89
c. Iridium-192 d. Samarium

67. **Phosphorus-32 emits:** *(All India 2006)*
a. Beta particles b. Alpha particles
c. Neutrons d. X- rays

68. **Which one of the following has the maximum ionization potential?** *(All India 2006)*
a. Electron b. Proton
c. Helium ion d. Gamma photon

69. **Which of the following malignant tumors is radioresistant?** *(All India 2006; AIIMS 2007)*
a. Ewing's sarcoma b. Retinoblastoma
c. Osteosarcoma d. Neuroblastoma

70. **The most radiosensitive tumour among the following is:** *(All India 2006)*
a. Bronchogenic carcinoma b. Carcinoma parotid
c. Dysgerminoma d. Osteogenic sarcoma

71. **Which of the following imaging techniques gives maximum radiation exposure to the patient?** *(All India 2006)*
a. Chest X-ray b. MRI
c. CT scan E. Bone scan

72. **The technique employed in radiotherapy to counteract the effect of tumor motion due to breathing is known as:** *(All India 2005)*
a. Arc technique b. Modulation
c. Gating d. Shunting

73. **Which one of the following radioisotope is not used as permanent implant?** *(All India 2005)*
a. Iodine-125 b. Palladium-103
c. Gold-198 d. Caesium-137

74. **Which of the following elements is obsolete in radiotherapy?** *(AIIMS 2009)*
a. Cesium-137 b. Cobalt-60
c. Radium-226 d. Iridium-192

75. Craniospinal irradiation is employed in the treatment of: *(KGMC 2011, PGI 2009)*
a. Oligodendroglioma b. Pilocytic astrocytoma
c. Mixed oligoastrocytoma d. Medulloblastoma
e. Glioblastoma

76. Which of the following is the most radiosensitive phase of the cell cycle? *(AIIMS Nov 2012, All India 2008, PGI 2009, 2008)*
a. G_2M b. G_2
c. S d. G_1

77. Amifostine protects all of the following except: *(All India 2009)*
a. CNS b. Salivary glands
c. Kidneys d. GIT

78. Which of the following is the most radiosensitive tumor?
a. Ewing's sarcoma *(AIIMS Nov 2005)*
b. Hodgkin's disease
c. Carcinoma cervix
d. Malignant fibrous histiocytoma

79. Which of the following radioactive isotopes in not used in brachytherapy? *(AIIMS 2005)*
a. Iodine-125 b. Iodine-131
c. Cobalt-60 d. Iridium-192

80. High energy linear accelerators use: *(PGI 2006)*
a. X-rays b. Gamma-rays
c. Alpha-rays d. Infrared-rays
e. β-rays

81. Ionizing radiation cause maximum damage in: *(PGI 2005)*
a. Hypoxic cells b. Cells in S phase
c. Cells in G_2M phase d. Dividing cells
e. Neurons

82. Which radionuclide is commonly used in teletherapy units? *(Orissa 2011)*
a. Radium-226 b. Cobalt-60
c. Caesium-137 d. Iridium-192

83. The half life of radioactive Cobalt-60 is: *(Orissa 2011)*
a. 2.26 years b. 3.26 years
c. 5.26 years d. 7.26 years

84. Amifostine is: *(AIIMS May 2012)*
a. Radiosensitiser b. Radioprotector
c. Radiomodifier d. Radiomimetic

85. Which of the following is radioprotective agent?
a. Cisplatin *(All India 2012)*
b. Amifostine
c. Methotrexate
d. Colony stimulating factor

86. For which malignancy, intensity modulated radiotherapy (IMRT) is the most suitable: *(AIIMS Nov 2005)*
a. Lung b. Prostate
c. Leukemia d. Stomach

MISCELLANEOUS

87. Which of the following malignant disease of children has the best prognosis? *(AIIMS Nov 2003)*
a. Wilm's tumor
b. Neuroblastoma
c. Rhabdomyosarcoma
d. Primitive neuroectodermal tumor

88. Neoadjuvant chemotherapy is not used in: *(AIIMS Feb 97)*
a. CA thyroid b. CA breast
c. CA esophagus d. CA lung

89. Which of the following is the most beneficial technique of using chemotherapy with a course of radiotherapy in head and neck malignancies? *(AIIMS Nov 2004)*
a. Neo adjuvant chemotherapy
b. Adjuvant chemotherapy
c. Concurrent chemotherapy
d. Alternating chemotherapy and radiotherapy

90. Migratory thrombophlebitis is associated with the following malignancies except: *(AIIMS Nov 2004)*
a. Lung cancer b. Prostate cancer
c. Pancreas cancer d. Gastro-intestinal cancer

91. Small deposits of neuroendocrine cell hyperplasia in scarred lungs are known as: *(JIPMER 2014)*
a. Teratoma b. Tumor let
c. Carcinoid d. Hamartoma

92. The most common malignant tumor of adult males in India is: *(All India 2004)*
a. Orophayngeal carcinoma b. Gastric carcinoma
c. Colo-rectal carcinoma d. Lung cancer

93. Most common cancer in India: *(All India 97)*
a. CA cervix b. CA breast
c. CA lung d. CA oral cavity

94. Trousseau's sign is seen in all the following except:
a. CA lung b. CA Stomach *(All India 94)*
c. CA Pancreas d. Liposarcoma

95. Pseudolymphoma is seen in: *(PGI Dec 97)*
a. Sjogren's syndrome
b. SLE
c. Mixed connective tissue disease
d. Behect's syndrome

96. Pancoast tumour is seen with cancer of: *(PGI Dec 99)*
a. Apical lobe of lung b. Lingual lobe
c. Thyroid d. Pyriform fossa

97. Erythema chronicum migrans is seen in: *(PGI June 99)*
a. Lyme's disease b. Glucagonoma
c. Gastrinoma d. Pheochromocytoma

98. All of the following are examples of round cell tumour, except: *(AIIMS Nov 2005)*
a. Neuroblastoma
b. Ewing Sarcoma
c. Non-Hodgkin's lymphoma
d. Osteosarcoma

99. RET proto-oncogene mutation is a hallmark of which of the following tumors?
a. Medullary carcinoma thyroid
b. Astrocytoma
c. Paraganglioma
d. Hurthle cell tumor thyroid

100. All are correctly matched except: *(PGI June 2006)*
a. BRCA-1: Lung
b. BCL-2: Apoptosis
c. Chromosome 16: Philadelphia chromosome
d. APC gene: Colon

101. Adjuvant chemotherapy is of definite value in: *(AIIMS Nov 2006)*
a. CA colon b. CA pancreas
c. CA gallbladder d. CA esophagus

102. Which of the following tumors are surgically curative? *(PGI 88)*
a. Pheochromocytoma b. Insulinoma
c. Glucagonoma d. Appendicular carcinoid
e. All

103. Which is not having underlying malignancy? *(APPG 2008)*
a. Paget's disease of bone
b. Paget's disease of nipple
c. Paget's disease of vulva
d. Paget's disease of anal region

104. Glomus tumor is seen in: *(AIIMS Nov 2008)*
a. Liver b. Adrenals
c. Pituitary d. Finger

105. BRCA-1 gene is located on: *(AIIMS May 2011)*
a. Chromosome 13 b. Chromosome 11
c. Chromosome 17 d. Chromosome 22

106. A 24 years old man presented with retroperitoneal, necrotic, heterogenous enhancing mass on CT near the hilum of the left kidney. What is the most probable diagnosis? *(AIIMS Nov 2010)*
a. Metastatic germ cell tumour
b. Metastatic melanoma
c. Lymphoma
d. Metastatic transitional cell tumour

107. Octreotide is used in all except: *(AIIMS May 2011)*
a. Insulinoma b. Glucagonoma
c. Glioma d. Carcinoids

108. Feature(s) of hamartoma is/are: *(PGI Nov 2011)*
a. Benign b. Malignant
c. Malformation d. Mostly Asymptomatic

109. Most common site of carcinoma in India? *(MHPGMCET 2001)*
a. Lung b. Oral cavity
c. Breast d. Uterus

110. National Cancer Control Programme (NCCP) launched in India in the year: *(Orissa 2011)*
a. 1975 b. 1982
c. 1985 d. 1992

111. Acanthosis nigricans is seen in: *(DNB 2009)*
a. GI maligancy b. Lung cancer
c. Breast cancer d. All of the above

112. Smoking is a risk factor for all cancer except: *(DNB 2007)*
a. Esophagus b. Urinary bladder
c. Pancreas d. Gallbladder

113. Most common Non-Hodgkin's lymphoma of orbit:
a. B cell b. T cell *(AIIMS May 2013)*
c. NK cell d. Plasma cel

EXPLANATIONS

TUMOR MARKERS

1. **Ans. c. CEA** *(Ref: Harrison 18/e p652; Schwartz 9/e p444-445; Sabiston 19/e p712-716)*

Paget's disease of nipple is differentiated by superficial spreading melanoma by **CEA positivity**Q.

Markers	Associated Cancers	Non-neoplastic Conditions
Hormones		
• **Human chorionic gonadotropin** • **Calcitonin** • **Catecholamines**	• **Trophoblastic tumors**Q, **nonseminomatous** testicular tumors • **Medullary carcinoma**Q of thyroid • **Pheochromocytoma**Q	• Pregnancy
Oncofetal Antigens		
• Alpha-Fetoprotein • **CEA**	• **Liver**Q cell cancer, **nonseminomatous**Q germ cell tumor of testis, **lung**Q cancer • Adenocarcinoma of the **colon**Q, **pancreas**Q, **lung**Q, **breast**Q, **ovary**Q, **prostate**Q	• Cirrhosis, hepatitis • Pancreatitis, hepatitis, inflammatory bowel disease, smoking
Isoenzymes		
• Prostatic acid phosphatase • **Neuron-specific enolase** • Lactate dehydrogenase	• Prostate cancer • **Small cell** cancer of lungQ, **Neuroblastoma**Q • Lymphoma, Ewing sarcoma	• Prostatitis, prostatic hypertrophy • Hepatitis, hemolytic anemia, many others
Specific proteins		
• **Immunoglobulins** • PSA and prostate specific membrane antigen	• **Multiple myeloma**Q and other gammopathies • **Prostate cancer**Q	• Infection, MGUS • **Prostatitis, prostatic hypertrophy**Q
Mucins and other Glycoproteins		
• **CA-125** • **CA-19-9** • **CD30** • **CD25**	• **Cancer of ovary**Q, fallopian tube, **endometrium**Q, **cervix, breast**Q, **lung**Q, **pancreas**Q and **colon**Q • **Colon**Q cancer, **pancreatic**Q cancer • **Hodgkin's disease**Q, anaplastic large cell lymphoma • **Hairy cell leukemia**, **adult T cell leukemia/lymphoma**Q	• **Pregnancy**Q, **endometriosis**Q, **PID**Q, **uterine fibroids**Q • **Pancreatitis,** Ulcerative colitis

2. **Ans. c. Hepatocellular carcinoma**

3. **Ans. b. Hepatoma, c. RCC** *(Ref: Harrison 18/e p831)*

Erythropoietin Secreting Tumors	
• **Renal cell carcinoma**Q	• **Cerebellar hemangioblastoma**Q
• **Hepatocellular carcinoma**Q	• **Massive uterine leiomyoma**Q

4. **Ans. a. Screening of a cancer, b. Follow up a cancer patient, especially for knowing about recurrence, d. For monitoring the treatment of a cancer** *(Ref: Harrison 18/e p652; Sabiston 19/e p712-716)*

Tumor Markers

- Tumor markers are **indicators of cellular, biochemical, molecular,** or **genetic alterations** by which neoplasia can be recognizedQ.
- These **surrogate measures of** the **biology** of the cancer provide insight into the **clinical behavior** of the tumorQ.
- This is particularly **useful when** the **cancer is not clinically detectable**Q.
- **The information provided may:**
  - Be **diagnostic** and **distinguish benign from malignant disease**Q
  - **Correlate with** the amount of tumor present (so-called **tumor burden**Q)
  - **Allow subtype classification** to more **accurately stage** patientsQ
  - Be **prognostic,** either by the **presence or absence** of the marker or by its **concentration**Q
  - **Guide choice of therapy** and **predict response to therapy**Q

5. **Ans. a. Cerebellar hemangioblastoma, b. Hepatoma, c. Renal cell carcinoma, e. Fibromyoma of uterus**
6. **Ans. a. Colon carcinoma, b. Breast carcinoma, c. Ovarian carcinoma, d. Bronchogenic carcinoma, e. Pancreatic carcinoma**
7. **Ans. a. Pregnancy, b. Breast carcinoma, d. Endometrial carcinoma, e. Endometriosis**
8. **Ans. a. Adenocarcinoma of colon, b. Pancreatic carcinoma, d. Ovarian carcinoma, e. Prostatic carcinoma**
9. **Ans. b. HCC, c. CA Lung**
10. **Ans. b. Metastatic carcinoma of liver**
11. **Ans. a. Cytokeratin** *(Ref: Robbins 8/e p324)*

SCREENING IMMUNOHISTOCHEMISTRY

- **Epithelial Markers**: **Cytokeratin** (positive in **carcinomas**)Q
- **Lymphoid Markers**: **CD-45** (positive in **lymphoma**)Q
- **Melanocytic Markers**: **S-100** (positive in **melanoma**)Q
- **Mesenchymal Markers**: **Vimentin** (positive in **sarcoma**)Q
- **Neuroendocrine Markers**: **Chromagranin** and **neuron specific enolase**Q

12. **Ans. b. Seminoma of the testes**
13. **Ans. None**
14. **Ans. d. Osteogenic sarcoma**
15. **Ans. d. Elevated only when there is hepatic metastasis**

SCREENING IN MALIGNANCY

16. **Ans. c. Colon cancer** *(Ref: Harrison 18/e p659-662; Schwartz 9/e p252; Bailey 25/e p97-98)*

Schwartz says "Because the **majority of colorectal cancers** are thought to **arise from adenomatous polyps**, preventive measures focus upon identification and removal of these premalignant lesions. In addition, **many cancers** are **asymptomatic** and **screening** may **detect** these **tumors at** an **early** and **curable stage**.

American Cancer Society Recommendations for Early Detection of Cancer in Average-Risk, Asymptomatic Individuals			
Cancer Site	**Population**	**Test or Procedure**	**Frequency**
Breast	Women aged **≥ 20 years**	• Breast self-examination • Clinical breast examination • Mammography	• **Monthly**, starting at age **20** • **Every 3 years**, ages **20–39** • **Annual,** starting at age **40**Q • **Annual,** starting at age **40**Q
Colorectal	Men and women aged **≥ 50 years**	• Fecal occult blood test (**FOBT**) or fecal immunochemical test (FIT) • **Flexible sigmoidoscopy**Q • **FOBT** and **flexible sigmoidoscopy**Q • Double-contrast barium enema (**DCBE**)Q • **Colonoscopy**Q	• **Annual,** starting at age **50**Q • **Every 5 years**, starting at age **50** • **Annual FOBT** (or FIT) and **flexible sigmoidoscopy** every **5 years**, starting at age 50Q • **DCBE every 5 years**, starting at age 50Q • **Colonoscopy every 10 years**Q, starting at age 50
Prostate	Men aged **≥50 years**	• Digital rectal examination (**DRE**) and prostate-specific antigen **(PSA) test**Q	• Offer PSA test and DRE annually, starting at **age 50**, for men who have life expectancy of at least 10 years
Cervix	Women aged **≥18 years**	• **Pap test**Q	• Cervical cancer screening beginning **3 years after first vaginal intercourse**, but no later than age 21 years
Endometrial	Women at **menopause**	—	• At the time of menopause, women at average risk should be informed about the risks and symptoms of endometrial cancer

17. **Ans. b Colon**
18. **Ans. b Carcinoma Breast, d. Carcinoma Cervix**
19. **Ans. d. Lung**

Well Established Benefit of Screening in	
• **Colorectal cancer**Q • **CA cervix**Q	• **CA oral cavity**Q • **CA breast**Q

LYMPH NODE METASTASIS

20. **Ans. b. Nasopharyngeal carcinoma** *(Ref: Sabiston 19/e p808-810; Schwartz 10/e 580, 593-594, 9/e p502; Bailey 26/e p681-683, 25/e p709-710; Devita 9/e p764-766)*

Nasopharyngeal Carcinoma

- **MC tumor** to produce **cervical LN metastasis**[Q]
- **MC tumor** responsible for **secondaries in the neck** with **no obvious primary malignancy**[Q]

21. Ans. c. Hard palate *(Ref: Bailey 25/e p734, 738; Devita 9/e p750; Cancer of the Head and Neck by Suen and Myer 4/e p288-289)*

- **LN metastasis** is **most common in**: **CA tongue**[Q] >Floor of mouth >Lower alveolus >Buccal mucosa >Upper alveolus >**Hard palate >Lip**[Q].

22. Ans. a. Pretracheal *(Ref: Bailey 25/e p967, 977)*

Important Lymph Nodes	
Rotter's nodes[Q]	• **Interpectoral** nodes (**CA breast**)[Q]
Rouvier nodes[Q]	• **Retropharyngeal** nodes (**CA Nasopharynx**)[Q]
Delphian nodes[Q]	• **Pre-cricoid/Pre-tracheal/Pre-laryngeal** lymph nodes[Q]
Irish nodes[Q]	• Nodes in **left axilla** (**CA stomach**)[Q]
Sister Mary Joseph nodes[Q]	• **Periumbilical metastatic cutaneous** nodules
Virchow nodes[Q]	• **Left supraclavicular** node[Q]
Cloquet node[Q]	• **Femoral canal** node[Q]
LN of **Lund**[Q]	• **Cystic** lymph node[Q]
Krouse Lymph node	• **Jugular fossa** lymph node[Q]

23. Ans. d. Excision biopsy of the node *(Ref: Harrison 18/e p467)*

- Harrison says "In cases of **lymphadenopathy**, if the patient history and physical findings are **suggestive of malignancy**, then a **prompt lymph node biopsy** should be done. FNAC is not of much use, as it does not provide enough tissue to reach a diagnosis."

24. Ans. c. Lung carcinoma *(Ref: Harrison 18/e p738; Sabiston 19/e p1573; Schwartz 10/e 623-645, 9/e p529; Devita 9/e p799-812)*

- **SCC** is a **variant of lung cancer,** rest three options are most commonly adenocarcinoma.

25. Ans. a. Undertake an open biopsy of the neck lump **26. Ans. b. Posterior tongue**

27. Ans. b. Angiosarcoma *(Ref: Harrison 18/e p817-820; Sabiston 19/e p768-774)*

- **MC site of metastasis** in **sarcomas of extremity**: **Lungs**[Q]
- **MC site of metastasis** in **retroperitoneal sarcomas**: **Liver**[Q]
- **LN metastasis** is **uncommon in soft tissue sarcoma**[Q].

Sarcomas with Lymph Node Metastasis (MARCES)	
• **M**alignant fibrous histiocytoma[Q]	• **C**lear cell sarcoma[Q]
• **A**ngiosarcoma[Q]	• **E**pithelial sarcoma[Q]
• **R**habdomyosarcoma[Q]	• **S**ynovial sarcoma[Q]

BONE METASTASIS

28. Ans. b. Prostate *(Ref: Harrison 18/e p820-821; Devita 9/e p2512-2513; CSDT 12/e p1202)*

- **MC site of primary** for **bone metastasis**: **CA Prostate**[Q]
- **MC cause** of **osteoblastic secondaries** in **males**: **CA Prostate**[Q]
- **MC cause** of **osteoblastic secondaries** in **females**: **CA Breast**[Q]
- **MC tumor metastasize to bone** in **females: CA Breast**[Q]

Bone Metastasis

- **Metastatic tumors of bone** are **more common than primary bone tumors**[Q].
- Tumors usually **spread to bone hematogenously, axial skeleton** is seeded **more than appendicular skeleton** partly due to **persistence of red marrow**[Q].
  - In order of decreasing frequency, the **sites most often involved** are **vertebrae (most common)**[Q] **>proximal femur >pelvis >ribs > sternum >proximal humerus >skull.**
  - **Extremities distal to elbow** and **knee** are **least commonly involved sites**[Q], but if distal extremity is involved there is **high probability of myeloma**[Q].
  - **Metastasis to small bones originate from: Lung, kidney** or **colon**[Q]

- **Bone** is a **common site of metastasis for** carcinoma of the **prostate, breast, lung, kidney, bladder, thyroid, lymphomas and sarcomas**[Q].
- **Bateson's vertebral plexus** allow cells to enter the vertebral circulation without first passing through the lungs and is responsible for **high rate of prostate cancer metastasis to bone**[Q].

Diagnosis

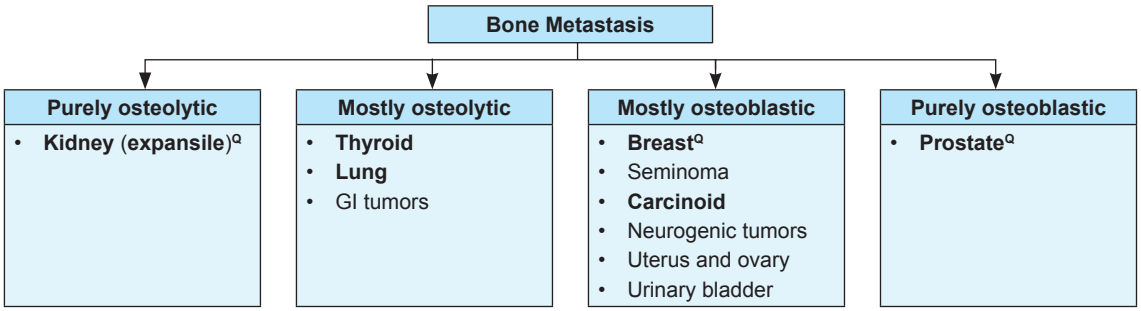
- **Bone scan** is **investigation of choice** for **bone metastasis**[Q].

> - **Purely osteolytic lesions** are **best detected by plain radiography**, but they are not apparent until they are **>1 cm** and have **destroyed 30-50% of bone**[Q].
> - These are associated with **hypercalcemia** and with the **excretion of hydroxyproline** containing peptides[Q].

Treatment

- Treatment options: **Bisphosphonates, corticosteroids, radiotherapy (EBRT) and radionucleotides.**
- **EBRT** is given **in symptomatic bony metastasis**[Q].
- **Samarium-153**, is a **beta emitter, very effective** in **relieving pain** of **bone metastasis**[Q].

29. **Ans. a. Samarium-153**
30. **Ans. c. Bone scan** *(Ref: Sutton 7/e p1251)*
31. **Ans. c. CA testis**
32. **Ans. d. Soft tissue sarcoma causes bony metastasis**
33. **Ans. a. Prostate**



34. **Ans. a. Kidney**

PULSATING SECONDARIES

- **Follicular carcinoma thyroid**[Q]
- **RCC**[Q]

35. **Ans. b. Neuroblastoma** *(Ref: Schwartz 10/e 678,1639-1640, 9/e p1449-1450; Sabiston 19/e p1859-1861; Bailey 25/e p814-815; Harrison 18/e p836; Ghai 7/e p590-591; Nelson's 18/e p2138)*

NEUROBLASTOMA

- **Metastasis** is present in **60–70%** of patients **at the time of diagnosis**[Q]
- **Common sites of metastasis: Long bones** (**MC**)[Q], Liver, Lymph nodes and Skin
- **Lung metastasis** is **rare** in **neuroblastoma**[Q]
- **Neuroblastoma** is the **MC extracranial solid tumor** in **childhood**[Q]
- **Neuroblastoma** is the **2nd MC solid malignancy** of childhood **after brain tumors**[Q]
- **MC intra abdominal solid tumor** in **childhood**: **Neuroblastoma**[Q]

36. **Ans. d. Multiple myeloma**
37. **Ans. d. Forearm and leg bones**
38. **Ans. d. Secondary from prostate**
39. **Ans. a. Lung** *(Ref: Bailey 24/e p1330)*
    - "**Prostate, breast** and **lung primaries account for 80% of all bone metastasis**."

ONCOLOGICAL EMERGENCIES

40. **Ans. a. Hypocalcemia** *(Ref: Harrison 18/e p2274; Schwartz 10/e 72,78, 9/e p65; Sabiston 19/e p113)*

TUMOR LYSIS SYNDROME

- Caused by **destruction of** large number of **rapidly proliferating neoplastic cells**[Q]
- Frequently, **acute renal failure** develops as a result of the syndrome[Q].
- **Most frequently associated with** the treatment of **Burkitt's lymphoma, ALL** and other **high grade lymphomas**[Q], **chronic leukemias** and rarely with solid tumors.

Pathophysiology

- **Hyperuricemia**: Due to destruction of malignant cells and rapid turnover of nucleic acid
- **Hyperkalemia:** Due to release of intracellular K leading to arrhythmia.
- **Hyperphosphatemia** and **Hypocalcemia:** Due to **release of intracellular phosphate,** which combines with calcium into bone, **calcium phosphate** gets **deposited in renal tubules** causing **renal failure**[Q].
- **Lactic acidosis**: Due to **deranged oxidative metabolism**[Q]

Characteristic Abnormalities of Tumor Lysis Syndrome	
• **Hyperuricemia**[Q] • **Hyperkalemia**[Q] • **Hyperphosphatemia**[Q]	• **Lactic acidosis**[Q] • **Hypocalcemia**[Q]

Treatment

- **Hydration, $NaHCO_3$, Allopurinol, Rasburicase** (recombinant urate oxidase), **Hemodialysis**[Q]

41. **Ans. a. Hyperuricemia, d. Hyperphosphatemia, e. Hyperkalemia**
42. **Ans. b. Hypercalcemia**
43. **Ans. b. Hypercalcemia**
44. **Ans. b. PTH-rp** *(Ref: Harrison 18/e p3111)*

Hypercalcemia of Malignancy

- **Main factor** leading to hypercalcemia is either **increased release of calcium form bone** or **increased calcium reabsorption** from DCT[Q].
- Mostly **underlying cause** is **secretion of PTH-rp**[Q].

Treatment

- **Mainstay of therapy**: **Rehydration** with a **0.9% saline** and diuresis with **furosemide**[Q]
- Other drugs used to lower serum calcium levels:
  - **Bisphosphonates** (**Zoledronic acid** is DOC), **Calcitonin**[Q]
  - **Mithramycin** (plicamycin), **Gallium nitrate**[Q]
  - **Glucocorticoids** (Hydrocortisone)[Q]

45. **Ans. None**
46. **Ans. d. Neutropenic colitis** *(Ref: Harrison 18/e p2276-2277; Schwartz 10/e 1236, 1241, 9/e p1070, 1074; Bailey 26/e p206, 25/e p1211)*

Typhlitis (Neutropenic Enterocolitis)

- Also referred to as **necrotizing colitis, ileocecal syndrome** and **cecitis**[Q]
- **Classically seen** in **neutropenic patients after chemotherapy**[Q] with cytotoxic drugs.
- **More common** among **children**[Q] than among adults
- **More common** among patients with **acute myelocytic leukemia** (AML) or **ALL**[Q]

Clinical Features

- Clinical syndrome of **fever** and **right-lower-quadrant tenderness** in an **immunosuppressed host**[Q].
- Associated **diarrhea** (**often bloody**) is common

Diagnosis

- Diagnosis can be confirmed by the finding of a **thickened cecal wall** on **CT** or **USG**[Q].

Treatment

- **Most cases resolve with medical therapy** alone[Q].
- **Surgical intervention:** If there is **no improvement by 24 hours** after start of antibiotic treatment and in **perforation**[Q]

47. **Ans. a. Hyperuricemia, b. Hyperkalemia, e. Hyperphosphatemia**
48. **Ans. b. Small cell carcinoma** *(Ref:Harrison 18/e p2266; 17/e p554)*

Superior Vena Cava (SVC) Syndrome

- Clinical manifestation of SVC obstruction, with severe reduction in venous return from head, neck and upper extremities.
- **MC cause** is **Lung cancer (small cell and squamous cell carcinoma)**[Q], alongwith **lymphoma** and **metastatic tumors** responsible for more than 90% of all SVC syndrome.
- **In young adults**, **malignant lymphoma** is the **leading cause** of SVC syndrome[Q].

Clinical Features

- Patients present with **neck and facial swelling** (especially around the eyes), **dyspnoea,** and **cough**[Q].
- Other symptoms include hoarseness, tongue swelling, headache, nasal congestion, epistaxis, dysphagia, pain, dizziness, syncope.
- **Characteristic physical findings are dilated neck veins, increased number of collateral veins covering the anterior chest wall, cyanosis, and edema of the face, arms and chest**[Q].

Diagnosis

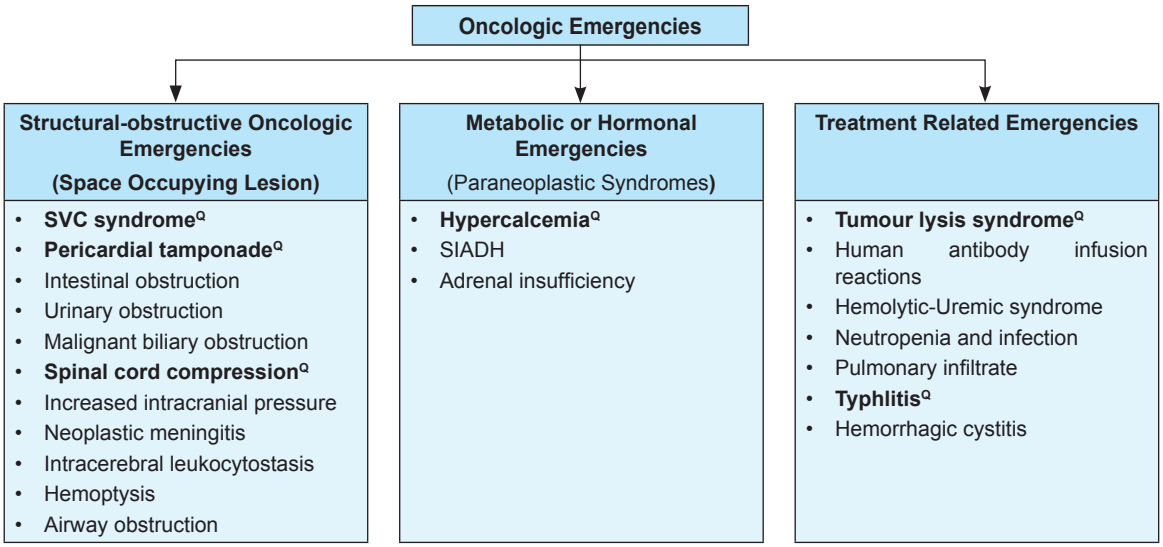
- Most significant chest radiographic finding is **widening of the superior mediastinum (MC right side)**[Q]
- **CT scan: Investigation of choice**[Q].

Treatment

- Potentially life threatening complication of **superior mediastinal mass** is **tracheal obstruction**[Q].
- Diuretics with low salt diet, head elevation and oxygen may produce temporary symptomatic relief.

Treatment	Underlying cause
Radiation Therapy[Q]	**Non-small cell lung cancer,** Metastatic solid tumors
Chemotherapy[Q]	**Small cell carcinoma or lymphoma**
Surgery[Q]	All other cases

49. Ans. d. CA cervix stage IIIb with pyometra *(Ref: Harrison 18/e p2266-2277)*



LYMPHOMA

50. Ans. a. Stomach *(Ref: Sabiston 19/e p1218-1219; Schwartz 10/e 1259, 9/e p935-937; Bailey 26/e p1160, 25/e p1075; Shackelford 7/e p1035-1042)*

GI Lymphoma

- **MC site** for **lymphoma**[Q] in the **GIT: Stomach >Ileum**
- **MC site** of **gastric lymphoma**: **Antrum**[Q]

- **MC type of gastric lymphoma: Diffuse large B-cell lymphoma**[Q] (55%) > **MALToma** (40%)
- **DLBL** is **MC type of NHL**, **extranodal lymphoma** and **GI lymphoma.**

51. Ans. b. Stomach

52. Ans. a. Lytic lesion in skull with suture diastasis

53. Ans. b. Neuroblastoma

SENTINEL LYMPH NODE BIOPSY

54. Ans. b. Carcinoma breast *(Ref: Harrison 18/e p690, 729; Schwartz 10/e 305-306, 545-547, 9/e p259, 416; Sabiston 19/e p753, 851)*

Sentinel Lymph Node Biopsy

- **SLN biopsy** is usually done in: **CA breast**[Q], **CA penis**[Q] and **Malignant melanoma**[Q]
- **No special OT is required**[Q]
- **SLN biopsy** is usually **done intra-operatively** by using **isosulphan blue dye** (**lymphazurin**) or **radioactive (Tc-99 labelled sulphur) colloid**. **Accuracy of detection** of SLN biopsy is **best when both** of the methods **are combined**[Q].
- When radioactive colloid is used, the SLN is detected by gamma-camera
- The blue dye colors the afferent lymphatics and SLN, hence aids in the identification

Contraindication of SLN Biopsy in CA Breast

1. **Palpable lymphadenopathy**[Q]
2. **Prior axillary surgery, chemotherapy** or **radiotherapy**[Q]
3. **Multifocal breast cancer**[Q]

55. **Ans. b. Blue dyes injected**

56. **Ans. d. CA colon**

GI MALIGNANCY

57. **Ans. d. Metaplasia** *(Ref: Sabiston 19/e p1033-1036; Schwartz 10/e 1017-1018, 9/e p831-832; Bailey 26/e p1001, 25/e p1022-1024; Schackelford 7/e p285, 294)*

Barrett's Esophagus

- **Metaplasia** of esophageal **squamous epithelium into columnar** in **distal**[Q] esophagus
- It is consequence of **severe reflux esophagitis**[Q]
- **MC type** of columnar epithelium is **intestinal epithelium** (**Intestinal metaplasia**[Q])

58. **Ans. a. Esophageal carcinoma** *(Ref: Schwartz 10/e 1008-1009, 9/e p866; Sabiston 19/e p1053)*

Endoscopic Mucosal Resection (in CA Esophagus)

- **EMR provides essential staging information that guides treatment**[Q].
- It may also be used as a **therapeutic modality for premalignant** and **early malignant conditions**[Q].

59. **Ans. a. CA colon** *(Ref: www.ncbi.nlm.nih.gov/pubmed/11775180)*

Radio-Immunoguided Surgery for Colorectal Cancer

- The **intra-operative detection** of **metastatic disease** in **colorectal cancer** depends on **tumor-associated antigen** and **antibodies** as well as **detection technology** (A **hand-held gamma detecting probe**) [Q].

SPONTANEOUS REGRESSION

60. **Ans. b. Osteosarcoma** *(Ref: Robbins 8/e p478, 966, 1059, 1172, 1365)*

Tumors with Spontaneous Regression (NCR MR)	
• **N**euroblastoma[Q]	• **M**alignant melanoma[Q]
• **C**horiocarcinoma[Q]	• **R**etinoblastoma[Q]
• **R**enal cell carcinoma[Q]	

61. **Ans. a. Malignant melanoma, b. Neuroblastoma**

62. **Ans. a. Neuroblastoma, b. Renal cell carcinoma**

63. **Ans. a. Neuroblastoma, b. Retinoblastoma**

RADIOTHERAPY

64. **Ans. c. Late S** *(Ref: Harrison 18/e p691-692; Schwartz 10/e 313-314, 9/e p264-265)*

- **Radiation energy** is absorbed by tissue causing **ionization** or **excitation**[Q], which are responsible for various biological effects.
- **Susceptibility of various phases of cell cycle to radiation: G_2M[Q] >G_2 >M >G_1 >Early S >Late S Phase**[Q].

Phase of Cell Cycle	Comment
$G_2M > G_2$	• **Most sensitive**[Q] to radiation
End of S phase	• **Most resistant**[Q] to radiation
G_1	• Radiation exposure leads to **chromosomal aberration**
G_2	• Radiation exposure leads to **chromatid aberration**

65. Ans. d. Samarium-153 *(Ref: Harrison 18/e p691-692)*

Pure Beta Emitters	
• **Strontium (Sr)-90**[Q]	• **H-3 (Tritium)**[Q]
• **Yttrium (Y)-90**[Q]	• **Phosphorus (P)-32**[Q]

66. Ans. c. Iridium-192 *(Ref: Principle and Practice of Radiation Oncology (Lippincott) 4/e p637; Harrison 18/e p692)*

SYSTEMIC RADIONUCLIDES

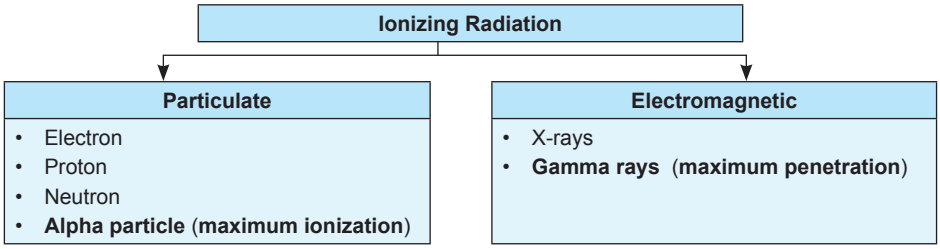
- **Systemic radionuclides** are **non-sealed** radionuclides which are administered orally, intravenously or intracavitary.
- Before administering it, **pregnancy** should be **ruled out**
- **Breast feeding** should be **discontinued for 1–2 weeks**.

Types	T½(days)	Decay particles	Use
Sodium iodide (I^{131})[Q]	**8**[Q]	**Gamma, beta**[Q]	**Hyperthyroidism** (diffuse toxic goiter, toxic multinodular goiter, or solitary toxic thyroid nodule), **thyroid carcinoma**[Q]
Sodium phosphate (P^{32}) Colloidal chromic Phosphate	**14.3**	**Beta**[Q]	Myeloproliferative disorders (**Polycythemia** and **thrombocytosis**[Q]) Intra-cavitary therapy of **malignant ascites**, **malignant pleural effusion** and **brain cyst**[Q]
Samarium-153 (Sm) chloride	**1.9**	**Beta**[Q]	**Painful bone metastases**[Q]
Strontium-89 (Sr) chloride	**50.5**	**Beta**[Q] **Never gamma**	**Painful bone metastases**[Q]
Rhenium (Re)	**3.8**	**Beta and Gamma**	**Painful bone metastases**[Q]

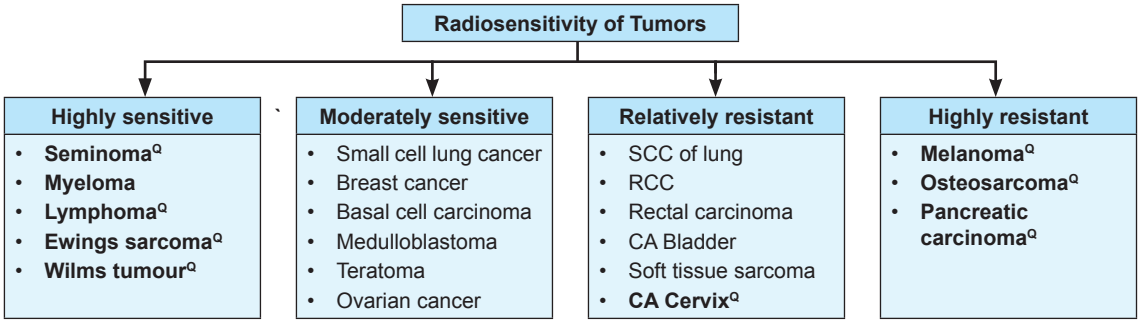
67. Ans. a. Beta particles

68. Ans. c. Helium ion *(Ref: Harrison 18/e p691-692)*

Alpha particles (**helium ion**) and **low energy neutrons** are **densely ionizing**; X-rays and gamma rays are sparsely ionizing.



69. Ans. c. Osteosarcoma *(Ref: Essentials of Radiology by Bhaduri/502)*



70. Ans. c. Dysgerminoma

71. Ans. c. CT scan *(Ref: Bailey 25/e p130)*

Diagnostic procedure	Typical effective dose (mSv)	Equivalent no. of chest radiographs
Radiographic examinations		
Limbs and joints (except hip)	< 0.01	< 0.5
Chest (single PA film)	**0.02**	**1**
Skull	0.07	3.5
Thoracic spine	0.7	35
Lumbar spine	**1.3**	**65**
Hip	0.3	15
Pelvis	0.7	35
Abdomen	1.0	50
Intravenous urography	**2.5**	**125**
Barium swallow	1.5	75
Barium meal	3	150
Barium follow-through	3	150
Barium enema	**7**	**350**
CT head	**2.3**	**115**
CT chest	**8**	400
CT abdomen or pelvis	10	500
Radionuclide studies		
Lung ventilation (133Xe)	0.3	15
Lung perfusion (99mTc)	1	50
Kidney (99mTc)	1	50
Thyroid (99mTc)	**1**	**50**
Bone (99mTc)	**4**	**200**
Dynamic cardiac (99mTc)	6	300
PET head (18F-FDG)	**5**	**250**

72. Ans. c. Gating *(Ref: Radiation oncology by Leibe Phillips 2nd/192-192)*

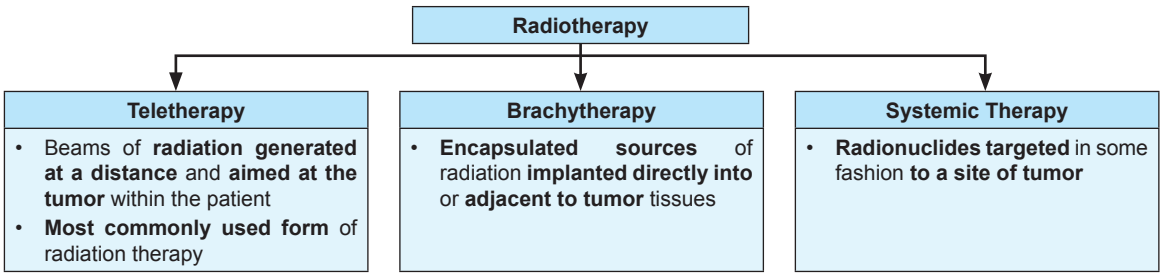
The technique employed in radiotherapy to counteract the effect of tumour motion due to breathing is known as Gating.

Techniques to Reduce the uncertainty due to **Respiratory Motion in Radiotherapy**

Respiratory gating	Active breathing control	Deep inspiration breath holding technique
• Patient **respiration during radiotherapy** can **cause significant motion of** the **tumor volume,** which can be **mitigated by gating** the **accelerator beam to** the **patient respiration.** • **Respiratory gating** is one of the **latest techniques in radiation therapy** and involves **matching radiation treatment to** a **patient** own **respiratory pattern.** • This approach **decreases possible complications** and **side effects**, while **using higher doses** and **getting better outcomes**.	• Patient nose is clamped • Patient breathes through an ABC apparatus, which simultaneously control radiation dose.	• **Patient** is asked to **hold** the **breath in deep inspiration.** • Breath hold **minimizes tumor motion** • It **expands** the **lung** to its **maximum volume putting** the **healthy lung tissue out of** the **radiation field**

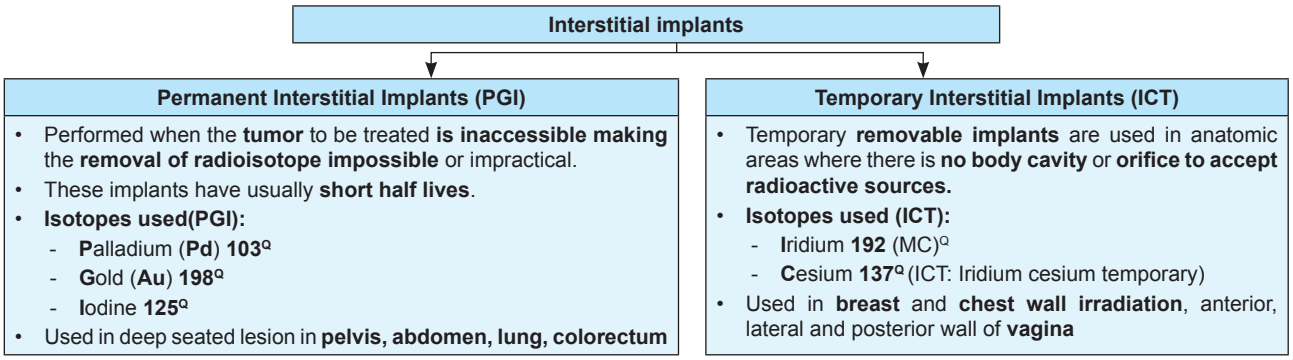
73. Ans. d. Caesium-137 *(Ref: Washington and Lever Principle of Radiotherapy 2nd/326; Harrison 18/e p691-692)*

- Cs-137 is not used as permanent implant, it is used as temporary interstitial implant.



Brachytherapy

- **Radiation therapy with encapsulated source** of radiation **implanted directly into** or adjacent to **tumor tissue**.
- It is delivered in two ways (1) **Intracavitary implants**[Q] (2) **Interstitial implants**
- **Interstitial implantation** is of two types:
  1. **Permanent implants (PGI)**[Q]**: P**d-103[Q], **G**old (Au)-198[Q], **I**-125[Q]
  2. **Temporary implants (ICT)**[Q]**: I**r-192[Q], **C**s-137[Q] (**T**emporary)
- Normal tissues are spared from radiation injury[Q].



74. Ans. c. Radium-226 *(Ref: Text Book of Radiation Oncology by Leibel Philips 2nd/231)*

Radium-226

- **Radium-226 is not used anymore because of:**
  - **Longest half life** among all isotopes
  - Emits **alpha** and **gamma rays,** which is the **most dangerous combination**
  - Produces **radon,** a radioactive inert gas, which is **difficult to remove**

75. Ans. d. Medulloblastoma, e. Glioblastoma *(Ref: Harrison 18/e p3388)*

Prophylactic Craniospinal Irradiation

- Prophylactic craniospinal irradiation is useful in **CNS malignancy** which **disseminate via CSF** or any **malignancy** with **high risk** of **CNS spread**[Q].

Indications of Prophylactic Craniospinal Irradiation	
• **Medulloblastoma**[Q]	• **ALL**[Q]
• **Glioblastoma**[Q]	• **Non hodgkin's lymphoma**[Q]
• **Germinoma**[Q]	• **Leptomeningeal Rhabdomyosarcoma**[Q]
• **Small cell Ca of lung**[Q]	

76. Ans. a. G_2M

77. Ans. a. CNS *(Ref: Radiation Oncology 8/e p41; Harrison 19/e p839-840)*

Amifostine

- Amifostine offers **no protection to CNS**, as it **doesn't cross blood brain barrier**
- Amifostine is a radiation protector
- Amifostine provide **protection against hematologic** and **non-hematologic toxicity of cisplatin** also

Mechanism of action:

- Amifostine **scavenge free radicals** produced by ionizing radiations

Tissue Protected:

- **Gut lining, hematopoietic system** and **salivary glands**

78. **Ans. a. Ewing's sarcoma**

Most radiosensitive ovarian tumor	• **Dysgerminoma**[Q]
Most radiosensitive **brain** tumor	• **Medulloblastoma**[Q]
Most radiosensitive **testicular** tumor	• **Seminoma**[Q]
Most radiosensitive **lung** tumor	• **Small cell CA**[Q]
Most radiosensitive **kidney** tumor	• **Wilms tumor**[Q]
Most radiosensitive **bone** tumor	• **Ewing's Sarcoma**[Q] and **Multiple myeloma**[Q]

79. **Ans. c. Cobalt-60** *(Ref: Text Book of Radiation Oncology by Leibel Philips 2nd/231)*

- **Cobalt-60** is a synthetic radioactive isotope of cobalt with a **half-life** of 5.27 years
- **Cobalt-60** is **used only in teletherapy**

80. **Ans. a. X-rays** *(Ref: Harrison 18/e p691-692)*

RADIOTHERAPY

- **X-rays** and **gamma rays** are the **most common radiations used** to treat cancers.
- **X-rays** are **generated by linear accelerators**
- **Gamma rays** are generated **from decay of atomic nuclei** in radio-isotopes like **cobalt.**

81. **Ans. c. Cells in G2M phase, d. Dividing cells**

82. **Ans. b. Cobalt-60**

83. **Ans. c. 5.26 years**

84. **Ans. b. Radioprotector** *(Ref: Radiation Oncology 8/e p41)*

Radiotherapy

Radiosensitiser	Radiation Protectors
• **Oxygen**[Q] (most effective Radiosensitiser) • **Metronidazole**[Q], misonidazole, tinidazole • **5-FU**[Q] (non-hypoxic cell sensitizer) • **Hydroxyurea**[Q] (non-hypoxic cell sensitizer) • **BUDR and IUDR**[Q] (non-hypoxic cell sensitizer) • **Cisplatin**[Q]**, paclitaxel, gemcitabine** • **Mitomycin**[Q]**, topotecan, vinorelbine** • **Dactinomycin (Actinomycin D)**[Q]	• **Amifostine** • **IL-1** • **GM-CSF**

- Hypoxic cells are **resistant** to radiotherapy[Q].
- **Augmentation of oxygen** is the **basis of radiosensitization**[Q].

85. **Ans. b. Amifostine**

86. **Ans. b. Prostate** *(Ref: Text Book of Radiation Oncology by Leibel Philips 2/e p315, 334)*

INTENSITY MODULATED RADIATION THERAPY (IMRT)

- The radiation dose is designed to **conform to the three dimensional (3-D) shape of** the **tumour** by modulation or controlling the intensity of the radiation beams to **focus a higher radiation dose to the tumour** while **minimizing radiation exposure to surrounding normal tissues**[Q].

Indications of IMRT	
• **Prostate cancer**[Q] • **Pancreatic tumors** • Head and neck cancers	• **Primary** and **metastatic brain tumors** • Liver tumors (HCC and metastasis)

In Radiotherapy

- **Most radiosensitive tissue** of body: **Bone marrow**[Q]
- **Least** radiosensitive tissue of body: **Nervous tissue / Brain**[Q]
- **Most radiosensitive blood cell: Lymphocyte**[Q] (That's why Lymphocytic predominant Hodgkins lymphoma has best prognosis)
- **Least radiosensitive blood cell**: **Platelet**[Q]
- **Most common organ** to be affected by radiation: **Skin**[Q] **(Erythema earliest change, layer most commonly affected stratum basalis)**
- Sebaceous gland function doesn't recover after radiotherapy.
- **Pinna** and **axillae** are common sites of **radionecrosis** i.e. for skin doses.
- Most **radio resistant** organ: **Vagina**
- Most common **mucosa** to be affected by radiation: **Intestinal mucosa**[Q] **(Earliest symptom** is **diarrhea)**
- **Most sensitive abdominal organ**: **Kidney**

MISCELLANEOUS

87. Ans. a. Wilm's tumor *(Ref: CSDT 11/e p1345; CPDT 16/e p807-809)*

- **5-year survival** in **localized Wilm's tumor** of **favorable histology: >97%**

88. Ans. a. CA thyroid *(Ref: Harrison 18/e p693)*

- Thyroid carcinoma is poorly responsive to chemotherapy.

Chemotherapy

Highly Chemosensitive Tumors	Chemoresistant Tumors
• Hodgkin's lymphoma	• Melanoma
• Wilm's tumor	• SCC of lung
• Ewing's sarcoma	• HCC
• ALL	• Thyroid carcinoma
• Teratoma (testis)	
• Embryonal Rhabdomyosarcoma	
• Choriocarcinoma	

89. Ans. c. Concurrent chemotherapy *(Ref: Bailey 26/e p720, 25/e p748; Devita 9/e p749; Cancer of the Head and Neck by Suen and Myer 4/e p291-292)*

Chemotherapy in Cancers of Oral Cavity, Head and Neck

- Adjuvant **chemotherapy** has been reported to **improve the rate of organ preservation** with **no change in overall survival**[Q].
- Chemotherapy is often **employed in palliative setting** in patients with **recurrent, unresectable** or **distant metastases**[Q].
- **Drugs used**: **Cisplatin**[Q], **Methotrexate**, 5-FU, Docetaxel and Paclitaxel
  - **Cisplatin** is the **cornerstone drug** in the modern management of head and neck cancer[Q].
  - **Most beneficial** is **concurrent chemotherapy**[Q].
- The addition of **concurrent chemotherapy** (**cisplatin**) to conventional radiation **significantly improved survival over radiation alone**[Q].
- **Concurrent chemoradiation** protocols have **improved locoregional control** and **reduce** the **development of distant disease**[Q].

90. Ans. b. Prostate cancer *(Ref: Sabiston 19/e p1816-1817; Schwartz 10/e p927, 9/e p789; Bailey 25/e p939)*

Malignancies associated with Migratory Thrombophlebitis	
• CA pancreas (MC)[Q]	• Prostate cancer[Q]
• CA lung[Q]	• Ovarian cancer[Q]
• GI malignancies[Q]	• Lymphoma[Q]

- **Trousseau's syndrome**: **Migratory thrombophlebitis**[Q]
- **Trousseau's sign: Carpopedal spasm** in **hypocalcemia**[Q]
- **Troisier's sign: Palpable left supraclavicular LN (Virchow's node)**[Q]

91. Ans. b. Tumor let

92. Ans. a. Orophayngeal carcinoma *(Ref: Bailey 26/e p709-710, 25/e p734, 738; Devita 9/e p729)*

- **MC site** of **CA oral cavity**: **Tongue >Lip**[Q]
- **MC histological type** of **CA oral cavity**: **Squamous cell carcinoma**[Q]
- **MC type** of **cancer in India**: **CA oral cavity**[Q]
- **MC site** of **CA oral cavity in India**: **Buccal mucosa**[Q] (38%) > Anterior tongue (16%) >Lower alveolus (15.7%)
- **LN metastasis** is **most common in**: **CA tongue**[Q] >Floor of mouth >Lower alveolus >Buccal mucosa >Upper alveolus >**Hard palate >Lip**[Q].
- **Bilateral lymphatic spread** is common in: **Lower lip**[Q], **supraglottis**[Q] and **soft palate**[Q].

93. Ans. d. CA oral cavity

94. Ans. d Liposarcoma

95. Ans. a. Sjogren's syndrome *(Ref:Harrison 18/e p406, 419)*

PSEUDOLYMPHOMA

- Group of disorders having a **benign course** but exhibiting **clinical** and **histological features** suggestive **of malignant lymphoma**.
- Characterized by **benign infiltration of lymphoid cells** or **histiocytes** which microscopically resembles a malignant lymphoma.

Pseudolymphoma is seen in	
Autoimmune Disorders	**Drug-induced**
• **Sjogren syndrome** • Dysgammaglobulinemia	• **Phenytoin** and phenobarbital • **Primidone**

96. Ans. a. Apical lobe of lung

97. Ans. a. Lyme's disease *(Ref: Harrison 18/e p1402)*

Condition	Seen in
Necrolytic erythema migrans	• **Glucagonoma**
Erythema chronicum migrans	• **Lyme's disease**
Erythema infectiosum (fifth disease)	• **Parvovirus B19**
Erythema marginatum	• **Acute rheumatic fever**

98. Ans. d. Osteosarcoma *(Ref: Robbins 8/e p475)*

Small Round Blue Cell Tumors (WEL PNR)	
• **Wilm's tumor**	• **Primitive neuroectodermal tumor**
• **Ewing's sarcoma**	• **Neuroblastoma**
• **Lymphoma**	• **Rhabdomyosarcoma**
• **Medulloblastoma**	• **Askin tumor**
• **Small cell variant of osteosarcoma**	• **Desmoplastic small cell tumor**

99. Ans. a. Medullary carcinoma thyroid *(Ref: Sabiston 19/e p705)*

Familial Cancer Syndromes			
Syndrome	**Genes**	**Locations**	**Cancer Sites and Associated Traits**
Breast/ovarian syndrome	**BRCA1**	**17**q21[Q]	Cancer of **breast, ovary, colon, prostate**[Q]
	BRCA2	**13**q12.3[Q]	Cancer of **breast, ovary, colon, prostate, gallbladder and biliary tree, pancreas, stomach; melanoma**[Q]
Cowden's disease	**PTEN**	**10**q23.3[Q]	Cancer of **breast, endometrium, thyroid**[Q]
FAP	**APC**	**5q21**[Q]	Cancer of breast, endometrium, thyroid
Familial melanoma	p16	9p21	Melanoma, pancreatic cancer, dysplastic nevi, atypical moles
	CDK4	12q14	
Hereditary diffuse gastric cancer	CDH1	16q22	Gastric cancer
HNPCC	**hMLH1**[Q]	**3**p21[Q]	**Colorectal** cancer, **endometrial** cancer, **transitional cell carcinoma** of **ureter** and **renal pelvis**, **carcinomas** of the **stomach, small bowel, pancreas, ovary**[Q]
	hMSH2[Q]	**2**p22-21	
	hMSH6	**2**p16[Q]	
	hPMS1	**2**q31.1	
	hPMS2	**7**p22.2[Q]	
Hereditary papillary RCC	**MET**[Q]	**7**q31[Q]	Renal cell cancer
Hereditary paraganglioma and pheochromocytoma	SDHB	1p36.1-p35	Paraganglioma, pheochromocytoma
	SDHC	1q21	
	SDHD	11q23	

Juvenile polyposis coli	BMPRIA	10q21-q22	Juvenile polyps of the gastrointestinal tract, gastrointestinal malignancies
	SMAD4/DPC4	18q21.1	
Li-Fraumeni	**p53**	**17**p13[Q]	**Breast** cancer, **soft tissue sarcoma, osteosarcoma, brain** tumors, **adrenocortical** carcinoma, **Wilms'** tumor, **phyllodes** tumor **(breast), pancreatic** cancer, **leukemia, neuroblastoma[Q]**
	hCHK2	22q12.1	
MEN-1	**MENIN[Q]**	**11**q13[Q]	**Pancreatic islet cell** tumors, **parathyroid hyperplasia, pituitary adenomas[Q]**
MEN-2	**RET[Q]**	**10**q11.2	**Medullary thyroid** cancer, **pheochromocytoma, parathyroid hyperplasia[Q]**
MYH-associated adenomatous polyposis	MYH	1p34.3-p32.1	Cancer of the colon, rectum, breast, stomach
Neurofibromatosis-1	**NF1[Q]**	**17**q11[Q]	**Neurofibromas, neurofibrosarcoma, acute myelogenous leukemia, brain** tumors[Q]
Neurofibromatosis -2	**NF2[Q]**	**22**q12[Q]	**Acoustic neuromas, meningiomas, gliomas, ependymomas[Q]**
Nevoid basal cell carcinoma	PTC	9q22.3	Basal cell carcinoma
Peutz-Jeghers syndrome	**STK11[Q]**	**19**p13.3[Q]	**Gastrointestinal carcinomas, breast** cancer, **testicular** cancer, **pancreatic** cancer, **benign pigmentation** of **skin** and **mucosa[Q]**
Retinoblastoma	**RB[Q]**	**13**q14[Q]	**Retinoblastoma, sarcomas, melanoma, malignant neoplasms** of the **brain** and **meninges[Q]**
Tuberous sclerosis	**TSC1**	**9**q34	**Multiple hamartomas, RCC, astrocytoma**
	TSC2	**16**p13	
von Hippel-Lindau syndrome	**VHL[Q]**	**3**p25[Q]	**RCC, hemangioblastomas** of **retina and CNS, pheochromocytoma[Q]**
Wilms' tumor	**WT[Q]**	**11**p13[Q]	**Wilm's tumor, aniridia, genitourinary abnormalities, mental retardation[Q]**

100. Ans. a. BRCA-1: Lung, c. Chromosome 16: Philadelphia chromosome

101. Ans. a. CA colon *(Ref: Harrison 18/e p693)*

- Harrison says "**Chemotherapy** can be administered **as an adjuvant** (i.e. in addition to surgery or radiation) after all clinical apparent disease has been removed. This use of chemotherapy may have **curative potential in breast** and **colorectal neoplasms**, as it attempts to **eliminate clinically unapparaent tumor** that may have **already disseminated**."

102. Ans. a. Pheochromocytoma, b. Insulinoma, d. Appendicular carcinoid *(Ref: Sabiston 19/e p954; Schwartz 10/e 1574,1585-1588, 9/e p1219; Bailey 25/e p816; Blumgart 5/e p940; Shackelford 7/e p1211)*

Glucagonoma are **mostly malignant** and **metastatic** at the time of presentation.

103. Ans. a. Paget's disease of bone

104. Ans. d. Finger *(Ref: Bailey 26/e p600-601, 25/e p618)*

Glomus Tumour

- These arise from **subcutaneous arteriovenous shunts** (**Sucquet– Hoyer canals**) especially in the **corium of** the **nail bed.**
- Typically, they are **small, purple nodules** measuring a few millimetres in size, which are **disproportionately painful in response to insignificant stimuli** (**including cold exposure**).
- **Subungual varieties** may be **invisible** causing **paroxysmal digital pain.**

105. Ans. c. Chromosome 17

106. Ans. a. Metastatic germ cell tumor *(Ref: Harrison 18/e p806, 810; Computed Body Tomography by Lee Sagel 4/e p1207)*

The necrotic retroperitoneal mass represents necrotic lymph nodes. Necrotic lymph nodes usually suggest malignant metastasis, most likely due to testicular (germ cell) tumor.

Testicular Tumors

- **Testicular tumors** tend to **metastasize via** the **lymphatic system**.
- In general, the **testicular lymphatics** which **follow** the course of the **testicular vessels**, drain directly into the **lymph nodes in** or **near** the **renal hilus**.
- After involvement of these sentinel nodes, the **lumbar paraaortic nodes become involved** (unilaterally or bilaterally), followed by **spread to the mediastinal** and **supraclavicular nodes** or hematogenous dissemination to lungs, liver and brain.
- **Seminoma** is **c-kit positive tumor[Q]**

107. Ans. c. Glioma *(Ref: KDT 6/e p577)*

- **Somatostatin** is a '**universal switch off'.** Somatostatin analogue **octreotide decreases secretion of** various **hormones.**

Uses of Octreotide	
• **Pancreatic neuroendocrine tumors** (**insulinoma**, glucagonoma, VIPoma)[Q]	• **Acromegaly**[Q]
• **Carcinoid tumors** and **syndrome**[Q]	• **Bleeding varices**[Q]
	• **Enterocutaneous fistula**[Q]

108. Ans. a. Benign, c. Malformation, d. Mostly Asymptomatic *(Ref: Robbins 8/e p262)*

Hamartoma

- **Hamartoma** refers to an **excessive, focal overgrowth of cells** and **tissues native to** the **organ** in which it occurs[Q].
- **Cellular elements** are **mature** and **identical to** those **found in** the remainder of the **organ**[Q]
- **Do not reproduce** the **normal architecture** of the surrounding tissue[Q].
- **Benign nature**[Q]
- **Mostly asymptomatic,** rarely presents with life-threatening clinical problems[Q]

Heterotopia (or Choristoma)

- **Choristoma** is applied to **microscopically normal cells** or **tissues** that are **present in abnormal locations**[Q].
- **Examples:** Rest of **pancreatic tissue** found **in** the **wall of** the **stomach** or **small intestine**, or a small mass of adrenal cells found in the kidney, lungs, ovaries, or elsewhere[Q].

109. Ans. b. Oral cavity

110. Ans. a. 1975 *(Ref: www.nihfw.org/.../NationalHealthProgramme)*

National Cancer Control Programme

- To control the problems associated with cancer the Govt. of India has launched a **National Cancer Control Programme in 1975** stressing on **primary prevention** and **early detection of cancer**[Q]**.**

Males	Female
• **MC cancer** in **males** (**PLC**): **Prostate >Lung >Colorectal**[Q]	• **MC cancer** in **females** (**BLC**): **Breast >Lung >Colorectal**[Q]
• **Cancer deaths** in **males** (**LPC**): **Lung >Prostate >Colorectal**[Q]	• **Cancer deaths** in **females** (**LBC**): **Lung >Breast >Colorectal**[Q]

Prevalence of Cancer

- **World wide: 10 million**[Q]
- **India: 2.5 million**[Q]

111. Ans. d. All of the above

"**Acanthosis nigrican** can be a **reflection of an internal malignancy**, most commonly the **adenocarcinoma of GIT, lung, uterus and breast.**"

112. Ans. d. Gallbladder

113. Ans. a. B cell *(Ref: http://www.mdanderson.org/patient-and-cancer-information/cancer-information/cancer-types/eye-cancer/orbit.html)*

Orbital lymphoma

- **MC type of cancer of** the **orbit in adults**[Q]
- Usually a form of **B-cell non-Hodgkin's lymphoma**[Q].

Clinical Features

- It may show up as a **nodule in the eyelid** or **around** the **eye**, or it may cause the **eye** to be **pushed out**[Q]**.**
- This type of eye cancer **usually does not cause pain**[Q].

Diagnosis

- **First step in diagnosis** of orbital lymphoma may be a **CT scan of the orbit** followed by a **surgical biopsy**[Q].
- Making the correct diagnosis of the biopsy is very important.

Treatment

- **Radiation therapy, monoclonal antibody** therapy, **chemotherapy** or a combination of these, depending on type of lymphoma the stage of the tumor.

CHAPTER 40

Sarcoma

MULTIPLE CHOICE QUESTIONS

SOFT TISSUE SARCOMA

1. Most common sarcoma in a child is: *(JIPMER 98)*
a. Fibrosarcoma b. Rhabdomyosarcoma
c. Leiomyosarcoma d. Liposarcoma

2. Most common site of lymphangiosarcoma? *(MHPGMCET 2007, JIPMER 91)*
a. Spleen
b. Liver
c. Retroperitoneum
d. Post irradiated postmastectomy limb

3. The most common sarcoma in childhood? *(MHSSMCET 2008)*
a. Malignant histiocytoma b. Rhabdomyosarcoma
c. Osteosarcoma d. Liposarcoma

4. With regard to the malignant behavior of leiomoyosarcoma, the most important criterion is: *(All India 2006)*
a. Blood vessel penetration by tumour cells
b. Tumour cells is lymphatic channels
c. Lymphocyte infiltration
d. The number of mitoses per high power field

5. Synovial sarcoma all are true except: *(All India 2010)*
a. Originates in synovium
b. Seen in young age group
c. Occurs at extra-articular sites more often
d. Seen in sites such as knee and foot

6. In which case lymph nodes are resected prophylactically? *(AIIMS Nov 98, Feb 97)*
a. Embryonal rhabdomyosarcoma
b. Liposarcoma
c. Fibrosarcoma
d. Neurofibroma

7. All of the following soft tissue sarcoma has propensity for lymphatic spread except: *(AIIMS Nov 2005)*
a. Neurofibrosarcoma b. Synovial sarcoma
c. Rhabdomyosarcoma d. Epitheloid sarcoma

8. M.C. retroperitoneal tumour is: *(DNB 2011, AIIMS June 98)*
a. Fibrosarcoma b. Liposarcoma
c. Dermoid cyst d. Rhabdomyosarcoma

9. True about soft tissue sarcoma: *(PGI Dec 2002)*
a. Lymphatic spread
b. Enlarged size
c. Pseudoencapsulated
d. Spread though musculoaponeurotic plane

10. True statement about soft tissue sarcoma is/are: *(PGI June 2004)*
a. Liposarcoma is MC reteroperitoneal sarcoma
b. Incisional biopsy is needed when size >5cm
c. FNAC is diagnostic
d. TNM staging done
e. Radiosensitive

11. Which of the following is best indicator of prognosis of soft tissue sarcoma? *(AIIMS Nov 2000, Feb 97, Nov 96, All India 98)*
a. Tumor size b. Histological type
c. Nodal metastasis d. Tumor grade

12. Malignant neoplasm arising from mesenchymal tissue are: *(COMEDK 2004)*
a. Carcinoma b. Sarcoma
c. Adenomas d. Teratomas

13. Which of the following sites of soft tissue sarcoma carries the best prognosis?
a. Head and neck b. Extremity
c. Visceral d. Reteroperitoneal

14. Most common site of rhabdomyosarcoma is: *(DNB 2011)*
a. Orbit b. Nasopharynx
c. Extremities d. Hypopharynx

15. Most common soft tissue tumour of adults is: *(DNB 2010)*
a. Embryonal rhabdomyosarcoma
b. Liposarcoma
c. Synovial sarcoma
d. Malignant fibrous histiocytoma

16. Sarcoma botryoides is also known as:
a. Embryonal rhabdomyosarcoma *(WBPG 2012, DNB 2010)*
b. Alveolar rhabdomyosarcoma
c. Leiomyosarcoma
d. Lipoblastomatosis

17. Blood borne spread is a feature of: *(DNB 2010)*
a. Carcinoma b. Sarcoma
c. Dysplasia d. Metaplasia

18. Malignant change in lipoma of retroperitoneum may present with: *(DNB 2009)*
a. Asymptomatic b. Renal failure
c. Abdominal pain d. All of the above

19. Which of the following immunohistochemical marker can be used for the diagnosis of rhabdomyosarcoma? *(JIMPER 2014, AIIMS May 2013)*
a. Myeloperoxidase b. Desmin
c. Cytokerartin d. Synaptophysin

20. Commonly done surgery in sarcoma is: *(JIMPER 2012)*
a. Wide excision
b. Compartmental exlision/exenteration
c. Excision
d. Enucleation

21. In which of the following malignancies, histological grade is a good prognostic indicator? *(JIMPER 2011)*
a. Soft tissue sarcoma b. RCC
c. Malignant melanoma d. All

KAPOSI SARCOMA

22. The tissue of origin of Kaposi sarcoma is: *(AIIMS 2005)*
a. Lymphoid b. Neural
c. Vascular d. Muscular

23. Commonest malignancy in HIV patient: *(AIIMS Nov 99)*
a. Kaposi sarcoma
b. Adenoma of stomach
c. Astrocytoma
d. CNS lymphoma

24. All are true regarding Kaposi sarcoma except one *(AIIMS Feb 97)*
a. Predominant in male
b. Multicentric origin
c. Chemotherapy is treatment of choice
d. Occurs in AIDS patients only

25. Kaposi's sarcoma: *(SGPGI 2004)*
a. Does not occur in non HIV positive persons
b. Has increasing incidence among AIDS patients
c. No GI bleeding
d. Uncommon among homosexual HIV positive

26. Kaposi sarcoma is commonly seen in: *(AMU 95)*
a. Upper limbs
b. Lower limbs
c. Head and Neck
d. Trunk

EXPLANATIONS

SOFT TISSUE SARCOMA

1. **Ans. b. Rhabdomyosarcoma** *(Ref: Devita 9/e p1780-1784; Sabiston 19/e p1862-1864; Schwartz 10/e 1465,1470, 9/e p1299-1300)*

RHABDOMYOSARCOMA

- **Rhabdomyosarcoma** arises from **mesenchymal tissues.**
- **MC sites** of origin: **Head** and **neck**[Q] **(parameningeal**[Q]**)>Extremities >Genitourinary tract >Trunk**
- **MC pediatric soft tissue sarcoma: Rhabdomyosarcoma**[Q]
- Associated with: **NF, Beckwith-Weidman syndrome, Li-fraumeni** and Fetal alcohol syndrome

Pathology

- **MC histological type: Embryonal rhabdomyosarcoma**[Q]
- **Diagnostic cell: Rhabdomyoblast**[Q]
- May contain **tadpole cells** or **strap cells**[Q]
- **Embryonal type** consist of spindle cell variant and **sarcoma botryoides**[Q] (tumor cells resemble **tennis racket**[Q] and tumor cells form submucosal zone of hypercellularity known as **cambium layer**[Q])

Clinical Features

- **MC presenting symptom: Mass**[Q] (may or may not be painful)
- Bimodal, **first peak** between **2–5 years, second peak** between **15–19 years**
- **Extremity RMS** are **more common** in **lower extremity**[Q]
- **MC site of metastasis: Lung**[Q]

Diagnosis

- **Diagnosis** is **confirmed by biopsy**[Q]
- **MRI: IOC** for diagnosing **extent of disease**[Q]
- **CT:** Used to rule out **lung metastasis**[Q]

Treatment

- **Wide-local excision**[Q] of tumor with surrounding involved tissue
- Tumor **not amenable to primary excision: Neoadjuvant chemotherapy,** after the tumor has decreased in size, **resection of gross residual disease**
- **Radiation therapy**: when **microscopic** or **gross residual disease** exists after initial treatment.

Prognosis

- Prognosis is related to the **site of origin, resectability, presence of metastases, number of metastatic sites,** and **histopathologic features**[Q]**.**
- **Embryonal variant** is a **favorable**[Q] and **alveolar type** has an **unfavorable prognosis**[Q]**.**
- **Pleomorphic variant: MC type in adults**[Q]

Favorable Primary Sites	Unfavorable Primary Sites
• Orbit[Q] • Nonparameningeal head and neck[Q] • Paratestis[Q] • Vagina[Q]	• Extremity[Q] • Parameningeal[Q]

2. **Ans. d. Post irradiated post-mastectomy limb** *(Ref: Sabiston 19/e p1825; Schwartz 10/e 493, 9/e p1285; Bailey 26/e p601, 25/e p845)*

ANGIOSARCOMA (LYMPHANGIOSARCOMA)

- Rare tumor that develops as a **complication** of **long-standing** (>10 years) **lymphoedema**[Q]**.**
- Stewart and Treves described **lymphangiosarcoma** of the **upper extremity** in women with **ipsilateral lymphedema** after **radical mastectomy**. **(Stewart-Treves Syndrome)**[Q]

Clinical Features

- **Acute worsening** of **edema**[Q]
- Appearance of **sub-cutaneous nodules** with propensity towards **hemorrhage and ulceration**[Q]

Treatment

- Pre-operative **chemotherapy** and **radiotherapy** followed by **surgical excision (radical amputation)**[Q]
- Associated with **poor prognosis**

3. **Ans. b. Rhabdomyosarcoma**

4. **Ans. d The number of mitoses per high power field** *(Ref: Devita 9/e p1529-1530)*

Grading of leiomyosarcomas is **difficult, and mitotic activity appears** to be the **best indicator of subsequent prognosis** when **combined with location and size.**

LEIOMYOSARCOMA

- Leiomyosarcomas are malignant tumors composed of cells showing **smooth muscle features.**
- **MC site: Uterus**[Q]
- **Desmin** and **actin** are the **MC positive stains**[Q]**.**
  - **Grading of leiomyosarcomas** is **difficult,** and **mitotic activity**[Q] **appears** to be the **best indicator of subsequent prognosis** when **combined with location and size.**
- **Common major vascular sites: Pulmonary artery** and **IVC**[Q]
- **Large tumor size** and **high mitotic rate/high grade** are factors in **poorer outcome.**
- **Complete excision** remains the **primary therapeutic choice**[Q]**.**

5. **Ans. a. Originates in synovium** *(Ref: Devita 9/e p1545)*

Synovial Sarcoma: It generally **does not originate from synovial tissue**, and it has been suggested that the name of this sarcoma subtype should be modified.

SYNOVIAL SARCOMA

- Synovial sarcoma usually occurs in **young adults**[Q]**.**
- **Typically found** in the **para-articular areas of** the **tendon sheaths** and **joints**[Q]**.**
- At least **50% of cases** are in the **lower limbs**[Q] (especially the **knee**[Q]), and most of the remainder are seen in the upper limbs.
- It generally **does not originate from synovial tissue**[Q]**.**
- Composed of two morphologically distinct types of cells that form a **characteristic biphasic pattern**[Q]**.**
  - **Characteristic chromosomal translocation, t(X;18)(p11.2;q11.2)**[Q]
  - **These hallmark translocations** have become the **gold standard in diagnosing synovial sarcoma**[Q]
  - **100% of biphasic and 96% of monophasic synovial sarcomas** possess the **specific t(X;18)(p11.2;q11.2) translocation**[Q]**.**

Treatment

- Adequate excision + adjuvant radiotherapy with or without adjuvant chemotherapy[Q].

6. **Ans. a. Embryonal rhabdomyosarcoma** *(Ref: Harrison 18/e p817-820; Schwartz 10/e 1486, 9/e p1288; Sabiston 19/e p772)*

- **MC site of metastasis in sarcomas of extremity: Lungs**[Q]
- **MC site of metastasis in retroperitoneal sarcomas: Liver**[Q]
- **LN metastasis is uncommon in soft tissue sarcoma**[Q]**.**

Sarcomas with Lymph Node Metastasis (MARCES)	
• **M**alignant fibrous histiocytoma[Q]	• **C**lear cell sarcoma[Q]
• **A**ngiosarcoma[Q]	• **E**pithelial sarcoma[Q]
• **R**habdomyosarcoma[Q]	• **S**ynovial sarcoma[Q]

7. **Ans. a. Neurofibrosarcoma**

8. **Ans. b. Liposarcoma** *(Ref: Devita 9/e p1534)*

- **MC soft tissue sarcoma in adults: Malignant fibrous histiocytoma**[Q] **>Liposarcoma**
- **MC retroperitoneal tumor: Liposarcoma**[Q]

- In Sabiston, liposarcoma is wrongly mentioned as the most common type of STS in adults.

9. **Ans. b. Enlarged size, c. Pseudoencapsulated, d. Spread though musculoaponeurotic plane** *(Ref: Devita 9/e p1533-1552; Sabiston 19/e p768-780; Schwartz 10/e 666-669, 9/e p1284-1295)*

SOFT TISSUE SARCOMA

- Rare unusual neoplasm of soft tissues
- **MC site: Extremity**[Q] **(lower** >upper) > Trunk > Retroperitoneum >Head and Neck
- **MC type: Malignant fibrous histiocytoma**[Q] **>Liposarcoma >Leiomyosarcoma** >Synovial sarcoma >Malignant peripheral nerve sheath tumor

- **MC pediatric soft tissue sarcoma: Rhabdomyosarcoma**Q
- **Hematogenous spread** is **typical of sarcomas**Q

Histopathological Type of STS is Site Dependent	
• **Extremity**	• **Malignant fibrous histiocytoma**Q **>Liposarcoma**
• **Retroperitoneum**	• **Liposarcoma**Q
• **Viscera**	• **GIST**Q

Pathology

- **STS** tends to **grow along fascial planes**Q, with the surrounding soft tissue compressed to **form a pseudocapsule**Q.
- **Clinical behavior** of STS is determined by: **Anatomic location (depth), grade and size**Q
- **MC route of spread** in soft tissue sarcoma: **Hematogenous**Q
- **MC site of metastasis: Lung**Q**; Lymphatic metastasis is rare**Q

Clinical Features

- **MC symptom** of STS: **Painless mass**Q
- **Size at presentation** is **dependent on the location of tumor**Q.
  - **Smaller tumors** are located **in distal extremities**Q
  - **Larger tumors** are detected **in proximal extremity** and **retroperitoneum**Q.
  - **Retroperitoneal STS** almost always present as **large asymptomatic mass**Q

Diagnosis of Soft Tissue Sarcoma

- **Core-cut** or **true-cut biopsy (CT or USG guided)** is **diagnostic**Q
- **Incisional biopsy** is done **if core-cut biopsy** is **non-diagnostic**Q
- **FNAC: To confirm** or **rule out** presence of **metastatic focus** or **local recurrence**Q

- **MRI: IOC for assessing extremity STS**Q
- **CECT: IOC for assessing retroperitoneal sarcoma**Q

Treatment

- **Adequate excision + adjuvant radiotherapy** with or without adjuvant chemotherapyQ.

Prognosis

- **Best prognostic factor** of soft tissue sarcoma: **Grading**Q
- **Best prognosis** is seen in: **Extremity STS**Q
- **MC cause of death** in STS: **Metastasis**Q**; 5-year survival rate** for STS (all stages): **50–60%**

10. **Ans. a. Liposarcoma is MC retroperitoneal sarcoma, b. Incisional biopsy is needed when size > 5 cm, d. TNM staging done**
11. **Ans. d. Tumor grade**
12. **Ans. b. Sarcoma**
13. **Ans. b. Extremity**
14. **Ans. a. Orbit**
15. **Ans. d. Malignant fibrous histiocytoma**
16. **Ans. a. Embryonal rhabdomyosarcoma**
17. **Ans. b. Sarcoma** *(Ref: Robbins 7/e p720)*

    Hematogenous spread is typical of sarcomas and lymphatic spread is typical of carcinoma.
18. **Ans. d. All of the above** *(Ref: Robbins 8/e p1318)*

Retroperitoneal Tumors

- Deep seated mass **in abdomen**
- When the tumor is **very large** do **symptoms of pain** or functional disturbances occur
- Retroperitoneal tumors may present themselves with signs of weight loss, emaciation and abdominal pain
- These tumors may also **compress the kidney** or **ureter** leading to **renal failure**

19. **Ans. b. Desmin** *(Ref: Devita 9/e p1780-1784; Sabiston 19/e p1862-1864; Schwartz 10/e 666-669,1465-1487, 9/e p1299-1300)*

    Desmin can be used **for the diagnosis of rhabdomyosarcoma.**
20. **Ans. a. Wide excision**
21. **Ans. a. Soft tissue sarcoma**

KAPOSI SARCOMA

22. **Ans. c. Vascular** *(Ref: Harrison 18/e p1564-1565; Devita 9/e p2101-2104; Sabiston 19/e p764; Schwartz 10/e 485, 9/e p418)*

Kaposi's Sarcoma

- Kaposi's sarcoma appears as **rubbery bluish nodules** that occur **primarily on the extremities**[Q] but **may appear anywhere** on the **skin and viscera**[Q].
- Classically, KS is seen in people of **Eastern Europe** or **sub-Saharan Africa**[Q].

AIDS-related Kaposi's Sarcoma

- **AIDS-related KS** occurs **primarily in male homosexuals** and **not in IV drug abusers** or **hemophiliacs**[Q]
- **Lesions spread rapidly to** the **nodes** and **GI** and **respiratory tract** often are **involved**[Q].
- Development of AIDS-related KS is **associated with concurrent infection** with a **herpes-like virus (HHV-8)**

Pathology

- **Usually multifocal**[Q] rather than metastatic.
- Histologically, the lesions are composed of **capillaries lined by atypical endothelial cells**[Q].
- **Early lesions** may **resemble hemangiomas**, while **older lesions** contain more spindle cells and **resemble sarcomas.**
- **Lesions** are **locally aggressive** but **undergo periods of remission**[Q].

Treatment

- Treatment for all types of KS consists of **radiation**[Q] to the lesions.
- **Combination chemotherapy** is effective in controlling the disease, although most patients develop an opportunistic infection during or shortly after treatment[Q].
- **Surgical treatment** is **reserved for lesions** that **interfere with vital functions**:, such as
  - **Bowel obstruction and Airway compromise**[Q]

23. Ans. a. Kaposi sarcoma *(Ref: Devita 9/e p2100)*

- **Most common malignancy in HIV positive individuals: NHL>Kaposi sarcoma**[Q]

24. Ans. d. Occurs in AIDS patients only

25. Ans. b. Has increasing incidence among AIDS patients

26. Ans. b. Lower limbs

Dermatofibrosarcoma Protuberans (DFSP)

- **DFSP** is a **low-grade sarcoma** because it **may recur locally** but **rarely metastasizes**[Q].
- Monomorphous, mononuclear, **spindle cell lesion involving** both **dermis** and **subcutis**[Q].
- **MC site: Trunk**[Q] (50%) >Extremities (30%) >Head and neck (20%)

Pathology

- **Large lesions** often are associated with **satellite nodules; Positive** for **CD34**[Q]
- Have **unpredictable radial extensions**[Q] of tumor **permeating through** the **subcutaneous tissue** large distances from the primary nodule.
- **More than 75%** of DFSP have a **ring chromosome**[Q], composed of translocated portions of chromosomes **17 and 22**[Q]

Clinical Features

- Typically **presents in early** or **mid-adult life**, beginning as a **nodular cutaneous mass**[Q].
- **Pattern of growth: Slow** and **persistent**[Q]
- Lesion enlarges over many years, it **becomes protuberant**[Q]

Treatment

- **Aggressive resection** with **special attention** to **radial margins** (local recurrence rate <5%)
- Up **to 50% recur after simple excision**[Q].
- **Imatinib**: **First line of treatment** for **advanced disease**[Q].

SECTION 10

OTHERS

CHAPTERS

- Chapter 41 Pediatric Surgery
- Chapter 42 Trauma
- Chapter 43 Transplantation
- Chapter 44 Anesthesia and Perioperative Complications
- Chapter 45 Robotics, Laparoscopy and Bariatric Surgery
- Chapter 46 Sutures and Anastomoses
- Chapter 47 Sterilization and Infection
- Chapter 48 Fluid, Electrolyte and Nutrition
- Chapter 49 Blood Transfusion
- Chapter 50 Shock
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CHAPTER 41

Pediatric Surgery

MULTIPLE CHOICE QUESTIONS

1. **A six years old female presents with constipation and urinary retention. On examination on a presacral mass is noted. Most probable diagnosis is:** *(AIIMS May 2008)*
   a. Pelvic neuroblastoma
   b. Rectal duplication cyst
   c. Sacrococcygeal teratoma
   d. Anterior sacral meningocele

2. **First meconium is said to be formed during the month of fetal life:** *(PGI 81, AIIMS 84)*
   a. Second
   b. Fourth
   c. Seventh
   d. Ninth

3. **Sacrococcygeal teratoma is embryological remnant of?** *(MHSSMCET 2007)*
   a. Neural tube
   b. Allantois
   c. Notochord
   d. Primitive streak

4. **A one month old female child has swelling over the back in the sacral region. There is no cough impulse in the swelling. X-ray examination shows erosion of the coccyx. The most likely clinical diagnosis would be:** *(UPSC 95)*
   a. Meningocele
   b. Lipoma
   c. Sacrococcygeal teratoma
   d. Neurofibroma

5. **Most common solid malignant tumor of infancy:**
   a. Neuroblastoma
   b. Nephroblastoma
   c. Germ cell tumor
   d. Rhabdomyosarcoma

6. **Most common posterior mediastinal mass in children is:**
   a. Hodgkin's disease
   b. Neuroblastoma
   c. Esophageal duplication cyst
   d. Bronchogenic cyst

7. **Malignant tumor of childhood that metastasizes to bone most often is:**
   a. Neuroblastoma
   b. Nephroblastoma
   c. Adrenal gland tumors
   d. Ovarian granulose cell tumor

8. **Which of the following is the most common tumor of newborn?** (All India 2012)
   a. Neuroblastoma
   b. Wilm's tumors
   c. Leukemia
   d. Sacrococcygeal teratoma

9. **Primitive streaks remnants give rise to:** *(DNB 2012)*
   a. Neuroblastoma
   b. Wilm's tumour
   c. Sacrococcygeal teratoma
   d. Hepatoblastoma

EXPLANATIONS

1. **Ans. d. Anterior sacral meningocele** *(Ref: Sabiston 19/e p1911; Schwartz 10/e p1750, 9/e p1553)*

Anterior Sacral Meningocele

- **Defect of anterior aspect** of **sacrum**[Q] involving one or more segments with herniation of meningeal sac into extra-peritoneal region.
- More common in **females**[Q]

Clinical Features

- **Symptoms** usually occur in **2nd to 3rd decade**[Q]
- Symptoms are primarily owing to the **mechanical effects**[Q] of a pelvic tumor.
- **Abdominal pain, constipation, urinary retention**[Q] or incontinence

Diagnosis

- **X-ray**: Unilateral sickle shaped distortion of sacral bone (**Scimitar sacrum**[Q]) is **pathognomonic**. This sign is not present in all cases.

2. **Ans. a. Second** *(Ref: Bailey 25/e p85)*

By **end of 3 months upper small intestine** has become **filled with meconium**. So the answer should be less than 3 months.

Meconium

- Meconium is a sterile mixture of epithelial cells, mucin and bile, formed as the fetus starts to swallow amniotic fluid.
- By **end of 3 months upper small intestine** has become **filled with meconium**[Q]**.**

3. **Ans. d. Primitive streak** *(Sabiston 19/e p1865-1866; Schwartz 10/e p1641, 9/e p1450)*

Sacrococcygeal Teratoma

- Teratomas occur most frequently in the neonatal period, and the sacrococcygeal region is the MC site[Q].
- More common in females[Q]

  - Thought to be a derivative of the **primitive streak**[Q]
  - Most often an obvious **external presacral mass**[Q]

- **Most of** the **tumor** is **usually external**, with a **minimal intrapelvic presacral component**[Q]
- These lesions should be **carefully followed** with **serial USG until delivery** because the **blood supply to the tumor** may grow to the point of **stealing a significant proportion of placental blood flow to the fetus**[Q]**.**
- The development of **hydrops** or **placentomegaly** is associated with a **poor prognosis**[Q]**.**

  - **Most neonatal SCTs** are **benign**[Q]**.**
  - **Incidence of malignancy** is **related to age at time of diagnosis** and is most frequently represented as **yolk sac tumors** or **embryonal carcinomas**[Q]**.**

Treatment:

- **Complete surgical excision**[Q] through a chevron-shaped buttock incision.

  - **Resection of** the **coccyx** is **critical**[Q] because **failure to remove** this structure **results in significantly higher local recurrence rates.**

4. **Ans. c. Sacrococcygeal teratoma**

5. **Ans. a. Neuroblastoma** *(Ref: Sabiston 19/e p1859-1861; Schwartz 10/e p678,1639-1640, 9/e p1449; Bailey 25/e p88-89)*

- **Neuroblastoma** is the **MC extracranial solid tumor** in **childhood**
- **Neuroblastoma** is the **2nd MC solid malignancy** of childhood **after brain tumors.**
- **MC solid tumor** in **childhood: Brain tumors**[Q]
- **MC intra abdominal solid tumor** in **childhood: Neuroblastoma**[Q]
- **MC malignant tumor** of **childhood** that **metastasizes to bone: Neuroblastoma**[Q]
- **MC site of metastasis** in **neuroblastoma: Long bones**[Q]

6. **Ans. b. Neuroblastoma** *(Ref: Schwartz 10/e p678, 9/e p570)*

Most common posterior mediastinal mass in children is neurogenic tumor (Neuroblastoma among the given options).

Mediastinal Tumors in Children		
Tumor Type	**Percentage** of Total	**Location**
Neurogenic tumors	**40**Q	**Posterior**Q
Lymphomas	**18**Q	Anterior/middle
Cysts	**18**	**All**
Germ cell tumors	**11**	**Anterior**
Mesenchymal tumors	9	**All**
Thymomas	Rare	Anterior

7. **Ans. a. Neuroblastoma**

8. **Ans. d. Sacrococcygeal teratoma** *(Ref: Surgery of Childhood Tumors (Springer) 2008/49)*

- **Sacrococcygeal teratoma** is the **predominant teratoma** as well as the **most common neoplasm** in the **fetus** and **newborn**Q with an estimated incidence of 1:20,000 to 1:40,000 live births and a **female predominance**Q ranging from 2:1 to 4:1.

9. **Ans. c. Sacrococcygeal teratoma**

CHAPTER 42

Trauma

MULTIPLE CHOICE QUESTIONS

TRAUMA

1. First step in trauma: *(NEET 2013)*
a. Blood transfusion b. IV fluids
c. Reconstruction d. Maintenance of airways

2. A patient travelling with high speed met an road traffic accident. His clinical presentation includes BP 80/40mm Hg, bleeding from nose, suspected femoral fracture, cyanosed body, difficulty in respiration and decreased respiratory sound on right side. Initial management preference will be given to: *(PGI Nov 2011)*
a. Haemostatic anterior and posterior nasal packing
b. Thoracosotomy tube insertion
c. ETT in line with cervical canal
d. I.V Fluid immediate
e. Chest X-ray

3. Which of the following occurs in acute trauma? *(JIPMER 2011)*
a. Increase in insulin b. Decrease in glucagon
c. Decrease in cortisol d. Increase in thyroxine

4. In surgical stress all hormone is increased except:
a. ADH b. ACTH *(PGI June 2009)*
c. Cortisol d. Insulin
e. Renin

5. In surgical stress all hormones are increased except:
a. Adrenaline b. ACTH *(PGI Nov 2011)*
c. Epinephrine d. Cortisol
e. Insulin

6. Early stage of trauma is characterized by: *(All India 2003)*
a. Catabolism b. Anabolism
c. Glycogenesis d. Lipogenesis

7. In case of clearing airway one of the following is not included: *(AIIMS June 95)*
a. Neck tilt b. Mouth gag
c. Chin lift d. Head lift

8. First step taken in case of multiple injuries of face and neck:
a. Blood transfusion *(UPSC 2008, AIIMS June 95)*
b. IV fluids
c. Reconstruction
d. Maintenance of airways

9. In severe injury, first to be maintained is: *(NEET 2013, PGI June 97)*
a. Hypotension b. Dehydration
c. Airway d. Cardiac status

10. Which one of the following veins should be avoided for intravenous infusion in the management of abdominal trauma?
a. Cubital b. Cephalic *(UPSC 2001)*
c. Long saphenous d. External jugular

11. Following trauma, which hormone is not released?
a. Thyroxine b. Glucagon *(All India 92)*
c. ADH d. GH

12. Protein metabolism after trauma is characterized by all of the following except *(UPSC 2007)*
a. Increased liver gluconeogenesis
b. Inhibition of skeletal muscle breakdown by IL-1 and TNF
c. Increased urinary nitrogen loss
d. Hepatic synthesis of acute phase reactants

13. A female with suspected child abuse was brought to the casualty with severe bleeding from perineum. What should be the first line of management? *(AIIMS November 2014)*
a. Airway maintenance
b. Internal iliac artery ligation
c. Whole blood transfusion
d. Inform police before starting the treatment

14. The first priority in management of a case of head injury with open fracture of shaft of femur is: (AIIMS May 2014)
a. Neurosurgery consultation
b. Give IV fluids
c. Intubation
d. Splintage of fracture

TRAUMA SCORING SYSTEM

15. Which one of the following is not a part of the Revised Trauma Score? *(UPSC 2001)*
a. Glasgow coma scale b. Systolic blood pressure
c. Pulse rate d. Respiratory rate

16. Trauma and injury severity score (TRISS) includes: *(All India 2010)*
a. GCS + BP + RR b. RTS + ISS + age
c. RTS + ISS + GCS d. RTS + GCS + BP

17. Mangled Extremity Severity Score (MESS) includes all of the following except? *(AIIMS May 2011)*
a. Shock b. Ischemia
c. Neurogenic injury d. Energy of injury

TRIAGE

18. In triage green color indicates: *(COMEDK 2005)*
a. Ambulatory patients
b. Dead or moribund
c. High priority treatment or transfer
d. Medium priority or transfer

19. Which colour of triage is given the highest priority?
a. Red b. Green *(AIIMS Nov 2013)*
c. Yellow d. Black

BLUNT TRAUMA ABDOMEN

20. Most common organ involved in blunt injury to the abdomen: *(JIPMER 2011,2014, PGI Dec 99, MCI March 2005)*
a. Spleen b. Liver
c. Intestines d. Kidney

21. Investigation of choice for blunt trauma abdomen in unstable patient: *(PGI Dec 2000)*
a. X-ray abdomen
b. USG
c. Diagnostic Peritoneal lavage (DPL)
d. MRI
e. CT scan

22. Investigation of choice for diagnosing intra abdominal bleeding in an unstable patient: *(PGI Dec 2001)*
a. CT scan
b. MRI scan
c. USG
d. Diagnostic peritoneal lavage

23. Babu is brought to the emergency as a case of road traffic accident. He is hypotensive. Most likely ruptured organ is:
a. Spleen b. Mesentery *(All India 2001)*
c. Kidney d. Rectum

24. Commonly injured in blunt abdominal injury is/are: *(PGI June 2001)*
a. Mid ileum b. Proximal jejunum
c. Mid jejunum d. Distal ileum
e. Ileocecal junction

25. A driver wearing seat belt applied brake suddenly to avoid accident. Most common organ injured in seat belt injury:
a. Liver b. Spleen *(AIIMS May 2013)*
c. Mesentery d. Abdominal aorta

26. Preferred incision for abdominal exploration in blunt injury abdomen is: *(All India 2007)*
a. Always midline incision
b. Depending upon the organ
c. Transverse incision
d. Paramedian

27. A case of blunt trauma is brought to the emergency, in a state of shock; he is not responding to IV crystalloids; next step in his management would be: *(All India 2001)*
a. Immediate laparotomy b. Blood transfusion
c. Albumin transfusion d. Abdominal compression

28. A patient developed hemoperitoneum following RTA, with BP 90/60 and pulse 140/min, which of the following to be done? *(PGI Dec 2003)*
a. DPL to be done
b. Liver is the MC organ to rupture
c. USG is better than CT scan
d. X-ray to be taken in supine position
e. Urgent surgery to be done

29. A male patient with blunt trauma abdomen is hemodynamically stable. What is the next line of management?
a. Observation *(All India 2008)*
b. Further imaging of abdomen
c. Exploratory laparotomy
d. Laparoscopy

30. Best diagnostic test in stable patient with blunt trauma abdomen is: *(DNB 2012)*
a. CECT scan b. MRI
c. DPL d. FAST

31. Blunt injuries to the abdomen: *(JIPMER 82, 80)*
a. May cause peritonitis
b. Rarely need urgent laparotomy
c. May cause intestinal obstruction
d. May cause gastroduodenal ulceration

32. Which of the following is not true? *(DPG 2007)*
a. Spleen is most commonly injured in the blunt trauma
b. Small intestine is most commonly injured in penetrating trauma
c. Thoracic duct injury needs urgent thoracotomy
d. Conservative treatment is preferred for solid organ injury

33. FAST stands for: *(AIIMS Nov 2013)*
a. Focused assessment with sonography for trauma
b. Focused abdominal sonography for trauma
c. Fast assessment with sonography for trauma
d. Fast assignment with sonography and tomography (computed)

34. A man with blunt injury abdomen after road side accident has a blood pressure of 100/80 mm Hg and a pulse rate of 120/min. Airway has been established and respiration has been stabilized. Next best step in management is: *(All India 2009)*
a. Immediate blood transfusion
b. Blood for cross matching and IV fluids
c. Ventilate the patient
d. Rush the patient to the OT

35. A patient is brought to the emergency as a case of head injury, following a head on collision road traffic accident. His BP is 90/60 mmHg. Tachycardia is present. Most likely diagnosis is: *(All India 2001)*
a. EDH b. SDH
c. Intracranial hemorrhage d. Intra-abdominal bleed

36. A 40-years old male drive had a car accident in which he got wedged in-between. He complained of severe abdominal pain with radiation to the back. The initial CT on admission was negative except for minimal retroperitoneal hematoma. The diagnosis is: *(ComedK 2010)*
a. Liver injury b. Duodenal perforation
c. Bowel rupture d. Pancreatic injury

37. True about indication of celiotomy in blunt trauma: *(PGI June 2009)*
a. Peritoneal air on imaging
b. Severe hypotension
c. Grade I spleen damage
d. Grade II liver damage
e. Patient with positive diagnostic peritoneal lavage

38. A patient with abdominal injury presents to the emergency department with signs of signs of peritonitis and shock. Airway and breathing were secured and IV fluids were started with 2 large bore cannulas. The next line of management should be: *(All India 2011)*
a. FAST
b. Exploratory laparotomy under general anesthesia
c. Insertion of abdominal drain followed by laparotomy
d. Laparoscopy

39. The four points of probe placement in Focused Abdominal Sonogram for trauma (FAST) in blunt thoraco-abdominal trauma are: *(Karnataka 2004)*
a. Epigastrium, (R) hypochondrium, (L) Lower chest, hypogastrium
b. Epigastrium, (R) and (L) Hypochondria, (R) Iliac fossa
c. Epigastrium, (R) and (L) Lumbar regions, hypogastrium
d. Hypogastrium, (R) and (L) Lumbar regions, (R) lower chest

40. All the following are True regarding fast–except:
a. It is a focused abdominal sonar for trauma *(APPG 2015)*
b. It is accurate in detecting < 50 ml. of free blood
c. It cannot reliably exclude injury in penetrating trauma
d. It detects free fluid in the abdomen or pericardium

DAMAGE CONTROL SURGERY

41. Damage control surgery is: *(JIMPER 2014, AIIMS May 2013)*
a. Minimal intervention done to stabilize the patient and do the definitive surgery later
b. Maximum possible surgical intervention is done immediately
c. Done during triage procedure
d. Done to control damage during surgery

42. Aim of damage control laparotomy are: *(PGI June 2009)*
a. Provide fascial closure
b. Arrest hemorrhage
c. Control contamination
d. Prevent infection
e. Prevent coagulopathy

43. Aims of abbreviated laparotomy: *(PGI June 2005)*
a. Decreased change of infection
b. Early ambulation
c. Early wound healing
d. Hemostasis

44. Abbreviated laparotomy done for: *(PGI Dec 2007)*
a. Coagulopathy
b. Hypotension
c. Early wound healing
d. Early ambulation
e. Hemostasis

ABDOMINAL COMPARTMENT SYNDROME

45. True about abdominal compartment syndrome:
a. ↓ Cardiac output *(PGI June 2009, Dec 2008)*
b. ↓ Urine output
c. ↓ Pulmonary capillary wedge pressure
d. ↓ Venous return
e. ↓ Systemic vascular resistance

46. True about abdominal compartment syndrome include the following except: *(MHSSMCET 2008)*
a. >15 cm of H_2O
b. Decreased pulmonary venous pressure
c. IAP Measured using Foley's catheterization of bladder
d. With >25-30 mm Hg IAP, life threatening hypoxia and ARDS can occur

47. Abdominal compartment syndrome is characterized by the following except: *(UPSC 2007)*
a. Hypercarbia and respiratory acidosis
b. Hypoxia due to increased peak inspiratory pressure
c. Hypotension due to decrease in venous return
d. Oliguria due to ureter obstruction

48. Increased intra abdominal pressure is/are associated with:
a. ↑ Pulmonary capillary wedge pressure *(PGI June 2004)*
b. ↑ Venous return
c. ↑ Pulmonary inspiratory pressure
d. ↑ Renal blood flow
e. ↑ Cardiac output

49. True about abdominal compartment syndrome:
a. ↓ Cardiac output *(PGI Dec 2008)*
b. ↓ Urine output
c. ↓ Venous return
d. ↓ Systemic vascular resistance

PENETRATING INJURIES

50. Organ most commonly damaged in penetrating injury of abdomen is: *(WBPG 2014, AIIMS Nov 94, Nov 95)*
a. Liver
b. Small intestine
c. Large intestine
d. Duodenum

51. Treatment of choice for stab injury caecum: *(All India 89)*
a. Cecostomy
b. Ileo-transverse anastomosis
c. Transverse colostomy
d. Sigmoid colostomy

52. Which of the following is used to define penetrating neck injury? *(AIIMS May 2009, All India 2008)*
a. 2 cm depth of wound
b. Injury to vital structures
c. Breach of platysma
d. Through and through wound

53. The probable cause of sudden death in a case superficial injury to neck is: *(DNB 2005)*
a. Injury to phrenic nerve
b. Air embolism through external jugular vein
c. Bleeding from subclavian artery
d. Injury to trachea

54. A man comes to emergency with stab injury to left flank. He has stable vitals. What would be the next step in management: *(AIIMS Nov 2008)*
a. CECT
b. Diagnostic peritoneal lavage
c. Laparotomy
d. Laparoscopy

55. A patient with stab injury to anterior abdomen presents with a tag of omentum protruding through the abdominal wall near the umbilicus. On evaluation he is hemodynamically stable and shows no signs of peritonitis. Initial management of patient should involve: *(All India 2011)*
a. FAST
b. Exploratory Laparotomy
c. Local Wound Exploration and Suturing
d. CECT Abdomen

BLAST INJURIES

56. In a blast injury, which of the following organ is least vulnerable to the blast wave? *(AIIMS June 2003)*
a. G.I tract
b. Lungs
c. Liver
d. Ear drum

57. Most common organ injured in underwater explosion:
a. TM
b. GIT *(MHSSMCET 2009)*
c. Lungs
d. Heart

HEPATIC INJURIES

58. A 17-years old boy is admitted to the hospital after a road traffic accident. Per abdomen examination is normal. After adequate resuscitation, his pulse rate is 80/min and BP is 110/70 mmHg. Abdominal CT reveals 1 cm deep laceration in the left lobe of the liver extending from the done more than half way through the parenchyma. Appropriate management at this time would be: *(DPG 2011, UPSC 2005)*
a. Conservative treatment
b. Abdominal exploration and packing of hepatic wounds
c. Abdominal exploration and ligation of left hepatic artery
d. Left hepatectomy

SPLENIC INJURIES

59. A 30-years old gentleman after sustaining road traffic accident present in emergency with BP 100/60 mmHg, Pulse 120 min and CT scan shows splenic laceration at inferior border after 2 units of blood transfusion, patients conditions are: BP 120/70 mmHg and pulse 84/min; the next line of management is: *(PGI June 2003)*

a. Laparotomy
b. Splenorrhaphy
c. Continue the conservative treatment and take subsequent measures on monitoring the patient
d. Splenectomy
e. X-ray abdomen and aspiration

60. A child presents in causality in stable condition after a blunt abdominal trauma associated with splenic trauma. Treatment of choice is: *(AIIMS Nov 2000)*

a. Observation
b. Splenectomy
c. Arterial embolisation
d. Splenorrhaphy

61. True about blunt abdominal trauma with splenic rupture: *(PGI June 2008)*

a. Kehr's sign-discoloration around umbilicus
b. Spleen is most common organ to be involved
c. Splenectomy is treatment of choice for splenic rupture
d. Cullen's sign seen

62. A 30-years old person met with a roadside accident. On admission his pulse rate was 120/ minute, BP was 100/60 mmHg. USG examination revealed laceration of the lower pole of spleen and hemoperitoneum. He was resuscitated with blood and fluid. Two hours later, his pulse was 84/ minute and BP was 120/70 mm Hg. The most appropriate course of management in this case would be: *(DPG 2011)*

a. Exploring the patient followed by splenectomy
b. Exploring the patient followed by excision of the lower pole of spleen
c. Splenorrhaphy
d. Continuation of conservative treatment under close monitoring system and subsequent surgery if further indicated

63. About trauma spleen false is: *(DPG 2006)*

a. Partial splenectomy cannot be done
b. Post splenectomy infection common
c. Can cause late onset shock
d. Mostly managed conservatively

64. Trauma to spleen in a stable patient is best diagnosed by:

a. X-ray abdomen *(MCI Sept 2005, March 2008)*
b. USG
c. CT scan
d. Diagnostic peritoneal lavage

65. In a RTA patient sustained trauma to left side of chest and abdomen. Fluid in the peritoneum and sign of hypotension was found on physical examination. Most probable diagnosis is? *(DNB 2014)*

a. Splenic injury
b. Diaphragmatic injury
c. Rib fracture
d. Renal injury

STOMACH, DUODENUM AND PANCREATIC INJURIES

66. Which of the following statements related to gastric injury is not true? *(All India 2007)*

a. Mostly related to penetrating trauma
b. Treatment is simple debridement and suturing
c. Blood in stomach is always related to gastric injury
d. Heals well and fast

67. A young patient presents with a massive injury to proximal duodenum, head of pancreas and distal common bile duce. The procedure of choice in this patient should be:

a. Roux-en-Y anastomosis *(All India 2008)*
b. Pancreaticoduodenectomy (Whipple's operation)
c. Lateral tube jejunostomy
d. Retrograde jejunostomy

CHEST TRAUMA

68. A patient died after a blunt trauma to chest. Most common cause of death in blunt trauma to chest is:

a. Esophageal rupture
b. Tracheo-bronchial rupture
c. Pulmonary laceration
d. Pneumothorax

69. Commonest cause of death in penetrating injury of chest:

a. Tracheobronchial injury *(AIIMS Sept 96, June 2000)*
b. Esophageal rupture
c. Pulmonary laceration
d. Chylothorax

70. A 40-years old man brought to the emergency room with a stab injury to the chest. On examination patient is found to be hemodynamically stable. The neck veins are engorged and the heart sounds are muffled. The following statements are true for this patient except: *(AIIMS Nov 2002)*

a. Cardiac tamponade is likely to be present
b. Immediate emergency room thoracotomy should be done
c. Echocardiogram should be done to confirm pericardial blood
d. The entry wound should be sealed with an occlusive dressing

71. Following a major trauma a patient presented 54 hours later with raised JVP and CVP of 16 mm of Hg and persistent hypotension. Most probable diagnosis is: *(PGI Dec 2000, Dec 2003)*

a. Tension pneumothorax
b. Cardiac tamponade
c. Head injury
d. Splenic trauma
e. Air embolism

72. Sitaram a 40-years old man, met with an accident and comes to emergency department with engorged neck veins, pallor, rapid pulse and chest pain Diagnosis is: *(AIIMS June 99)*

a. Pulmonary laceration
b. Cardiac tamponade
c. Hemothorax
d. Splenic rupture

73. A patient is brought to casualty with severe hypotension following a road traffic accident. No external injury is evident. The cause of hypotension is *(AIIMS June 2001)*

a. Fracture rib
b. Intrathoracic and abdominal bleed
c. Iatrogenic shock
d. Intracranial bleed

74. Which of the following is most common cause of hypotension in fracture ribs (T10 -T12)? *(AIIMS Nov 99, June 99)*

a. Abdominal solid visceral organ injury
b. Injury to aorta
c. Inter costal artery damage
d. Pulmonary contusion

75. Treatment of acutely developing massive left sided hemothorax in a young male after an accident is:

a. Strapping of chest *(AIIMS Nov 93)*
b. Tube thoracostomy
c. Endotracheal intubation + IPPV + pleural fluid aspiration
d. Conservative, wait and watch

76. Treatment of rib fracture: *(PGI Dec 2002)*
a. Immediate thoracotomy b. IPPV
c. Strapping d. ICWSD

77. In case of blunt injury thorax, most common complication is: *(AIIMS June 95)*
a. Pneumothorax b. Rib fracture
c. Hemopneumothorax d. Aortic rupture

78. Best approach in thoracic trauma is: *(Recent Questions 2013)*
a. Midline sternotomy
b. Parasternal thoracotomy
c. Anterolateral thoracotomy
d. Posterolateral thoracotomy

FLAIL CHEST

79. True about flail chest: *(PGI June 2004)*
a. Fracture of 3 or 4 ribs
b. Chest wall moves inwards during inspiration
c. Mechanical Ventilation always needed
d. Mediastinal shift
e. Ultimately leads to respiratory failure

80. What is the treatment of choice in severe fail chest?
a. IPPV b. Strapping *(UPSC 2008)*
c. Wiring d. Nasal Oxygen

81. The immediate treatment of choice in most cases of flail chest is: *(PGI 81, AMC 86)*
a. Analgesics
b. Positive pressure ventilation
c. Tracheostomy
d. Breathing exercises

82. Steering wheel injury on chest of a young man reveals multiple fractures of ribs and paradoxical movement with severe respiratory distress. X-ray shows pulmonary contusion on right side without pneumothorax. What is the initial treatment of choice? *(UPSC 2007)*
a. Immediate internal fixation
b. Endotracheal intubation and mechanical ventilation
c. Thoracic epidural analgesia and O2 therapy
d. Stabilization with towel clips

83. Management of flail chest with respiratory failure is:
a. Chest tube drainage *(DNB 2008, MCI Sept 2006)*
b. Oxygen administration
c. IPPV
d. Internal operative fixation of the fractures segments

84. True about flail chest are all except: *(MCI March 2007)*
a. Ultimately leads to respiratory failure
b. Paradoxical respiration
c. Fracture of 3-4 ribs
d. Mediastinal shift

85. Simple rib fracture should be treated with all except: *(MHPGMCET 2007)*
a. Analgesics b. Physiotherapy
c. Early ambulation d. Strapping of chest

86. A man presented with fractures of 4th to 10th ribs and respiratory distress after RTa. He is diagnosed to have flail chest and a PaO2 of <60%. Management is: *(AIIMS June 2001)*
a. Tracheostomy
b. IPPV with oral intubation
c. Fixation of ribs
d. Strapping of chest

87. A man is brought to casualty who met with RTa. He sustained multiple rib fractures with paradoxical movement of chest. Management is: *(PGI June 2006)*
a. Tracheostomy
b. Consult cardiothoracic surgeon
c. Strapping
d. Intermittent positive pressure ventilation
e. No intervention required

88. Treatment of choice of flail chest is: *(Recent Questions 2013)*
a. External fixation of flail segment and mechanical ventilation
b. Strapping
c. O_2 administration
d. Intrapleural local analgesia

DIAPHRAGMATIC INJURY

89. Traumatic diaphragmatic injury except: *(PGI Nov 2009)*
a. Left side rupture due to weak left hemidiaphragm at point of entry of embryonic origin
b. Most commonly due to trauma
c. Smaller tears heal spontaneously and surgery is not required
d. Abdominal approach is the most favored
e. Mask ventilation is encouraged in patient with massive visceral herniation

90. True about diaphragmatic injury: *(PGI Dec 2008)*
a. Advise diagnostic laparoscopy
b. Chest X-ray is useful
c. Conservative management is done in most cases
d. Late complication is herniation of abdominal content
e. All penetrating diaphragmatic injury must be repaired via chest

91. About diaphragmatic injury, true statement is:
a. Treatment is conservative *(AIIMS June 98)*
b. Resolves spontaneously
c. Left side is more common
d. Associated with pneumothorax

92. Diagnosis of traumatic rupture of diaphragm: *(PGI June 2007)*
a. Laparoscopy
b. Chest X ray
c. Diagnostic peritoneal lavage
d. CT

HEAD INJURY

93. Prognosis in head injury is best given by: *(All India 2007, AIIMS Nov 2006)*
a. Glasgow coma scale b. Age of patient
c. Mode of injury d. CT head

94. Base of the skull fracture presents with involvement of the petrous temporal bone, which of the following important sign is seen? *(UPPG 2007)*
a. Subconjuctival hematoma
b. CSF rhinorrhoea
c. Raccoon eyes
d. Battle sign

95. A 20-years old male come to causality with head injury. Examination reveals normal consciousness and blood in the tympanic membrane. Most likely cause is: *(UPPG 2008)*
a. Extradural hemorrhage
b. Subdural hemorrhage
c. Intraventricular hemorrhage
d. Basilar fracture

96. The earliest manifestation of increased intracranial pressure following head injury is: *(All India 2005)*
a. Ipsilateral papillary dilatation
b. Contralateral papillary dilation
c. Altered mental status
d. Hemiparesis

97. The term post traumatic epilepsy refers to seizures occurring:
a. Within moment of head injury *(AIIMS Nov 2002)*
b. Within 7 days of head injury
c. Within several weeks to months after head injury
d. Many years after head injury

98. After 4 weeks of head trauma, patient presents with features of irritability and altered sensorium. Commonest cause will be: *(AIIMS Nov 2000)*
a. Chronic subdural hematoma
b. Extradural hematoma
c. Intraparenchymal bleed
d. Electolyte imbalance

99. After head injury, biconvex, lenticular shape hematoma in CT scan is characteristic of which of the following: *(AIIMS June 99)*
a. Extradural hemorrhage b. Subdural hemorrhage
c. Intracerebral hematoma d. Diffuse-axonal injury

100. Which of the following is commonest source of extradural hemorrhage? *(AIIMS Nov 98, Feb 97, All India 96)*
a. Middle meningeal artery b. Subdural venous sinus
c. Charcot's artery d. Middle cerebral artery

101. CSF otorrhea is caused by: *(AIIMS Nov 98)*
a. Fracture of cribriform plate
b. Fracture of parietal bone
c. Fracture of petrous temporal bone
d. Fracture of tympanic membrane

102. Management for CSF rhinorhoea is: *(AIIMS Feb 97)*
a. Plain X-ray and packing of nose
b. Nasal packing only
c. Antibiotics and observation
d. Immediate surgery

103. After rupture of middle meningeal artery bleeding occurs in which region? *(AIIMS Feb 97)*
a. Subdural bleed b. Extradural bleed
c. Intracerebral bleed d. Subarachnoid bleed

104. A patient with sudden headache, vomiting and unconsciousness, diagnosis is: *(PGI June 2001)*
a. Subarachnoid hemorrhage
b. Intracerebral hemorrhage
c. Subdural hemorrhage
d. Extradural hemorrhage

105. Hemostasis in scalp wound is best achieved by:
a. Direct pressure over the wound *(AIIMS 79, PGI 85)*
b. Catching and crushing the bleeders by haemostats
c. Eversion of galea aponeurotica
d. Coagulation of bleeders

VASCULAR INJURIES

106. In traumatic transaction of the femoral artery and vein, which among the following should be done? *(PGI Dec 2001)*
a. Femoral artery repair with vein ligation
b. Repair of artery and vein
c. Ligation of femoral artery
d. Below knee amputation
e. Repair of artery with contralateral sympathectomy

107. A person following a road-traffic accident presented in emergency with laceration of inguinal region. On examination, there was swelling of inguinal region and distal pulsation was felt; internal iliac artery was normal, common iliac and external femoral artery was normal but common femoral vein is transected. Treatment of choice is:
a. Vein repair with continuity *(PGI June 2003)*
b. Sclerotherapy
c. Ligation of femoral artery and vein
d. Amputation below knee

108. In traumatic injury to common femoral vein and external femoral artery, which among the following should be done?
a. Ligation of both artery and vein *(PGI Dec 2003)*
b. Repair of artery and vein
c. Below knee amputation
d. Repair of artery and contralateral sympthectomy
e. Sclerotherapy

109. True about aortic transaction: *(PGI June 2008)*
a. Most commonly due to deceleration injury
b. High mortality
c. Surgery definitive treatment
d. Aortography gold standard

110. Which of the following causes maximum bleeding? *(PGI 95)*
a. Partial arterial severing
b. Complete arterial severing
c. Artery caught between fractured end of bones
d. Intimal tear

SEAT BELT INJURY

111. Which of the following statement(s) is/are true about trauma injury? *(PGI June 2009)*
a. Seat belt can cause pancreato-duodenal injury
b. Late death is caused by sepsis
c. Damage Control Surgery (DCS) is used to control major bleeding and to prevent contamination of peritoneal cavity.
d. In DCS the abdomen is closed in layer to prevent evisceration
e. In DCS, laparotomy is decided based on patient prognosis

112. Seat belt causes injury to: *(MAHE 2004)*
a. Duodenum
b. Head injury due to wind screen
c. Thorax
d. All

MISCELLANEOUS

113. A patient presents in emergency with a cervical spine fracture. First thing to do is: *(AIIMS Nov 99, June 99)*
a. Locate the fracture by shifting the patient side to side
b. X-ray of spine
c. Clear the airway and intubate him
d. Immobilize the cervical spine

114. What will be the appropriate management of a patient with a clean wound over forearm with slight loss of tissue? He has received, tetanus toxoid 12 years back: *(AIIMS June 99)*
a. Complete course of TT
b. Only one dose of TT
c. Full dose of Human tetanus Ig
d. No treatment needed

115. Limb salvage can be done in all except: *(AIIMS Feb 97)*
a. Nerve injury b. Vascular injury
c. Bone injury d. Muscle injury

116. A patient after sustaining RTA, developed fracture left shaft of femur with guarding and rigidity in the abdomen. Following is to be done: *(PGI Dec 2003)*
a. X-ray of left lower limb and USG abdomen
b. Start IVF, Ryle's tube and catheterization
c. Stabilize the fracture and monitor the patient and do surgery if necessary later on
d. Grouping and cross matching of two unit of blood
e. Stabilize the fracture only

117. Which one of the following is not a principle followed in the management of missile injuries? *(UPSC 2004)*
a. Excision of all dead muscles
b. Removal of foreign bodies
c. Removal of fragments of bone
d. Leaving the wound open

118. When bullet is shot above pubic symphysis in midline directed backwards, first organ to get injuries is? *(DPG 2008)*
a. Bladder
b. Abdominal aorta
c. Left renal vein
d. Spleen

119. In resection of muscle with history of trauma/crush injury, resection depends on: *(PGI Dec 2006)*
a. Contractility of muscle
b. Color of muscle
c. Bleeding punctuate spots
d. Size of muscle
e. Function of muscle

120. During reconstruction of an amputated limb which of the following is done first? *(AIIMS Nov 2010)*
a. Arterial repair
b. Venous repair
c. Fixation of the bone
d. Nerve anastomoses

121. Which of the following structures is fixed first during reimplantation of an amputated digit?
a. Bone
b. Artery
c. Vein
d. Nerve

122. Hypotension in acute spinal injury is due to: *(AIIMS Nov 2006)*
a. Loss of sympathetic tone
b. Loss of parasympathetic tone
c. Orthostatic hypotension
d. Vasovagal attack

123. Due to decelerations, aorta can be ruptured at places where it is fixed except: *(AIIMS May 2012)*
a. At ligamentum arteriosum
b. Behind the esophagus
c. Behind the crura of diaphram
d. Aortic valve

124. Criteria for brainstem death includes: *(All India 2012)*
a. Positive Doll's eye reflex
b. Absent pupillary light reflex and dilated pupils
c. Pinpoint pupils
d. Positive vestibulo-ocular reflex

125. During resuscitation, artefacts of fractured ribs most commonly involve: *(AIIMS May 2014)*
a. 2nd – 4th ribs
b. 3rd – 5th ribs
c. 4th – 6th ribs
d. 5th – 7th ribs

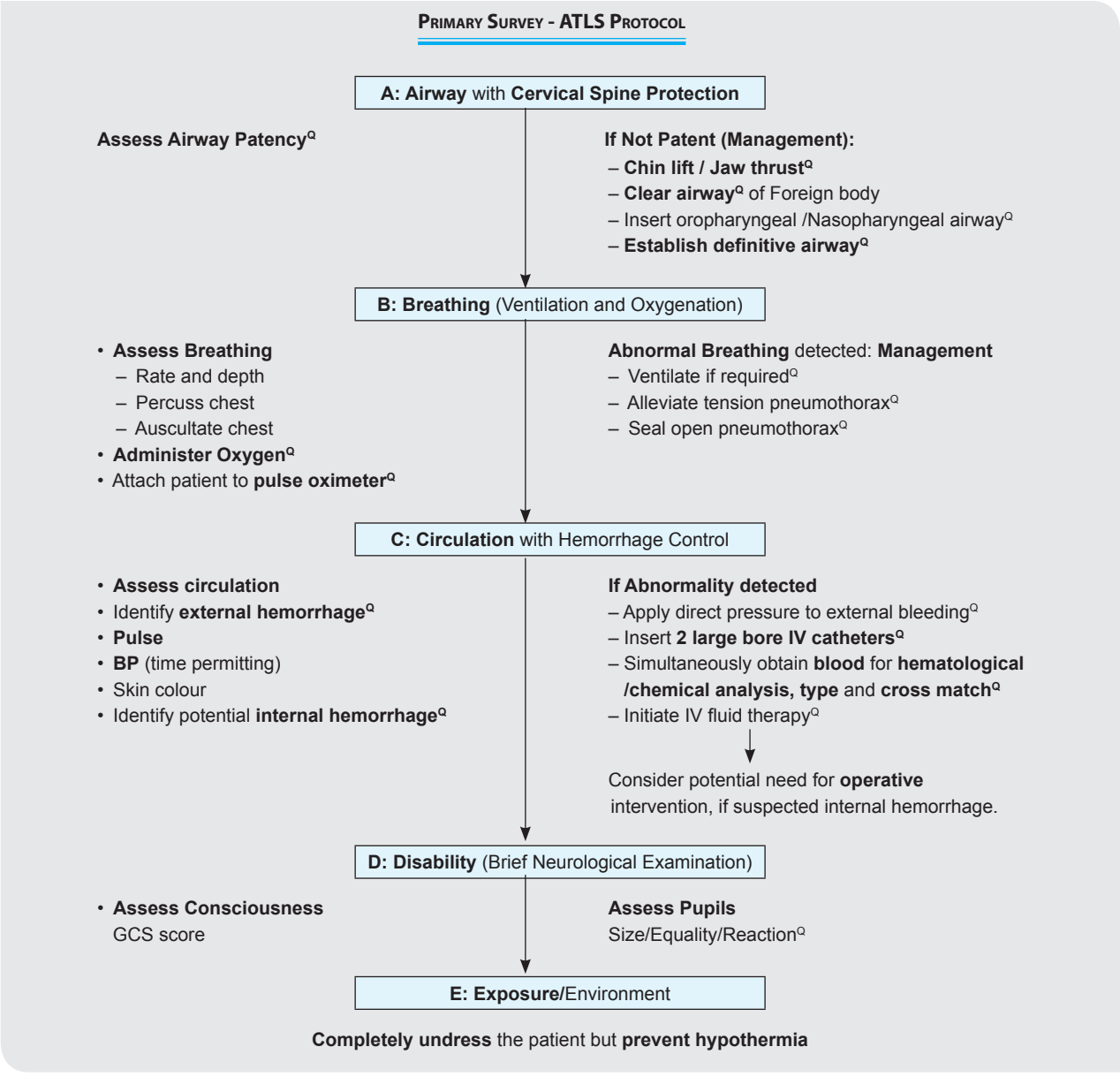
EXPLANATIONS

TRAUMA

1. **Ans. d. Maintenance of airways**

2. **Ans. a. Hemostatic anterior and posterior nasal packing, b. Thoracosotomy tube insertion, c. ETT in line with cervical canal, d. I.V Fluid immediate** *(Ref: Advanced Trauma Life Support (ATLS) Manual 7/e p33-34; CSDT 11/e p205)*

The patient in question needs to be managed in accordance with the Advanced Trauma Life Support (ATLS) protocol.



- **Anterior** and **posterior nasal packing** should be done to **control nose bleeding**[Q].
- **Resuscitation** of patient **in hypovolemic shock** begins with making sure that **airway is secure** by ensuring that **ventilation and oxygenation** are **adequate**, and in the case of **hemorrhagic shock**, by **controlling bleeding**[Q].
- **External bleeding** is controlled by **application of pressure** over the bleeding areas, **surgical control** or in a rare case, **by tourniquet**[Q].
- **Immediately life-threatening pulmonary injuries** that must be **detected** and **treated** (by **chest tube** or **thoracotomy**) include presence of **tension pneumothorax, open pneumothorax, flail chest** and **massive hemothorax**[Q].

- **Large bore needle** or **IV cannula** should be in place **while** a **chest tube is inserted** for definitive management[Q].
- The **chest X-ray** is of utmost importance in thoracic trauma however, the **aforementioned life-threatening injuries preclude the necessity** of chest X-ray for diagnosis and **should be identified clinically[Q].**

3. Ans. d. Increase in thyroxine *(Ref: Bailey 25/e p4-9; CSDT 11/e p103-105)*

CSDT says "Following injury, **neural impulses** carried **via spinothalamic pathways** activate the brain stem and thalamic and cortical centers, which stimulate the hypothalamus. Hypothalamic stimulation triggers combined neural and endocrine discharges. **Norepinephrine[Q]** is released sympathetic nerve endings, **epinephrine[Q]** from the adrenal medulla[Q], **aldosterone** from the adrenal cortex, **ADH[Q]** from the adrenal cortex, ADH from the posterior pituitary, **glucagon[Q]** from the pancreas, and **ACTH[Q], TSH[Q]**, and **growth hormone[Q]** from the anterior pituitary. Theses hormones produce **secondary elevations of cortisol[Q]**, **thyroid hormone[Q]**, and **somatomedins**."

Hormones Increased in Response to Surgical Stress

- **Catecholamines[Q]:** The plasma catecholamines **increase immediately after trauma** and achieve **peak concentration** in **24-48 hours** depending on the severity.
- **Glucagon[Q]:** Glucagon along with catecholamine and cortisol **promotes** and **prolongs** the **liver glycogenesis.**
- **Cortisol[Q]:** Hypothalamus during stress secretes ACTH[Q], which in turn initiates sudden increase in cortisol level[Q]
- **Growth Hormone[Q]:** The secretion of GH is governed by hypothalamic factors, autonomic stimulation and non-hormonal signals. The primary metabolic action of **GH** during stress is to **promote protein synthesis** and **enhance lipid break down**, and glucose stores.
- **Vasopressin** (ADH)[Q]
- **Aldosterone[Q]**
- **Renin-Angiotensin**[Q]

  - The **plasma concentration of insulin** during stress has been noted to be **biphasic,** characterized by the **suppression of insulin secretion followed by a normal secretion[Q].**

4. Ans. d. Insulin **5. Ans. e. Insulin**

6. Ans. a. Catabolism *(Ref: CSDT 11/e p100)*

Metabolic and Neuroendocrine Response to Trauma or Surgery

- **Injury Phase (Phase of catabolism):**
  - **Begins at** the **time of injury** and **lasts for 2-5 days[Q]**
  - Phase of **hypermetabolism[Q]**
  - Stress hormones (**cortisol, catecholamines and glucagon[Q]**) and volume control hormones (**renin-angiotensin, aldosterone** and **ADH[Q]**) are increased. This leads to proteolysis, lipolysis, hyperglycemia and wound healing despite of negative nitrogen balance.
- **Turning Point:**
  - Transient period marked physiologically by turning off of the neuroendocrine response and clinically by the appearance of getting well.
- **Early Anabolic Phase:**
  - Marked by gain in muscular strength or **positive nitrogen balance[Q]**.
- **Late Anabolic Phase:**
  - Marked by gain in weight and body fat or **positive caloric balance[Q]**

7. Ans. d. Head lift **8. Ans. d. Maintenance of airways** **9. Ans. c. Airway**

10. Ans. c. Long saphenous

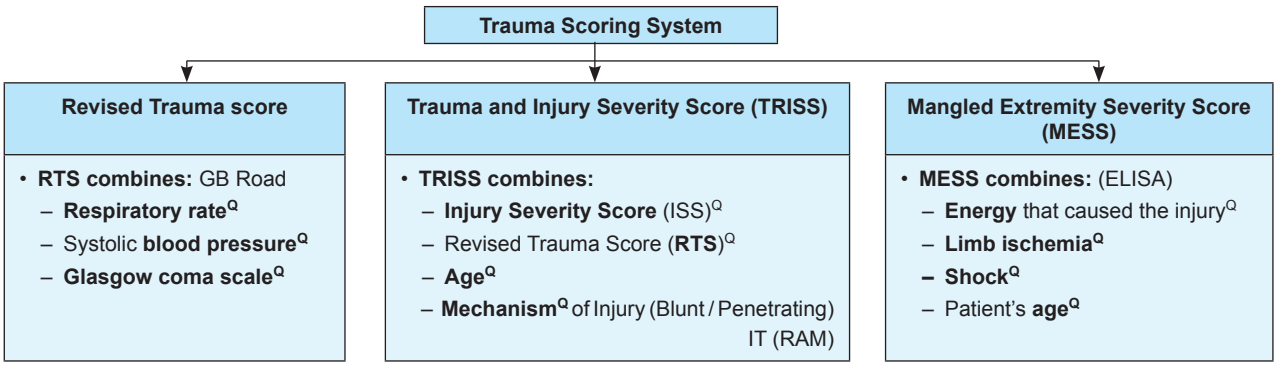
- **First preference for venous access** is always for **upper extremity veins[Q].**
- **Lower extremity veins** is **avoided** because:
- **To prevent DVT[Q]**
- **To preserve** the **long saphenous vein**, as it is used for arterial grafting in case of vascular injury[Q]
- If venous access to the upper extremity veins or external jugular veins is not possible, then a venous cut down on the greater saphenous is done.

11. Ans. a. Thyroxine **12. Ans. b. Inhibition of skeletal muscle breakdown by IL-1 and TNF**

13. Ans. a. Airway maintenance **14. Ans. c. Intubation**

TRAUMA SCORING SYSTEM

15. Ans. c. Pulse rate *(Ref: Trauma Manual by Moore and Mattox 4/e p6; The Trauma manual: Trauma and Acute Care Surgery 3/e p5)*



16. **Ans. b. RTS +ISS +age**

17. **Ans. c. Neurogenic injury**

TRIAGE

18. **Ans. a. Ambulatory patients**

19. **Ans. a. Red** *(Ref: Sabiston 19/e p609-610)*

Triage means "to sort," *involves* ***prioritizing victims into categories based on*** *their* ***severity of injury, likelihood of survival,*** *and* ***urgency of care*** *. **Red** color is given **first priority** and signifies a **critical patient** .*

Triage

- **Triage means "to sort,"** involves **prioritizing victims into categories based on** their **severity of injury, likelihood of survival**, and **urgency of care**.
- The method of triage widely used by **municipalities** is the **START triage scheme**, which stands for **simple triage** and **rapid treatment**. This is accomplished by color tagging of patients.

BLUNT TRAUMA ABDOMEN

20. **Ans. a. Spleen** *(Ref: Sabiston 19/e p457-459; Schwartz 10/e p173-174, 9/e p152-155; Bailey 25/e p348)*

- **MC organ injured** in **blunt trauma abdomen: Spleen** >Liver
- **MC organ injured** in **penetrating trauma: Small intestine**

21. **Ans. b. USG**

22. **Ans. c. USG** *(Ref: Sabiston 19/e p455; Schwartz 10/e p173-174, 9/e p155; Bailey 25/e p275, 287, 1184)*

- **Blunt trauma patient** with **hemodynamic instability** should be **evaluated by USG (FAST)** in the resuscitation room, if available.
- **Hemodynamically stable patients** sustaining blunt trauma are adequately **evaluated by CECT** (after USG).

23. **Ans. a. Spleen**

24. **Ans. b. Proximal jejunum, e. Ileocecal junction** *(Ref: Sabiston 19/e p463-464)*

Mechanism of injury of Small Intestine by Blunt Trauma

- **Crushing of bowel between vertebral bodies** and **blunt object** such as steering wheel or handle bar
- **Deceleration shearing** of the small bowel at points **where it is fixed** such as **ligament of Treitz** (**duodenojejunal junction**), the **ileocecal junction** and around the **mesenteric artery**.
- Closed loop rupture caused by sudden increase in intra-abdominal pressure.

25. **Ans. c. Mesentery** *(Bailey 25/e p1003-1004)*

Most common organ injured in seat belt injury is Mesentery.

Seat Belt Injury

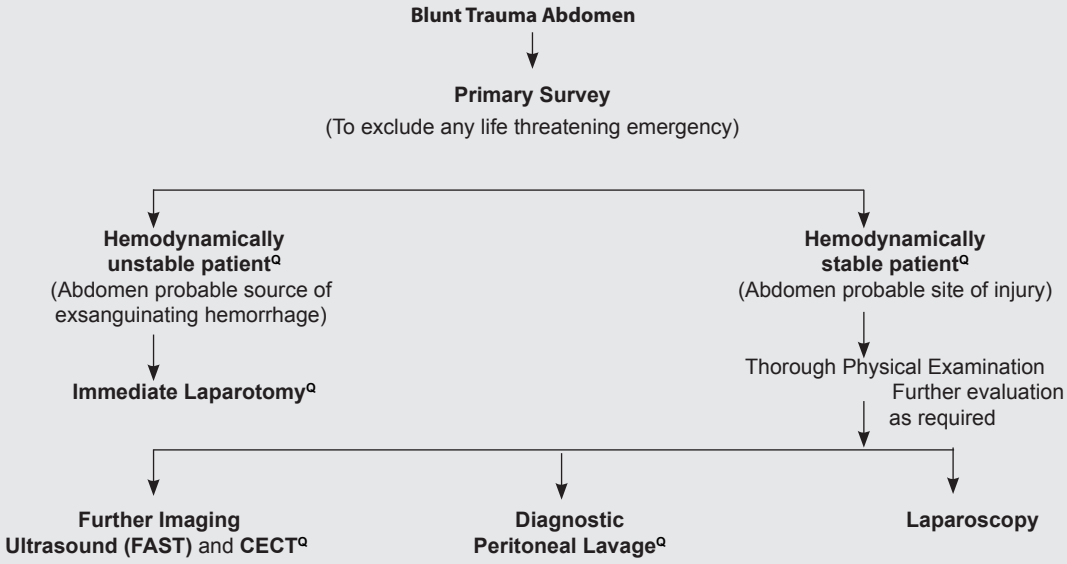
- If a car accident occurs when a seatbelt is worn, **sudden deceleration** can result in a **torn mesentery**.
- Blunt trauma to the abdomen by **seatbelt injury** may **compress the pancreas over the vertebral column** and result in **pancreatico-duodenal injury**
- If there is any **bruising of the abdominal wall**, or even marks of clothing impressed into the skin, laparotomy may be indicated.

26. Ans. a. Always midline incision (Ref: Sabiston 19/e p455; Schwartz 9/e p155; Bailey 25/e p275, 287, 1184)

Blunt Trauma Abdomen

- **Preferred incision** for **emergency abdominal exploration** is a **long midline incision**[Q].
- Bailey says "The **routine approach for abdominal trauma** is **full midline Laparotomy"**
- Schwartz says **"All emergency abdominal explorations** are performed using a **long midline** incision because of its versatility."[Q]

27. Ans. a. Immediate laparotomy *(Ref: Sabiston 19/e p456; Schwartz 10/e p173-174, 9/e p155; Bailey 25/e p275; CSDT 12/e p228)*



28. Ans. c. USG is better than CT scan, e. Urgent surgery to be done

29. Ans. b. Further imaging of abdomen *(Ref: CSDT 12/e p228)*

A **hemodynamically stable patient** after **blunt trauma abdomen** should need **further evaluation by imaging**. Imaging of the abdomen with Ultrasound (**FAST**) is the best **next line of investigation**.

30. Ans. a. CECT Scan

31. Ans. b. Rarely need urgent laparotomy

32. Ans. c. Thoracic duct injury needs urgent thoracotomy *(Ref: Bailey 25/e p731)*

33. Ans. a. Focused assessment with sonography for trauma *(Ref: Sabiston 19/e p437)*

FAST stands for Focused assessment with sonography for trauma.

FAST (Focused Assessment with Sonography for Trauma)

- FAST is a **rapid diagnostic examination** to assess patients with **potential thoracoabdominal injuries**[Q].
- **FAST** is performed **within 2-4 minutes**[Q].
- **FAST sequentially surveys** for the presence or absence of blood in the **pericardial sac**, the right upper quadrant (**RU**[Q]), left upper quadrant (**LU**[Q]), and **pelvis**[Q].

> - **4 'Ps' are evaluated in sequence: Pericardial sac → Perihepatic region → Perisplenic region → Pelvis** [Q]

Two Important X-rays in Trauma Patients

- Chest X-ray[Q]
- X-ray pelvis[Q] with bilateral hip joint

34. Ans. b. Blood for cross matching and IV fluids *(Ref: Advanced Trauma Life Support (ATLS) Manual 7/e p33,34)*

The patient in question needs to be managed in accordance with the Advanced Trauma Life Support (ATLS) protocol.
The **airway** (A) has been **secured** and the respiration / **breathing** (B) have already been **stabilized. Circulation** (C) needs to be established next. This is achieved by **external control of hemorrhage** (no external hemorrhage is present in this patient) and by restoring circulating volume (TV fluids).
Intravenous access for **fluid resuscitation** should be begun next with **two 16 gauge peripheral catheters**. Blood should be drawn simultaneously and sent for typing and cross matching, at the same time.

35. **Ans. d. Intra-abdominal bleed** *(Ref: CSDT 11/e p252)*

- CSDT says "Patients with blunt trauma and hypovolemia should be examined first for intra-abdominal bleeding even if there is no overt existence of abdominal trauma."[Q]

36. **Ans. d. Pancreatic injury** *(Ref: Sabiston 19/e p462)*

This is a typical case of **pancreatic injury** with **minimal retroperitoneal hematoma** and characteristic presentation of **pain radiating to back**.

37. **Ans. a. Peritoneal air on imaging, b. Severe hypotension, e. Patient with positive diagnostic peritoneal lavage** *(Ref: Sabiston 19/e p 455-456; Schwartz 10/e p173-174, 9/e p155; Bailey 26/e p359, 25/e p275, 287, 1184)*

Indications of Urgent Laparotomy in Blunt Trauma Abdomen

- Peritonitis[Q]
- Free air seen on radiographic examination[Q]
- Unexplained hypovolemia[Q]
- Positive DPL[Q]
- Presence of other injuries known to be frequently associated with intra-abdominal injuries

Diagnostic Peritoneal Lavage (DPL)

- **DPL** has **historically** been the **cornerstone diagnostic study** used to detect significant **intraperitoneal injury requiring surgical intervention, replaced by FAST[Q].**
- This quick, simple procedure can be easily performed in the resuscitation area of the emergency department.
- DPL is performed through an **infraumbilical incision** unless the patient has a pelvic fracture or is pregnant.
  - The linea alba is sharply incised, and the **catheter** is directed **into the pelvis[Q]**.
  - The abdominal contents should initially be aspirated using a 10-mL syringe.

Positive DPL
• **More than 10 ml** of **gross blood** is **aspirated** directly from the peritoneal cavity[Q]
• **Returned effluent contains**:
– **>100,000/mm³** of **RBCs[Q]**
– **>500/mm³** of **WBCs[Q]**
– Demonstrable **bacteria** or **bile[Q]**

- **Sensitivity of DPL** for detecting significant intra-abdominal injury has been reported to range from **82% to 96%,** whereas its **specificity ranges** from **87% to 99%.**

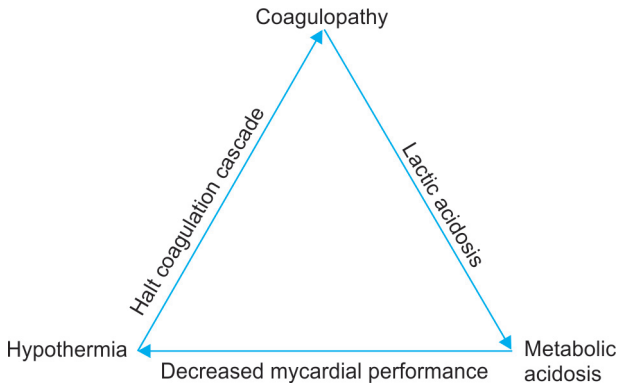
38. **Ans. b. Exploratory laparotomy under general anesthesia**

39. **Ans. c. {Epigastrium, (R) and (L) Lumbar regions, hypogastrium}** *(Ref: Sabiston 19/e p437)*

40. **Ans. b. It is accurate in detecting < 50 ml. of free blood**

DAMAGE CONTROL SURGERY

41. **Ans. a. Minimal intervention done to stabilize the patient and do the definitive surgery later** *(Ref: Sabiston 19/e p438; Schwartz 10/e p192-195, 9/e p166-167; Bailey 26/e p362-363)*



Damage Control Surgery (DCS)

- **DCS** centers on coordinating **staged operative interventions** with periods of **aggressive resuscitation** to salvage trauma patients sustaining major injuries[Q].
- **Damage control includes** an **abbreviated laparotomy**, **temporary packing**, and **closure of the abdomen** in an effort to **blunt the physiologic response to prolonged shock** and **massive hemorrhage[Q].**
  - These patients are often **at limits of their physiological reserve** when they present to operating room and **persistent operative efforts** result in **exacerbation of** their **underlying hypothermia**, **coagulopathy** and **acidosis,** initiating a **vicious cycle** that **culminates in death[Q].**
- In these situations, **abrupt termination of** the **procedure** after **control of surgical hemorrhage** and **contamination**, followed by **ICU resuscitation** and **staged reconstruction**, can be life saving[Q].

Phases of Damage Control Surgery

Phase I (Initial Exploration)	Phase II (Secondary Resuscitation)	Phase III (Definitive Operation)
• This phase consists of an **initial operative exploration** to attain rapid **control of active hemorrhage** and **contamination[Q]** • The abdomen is entered via a **midline incision** and if exsanguinating hemorrhage is encountered **four quadrant packing[Q]** should be performed • **Any violations of GI tract** should be treated with **suture closure** or **segmental stapled resection[Q]** • **External drains** are placed to control any major pancreatic or biliary injuries	• Following completion of the initial exploration, the **critically ill patient** is **transferred to** the **ICU[Q]**. • Invasive monitoring and complete ventilator support[Q] are often needed. • This phase focuses on **secondary resuscitation** to **correct hypothermia, coagulopathy** and **acidosis[Q]**	• It consists of **planned re-exploration** and **definitive repair[Q]** of injuries • This phase typically occurs **48** to **72 hours following initial** and **after successful secondary resuscitation[Q]** • The abdomen should be closed primarily if possible • **Risky GI anastomoses** or **complex reconstruction** should be **avoided[Q]**

42. Ans. b. Arrest hemorrhage, c. Control contamination, d. Prevent infection, e. Prevent coagulopathy *(Ref: Sabiston 19/e p438; Schwartz 10/e p192-195, 9/e p166-167)*

43. Ans. d. Hemostasis

44. Ans. a. Coagulopathy, e. Hemostasis

ABDOMINAL COMPARTMENT SYNDROME

45. Ans. a. ↓Cardiac output, b. ↓Urine output, d. ↓Venous return *(Ref: Sabiston 19/e p471-473; Schwartz 10/e p217-218, 9/e p188-189)*

Abdominal Compartment Syndrome

- ACS is defined as increased intra-abdominal pressure (IAP >20 mm Hg) resulting in compression of abdominal structures[Q], producing fatal complications due to pulmonary failure and mesenteric vascular compromise.
- **Normal IAP= 5-7 mmHg; Intra-abdominal hypertension IAP ≥ 12 mmHg**
- ACS occurs **predominantly in:**
  - Patients in **profound shock[Q]**
  - Patients **requiring large amounts of resuscitation fluids** and **blood[Q]**
  - Those **with major visceral** or **vascular abdominal injuries[Q]**
  - **ACS** is **characterized by** a **sudden increase in intra-abdominal pressure**, **increased peak inspiratory pressure**, **decreased urinary output**, **hypoxia, hypercapnia**, and **hypotension** secondary to **decreased venous return** to the heart[Q].

Physiologic Consequences of Increased Intra-abdominal Pressure

Decreased	Increased
• **Cardiac output[Q]** • **Central venous return[Q]** • **Visceral blood flow[Q]** • **Renal blood flow[Q]** • **Glomerular filtration**	• **Cardiac rate[Q]** • Pulmonary capillary wedge pressure[Q] • Peak inspiratory pressure[Q] • **Central venous pressure[Q]** • Intrapleural pressure • **Systemic vascular resistance[Q]**

Diagnosis

- Diagnosis is confirmed by measuring bladder pressure, which ultimately represents intra-abdominal pressure.
- A **urinary bladder catheter** is the **gold standard** indirect method used to measure IAP.

Abdominal Compartment Syndrome Grading System			
Grade	**Bladder Pressure (mm Hg)**	**Clinical Features**	**Treatment**
I	**12–15**	None	**Normovolemic** resuscitation
II	**16–20**	**Oliguria**[Q], splanchnic hypoperfusion	**Hypovolemic** resuscitation
III	**21–25**	**Anuria**, increased ventilation pressure	**Decompression**
IV	**>25**	**Anuria**, **increased ventilation pressure** and **decreased PO_2**[Q]	**Emergency re-exploration**

Treatment

- Treatment includes **rapid decompression** of the elevated intra-abdominal pressure **by opening the abdominal wound** and performing a **temporary closure** of the abdominal wall with **mesh** or a **plastic bag (Bogota bag)**[Q].

46. Ans. b. Decreased pulmonary venous pressure

47. Ans. d. Oliguria due to ureter obstruction

48. Ans. a. ↑Pulmonary capillary wedge pressure, c. ↑ Pulmonary inspiratory pressure

49. Ans. a. ↓ Cardiac output, b. ↓ Urine output, c. ↓ Venous return

PENETRATING INJURIES

50. Ans. b. Small intestine

51. Ans. b. Ileo-transverse anastomosis *(Ref: Sabiston 19/e p465)*

- Sabiston says "**Stab** and **low-velocity wounds** to the colon with **minimal contamination** and **hemodynamic stability** can be **managed by primary repair**." [Q]

52. Ans. c. Breach of platysma *(Ref: Sabiston 19/e p445-446; Schwartz 10/e p197-200, 9/e p148-150)*

Neck Injuries

- **Most severe neck injuries** are caused **by penetrating wounds** and may present an immediate threat to life as a result of **airway compromise** or **hemorrhage**[Q].
  - The **major vascular** and **aerodigestive structures** in the neck are **located in** the **anterior triangle**, and **all are deep to** the **platysma**[Q].
  - **Platysma** and **SCM** are **useful anatomic boundaries**[Q].
- Injuries that **do not penetrate** the **platysma** can be **considered superficial**, and no further investigation is needed. Wounds that **penetrate** the **platysma** must be further evaluated.
- Injuries that are **anterior to SCM** present a **high likelihood of significant injury**, whereas those that track **posterior to SCM** are **unlikely to involve major vascular** or **aerodigestive structures**.
- **Penetrating injuries to** the **posterior triangle** should raise concern about **trauma to** the **cervical spine** and **spinal cord**[Q].

Neck is divided into Three Horizontal Zones on craniocaudal location	
Zone I	• **At thoracic inlet**[Q] • Extends from **sternal notch to cricoid cartilage**[Q] • Injuries in this zone carry the **highest mortality** because of the **presence of great vessels**[Q] and difficult surgical approach.
Zone II	• **Midportion of** the **neck**[Q] • Extends from **cricoid cartilage to angle of mandible**[Q]
Zone III	• Extends from **angle of mandible to base of skull**[Q]

53. Ans. b. Air embolism through external jugular vein *(Ref: Bailey 25/e p75,76,1381,1382)*

When **neck or chest veins are injured**, air may enter the veins and causes **immediate death due to air embolism.**

54. Ans. a. CECT *(Ref: Sabiston 19/e p456; Washington Manual of Surgery 5th/373)*

According to **EAST Guidelines "Current recommendations for nonoperative management** of **penetrating trauma include** use of **Triple Contrast CT** (IV, oral and rectal) and **serial examinations**."

Penetrating Abdominal Injuries

- **Gunshot Abdominal Wounds:**
  - Chances of **internal injury** is **very high in gunshot wounds,** thus little pre-operative evaluation is required and **laparotomy is mandatory**[Q].
- **Stab Wounds to Abdomen:**
  - **Exploratory laparotomy** is indicated in patients with isolated penetrating abdominal wound if **hypotensive** or **in shock** or **showing peritoneal signs**[Q].

Anterior Stab Wounds	Flank and Back Wounds
• **Local wound exploration** can be performed to determine **if there is any penetration of** the **peritoneal cavity**[Q]. • If the tract terminates without entering the peritoneum, the injury can be managed as a deep laceration[Q] and laparotomy is not needed. • Otherwise, **penetration of the peritoneum** is assumed and **significant injury** must be **excluded by further diagnostic evaluations**[Q] (FAST, CECT, DPL or laparoscopy)	• Risk of injury to **colon, kidney** and **ureter**[Q] • **Triple contrast CT**[Q] is advised **to detect colon** and **retroperitoneal injuries** and the **need for laparotomy**.

55. Ans. d. CECT Abdomen *(Ref: Practice Management Guidelines for Selective Non-operative Management of Penetrating Abdominal Trauma (Journal of Trauma; Vol 68, No. 3, March 2010)*

"Omental **protrusion** in a **hemodynamically stable patients without signs of peritoneal irritation** is **not an absolute indication for exploratory laparotomy**"- Injury: volume 18; Issue 2; 87-88

- **Routine laparotomy** is **not indicated in hemodynamically stable patients** with abdominal stab wounds **without signs of peritonitis** or **diffuse abdominal tenderness** (away from the wound site). [Q]
- Such patients can be **initially managed non-operatively**, but an **abdominopelvic CT scan** should be strongly considered **as a diagnostic tool to facilitate initial management decisions**.[Q]

BLAST INJURIES

56. Ans. c. Liver *(Ref: Sabiston 19/e p612-613; Bailey 26/e p430, 25/e p422-423)*

Blast Injuries

- **Primary blast injuries** result from the rapid overpressure or shock waves produced by an explosion
- These injuries result from the **dramatic changes in barometric pressure** projected from the point of detonation
- Primary blast injuries predominantly cause **damage to air filled hollow organs** of the body **from rapid pressure change** (**barotraumas**).
  - Damage to air filled organs includes **middle ear, lungs** and **GIT.**[Q]
- **Most sensitive** and **most frequently injured hollow organ**: **Tympanic membrane**[Q] **>Lungs**
- **Blast damage to the lungs** is the **MC cause of life threatening injury**[Q] following an explosion.

Most Severely Affected Organs	Most Commonly Affected Organs
• **Air Blast : Lungs**[Q] • **Underwater : GIT**[Q]	• **Air : Tympanic membrane**[Q] • **Underwater (Fully submerged): TM**[Q] • **Underwater (Head is out): GIT**[Q]

57. Ans. a. TM

HEPATIC INJURIES

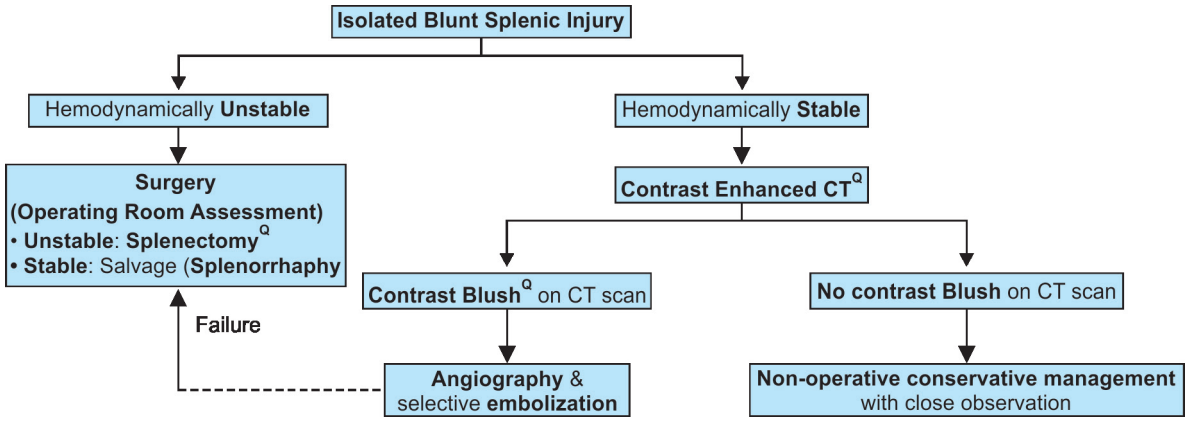
58. Ans. a. Conservative management *(Ref: Sabiston 19/e p459-461; Schwartz 9/e p175; Bailey 25/e p1086-1088; Blumgart 5th/1806-1814; Shackelford 7/e p1479-1487)*

Explanation is given in chapter no. 3 Liver.

SPLENIC INJURIES

59. Ans. c. Continue the conservative treatment and take subsequent measures on monitoring the patient *(Ref: Trauma Manual by Moore and Mattox 4th/252)*

As the patient is hemodynamically unstable, immediate surgical exploration should be done.



60. **Ans. a. Observation**

61. **Ans. b. Spleen is most common organ to be involved, d. Cullen's sign seen**

62. **Ans. d. Continuation of conservative treatment under close monitoring system and subsequent surgery if further indicated**

63. **Ans. a. Partial splenectomy cannot be done**

64. **Ans. c. CT scan**
Splenic trauma is discussed in chapter no. 20 Spleen.

65. **Ans. a. Splenic injury**

STOMACH, DUODENUM AND PANCREATIC INJURIES

66. **Ans. c. Blood in stomach is always related to gastric injury** *(Ref: Sabiston 19/e p461-462; Schwartz 9/e p178;Bailey 25/e p348)*
Blood in stomach is suggestive of injury to the stomach but it is not always due to stomach injury.
Blood in stomach may result from injury to adjacent gastrointestinal tract such as the esophagus or from stress ulcerations.

Gastric Injuries

- **Gastric injuries** are **most commonly** results **from penetrating trauma**Q.
- **Most common treatment** of penetrating gastric injuries is **simple debridement** and **suturing**Q.
- **Stomach** has a **rich blood supply**, so healing in gastric injuries is good and poses no special problem.

67. **Ans. b. Pancreaticoduodenectomy (Whipple's operation)** *(Ref: Sabiston 19/e p462-463, 1545; Schwartz 9/e p179; Bailey 25/e p1137-1138; Shackelford 7/e p1234-1239)*
Explanation is given in chapter no. 8 Pancreas.

CHEST TRAUMA

68. **Ans. b. Tracheo-bronchial rupture**

69. **Ans. a. Tracheobronchial injury** *(Ref: Sabiston 19/e p453)*

- **Tracheobronchial injuries** are so **fatal** that **most patients die at** the **scene** or **during transport** as a result of poor ventilation.

70. **Ans. b. Immediate emergency room thoracotomy should be done** *(Ref: Sabiston 19/e p1667; Schwartz 10/e p129,167, 9/e p107, 140; Bailey 26/e p848, 25/e p342)*

Pericardial Tamponade

- Pericardial tamponade must be differentiated from tension pneumothorax in the shocked patient with distended neck veins.
- It is most commonly the result of **penetrating trauma**Q.
  - Characterized by **Beck's Triad (MDH): M**uffled heart sounds, **D**istended neck veins and **H**ypotension Q

Diagnosis

- **Chest X-ray**: **Enlarged heart shadow**Q
- **Echocardiography**: ECHO is **diagnostic**Q showing fluid in the pericardial sac
- **Central line**: **Rising central venous pressure**Q

Treatment

- **Needle pericardiocentesis** can **buy enough time to move to** the **operating room**Q.
- **Treatment of choice**: **Surgical pericardiotomy**Q

71. Ans. a. Tension pneumothorax, b. Cardiac tamponade *(Ref: Sabiston 19/e p437, 1667; Schwartz 10/e p625, 9/e p107, 140; Bailey 26/e p848, 25/e p342*

Cardiac Tamponade	Tension Pneumothorax
• **Hypotension** and **raised JVP and CVP** is seen[Q] • **More common in penetrating injuries** to chest[Q] • **Muffled heart sound** is seen[Q]	• **Hypotension** and **raised JVP and CVP** is seen[Q] • Less common • **Respiratory distress** (dyspnea and Tachypnea), **resonant chest, absent breath sounds, mediastinal shift** are seen[Q]

72. Ans. b. Cardiac tamponade **73. Ans. b. Intrathoracic and abdominal bleed**

74. Ans. a. Abdominal solid visceral organ injury *(Ref: Sabiston 19/e p456; Schwartz 10/e p625, 9/e p; Bailey 25/e p)*

- **MC cause of hypotension in trauma** patients: **Hemorrhage**[Q]
- **MC cause of shock** after trauma is **hypovolemia**, and there are **five places** that a patient **can lose large volume of blood**: **Externally**, the **chest,** the **abdomen,** the **retroperitoneum**, and into **muscle compartments** (**Blood on the floor and four more**).[Q]
- **Fracture of lower ribs** (T_9-T_{12}) are usually associated with s**plenic** or **hepatic injuries**[Q]
- **Fracture of upper ribs** (T_1-T_3), **clavicle** or **scapula** is usually associated with **major vascular injuries**[Q].

75. Ans. b. Tube thoracostomy **76. Ans. b. IPPV**

77. Ans. b. Rib fracture *(Ref: Schwartz 10/e p625, 9/e p175)*

- Schwartz says "**Most common injury of** the **chest** is **fracture of** one or more **ribs**, including fracture at the costochondral junction." [Q]

78. Ans. c. Anterolateral thoracotomy

FLAIL CHEST

79. Ans. a. Fracture of 3 or 4 ribs, b. Chest wall moves inwards during inspiration, e. Ultimately leads to respiratory failure *(Ref: Sabiston 19/e p1594; Schwartz 10/e p164,203, 9/e p138, 175; Bailey 26/e p355, 25/e p343)*

Flail Chest

- A flail chest occurs when a **segment of** the **chest wall does not have bony continuity with** the **rest of** the **thoracic cage**[Q].
- This condition usually results from blunt trauma associated with multiple rib fractures, i.e. **three or more ribs fractured in two or more places**[Q].
- The blunt force required to disrupt the integrity of the thoracic cage typically produces an **underlying pulmonary contusion** as well.

Clinical Features

- **On inspiration** the **loose segment** of the chest wall is **displaced inwards** and less air therefore moves into the lungs (**Paradoxical respiration**)[Q]
- To confirm the diagnosis the chest wall can be observed for **paradoxical motion of a chest wall segment**[Q] for several respiratory cycles and during coughing.
  - **Voluntary splinting** as a result of pain, **mechanically impaired chest wall movement** and the **associated lung contusion** are all **causes of** the **hypoxia** and **respiratory failure**[Q].
  - The patient is also at high risk of developing a **pneumothorax** or **hemothorax**[Q].

Diagnosis

- **Diagnosis** is made **clinically**[Q], not by radiography.

Treatment

- **Chest strapping** or **splinting should be avoided**[Q].
- **Currently, treatment** consists of **oxygen administration**, **adequate analgesia** (including opiates) or **epidural analgesia** and **physiotherapy**[Q].
- **IPPV** (**Intermittent positive pressure ventilation**) is **reserved for** cases developing **respiratory failure** despite adequate analgesia and oxygen[Q].

80. Ans. a. IPPV **81. Ans. a. Analgesics**

82. Ans. b. Endotracheal intubation and mechanical ventilation **83. Ans. c. IPPV**

84. Ans. d. Mediastinal shift **85. Ans. d. Strapping of chest**

86. Ans. b. IPPV with oral intubation **87. Ans. d. Intermittent positive pressure ventilation**

88. Ans. a. External fixation of flail segment and mechanical ventilation

DIAPHRAGMATIC INJURY

89. Ans. c. Smaller tears heal spontaneously and surgery is not required, e. Mask ventilation is encouraged in patient with massive visceral herniation *(Ref: Sabiston 19/e p454-455; Schwartz 10/e p202-203, 9/e p175; Bailey 26/e p356-357, 25/e p344-345)*

With bag and mask ventilation, the air may enter the herniated bowel loops producing more deterioration in respiratory distress.

Diaphragmatic Injury

- **Diaphragmatic injuries** are **often caused by penetrating injuries**[Q].
- Patients **sustaining penetrating injuries below** the **nipples** and **above the costal margins** should be **investigated to rule out diaphragmatic injury**[Q].

Etiology

- **Penetrating trauma** (knife, bullet, repair of hiatus hernia)
- **Blunt trauma** (motor vehicle accident, fall from height, bout of hyperemesis):
  - Caused by **compressive force** applied to the **pelvis** and **abdomen**.
  - Rupture is **usually large**, with herniation of abdominal content into chest

Clinical Features

- **Most diaphragmatic injuries** are **silent** and the presenting features are those of injury to the surrounding organs[Q].
- **Late complication**: **Herniation of abdominal contents** in to the **chest**[Q].

> - **Herniation of organ: Stomach**[Q] **>Colon** >Small intestine >Omentum >Spleen >Kidney and pancreas.

Diagnosis

- There is **no single standard investigation** to diagnose **diaphragmatic injuries**[Q].
- **Chest X-ray** after placement of a nasogastric tune may be helpful (as this may show the **stomach herniated into the chest)**
- Contrast study of upper or lower GIT, CT scan and diagnostic peritoneal lavage all lack positive or negative predictive value.

> - **Most accurate evaluation** is by **video assisted thracoscopy** (**VATS**) or **laparoscopy**[Q], offering the **advantage of allowing** the **surgeon to proceed to repair** and **additional evaluation** of the **abdominal organs.**

Treatment

- **Operative repair**[Q] is recommended **in all cases.**
- **All penetrating diaphragmatic injury** must be **repaired via the abdomen** and not the chest, **to rule out penetrating hollow viscus injury.**

> **Bergvist Triad: Rib fracture** + Fracture of **spine /pelvis + Traumatic rupture** of **diaphragm**

90. Ans. a. Advise diagnostic laparoscopy, b. Chest X-ray is useful, d. Late complication is herniation of abdominal content

91. Ans. c. Left side is more common

92. Ans. a. Laparoscopy, b.Chest X ray

HEAD INJURY

93. Ans. a. Glasgow coma scale

94. Ans. a. Sub conjunctival hematoma *(Ref: Harrison 18th/3381; Sabiston 19/e p1894)*

95. Ans. d. Basilar fracture *(Ref: Bailey 26/e p314-315, 25/e p302; 24th/595-599)*

Skull Base Fractures

Anterior Cranial Fossa Fracture	Middle Cranial Fossa Fracture
• Subconjunctival hematoma[Q]	• **CSF otorrhea** or **rhinorrhea**[Q]
• **CSF rhinorrhea**[Q]	• **Hemotympanum**[Q]
• **Carotico-cavernous fistula**[Q]	• **Ossicular disruption**[Q]
• Periorbital hematoma or **"Raccoon eyes"**[Q]	• **Battle sign**: **Bruising behind the ear**[Q]
	• **7th** and **8th cranial nerve palsies**[Q]

96. Ans. c. Altered mental status *(Ref: Harrison 18th/2257)*

- **Early signs of elevated ICP** includes **drowsiness** and a **diminished level of consciousness**.
- **Coma** and **unilateral papillary changes** are **late signs** and **require immediate intervention**.

97. Ans. d. Many years after head injury *(Ref: Harrison 18th/3256)*

- Harrison says "The **superficial cortical scars** that evolve from contusions are **highly epileptogenic** and may later **manifest as seizures**, even **after many years**."

98. **Ans. a. Chronic subdural hematoma** *(Ref: Harrison 18th/3379; Sabiston 19/e p439; Schwartz 10/e p1719-1720, 9/e p1525)*
99. **Ans. a. Extradural hemorrhage**
100. **Ans. a. Middle meningeal artery** *(Ref: Sabiston 19/e p439-441*
101. **Ans. c. Fracture of petrous temporal bone** *(Ref: Bailey 25/e p302; 24th/595-599)*
102. **Ans. c. Antibiotics and observation**
103. **Ans. b. Extradural bleed**
104. **Ans. a. Subarachnoid hemorrhage**
105. **Ans. c. Eversion of galea aponeurotica**

Discussed in chapter no. 33 Cerebrovascular disease.

VASCULAR INJURIES

106. **Ans. a. Femoral artery repair with vein ligation, b. Repair of artery and vein** *(Ref: Sabiston 19/e p1789)*

Vascular Injuries

Arterial Injuries

- Repair of femoral artery is always attempted. Most injuries require end-to-end anastomosis or an interposition graft[Q].
  - Arterial defects of **1-2 cm** can be **bridged**[Q]
  - **Interposition grafts** are employed when **end-to-end anastomosis cannot be accomplished** without tension[Q].

Venous Injuries

- Venous injuries are **more difficult to repair** due their **propensity to thrombose**[Q]
- **Repair** the **venous injuries encountered during exploration** for an associated arterial trauma, but only **in hemodynamically stable** patients if **repair will not jeopardize** or **delay the management** of other significant injuries[Q].
- **Decision to repair** or **ligate** the vein **depends on** the **condition of the patient**[Q]

107. **Ans. a. Vein repair with continuity**
108. **Ans. b. Repair of artery and vein**
109. **Ans. a. Most commonly due to deceleration injury, b. High mortality, c. Surgery definitive treatment, d. Aortography gold standard** *(Ref: Sabiston 19/e p1793-1794; Schwartz 10/e p214-215, 9/e p151, 172-173; Bailey 25/e p343; CSDT 11/e p257-259)*

Discussed in chapter no. 26 Arterial Disorders.

110. **Ans. c. Artery caught between fractured ends of bones**

SEAT BELT INJURY

111. **Ans. a. Seat belt can cause pancreato-duodenal injury, b. Late death is caused by sepsis, c. Damage Control Surgery (DCS) is used to control major bleeding and to prevent contamination of peritoneal cavity, e. In DCS, laparotomy is decided based on patient prognosis** *(Ref: Bailey 26/e p302, 25/e p1003-1004)*

Seat Belt Injury

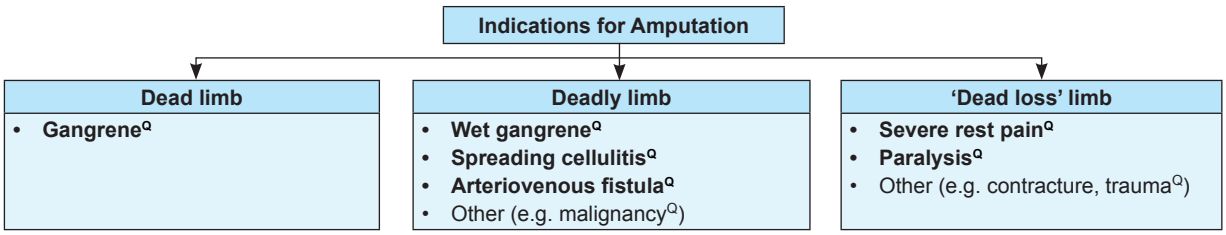
- If a car accident occurs when a seatbelt is worn, **sudden deceleration** can result in a **torn mesentery**[Q].
- Blunt trauma to the abdomen by **seatbelt injury** may **compress the pancreas over the vertebral column** and result in **pancreatico-duodenal injury**[Q]
- If there is any **bruising of the abdominal wall**, or even marks of clothing impressed into the skin, laparotomy may be indicated[Q].

112 **Ans. a. Duodenum**

MISCELLANEOUS

113. **Ans. d. Immobilize the cervical spine**
114. **Ans. b. Only one dose of TT**
115. **Ans. b. Vascular injury** *(Ref: Bailey 26/e p891, 25/e p915)*

Bailey says **"Amputation** should be considered **when part of a limb is dead, deadly** or a **dead loss**. A limb is dead when arterial occlusive disease is severe enough to cause infarction of macroscopic portions of tissue, i.e. gangrene. The occlusion may be in major vessels (atherosclerotic or embolic occlusions) or in small peripheral vessels (diabetes, Buerger's disease, Raynaud's disease, inadvertent intra-arterial injection). If the obstruction cannot be reversed and the symptoms are severe, amputation is required."



116. Ans. a. X-ray of left lower limb and USG abdomen, b. Start IVF, Ryle's tube and catheterization, d. Grouping and cross matching of two unit of blood *(Ref: Sabiston 19/e p456)*

117. Ans. c. Removal of fragments of bone *(Ref: http://surgeryonline.wordpress.com/tag/missile-injuries/)*

Management of Missile Injuries

- In limb wounds, **exploration** is followed by **thorough wound excision**[Q], after which, with very few exceptions, the **wound should be left open**[Q].
- A minimal amount of skin edge (i.e. only that which has been contaminated) should be excised[Q] around the entrance and exit wounds.
  - **Foreign matter** should be **removed** from the wound[Q].
  - **Delayed primary closure** should follow **within 4-7 days** after injury[Q].
- Dead muscle that does not bleed or contract, is mushy in consistency or has an unhealthy colour must be excised. These criteria comprise is the '4 Cs' for muscle excision (Colour, Contractility, Consistency, Capillary bleeding)[Q]
  - **Bone shattered** by high-energy transfer will in many instances **still have attachment to periosteum or muscle**[Q].
  - Such fragments must not be discarded. Loss of bone may result in malunion (e.g. shortening) or nonunion[Q].

118. Ans. b. Abdominal aorta *(Ref: Schwartz 9/e p160-164; 8th/60-61)*

When bullet is shot above pubic symphysis in midline directed backwards, first organ to get injuries is abdominal aorta.

- Penetrating trauma caused by bullet injuries is not limited by elastic properties of the tissue and vascular injuries are far more common[Q].
- If exsanguinating hemorrhage originates near the midline in the retroperitoneum, direct manual pressure is applied with a laparotomy pad and the aorta is exposed at the diaphragmatic hiatus and clamped.
- For stable patients with large midline hematomas, clamping the aorta proximal to the hematoma is a wise precaution[Q].

119. Ans. a. Contractility of muscle, b. Color of muscle, c. Bleeding punctuate spots

120. Ans. c. Fixation of the bone *(Ref: Master Techniques in Orthopedic Surgery Series by Moran and Cooney (2008)/487)*

Bone is the first structure to be fixed in hand injuries.

Sequence of repair in Hand Injuries (BE FAN of VeinS)

- **B**one shortening and stabilization/fixation[Q]
- **A**rterial anastomoses[Q]
- **S**kin/wound closure[Q]
- **E**xtensor tendon repair[Q]
- **N**erve repair[Q]
- **F**lexor tendon repair[Q]
- **V**enous anastomosis[Q]

121. Ans. a. Bone

122. Ans. a. Loss of sympathetic tone *(Ref: Sabiston 19/e p441-444)*

Spinal Cord Injuries

- **High spinal cord injuries** can also **result in systemic hypotension** because of **loss of sympathetic tone**[Q].
- The patient will usually have **hypotension** and **relative bradycardia** and will show evidence **of good peripheral perfusion** on physical examination[Q].
- The term **neurogenic shock** is used but is somewhat of a **misnomer** because these patients are **typically hyperdynamic**, with **high cardiac output secondary to loss of sympathetic vascular tone**[Q].

Treatment

- **Hypotension associated with high spinal injury** can be **treated by** alpha-agonist **phenylephrine**[Q].

123. Ans. b. Behind the esophagus *(Ref: Sevitt S. The mechanisms of traumatic rupture of the thoracic aorta. Br J Surg 1977; 64; 166)*

- The **majority of blunt injuries to** the **thoracic aorta** occur **at aortic isthmus just distal to the left subclavian artery**. Other locations include the **transverse arch, proximal ascending aorta**, and **descending aorta just proximal to the diaphragm**Q.
- **Tethering of aorta by the ligamentum arteriosum** is believed to account for the **high frequency of aortic injury in** the **isthmus region**Q.

124. Ans. b. Absent pupillary light reflex and dilated pupils *(Ref: Harrison 18th/2252)*

Brain Death

- This is a state of **cessation of cerebral function** with **preservation of cardiac activity** and **maintenance of somatic function by artificial means**Q.
- It is the only type of brain damage recognized as equivalent to death.

Criteria for Brain Death
• **Widespread cortical destruction** that is reflected by **deep coma** and **unresponsiveness** to all forms of stimulationQ
• **Global brainstem damage** demonstrated by **absent pupillary light reaction** and by the **loss of oculovestibular** and **corneal reflexes**Q
• **Destruction of** the **medulla**, manifested by **complete apnea**Q.

125. Ans. c. 4th – 6th ribs *(Ref: https://storify.com/forensicmed/cardiopulmonary-resuscitation-related-rib-fracture)*

During resuscitation, artefacts of fractured ribs most commonly involve 4th – 6th ribs.

- *"The vast majority (90%+) of fractures occur in ribs 2 to 7; fractures in the bony parts of rib numbers 1 and 8 to 10 are possible but probably very rare; it is difficult to see how fractures can occur in rib numbers 11 and 12 following standard manual CPR."- https://storify.com/forensicmed/cardiopulmonary-resuscitation-related-rib-fracture.*

- The **majority of blunt injuries to** the **thoracic aorta** occur **at aortic isthmus just distal to the left subclavian artery**. Other locations include the **transverse arch, proximal ascending aorta**, and **descending aorta just proximal to the diaphragm**Q.
- **Tethering of aorta by the ligamentum arteriosum** is believed to account for the **high frequency of aortic injury in** the **isthmus region**Q.

Rib fractures following CPR in adults are **quite common - 30 to 60%** of prospective post-mortem studies.

- Post-CPR rib fractures are **often bilateral.**
- The site of rib fracture is **dependent on:** the **position of the hands; force used;** and **method of chest compression** (manual or device-assisted).
- ***The vast majority (90%+) of fractures occur in ribs 2 to 7;*** fractures in the bony parts of rib numbers 1 and 8 to 10 are possible but probably very rare; it is difficult to see how fractures can occur in rib numbers 11 and 12 following standard manual CPR.
- The **vast majority of fractures (90%+) occur in the anterior third** of the bony part of the rib, some occur in the middle third but - following standard manual CPR - none in the posterior third of the bony part of the rib.
- **Posterior rib fractures** occur following **automated band-type CPR**.
- Lateral fractures i.e. those occurring between the anterior and posterior axillary lines, do occur after standard CPR. If a fracture is noted in rib numbers 10 to 12 or in the posterior third of the bony part of a rib, then non-resuscitation trauma should be suspected.

Fractures are more common
• **On the left side** of the chest
• With **increasing age** of the patient
• In **females**
• With **increasing length of time of resuscitation attempts**
• Following the **involvement of untrained persons**
• With the **use of ACD-CPR**

- Chest x-ray is unreliable as a diagnostic tool for detecting rib fractures.
- **CT is better than x-ray** and may complement the post-mortem detection of rib fractures.

- Rib fractures following CPR in adults are **quite common - 30 to 60%** of prospective post-mortem studies.
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- Chest x-ray is unreliable as a diagnostic tool for detecting rib fractures.
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CHAPTER 43

Transplantation

MULTIPLE CHOICE QUESTIONS

FLUIDS USED IN TRANSPLANTATION

1. Amputated digits are preserved: *(AIIMS GIS Dec 2011, All India 92)*
a. Cold saline
b. Cold Ringer Lactate
c. Plastic bag in ice
d. Deep freezer

2. Allopurinol is used in organ preservation as: *(AIIMS May 2009)*
a. Antioxidant
b. Preservative
c. Free radical scavenger
d. Precursor for energy metabolism

GRAFT

3. Kidney transplantation is an: *(DNB 2009, COMEDK 2006)*
a. Allograft
b. Isograft
c. Xenograft
d. Synergic graft

4. Transplantation between genetically different members of the same species is termed as: *(COMEDK 2009)*
a. Autograft
b. Isograft
c. Allograft
d. Xenograft

5. A kidney transplant between identical twins is an example of: *(COMEDK 2011)*
a. Isograft
b. Allograft
c. Autograft
d. Xenograft

6. Transplantation of kidney from mother to son is an example of: *(AIIMS 84)*
a. Autograft
b. Allograft
c. Isograft
d. Xenograft

7. Graft from sister to brother is: *(JIPMER 90)*
a. Isograft
b. Allograft
c. Autograft
d. Heterograft

8. An isograft indicates transfer of tissues between: *(All India 93)*
a. Unrelated donors
b. Related donors
c. Mynozygotic twins
d. From the same individual

9. Skin grafting done on wound following major skin taken from twin brother: *(Recent Questions 2013)*
a. Isograft
b. Allograft
c. Autograft
d. Xenograft

MATCHING AND GRAFT REJECTION

10. Acute cellular rejection following solid organ transplantation occurs: *(COMEDK 2011)*
a. Within minutes to hours of transplantation
b. Within 48 hours of transplantation
c. Between 5 to 30 days of transplantation
d. Beyond 30 days after transplantation

11. Hyperacute rejection is due to: *(AIIMS Nov 2012)*
a. Preformed antibodies
b. Cytotoxic T-lymphocyte medicated injury
c. Circulating macrophage mediated injury
d. Endothelitis caused by donor antibodies

12. Most important HLA for organ transplantation and tissue typing: *(MAHE 98)*
a. HLA-A
b. HLA-B
c. HLA-C
d. HLA-D

13. HLA matching is not necessary in which of the following organ transplantation? *(JIPMER 2002)*
a. Liver
b. Bone marrow
c. Pancreas
d. Kidney

14. Immunological rejection is mediated by recipients:
a. Eosinophils
b. Lymphocytes
c. Neutrophils
d. Plasma cells

15. Transplantation of which one of the following organs is most often associated with hyper-acute rejection? *(UPSC 2006)*
a. Heart
b. Kidney
c. Lungs
d. Liver

16. Hyperacute rejection of graft is seen in? *(MHSSMCET 2006, 2008, All India 2003)*
a. Lung
b. Liver
c. Kidney
d. Pancreas

KIDNEY TRANSPLANTATION

17. Renal transplantation is most commonly done in: *(PGI Dec 97)*
a. Chronic glomerulonephritis
b. Bilateral staghorn calculus
c. Horse shoe kidney
d. Oxalosis

18. Commonest malignancy in renal transplant recipient is: *(AIIMS Nov 95)*
a. Skin cancer
b. Renal cell carcinoma
c. Non-Hodgkin's lymphoma
d. Hodgkin's lymphoma

19. Highest chance of success in renal transplant is seen when the donor is the? *(NIMHANS 86, JIPMER 87, All India 88)*
a. Identical twin
b. Father
c. Mother
d. Sister
e. Husband

20. Principal cause of death in renal transplant patients: *(AIIMS 86, PGI 86, UPSC 88)*
a. Uremia
b. Malignancy
c. Rejection
d. Infection

21. Investigation of choice in the early phase of renal transplant: *(Kerala 97)*
a. IVP
b. Retrograde cystourethrogram
c. Ultrasonogram
d. CT Scan

22. Infection in renal transplant patient is usually caused by: *(Rohtak 98)*
a. CMV b. HIV
c. Herpes d. Salmonella
e. Pneumococcus

23. Most common type of renal transplantation in India is: *(All India 99)*
a. Allograft b. Autograft
c. Isograft d. Xenograft

24. A patient had undergone a renal transplantation 2 months back and now presented with difficulty breath. X-ray showed bilateral diffuse interstitial pneumonia. The probable etiologic agent would be: *(AIIMS June 2002)*
a. CMV b. Histoplasma
c. Candida d. Pneumocystis carinii

25. Most common disease caused by CMV in a post renal transplant patients: *(JIPMER 2011)*
a. Pyelonephritis b. Meningitis
c. Pneumonia d. GI ulceration

26. An elderly male presents 2 months after renal transplanatation with nephropathy. Which of the following can be a viral etiological agent? *(AIIMS May 2014)*
a. Polymoa virus BK
b. Human herpes virus type 6
c. Hepatitis C
d. Human papilloma virus, high risk types

LIVER TRANSPLANTATION

27. Expanded criteria for liver donation include all of the following except: *(All India 2012)*
a. Taken from diseased individual after brain death
b. Hepatitis B serology positive
c. Age of donor may be >70 years
d. Can be taken from individual with mild hepatic steatosis

28. Extended criteria for liver donation include all of the following except: *(All India 2012, AIIMS GIS Dec 2011)*
a. Donor age > 70 years b. HBsAg positive donor
c. Mild hepatic steatosis d. Donor after cardiac death

29. Indications of Liver transplantation are all, except: *(PGI June 2005)*
a. Biliary
b. Sclerosing cholangitis c. Hepatitis A
d. Cirrhosis e. Fulminant hepatic failure

30. Auxiliary orthotopic liver transplant is indicated for: *(AIIMS May 2008)*
a. Metabolic liver disease
b. As a standby procedure until finding a suitable donor
c. Drug induced hepatic failure
d. Acute fulminant liver failure for any cause

31. Reduced liver transplants: *(GB Pant 2011)*
a. Given to two recipients after dividing into two parts
b. Left lateral lobe divided and given to child
c. Left lateral segment divided from segment 2 and given to child
d. Part of liver segment transplanted into recipient depending upon requirement

32. All are scoring system used in liver transplant except:
a. CTP b. PELD
c. MELD d. MPI

33. Liver transplantation was first done by: *(JIPMER 99)*
a. Starzl b. Huggins
c. Carrel d. Christian Bernard

34. All are marginal liver donor except:
a. Older donor
b. HBV core antibody positive donors
c. Moderate steatosis
d. Severe hepatitis

35. A 65-years old male with cirrhosis would be unsuitable for liver transplantation in the presence of:
a. CTP 'B' b. HCC <5 cm
c. Ascites d. Age >65 years
e. Active alcohol abuse

36. Which of the following is not an indication for liver transplantation? *(DNB 2002)*
a. Fatty liver b. HIV
c. Willson's disease d. Primary hyperoxaluria

PANCREAS TRANSPLANTATION

37. The advantage of bladder drainage over enteric drainage after pancreatic transplantation is better monitoring of: *(All India 2009)*
a. HBA_1C levels
b. Amylase levels
c. Glucose levels
d. Electrolyte levels

38. Site of transplantation in islet cell transplant for diabetes mellitus: *(PGI 84)*
a. Forearm muscles
b. Pelvis
c. Thigh
d. Injected into the portal vein

SMALL INTESTINE TRANSPLANTATION

39. All are true about intestinal transplant except: *(JIPMER GIS 2011)*
a. Principal barrier to widespread application is vigorous rejection reactions
b. Severe form of GVHD occurs when T cells of graft respond to foreign HLA cells
c. Uniquely dangerous complication is loss of protective mucosal barrier, bacterial translocation and severe sepsis
d. Majority of intestinal grafts are multivisceral grafts

HEART TRANSPLANTATION

40. Dr. Christian Bernard performed the 1st heart transplant in the year: *(Kerala 97)*
a. 1962 b. 1965
c. 1969 d. 1967

41. Dr. Christian Bernard is associated with: *(DNB 2009)*
a. Heart transplant b. Renal transplant
c. Liver transplant d. Hair transplant

LUNG TRANSPLANTATION

42. Indications of lung transplantation:
a. COPD
b. Alpha-1 antitrypsin deficiency
c. Cystic fibrosis and brochiectasis
d. All of the above

POST-TRANSPLANT INFECTIONS

43. Post-transplant lymphoma is most commonly associated with: *(AIIMS May 2012)*
a. EBV b. CMV
c. Herpes simplex d. HHV-6

MISCELLANEOUS

44. In which of the following year the transplantation of human organs act was passed by Government of India?
a. 1994 b. 1996
c. 2000 d. 2002

45. Commonest complication of immunosuppression is: *(NIMHANS 86, JIPMER 87, All India 88)*
a. Malignancy b. Graft rejection
c. Infection d. Thrombocytopenia

46. Following drugs are known immunosuppressive agent except: *(AIIMS 84)*
a. Prednisolone b. Cephalosporin
c. Azathioprine d. Cyclosporine-A

47. Steroids are used in transplantation: *(TN 2003)*
a. To prevent graft rejection
b. To prevent infection
c. To speed up recovery
d. To enhance immunity

48. Which of the following organs/tissues are presently not being used for organ/tissue transplantation? *(All India 2011)*
a. Blood vessels
b. Lung
c. Liver
d. Urinary Bladder

49. Cold ischemic time of the kidney should be ideally below:
a. 2 hours b. 6 hours *(DNB 2010)*
c. 12 hours d. 24 hour

EXPLANATIONS

FLUIDS USED IN TRANSPLANTATION

1. **Ans. c. Plastic bag in ice** *(Ref: Sabiston 19/e p1973; Schwartz 9/e p1622)*

- The **amputated digits** are **cleansed under saline solution, wrapped in saline moistened gauze**, and **placed in a plastic bag**[Q].
- The **plastic bag containing the part** is then **placed on** (not packed in) a **bed of ice** in a suitable container[Q].
- The amputated part should never be immersed in nonphysiological solution such as antiseptics or alcohol.

2. **Ans. c. Free radical scavenger** *(Ref: Schwartz 9/e p282; Bailey 26/e p1421, 25/e p1418)*

Organ Preservation Solution

- **Liver, pancreas and kidney** can be successfully preserved for **upto 2 days** by **flushing** the organ **with University of Wisconsin solution** and storing them at hypothermia (0-50C)[Q].

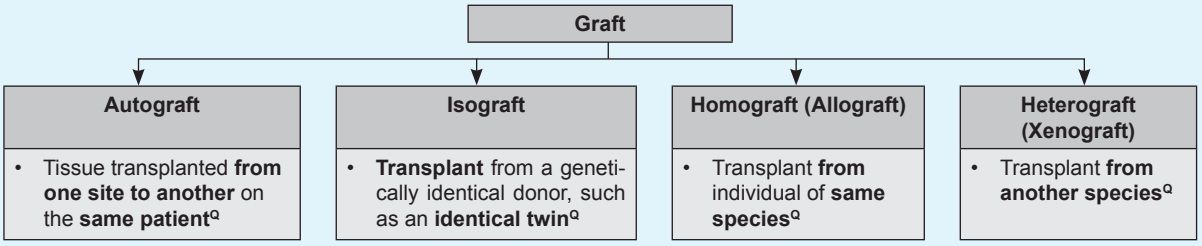
University of Wisconsin Solution

- **UW solution**: Cationic composition (**high potassium** and **low sodium**) **mimics intracellular levels**[Q] to minimize diffusion down electrochemical gradients.
- UW solution (marketed as **Viaspan**) contains **high** level of **potassium** and **adenosine**[Q].

Special composition of UW solution	
Lactobionate and raffinose	• **Minimizes cell swelling**[Q]
Hydroxyethyl starch	• **Prevention of the extracellular space expansion**[Q]
Glutathione	• **Anti-oxidant**[Q]
Allopurinol	• **Free radical scavenger**[Q]
Adenosine	• **Precursor for energy metabolism**[Q]

GRAFT

3. **Ans. a. Allograft** *(Ref: Schwartz 9/e p273; Bailey 26/e p1408, 25/e p1408)*



4. **Ans. c. Allograft**
5. **Ans. a. Isograft**
6. **Ans. b. Allograft**
7. **Ans. b. Allograft**
8. **Ans. c. Mynozygotic twins**
9. **Ans. a. Isograft**

MATCHING AND GRAFT REJECTION

10. **Ans. c. Between 5 to 30 days of transplantation** *(Ref: Schwartz 9/e p274-275; Bailey 26/e p1408-1412, 25/e p1408-1412)*

Types of Graft Rejection

Hyperacute Rejection	Acute (cellular) Rejection	Chronic Rejection
• **Immediate** (within minutes to hours) **graft destruction** due to **ABO** or **pre-formed anti-HLA antibodies**Q.	• Occurs **during** the **first 6 months**Q	• Occurs **after** the **first 6 months**Q
• Characterised by **intravascular thrombosis**Q	• Most commonly presents **between 5-30**Q **days** after transplantation	• **MC cause** of **graft failure**Q
• **Kidney transplants** are **particularly vulnerable**Q to hyperacute graft rejection	• **T-cell dependent,** characterized by **mononuclear cell infiltration**Q	• **Non-immune factors** may contribute to pathogenesis
• **Heart** and **liver transplants** are **relatively resistant**Q.	• Usually **reversible**Q	• Characterized by **myointimal proliferation** in **graft arteries** leading to **ischemia** and **fibrosis**Q

11. Ans. a. Preformed antibodies

12. Ans. d. HLA-D *(Ref: Bailey 26/e p1409-1412, 25/e p1408-1412)*

HLA Antigens

- In organ transplantation, **HLA-A, -B** and **-DR** are the **most important antigens** to take into account when matching donor and recipient in an attempt to reduce the risk of graft rejection
- **HLA matching** has a relatively small but **definite beneficial effect on renal allograft survival** (**HLA-DR**Q >HLA-B >HLA-A).
- Are the **MC cause of graft rejection**Q
- Their physiological function is to act as **antigen recognition units**
- Are **highly polymorphic** (amino acid sequence differs widely between individuals)
- **Anti-HLA antibodies** may cause **hyperacute rejection**Q

  - In the **case of liver transplants, HLA matching does not confer an advantage**Q
  - Although it is **beneficial in cardiac transplantation**, it is **not practicable because of the relatively small size of** the **recipient pool** and the **short permissible cold ischemic time**Q.

13. Ans. a. Liver

14. Ans. b. Lymphocytes *(Ref: Bailey 25/e p1409)*

- The **cellular effectors of graft rejection** include **cytotoxic CD8 T cells**Q, which **recognize donor HLA class I antigens** expressed by the graft and **cause target cell death** by releasing lytic molecules such as perforin and granzyme.

15. Ans. b. Kidney

16. Ans. c. Kidney

KIDNEY TRANSPLANTATION

17. Ans. a. Chronic glomerulonephritis *(Ref: Campbell 10/e p1226-1227)*

Most Common Cause of End-stage Renal Disease
• **Diabetes mellitus >Hypertension >Glomerulonephritis**Q

18. Ans. a. Skin cancer *(Ref: Bailey 26/e p1415-1416, 25/e p1415-1416)*

Side Effects of non-specific Immunosuppression

Infection	Malignancy
• High risk of **opportunistic infection by viruses**	• Recipients are at risk of **post-transplant lymphoproliferative disorder (PTLD)**Q
• Viral infection may result from **reactivation of latent virus** or from **primary infection**	• There is a **high risk** of **squamous cancer of** the **skin**Q and recipients should be reviewed regularly
• **CMV** is a **major problem**Q	
• Bacterial and fungal infections are also common	
• **Risk of infection** is **highest** during **first 6 months**Q after transplantation	
• **Chemoprophylaxis** is important in **high-risk patients**	
• **Pre-transplant vaccination** against community-acquired infection should be considered	

19. **Ans. a. Identical twin**

20. **Ans. d. Infection** *(Ref: Campbell 10/e p1251-1253)*

Most Common Cause of Death in Renal Transplant Patients

- Heart disease[Q] >Infection[Q] >Stroke

21. **Ans. c. Ultrasonogram:** *(Ref: Bailey 26/e p1425, 25/e p1423)*

Vascular Complications After Kidney Transplantation

- **Vascular complications** after renal transplantation are low, **presents during the first week** after transplantation with **sudden pain** and **swelling** at the site of the graft.
- **Diagnosis is confirmed by Doppler ultrasonography[Q].**
- **Urgent surgical exploration** is indicated and, in most cases, **transplant nephrectomy[Q]** is required.

22. **Ans. a. CMV** 23. **Ans. a. Allograft**

24. **Ans. a. CMV** *(Ref: Sabiston 19/e p647; Bailey 26/e p1416, 25/e p1416)*

CMV Infection

- **CMV** is **most important pathogen** in **clinical transplantation[Q]**.
- **CMV infections** usually occur after **30-50 days[Q]** after transplantation.

Clinical Features

- Fever, malaise, arthralgia, leukopenia and thrombocytopenia, hepatitis, **interstitial pneumonitis[Q]**, enterocolitis and disseminated disease.

Diagnosis

- **Invasive CMV infection** with **histologic evidence** or a positive **CMV culture** from **deep tissue specimens** is **confirmatory[Q]**
- **Chest X-ray: Bilateral diffuse interstitial pneumonia[Q]**

Treatment

- **IV ganciclovir[Q]** is the **mainstay** of treatment and is safe and effective for **prophylaxis** and **treatment**.

25. **Ans. c. Pneumonia**

26. **Ans. a. Polyoma virus BK** *(Ref: Harrison 18/e p2333)*

Polyoma virus BK can be an etiological agent in an elderly male, who presents 2 months after renal transplantation with nephropathy.

Polyoma BK Virus:

- **BK virus** is **Polyoma virus associated with nephropathy**, **typically after 1-4moths after transplant.**
- **High levels of BK virus replication detected by PCR in urine and blood are predictive of pathology**, especially in setting of **renal transplantation.**
- **Urinary excretion of BK virus** and **BK viremia** are associated with the **development of ureteric strictures, Polyoma virus associated nephropathy** (1-10% of renal transplant recipients), and (less commonly) generalized vasculopathy.
- Timely detection and early reduction of immunosuppression are critical and can reduce rates of graft loss related to Polyoma virus associated nephropathy from 90% to 10-30%.

Common Infections after Solid Organ Transplantation, by Site of Infection

	Period after Transplantation		
Infected Site	**Early (<1 Month)**	**Middle (1-4 Months)**	**Late (>6 Months)**
Donor organ	Bacterial and fungal infections of the graft, anastomotic site, and surgical wound	**CMV infection[Q]**	**EBV infection[Q]** (may present in allograft organ)
Systemic	Bacteremia and candidemia (often resulting from central venous catheter colonization)	**CMV infection[Q]** (fever, bone marrow suppression)	**CMV infection[Q]**, especially in patients given **early posttransplantation prophylaxis**; **EBV proliferative syndromes** (may occur in donor organs)
Lung	Bacterial aspiration pneumonia with prevalent nosocomial organisms associated with intubation and sedation (highest risk in lung transplantation)	***Pneumocystis infection[Q]*; CMV pneumonia[Q] (highest risk in lung transplantation); *Aspergillus* infection[Q] (highest risk in lung transplantation)**	***Pneumocystis* infection[Q]**; granulomatous lung diseases (nocardiae, reactivated fungal and mycobacterial diseases)

Kidney	Bacterial and fungal (*Candida*) infections (cystitis, pyelonephritis) associated with urinary tract catheters (highest risk in kidney transplantation)	**Renal transplantation: BK virus infection (associated with nephropathy[Q])**; JC virus infection	**Renal transplantation**: bacteria (late urinary tract infections, usually not associated with bacteremia); **BK virus (nephropathy[Q], graft failure, generalized vasculopathy)**
Liver and biliary tract	Cholangitis	**CMV hepatitis[Q]**	**CMV hepatitis[Q]**
Heart	-	***Toxoplasma gondii* infection[Q]** (highest risk in heart transplantation)	***Toxoplasma gondii* infection[Q]** (highest risk in heart transplantation)
Gastrointestinal tract	Peritonitis, especially after liver transplantation	Colitis secondary to ***Clostridium difficile*[Q]** infection (risk can persist)	Colitis secondary to **C. difficile infection** (risk can persist)
Central Nervous System	-	***Listeria* (meningitis); *T. gondii* infection**	**Listeria meningitis[Q]; Cryptococcus meningitis; Nocardia abscess; JC virus-associated PML**

LIVER TRANSPLANTATION

27. Ans. a. Taken from diseased individual after brain death *(Ref: Sabiston 19/e p662)*

Extended Deceased Donor Criteria	
• Mild to moderate **steatosis[Q]**	• **Hepatitis B core antibody positive[Q]**
• **Hepatitis C positive[Q]**	• **Non-heart-beating donor[Q]**
• Age **>65 years[Q]**	

28. Ans. b. HBsAg positive donor

29. Ans. c. Hepatitis A *(Ref: Harrison 18/e p2607-2608)*

30. Ans. a>d. Metabolic liver disease >Acute fulminant liver failure for any cause *(Ref: Blumgart 5/e p1689-1693)*

31. Ans. d. (Part of liver segment transplanted into recipient depending upon requirement)

32. Ans. d. MPI

33. Ans. a. Starzl

34. Ans. d. Severe hepatitis

35. Ans. e. Active alcohol abuse

Discussed in chapter no. 4 Liver.

36. Ans. b. HIV

PANCREAS TRANSPLANTATION

37. Ans. b. Amylase levels *(Ref: Sabiston 19/e p675-679; Schwartz 10/e p340-344, 9/e p290-295; Bailey 26/e p1427, 25/e p1425-1426; Blumgart 5/e p1796-1805; Shackelford 7/e p1251-1260)*

- Bailey 25/e p1425: '**Urinary drainage** of the pancreas has the **advantage** that **urinary amylase levels can be used to monitor graft rejection**'[Q]

38. Ans. d. Injected into the portal vein *(Ref: Bailey 26/e p1427, 25/e p1425)*

- The **islets** are then **purified from the dispersed tissue** by **density-gradient centrifugation** and can be **delivered into the recipient liver** (the preferred site for transplantation) **by injection into the portal vein**[Q].

SMALL INTESTINE TRANSPLANTATION

39. Ans. d. Majority of intestinal grafts are multivisceral grafts *(Ref: Sabiston 19/e p682-689; Schwartz 10/e p352-354, 9/e p1010; Bailey 25/e p1427-1428; Schackelford 7/e p1008-1012)*

Discussed in chapter no. 13 Small Intestine.

HEART TRANSPLANTATION

40. Ans. d. 1967 *(Ref: Bailey 25/e p1428)*

- **Barnard** performed the **first human heart transplant** in **Cape Town, South Africa,** in **1967**[Q].

41. Ans. a. Heart transplant

LUNG TRANSPLANTATION

42. Ans. d. All of the above *(Ref: Sabiston 19/e p1589)*

Indications of Lung Transplantation	
• **COPD**[Q]	• **Primary pulmonary hypertension**[Q]
• **Alpha-1 antitrypsin deficiency**[Q]	• **Cystic fibrosis**[Q]
• **Pulmonary fibrosis**[Q]	• **Bronchiectasis**[Q]

POST-TRANSPLANT INFECTIONS

43. Ans. a. EBV *(Ref: Sabiston 19/e p648; Bailey 25/e p1415; Anantnarayan 8/e p475)*

Post-Transplant Lymphoproliferative Disorder (PTLD)

- **PTLD** is associated with **replication of EBV** in **B cells** induced by **enhanced immunosuppression**, primarily observed in patients who have received **more than one** course of polyclonal antilymphocyte globulin **(ALG)** or **monoclonal OKT3**[Q].

Clinical Features

- Clinical presentation of PTLD includes **fever, malaise** and **lymphadenopathy**[Q]

Diagnosis

- The **diagnosis** is made by **tissue biopsy**[Q].

Treatment

- **Polyclonal PTLD: Discontinuation of immunosuppression** and **antiviral therapy**[Q].
- **Monclonal PTLD: Radiation, chemotherapy** and occasionally **surgical resection**. **Antibody against CD20**[Q] represents a novel approach in treating monoclonal PTLD with favorable outcome.

MISCELLANEOUS

44. Ans. a. 1994 *(Ref: www.medindia.net › Health Acts in India)*

- **Transplantation of Human Organ Act** was passed by Government of India in **1994**[Q].

45. Ans. c. Infection

46. Ans. b. Cephalosporin

47. Ans. a. To prevent graft rejection

48. Ans. d. Urinary bladder *(Ref: Essentials of General Surgery by Lawrence 4/e p475)*

Organs and Tissues that can be Transplanted at Present	
• **Kidney**[Q]	• Middle ear
• **Lung**[Q]	• Skin
• **Liver**[Q]	• Bone/tendons
• **Pancreas and islet cells of Langerhans**[Q]	• Bone marrow
• **Heart and heart valves**[Q]	• **Blood vessels**[Q] (most common saphenous vein[Q])
• **Cornea**[Q]	

49. Ans. None >C (12 hours) *(Ref: Bailey 26/e p1421)*

- **Optimal storage time for kidney should be <18 hours.**

Maximum and Optimal Cold Storage Times		
Organ	**Optimal storage time (hours)**	**Safe maximum storage time (hours)**
Kidney	**<18**[Q]	**36**[Q]
Liver	**<12**	**18**
Pancreas	**<10**	**18**
Small intestine	**<4**	**6**
Heart	**<3**[Q]	**6**[Q]
Lung	**<3**[Q]	**8**

CHAPTER 44

Anesthesia and Perioperative Complications

MULTIPLE CHOICE QUESTIONS

1. **A young male presented with dyspnea, bleeding and petechial hemorrhage in the chest after 2 days following fracture shaft of the femur right side. Most likely cause is:** *(UPPG 2008)*
   a. Air embolism
   b. Fat embolism
   c. Pulmonary thromboembolism
   d. Amniotic fluid embolism

2. **Reactionary hemorrhage occurs:** *(UPPG 2010 DPG 2008 Orissa 2011)*
   a. After 24 hours
   b. After 48 hours
   c. Within 24 hours
   d. After 7 days

3. **Secondary hemorrhage is due to:** *(DPG 2005)*
   a. Slipped ligature
   b. Occurs 7-16 days after surgery
   c. Due to disconnection of blood transfusion line
   d. None of the above

4. **Post-dural puncture headache is typically:** *(AIIMS June 2003)*
   a. A result of leakage of blood into the epidural space
   b. Worse when lying down than in sitting position
   c. Bifrontal or occipital
   d. Seen within 4 hours of dural puncture

5. **In the immediate post operative period, the common cause of respiratory insufficiency could be because of the following except:** *(AIIMS June 2003)*
   a. Residual effect of muscle relaxant
   b. Overdose of narcotic analgesic
   c. Mild hypovolemia
   d. Myocardial infarction

6. **A patient undergoing surgery suddenly develops hypotension. The monitor shows that the end tidal CO2 has decreased abruptly by 155 mm Hg. What is the probable diagnosis?** *(AIIMS June 2003)*
   a. Hypothermia
   b. Pulmonary embolism
   c. Massive fluid deficit
   d. Myocardial depression due to anesthetic agent

7. **A patient developed respiratory distress and hypoxemia after central venous catheterization through internal jugular vein, reason for this is:** *(AIIMS Nov 2000)*
   a. Pneumothorax
   b. Hypovolemia
   c. Septicemia
   d. Cardiac tamponade

8. **An elective surgery is to be done in a patient taking heavy doses of aspirin. Management consists of:** *(All India 2000)*
   a. Proceed with surgery
   b. Stopping aspirin for 7 days and then do surgery
   c. Preoperative platelet transfusion
   d. Intra operative platelet transfusion

9. **Commonest artery for cannulation is:** *(PGI June 97)*
   a. Radial
   b. Ulnar
   c. Brachial
   d. Cubital

10. **A two months old infant has undergone a major surgical procedure. Regarding postoperative pain relief which one of the following is recommended?** *(All India 2006)*
    a. No medication is needed, as infant does not feel pain after surgery due to immaturity of nervous system
    b. Only paracetamol suppository is adequate
    c. Spinal narcotics via intrathecal route
    d. Intravenous narcotic infusion in lower dosage

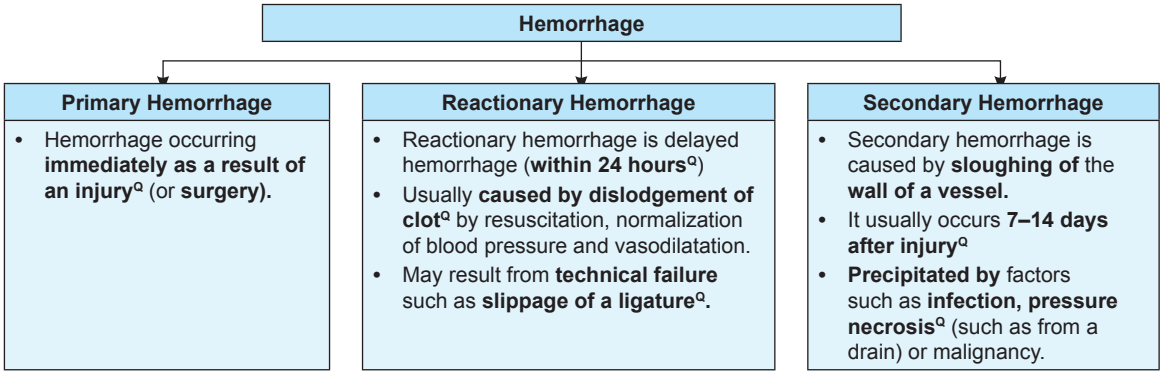
11. **Air embolism in neural surgery maximum in which position?** *(PGI Dec 2007)*
    a. Sitting
    b. Supine
    c. Trendelenberg
    d. Left lateral
    e. Right lateral

12. **Most common coagulopathy noted in surgical patients is:** *(AIIMS 86, 88)*
    a. Thrombocytopenia
    b. Afibrinogenemia
    c. Fibrinolysis
    d. Factor VIII deficiency

13. **Presence of trifluroacetic acid (TFA) in urine indicates that volatile anesthetic agent used was:** *(JIPMER 81, AIIMS 87)*
    a. Halothane
    b. Methoxyflurane
    c. Trichloroethylene
    d. None of the above

EXPLANATIONS

1. **Ans. b. Fat embolism** *(Ref: Apley's 8/e p535-536, Rockwood 6/e p553)*
   - Discussed in chapter no. 29 Thorax and Lung.
2. **Ans. c. Within 24 hours** *(Ref: Bailey 26/e p19-20, 25/e p19-20)*



3. **Ans. b. Occurs 7-16 days after surgery**
4. **Ans. c. Bifrontal or occipital** *(Ref: Harrison 18/e p43)*

Post-Lumbar Puncture Headache

- **Headache** is **positional[Q]:** it begins when the patient sits or stands upright and **resolves upon reclining.**
- **Location: Occipitofrontal[Q]**
- **Nature:** usually a **dull ache** but may be **throbbing[Q].**
- **Recumbency** usually **improves** the **headache[Q]**
- **Post-LP headache** usually **begins within 48 hours** but may be **delayed for up to 12 days[Q].**
- **Incidence: 10-30%.**

Treatment

- Beverages with **caffeine** may **provide temporary relief[Q].**
- **Initial treatment: Bed rest[Q]**
- **Persistent pain: IV caffeine[Q]** (500 mg in 500 mL saline administered over 2 hours) can be **very effective.**
- **If a leak can be identified**, an **autologous blood patch** is **usually curative[Q].**

5. **Ans. c. Mild hypovolemia** *(Ref: Bailey 26/e p15, 25/e p15, 261)*

Causes of Acute Post-Operative Shortness of Breath	
• **MI** and **heart failure[Q]**	• **Pulmonary embolism[Q]**
• **Chest infections[Q]**	• **Exacerbation** of **asthma** or **COPD[Q]**

- In **mild hypovolemia**, the **systemic blood circulation** is **maintained by shifting the blood from splanchnic circulation** to the **systemic circulation[Q].**
- **Healthy volunteers** could have **10-15% of their blood volume removed** with **no significant change in heart rate, BP, cardiac output** or **blood flow** to the splanchnic bed[Q].

6. **Ans. b. Pulmonary embolism** *(Ref: Harrison 18/e p2170-2177; Sabiston 19/e p295-297; Bailey 25/e p939)*
7. **Ans. a. Pneumothorax** *(Ref: Complications in Anesthesiology by Kirby (2007)/169)*
8. **Ans. b. Stopping aspirin for 7 days and then do surgery** *(Ref: www.facs.org › surgerynews › surgerynewsupdat 2012)*

Aspirin should be **stopped 1 week before surgery[Q].**

New Recommendations

- **Aspirin need not be stopped before surgery[Q]**
- **Thyroid medications** should be **continued[Q]**
- **Anti-hypertensives** should be **continued** (even losartan)[Q]

- **OCPs** should be **continued till day of surgery**Q
- **Anti-depressants, anti-epileptics, anti-psychotics** should be **continued except TCA**, which should be **stopped 3 weeks before surgery** due to risk of **intra operative arrhythmia**Q
- **Ticlopidine: 14 days** before surgeryQ
- **Clopidogrel: 7 days** before surgeryQ
- **Warfarin: 3 days** before surgeryQ
- **LMWH: 12 hours** before surgeryQ

9. **Ans. a. Radial** *(Ref: Lee Anesthesia 12/e p25)*

- **Arterial puncture** and **cannulation** is performed to measure PaO_2, $PaCO_2$, SpO_2 & pH to clarify the **acid-base** and **electrolyte status.**
- Any artery that can be compressed after puncture may be used (but **not end arteries**), usually the **radial**Q (**preferred**), brachial or femoral.

10. **Ans. d. Intravenous narcotic infusion in lower dosage** *(Ref: Schwartz 9/e p1414)*

Pain Management in Infants

- For **minor procedures: Pacifiers** dipped in sucrose
- For **major procedures: IV narcotic agent**Q (morphine or fentanyl)
- **Paracetamol** as **oral suspension** or as **peranal suppositories** can be used for mild to moderate pain.

11. **Ans. a. Sitting** *(Ref: http://emedicine.medscape.com/article/761367-overview)*

Venous Air Embolism

- **Venous air embolism** is a **well known complication of neurosurgical procedures** performed in **sitting position**Q**.**
- **Operative site >5 cm above right atrium** is a **risk factor for VAE**Q**.**
- **More common** in **posterior fossa surgeries**Q

Management

- Once VAE is suspected, any **central line procedure** in progress should be **terminated immediately**Q**.**
- Administer **100% oxygen**Q
  - Promptly place the patient in **Trendelenberg (Head down) position** and **rotate towards the left lateral decubitus position**Q**.** This maneuver helps trap air in the apex of the ventricle, prevents its ejection into pulmonary arterial system and maintains right ventricular output.
- Consider transfer to **hyperbaric chamber**Q**.**

12. **Ans. a. Thrombocytopenia** *(Ref: Schwartz 10/e, 90-91,1428, 9/e p72, 8/e p69)*
13. **Ans. a. Halothane** *(Ref: en.wikipedia.org/wiki/Halothane)*

Physical properties of Halothane

- **No analgesia**Q and **least pungent (non-irritant)**Q
- **Pleasant to smell**, so **excellent for induction in children**Q
- Halothane has **highest fat/blood coefficient**Q 51 (can get deposited in adipose tissues after prolonged exposure)
- **Trifluoloroacetic acid** is a **metabolite** and **found in urine**Q

CHAPTER 45 Robotics, Laparoscopy and Bariatric Surgery

MULTIPLE CHOICE QUESTIONS

LAPAROSCOPY

1. The intra-abdominal pressure during laparoscopy should be set between: *(DNB 2011, AIIMS Nov 2003)*
a. 5-8 mm of Hg b. 10-15 mm of Hg
c. 20-25 mm of Hg d. 30-35 mm of Hg

2. Gases for pneumoperitoneum: *(PGI June 2007)*
a. CO_2 b. N_2
c. Room air d. N_2O

3. Which gas is used in laparoscopy? *(DNB 2012, AIIMS June 94)*
a. CO_2 b. N_2O
c. O_2 d. N_2

4. Layers which are penetrated with trocar and cannula in production of pneumoperitoneum are: *(PGI June 2005)*
a. Skin and superficial fascia b. Deep fascia
c. Rectus abdomnis d. Transversus abdomnis
e. Rectus sheath

5. Shoulder pain post laparoscopy is due to: *(AIIMS Nov 2007)*
a. Subphrenic abscess b. CO_2 retention
c. Positioning of the patient d. Compression of the lung

6. A lady presented in the emergency department with a stab injury to the left side of the abdomen. She was hemodynamically stable and a contrast enhanced CT scan revealed a laceration in spleen. Laparoscopy was planned, however, the patients PO2 suddenly dropped as soon as the pneumoperitoneum was created. What is the most likely cause? *(All India 2010)*
a. Gaseous embolism through splenic vessels
b. Injury to the left lobe of the diaphragm
c. Inferior vena cava compression
d. Injury to colon

7. Day care surgery can be done in: *(PGI Nov 2010)*
a. Lateral sphincterotomy b. Rhinoplasty
c. Orchidectomy d. Total thyroidectomy
e. Sub-cutaneous mastectomy

8. Advantage of minimal access surgery: *(PGI Nov 2010)*
a. ↑ Heat loss b. Better Hemostasis control
c. Improved vision d. ↓ in wound pain
e. Improved Mobility

9. Minimal invasive surgery includes all except: *(MHPGMCET 2002)*
a. FESS b. Lap cholecystectomy
c. Endoscopic sclerotherapy d. PCNL

10. During laparoscopy, the intra-abdominal pressure is: *(MHSSMCET 2008)*
a. 5-10 mm Hg b. 12-15 mm Hg
c. 15-20 mm Hg d. 20-25 mm Hg

11. Instrument used to create artificial pneumoperi-toneum in laparoscopy: *(MHSSMCET 2008)*
a. Maryland forceps b. Veres needle
c. Trocar d. All of the above

12. Not a complication of laparoscopy: *(MHSSMCET 2008)*
a. Diaphragmatic rupture b. Vascular injury
c. Pneumothorax d. Pneumomediastinum

13. Complications of laparoscopy: *(MHSSMCET 2009)*
a. Diaphragmatic rupture b. Vascular injury
c. Pneumothorax d. All of the above

BARIATRIC SURGERY

14. Cancers associated with excess fat intake are/is:
a. Breast *(PGI Dec 2000)*
b. Colon c. Prostate
d. Lung e. Thyroid

15. Bariatric surgical procedures include all except: *(AIIMS Nov 2008)*
a. Gastric banding b. Gastric bypass
c. Biliopancreatic diversion d. Ileal transposition

16. All of the following are primarily restrictive operations for morbid obesity, except: *(All India 2010)*
a. Vertical band gastroplasty
b. Duodenal switch operation
c. Roux-en-Y operation
d. Laparoscopic adjustable gastric banding

17. Complication (s) of obesity is/are: *(PGI Nov 2010)*
a. Venous ulcer b. Pulmonary embolism
c. ↑Mortality d. Prostate cancer
e. Pulmonary hypertension

18. Morbid obesity is BMI greater than: *(MHSSMCET 2006)*
a. 25 b. 30
c. 40 d. 45

19. Irrespective of comorbidity, bariatric surgeries should be done when BMI is greater than: *(MHSSMCET 2008)*
a. 35 b. 40
c. 45 d. 50

20. The most effective bariatric surgery with treatment in the form of weight loss for morbid obesity is: *(MHSSMCET 2008)*
a. Roux-en-Y surgery
b. Biliopancreatic diversion
c. Vertical banded gastroplasty
d. Any of the above

21. In Duodenal switch operation, which of the following is not done? *(MHSSMCET 2010)*
a. Cholecystectomy b. Appendectomy
c. Jejunoileal anastomosis d. Distal gastrectomy

22. Peterson hernia: *(MHSSMCET 2010)*
a. An internal hernia occurring behind Roux-en-Y limb
b. An internal hernia occurring through window in the transverse mesocolon
c. Cervical hernia
d. None

23. Vertical banded gastroplasty also known as stomach stapling is done for: *(DNB 2010)*
a. Gastric carcinoma b. Achalasia cardia
c. Perforated gastric ulcer d. Morbid obesity

EXPLANATIONS

LAPAROSCOPY

1. **Ans. b. 10-15 mm of Hg** *(Ref: Sabiston 19/e p418-419; Schwartz 10/e p417, 9/e p361)*

LAPAROSCOPY

- **Needle used** for pneumoperitoneum: **Veress needle**Q
- **Most commonly used gas: CO_2**Q
- **Flow of gas: 1L/min**Q
- **Intra-abdominal pressure: 12-15** mm HgQ
- **Trocar** is inserted **at** or **just below** the **umbilicus**Q penetrating **skin, superficial** & **deep fascia, fascia transversalis** & **parietal peritoneum.**Q

> - **Post-laparoscopy shoulder pain** is due to **CO_2 retention** causing **irritation of diaphragm** & **referred pain to** the **shoulder** through **phrenic nerve**Q**.**

2. **Ans. a. CO_2, c. Room air, d. N_2O** *(Ref: Sabiston 19/e p418-419; Schwartz 10/e p417-419, 9/e p361)*

GASES USED IN PNEUMOPERITONEUM

- **First pneumoperitoneum** was created by **filtered room air**Q**.**
- **CO_2** & **N_2O** are now **preferred** because of **increased risk of gas embolism with room air**Q**.**
- **CO_2**: 200 times **more diffusible than O_2, rapidly cleared** from the body & lungs, **doesn't support combustion**Q
- **N_2O**: 68% as **rapidly absorbed in blood** as CO_2, have **mild analgesic effect**, used **for short operative procedures** like sterilization or drillingQ.
- **For prolonged laparoscopic procedures, N_2O should not be preferred** because it **supports combustion** better than airQ.

3. **Ans. a. CO_2**
4. **Ans. a. Skin and superficial fascia**
5. **Ans. b. CO_2 retention**

6. **Ans. a. Gaseous embolism through splenic vessels** *(Ref: Laparoscopic Surgery by Garcia & Jacobs/25)*

- **Sudden drop in pO_2 immediately during induction of pneumoperitoneum** suggest the possibility of **gas embolism** as a result of entry of insufflating gas into circulation through the tear in splenic vessels.
- **Gas embolism** may also have resulted from **inadvertent insertion of** the **trocar** or **veress needle into a vessel** or **abdominal organ.**

GAS EMBOLISM

- **Most commonly** seen **during induction of pneumoperitoneum** at the time of insufflations of gas from **unintended insufflations of gas directly into an open vein**Q**.**
- The more soluble a gas in the blood, the lower chances are for gas embolism.
- **CO_2** is **preferred for pneumoperitoneum** as it is **highly soluble in blood** and is **rapidly eliminated**Q**.**
- **CO_2 Embolism:** An **initial rise in ET-CO_2** due to **pulmonary excretion of absorbed CO_2** is followed by a **sudden decrease due to fall in cardiac output**Q**.**

7. **Ans. a. Lateral sphincterotomy, b. Rhinoplasty, c. Orchidectomy, e. Sub-cutaneous mastectomy** *(Ref: Bailey 25/e p198, 268)*

DAY CARE SURGERY OR AMBULATORY SURGERY

- Surgical procedures suitable for ambulatory surgery should be accompanied by **minimal postoperative physiologic disturbances** and an **uncomplicated recovery**Q**.**
- The **primary predictors of prolonged stay** or **unanticipated admission after day-care surgery** are related to the **type of surgical procedure** and **associated complications** (e.g. **blood loss, incision pain, postoperative nausea** & **vomiting**)Q
- For **superficial procedures** (e.g. **mastectomy,**) **reductions in** both **cost** & **per-operative complications** have been observed when these procedures are performed on an **outpatient basis**Q**.**

Specialty	Types of surgical procedures
Dental	• Extraction, restoration, facial fractures
Dermatology	• Excision of skin lesions
General	• Biopsy, **endoscopy**, excision of masses, **hemorrhoidectomy, herniorrhaphy, laparoscopic cholecystectomy, adrenalectomy, splenectomy, varicose vein surgery**Q

Gynecology	• Cone biopsy, dilatation & curettage, hysteroscopy, diagnostic laparoscopy, **laparoscopic tubal ligation**[Q], uterine polypectomy, vaginal hysterectomy
Ophthalmology	• Contract extraction, chlazion excision, nasolacrimal duct probing, strabismus repair, tonometry
Orthopedics	• Anterior cruciate repair, knee **arthroscopy**[Q], shoulder reconstructions, bunionectomy, carpal tunnel release, closed reduction, hardware removal, manipulation under anesthesia and minimally invasive hip replacements
Otolaryngology	• Adenoidectomy, laryngoscopy, mastoidectomy, myringotomy polypectomy, **rhinoplasty**, tonsillectomy, tympanoplasty
Pain clinic	• **Chemical sympathectomy, epidural injection, nerve blocks**[Q]
Plastic surgery	• Basal cell cancer excision, cleft lip repair, liposuction, **mammoplasty**[Q] (reductions & agumentations), otoplasty, scar revision, **septorhinoplasty**[Q], skin graft
Urology	• Bladder surgery, circumcision, cystoscopy, lithotripsy, **orchidectomy**[Q], prostate biopsy, vasovasostomy, laparoscopic nephrectomy and prostatectomy

8. **Ans. c. Improved vision, d. ↓ in wound pain, e. Improved Mobility** *(Ref: Bailey 25/e p247-249)*

Advantages of Minimal Access Surgery (MAS)	
• **Decrease** in **wound size**[Q] • **Reduction** in **wound infection, dehiscence, bleeding, herniation** & **nerve entrapment**[Q] • **Decrease** in **wound pain**[Q]	• **Improved mobility**[Q] • Decreased wound trauma • **Decreased heat loss**[Q] • **Improved vision**[Q] • Faster recovery & shorter hospital stay

9. **Ans. d. PCNL** *(Ref: Bailey 25/e p247-249)*

Minimal Access Surgery (MAS) includes	
• **Laparoscopy**[Q] • **Thoracoscopy**[Q] • **Endoluminal endoscopy**[Q]	• **Perivisceral endoscopy**[Q] • **Arthroscopy & intra-articular joint surgery**[Q]

10. **Ans. b. 12-15 mm Hg**

11. **Ans. b. Veress needle**

12. **Ans. d. Pneumomediastinum** *(Ref: Bailey 25/e p253)*

Complications of Laparoscopy	
• **Vascular injury**[Q] • **Diaphragmatic injury**[Q] • Bile duct injury[Q]	• **Gas embolism**[Q] • **Pneumothorax**[Q] • Visceral injury[Q]

13. **Ans. d. All of the above**

BARIATRIC SURGERY

14. **Ans. a. Breast, b. Colon, c. Prostate** *(Ref: Sabiston 19/e p359; Schwartz 10/e p1099-1131, 9/e p951)*

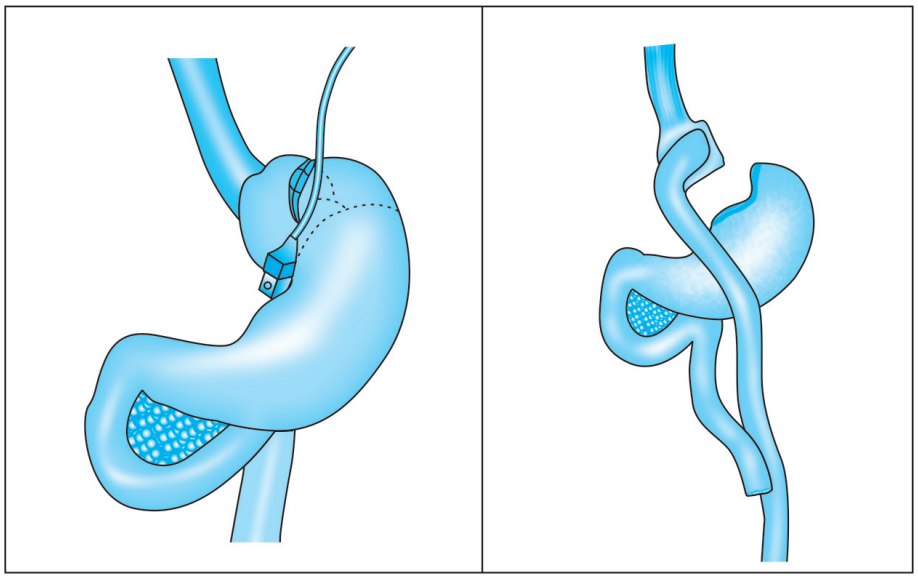
Increased Cancer Risk in Obese Patients (PEEL CP GO KBC)		
• **Prostate**[Q] • **Endometrial**[Q] • **Esophagus**[Q] • **Liver**[Q]	• **Cervix**[Q] • **Pancreas**[Q] • **Gall Bladder**[Q] • **Ovarian**[Q]	• **Kidney**[Q] • **Bile duct**[Q] • **Breast**[Q] • **Colon & rectum**[Q]

15. **Ans. d. Ileal transposition** *(Ref: Sabiston 19/e p363; Schwartz 10/e p1099-1131, 9/e p952)*

Bariatric Surgery

- **Indication for Bariatric Surgery**
  - Patients that have a BMI of **35 Kg/m²** or more **with comorbidity**[Q]
  - Those with a BMI of **40 Kg/m²** or greater regardless of comorbidity[Q]

Bariatric Operation	Mechanism of Action
• **Vertical banded gastroplasty** • Laparoscopic adjustable **gastric banding**	**Restrictive**[Q]
• Roux-en-Y gastric bypass (**RYGB**)	**Largely Restrictive**[Q]/Mildly Malabsorptive
• **Bilopancreatic diversion** • **Duodenal switch**	**Largely Malabsorptive**[Q]/Mildly Restrictive



16. **Ans. b. Duodenal switch operation**

17. **Ans. a. Venous ulcer, b. Pulmonary embolism, c. ↑ Mortality, d. Prostate cancer, e. Pulmonary hypertension** *(Ref: Sabiston 19/e p359; Schwartz 9/e p951)*

Pathologic Consequences of Obesity	
System	**Pathology**
Health	• **Increase in mortality**[Q]
Endocrine	• **Insulin resistance** and type 2 **diabetes mellitus**[Q]
Reproductive	• Male hypogonadism, gynecomastia, menstrual abnormalities, polycystic ovarian syndrome
Cardiovascular	• **Coronary disease,** congestive heart failure
Pulmonary	• Obstructive sleep apnea, "obesity hypoventilation syndrome", **pulmonary hypertension, DVT** & **pulmonary embolism**[Q]
Heaptobiliary	• Nonalcoholic fatty liver disease, symptomatic **gallstones**
Bone, joint, and cutaneous disease	• Osteoarthritis, acanthosis nigricans, friability of skin, **venous stasis & ulcers**[Q]
Neurologic	• Carpal tunnel syndrome, pseudotumor cerebri, stroke

18. **Ans. c. 40** *(Ref: Schwartz 10/e p421-422, 9/e p950)*

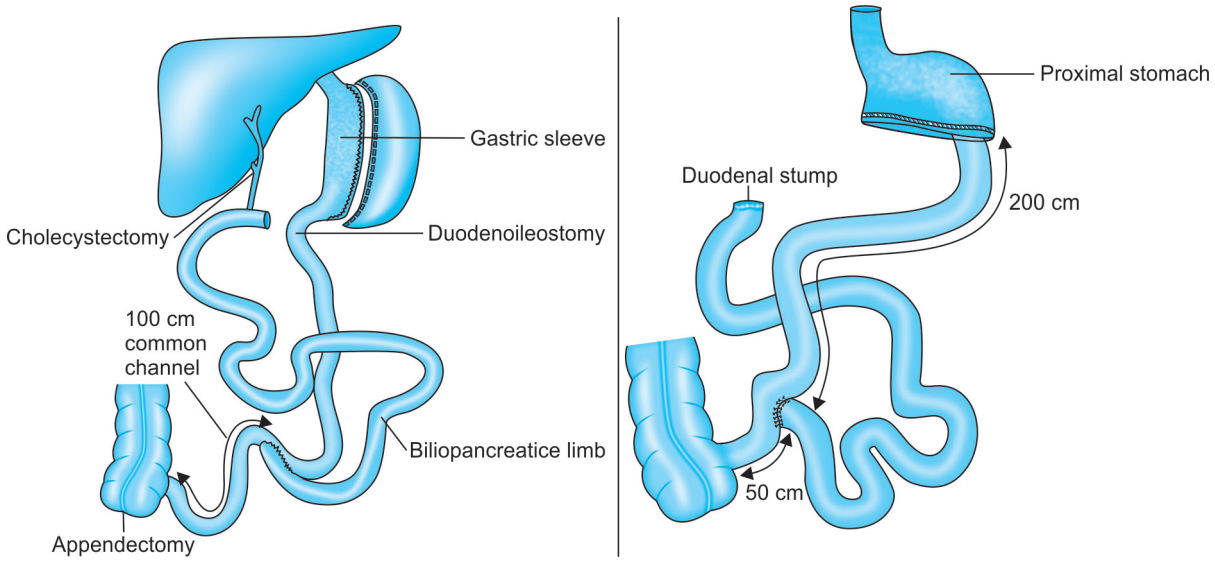
Advantages of Minimal Access Surgery (MAS)	
Category	**BMI**
Underweight	<18.5[Q]
Normal	18.5-24.9[Q]
Overweight	25.0-29.9[Q]
Obesity (Class **I**)	**30-34.9**[Q]
Severe obesity (Class **II**) **Morbid obesity** (Class **III**)	**35-39.9**[Q] **40-49.9**[Q]
Superobesity	**>50**[Q]

New Guidelines for Asia

- **Overweight** if the BMI is **23 Kg/m²** or more[Q] (International Standard is 25).
- **Obese** if the BMI is **25 Kg/m²** or moreQ (I.S. is 30).
- An Indian qualifies for **bariatric surgery** for obesity if the BMI is **32.5 Kg/m²** (I.S. 35) **with comorbidity**[Q] or **37.5 Kg/m²** without comorbidity(I.S. 40)[Q].

19. **Ans. b. 40**

20. Ans. b. Biliopancreatic diversion *(Ref: Sabiston 19/e p371; Schwartz 10/e p1103, 9/e p968)*



Biliopancreatic Diversion

- When the bile is diverted from the intestinal tract so that only the **distal 50 to 100 cm** of **ileum** is **used for bile reabsorption**, the procedure is termed a biliopancreatic diversion.
- **Most effective bariatric surgery**Q, especially valuable in patients with **severe morbid obesity** or in those who have **failed to maintain weight loss** following gastric bypass surgery or restrictive proceduresQ.
- **Main side effect** with BPD: Patients usually have an increase of **2-4 bowel movements**/day, which in general are **more malodorous**, suggesting fat malabsorption.

21. Ans. d. Distal gastrectomy *(Ref: Sabiston 19/e p372; Schwartz 10/e p1119-1121, 9/e p968)*

- **Sleeve gastrectomy** is done in **duodenal switch operation not the distal gastrectomy.**

Duodenal Switch Operation

- It involves a greater curvature **sleeve gastrectomy** with maintenance of the **continuity of** the antrum, pylorus and **first portion** of the duodenum.
- This allows for a **lower marginal ulcer** rate and a lower incidence of **dumping syndrome.**

Components of Duodenal Switch Operation	
• **Sleeve gastrectomy**Q • **Duodenoileostomy**Q • **Jejunoileal bypass**Q	• **Cholecystectomy**Q • **Appendectomy**Q

22. Ans. a. An internal hernia occurring behind Roux-en-Y limb

Gibbon's hernia	• **Hernia with hydrocele**Q
Berger's hernia	• **Hernia** into **pouch** of **Douglas**Q
Beclard's hernia	• **Femoral hernia** through **opening of saphenous vein**Q
Amyand's hernia	• Inguinal hernia **containing appendix**Q
Ogilive's hernia	• Hernia through the **defect in conjoint tendon** just lateral to where it inserts with the rectus sheathQ
Stammer's hernia	• **Internal hernia** occurring **through window in** the **transverse mesocolon after** retrocolic **gastrojejunostomy**Q
Peterson hernia	• Hernia **under Roux limb** after **Roux-en-Y gastric bypass**Q

Perioperative Mortality in Bariatric Surgery

- **MC cause of death** within 30 days of bariatric surgery: **Pulmonary embolism**Q (36%) > **Cardiac complications** (24%) > **Anastomotic leaks** (20%)
- **MC cause of death** in **immediate post-operative period: Peritonitis secondary to anastomotic leak**Q (leak **most commonly** occurs at the **gastrojejunostomy)**

23. Ans. d. Morbid obesity

CHAPTER 46

Sutures and Anastomoses

MULTIPLE CHOICE QUESTIONS

SUTURES

1. Which of the following is a non absorbable suture? *(NEET Pattern, All India 2008)*
a. Polypropylene
b. Vicryl
c. Catgut
d. Polydioxanone

2. Absorbable sutures are: *(PGI June 2004)*
a. Catgut
b. Silk
c. Polypropylene
d. Polyglycolic acid
e. Vicryl

3. Surgically used suture material polydioxanone (PDS): *(COMEDK 2014)*
a. A non-absorbable and remains encapsulated
b. Undergoes hydrolysis and complete absorption
c. Undergoes phagocytosis and enzymatic degradation
d. Is specifically used for heart valves of synthetic grafts

4. Catgut is prepared from submucosal layer of the intestine of: *(DNB 2005, 2000, AIIMS 81, DNB 89)*
a. Cat
b. Sheep
c. Human being
d. Rabbit

5. Vicryl, the commonly used suture material is a: *(UPSC 2000)*
a. Homopolymer of polydiozanone
b. Co-polymer of glycolide and lactide
c. Homopolymer of glycolide
d. Homopolymer of lactide

6. PDS is absorbed within: *(WBPG 2012, MAHE 2001)*
a. 7 days
b. 21 days
c. 100 days
d. 225 days

7. Surgically used suture material polydioxanone (PDS): *(WBPG 2012, COMEDK 2005)*
a. Is non absorbable and remains encapsulated
b. Undergoes hydrolysis and complete absorption
c. Undergoes phagocytosis and enzymatic degradation
e. Is specifically used for heart valves or synthetic grafts

8. The surgeon who introduce catgut in surgery was *(MAHE 2005)*
a. Astley Cooper
b. Lord Lister
c. John Hunter
d. Syme

9. Which of the following is a delayed absorbable synthetic suture material? *(DPG 2009 Feb)*
a. Chromic catgut
b. Vicryl
c. Silk
d. Nylon

10. Which of the following is not absorbable suture? *(DNB 2011, APPG 2008)*
a. Catgut
b. Polyamide
c. Polyglactin
d. Polyester

11. Which one of the following is used as preservative for packing catgut suture? *(AIIMS Nov 2002)*
a. Isopropyl alcohol
b. Colloidal iodine
c. Glutaraldehyde
d. Hydrogen peroxide

12. Which of the following is ideal time to removal of scalp suture? *(MHSSMCET 2009)*
a. 3 days
b. 5 days
c. 7 days
d. 10 days

13. Suture material used for laparoscopic choledochotomy repair: *(MHSSMCET 2010)*
a. Silk
b. Catgut
c. Polyethylene
d. Vicryl

14. Catgut is preserved in: *(Recent Questions 2013)*
a. Glutraldehyde
b. Isopropyl alcohol
c. Iodine
d. Certrimide

15. Raw material used in nylon suture is: *(APPG 2015)*
a. Polyethylene terephthalate
b. Polyamide polymer
c. Polybutylene terephthalate
d. Polyester polymer

ANASTOMOSIS

16. Disparity of the bowel ends during end to end anastomosis is corrected by: *(Karnataka 2004)*
a. Cheatle's maneuver
b. Connell suture
c. Lambert suture
d. Czerny technique

17. In abdominal surgery Lembert suture refers to:
a. Single layer suturing *(Karnataka 2006)*
b. Sero-muscular sutures
c. All coat intestinal suturing
d. Skin suturing

18. Colonic anastomosis is most likely to rupture on which post-op day? *(MHSSMCET 2005)*
a. 1-2 days
b. 3-4 days
c. After 7 days
d. After 14 day

19. Regarding vascular surgery distal to popliteal artery, which of the following is true? *(MHSSMCET 2006)*
a. Suture with polypropylene
b. 6-0 suture used
c. Needle pass from within outwards
d. All the above

20. When knots are cut short, the free ends of 'ears' should be left at least _____ mm long? *(MHSSMCET 2008)*
a. 1-2 mm
b. 3-4 mm
c. 5-6 mm
d. 7-8 mm

21. The single layer extramucosal anastomosis was popularized by: *(MHSSMCET 2008)*
a. Carrel
b. Antoine Lambert
c. Norman Matheson
d. Emil Theodar Kocher

22. On table colonic lavage was used for first time in 1968 by: *(MHSSMCET 2008)*
a. Muir
b. Carrel
c. Connell
d. Lembert

23. Carrel's triangle is used in: *(MHSSMCET 2008)*
a. Vascular anastomosis
b. Bowel anastomosis
c. Tendon repair
d. Nerve repair

24. Intestinal anastomosis strength is provided by: *(JIPMER 2015)*
a. Mucosa
b. Sub mucosa
c. Serosa
d. Muscularis mucosa

25. Stapler used for MIPH: *(Recent Questions 2013)*
a. Linear cutting stapler
b. Circular cutting stapler
c. Linear stapler
d. Circular stapler

EXPLANATIONS

SUTURES

1. **Ans. a. Polypropylene** *(Ref. Bailey 26/e p37-38, 25/e p236-239)*

Suture Materials

Absorbable

- These sutures **get absorbed** in the tissues either **by enzymatic digestion** or by **phagocytosis**[Q].

1. **Natural absorbable**:
   - Plain and chromic **catgut**[Q]
2. **Synthetic absorbable**:
   - Polyglycolic acid (**Dexon**)[Q]
   - Polyglactin (**Vicryl**)[Q]
   - **Polydioxanone (PDS)**[Q]
   - Polyglycaprone

Non-absorbable

- These sutures **remain in the tissues for indefinite period.**

1. **Natural non-absorbable:**
   - **Linen**[Q]
   - **Silk**[Q]
2. **Synthetic non-absorbable**:
   - **Polypropylene** (**Prolene**)[Q]
   - Monofilament polyamide (**Ethilon**)[Q]
   - **Polyester**[Q] (ethibond)
   - **Nylon**[Q]

Depending upon Number of Strands

Monofilament

- Consist of **single strand**[Q] of fiber
- Sutures are **smooth and strong**[Q]
- Chances of **bacterial contamination is less**[Q]
- **Knot tied** may become **loose**[Q]
- Prolene, polyamide, catgut

Polyfilament

- Consist of **multiple strands**[Q] braided together
- **Easier to handle** and **knot tied doesn't slip**[Q]
- Bacteria may lodge in the crevices of the suture, so **not suitable in presence of infection**[Q]
- Silk, linen, polyglycollic acid

2. **Ans. a. Catgut, d. Polyglycolic acid, e. Vicryl**
3. **Ans. b. Undergoes hydrolysis and complete absorption**
4. **Ans. b. Sheep** *(Ref. Bailey 26/e p37-38, 25/e p236-239)*

SUTURES

- **John Hunter** discovered **catgut**[Q].
- **Plain catgut** is derived from **submucosa of sheep's intestine**[Q].
- **Plain catgut** loses **50% tensile strength in 3 days**[Q] and **all tensile strength in 15 days** and **absorbed in 60 days**[Q].
- **Isopropyl alcohol**[Q] is used as **preservative for packing catgut sutures.**
  - **Vicryl** (Co-polymer of **glycolide** and **lactide**) maintains **tensile strength for 28-30 days**[Q] and gets **absorbed in 80-90 days (Delayed absorption)**[Q]
  - **Vicryl** is used for **bile duct surgeries**[Q].
- **PDS** sutures exhibit the **lowest affinity to the adherence of E. coli** and **Staphylococcus aureus**; **Dexon sutures** exhibit the **highest affinity** to these species.
- **Polydioxanone (PDS)** undergoes **hydrolysis** and **complete absorption within 180 days.**
- **Raw material used in nylon suture:** Polyamide polymer

5. **Ans. b. Co-polymer of glycolide and lactide**
6. **Ans. d. 225 days**
7. **Ans. b. Undergoes hydrolysis and complete absorption** *(Ref. Bailey 25/e p237)*

Suture	Types	Raw material	Tensile strength	Absorption rate
Silk	Braided or twisted **multifilament**; Coated (with wax or silicone) or uncoated	Natural protein Raw silk from silkworm	Loses 20% when wet; 80-100% lost by 6 months	Fibrous encapsulation in body at 2-3 weeks ; **Absorbed** slowly over **1-2 year**[Q]
Catgut	Plain	Collagen derived from healthy **sheep** or catle	Lost within 7-10 days	**Phagocytosis** & **enzymatic degradation** within **7-10 days**[Q]
Catgut	**Chromic**	Tanned with **chromium salts** to **improve handling** & **resist degradation** in tissue[Q]	Lost within 21-28 days	Phagocytosis & enzymatic degradation **within 90 days**
Polyglactin (Vicryl)	Braided multifilament	Copolymer of **lactide** & **glycolide**[Q] in a ratio of 90:10, coated with polyglactin & calcium stearate	Approx, 60% remains at 2 weeks; 30% remains at 3 weeks	Hydrolysis minimal until 5-6 weeks; Complete absorption **60-90 days**[Q]
Polyglyconate	Monofilament Dyed or undyed	Copolymer of **glycolic acid** & **trimethylene carbonate**[Q]	Approx, 70% remains at 2 weeks; 55% remains at 3 weeks	Hydrolysis minimal until 8-9 weeks; Complete absorption **180 days**[Q]
Polyglycaprone	Monofilament	Coplymer of **glycolite** & **caprolactone**[Q]	21 days maximum	**90-120 days**[Q]
Polyglycolic acid (Dexon)	Braided multifilament Dyed or undyed Coated or Uncoated	Polymer of **polyglycolic acid**[Q]	Approx, 40% remains at 1 weeks; 20% remains at 3 weeks	**Hydrolysis**[Q] minimal at 2 weeks; significant at 4 weeks; Complete absorption **60-90 days**[Q]
Polydioxanone (PDS)	Monofilament dyed or undyed	**Polyester polymer**[Q]	Approx, 70% remains at 2 weeks; 50% remains at 4 weeks; 14% remains at 8 weeks	**Hydrolysis** minimal at 90 days; Complete absorption **180 days**[Q]

8. **Ans. c. John Hunter**
9. **Ans. b. Vicryl**
10. **Ans. d. Polyester**
11. **Ans. a. Isopropyl alcohol**
12. **Ans. c. 7 days** *(Ref. Sabiston 18/e p2134)*

Guidelines for Day of Suture Removal by Area			
Body Regions	**Removal**	**Body Regions**	**Removal**
Eyelid	3-4	Chest, abdomen	8-10
Eyebrow	**3-5**	Ear	10-14
Nose	**3-5**	**Back**	**12-14**
Lip	**3-4**[Q]	**Extremities**	**12-14**
Face (other)	**3-4**[Q]	**Hand**	**10-14**
Scalp	**6-8**[Q]	**Foot, sole**	**12-14**

13. **Ans. d. Vicryl**
14. **Ans. b. Isopropyl alcohol**
15. **Ans. b. Polyamide polymer**

ANASTOMOSES

16. **Ans. a. Cheatle's maneuver** *(Ref. Bailey 26/e p42-44, 25/e p242-246)*

The **Cheatle split** (making a **cut into** the **anti-mesenteric border**) may help to **enlarge** the **lumen of distal, collapsed bowel**[Q].

Wound Closure & Anastomoses

- As a general rule, **each suture** should be **separated by a gap** that is **twice** the **thickness of** the **skin**[Q].
- When **knots are cut short**, the **free ends** or 'ears' should be left **at least 1-2 mm** long[Q]. This is particularly important with **monofilament non-absorbables**[Q].
  - It has been suggested by **Jenkins** that a **suture length to wound length ratio** of **4:1** indicates the **optimum size of tissue bites** and of **suture spacing**[Q].
- **Anastomosis of vessels** was **pioneered by Carrel**[Q].

Bowel Anastomoses

- **Lembert** described **seromuscular suture technique** for **bowel anastomosis** in 1826Q.
- **Senn** advocated a **two-layer technique for closure**Q
- **Halsted** favoured a **one-layer extramucosal closure**Q.
- **Connell** used a **single layer of interrupted sutures** incorporating all layers of the bowelQ.
- **Kocher's method**, a **twolayer anastomosis**, first a **continuous all-layer suture using catgut**, then an **inverting continuous** (or interrupted) **seromuscular layer** suture **using silk**, became the standard. There is evidence that **inversion is safest in bowel** (least likely to leak), although end-to-end staplers give an everted anastomosis without complication.
- The **single-layer extramucosal anastomosis**, advocated by **Matheson**Q, causes the least tissue necrosis or luminal narrowing.
- The **Cheatle split** (making a **cut into** the **anti-mesenteric border**) may help to **enlarge** the **lumen of distal, collapsed bowel**Q.
- **Bowel anastomotic leaks** are generally occur **on day 7**Q.

17. **Ans. b. Sero-muscular sutures**
18. **Ans. c. After 7 days**
19. **Ans. d. All of the above** *(Ref. Bailey 26/e p44-45, 25/e p244-246)*

Vascular Anastomoses

- **Vascular anastomoses** require **more precision** than bowel anastomoses as they must be **immediately watertight**Q at the end of the operation when the clamps are removed.
- **Suture size depends on vessel calibre**:
  - **2/0** for **aorta**Q
  - **4/0** for **femoral artery**Q
  - **6/0** for **popliteal to distal arteries**Q
  - **Microvascular anastomoses** are made using a loupe and an interrupted suture down to **10/0 size**

Anastomosis of Vessels

- **Polypropylene-like sutures** with indefinite integrity give the **best results**Q
- **Intimal suture line** must be **smooth**Q
- **Knots** must be **secure**Q
- **Needle** must **pass from within outwards**Q

20. **Ans. a. 1-2 mm**
21. **Ans. c. Norman Matheson**
22. **Ans. a. Muir** *(Ref. www.ncbi.nlm.nih.gov › ... › Ann R Coll Surg Engl › v.75(3); May 1993)*

- **On table colonic lavage** was used for first time in 1968 by **Muir**Q**.**

23. **Ans. a. Vascular anastomosis**
24. **Ans. b. Sub mucosa**
25. **Ans. b. i.e. Circular cutting stapler** *(Ref: Schwartz 9/e p1058)*

Procedure for prolapse and hemorrhoidectomy (PPH) — aka MIPH — aka stapled emorrhoidectomy —

- Minimally invasive proctoscopic hemorrhoidectomy
  - In this procudure, a circular cutting stapler (PPH3) is used to excise a short. Circumferential segment of rectal mucosa proximal to dentate line, thus ligating venules feeding the hemorrhoides.

CHAPTER 47

Sterilization and Infection

MULTIPLE CHOICE QUESTIONS

STERILIZATION AND DISINFECTION

1. **Ways to prevent a highly infectious disease transmitted by aerosol; precautions used:** *(PGI Dec 2007)*
   a. Isolation ward
   b. Facemask
   c. Keep isolated in a room with positive pressure
   d. Keep isolated in a room with negative pressure
   e. Cohort nursing

2. **Use of all the following significantly decreases airborne infection in operating room except:** *(UPSC 2000)*
   a. Laminar air flow
   b. Air-conditioning
   c. Ultraviolet light
   d. Microfilters

3. **A chest physician performs bronchoscopy in the procedure room of the out patient department. To make the instrument safe for use in the next patient waiting outside, the most appropriate method to disinfect the endoscope is by:**
   a. 70% alcohol for 5 min *(All India 2003)*
   b. 2% glutaraldehyde for 20 min
   c. 2% formaldehyde for 10 min
   d. 1% sodium hypochlorite for 15 min

4. **All the following are sporicidal agents except:** *(JIPMER 2010)*
   a. Ethylene oxide
   b. Phenol
   c. Ozone
   d. Gluteraldehyde

5. **Flexible endoscopes are best sterilized with:** *(MHSSMCET 2008, MHPGMCET 2007)*
   a. Formaldehyde
   b. Ethylene oxide
   c. Gamma irradiation
   d. Peracetic acid

6. **Best disinfectant for endoscope is:** *(JIPMER 2014, 2012)*
   a. Hypochlorite
   b. Formaldehyde
   c. Glutaraldehyde
   d. Chlorohexidine

PREVENTION OF INFECTION AND PROPHYLAXIS

7. **What is the best time to give prophylactic antibiotic?**
   a. 1 day before surgery *(DPG 2007)*
   b. At the time of skin incision
   c. At the time of induction
   d. 2 days before to 3 days after surgery

8. **Regarding antibiotics true statement:** *(PGI June 2006)*
   a. No prophylaxis for clean contaminated surgery
   b. No prophylaxis for gastric ulcer surgery
   c. Prophylaxis for colorectal surgery
   d. Local irrigation with antibiotic

9. **When do we have to start antibiotics to prevent post operative infection?** *(DPG 2011, JIPMER 2003)*
   a. 2 days before surgery
   b. After surgery
   c. 1 week before surgery
   d. 1 hour before surgery and continue after surgery

10. **Ideally, when should antibiotics be given during a surgery?**
    a. At the time of induction *(MHSSMCET 2011)*
    b. At the time incision
    c. After the surgery is over
    d. A couple of days prior surgery

11. **Preferred time for prophylactic antibiotic:** *(PGI June 2009)*
    a. 1 day before surgery
    b. At the time of induction of anesthesia
    c. I.V. during surgery
    d. I.M. before 6 hours
    e. Orally given

12. **Optional timing of administration of prophylactic antibiotic for surgical patients is:** *(APPG 2015)*
    a. At the induction of anesthesia
    b. Any time during the surgical procedure
    c. One hour after induction
    d. One hour prior to induction of anesthesia

13. **Preoperative shaving is ideally done at:** *(JIPMER 81, DPG 86)*
    a. Evening before
    b. Morning of operation
    c. Just before operation
    d. At operation table

14. **In a post operative intensive care unit, five patients developed post-operative wound infection on the same wound. The best method to prevent cross infection occurring in other patients in the same ward is to:** *(All India 2003)*
    a. Give antibiotics to all other patients in the ward
    b. Fumigate the ward
    c. Disinfect the ward with sodium hypochlorite
    d. Practice proper hand washing

15. **In a surgical post-op ward, a patient developed wound infection. Subsequently 3 other patients Developed similar infections in the ward. What is the most effective way of preventing the spread of infection?** *(AIIMS Nov 2001)*
    a. Give IV antibiotics to all patients in the ward
    b. Proper hand washing of all ward personnel
    c. Fumigation of the ward
    d. Wash OT instruments with 1% perchlorate

16. **The most effective method of reduction of incidence of institutional pediatric Staphylococcus aureus infection is:** *(COMEDK 2010)*
    a. Mask and gown use with each suspected patient
    b. Meticulous hand washing before and after contact with patients
    c. Treatment of all culture-positive patients with vancomycin
    d. Routine isolation of culture-positive patients

17. **Ampicillin prophylaxis is given in:** *(PGI 86)*
    a. Rectal surgery
    b. Splenectomy
    c. Head and neck surgery
    d. Biliary surgery

SIRS AND MODS

18. A 60 years old lady underwent abdominal surgery and on the 4th post-operative day she was diagnosed to have systemic inflammatory response syndrome (SIRS). What are the features of SIRS? *(UPSC 2004)*
a. Normal body temperature and normal respiratory rate
b. WBC >12x109/L or <4x109/L
c. Respiratory rate >24 breaths/minute and heart rate >90 beats/minute
d. Respiratory rate <10 breaths/minute

19. SIRS with established source of infection is known as:
a. Sepsis b. Severe sepsis
c. Septic shock d. MODS

20. Indicator of hypoperfusion in severe sepsis:
a. Systolic BP <90 mmHg b. Lactic acidosis
c. Oliguria d. All of the above

CELLULITIS AND PYOGENIC BACTERIAL INFECTION

21. True about management of necrotizing soft tissue infection: *(PGI Nov 2011)*
a. Broad spectrum antibiotics should be started
b. Penicillin is not usually effective due to resistant strains
c. Immediate debridement + IV antibiotic has main role in treatment
d. Hyperbaric O_2 is useful
e. Amputation always indicated

22. False about cellulitis: *(PGI Nov 2010)*
a. Caused by Strep. pyogenes
b. Causes SIRS
c. Localized infection
d. Abscess if any should be managed conservatively
e. I and D of abscess should be done

23. Extensive surgical debridement, decompression or amputation may be indicated in the following clinical setting except: *(UPSC 2007)*
a. Progressive synergistic gangrene
b. Acute thrombophlebitis
c. Acute hemolytic streptococcal cellulitis
d. Acute rhabdomyolysis

24. Cellulitis is most commonly caused by: *(MCI Sept 2008, 2010)*
a. Clostridia b. Staphylococci
c. Streptococci d. H. influenza

25. All of the following statements about necrotizing fasciitis are true, except: *(All India 2009)*
a. Infection of fascia and subcutaneous tissue
b. Most commonly caused by Group A beta hemolytic streptococci
c. Most commonly site is perineum followed by trunk and extremities
d. Surgical debridement is mandatory

26. Erysipelas is caused by: *(PGI 88)*
a. Staph. aureus b. Staph. albus
c. Strep. pyogenes d. Hemophilus

27. Following are true of erysipelas except: *(AIIMS 84)*
a. Streptococcal infection b. Contagious and infectious
c. Margins are raised d. Common in tropics

28. Chronic thick walled pyogenic abscess may be due to the following except: *(AIIMS 84)*
a. Presence of a foreign body
b. Prolonged antibiotic therapy
c. Virulent strains of organism
d. Inadequate drainage

29. Treatment of spreading streptococcal cellulitis is: *(PGI 86)*
a. Erythromycin b. Penicillin
c. Tetracycline d. Chloramphenicol

30. A carbuncle is treated by: *(UPSC 95)*
a. Incision and drainage
b. Cruciate incision and deroofing
c. Antibiotics alone
d. Wide excision

31. A boil is due to staphylococcal infection of: *(UPPG 97)*
a. Hair follicle b. Sweat gland
c. Subcutaneous tissue d. Epidermis

32. True about cellulitis of lower limb: *(PGI 2000)*
a. Infection of skin and subcutaneous tissue
b. Fever and malaise are common
c. Margins are distinct
d. Extrnal wound always present
e. Involved site is red and hot

33. Best management of contaminated wound with necrotic material: *(AIIMS Nov 2013)*
a. Debridement b. Tetanus toxoid
c. Gas gangrene serum d. Broad spectrum antibiotics

34. Which is not true of carbuncle? *(JIPMER 86)*
a. Infective gangrene of subcutaneous tissue
b. Caused by staphylococcus
c. Diabetic are more prone
d. Caused by streptococcus
e. Penicillin and excision of necrotic tissue is treatment of choice

GAS GANGRENE

35. Gas gangrene is caused by: *(JIPMER 2010)*
a. Cl. botulinum b. Cl. difficile
c. Cl. perfringens d. Cl. tetani

36. True about treatment of gas gangrene after contaminated road traffic accident: *(PGI Nov 2011)*
a. IV administration of anti-gas gangrene serum
b. Penicillin
c. Immediate suturing
d. Surgical debridement
e. Irrigation of anti-gas gangrene serum

37. Which of the following is not true about gas gangrene?
a. Caused by Clostridium tetani *(MHSSMCET 2011)*
b. Immunocompromised patients are most at risk
c. Gas and smell are characteristic
d. Antibiotic prophylaxis is essential when performing amputations to remove dead tissue

38. Hyperbaric oxygen is useful in: *(PGI 88)*
a. Tetanus b. Gas gangrene
c. Frostbite d. Vincent's angina

39. Which of the following is not true of gas gangrene?
a. It is caused by clostridium perfringens *(AIIMS June 2003)*
b. Clostridium perfringens is a gram-negative spore-bearing bacillus
c. Gas gangrene is characterized by severe local pain, crepitus and signs of toxemia
d. High dose penicillin and aggressive debridement of affected tissue is the treatment of established infection

40. Best way to prevent gas gangrene is: *(NEET 2013, AIIMS Nov 93)*
a. Immunoglobulins
b. Hyperbaric oxygen
c. Proper wound debridement
d. Anti gas gangrene serum

41. Hypotension in a cause of gas gangrene is best treated by: *(JIPMER 87)*
a. Ringer lactate
b. Normal saline
c. Plasma
d. Whole blood

42. Treatment of contaminated wound in gas gangrene is: *(JIPMER 95)*
a. Debridement of wound
b. Systemic penicillin
c. Metronidazole administration
d. Peroxide dressings

43. Foaming liver is seen in: *(PGI 88)*
a. Organophosphorus poisoning
b. Actinomycosis
c. Gas gangrene
d. Anthrax

TETANUS

44. Tetanus is caused by: *(PGI 88)*
a. Cl. tetani
b. Cl. welchii
c. Cl. edematiens
d. Cl. septicum

45. Following may be premonitory symptoms of tetanus except: *(AIIMS 84)*
a. Sleeplessness
b. Anxious expression
c. Urinary incontinence
d. Headache

46. Period of onset in tetanus refers to the time between: *(Karnataka 2006)*
a. First injury to spasm
b. First symptom to spasm
c. First spasm to death
d. Trismus to laryngeal spasm

TUBERCULOSIS

47. Regarding tuberculous lymphadenitis, which is correct?
a. Seen in children and young adults
b. Seen in the aged
c. History of contact or drinking infected milk
d. Mostly cervical
e. All are the correct

48. Commonest cause of acute lymphadenitis in India: *(MAHE 2005)*
a. Barefoot walking
b. TB
c. Staphylococcal skin infection
d. Lymphoma

SYPHILIS

49. Moth eaten alopecia is seen with: *(PGI 88)*
a. Leprosy
b. Syphilis
c. Fungal infection
d. Cylindroma

50. Moon's molars seen with: *(PGI 88)*
a. Syphilis
b. Leprosy
c. Amyloidosis
d. Actinomycosis

51. Which of the following about yaws is incorrect? *(PGI 88)*
a. Caused by Treponema pertenue
b. Spread by direct contact
c. Sexually transmitted
d. Penicillin is used as treatment

52. Painless effusions in joints in congenital syphilis is called: *(All India 95)*
a. Clutton's joints
b. Banton's joints
c. Charcot's joints
d. Synovitis

53. All are features of gummatous ulcer except: *(APPG 96)*
a. Punched out edges
b. Syphylitic in nature
c. Wash leather slough
d. Erythematous base

54. Thymus gland abscess seen in congenital syphilis is called: *(PGI 80, AIIMS 86)*
a. Fouchier's abscess
b. Politzeri abscess
c. Douglas abscess
d. Dubois abscess

55. A mentally retarded child aged 12 years has multiple, painful, discharging shiny white lesions around the anus. Which of the following is the most probable diagnosis:
a. Lupus vlugaris
b. Carcinoma *(UPSC 97)*
c. Syphilitic condyloma
d. Hemorrhoids

LEPROSY

56. Globi is seen in leprosy: *(PGI 88)*
a. Tuberculoid
b. Lepromatous
c. Border line
d. Borderline tuberculoid

57. Which of the following parts of the body is not affected by leprosy? *(PGI 88)*
a. Testes
b. Ovary
c. Nasal mucosa
d. Axilla

58. Leonine facies is seen in leprosy: *(PGI 88)*
a. Tuberculoid
b. Borderline
c. Lepromatous
d. Borderline tuberculoid

59. Most commonly affected peripheral nerve in leprosy is: *(PGI 88)*
a. Ulnar
b. Radial
c. Medial
d. Lateral Popliteal

ACTINOMYCOSIS

60. Actinomycosis is sensitive to: *(PGI 88)*
a. Streptomycin
b. Nystatin
c. Penicillin
d. Iodox-uridine

61. Most common form of actinomycosis is: *(JIPMER 87,PGI 88)*
a. Fascio cervical
b. Thoracic
c. Right iliac fossa
d. Liver

62. A patient with a fistula and chronic pus discharge from lower face and mandible is most commonly suffering from: *(Kerala 89)*
a. Dental cyst
b. Vincent's angina
c. Ludwig's angina
d. Actinomycosis

HIV AND COMPLICATIONS

63. In AIDS, lymphadenopathy is most often due to:
a. TB *(PGI Dec 97)*
b. Lymphoma
c. Non specific enlargement of lymph node
d. Kaposi's sarcoma

64. The HIV virus can be transmitted by the following routes, except: *(Karnataka 94)*
a. Homosexual contact
b. Intact skin
c. Materno-fetal
d. Needle prick

65. The high risk groups for transmission of HIV virus include the following except: *(Karnataka 94)*
a. Homosexuals
b. Hemophiliacs
c. Children of HIV mothers
d. Health care workers

66. Universal (standard) precautions to be observed by surgeons for the prevention of hospital acquire HIV infection include the following except: *(UPSC 2005)*
a. Wearing gloves and other barrier precaution
b. Washing hands on contamination
c. Handling sharp instruments with care
d. Pre-operative screening of all patients of HIV

ANTHRAX

67. Most common form of anthrax is: *(PGI 88)*
a. Wool sorters disease
b. Alimentary type
c. Cutaneous type
d. None of the above

68. Malignant pustule occurs in: *(KGMC 2011)*
a. Melanoma
b. Gas gangrene
c. Ovarian tumour
d. Anthrax

HAND INFECTIONS

69. Most common hand infection is due to: *(DPG 2008)*
a. E. coli
b. Staph. aureus
c. Streptococcus
d. Pseudomonas

70. From the index finger infection goes to: *(AIIMS Nov 96)*
a. Thenar space
b. Hypothenar space
c. Mid-palmar space
d. Space of parona

71. Felon is: *(DPG 2005)*
a. Mid palmer space infection
b. Terminal pulp space infection
c. Infection of ulnar bursa
d. Infection of radial bursa

72. Pulp space infection is known as: *(MHSSMCET 2009)*
a. Felon
b. Paronychia
c. Perinoychia
d. Onychonychia

73. Which of the following should not be treated with surgery? *(MHPGMET 2005)*
a. Felon
b. Acute paronychia
c. Herpetic whitlow
d. Chronic paronychia

INTRA-ABDOMINAL INFECTIONS

74. Sub phrenic abscess, not seen is: *(DPG 2006)*
a. Air fluid level
b. Leucopenia
c. More common on right side
d. Associated with shoulder pain

75. In which of the following condition burst abdomen is commonly associated? *(PGI Dec 2005)*
a. Drainage coming out through the wound
b. Non absorbable sutures
c. Interrupted sutures
d. Medial incision is more risk (as compared to transverse incision)
e. Transverse incision is better than paramedian incision

76. Infection of all the following structures can be cause psoas abscess except: *(DPG 2009 March)*
a. Vertebrae
b. Appendix
c. Hip joint
d. Ribs

77. All of the following favor postoperative wound dehiscence except: *(Karnataka 2005)*
a. Malignancy
b. Vitamin B complex deficiency
c. Hypoproteinaemia
d. Jaundice

78. Which of the following is the most pathognomonic sign of impending burst abdomen?
a. Fever
b. Shock
c. Pain
d. Serosanguinous discharge

MISCELLANEOUS

79. Chronic burrowing ulcer is caused by: *(All India 2007, AIIMS May 2008)*
a. Microaerophilic streptococci
b. Peptostreptococcus
c. Streptococcus viridians
d. Streptococcus pyogenes

80. In a surgical patient, the causes of non-surgical infection: *(DPG 2010, PGI June 2004)*
a. Lower RTI
b. Wound infection
c. Clostridium difficile diarrhea
d. UTI

81. Mycotic abscesses are due to: *(All India 2006)*
a. Bacterial infection
b. Fungal infection
c. Viral infection
d. Mixed infection

82. Golden period for treatment of open wound in hours:
a. 4
b. 6 *(AIIMS 86, 88)*
c. 12
d. 24

83. Sardonic grin is associated with: *(AIIMS 87)*
a. Rabies
b. Tetanus
c. Bell's palsy
d. Hemiplegia

84. Scrum pox is seen among players: *(PGI 88)*
a. Football
b. Hockey
c. Rugby
d. Chess

85. Multiple fistula in ano commonly occurs in: *(TN 91)*
a. Tuberculosis
b. Gonococcal protocolitis
c. LGV
d. Colloid carcinoma of rectum

86. Follman's balanitis is caused by: *(Kerala 2003)*
a. Trichomonas
b. Candida
c. H. Ducreyl
d. None

87. All of the following are perils of prolonged antibiotic therapy in intra abdominal sepsis except:
a. Masking of general signs
b. Subacute intestinal obstruction
c. Malignant change
d. Frozen pelvis

88. Pyrexia due to wound infection commonly occurs after:
a. Third post operation day *(PGI 81, AMU 87)*
b. Fifth post operation day
c. Seventh post operation day
d. Second post operation day

89. Hilton's method of treatment of an axillary abscess is advised because it: *(Karnataka 94)*
a. Protects vital structure
b. Ensures adequate drainage
c. Hinders the spread of infection
d. Allows local instillation of antibiotics

90. Antibioma is best treated by: *(JIPMER 95)*
a. Partial resection
b. Complete resection
c. Aspiration
d. Administration of antibiotics

91. True about surgical wounds: *(PGI Nov 2010)*
a. No antibiotics required in clean surgery
b. Incision of abscess is done in contaminated wound
c. Spillage of stomach content converts a clean/contaminated case to a contaminated case
d. In clean/contaminated wounds infection rate is 10%
e. Hernia repair is contaminated wound

92. Anaerobic infection is precipitated by: *(MHPGMCET 2001)*
a. Trauma
b. Impaired circulation
c. Tissue necrosis
d. All of the above

93. Hilton's method is used in: *(MHSSMCET 2005)*
a. To minimize the scar
b. To prevent injury to vital structure
c. To have complete drainage
d. To drain large abscesses

EXPLANATIONS

STERILIZATION AND DISINFECTION

1. **Ans. a. Isolation ward, b. Facemask, d. Keep isolated in a room with negative pressure** *(Ref: Prevention of Hospital Acquired Infection by WHO)*

Preventive Measure for Hospital Acquired Infection

- **Isolation: Infective patients** must be isolated in **room with adequate ventilation** and **negative pressure**Q
- **Hospital staff:** Those who are suffering from skin disease, sore throat, common cold, ear infection diarrhea or dysentery and other infections ailments should be **kept away from work until complete cured**Q.

> - **Hand washing**Q**:** The **most common route of infection** is **via the hands**Q. Hands washing with soap and water may not be sufficient; a **suitable disinfectant must be employed** for hand washingQ.

- **Dust control:** Hospital dust contains numerous bacteria and virus. Suppression of dust by **wet dusting** and **vacuum (negative pressure) cleaning**Q are important control measure.
- **Disinfection:** the article used by the patient as well as patient's urine, feces, sputum should properly disinfect. **Proper sterilization**Q of instrument should be enforced.
- **Control of droplet infection:** Use of **face masks**Q, proper bad spacing, prevention of overcrowding and ensuring adequate lighting and ventilation are important control measure
- **Nursing technique:** Barrier nursing and task nursing have also been recommended to minimize cross infection.
- **Administrative measures:** There should be a **hospital control infection committee**Q to form late policies regarding control of hospital acquired infection.

2. **Ans. b. Air-conditioning**
3. **Ans. b. 2% glutaraldehyde for 20 min** *(Ref: Bailey 24/e p135)*

Techniques of Sterilization	
Steam (121°C for 15 minutes)	• Surgical instrumentsQ
Ethylene oxide	• **Heart lung machine**Q, respirators, dental labs
Hot air oven	• **Glass syringe**Q**, test tubes, flasks**Q, cutting instruments
Irradiation **(gamma rays)**	• **Industrial packaging**Q
Paracetic acid (STERIS)	• **Flexible endoscopes**Q
Isopropyl alcohol	• **Clinical thermometer**Q
Beta propiolactone >Formaldehyde	• **Fumigation of OT, labs, wards**Q
2% Glutaraldehyde	• **Endoscope (cystoscope, bronchoscope)**Q
Autoclaving	• **Culture media, suture materials except catgut**Q

4. **Ans. b. Phenol** *(Ref: Anantnarayan 7/e p31)*

Sporicidal Agents	
• **Ethylene oxide**Q • **Glutaraldehyde**Q	• **Halogens**Q • **Ozone**Q

5. **Ans. d. Peracetic acid**
6. **Ans. c. Glutaraldehyde**

PREVENTION OF INFECTION AND PROPHYLAXIS

7. **Ans. c. At the time of induction** *(Ref: Sabiston 19/e p251-252; Schwartz 10/e p142, 9/e p119, 222; Bailey 25/e p41)*

Prophylactic Antibiotics

- **Antibiotics** should be used **when local wound defenses** are **not established** (the decisive period).
- Ideally, **maximal blood** and **tissue levels** should be **present at the time** at which the **first incision** is made and before contamination occurs.

- **IV** administration at **induction**Q **of anesthesia** is optimal.
- If induction is not mentioned in the option go for **30 minutes** to **1 hour before surgery**Q.

- In **long operations,** those involving the **insertion of a prosthesis**, when there is **excessive blood loss** or when **unexpected contamination** occurs, antibiotics may be **repeated 8** and **16 hours later**Q**.**
- The use of the newer, **broad-spectrum antibiotics for prophylaxis should be avoided**Q**.**
- **Benzylpenicillin**Q should be used if **Clostridium** gas gangrene infection is a possibility
- Patients with **heart valve** disease or a **prosthesis** should be **protected** from bacteraemia caused by **dental work, urethral instrumentation or visceral surgery**Q

8. **Ans. c. Prophylaxis for colorectal surgery** *(Ref: Sabiston 19/e p251-252)*

Prophylactic systemic antibiotics reduce infection and are **clinically beneficial in the following circumstances**	
• **High-risk gastroduodenal procedures:** Operations for **gastric cancer, ulcer**Q**, obstruction,** or **bleeding** • **High-risk biliary procedures:** Operations in patients **>60 years, CBD stones**, or **jaundice**, previous **biliary tract operations** or endoscopic biliary manipulation • **Resection** and **anastomosis** of the **colon**Q or small intestine • **Cardiac procedures** through a median sternotomy • **Vascular surgery** of the **lower extremities** or **abdominal aorta**Q • Operations entering the **oropharyngeal cavity**Q • Implantation of any **permanent prosthetic material**Q	• **Amputation** of an extremity with **impaired blood supply**Q, particularly in the presence of a current or recent ischemic ulcer • **Craniotomy** • Any wound with known **gross bacterial contamination**Q • **Accidental wounds** with **heavy contamination** and tissue damageQ. • Injuries prone to **clostridial infection** because of **extensive devitalization** of muscle, **heavy contamination,** or **impairment of the blood supply**Q

9. **Ans. d. 1 hour before surgery and continue after surgery**
10. **Ans. a. At the time of induction**
11. **Ans. b. At the time of induction of anesthesia**
12. **Ans. a. At the induction of anesthesia**
13. **Ans. c. Just before operation**
14. **Ans. d. Practice proper hand washing** *(Ref: Bailey 25/e p43)*

Avoiding Surgical Site Infections

- **Staff** should **always wash their hands** between patientsQ
- **Length of patient stay** should be **kept** to a **minimum**Q
- **Preoperative shaving** should be **avoided** if possibleQ
- **Antiseptic skin preparation** should be standardizedQ
- Attention to theatre technique and disciplineQ
- **Avoid hypothermia** perioperatively and ensure **supplemental oxygenation** in recoveryQ

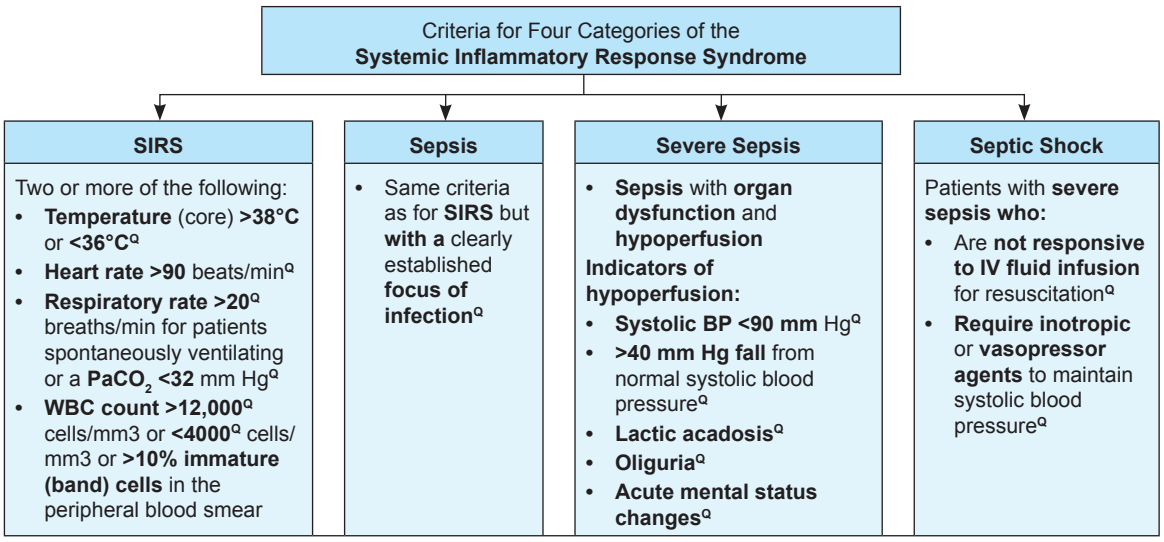
15. **Ans. b. Proper hand washing of all ward personnel**
16. **Ans. b. Meticulous hand washing before and after contact with patients**
17. **Ans. d. Biliary surgery** *(Ref: www.ncbi.nlm.nih.gov/pubmed/8526441)*

Prophylactic Antibiotics in Biliary Surgery

- **Prophylactic antibiotics in biliary surgery** are designed to **reduce** the **incidence of postoperative wound infections.**
- The efficacy of antibiotics in the prevention of wound infections has been demonstrated with first, second and third generation **cephalosporins, ampicillin**Q associated with clavulanate, **ureido-penicillins, aminoglycosides, sulfonamides** and **quinolones.**

SIRS AND MODS

18. **Ans. b. WBC>12x109/L or <4x109/L, c. Respiratory rate>24 breaths/minute and heart rate>90 beats/minute** *(Ref: Sabiston 19/e p590; Schwartz 10/e p19,138, 9/e p116-117; Bailey 25/e p37-38)*



19. **Ans. a. Sepsis**

20. **Ans. d. All of the above**

CELLULITIS AND PYOGENIC BACTERIAL INFECTION

21. **Ans. a. Broad spectrum antibiotics should be started, c. Immediate debridement + IV antibiotic has main role in treatment, d. Hyperbaric O_2 is useful** *(Ref: Sabiston 19/e p2011; Bailey 25/e p39-40)*

Necrotizing Fasciitis

- Necrotizing fasciitis is a **rapidly progressive bacterial infection** characterized by involvement and **necrosis of** the **subcutaneous tissue** and **fascia**, with typical **sparing of** the **underlying muscle**.
- **MC site of infection: Lower extremities**
- May involve trunk, **perineum** (**Fournier's gangrene**) or head and neck and any other site.

Etiological Agents

- **MC single etiological agents: Group A beta hemolytic streptococci**
  - More commonly, **necrotizing fasciitis** results from a **polymicrobial synergistic infection**
- Microorganism responsible: **Group A beta hemolytic streptococci** + Staphylococcus, E. coli, Pseudomonas, Proteus, Bacteroides/Clostridium (**Anaerobes**)

Risk Factors for Necrotizing Fasciitis		
• **Diabetes**	• **Smoking**	• Peripheral vascular disease
• Pressure sores	• **Penetrating trauma**	• **Skin infection / damage** (abrasions, bites, boils)
• **Immunocompromised states**	• **Obesity**	
	• **IV drug abuse**	

Clinical Presentation

- **Pain** is the **most important presenting symptom**
- **Pain** is **disproportionately greater** than that expected from degree of cellulites present
  - Without treatment **pain may decrease due to thrombosis of small blood vessels** and **destruction of peripheral nerves** (an **ominous sign**)
- **Skin Features: Edema, erythema** (Infected area is red, hot, shiny, swollen and exquisitely tender)
- **Woody hard texture** to subcutaneous tissue
- Inability to distinguish fascial planes and muscle groups on palpation
- **Skin vesicles / cutaneous bullae, soft tissue crepitus** due to **gas production** may be seen when necrotizing fasciitis is caused due to mixed flora but not due to group A streptococcus
- **Systemic features:** Fever, **hypotension**, tachycardia, progression to **septic shock, DIC** or **multiple organ failure**

Management

- This is a **surgical emergency** and **surgical debridement is mandatory**[Q]
  - **Treatment: Urgent surgical debridement + IV fluids + Broad spectrum IV antibiotics + Supportive treatment**[Q]
- **Mortality rate** is nearly **100% without surgical debridement**[Q]
- **Hyperbaric oxygen** helps in **wound healing**[Q]

22. Ans. c. Localized infection, d. Abscess if any should be managed conservatively *(Ref: Sabiston 19/e p1740; Schwartz 10/e p151,483, 9/e p126-127; Bailey 25/e p37)*

Cellulitis

- It is **non-suppurative inflammation, spreading along** the **subcutaneous tissues** and **connective tissue planes** and across intercellular spaces[Q].
- The term is a misnomer, as the **lesion** is one of the **connective** and **interstitial tissue** and not of the cells.
  - **MC causative organism: Streptococcus pyogenes**[Q]

Pathology

- The **organism** usually gains **access through a wound** or **scratch or** following **surgical incision**[Q]**.**
- There is **wide speared swelling** and **redness** at the area of inflammation, but without definite localization **blebs** and **bullae** form on the skin. **Central necrosis** may occur **at later stage**[Q]**.**

Clinical Features

- There is varying degree of **fever** and **toxemia. Affected part** is very much **swollen** and **painful**[Q]**.**
- **Diabetic individual** often suffer from cellulitis[Q]
- **Examination:** Affected part is warm, swollen and tender, there is **pitting edema** and **brawny induration. Surrounding lymph vessels** may be seen as **red streaks** due to lymphangitis[Q].

Treatment

- **Rest** and **elevation** of the part to reduce edema; Appropriate **antibiotic** preferably broad spectrum[Q]
- **Penicillin** is **still sensitive against streptococci**[Q]
  - **Failure** of inflammatory swelling **to subside after 48 to 72 hours** suggests that an **abscess** has developed. In that case **incision** and **drainage** of the pus should be accomplished[Q].

23. Ans. b. Acute thrombophlebitis **24. Ans. c. Streptococci**

25. Ans. c. Most commonly site is perineum followed by trunk and extremities

- **MC site of necrotizing fasciitis is extremities**[Q] followed by trunk and perineum (Fournier's gangrene).

26. Ans. c. Strep. pyogenes *(Ref: Bailey 25/e p600)*

Erysipelas

- This is a **sharply demarcated streptococcal infection** of the **superficial lymphatic vessels**, usually associated with **broken skin** on the face[Q].

Clinical Features

- Affected area is **erythematous** and **edematous.** Patient may be **febrile** and have a **leucocytosis**[Q]**.**

Treatment

- Prompt administration of **broad-spectrum antibiotics after** swabbing the area for **culture and sensitivity** is usually all that is necessary.

27. Ans. b. Contagious and infectious, d. Common in tropics **28. Ans. c. Virulent strains of organism**

29. Ans. b. Penicillin

30. Ans. a. Incision and drainage, d. Wide excision *(Ref: www.ncbi.nlm.nih.gov)*

Carbuncle

- A **carbuncle** is an abscess larger than a boil, usually with one or more openings draining pus onto the skin.
- **Most commonly** caused by **Staphylococcus aureus**[Q]**; MC location: Nape of the neck**[Q]**.**

Etiology

- **Triggers for carbuncle: Folliculitis, friction** from clothing or shaving, having the **hair pulled out,** generally **poor hygiene, poor nutrition** or **weakening of immunity**Q.
- Persons with **diabetes**Q and **immune system diseases** are **more likely** to develop carbuncles.

Clinical Features

- **Carbuncle:** Made up of several skin boils, infected mass is filled with fluid, pus and dead tissues.
- It may be **red** and **irritated, grow very fast** and have a **white** or **yellow center**Q.

Treatment

- **Proper excision by cruciate incision**Q will usually treat the condition effectively
- **Surgical incision** and **drainage** of **all suppurative collections** with **antibiotics**Q.

31. **Ans. a. Hair follicle** *(Ref: Schwartz 10/e p474, 9/e p409)*

- **Folliculitis, carbuncles** and **furuncles** are all types of localized (superficial) skin infections that fall under the category of **boils**Q.
- **Hair follicles** serve as **portals for a number of bacteria**, although **S. aureus** is the **MC cause of localized folliculitis**Q.

32. **Ans. a. Infection of skin and subcutaneous tissue, b. Fever and malaise are common, c. Margins are distinct, e. Involved site is red and hot**

33. **Ans. a. Debridement**

34. **Ans. d. Caused by streptococcus**

GAS GANGRENE

35. **Ans. c. Cl. perfringens** *(Ref: Harrison 18/e p1208; Ananthnarayan 8/e p256)*

Gas Gangrene

- Caused by **C. perfringens (Gram-positive, anaerobic, spore-bearing** bacilli are widely found in **soil** and **feces)**Q.
- This is relevant to **military, traumatic surgery** and **colorectal operations**Q.

Risk Factors

- **Immunocompromised, diabetics** or patients with **malignant disease**Q
- Wounds containing **necrotic** or **foreign material**, resulting **in anaerobic conditions**Q

Clinical Features

- **Severe local wound pain** and **crepitus (gas in the tissues**, which may also be **noted on plain radiographs)**Q.
- The **wound produces** a **thin, brown, sweet smelling exudate**Q, in which Gram staining will reveal bacteria.
  - **Gas** and **smell** are **characteristic**Q
  - If septicemia occurs, **gas** may be **produced** in the other organ, notably the **liver** known as '**foaming liver**'Q.
- **Edema** and **spreading gangrene** follow the release of **collagenase, hyaluronidase**, other proteases and **alpha toxin**Q.
- **Early systemic complications** with **circulatory collapse** and **multi-organ failure**Q follow if prompt action is not taken

Treatment

- **Antibiotic prophylaxis** in patients at risk, especially when **amputations** are performed **for peripheral vascular disease with open necrotic ulceration**Q.
  - Once a **gas gangrene infection is established, large doses of IV penicillin** and **aggressive debridement** of affected tissues are requiredQ.
  - The use of **hyperbaric oxygen** is controversial.

- **Closure of traumatic wounds** or **compound fractures** should be **delayed for 5–6 days**Q until it is certain that these sites are free of infection.
  - **Passive anti-gas gangrene serum** given **IM** or **in emergencies IV**Q used to be common practice in prophylaxis.

36. **Ans. a. IV administration of anti-gas gangrene serum, b. Penicillin, d. Surgical debridement**

37. **Ans. a. Caused by Clostridium tetani**

38. **Ans. b. Gas gangrene, c. Frostbite**

39. **Ans. b. Clostridium perfringens is a gram-negative spore-bearing bacillus**

40. **Ans. c. Proper wound debridement**

41. **Ans. a. Ringer lactate**
42. **Ans. a. Debridement of wound, b. Systemic penicillin**
43. **Ans. c. Gas gangrene**

TETANUS

44. **Ans. a. Cl. tetani** *(Ref: Schwartz 10/e p186,264, 9/e p156, 228; Bailey 25/e p39)*

Tetanus

- Caused by **Clostridium tetani (anaerobic, terminal spore-bearing, Gram-positive** bacterium)Q following implantation into tissues or a wound
- **Spores** are widespread in **soil** and **manure**, and so the infection is **more common in traumatic civilian** or **military wounds.**

Clinical Features

- Signs and symptoms of tetanus are mediated by the release of the **exotoxin tetanospasmin,** which **affects myoneural junctions** and the **motor neurons** of the **anterior horn** of the spinal cord.
- **MC initial symptoms: Trismus (lockjaw)Q, muscle pain** and **stiffness**, back pain, and difficulty swallowing.

- A **short prodromal period**, which has a **poor prognosis**, leads to **spasms** in the distribution of the **short motor nerves of** the **face** followed by the **development of severe generalised motor spasms** including **opsithotonus, respiratory arrest** and **death**Q.
- A **longer prodromal period** of 4–5 weeks is **associated with** a **milder form of** the **disease**Q.

- The **entry wound** may show a **localized small area of cellulitis**; exudate or aspiration may give a sample that can be stained to show the presence of Gram-positive rods.

- **Risus sardonicus (sardonic grinQ):** Highly characteristic, abnormal, **sustained spasm of** the **facial muscles** that appears to **produce grinning**

Treatment

- **Prophylaxis with tetanus toxoid** is the **best preventative treatment**Q.
- **Established infection: Minor debridement** of the wound with antibiotic **benzylpenicillin**Q
- **Relaxants** may also be required, and the patient may require **ventilation in severe forms**, which may be associated with a high mortality.
- **Anti-toxin using human immunoglobulin** for both **at-risk wounds** and **established infection**Q.

45. **Ans. c. Urinary incontinence**
46. **Ans. b. First symptom to spasm**

TUBERCULOSIS

47. **Ans. a. Seen in children and young adults, c. History of contact or drinking infected milk, d. Mostly cervical** *(Ref: Bailey 25/e p37)*

Tuberculous Lymphadenitis

- Most commonly affects **children** or **young adults**Q, but can occur at any age.
- **Deep upper cervical nodes** are **most commonly affected**Q, but there may be a widespread cervical lymphadenitis with many matting together.

- In most cases, the **tubercular bacilli gain entrance through** the **tonsil** of the corresponding side as the lymphadenopathy.
- Both **bovine**Q and **human tuberculosis** may be responsible.

Pathology

- In approximately **80% of patients**, the **tuberculous process is limited to the clinically affected group of lymph nodes**Q, but a primary focus in the lungs must always be suspected.
- If **treatment** is **not instituted**, the **caseated node** may **liquefy** and **break down** with the formation of a **cold abscess**Q in the neck.

- **Collar-stud abscess**Q**:** Pus is initially confined by the **deep cervical fascia**, but after weeks or months, this may **become eroded at one point, pus flows through the small opening** into the **space beneath the superficial fascia** known as **'collar-stud' abscess.**

Treatment

- **Treatment: ATT**
- If an **abscess fails to resolve despite ATT: Excision of the abscess** and its surrounding **fibrous capsule** with the **relevant lymph nodes**Q.

48. **Ans. c. Staphylococcal skin infection** *(Ref: Sabiston 19/e p1831-1832; Schwartz 10/e p1602, 9/e p1414; Bailey 25/e p37)*

ACUTE LYMPHADENITIS

- **Enlarged tender lymph nodes** are usually the result of a **bacterial infection** (**staphylococcal**[Q] or **streptococcal**).
- **Treatment of** the **primary cause** (e.g., **otitis media** or **pharyngitis**) **with antibiotics** often is all that is necessary.
- **Fluctuant nodes: Incision** and **drainage**[Q]

SYPHILIS

49. **Ans. b. Syphilis** *(Ref: Rook's 7/e p30.1-30.30, 25.20-39)*

Congenital Syphilis

Early Congenital Syphilis

- **Snuffles (rhinitis)**[Q] is **earliest feature.**
- Lesions are **vesicobullous**[Q]
- **Snail track ulcers** on mucosa

Late Congenital Syphilis

- Characterized by **Hutchinson's triad (interstitial keratitis + 8th nerve deafness + Hutchinson's teeth i.e. pegged central upper incisors)**[Q]
- **Saddle nose, sabre tibia, mulberry molars**[Q]
- Bull dog's jaw (protrusion of jaw)
- **Rhagades**[Q] (linear fissure at mouth, nares)
- Frontal bossing, hot cross bun deformity of skull
- **Clutton's joint**[Q] (painless swelling of joints, most commonly both knee)
- **Palatal perforation**[Q]
- **Higaumenakis sign** (periostitis leads to unilateral enlargement of sterna end of clavicle)

Clinical Presentation of Syphilis

Primary Syphilis

- **Painless, indurated, non-bleeding**, usually single **punched out ulcer (hard chancre)**[Q]
- **Painless, rubbery shotty lymphadenopathy**[Q]

Secondary Syphilis

- **Bilateral symmetrical asymptomatic** localized or **diffuse mucocutaneous lesion**[Q] (macule, papule, paulosquamous and rarely pustule)
- **Non-tender generalized lymphadenopathy**[Q]
- **Highly infectious condylomata lata**[Q], in warm moist intertriginous areas
- **Moth eaten alopecia, arthritis, proteinuria**[Q]

Tertiary Syphilis

- **Gumma, neurosyphilis / tabes dorsalis**[Q]
- Ostitis, periostitis
- **Aortitis, aortic insufficiency, coronary stenosis and nocturnal angina**[Q]

50. **Ans. a. Syphilis**

51. **Ans. c. Sexually transmitted** *(Ref: Harrison 18/e p1390-1391)*

YAWS

- Also known as **pian, framboesia,** or **bouba**; Caused by **Treponema pertenue**[Q]
- **Infection is transmitted by direct contact** with **infectious lesions**[Q].

Clinical Features

- Characterized by the **development of one** or **several primary lesions** ("**mother Yaws**") followed by **multiple disseminated skin lesions**[Q].
- **All early skin lesions are infectious** and may persist for many months

Treatment

- **Treatment** is normally by a single intramuscular injection of **penicillin**[Q], or by a course of penicillin, **erythromycin** or **tetracycline** tablets

52. **Ans. a. Clutton's joints**

53. **Ans. d. Erythematous base**

54. **Ans. d. Dubois abscess** *(Ref: http://en.wikipedia.org/wiki/Abscess_of_thymus)*

Dubois Abscesses

- An **abscess of** the **thymus** associated with **congenital syphilis**[Q]
- It can present with **chest pain** behind the sternum.

55. **Ans. c. Syphilitic condyloma**

LEPROSY

56. **Ans. b. Lepromatous** *(Ref: Rooks 7/e p29.1-29.19)*

Type of leprosy	Characteristic feature
Neuritic	• Slit smear negative[Q]
TT	• **Single skin lesion**[Q] • **MC type** in **India** and **Africa**[Q]
BT	• **Satellite lesion**[Q] • **MC type** in **South East Asia**[Q]
BB>BL	• **Inverted saucer lesion**[Q]
LL	• **Subepidermal free zone**[Q] • **Globi**[Q] are seen • **Lucio phenomenon**[Q] • **Lozarine leprosy reaction**[Q] • **Leonine facies**[Q]

Leprosy

- **MC affected peripheral nerve** in leprosy: **Ulnar nerve**[Q]
- **Organ not involved** in leprosy: **Ovary**[Q]

57. **Ans. b. Ovary**
58. **Ans. c. Lepromatous**
59. **Ans. a. Ulnar**

ACTINOMYCOSIS

60. **Ans. c. Penicillin** *(Ref: Harrison 18/e p1326; Sabiston 19/e p1589)*

Actinomycosis

- Actinomycosis is a **granulomatous suppurative bacterial disease** caused by **Actinomyces**[Q].
- Usually **results following tooth extraction, odontogenic infection**, or **facial trauma**[Q].

Clinical Features

- **Oral-cervicofacial disease** is the **MC form**[Q], **characterized by** a **painless "lumpy jaw."**
- **Pelvic actinomycosis** is a rare but **proven complication of use of intrauterine devices**[Q].

Diagnosis

- Accurate diagnosis depends on **careful histologic analysis.**
- **Presence of sulfur granules within purulent specimen** is **pathognomonic**[Q].

Treatment

- **Penicillin** and **sulfonamides**[Q] are typically effective against these infections.

61. **Ans. a. Fascio cervical**

62. **Ans. d. Actinomycosis**

HIV AND COMPLICATIONS

63. **Ans. c. Non specific enlargement of lymph node** *(Ref: Harrison 18/e p466, 1525)*

Persistent Generalized Lymphadenopathy (PGL)

- **HIV patients** develop **PGL** as an **early clinical manifestation** of HIV infection[Q].
- PGL is defined as presence of **>1 LN** in **two or three extra-inguinal sites** for **>3 months without an obvious cause**[Q].
- Enlargement is due to **follicular hyperplasia**[Q].

64. **Ans. b. Intact skin**

65. **Ans. d. Health care workers**

66. **Ans. d. Pre-operative screening of all patients of HIV** *(Ref: en.wikipedia.org/wiki/Universal_precautions)*

Universal Precautions

- **Universal precautions** refers to the practice, in medicine, of **avoiding contact with patient's bodily fluids**, by means of the **wearing of nonporous articles** such as **medical gloves, goggles,** and **face shields**Q.
  - Includes **good hygiene habits**, such as **hand washing** and the **use of gloves** and **other barriers, correct handling of hypodermic needles** and **scalpels**, and **aseptic techniques**Q.
- **Protective clothing include:** Barrier gowns, gloves, eyewear (goggles or glasses) and face shieldsQ
- **Typically practiced against: Blood, semen, vaginal secretions**Q, synovial fluid, amniotic fluid, CSF, pleural fluid, peritoneal fluid, pericardial fluid

ANTHRAX

67. **Ans. c. Cutaneous type** *(Ref: Harrison 18/e p1769-1771)*

Anthrax

- Caused by **Bacillus anthracis**Q
- Three major clinical forms: **Cutaneous**Q **(MC)**, gastrointestinal and inhalational

Risk Factors for Necrotizing Fasciitis	
Woolsorters' disease	• **Occupational hazard for people who sorted wool**Q • **Most dangerous form** of **inhalational anthrax**Q
Hide porter's disease	• Caused by **contact with contaminated hair, wool, hides** or **products made from them (Hide-porter's disease)**Q
Malignant pustule	• Commonly seen in **head and neck**Q • **Eschar stage** that appears 2-6 days after the hemorrhagic vesicle dries to become a **depressed black scab**Q surrounded by redness and extensive edema

68. **Ans. d. Anthrax**

HAND INFECTIONS

69. **Ans. b. Staph. aureus** *(Ref: Sabiston 19/e p1977; Bailey 25/e p507)*

Hand Infection

- **Infections of hand** are most commonly caused by **staphylococcus aureus** in **80% of cases**Q.

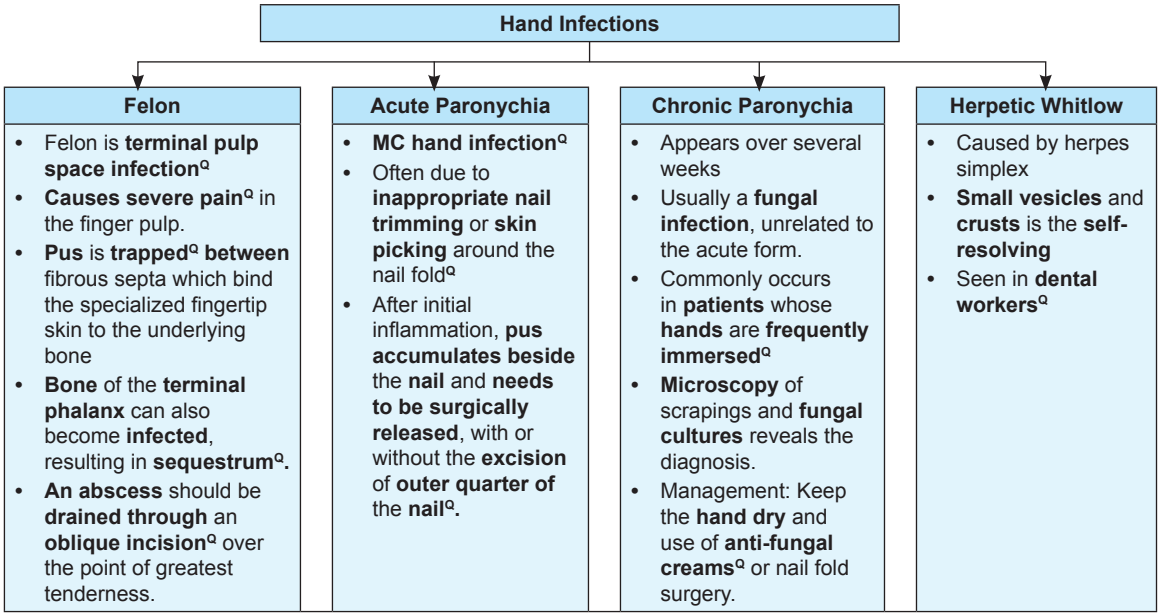
Management

- **Elevation, splinting** and **antibiotics** if no pus; **Surgical drainage** if **pus** is presentQ
- **Tendon sheath pus** needs **irrigation**Q
- **Bites** should be **explored**, cleaned and managed with **broad-spectrum antibiotics**Q
- All infections need **early mobilization** once inflammation settlesQ

70. **Ans. a. Thenar space** *(Ref: BDC 4/e vol I/129; Keith and Moore 4/e p765)*

Infection from	Can spread to
Thumb	• **Thenar space**Q
Index finger	• **Thenar space**Q
Middle finger	• **Mid-palmar space**Q
Ring-finger	• **Mid-palmar space**Q
Little finger	• **Ulnar bursa** and **forearm space of parona**Q

71. **Ans. b. Terminal pulp space infection** *(Ref: Bailey and Love 25/e p507)*



72. **Ans. a. Felon**

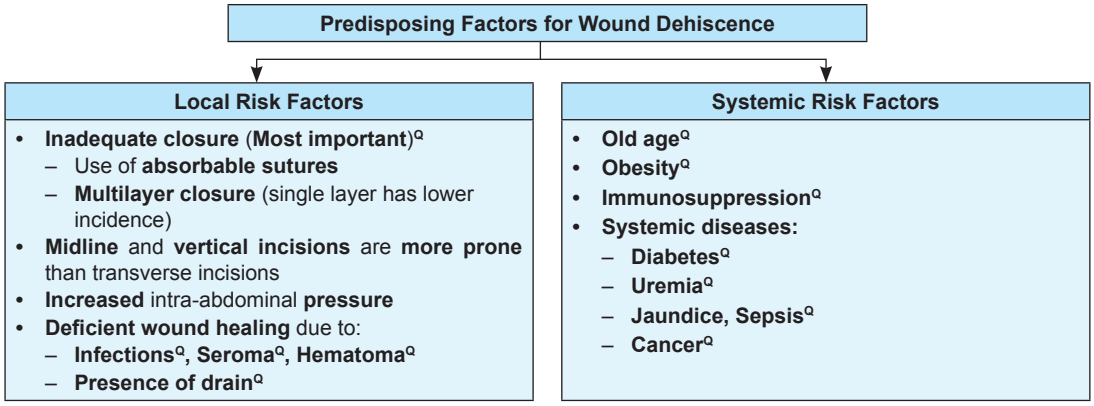
73. **Ans. c. Herpetic whitlow**

INTRA-ABDOMINAL INFECTIONS

74. **Ans. b. Leucopenia**

Leucocytosis is seen in subphrenic abscess, not the leucopenia.

75. **Ans. a. Drainage coming out through the wound, d. Medial incision is more risk (as compared to transverse incision), e. Transverse incision is better than paramedian incision** *(Ref: CSDT 11/e p24)*



Wound Dehiscence (Burst Abdomen)

- **Serous** or **serosanguinous discharge** from the wound is the **first sign**[Q] of dehiscence
  - **Most commonly** observed between 5th and 8th post-operative day[Q] (may occur at any time following wound closure)
- Wound dehiscence is **partial** or **total disruption** of any or all layers of the operative wound.
- **Extrusion** of **abdominal viscera** after rupture of all layers is known as **evisceration**[Q].

Management

- **Wound dehiscence** without evisceration: **Prompt elective closure**[Q] of the wound
- **Wound dehiscence with evisceration:**
  - Wound is **covered with moist towels**
  - Under GA, **any exposed bowel** or **omentum** is rinsed with **RL** containing **antibiotics** and then **returned to abdomen**
  - Previous sutures are removed, wound is reclosed (**Tension suturing**[Q])

76. Ans. d. Ribs *(Ref: en.wikipedia.org/wiki/Psoas_muscle_abscess)*

Causes of Secondary Psoas Abscess	
• Crohn's disease	• Diverticulitis
• **Appendicitis**Q	• Colon cancer
• Ulcerative colitis	• **Vertebral osteomyelitis**Q

- A **prosthetic infection of hip** can give rise to **psoas abscess**Q.

77. Ans. b. Vitamin B complex deficiency

78. Ans. d. Serosanguinous discharge

MISCELLANEOUS

79. Ans. a. Microaerophilic streptococci *(Ref: Dorland's Medical Dictionary 28/e p1770, 1771; Bailey 25/e p39)*

Chronic Burrowing ulcer

- Caused by **synergistic infection** of **Microaerophilic non-hemolytic Streptococci** and aerobic hemolytic staphylococci.
- Also known as **burrowing phagedenic ulcer, Meleney's ulcer, progressive synergistic gangrene**
- Associated with the **formation of burrowing cutaneous fissures** and **sinus tracts** that open at distant sites. (**Meleney's burrowing ulcers**)

80. Ans. a. Lower RTI, c. Clostridium difficile diarrhea, d. UTI *(Ref: Sabiston 19/e p244-250)*

Hospital Acquired Infection (HAI)

- Infection that **follows surgery** or **admission to hospital**
- **Common HAI are:**
  - **Respiratory infections**Q (including ventilator-associated pneumonia)
  - **UTI**Q (mostly related to urinary catheters),
  - **Bacteraemia** (mostly related to indwelling vascular catheters)
  - **Surgical site infections**Q
  - **Antibiotic associated diarrhea**, caused by Clostridium difficileQ

- **MC** nosocomial or **hospital acquired infection: Surgical site infections**Q
- **MC non-surgical** hospital acquired infection: **UTI**Q

81. Ans. b. Fungal infection

82. Ans. a. 4

83. Ans. b. Tetanus

84. Ans. c. Rugby *(Ref: http://en.wikipedia.org/wiki/Herpes_gladiatorum)*

Herpes Gladiatorum

- **Herpes Gladiatorum** is one of the most infectious of **herpes-caused diseases** transmitted by **skin-to-skin contact**Q.
- Strongly associated with **contact sports**, also known as **herpes rugbiorum** or "**scrumpox**" (after **rugby football**), "**wrestler's herpes**" or "**mat pox**" (after wrestling)Q.

85. Ans. a. Tuberculosis, c. LGV *(Ref: Bailey 25/e p1262)*

86. Ans. d. None *(Ref: sti.bmj.com/content/51/2/138.full.pdf+html)*

Syphilitic Balanitis of Follmann

- **Syphilitic balanitis of Follmann** is a very rare manifestation of **primary syphilis infection**Q
- Develop after the appearance of the primary chancre

87. Ans. c. Malignant change

88. Ans. b. Fifth post operation day *(Ref: Bailey 25/e p265)*

Causes of Post-operative Fever	
Day	**Cause**
2–5 days	• **Atelectasis** of the lung[Q]
3–5 days	• **Superficial** and **deep wound infection**[Q]
5 days	• **Chest infection** including viral respiratory tract infection, **UTI** and **thrombophlebitis**[Q]
>5 days	• **Wound infection**, anastomotic leakage, intracavitary collections and abscesses[Q]

89. Ans. a. Protects vital structure *(Ref: lessons4medicos.blogspot.com/.../hiltons-method-to-drain-abscesses.)*

Hilton's Method of Abscess Drainage

- **During drainage** of abscess situated in important areas like **axilla** or **groin**[Q], there is chance **of injury to underlying major vessels** and **nerves**[Q] if adequate care is not taken.
- In **drainage of abscess** in such locations, the **skin** and **subcutaneous tissue** are **incised with a knife.**
- **Deep fascia** is **not incised** by sharp knife bur **pierced by thrusting a sinus forceps** through the deep fascia and the **sinus forceps** is then **opened up** to **enlarge** the **opening in** the **deep fascia** for **easy drainage of pus**[Q]**.**

- **Hilton's method protects** underlying important **vessels** and **nerves**[Q]**.**

90. Ans. b. Complete resection *(Ref: www.ncbi.nlm.nih.gov/pubmed/22019686)*

Antibioma

- **Antibiotic induced swelling**
- When an **abscess occur in** the **breast** and **antibiotic** was **given, without** even **draining** the abscess, the **abscess cavity** next will **become fibrous** and it result in **firm to large lump** in the breast.
- Antibioma can be **confused for malignancy, excision** is done

91. Ans. a. No antibiotics required in clean surgery, c. Spillage of stomach content converts a clean/contaminated case to a contaminated case, d. In clean/contaminated wounds infection rate is 10% *(Ref: Sabiston 19/e p251-252; Schwartz 9/e p119, 222)*

- **Prophylactic systemic antibiotics** are **not indicated** for patients undergoing **low-risk straightforward clean surgical operations** in which no obvious bacterial contamination or insertion if a foreign body has occurred[Q].
- **SSI risk** has traditionally been **correlated to wound class**. The accepted range of infection rates has been **1-5 % for clean, 3-11% for clean contaminated**[Q], and **>27% for dirty wounds**
- **Contaminated wounds: Open accidental wounds** encountered early after injury, those with **extensive introduction of bacteria** into a normally sterile area of the body due to **major breaks in sterile technique** (e.g. open cardiac massage), **gross spillage of viscus contents** such as from the **intestine**, or incision through **inflamed**, albeit **nonpurulent tissue**[Q]**.**
- **Hernia repair** is **clean wound**[Q]**.**

92. Ans. d. All of the above

93. Ans. b. To prevent injury to vital structure

CHAPTER 48

Fluid, Electrolyte and Nutrition

MULTIPLE CHOICE QUESTIONS

ENTERAL NUTRITION

1. **The length of the feeding tube to be inserted for transpyloric feeding is measured from the tip of:** *(AIIMS Nov 2002)*
   a. Nose to the umbilicus b. Ear lobe to the umbilicus
   c. Nose to the knee joint d. Ear lobe to the knee joint

2. **Ramesh met an accident with a car and has been in 'deep coma' for the last 15 days. The most suitable route for the administration of protein and calories is by:** *(All India 2002)*
   a. Jejunostomy tube feeding
   b. Gastrostomy tube feeding
   c. Nasogastric tube feeding
   d. Central venous hyperalimentation

3. **Contraindications of enteral nutrition:** *(PGI Dec 2006)*
   a. Intestinal obstruction b. Severe pancreatitis
   c. Severe diarrhea d. IBD
   e. Intestinal fistula

4. **A patient undergoes a prolonged and complicated pancreatic surgery for chronic pancreatitis. Most preferred route for supplementary nutrition in this patient would be:** *(All India 2008)*
   a. Total parenteral nutrition b. Feeding gastrostomy
   c. Feeding jejunostomy d. Oral feeding

5. **Recognized frequent complications of enteral feeding:** *(PGI June 2005)*
   a. Constipation
   b. Diarrhea
   c. Aspiration pneumonia
   d. Hypoglycemia
   e. Hypernatremia

6. **A patient undergoes a prolonged and complicated pancreatic surgery for chronic pancreatitis. Most preferred route for supplementary nutrition in this patient would be:**
   a. Total parenteral nutrition b. Feeding gastrostomy
   c. Feeding jejunostomy d. Oral feeding *(DNB 2009)*

7. **Not a contraindication of enteral nutrition:** *(Punjab 2009)*
   a. Severe diarrhea b. Severe pancreatitis
   c. IBD d. Intestinal fistula

8. **In percutaneous endoscopic gastrostomy (PEG), which of the following is not used?** *(MHSSMCET 2008)*
   a. Push technique b. Pull technique
   c. Retraction method d. Introducer technique

TOTAL PARENTERAL NUTRITION

9. **Parenteral nutrition is not used in:** *(PGI June 2008)*
   a. Enterocutaneous fistula b. Burns
   c. Crohn's disease d. Paralytic ileus
   e. Pancreatitis

10. **A patient on TPN develops deficiency of:** *(PGI Dec 2006)*
    a. Folic acid b. Iron
    c. Vitamin B12 d. Copper
    e. Fatty acids

11. **Which of the following nutrients are not included in TPN?** *(All India 2011)*
    a. Lipids b. Carbohydrates
    c. Proteins d. Fibers

12. **Side-effect(s) of parenteral nutrition is/are:**
    a. Hypoglycemia *(PGI Nov 2011)*
    b. Hyperglycemia c. Hypercalcemia
    d. Hypercapnia e. Hypophosphatemia

13. **Best vein for total parenteral nutrition is:** *(MHPGMCET 2002)*
    a. Subclavian vein b. Femoral vein
    c. Brachial vein d. Saphenous vein

14. **One is not indication of total parenteral nutrition:** *(AIIMS Nov 95)*
    a. Acute pancreatitis b. Enterocolic fistula
    c. Chronic liver disease d. Fecal fistula

15. **TPN is indicated in all except:** *(PGI Dec 2005)*
    a. Short bowel syndrome b. Burn
    c. Sepsis d. Enterocutaneous fistula

16. **Best vein for total parenteral nutrition is:**
    a. Subclavian vein b. Femoral vein
    c. Brachial vein d. Saphenous vein

17. **True about TPN:** *(PGI June 2008)*
    a. Carbohydrate forms about 40% of energy source
    b. In abdominal injury early parenteral nutrition should be started
    c. Proteins forms 60% of energy source
    d. Lipids form 20% of energy source

18. **Which of the following is not acomplication of TPN:**
    a. Hyperammonemia *(JIPMER 2014, 2013)*
    b. Hypercholesterolemia
    c. Neutrophil dysfunction
    d. Hyperphosphatemia

19. **Which of the following is not a complication of Total Parenteral Nutrition?** *(AIIMS Nov 2008)*
    a. Metabolic bone disease
    b. Essential fatty acid deficiency
    c. Congestive cardiac failure
    d. Hypophosphatemia

20. **Most common complication of parenteral nutrition includes all except:** *(MCI Sept 2009)*
    a. Hyperglycemia b. Hyperkalemia
    c. Hyperosmolar dehydration d. Azotemia

21. **Which of the following is preferred for cannulation in TPN?** *(MCI Sept 2009)*
    a. Subclavian vein
    b. Great saphenous vein
    c. Median cubital vein
    d. External jugular vein

22. Which is best method for supplementing nutrition in patients who have undergone massive resection of the small intestine is? *(MCI Sept 2009)*
a. Parenteral b. Enteral
c. Gastrostomy d. All of the above

23. All of the following are complications in a patient on total parenteral nutrition except: *(MCI Sept 2008)*
a. Hypercholesterolemia b. Hyperglycemia
c. Hypotriglyceridemia d. Hypophosphatemia

24. Which of the following is the most common complication of TPN? *(AIIMS 95)*
a. Catheter related complications
b. Acidosis
c. Acaculous cholecystitis
d. Hypokalemia

25. A patient on total parenteral nutrition for 20 days presents with weakness, vertigo and convulsions. Diagnosis is: *(All India 2000)*
a. Hypomagnesemia b. Hyperammonemia
c. Hypercalcemia d. Hyperkalemia

26. In IV hyperalimentation, we give: *(PGI June 2002)*
a. Hypertonic saline b. Fats
c. Amino acids d. Dextrose
e. LMW dextran

27. Complication of TPN include: *(AIIMS 87)*
a. Hyperglycemia
b. Hyperkalemia
c. Hyperosmolar dehydration
d. Azotemia
e. All of the above

28. Albumin infusion for parenteral use is restricted because:
a. It is costly *(AIIMS 84)*
b. Carcinogenic
c. Does not raise oncotic pressure
d. All of the above

29. Following TPN, one expects weight gain after: *(AIIMS 84)*
a. 2 days b. 7 days
c. 4 weeks d. 6 weeks

30. The minimum amount of proteins needed for positive nitrogen balance is: *(PGI 85)*
a. 20-30 gm/day b. 35-40 gm/day
c. 50 gm/day d. 60 gm/day

31. Deficiency of following elements is seen with hyperalimentation except: *(JIPMER 93)*
a. Calcium b. Phosphates
c. Zinc d. Magnesium

32. Following TPN, weight loss is seen: *(Orissa 99)*
a. Up to 7 days b. 7-10th day
c. 10-15th day d. 15th day onwards

33. TPN may be complicated by: *(AIIMS 80, 81)*
a. Obstructive jaundice b. Hyperosteosis
c. Hypercalcemia d. Pancreatitis

34. Complication of total parenternal nutrition is: *(Recent Questions 2013)*
a. CHF
b. Hypochloremia
c. Metabolic acidosis
d. Leukopenia

ELECTROLYTE ABNORMALITIES

35. Chronic vomiting leads to all except: *(PGI Nov 2011)*
a. Hyponatremia b. Hypochloremia
c. Metabolic alkalosis d. Metabolic acidosis
e. Hypokalemia

36. Hypokalemia with alkalosis is found in: *(Orissa 2011)*
a. Diarrhea
b. Vomiting
c. Ureterosigmoidostomy
d. Villous adenoma of rectum

37. Condition which does not cause metabolic acidosis:
a. Renal failure *(AIIMS 84)*
b. Ureterosigmoidostomy
c. Pancreatic or biliary fistula
d. Pyloric stenosis

38. Following fistulous conditions give rise to maximum fluid and electrolyte imbalance: *(AIIMS 85)*
a. Distal ileal b. Gastric
c. Duodenal d. Sigmoid

39. Highest concentration of potassium is seen in: *(AIIMS 92)*
a. Jejunum b. Ileum
c. Duodenum d. Colon

40. Most common cause of metabolic alkalosis is: *(Karnataka 94)*
a. Cancer stomach b. Pyloric stenosis
c. Small-bowel obstruction d. Diuretics

41. Hyponatremia in multiple myeloma is: *(Kerala 95)*
a. True b. Relative
c. Absolute d. Pseudo

42. All of the following are seen in persisting vomiting except: *(AIIMS Nov 99)*
a. Hypokalemia b. Decreased K+ in urine
c. Elevated pH of blood d. Metabolic alkalosis

43. After ureterosigmoidostomy which electrolyte abnormality may occur: *(AIIMS June 99)*
a. Hyperchloremic acidosis b. Metabolic alkalosis
c. Metabolic acidosis d. Hypochloremic acidosis

44. In post burn patient, true is: *(AIIMS June 94)*
a. Hypokalemic alkalosis b. Hyperkalemic alkalosis
c. Hyperkalemic acidosis d. Hypokalemic acidosis

45. Which of the following is not an important cause of hyponatremia? *(All India 2004)*
a. Gastric fistula
b. Excessive vomiting
c. Excessive sweating
d. Prolonged Ryle's tube aspiration

46. Metabolic changes associated with excessive vomiting includes the following: *(All India 99)*
a. Metabolic acidosis b. Hyperchloremia
c. Hypokalemia d. Decreases bicarbonates

IV FLUIDS

47. The highest concentration of potassium is in: *(AIIMS 85)*
a. Plasma b. Isotonic saline
c. Ringer lactate d. Darrow's solution

48. Pitting edema indicates an excess of __litres of fluid in tissue spaces: *(PGI 88)*
a. 2.5 b. 3.5
c. 4.5 d. 5.5

49. In patients depending entirely on parenteral fluids, there is weight loss of daily: *(PGI 88)*
a. 50 gm b. 150 gm
C. 200 gm d. 250 gm

50. 20 mEq (mmol) of potassium chloride in 500 ml of 5% dextrose solution is given intravenously to treat:
a. Metabolic alkalosis *(PGI 81, AIIMS 84)*
b. Respiratory alkalosis
c. Metabolic acidosis
d. Respiratory acidosis

51. Haemacel contains: *(PGI 81, AIIMS 84)*
a. Albumin b. Degraded gelatin
c. Calcium d. Sodium

52. In the immediate post operative period, body potassium is:
a. Exchanged with calcium *(JIPMER 86, AMU 86)*
b. Exchanged with magnesium
c. Retained in body
d. Excreted excessively

53. Low molecular weight dextran is contra indicated in:
a. Foctal distress syndrome *(AIIMS 81, PGI 81)*
b. Cerebrovascular accident
c. Electrical burns
d. Thrombocytopenia

54. C.V.P (Central Venous Pressure) and pulmonary wedge pressure give an accurate assessment of all the following except: *(UPSC 95)*
a. Tissue perfusion b. Volume depletion
c. Volume overload d. Myocardial function

55. 10% dextrose is: *(DNB 2005)*
a. Isotonic b. Hypotonic
c. Hypertonic d. None

56. In a patient with multisystem trauma, the presence of hypotension along with elevated central venous pressure is suggestive of: *(UPSC 97)*
a. Upper airway obstruction
b. Major abdominal bleed
c. Cardio-pulmonary problem
d. Spinal cord injury

57. Which of the following is the best method to assess the adequacy of replacement? *(AIIMS 2000)*
a. Decrease in thirst b. Increase in urine output
c. Blood pressure d. Increased PaO2

58. In a person who has fasted for 5 days all are seen except:
a. GH levels decreased *(AIIMS 98)*
b. Glucose tolerance decreased
c. Immunoreactive insulin decreased
d. Free fatty acids (Plasma) increased

59. Content of Na+ in ringer lactate is mEq/L: *(TN 99)*
a. 154 b. 12
c. 130 d. 144

60. Fructose is not used in IV infusion as it cause: *(AIIMS 89)*
a. Irritability
b. Mental retardation
c. Increased erythrocyte protoporphyrin
d. Increased urinary coporoporphyrin

61. Sodium content of one liter of isotonic saline is *(DNB 2011, PGI 88)*
a. 140 mEq b. 154 mEq
c. 40 mEq d. 70 mEq

62. A postoperative patient with pH 7.25, MAP (mean arterial pressure) 60 mm of Hg treated with: *(PGI 2003)*
a. IV sodium bicarbonate
b. Only normal saline
c. Fluid therapy with CVP monitoring
d. Fluid restriction

63. Most common cause of water intoxication in surgical patient is due to: *(COMEDK 2005)*
a. Colorectal wash with plain water
b. Syndrome of inappropriate secretion of ADH
c. Irrigation during transurethral resection of prostate
d. Excessive infusion of 5% glucose

64. A young man weighing 65 kg was admitted to the hospital with severe burns in a severe catabolic state. An individual in this state requires 40 kcal per kg body weight per day 1 gms of protein/kg body weight/day. This young man was given a solution containing 20% glucose and 4.25% protein. If 3000 ml of solution in infused per day: *(AIIMS Nov 2003)*
a. The patient would not be getting sufficient protein
b. The calories supplied would be inadequate
c. Both protein and calories would be adequate
d. Too much protein is being infused

65. After 30% loss of blood volume in road traffic accident. What is the next management?
a. IV fluids only
b. IV fluids with cardiac stimulant
c. Dopamine
d. Vasopressor drug

66. Which among the following is best method to assess intake of fluid in polytrauma patient? *(PGI June 2006, AIIMS Nov 95, AIIMS Nov 94)*
a. Urine output b. CVP
c. Pulse d. BP

67. Which of the following is hypertonic *(DNB 2009)*
a. 5% dextrose b. 0.45% normal saline
c. 0.9% normal saline d. 3% normal saline

68. All electrolyte abnormalities are seen in immediate postoperative period, except: *(AIIMS Nov 94)*
a. Negative Nitrogen balance b. Hypokalemia
c. Glucose intolerance d. Hyponatremia

69. Blood loss during major surgery is best estimated by:
a. Visual assessment *(PGI June 99)*
b. Suction bottles
c. Transesophageal USG Doppler
d. Cardiac output by thermodilution

70. Concentration of sodium in RL is: *(Recent Questions 2013)*
a. 154 b. 120
c. 130 d. 144

MISCELLANEOUS

71. The disadvantage of elemental diets in children include: *(AIIMS 81, PGI 86)*
a. Hypertonic dehydration b. Lower caloric input
c. Dumping syndrome d. High nitrogen input

72. During nutritional assessment of a surgical patient, the status of muscle protein is indicated by which one of the following parameters: *(UPSC 95)*
a. Serum albumin
b. Triceps skinfold thickness
c. Mid-arm circumference
d. Hb level

73. Cortisol level returns to normal ____after hemorrhage:
a. 2 weeks b. 10 days *(Orissa 98)*
c. 7 days d. 3 days

74. Body water content in percentage of body weight is lowest in: *(Orissa 98)*
a. Well-built man
b. Fat woman
c. Well nourished child
d. Fat man

75. Water content in infant:
a. 60-70% b. 75-80%
c. 80-90% d. >90%

76. Insensible daily water loss is: *(PGI 88)*
a. 500-600 ml b. 800-1000 ml
c. 1000-1500 ml d. 2000 ml

77. Critical pH in Mendelson syndrome: *(Orissa 2004)*
a. 2.5 b. 3.0
c. 3.5 d. 4.0

78. The ideal colloidal solution is: *(MHSSMCET 2005, MHPGMCET 2006)*
a. Dextran b. Plasma
c. Albumin d. Hydroxyethyl starch

79. Skin fold thickness (for assessment of nutritional status) can be measured at all the following except: *(MHSSMCET 2006)*
a. Biceps b. Triceps
c. Suprailiac region d. None

80. In surgical patient malnutrition is best assessed by:
a. Serum albumin *(Recent Questions 2013)*
b. Hb level
c. Mid arm circumference
d. Tricpes skin fold thickness

EXPLANATIONS

ENTERAL NUTRITION

1. **Ans. b. Ear lobe to the umbilicus** *(Ref: en.wikipedia.org/wiki/Feeding_tube)*

   - **Feeding tube length** is measured by following the normal route for the tube **(Nasal ala → To ear lobe → To epigastrium)**[Q]
   - The distance between the nasal ala and ear lobe is almost equal to the distance between the epigastrium and umbilicus, the length can be measured from **ear lobe to umbilicus**[Q].

2. **Ans. a. Jejunostomy tube feeding** *(Ref: Sabiston 19/e p132-136; Bailey 26/e p266-270, 25/e p229-231)*

   Unless the GI tract is nonfunctional, its use for nutritional support is preferable as compared to TPN. In a patient who is **comatose** either **NG feeding** or **feeding through a gastrostomy tube** may lead to **vomiting** and **aspiration**. This can be **avoided by using a nasoenteric tube** with the **tip placed in jejunum** under fluoroscopic guidance or endoscopic control. Alternatively, a **catheter** may be **placed directly into the proximal jejunum** through a small upper abdominal incision.

   ENTERAL NUTRITION

   - **Enteral feeding** means **delivery of nutrients into** the **GIT**[Q].
   - The **alimentary tract** should be **used** whenever **possible**[Q].
   - This can be achieved with oral supplements (sip feeding) or with a variety of **tube-feeding techniques delivering food into** the **stomach, duodenum** or **jejunum**[Q].

Advantages of Enteral route over Parenteral Route	
• **Maintains integrity** of **gastrointestinal tract**[Q] • **Reduces translocation of gut bacteria**[Q] that may lead to infection.	• **Reduces** the **levels of pro inflammatory cytokines**[Q] generated by the gut that contribute to hypermetabolism.

Enteral Nutrition

Indications	Contraindications
• **Protein-energy malnutrition** with **inadequate oral intake**[Q] • **Dysphagia** except for fluids[Q] • **Major trauma** (or **surgery**[Q]) when return to required dietary intake is prolonged • **Inflammatory bowel disease**[Q] • **Distal, low-output** (<200 ml/day) **enterocutaneous fistula**[Q] • To enhance adaptation after massive enterectomy	• **Small bowel obstruction or ileus**[Q] • **Severe diarrhea**[Q] • **Proximal small intestinal fistula**[Q] • **Severe pancreatitis**[Q]

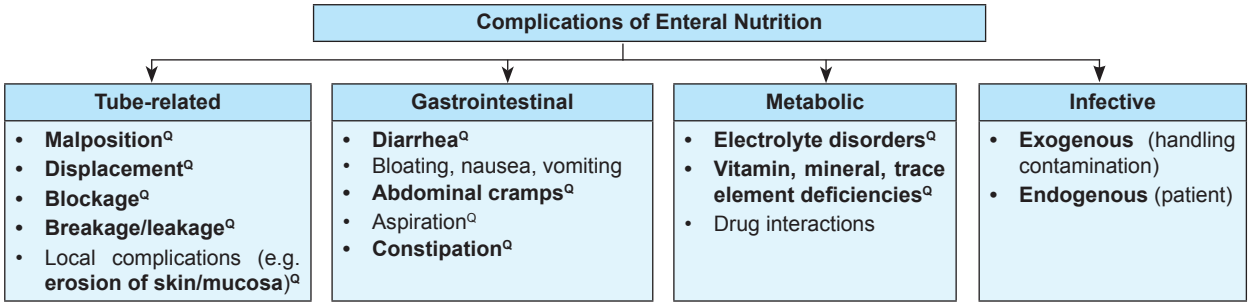
3. **Ans. a. Intestinal obstruction, b. Severe pancreatitis, c. Severe diarrhea, e. Intestinal fistula**

4. **Ans. c. Feeding Jejunostomy** *(Ref: Essentials of General Surgery by Lawrence 4/e p80)*

   - A **feeding jejunostomy** is the **preferred procedure to provide supplementary nutrition** in this patient as it **provides protection to** the **pancreatic anastomosis** and cause **minimal stimulation of pancreatic secretion** thereby **giving rest to** the **pancreas**[Q].
   - **After pancreatic surgery,** TPN **should or only be used when there is intolerance to enteral nutrition** or enteral nutrition is contraindicated[Q].
   - Pancreatic surgery does not usually interfere with the function of the gastrointestinal tract and enteral route remains the preferred mode for providing nutrition.

Operations where Early Oral Feeding is not Recommended	
• Major surgery involving upper GI tract: – **Esophageal resection**[Q] – **Gastric resection**[Q]	• Major Hepatic Surgery[Q] • **Major Pancreatic Surgery**[Q]

5. **Ans. a. Constipation, b. Diarrhea, c. Aspiration pneumonia** *(Ref: Sabiston 19/e p135; Bailey 26/e p269, 25/e p231)*



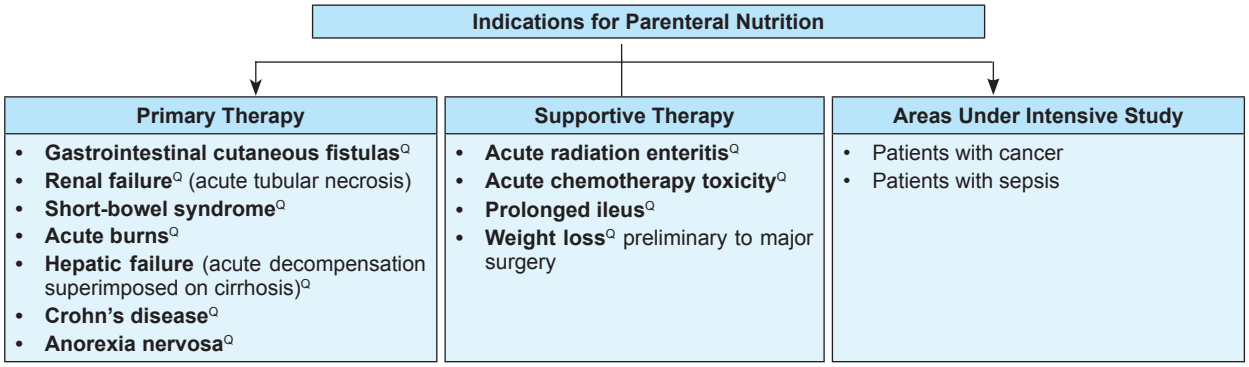
6. **Ans. c. Feeding jejunostomy**
7. **Ans. c. IBD**
8. **Ans. c. Retraction method** *(Ref: Sabiston 19/e p135)*

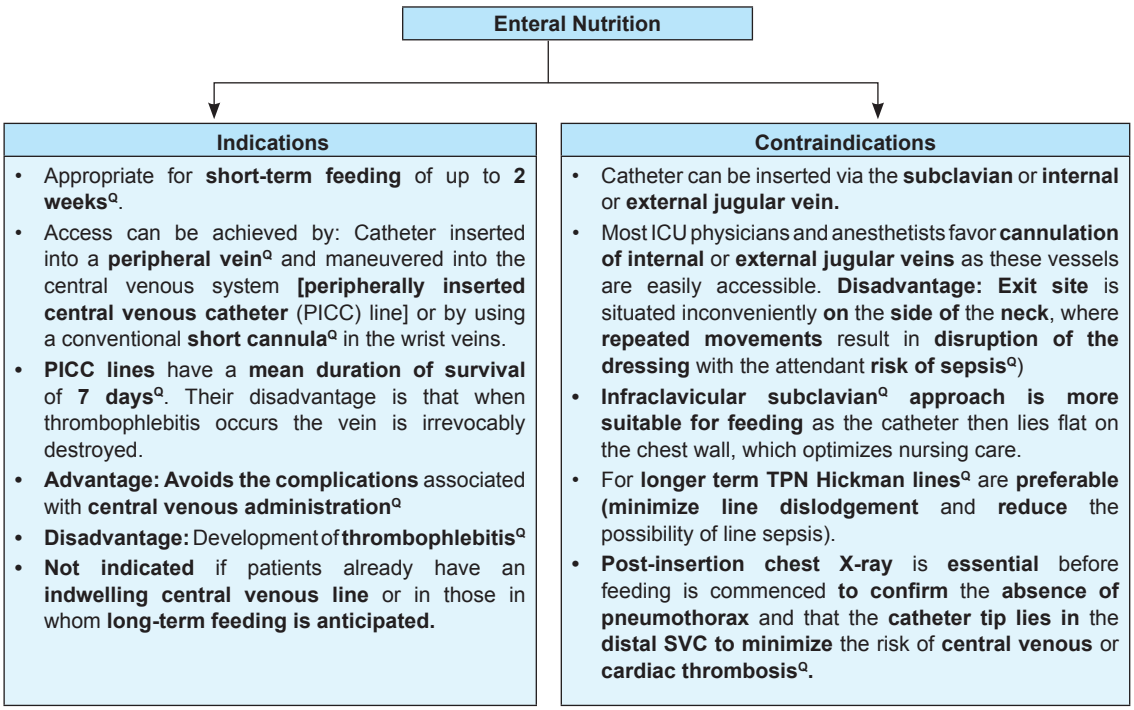
Methods used for Percutaneous Endoscopic Gastrostomy (PEG)

- Push technique
- Pull technique
- Introducer technique

TOTAL PARENTERAL NUTRITION

9. **Ans. e. Pancreatitis** *(Ref: Sabiston 19/e p137-141; Bailey 26/e p268-270, 25/e p231-233)*





10. **Ans. a. Folic acid, b. Iron, c. Vitamin B12, d. Copper, e. Fatty acids** *(Ref: Sabiston 19/e p140; Bailey 26/e p270, 25/e p233)*

Complications of Parenteral Nutrition

Related to nutrient deficiency	Related to overfeeding	Related to sepsis	Related to line
• **Hypoglycemia[Q], hypocalcemia[Q], hypophosphatemia, hypomagnesaemia** (refeeding syndrome) • **Chronic deficiency syndromes (essential fatty acids[Q], zinc[Q],** mineral and trace elements)	• **Excess glucose: hyperglycemia[Q], hyperosmolar dehydration[Q], hepatic steatosis[Q],** hypercapnia, increased sympathetic activity, fluid retention, **electrolyte abnormalities[Q]** • **Excess fat: hypercholesterolemia[Q]** and formation of lipoprotein X, hypertriglyceridemia[Q], hypersensitivity reactions • **Excess amino acids:** hyperchloremic **metabolic acidosis, hypercalcemia[Q], aminoacidemia, uremia[Q]**	• **Catheter-related sepsis[Q]** • **Increased risk of systemic sepsis[Q]**	• **On insertion: pneumothorax[Q], damage to adjacent artery[Q], air embolism, [Q] thoracic duct damage[Q],** cardiac perforation or tamponade, **pleural effusion,** hydromediastinum • **Long-term use: occlusion, venous thrombosis[Q]**

11. **Ans. d. Fibers** *(Ref:Bailey 26/e p264, 25/e p231)*

Total parenteral Nutrition

Energy Sources	Non-energy Essential sources
• **Carbohydrates[Q]** • **Lipids[Q]** • Amino acids[Q]	• **Electrolytes[Q]** • **Trace elements[Q]** • **Vitamins[Q]** • Water

12. **Ans. a. Hypoglycemia, b. Hyperglycemia, c. Hypercalcemia, d. Hypercapnia, e. Hypophosphatemia**

13. **Ans. a. Subclavian vein** *(Ref: Sabiston 19/e p137-138; Bailey 25/e p232)*

- Preferred site for central vein infusion: SVCQ
- Preferred access site for TPN: SubclavianQ >Jugular >Femoral vein

14. **Ans. c. Chronic liver disease** 15. **Ans. c. Sepsis** 16. **Ans. a. Subclavian vein**

17. **Ans. d. Lipids form 20% of energy source** *(Ref: Sabiston 19/e p138)*

TPN Formulation

Without Lipid (75/25)	With Lipid (60/20/20)
• Calories from **amino acids: 20-25%[Q]** • Calories from **dextrose: 75-80%[Q]**	• Calories from **amino acids: 20-25%[Q]** • Calories from **lipids: 20%[Q]** • Calories from **dextrose: 55-60%[Q]**

18. **Ans. d. Hyperphosphatemia** 19. **Ans. c. Congestive cardiac failure**

20. **Ans. None** *(Ref: CSDT 12/e p161)*

Electrolyte Abnormalities in TPN	
• **Hyponatremia** and **hypernatremia[Q]**	• **Hypocalcemia** and **hypercalcemia[Q]**
• **Hypokalemia** and **Hyperkalemia[Q]**	• **High zinc** and low **zinc[Q]**
• **Hypophosphatemia** and **hyperphosphatemia[Q]**	• **High copper** and low **copper[Q]**
• **Hypomagnesemia** and **Hypermagnesemia[Q]**	• **Hyperchloremic metabolic acidosis[Q]**

21. **Ans. a. Subclavian vein** 22. **Ans. a. Parenteral** 23. **Ans. c. Hypotriglyceridemia**

24. **Ans. None**

25. Ans. a. Hypomagnesemia *(Ref: Harrison 18/e p357, 3090, 3099)*

Clinical Features

Hypomagnesemia	Hyperkalemia	Hypercalcemia
• **Weakness,** muscle cramps and **tremors**[Q] • **Marked neuromuscular** and **CNS hyperirritability** with jerking and **nystagmus**[Q]	• Interferes with neuromuscular function to produce muscle **weakness** which may progress to **flaccid paralysis**[Q] and **hypoventilation** if respiratory muscles are involved	• **Fatigue, depression, mental confusion,** lethargy[Q] • Anorexia, nausea, **vomiting, constipation and polyuria**[Q]

26. Ans. b. Fats, c. Amino acids, d. Dextrose

27. Ans. e. All of the above

28. Ans. a. It is costly

29. Ans. b. 7 days

30. Ans. d. 60 gm/day

31. Ans. None

32. Ans. a. Up to 7 days

33. Ans. c. Hypercalcemia

Refeeding Syndrome

- Characterized by **severe fluid** and **electrolyte shifts** in **malnourished patients undergoing refeeding.**
- It can occur with either enteral or **parenteral nutrition** but is more common with the latter.
- It results in **hypophosphataemia, hypocalcaemia** and **hypomagnesaemia**[Q].
- **Risk Factors: Alcohol dependency, severe malnutrition, Anorexics** and **prolonged periods of fasting**[Q].

Treatment

- Treatment involves **matching intakes with requirements** and assiduously **avoiding overfeeding**[Q].
- **Calorie delivery** should be **increased slowly** and vitamins administered regularly.
- **Hypophosphataemia** and **hypomagnesaemia require treatment**[Q].

34. Ans. c. Metabolic acidosis

ELECTROLYTE ABNORMALITIES

35. Ans. d. Metabolic acidosis *(Ref: Sabiston 19/e p1196; Schwartz 10/e p73-75, 1599, 9/e p921; Bailey 25/e p1065)*

- Chronic vomiting leads to **Hypochloremic, hypokalemic, metabolic alkalosis.**

36. Ans. b. Vomiting *(Ref: Harrison 18/e p368)*

Causes of Non-Anion-Gap Acidosis

Tube-related	Gastrointestinal	Metabolic	Infective
• **External pancreatic** or **small-bowel drainage**[Q] • Ureterosigmoidostomy, **jejunal loop, ileal loop**[Q] • Drugs: – **Calcium chloride (acidifying agent)** – **Magnesium sulphate (diarrhea)** – **Cholestyramine (bile acid diarrhea)**	• **Hypokalemia** – **Proximal RTA (type 2)**[Q] – **Distal (classic) RTA (type 1)**[Q] • Hyperkalemia – **Type 4 RTA**[Q] – **Mineralocorticoid deficiency**[Q] – **Mineralocorticoid resistance**[Q] – **$^{-}$Na+ delivery to distal Nephron** – **Tubulointerstitial disease** – **Ammonium excretion defect**	• Potassium sparing diuretics (amiloride, triamtere**ne, spironolactone)** • **Trimethoprim**[Q] • **Pentamidine**[Q] • **ACE inhibitors and AT-II receptor blockers**[Q] • **NSAIDs**[Q] • **Cyclosporine**[Q]	• **Acid loads** (ammonium chloride, hyperalimentation) • **Loss of potential bicarbonate:** ketosis with ketone excretion • **Expansion acidosis** (rapid saline administration) • Hippurate • Cation exchange resins

Causes of High Anion–Gap Metabolic Acidosis

- **Lactic acidosis**[Q]
- **Ketoacidosis**[Q] (Diabetic, Alcoholic, Starvation)
- Toxins **(Ethylene glycol, Methanol, Salicylates,** Propylene glycol, Pyroglutamic acid)[Q]
- **Renal failure**[Q] (acute and chronic)

37. Ans. d. Pyloric stenosis

38. **Ans. c. Duodenal** *(Ref: Sabiston 19/e p1271)*

Enterocutaneous Fistulas

- **Enterocutaneous fistulas** are classified according to their **location and volume of daily output.**
- These factors **dictate both treatment** and **morbidity** and **mortality rates**Q.
- In general, the **more proximal** the **fistula in** the **'intestine'** (but **not** the **stomach**), the **more serious the problem**, with **greater fluid** and **electrolyte loss**Q.
  - **Maximum fluid** and **electrolyte imbalance** occur in **duodenal fistulas**Q.

39. **Ans. d. Colon** *(Ref: Schwartz 10/e p69, 9/e p54; Bailey 25/e p227)*

- **Maximum K+ concentration: Colon**Q **(30 mEq/L) >Saliva (25 mEq/L)**

Composition of GI Secretions					
Type of Secretion	**Volume (mL/day)**	**Na (mEq/L)**	**K (mEq/L)**	**Cl (mEq/L)**	**HCO3– (mEq/L)**
Stomach	1000–2000Q	60–90	10–30	100–130Q	0
Small intestine	2000–3000Q	120–140	5–10	90–120	30–40
Colon	—	60	30Q	40	0
Pancreas	600–800Q	135–145Q	5–10	70–90	95–115Q
Bile	300–800Q	135–145Q	5–10	90–110	30–40

40. **Ans. b. Pyloric stenosis**

41. **Ans. d. Pseudo** *(Ref: Harrison 18/e p347)*

Pseudohyponatremia

- Patients with **multiple myeloma** also have a **decreased anion gap** [i.e., **Na+ – (Cl– + HCO3–)**] because the **M component** is **cationic,** resulting in **retention of chloride**Q.
- This is **often accompanied by hyponatremia** that is felt to be artificial (**Pseudohyponatremia**) because **each volume of serum** has **less water** as a **result of the increased protein**Q.

42. **Ans. b. Decreased K^+ in urine**
43. **Ans. a. Hyperchloremic acidosis**
44. **Ans. c. Hyperkalemic acidosis**
45. **Ans. c. Excessive sweating**
46. **Ans. c. Hypokalemia**

IV FLUIDS

47. **Ans. d. Darrow's solution** *(Ref: Bailey 25/e p226; www.idruginfo.com/?cat=drug...Darrow's%20Solution)*

Composition of crystalloid and colloid solutions (mM/L)						
Solution	Na+	K+	Ca2+	Cl-	Lactate	Colloid
Hartmann's (RL)	130	4	< 2.7	109	28	
Normal saline (0.9% NaCl)	154			154		
Dextrose saline (4% dextrose in 0.18% saline)	30			30		
Gelofusine	150		< 1	150		Gelatin 4%
Hemacel	145	5.1	< 6.26	145		Polygelin 75 g/L
Hetastarch						Hydroxyethyl starch 6%
Lactated potassium saline injection (Darrow's solution)	121	35		103	53	

48. **Ans. c. 4.5**
49. **Ans. b. 150g**
50. **Ans. a. Metabolic alkalosis**
51. **Ans. b. Degraded gelatin**
52. **Ans. d. Excreted excessively**

- In **immediate post-operative period** due to **increased adrenocortical activity**, there is **Na+ retention and K+ excretion**Q.

53. **Ans. d. Thrombocytopenia** *(Ref: en.wikipedia.org/wiki/Dextran)*

- **Dextran interferes with platelet function**Q**.**

54. **Ans. a. Tissue perfusion** *(Ref: Sabiston 19/e p87; Bailey 26/e p17, 25/e p17)*

- **Urine output** is **best clinical guide of tissue perfusion**Q**.**

Hemodynamic Monitoring

Central venous Pressure (CVP)	Pulmonary Capillary wedge Pressure (PCWP)
• **Measurement of CVP** and its response to a small fluid challenge may assist in **distinguishing cardiogenic shock** and **Hypovolemic shock**[Q]. • In **seriously ill patients**, the **CVP** is **not a reliable indicator of left ventricular function** because of the **wide disparity** that can exist **between left** and **right ventricular functions**[Q].	• It is a **better indicator** for both **blood volume** and **left ventricular function** than CVP[Q]. • Obtained by **pulmonary artery floatation balloon catheter** (**Swan-Ganz**)[Q]. • Used to **differentiate left** and **right ventricular failure**, **pulmonary embolism, septic shock** and **ruptured mitral valve**[Q] • **Accurate guide** to therapy with **fluids**, **inotropic agents** and **vasodilators**[Q]. • May also be used to **measure cardiac output** by thermodilution technique.

55. **Ans. c. Hypertonic**
56. **Ans. c. Cardio-pulmonary problem**
57. **Ans. b. Increase in urine output**
58. **Ans. a. GH levels decreased**
59. **Ans. c. 130**
60. **None**
61. **Ans. b. 154 mEq**
62. **Ans. c. Fluid therapy with CVP monitoring**
63. **Ans. d. Excessive infusion of 5% glucose**
64. **Ans. c. Both protein and calories would be adequate** *(Ref: Sabiston 19/e p138; Bailey 25/e p225)*

- Calories are calculated by catabolism of glucose (not proteins).

Glucose:
- Amount of glucose in 20% glucose in 3000 ml of solution: 3000 x 20/100 = 600 gms
- 1 gm glucose on catabolism produces: 4.2 kcal
- 600 gms of glucose would produce: 600 x 4.2 = 2520 kcal

Protein:
- Percentage of protein in fluid: 4.25%
- Percentage of protein in 3000 ml of fluid: 3000 x 4.25/100 = 127.5 gms

- Calories required for the patient: 40x65 = 2600 kcal
- Proteins required for the patient: 2 x65 = 130 gms

	Required Amount	Supplied by solution
Calories	2600 kcal	2520 kcal
Proteins	130 gms	127.5 gm

65. **Ans. a. IV fluids only** *(Ref: Sabiston 19/e p72)*

Four Classes of Hemorrhagic Shock (According to the ATLS course)				
	Class			
Parameter	**I**	**II**	**III**	**IV**
Blood loss (%)	**0-15**[Q]	**15-30**[Q]	**30-40**[Q]	**>40**[Q]
CNS	**Slightly** anxious	**Mildly** anxious	**Anxious** or confused	Confused or **lethargic**
Pulse (beats/min)	**<100**	**>100**	**>120**	**>140**
Blood pressure	Normal	Normal	**Decreased**[Q]	**Decreased**[Q]
Pulse pressure	Normal	**Decreased**	**Decreased**[Q]	**Decreased**[Q]
Respiratory rate	**14-20/min**	**20-30/min**	**30-40/min**[Q]	**>35/min**[Q]
Urine (mL/hr)	**>30**	**20-30**	**5-15**	**Negligible**[Q]
Fluid	**Crystalloid**[Q]	**Crystalloid**[Q]	**Crystalloid + blood**[Q]	**Crystalloid + blood**[Q]

66. **Ans. a. Urine output**

67. **Ans. d. 3% normal saline** *(Ref: Fluids and Electrolytes by Lippincott Williams and Wilkins/55)*

Isotonic	Hypertonic	Hypotonic
Dextrose 5% in water	5% dextrose in half normal saline	0.45 normal saline
0.9% normal saline	5% dextrose in normal saline	
Ringer lactate	Dextrose 10% in water	

68. **Ans. d. Hyponatremia**

69. **Ans. b. Suction bottles** *(Ref: www.ncbi.nlm.nih.gov/pubmed/16756621)*

Measurement of Blood Loss during Surgery (Gravimetric Method)

- Blood loss during operation is measured by: **Weighing the swabs** after use and subtracting the dry weight and fluid used + **volume of blood collected in suction bottles** (after subtracting irrigating fluid)Q

70. **Ans. c. 130**

MISCELLANEOUS

71. **Ans. a. Hypertonic dehydration, c. Dumping syndrome**

72. **Ans. c. Mid-arm circumference** *(Ref:www.ncbi.nlm.nih.gov/pubmed/1492750)*

Anthropometric Techniques for Nutritional Assessment

- Anthropometric techniques incorporating measurements of **skinfold thicknesses** and **mid-arm circumference** permit estimations of **body fat** and **muscle mass,** and these are **indirect measures of energy** and **protein stores.**
  - **Skinfold thickness** is measured at **ulnar, triceps, subscapular** and **suprailiac region**Q.

73. **Ans. d. 3 days** *(Ref: adc.bmj.com/content/50/7/555.full.pdf)*

- **The normal** rise in **cortisol** secretion **after** surgery lasts about **3 days.**

74. **Ans. b. Fat woman**

75. **Ans. b. 75-80%** *(Ref: Sabiston 19/e p104-105; Bailey 25/e p225)*

Total Body Water (60% of body weight)Q

Central venous Pressure (CVP)

- **Is 2/3rd of TBW**Q **(40% of body weight)**
- Portion of total body fluid which remains within the cell membrane.

Pulmonary Capillary wedge Pressure (PCWP)

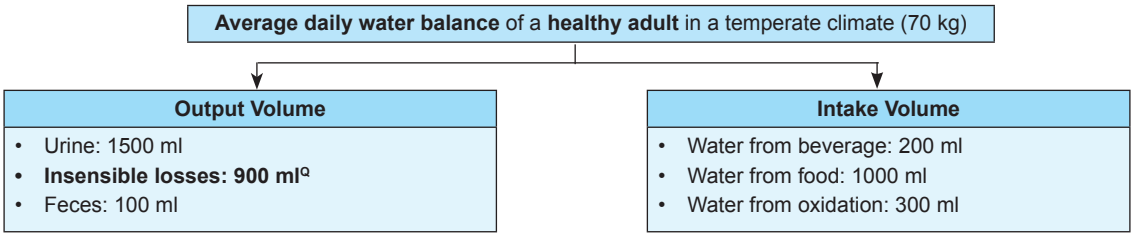
- Is 1/3rd of TBW (20% of body weight)Q
- It is general term foe all the body fluids outside the cell. It consists of:
  - **Interstitial fluid, Plasma, Lymph and CSF**

ECF	
In the Vascular system (Plasma)	Outside the vascular system (Interstitial fluid)
25% or 1/4th of ECF 5% of body weightQ	75% or 3/4th of ECF 15% of body weightQ

Total Body Water

- In an average **young adult male** 60% of **total body weight** is TBWQ.
- In an average **young adult female** it is **50%**Q.
- The **lower percentage** of TBW in **females** correlates with a **higher percentage of adipose tissue** and **lower percentage of muscle mass** in most.Q
- Estimates of percentage of TBW should be **adjusted downward approximately 10-20% for obese individuals** and **upward by 10% for malnourished individuals**Q.
- The **highest percentage of TBW** is found **in newborns**, with **80%** of their **total body weight**Q comprised of water. This decreases to approximately **65% by 1 year of age**Q and thereafter remains fairly constant.
- Percentage of protein in 3000 ml of fluid: 3000 x 4.25/100 = 127.5 gms

76. Ans. b. 800-1000 ml *(Ref: Bailey 25/e p226)*



77. Ans. a. 2.5 *(Ref: Sabiston 19/e p293)*

Mendelson's Syndrome

- **Critical pH value: 2.5**
- **Gastric pH** of 2.5 or less with a **gastric** contents volume greater than **25 ml** are **critical values**.
- **Maximum pulmonary damage** is achieved at an aspirate **pH value of 1.5.**

78. Ans. c. Albumin

79. Ans. d. None

80. Ans. c. i.e., Mid arm circumference *(Ref: Sabiston 9/e p40, Sabiston 18/e p154)*

CHAPTER 49

Blood Transfusion

MULTIPLE CHOICE QUESTIONS

BLOOD TRANSFUSION

1. **MC blood transfusion reaction is:** *(All India 2008)*
   a. Febrile non-hemolytic transfusion reaction
   b. Hemolysis
   c. Transmission of infections
   d. Electrolyte imbalance

2. **All of the following infections may be transmitted via blood transfusion, except:** *(AIIMS May 2009, All India 2002)*
   a. Parvo B-19 b. Hepatitis G
   c. Dengue virus d. Cytomegalovirus

3. **Which of the following is the least likely complication after massive blood transfusion?** *(AIIMS May 2009)*
   a. Hyperkalemia b. Citrate toxicity
   c. Hypothermia d. Metabolic acidosis

4. **Fresh hold blood transfusion is done with in how much time of collection?** *(DNB 2006)*
   a. Immediately b. 1 hours
   c. 4 hours d. 24 hours

5. **Which of the following investigations should be done immediately to best confirm a non matched blood transfusion reaction?** *(All India 2010)*
   a. Indirect Coomb's test
   b. Direct Coomb's test
   c. Antibody in patient's serum
   d. Antibody in donor serum

6. **Blood components products are:** *(PGI Dec 2005)*
   a. Whole blood b. Platelets
   c. Fresh frozen plasma d. Leukocyte reduced RBC
   e. All of the above

7. **A man is rushed to casualty, nearly dying after a massive blood loss in an accident. There is not much time to match blood groups, so the physician decides to order for one of the following blood groups. Which one of the following blood groups should the physician decide:** *(AIIMS June 2004)*
   a. O negative b. O positive
   c. AB positive d. AB negative

8. **One unit of fresh blood arises the Hb% concentration by:**
   a. 0.1 gm% b. 1 gm% *(All India 2003)*
   c. 2 gm% d. 2.2 gm%

9. **Which of the following statements about acute hemolytic blood transfusion reaction is true?** *(PGI June 2004)*
   a. Complement mediated hemolysis is seen
   b. Type III hypersensitivity is responsible for most cases
   c. Rarely life threatening
   d. Renal blood flow is always maintained
   e. No need for stopping transfusion

10. **True about blood transfusions:** *(PGI June 98)*
    a. Antigen 'D" determines Rh positivity
    b. Febrile reaction is due to HLA antigens
    c. Anti-d is naturally occurring antibody
    d. Cryoprecipitate contains all coagulation factors

11. **Which of the following is better indicator of need for transfusion?** *(AIIMS 80, UPSC 87)*
    a. Urine output b. Hematocrit
    c. Colour of skin d. Clinical examination

12. **Massive blood transfusion is defined as:** *(PGI 95)*
    a. 350 ml in 5 min b. 500 ml in 5 min
    c. 1 litre in 5 min d. Whole blood volume

13. **How long can blood stored with CPDA?** *(JIPMER 2003)*
    a. 12 days b. 21 days
    c. 28 days d. 48 days

14. **Massive transfusion in previous healthy adult male can cause hemorrhage due to:** *(PGI 98)*
    a. Increased t-PA
    b. Dilutional thrombocytopenia
    c. Vitamin K deficiency
    d. Decreased fibrinogen

15. **Arterial blood gas analysis in a bottle containing heparin causes a decrease in value of:**
    a. pCO2 b. HCO_3
    c. pH d. All of the above

16. **Massive blood transfusion is defined as:**
    a. Whole blood volume in 24 hours *(Recent Questions 2013)*
    b. Half blood volume in 24 hours
    c. 40% blood volume in 24 hours
    d. 60% blood volume in 24 hours

BLOOD TRANSFUSION COMPLICATIONS

17. **After blood transfusion the febrile non-hemolytic transfusion reaction (FNHTR) occurs due to?**
    a. Alloimmunization
    b. Antibodies against donor leukocytes and HLA Ag
    c. Allergic reaction
    d. Anaphylaxis

18. **Blood grouping and cross-matching is must prior to infusion of:** *(MHPGMCET 2007)*
    a. Gelatin b. Dextran
    c. Albumin d. FFP

19. **Blood grouping and cross matching is must prior to infusion of:** *(MHPGMCET 2008)*
    a. Gelatin b. Albumin
    c. Dextran d. Hemaceal

20. **Collection of blood for cross matching and grouping is done before administration of which plasma expander?**
    a. Hydroxyl ethyl starch b. Dextran *(MHSSMCET 2007)*
    c. Mannitol d. Hemacele

21. **Mismatched blood transfusion in anesthetic patient presents is:**
    a. Hyperthermia and hypertension *(PGI June 2000)*
    b. Hypotension and bleeding from site of wound
    c. Bradycardia and hypertension
    d. Tachycardia and hypertension

22. All of the following are major complications of massive transfusion except: *(All India 2006)*
a. Hypokalemia
b. Hypothermia
c. Hypomagnesaemia
d. Hypocalcaemia

23. Massive transfusions results in: *(PGI 88)*
a. DIC
b. Hypothermia
c. Hypercalcemia
d. Thrombocytopenia

RED BLOOD CELLS

24. The maximum life of a transfused RBC is: *(JIPMER 80, DNB 89)*
a. One hour
b. One day
c. 15 days
d. 50 days
E. 100 days

PLATELETS

25. Platelets can be stored at: *(AIIMS Nov 2005)*
a. 20-24°C for 5 days
b. 20-24°C for 8 days
c. 4-8°C for 5 days
d. 4-8°C for 8 days

26. Blood platelets in stored blood do not remain functional after: *(PGI 88, 81, AIIMS 86)*
a. 24 hours
b. 48 hours
c. 72 hours
d. 96 hours

PLASMA

27. Indication of fresh frozen plasma is/are: *(PGI Nov 2011)*
a. Hypovolemia
b. Nutritional supplement
c. Coagulation factor deficiency
d. Warfarin toxicity
e. Hypoalbuminemia

28. True about FFP (Fresh frozen plasma) is the following except: *(MHPGMCET 2009)*
a. Good source of all coagulation factors
b. Prepared from single unit of blood
c. Coagulation factor levels are equal to Plasma
d. None of the above

29. Stored plasma is deficient in: *(PGI 79, DNB 90)*
a. Factors 7 and 8
b. Factors 2 and 5
c. Factors 5 and 8
d. Factors 7 and 9

30. With reference to fresh frozen plasma (FFP), which one of the following statement is not correct? *(UPSC 2008)*
a. It is used as volume expander
b. It is stored at – 40°C to – 50°C
c. It is a source of coagulation factors
d. It is given in a dose of 12-15 ml/kg body weight

31. In cholecystectomy, fresh frozen plasma should be given:
a. Just before operation *(UPPG 2008)*
b. At the time of operation
c. 6 hours before operation
d. 12 hours after operation

32. Half life of factor VIII is: *(PGI 88)*
a. 4 hours
b. 8 hours
c. 34 hours
d. 48 hours

33. Rosenthal's syndrome is seen in deficiency of factor:
a. II
b. V *(AIIMS 81, DNB 91)*
c. IX
d. XI

CRYOPRECIPITATE

34. Cryoprecipitate contains: *(MCI March 2009)*
a. Factor II
b. Factor V
c. Factor VIII
d. Factor IX

35. Cryoprecipitate is a rich source of: *(PGI 79, AIIMS 85)*
a. Thromboplastin
b. Factor VIII
c. Factor X
d. Factor VII

36. Which one of the following blood fractions is stored at -40°C? *(UPSC 2006)*
a. Cryoprecipitate
b. Human albumin
c. Platelet concentrate
d. Packed red cells

37. Cryoprecipitate contains all except: *(AIIMS Nov 2007)*
a. Factor VIII
b. Factor IX
c. Fibrinogen
d. VWF

EXPLANATIONS

BLOOD TRANSFUSION

1. **Ans. a. Febrile non-hemolytic transfusion reaction** *(Ref: Harrison 18/e p954-956)*

Febrile non-hemolytic transfusion reaction is the most common complication associated with the transfusion of cellular blood components.

Complications of Blood Transfusion

Reactions	Infections	Other Complications
• Febrile non-hemolytic transfusion reaction (**FNHTR**): **MC**Q • Allergic • **Delayed hemolytic**Q • Transfusion-related acute lung injury (**TRALI**)Q • **Acute hemolytic**Q • Fatal hemolytic • Anaphylactic	• Hepatitis **B** and **C**Q • Hepatitis **G**Q • **HIV-1 and -2**Q • **HTLV-I and -II**Q • **Malaria**Q • **West Nile virus**Q • **Parvovirus B-19**Q • **HHV-8**Q • **CMV**Q	• RBC allosensitizationQ • HLA allosensitizationQ • Graft-versus-host disease

2. **Ans. c. Dengue virus**

3. **Ans. d. Metabolic acidosis** *(Ref: Harrison 18/e p954-956)*

- **Massive transfusion** can lead to **coagulopathy** and **metabolic complications**Q.

Metabolic Complications of Massive Transfusion

General	Electrolyte
• **Fluid overload**Q • **Hypothermia**Q • **Impaired oxygen delivery capacity of Hb**Q (decreased 2, 3-DPG)	• **Hyperkalemia**Q • **Hypocalcemia**Q • **Hypomagnesemia**Q • **Metabolic alkalosis**Q • **Metabolic acidosis (rare)**Q

4. **Ans. d. 24 hours**

5. **Ans. b. Direct Coomb's test** *(Ref: Harrison 18/e p954)*

- **Direct Coomb's test** or **direct antiglobulin test** on post-transfusion blood sample from patient should be done to **detect antibodies directed against** the **transfused RBCs**Q.

6. **Ans. e. All of the above** *(Ref: Harrison 18/e p952-954)*

Characteristics of Selected Blood Components

Component	Volume (mL)	Content	Clinical Response
Whole Blood	**450 ml ± 45**	• No elements removed • Contains **RBCs, WBCs, plasma** and **platelets** (**WBCs** and **platelets** may be **non-functional**Q)	• Not for routine use • Used for **acute massive bleeding, open heart surgery** and neonatal total exchange
Packed RBCs	**180–200**	• **RBCs** with variable **leukocyte** content and **small** amount of **plasma**	• Increase **Hb 1 gm/dL** and **hematocrit 3%**Q
Platelets	**50–70**	• 5.5 x 10^{10}/RD unit	• Increase platelet count **5000–10,000/μL**Q
FFP	**200–250**	• **Plasma proteins**: **Coagulation factors,** proteins **C and S, antithrombin**Q	• Increases **coagulation factors about 2%**
Cryoprecipitate	**10–15**	• Cold-insoluble plasma proteins, **fibrinogen, factor VIII, vWF**Q	• Topical fibrin glue, also **80 IU factor VIII**Q

7. **Ans. a. O negative** *(Ref: Harrison 18/e p951; Bailey 26/e p21-22, 25/e p21-22)*

Selection of Blood for Emergency Transfusion

Patient's Blood group is known	Patient's Blood group cannot be determined
• Unmatched **blood group** of the **same group** should be used	• Group **'O' RBCs** are chosen • Such unmatched blood should be **Rh negative**, when used in **women of child bearing age**, in whom sensitization to Rh antigen would be undesirable • Rh positive blood can be used if Rh negative blood is not available in older females and males

8. **Ans. b. 1 gm%**

9. **Ans. a. Complement mediated hemolysis is seen** *(Ref: Harrison 18/e p954)*

- **Acute hemolytic transfusion reactions** following blood transfusion are **type II hypersensitivity reactions** caused most often by the **complement mediated hemolysis**Q.
- These reactions are often **life-threatening** and complications include **oliguria** and **acute renal failure** (**decreased renal blood flow**)Q.

10. **Ans. a. Antigen 'D" determines Rh positivity; b. Febrile reaction is due to HLA antigens** *(Ref: Harrison 18/e p954)*

- **Rh positive** or **negative status** depends on the **presence or absence of antigen D** (Rh D) **on RBCs**Q.
- **Febrile (non-hemolytic) reactions** are caused by **antibodies directed against donor leucocytes** and **HLA antigen** may **mediate these reactions**Q.

11. **Ans. b. Hematocrit**

12. **Ans. d. Whole blood volume**

13. **Ans. c. 28 days** *(Ref: Sabiston 19/e p588)*

Whole Blood	
Anticoagulant used	**Maximum storage**
ACD/CPD/CP2D	**21 days**Q
CPDA-1 (citrate phosphate dextrose adenine)	**35 days**Q

14. **Ans. b. Dilutional thrombocytopenia**

15. **Ans. d. All of the above** *(Ref: Clinical Laboratory Medicine 6/e p396)*

Heparin Excess in Blood gas Syringe

Effects due to Dilution of Sample	Effects due to Acidic Nature of Heparin
• Decreased $PaCO_2$Q • Decreased HCO_3Q	• Decreased pHQ

16. **Ans. a. i.e., Whole blood volume in 24 hours**

According to Sabiston - Massive Blood Transfusion is defined as -

- **Transfusion greater than patient's total blood volume in 24 hours**
- **Or as acute administration of more than 10 units of blood over a few hours.**

According to Schwartz *"Massive transfusion is a single transfusion of 2500 ml or 5000 ml transfused over a period of 24 hours"*

BLOOD TRANSFUSION COMPLICATIONS

17. **Ans. b. Antibodies against donor leukocytes and HLA Ag**

18. **Ans. b. Dextran**

19. **Ans. c. Dextran**

20. **Ans. b. Dextran** *(Ref: en.wikipedia.org/wiki/Dextran)*

Dextran

- It is a **polysaccharide polymer** of varying molecular weight producing an **osmotic pressure** similar to the plasma
- **Disadvantages:**
  - **It induces rouleaux of RBCs** and this **interferes with blood grouping** and **cross matching**[Q] procedures, hence need for a blood sample beforehand.
  - It **interferes with platelet function**, hence it is recommended that **total volume** of dextran **should not exceed 1000 mL.**

- **LMW dextran (short acting) prevents sludging of RBCs in vessels** and **renal shut down in severe hypotension** and it is **less likely to induce rouleaux formation** than HMW dextran (long acting).

21. Ans. b. Hypotension and bleeding from site of wound *(Ref: Schwartz 10/e p119,122,171-172, 9/e p83)*

- Schwartz says "In **patients who are anesthetized** and have an **open wound**, the two dominant signs (of **mismatched blood transfusion**) are **diffuse bleeding** and **hypotension**."

- **MC symptom of hemolytic transfusion** reactions **in** a **conscious patient**: Sensation of **heat** and **pain along the vein** into which the blood is being transfused[Q].
- **MC sign** of **hemolytic transfusion** reactions **in** a **conscious patient**: **Oliguria**[Q] **>hemoglobinuria.**

22. Ans. a. Hypokalemia

23. Ans. a. DIC; b. Hypothermia; d. Thrombocytopenia

RED BLOOD CELLS

24. Ans. d. 50 days *(Ref: Schwartz 10/e p1914-1915, 9/e p78; Bailey 26/e p21, 25/e p21)*

Red Blood Cells

- **RBCs** are **stored at 1-6°C**[Q]; **Mean life** of **transfused RBCs** is **35 days**[Q]**.**

Anticoagulant used	Maximum storage
ACD/CPD/CP2D	21 days[Q]
CPDA-1	35 days[Q]

PLATELETS

25. Ans. a. 20-24° C for 5 days

(Ref: Harrison 18/e p953; Sabiston 19/e p588; Schwartz 10/e p85, 9/e p79; Bailey 26/e p21, 25/e p21)

Platelet Concentrates

- **Volume**: **50 ml**[Q]
- Platelets are the **only blood products** which are **stored at room temperature, 20-24° C**[Q] **(survival is 4-5 days)**[Q].
- **1 unit of platelet** increases the count by **5000-10000**[Q].

  - The **threshold for prophylactic platelet transfusion** is **10,000/μL**[Q]**.**
  - **For invasive procedures**, **50,000/μL** platelets is the usual target level.
  - Platelet count should be **1,00,000/μL** before accepting the patient **for surgery**.

- **Transfused platelets** generally **survive for 2-7 days** following transfusion.
- **ABO compatibility** is desirable but **not necessary**.

  - **Blood platelets in stored blood** are **non-functional after 24 hours**[Q].

26. Ans. a. 24 hours

PLASMA

27. Ans. c. Coagulation factor deficiency; d. Warfarin toxicity *(Ref: Harrison 18/e p953; Sabiston 19/e p588)*

Fresh-frozen Plasma (FFP)

- **FFP** is produced from the **separation of plasma** from **donated blood**Q.
- **Stored** at **-18°C** and has a **shelf life** of **1 year**Q.
- **Each unit** contains **400 mg of fibrinogen** and **1 unit activity of each** of the **clotting factors**Q.
  - **Most labile clotting factors** (**V** and **VIII**) may be **diminished**Q proportional to shelf life.
- **FFP contains stable coagulation factors** and **plasma proteins**: **fibrinogen, antithrombin, albumin, proteins C and S**Q.

Indications for FFP	
• **Correction of coagulopathies:** – **Rapid reversal of warfarin**Q – Supplying deficient plasma proteinsQ	• Treatment of **thrombotic thrombocytopenic purpura**Q

- Patients who are **IgA-deficient** and **require plasma support** should receive **FFP from IgA-deficient donors to prevent anaphylaxis.**
  - **FFP should not be** routinely **used to expand blood volume**Q.
  - **FFP**: An **acellular component** and **does not transmit intracellular infections**, e.g., CMV.

28. Ans. a. Good source of all coagulation factors

29. Ans. c. Factors 5 and 8

30. Ans. a. It is used as volume expander

31. Ans. a. Just before operation

The question is incomplete. It should be "A cirrhotic patient with abnormal coagulation needs cholecystectomy, FFP should be given:"

Fresh Frozen Plasma

- Transfusions with **FFP** are given to **replenish clotting factors**Q.
- The **effectiveness** of the **transfusion** in maintaining hemostasis is **dependent on** the **quantity** of each factor delivered and its **half-life**.

- The **half-life** on the **most stable clotting factor**, factor **VII**, is **4 to 6 hours**Q.
- A reasonable transfusion scheme would be to **give FFP on call** to the **operating room**.
- This way the **transfusion** is **complete prior** to the **incision**, with **circulating factors** to **cover** the **operative** and **immediate postoperative period**Q.

32. Ans. b. 8 hours

- The **half life** of **factor VIII** is **8-12 hours**.

33. Ans. d. XI *(Ref: http://en.wikipedia.org/wiki/Haemophilia_C)*

- **Hemophilia C (Rosenthal syndrome):** Due to **factor XI deficiency**Q

CRYOPRECIPITATE

34. Ans. c. Factor VIII *(Ref: Harrison 18/e p953; Sabiston 19/e p588; Schwartz 10/e p73-75,1599, 9/e p82; Bailey 26/e p21, 25/e p21)*

Cryoprecipitate

- **Cryoprecipitate** is a source of **fibrinogen**Q, **factor VIII**Q and **von Willebrand factor (vWF)**Q.
- It is **ideal for supplying fibrinogen** to the volume-sensitive patient.
- Stored at ≤-18°C
  - **1 unit** of cryoprecipitate contains **80-145 units of Factor VIII** and **250 mg of fibrinogen**Q.
  - Cryoprecipitate is **pooled from many donors**, so there are **maximum chances of disease transmission** among all blood productsQ.
- Cryoprecipitate may also **supply vWF** to patients with **dysfunctional** (**type II**) or **absent** (**type III**) **von Willebrand disease**.

35. Ans. b. Factor VIII

36. Ans. a. Cryoprecipitate

37. Ans. b. Factor IX

CHAPTER 50

Shock

MULTIPLE CHOICE QUESTIONS

SHOCK

1. **Shock is clinically best assessed by:** *(PGI Dec 97)*
   a. Urine output b. CVP
   c. BP d. Hydration

2. **Which of the following is the best parameter to assess fluid intake in a poly-trauma patient?** *(All India 94)*
   a. Urine output b. BP
   c. Pulse d. Pulse oximetry

3. **Following is the most important factor in the management of shock:** *(AIIMS 84)*
   a. Blood pressure b. Cardiac output
   c. CVP to 8 cm of water
   d. Deficiency of effective circulation

4. **Which of the following is true for shock?** *(MCI Sept 2005)*
   a. Hypotension b. Hypoperfusion to tissues
   c. Hypoxia d. All of the above

5. **Neurogenic shock is characterized by:** *(AIIMS May 2014)*
   a. Hypertension and tachycardia
   b. Hypertension and bradycardia
   c. Hypotension and tachycardia
   d. Hypotension and bradycardia

HEMORRHAGIC SHOCK

6. **Immediate management of a patient with multiple fracture and fluid loss includes the infusion:** *(All India 94)*
   a. Blood b. Dextran
   c. Normal saline d. Ringer lactate

7. **Hemorrhage leads to:** *(MCI Sept 2005)*
   a. Septic shock b. Neurogenic shock
   c. Hypovolemic shock d. Cardiogenic shock

8. **In traumatic cases, shock is most likely due to:** *(DNB 2011, MCI Sept 2007)*
   a. Injury to intra abdominal solid organ
   b. Head injury
   c. Septicemia
   d. Cardiac failure

9. **Which of the following is ideal in moderate hemorrhagic shock?** *(Karnataka 2012, MCI Sept 2007)*
   a. Dextrose b. Ringer lactate
   c. Blood d. Dextran

10. **Compensatory mechanism in a patient with hypovolemic shock:** *(JIPMER 2011)*
    a. Increased renal blood flow
    b. Decrease in cortisol
    c. Decrease in vasopressin
    d. Decreased cutaneous blood flow

11. **Features of hypovolemic shock are all except:** *(NIMHANS 86)*
    a. Oliguria b. Bradycardia
    c. Low BP d. Acidosis

12. **One of the following is earliest indication of concealed acute bleeding:** *(All India 95)*
    a. Tachycardia b. Postural HT
    c. Oliguria d. Cold clammy fingers

13. **Blood loss in class II hemorrhagic shock is:**
    a. < 15% b. 15-30% *(Recent Questions 2013)*
    c. 30-40% d. >40%

14. **Most common type of shock in emergency room is:**
    a. Cardiogenic *(Recent Questions 2013)*
    b. Hypovolemic shock
    c. Obstructive
    d. Neurogenic

15. **Most common type of shock in surgical practice:** *(DNB 2014)*
    a. Cardiogenic b. Hypovolemic
    c. Neurogenic d. Septic shock

SEPTIC SHOCK

16. **The most important cause of the death in septic shock is:**
    a. DIC b. Respiratory failure
    c. Renal d. Cardiac *(JIPMER 80)*

17. **35-years old Mona developed feature of septicemia. Shock in form of hypotension and low urine output. She was being treated for colonic necrosis. What will be the management?**
    a. IV fluids + dopamine b. IV fluids only *(AIIMS June 99)*
    c. Only dopamine d. Antibiotic in high dose

18. **Plasma expanders are used in:** *(NEET 2013, Recent Question 2013, DNB 2012)*
    a. Septic shock b. Vasovagal shock
    c. Neurogenic shock d. Cardiogenic shock

MISCELLANEOUS

19. **Blood clot the size of a clenched fist is roughly equal to:**
    a. 250 ml b. 350 ml *(PGI 88)*
    c. 500 ml d. 600 ml

20. **What is normal pulmonary capillary wedge pressure?** *(MHSSMCET 2005)*
    a. 4-8 mm of Hg b. 8-12 mm of Hg
    c. 12-16 mm of Hg d. 15-25 mm of Hg

21. **A patient with spine, chest and abdominal injury in road traffic accident developed hypotension and bradycardia. Most likely reason is:** *(AIIMS Nov 2013)*
    a. Hypovolemic shock
    b. Hypovolemic + neurogenic shock
    c. Hypovolemic + septicemic shock
    d. Neurogenic shock

22. **Patient is on shock. IV cannulation not possible, intraosseous line for IVF should be done within:** *(WBPG 2014)*
    a. 1 minute b. 1.5 minute
    c. 2 minute d. 2.5 minute

EXPLANATIONS

SHOCK

1. **Ans a. Urine output** *(Sabiston 19/e p72-84; Schwartz 10/e p109-131, 9/e p91-102; Bailey 26/e p13-16, 25/e p13-16)*

Shock

- **Shock: Inadequate delivery of oxygen** and **nutrients** due to **poor tissue perfusion**[Q] to maintain normal tissue and cellular function
- **Mean arterial pressure <60 mm Hg** in previously normotensive patients
- **Systemic vascular resistance rises** leading to **decreased cutaneous blood flow**[Q] and **autoregulation** is **critical in sustaining cerebral** and **coronary blood flow**[Q].

Blalock Classification of Shock	
1. **Hypovolemic (MC)**[Q]	3. Cardiogenic
2. Vasogenic	4. Neurogenic

Monitoring in Shock
1. The best management of shock is done by putting pulmonary catheter. **PCWP is considered better guide than CVP for fluid titrations**[Q] as it can also determine left ventricular preload.
2. **Invasive arterial pressure** is **mandatory**[Q]**.**
3. **Blood gas analysis**[Q]. There is **metabolic acidosis** in shock.
4. **Mixed venous oxygen saturation** is considered as **best guide for tissue perfusion** (i.e. cardiac output)
5. **Urine output** is **best clinical guide of tissue perfusion**[Q].

2. **Ans a. Urine output**
3. **Ans d. Deficiency of effective circulation**
4. **Ans d. All of the above**
5. **Ans. d. Hypotension and bradycardia**

HEMORRHAGIC SHOCK

6. **Ans d. Ringer lactate** *(Ref: Schwartz 10/e p109,110,119-123, 9/e p100-101; Bailey 26/e p19-20, 25/e p19-20)*

- **Resuscitation following blood loss from multiple fractures** begins with administration of **2-3 liters of isotonic crystalloid immediately** to **restore BP** and **peripheral circulation**[Q].
- **Lactated ringer (RL) solution** is generally **preferred over 0.9% NaCl** (normal saline) as it is **balanced salt solution** and designed to **mimic extracellular fluid**[Q].
- Resuscitation with **colloids** is **no more effective than crystalloids** but is **more expensive**[Q].

7. **Ans c. Hypovolemic shock**
8. **Ans a. Injury to intra abdominal solid organs**
9. **Ans b. Ringer lactate**

- Patients with **blunt trauma** and **hypovolemia** should be **examined first for intra-abdominal bleeding** even if there is no overt existence of abdominal trauma.[Q]

10. **Ans d. Decreased cutaneous blood flow**
11. **Ans b. Bradycardia**
12. **Ans a. Tachycardia**

Four Classes of Hemorrhagic Shock (According to the ATLS course)				
	Class			
Parameter	**I**	**II**	**III**	**IV**
Blood loss (%)	0-15[Q]	15-30[Q]	30-40[Q]	>40[Q]
CNS	**Slightly** anxious	**Mildly** anxious	**Anxious** or confused	Confused or **lethargic**
Pulse (beats/min)	<100	>100	>120	>140
Blood pressure	Normal	Normal	**Decreased**[Q]	**Decreased**[Q]
Pulse pressure	Normal	**Decreased**	**Decreased**[Q]	**Decreased**[Q]
Respiratory rate	14-20/min	20-30/min	30-40/min[Q]	>35/min[Q]
Urine (mL/hr)	>30	20-30	5-15	Negligible[Q]
Fluid	Crystalloid[Q]	Crystalloid[Q]	Crystalloid + blood[Q]	Crystalloid + blood[Q]

13. **Ans b. 15-30%**
14. **Ans b. Hypovolemic shock**
15. **Ans. b. Hypovolemic**

SEPTIC SHOCK

16. **Ans d. Cardiac** *(Ref: Sabiston 19/e p85; Schwartz 10/e p127,171, 9/e p102-103; Bailey 26/e p14-15, 25/e p14-15)*

- **Hypotension** is the **MC cause of death** in **septic shock**Q.
- **Cardiac output** is **decreased in septic shock,** leading to **hypotension**Q.

17. **Ans b. IV fluids only** *(Ref: Sabiston 19/e p85; Schwartz 10/e p124-126, 9/e p102-103; Bailey 26/e p16-18, 25/e p16-18)*

Treatment of Septic Shock

- **First line of treatment: Aggressive volume expansion** with **crystalloid solution**Q and restoration of arterial oxygenation with **inspired oxygen** and frequently with **mechanical ventilation** are the highest priorities**Q**.
- **Second line: Ionotropic support** with **dopamine, norepinephrine,** or **vasopressin**Q in the presence of **hypotension** or **dobutamine**Q if **arterial pressure is normal**.
- **High dose activated protein C (APC)**Q provides a **survival benefit** in patients with **severe sepsis** and **septic shock**
- **Plasma expanders** are **useful** as **septic shock** is associated with **peripheral vasodilatation** causing **reactive hypovolemia**
- **Antibiotics** and **surgical debridement or drainage** to **control infection**Q

18. **Ans a. Septic shock**

MISCELLANEOUS

19. **Ans c. 500 ml** *(Ref: Bailey 24/e p61)*

- **Blood clot of size of a clenched fist** is roughly equal to **500 ml**Q.

20. **Ans b. 8-12 mm of Hg** *(Ref: Bailey 26/e p17, 25/e p17)*

Pulmonary Capillary wedge Pressure (PCWP)

- It is a **better indicator** for both **blood volume** and **left ventricular function** than CVPQ.
- Obtained by **pulmonary artery floatation balloon catheter (Swan-Ganz)** Q.
- **Normal PCWP: 6-12 mm Hg**Q
- Used to **differentiate left and right ventricular failure, pulmonary embolism, septic shock and ruptured mitral valve**Q
- **Accurate guide** to therapy with **fluids, inotropic agents** and **vasodilators**Q.
- May also be used to **measure cardiac output** by thermodilution techniqueQ.

21. **Ans d. Neurogenic shock** *(Ref: Harrison 18/e p2222, 2219)*

*A patient with **spine, chest and abdominal injury** in road traffic accident developed **hypotension** and **bradycardia.** Most likely reason is **neurogenic shock.***

*"Neurogenic shock: In addition to **arteriolar dilation, venodilation** causes **pooling in the venous system**, which **decreases venous return and cardiac output."**- Harrison 18th/2222*

Neurogenic Shock

- **Interruption of sympathetic vasomotor input** after a **high cervical spinal cord injury**, inadvertent **cephalad migration of spinal anesthesia**, or **devastating head injury** may result in neurogenic shock.

> - In addition to **arteriolar dilation, venodilation** causes **pooling in the venous system**, which **decreases venous return and cardiac output.**

- The **extremities are often warm, in contrast to the usual sympathetic vasoconstriction-induced coolness in hypovolemic** or **cardiogenic shock.**

Treatment

- Treatment involves a simultaneous approach to the **relative hypovolemia** and to the **loss of vasomotor tone**.
- **Excessive volumes of fluid** may be required to restore normal hemodynamics if given alone.
- Once hemorrhage has been ruled out, **norepinephrine** or a **pure alpha-adrenergic agent (phenylephrine)** may be necessary

Physiologic Characteristics of the Various Forms of Shock				
Type of Shock	**CVP and PCWP**	**Cardiac Output**	**SVR**	**Venous O_2 Saturation**
Hypovolemic	↓	↓	↑	↓
Cardiogenic	↑	↓	↑	↓
Septic				
Hyperdynamic	↑↓	↓	↓	↑
Hypodynamic	↑↓	↑	↑	↑↓
Traumatic	↓	↑↓	↑↓	↓
Neurogenic	↓	↓	↓	↓
Hypoadrenal	↑↓	↓	=↓	↓

22. Ans b. 1.5 minutes

- Guidelines state that, during CPR in children aged younger than 6 years, intraosseous access should be obtained if there is inability to achieve reliable venous access after **three attempts or 90 seconds,** whichever comes sooner. Intraosseous access has the same benefits in children aged over 6 years but access to the anterior tibial marrow is more difficult and other sites such as the lower femur, iliac crest or sternum should be considered.

CHAPTER 51

Miscellaneous

MULTIPLE CHOICE QUESTIONS

1. **Most important technical consideration at the time of doing below knee amputation is:** *(AIIMS Nov 2000)*
   a. Posterior flap should be longer than the anterior flap
   b. Stump should be long
   c. Stump should be short
   d. Anterior flap should be longer than posterior flap

2. **Referred pain from all of the following conditions may be felt along the inner side of right thigh, except:**
   a. Inflamed pelvic appendix *(All India 2006)*
   b. Inflamed ovaries
   c. Stone in pelvic ureter
   d. Pelvic abscess

3. **Following are true about William Halsted:** *(PGI June 2008)*
   a. First person to receive nobel prize in surgery
   b. Pioneered introduction of gloves
   c. Promoted radical approach for breast surgery
   d. Pioneered role of antibiotics

4. **FNAC needle size:** *(AIIMS Nov 2007)*
   a. 18-22 b. 22-26
   c. 27-29 d. 16-18

5. **Bee venom can be neutralized by applying:** *(PGI 88)*
   a. Soda bicarbonate b. Vinegar
   c. Lemon juice d. Dilute HCL

6. **The most dangerous injury is:** *(PGI 88)*
   a. Snake bite b. Scorpion bite
   c. Wasp sting d. Human bite

7. **The best site for intramuscular injection is:** *(PGI 88)*
   a. Deltoid
   b. Anterolateral part of thigh
   c. Upper outer segment of buttocks
   d. Upper inner segment of buttocks

8. **Hereditary spherocytosis is transmitted as:** *(PGI 85)*
   a. Autosomal dominant b. Autosomal recessive
   c. X-linked dominant d. X-linked recessive

9. **Subcutaneous calcification are seen in:** *(JIPMER 93)*
   a. Gout b. Hyperparathyroidism
   c. Onchronosis d. Malignancies

10. **In polycythaemia vera the most common postoperative complication following major surgery is:** *(PGI 91, AMU 87)*
    a. Thrombosis b. Gastric ulcer
    c. Diabetes insipidus d. Haemorrhage

11. **Biot's respiration is seen in:** *(JIPMER 88, AI 90)*
    a. Hypnosedative poisoning b. Appendicitis
    c. Cholecystitis d. Bulbar poliomyelitis

12. **'Sterile needle test' helps in differentiating:** *(Gujrat 2014, JIPMER 81, AIIMS 86)*
    a. Healing process b. Depth of burns
    c. Degenerative process d. Infection

13. **Van Buchem's syndrome is characterized by all except:** *(Gujrat 2014, PGI 80, Rohtak 86)*
    a. Overgrowth b. Distortion of mandible
    c. Facial Palsy
    d. Increased acid phosphatase

14. **The stage of myasthenia gravis that best responds to thymectomy is:** *(AIIMS 80, 81, PGI 86)*
    a. Stage 1: active b. Stage 2: Inactive
    c. Stage 3: burnt out d. Those with thymoma
    e. None of the above

15. **Quant's sign (a T-shaped depression in the occipital bone) may be present in:** *(Gujrat 2014, JIMPER 81, AIIMS 84)*
    a. Down's syndrome b. Head injury
    c. Rickets d. Scurvy

16. **Nezelof's syndrome is recurrent episodes of:** *(Gujrat 2014, JIPMER 81, DNB 90)*
    a. Appendicitis b. Cholecystitis
    c. Intestinal obstruction d. Pneumonia

17. **Hickey-Hare test is used to diagnose:** *(Gujrat 2014, PGI 81, AIIMS 86)*
    a. Congenital pyloric stenosis b. Doudenal atresia
    c. Achlasia cardia d. Diabetes insipidus

18. **Usually employed technique for splanchnic block is:** *(JIPMER 79, AIIMS 80)*
    a. Braun's method b. Kappi's method
    c. Wending's method d. None of the above

19. **Secondary amyloidosis occurs in:** *(JIPMER 80, AIIMS 82)*
    a. Chronic osteomyelitis b. Rheumatoid arthritis
    c. Leprosy d. Syphilis

20. **Arrow headed finger on X-ray is suggestive of:** *(PGI 83, 85)*
    a. Acromegaly b. Hyperparathyroidism
    c. Down's syndrome d. Sarcoidosis

21. **A Seldinger needle is used for:** *(AIIMS 81, AMC 87)*
    a. Liver biopsy b. Suturing skin
    c. Arteriography d. Lymphography

22. **Blongnini's symptom (a feeling of crepitation occurring from gradual increasing pressure on the abdomen) is seen in:** *(Gujrat 2014, PGI 80, 81, AIIMS 84)*
    a. Congenital pyloric stenosis b. Gastric polyp
    c. Duodenal atresia d. Measles

23. **Mauriac's syndrome is characterized by the following except:** *(Gujrat 2014, JIPMER 81, AIIMS 86)*
    a. Diabetes b. Obesity
    c. Dwarfism d. Cardiomegaly

24. **A cricoids hook is used particularly:** *(JIPMER 81, DNB 89)*
    a. In thyroidectomy
    b. In block dissection of the neck
    c. For retracting the superior laryngeal nerve
    d. In tracheostomy

25. **Not a premalignant ulcer:** *(Kerala 94)*
    a. Bazin's ulcer b. Paget's disease of nipple
    c. Marjolin's ulcer d. Lupus vulgaris

26. During endotracheal intubation, unilateral breath sounds, no air heard entering the stomach and no gastric distension is suggestive of entry of the endotracheal tube into: *(UPSC 96)*
a. Right main bronchus b. Esophagus
c. Mid-trachea d. Left main bronchus

27. Aminopeptidase is elevated in obstruction of: *(Assam 96)*
a. Ureter b. Urethra
c. CBD d. Bladder

28. Sappey's line denotes a line: *(Karnataka 95)*
a. Encircling the neck at C6 vertebra level
b. Encircling the trunk just above the umbilicus
c. Encircling the salpigian tubes
d. None of the above

29. Hormonal treatment is given for which of the following malignancy? *(Kerala 96)*
a. Choriocarcinoma b. Carcinoma prostate
c. Hepatoma d. Teratoma
e. Granulosa cell tumour

30. A female patient complains of periumbilical pain and nausea particularly after taking food. The diagnosis is: *(UPPG 95)*
a. Meckel's diverticulum b. Peptic ulcer syndrome
c. Lactose intolerance d. None

31. Most common tumour among children 1-5 years in South Africa is: *(TN 96)*
a. Neuroblastoma b. Wilm's tumour
c. Neurofibroma d. Burkitt's lymphoma

32. First neurosurgeon of India: *(SCTIMS 98)*
a. Jacob Chandy b. Jacob Abraham
c. K.V. Mathal d. Mathew Chandy

33. Local anesthetics cannot be used at the site of infection because it causes: *(MAHE 2001)*
a. Spread of infection b. Lowered efficiency
c. Both d. None

34. All are true about long flexor tendons except: *(Kerala 95)*
a. Flexor digitorum prefunds inserted to distal phalanx bas
b. Flexor digitorum superficialis attached to the sides of middle phalanx
c. Damage to the tendons involves formation of tenoma during repair
d. Good repair results if tendon sheath is damaged

35. No man's land in palm corresponds: *(Gujrat 2014, MAHE 98)*
a. Zone I b. Zone II
c. Zone III d. Zone IV

36. Failure of migration of neural crest cells is seen in: *(Kerala 2001)*
a. Albinism b. Congenital megacolon
c. Odonotomes d. Adrenal tumour

37. Hypothermia is used in all except: *(PGI 98)*
a. Cardiac surgery b. Neonatal ischemia
c. Heat stroke d. Cardiac arrhythmia

38. The commonest symptom post operatively seen is:
a. Depression b. Psychosis *(Kerala 97)*
c. Euphoria d. None of the above

39. The most sensitive qualitative method for detection of air embolism is: *(Gujrat 2014, PGI 79, AIIMS 86)*
a. Doppler ultra sound b. Elector cardiogram
c. Arterial pressure
d. End expiratory carbon dioxide content

40. Fiberoptic endoscopy is contraindicated in: *(PGI 98)*
a. Children b. Aneurysm of arch of aorta
c. Cervical spondylosis d. Hemoptysis

41. Depressed bridge of nose can be due to any of the following except: *(Karnataka 2003)*
a. Leprosy b. Syphilis
c. Thalassemia d. Acromegaly

42. In sickle cell anemia sudden onset of pancytopenia with hemolysis and no rise of reticulocyte count occurs in: *(JIPMER 2004)*
a. Sequestration crisis b. Aplastic crisis
c. Hemolytic crisis d. Vaso-occlusive crisis

43. Who said these words: To study the phenomenon of disease without books is to sail an uncharted sea, while to study books without patients is not to go to sea at all? *(Karnataka 2004)*
a. Hamilton Bailey b. Sir Robert Hutchison
c. Sir William Osler d. J.B. Murphy

44. In the acronym "Swelling" used for the history and examination of a lump or swelling, the letter 'N' stands for: *(Karnataka 2004)*
a. Nodes b. Noise (Thrill/bruit)
c. Numbness d. Neurological effects

45. Lamina dura lining the alveolus is: *(Karnataka 2002)*
a. Cancellous bone b. Ligament
c. Dense cortical bone d. Muscle

46. Vidian neurectomy is indicated in: *(MAHE 2005)*
a. Glossopharyngeal neuralgia
b. Trigeminal neuralgia
c. Vasomotor rhinitis
d. Atrophic rhinitis

47. Orthobaric oxygen in used in: *(MAHE 2005)*
a. Carbon monoxide poisoning
b. Ventilation failure
c. Anaerobic infection
d. Gangrene

48. 'Tennis elbow' is characterized by: *(MAHE 2005)*
a. Tenderness over the medial epicondyle
b. Tendinitis of common extensor origin
c. Tendinitis of common flexor origin
d. Painful flexion and extension

49. Pelvic exenteration is known as: *(Gujrat 2014, APPG 2006)*
a. Miles Operation b. Lyods operation
c. Finch operation d. Brunschwigs operation

50. About congenital torticollis all are except: *(AIIMS Nov 2006)*
a. Always associated with breech extraction
b. Spontaneous resolution in most cases
c. 2/3rd cases have palpable neck mass at birth
d. Uncorrected cases develop plagicephaly

51. Dye used in chromo endoscopy for detection of cancer: *(AIIMS May 2009)*
a. Gentian violet b. Toluidine blue
c. Hemotoxiline and eosine d. Methylene blue

52. Concomitant chemo-radiotherapy is indicated in all of the following except: *(All India 2009)*
a. Stage IIIB CA cervix
b. T2 N0 M0 anal cancer
c. T2 N0 M0 glottic cancer
d. T1 N2 M0 Nasopharyngeal cancer

53. Smoking may be associated with all of the following cancer's except: *(All India 2009)*
a. CA Larynx b. CA Nasopharynx
c. CA Bladder d. CA Esophagus

54. Hutchinson and Pepper syndrome is a feature of: *(COMEDK 2004)*
a. Von Recklinghausen's b. Neuroblastoma
c. Renal cell carcinoma d. Meningioma

55. Not a submucosal lesion: *(Punjab 2009)*
a. Lipoma
b. Ranula
c. Carcinoid
d. None

56. Frozen section is/are used for: *(PGI Nov 2009)*
a. Enzyme
b. Intra-operative histopathological examination
c. Fat
d. Acid fast bacilli
e. To check surgical margin in tumor surgery

57. Condition associated with panniculitis is/are: *(PGI Nov 2009)*
a. Pancreas cancer
b. Chronic pancreatitis
c. Acute pancreatitis
d. Pancreatic divisum
e. Posttraumatic pancreatitis

58. True about apocrine gland: *(PGI June 2009)*
a. Modified sweat gland
b. Modified sebaceous gland
c. Present in axilla and groin
d. Hidradenitis suppurativa is infection of apocrine gland

59. Not associated with fat necrosis: *(PGI June 2009)*
a. Liposuction
b. Radiotherapy
c. Mammoplasty
d. Carcinoma breast
e. Following trauma

60. Which of the following is the most commonly used 'fixative' in diagnostic pathology?
a. Formaldehyde
b. Ethyl alcohol
c. Mercuric chloride
d. Picric acid

61. Aflatoxins are produced by: *(All India 2011)*
a. Aspergillus flavus
b. Aspergillus niger
c. Aspergillus fumigates
d. Candida

62. Axillary abscess is safely drained by which approach? *(AIIMS May 2011)*
a. Medial
b. Posterior
c. Lateral
d. Floor

63. Topical mitomycin C is used in : *(AIIMS May 2011)*
a. Basal skull carcinoma
b. Tracheal stenosis
c. Skull base osteomyelitis
d. Angiofibroma

64. Fixative used in histopathology: *(AIIMS May 2012)*
a. 10% buffered neutral formalin
b. Bouins fixative
c. Glutaraldehyde
d. Ethyl alcohol

65. Potato nodes are feature of: *(DNB 2010)*
a. Sarcoidosis
b. Tuberculosis
c. Carcinoid
d. Lymphoma

66. Moures sign is seen in: *(Recent Questions 2013)*
a. Carcinoma
b. Appendicitis
c. Varicose vein
d. Pancreatitis

EXPLANATIONS

1. **Ans. a. Posterior flap should be longer than the anterior flap** *(Ref: Sabiston 19/e p1742; Bailey 26/e p892, 25/e p916-917)*

Below Knee Amputation

- **Posterior flap** should be **longer than anterior flap** as the **posterior skin** has a **good blood supply** (anterior skin has poor due to lack of muscle an anterior aspe ct). Good blood supply **helps in easy healing of stump**Q.
- Equally short anterior and posterior flaps are used only when the long posterior flap technique is not feasible because of previous wounds or extensive tissue ischemia.
- **Longer stump is better** in general **for amputation at all sites except below knee amputation**Q.
- **Best level for below knee amputation** (as for prosthetic fitting is concerned): At the **distal musculotendinous junction** of the **gastrocnemius muscle**Q.

2. **Ans. d. Pelvic abscess**

3. **Ans. b. Pioneered introduction of gloves, c. Promoted radical approach for breast surgery** *en.wikipedia.org/wiki/William_Stewart_Halsted*

Contributions of William Steward Halsted (Father of 'safe' surgery)

- **First emergency blood transfusion** was performed on his sister
- Development of **Halsted radical mastectomy**Q
- Invention of **surgical gloves**Q

4. **Ans. b. 22-26** *www.ncbi.nlm.nih.gov/pubmed/17405171*

- **FNAC Needle Size: 21-25 guaze**Q

5. **Ans. a. Soda bicarbonate** *(Ref: Harrison 18/e p3581)*
Bee venom can be **neutralized by** applying **soda bicarbonate**

6. **Ans. a. Snake bite**

7. **Ans. c. Upper outer segment of buttocks**

8. **Ans. a. Autosomal dominant**

9. **Ans. b. Hyperparathyroidism, d. Malignancies** *(Ref: radiographics.rsna.org/content/19/suppl_1/S11.full)*

- **Subcutaneous calcifications** are seen in both **hyperparathyroidism** and **malignancies**Q.

10. **Ans. a. Thrombosis** *(Ref: Harrison 18/e p900)*

- **Thrombosis: MC postoperative complication** following major surgery in **polycythemia vera**Q.

11. **Ans. None** *en.wikipedia.org/wiki/Biot's_respiration*
Biot's respiration is **seen in raised ICT.**

12. **Ans. b. Depth of burns** *(Ref: Sabiston 19/e p522; Schwartz 9/e p199)*

- **'Sterile needle test'** helps in **differentiating depth of burns.**

13. **Ans. b. Distortion of mandible** *http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1376897/*

Van Buchem Disease

- Van Buchem disease (**hyperostosis corticalis generalisata**) is an **autosomal recessive** disorder characterized by **hyperostosis of the skull, mandible, clavicles, ribs**, and **diaphyseal cortices** of the **long bones**Q.
- **Most striking clinical features** are the **enlargement of the jaw** and **thickness of the skull**, which may lead to **facial nerve palsy, hearing loss,** and **optic atrophy**Q.

14. **Ans. a. Stage** *1 active onlinelibrary.wiley.com/doi/10.1002/bjs.1800650503/pdf*

- **Stage I**, the **active stage**, is **characterized by remissions** and **best respond to thymectomy**Q.

15. **Ans. c. Rickets** *http://www.kmle.com/search.php?Search=Quant's%20s.*

Quant's Sign

- A **T-shaped depression in** the **occipital bone** occurring in many cases of **rickets,** especially in **infants lying constantly in bed** with pressure on the **pressure on the occiput**Q.

16. **Ans. d. Pneumonia** *en.wikipedia.org/wiki/Nezelof_syndrome*

Nezelof Syndrome

- **Nezelof syndrome** (also known as "**Thymic dysplasia with normal immunoglobulins**")
- An **autosomal recessive** congenital immunodeficiency condition due to underdevelopment of the thymus.
- It causes **severe infections** and **malignancies**Q.
- **Treatment: Antimicrobial therapy**, **IV immunoglobulin**, **bone marrow transplantation**, thymus transplantation and thymus factors.

17. **Ans. d. Diabetes insipidus** *(Ref: medical-dictionary.thefreedictionary.com/Hickey-Hare+tes)*

Hickey-Hare Test

- **Hickey-Hare test** is **hypertonic saline infusion test** that induces plasma hyperosmolality.
- Used for **distinguishing between different causes** of **polyuria** and **polydipsia**Q.

18. **Ans. a. Braun's method** *(Ref: Lee Anesthesia (2005)/449)*

Splanchnic Block

- **Splanchnic block** can be performed **from the front** (**Braun**Q, Wendling), or **from behind** (**Kappis**).

19. **Ans. a. Chronic osteomyelitis, b. Rheumatoid arthritis, c. Leprosy** *(Ref: Harrison 18/e p945-949)*

Amyloidosis

- Amyloidosis is a pathological proteinaceous substance **deposited between cells**Q in various tissues and organs of the body in a variety of clinical settings.

Types of Amyloid Protein

- **AL (Amyloid Light chain):**
  - This is **derived from plasma cells**Q and contains immunoglobulin light chains
  - Associated with **primary amyloidosis** and immunocyte dyscrasias with amyloidosis like **multiple myeloma**Q
- **AA (Amyloid Associate protein):**
  - It is unique non-immunoglobulin protein synthesized by **reticuloendothelial cells of liver**Q.
  - Associated with **secondary amyloidosis** and **reactive systemic amyloidosis**Q.

  - Chronic inflammatory conditions: Tuberculosis^Q, Bronchiectasis^Q, Osteomyelitis^Q
  - **Connective tissue disorders: Rheumatoid Arthritis (MC)**Q, Ankylosing spondylitis^Q and Primary biliary cirrhosis^Q
  - **Non immune derived tumors: Renal cell carcinoma**Q **and Hodgkin's lymphoma**Q

- **β_2 microalbumin (Aβ_2m): Hemodialysis associated amyloidosis**Q
- **β_2 Amyloid protein: Senile cerebral**Q**, Alzheimer's disease**Q
- **Transthyretin (ATTR): Familial amyloidotic neuropathies**Q **and** Systemic senile amyloidosis^Q
- Calcitonin associated amyloid (A cal): **Medullary CA thyroid**Q
- Islet amyloid peptide (AIAPP): **Type II DM**Q
- Atrial natriuretic factor associated amyloid: Isolated atrial Amyloidosis and Misfolded prion protein (PrPsc) disease

  - Common Biopsy sites in Amyloidosis: Subcutaneous abdominal fat aspirate^Q, Rectum^Q, Skin^Q, Gingiva^Q

20. **Ans. a. Acromegaly** *www.acromegalycommunity.com/blog*

- **Arrow headed finger** on X-ray is suggestive of **Acromegaly**Q.

21. **Ans. c. Arteriography** *(Ref: Sabiston 19/e p1733; Schwartz 10/e p1051, 9/e p751; Bailey 25/e p903)*

Seldinger needle is **used for angiography** (arteriography).

Arteriography

- **Aortic** and **lower extremity arteriograms** are generally performed **by needle puncture** of the **femoral**Q or **brachial arteries**Q followed by **guidewire placement** and **catheter insertion** using the **Seldinger technique**.

22. **Ans. d. Measles**
23. **Ans. d. Cardiomegaly en.wikipedia.org/wiki/Mauriac_syndrome**

Mauriac Syndrome

- **Mauriac syndrome** is a rare complication in children and adolescents with **diabetes mellitus type 1,** characterized by **hepatomegaly, growth impairment,** and **cushingoid features**Q.

24. **Ans. d. In tracheostomy** *www.hopkinsmedicine.org*
    - A **cricoids hook** is **used in tracheostomy**[Q].
25. **Ans. a. Bazin's ulcer** *emedicine.medscape.com/article/1083213-overview*

Bazin Disease

- **Bazin disease** (or "**Erythema induratum**") is a **panniculitis** on the **back of the calves**[Q].
- It is now considered a panniculitis that is **not associated with a single defined pathogen**[Q].
- It occurs **mainly in women**[Q], but is very rare now.

26. **Ans. a. Right main bronchus**
27. **Ans. c. CBD** *(Ref: American Journal of Gastroenterology; Dec1963, Vol. 41 Issue 6, p620)*

Leucine Aminopeptidase

- **Increased Leucine aminopeptidase (LAP) activity** is seen in:
  - **Carcinoma of the pancreas, choledocholithiasis, acute pancreatitis**[Q]
  - **Viral hepatitis, cirrhosis, carcinoma** with **liver metastases**[Q]
- In **common bile duct obstruction**, whether due to **carcinoma pancreas** or **choledocholithiasis**, the **elevated serum LAP levels returned** to **normal following relief of the obstruction.** This is in agreement with the hypothesis that the increased serum LAP activity in these conditions is the result of bile duct obstruction.

28. **Ans. b. Encircling the trunk just above the umbilicus** *(Ref: Principles and Practice of General Surgery by Kirby I. Bland, Michael G. Sarr, Markus W. Büchler (2008) Volume I/1592)*

Sappey's Line

- **Sappey's line** defines a **band of skin extending from** the **umbilicus**[Q], along the **iliac crests** over to L1.
- This line **divides sites** which **drain to axilla above**, **groin below** or **both sites**[Q].

29. **Ans. b. Carcinoma prostate**
30. **Ans. a. Meckel's diverticulum**
31. **Ans. d. Burkitt's lymphoma** *www.ncbi.nlm.nih.gov/pubmed/19661660*
    - Commonest tumour among children 1-5 years in South Africa is Burkitt's lymphoma.
32. **Ans. a. Jacob Chandy** *www.cmch-vellore.edu/pdf/jacob.pdf*
    - **Jacob Chandy: Pioneering Neurosurgeon of India**[Q]
33. **Ans. c. Both**
34. **Ans. d. Good repair results if tendon sheath is damaged**
35. **Ans. b. Zone II** *(Ref: Apley's 8/636-638)*

Bunnel's no-man's land is Zone II.

Zone II (No Man's Land or Dangerous Area of Hand[Q]**)**

- Situated **between** the **opening of** the **flexor sheath** (the **distal palmar crease**) and **insertion of flexor superficialis** (**flexor crease** of **proximal interphalangeal joint)**[Q]
- Also known as "**No man's land"** or **dangerous area of hand**[Q].
- The **result of flexor tendon repair is worst** in this area because both superficial and deep tendons run together in a tight sheath and passes through three pullies.

36. **Ans. b. Congenital megacolon**
37. **Ans. b. Neonatal ischemia, d. Cardiac arrhythmia** *(Ref: Schwartz 9/e p674)*
38. **Ans. d. None of the above**

Post-operative Psychiatric Symptoms

- **Delirium**[Q] **(20%)** >Depression (9%) >Dementia (3%) >Functional psychosis (2%).

39. **Ans. d. End expiratory carbon dioxide content** *(Ref: Schwartz 9/e p787-789)*
40. **Ans. b. Aneurysm of arch of aorta emedicine.medscape***.com/article/1890999-overview*
    - **Fiberoptic endoscopy** is **contraindicated in aneurysm of arch of aorta**.
41. **Ans. d. Acromegaly** *(Ref: Harrison 18/e p2894-2895)*

Leprosy, Syphilis and **Thalassemia** causes **depressed bridge of nose**.

42. **Ans. a. Sequestration crisis** *(Ref: Harrison 18/e p855)*

43. **Ans. c. Sir William Osler** *http://en.wikipedia.org/wiki/William_Osler*
    - **Sir William Osler**: "To study the phenomenon of disease without books is to sail an uncharted sea, while to study books without patients is not to go to sea at all"[Q]
44. **Ans. b Noise Thrill/bruit**
45. **Ans. c. Dense cortical bone**
46. **Ans. c. Vasomotor rhinitis** *www.ncbi.nlm.nih.gov/pubmed/16686388*
    - **Vidian neurectomy** is indicated **in** the cases of **vasomotor rhinitis** with **profuse secretion refractory to conservative treatment**[Q].
47. **Ans. a. Carbon monoxide poisoning** *www.biomedsearch.com/searchlist.html?p=3101...txt=oxygen...*
    - Severe **carbon monoxide poisoning** treated by **hyperbaric oxygen therapy**[Q].
48. **Ans. b. Tendinitis of common extensor origin** *(Ref: Bailey 25/e p495-496)*

Tennis Elbow (Lateral Epicondylitis)

- This is the **most common cause of elbow pain** excluding traumatic conditions
- Usually occurs in patients of **30-50 years**; **Etiology** is **unknown**[Q] in most of cases
- **Strenuous** or **overactivity** may **precede symptoms**
- **Anterodistal lateral epicondyle tenderness**[Q]

Diagnosis

- **Resisted wrist extension** is a reliable **diagnostic test**[Q]
- **Local anesthetic injection** is **diagnostically helpful**

Treatment

- Vast **majority improve** with **supervised conservative management**[Q]
- **Open** or **arthroscopic release** yields **good results** in **recalcitrant cases**
- **Arthroscopic release** also identifies associated pathology

49. **Ans. d. Brunschwig operation medifactsonline**.*blogspot.com/2011/.../1000-eponyms-in-surgery*

Brunschwig Operation

- **Pelvic exentration**[Q]: Surgery to **remove** the **lower colon, rectum** and **bladder,** and **create permanent stoma.**

50. **Ans. a. Always associated with breech extraction** *(Ref: Bailey 25/e p582)*

Torticollis

- In torticollis the **head is tilted toward** and **rotated away from the tight sternocleidomastoid muscle**.
- **Congenital torticollis** is usually **secondary to intrauterine moulding** but may present with fixed **sternocleidomastoid contracture** or with a **palpable mass in the muscle**.
- **Most cases resolve with stretching** but, occasionally, **surgical release** of the sternocleidomastoid at one or both ends is needed.

51. **Ans. d. Methylene blue** *en.wikipedia.org/wiki/Chromoendoscop*

Chromoendoscopy

- **Chromoendoscopy**: **Dyes** are **instilled into** the **GIT at** the time of **visualization** with **fibre-optic endoscopy**[Q].
- **Chiefly enhance** the **characterization of tissues**[Q]
- **Detail achieved** can often **allow for identification of the tissue type** or **pathology**[Q]

Stains used

- **Absorptive stains** have an affinity **for particular mucosal elements**, and include **Lugol's iodine, methylene blue** and **gentian violet**[Q].

Lugol's iodine	• Specifically **stains non-keratinized squamous epithelium**[Q] • **Useful for** identifying **squamous tissue, squamous dysplasia** and **squamous cell carcinomas**[Q].
Methylene blue	• Stains **absorptive epithelium**[Q] • Useful for **identifying** abnormality in **small intestine**, **colon** and **Barrett's esophagus**[Q] (intestinal metaplasia)

- **Contrast stains** are **not absorbed** but rather **provide contrast** by **permeating between irregularities in the mucosa to highlight irregularities**. The primary contrast stain is **indigo carmine**[Q].

- **Chief use** of **Indigo carmine**: **Identification of dysplastic cells** in individuals with **chronic UC**[Q].

- **Reactive stains** undergo an **observable change** due to a **chemical process** related to the function of the gastrointestinal tract. **Congo red** is used as a **test for achlorhydria in the stomach**[Q], as it changes **colour from red to black** at a pH less than 3.

Uses of Chromoendoscopy

- Identification of **squamous cell carcinomas** or **dysplasia** of the esophagus[Q]
- Identification of **Barrett's esophagus** and **dysplasia**[Q]
- identification of **early gastric cancer**[Q]
- Characterization of **colonic polyps** and **colorectal cancer**[Q]
- In **screening for dysplasia** in individuals with **ulcerative colitis**[Q].

52. Ans. c. T2 N0 M0 glottic cancer *(Ref: Harrison 18/e p735)*

- **Concomitant chemoradiotherapy** is indicated in **advanced cancers of head and neck.**[Q]
- **T2 N0 M0 glottic cancer** represents **stage II cancer** which is defined as **localized disease**, which is not an indication for concomitant chemoradiotherapy.

53. Ans. None *(Ref: Harrison 18/e p3561-3562)*

Smoking may be associated with all of the above cancers.

Smoking Associated Cancers		
• **Lung**[Q] • **Nasopharynx, oropharynx hypopharynx** and **Larynx**[Q] • **Nasal cavity** and **paranasal sinuses**[Q]	• **Oral cavity**[Q] • **Esophagus**[Q] • **Stomach**[Q] • **Pancreas**[Q] • **Liver**[Q]	• **Kidney**[Q] • Ureter and **Urinary Bladder**[Q] • **Uterine Cervix**[Q] • Acute Myeloid Leukemia

- **Smoking** is **not associated with postmenopausal Breast cancer** and **endometrial cancer.**

54. Ans. b. Neuroblastoma emedicine *medscape.com/article/439263-overview*

Neuroblastoma

- **Hutchinson and Pepper syndrome** is **skull metastasis** seen in neuroblastoma[Q].

55. Ans. b. Ranula *(Ref: Bailey 25/e p754)*

56. Ans. a. Enzyme, b. Intra-operative histopathological examination, c. Fat, e. To check surgical margin in tumor surgery *(Ref: Bailey 25/e p169-170; en.wikipedia.org/wiki/Histopathology)*

Frozen Section Biopsy

- Biopsy technique in pathology laboratories **for making urgent on-table diagnosis**[Q]
- Frozen section biopsy is a procedure done in a **pathology setup existing adjacent to** the **operation theatre**[Q].
- Surgeons are the main users of this service.

Procedure

- An **unfixed fresh tissue is frozen** (using CO_2 to **-25**^{0}**C**) and section are made and stained.

57. Ans. a. Pancreas cancer, c. Acute pancreatitis, d. Pancreatic divisum *(Ref: Harrison 18/e p419)*

Uses of Frozen Section Biopsy

- It is quick and surgeon can decide the further steps of procedure in the same sitting like **nodal clearance/type of resection** to be done.
- During surgery after resection of the tumor to look for (on table) the **clearance in the margin** and **depth**, also **to study** the **lymph nodes for their positivity**[Q].
- Used for **demonstration of** certain **constituents** which are **lost in processing with alcohol** or **xylene**, e.g., **fat, enzymes**[Q].

Panniculitis

- **Inflammatory lesions** of the **subcutaneous fat**[Q]
- **Divided into the distinct categories:**
  - **Septal panniculitis**: Inflammation is confined the **interlobular septa** of the subcutis
  - **Lobular panniculitis**: Inflammation involves the **entire fat lobule** and often the septa as well
  - **Panniculitis secondary to vasculitis:** Involve **large vessels in** the **subcutis,** in which the inflammation is usually restricted to the immediate vicinity of the involved vessel.
- **Pancreatic panniculitis:**
  - Manifests as **painful** or **asymptomatic subcutaneous nodules** or **indurated plaques** on the thighs, buttocks, lower trunk or **distal extremities** usually the lower.
  - Lesions are associated with **acute pancreatitis**[Q] or less commonly, **pancreatic carcinoma**[Q] either of which may be asymptomatic
  - It has also been associated with **low grade pancreatitis** in a patient **with pancreas divisum**[Q].

58. Ans. a. Modified sweat gland, c. Present in axilla and groin, d. Hidradenitis suppurativa is infection of apocrine gland *(Ref: Bailey 25/e p1266; en.wikipedia.org/wiki/Apocrine_sweat_gland)*

Apocrine Glands

- An **apocrine sweat gland** is a modified **sweat gland**
- In humans, **apocrine sweat glands** are found only in certain locations of the body: **Axilla, areola** and **nipples** of the breast, **perianal region**, and some parts of the **external genitalia**.
- **Hidradenitis suppurative** is **chronic suppurative condition** of **apocrine glands bearing skin**.

59. Ans. d. Carcinoma breast *(Ref: Breast Pathology By Frances P O Malley (2006)/76-78)*

Causes of Fat Necrosis

- **After surgery/ surgical trauma**: **Wide local excision, Reduction mammoplasty**[Q]
- Following **radiotherapy including iridium implants**[Q]
- Following **trauma**[Q]
- **Autologous fat injection**[Q] using the liposuction technique to fill in irregular contours and small soft tissue defects in the breast may lead to **fat necrosis secondary to poor blood supply** in the injected fat.

60. Ans. a. Formaldehyde *(Ref: Surgical Pathology by Rosai and Ackermann 9/e p27)*

Formalin

- **Formaldehyde** as a **buffered 10% aqueous solution (formalin**[Q]**)** is the **fixative most commonly used** in **histology**[Q]
- In routine clinical diagnostics it **offers** the **best possible compromise** between a **simple** and a **reliable method** as well as **extremely good structural preservation**[Q]**.**
  - The **strong cross-linking action** of **formaldehyde is essential**, **to protect the tissue from** the **aggressive effect of concentrated solvents** in the **course of fixation** and **embedding in paraffin**[Q].
- **Fixation of tissue arrests** the **autolysis** and **putrefaction** and **stabilizes the cellular and tissue contents**[Q]

61. Ans. a. Aspergillus flavus *(Ref: Ananthnarayan 7/e p625)*

- **Primary Aflatoxin Producing Fungi: Aspergillus flavus**[Q] **and Aspergillus parasiticus**[Q]

62. Ans. d. Floor *(Ref: BDC 4/e pI/58)*

Axillary Abscess

- An **axillary abscess** is **incised through** the **floor**[Q] of the axilla, midway between the anterior and posterior axillary folds, and nearer to the medial wall in order **to avoid injury to** the **main vessels running along the anterior, posterior** and **lateral walls.**

63. Ans. b. Tracheal stenosis *(Ref: Dhillon 3/e p67)*

- **Topical Mitomycin C** is the **drug of choice** used to aid the treatment of **laryngeal stenosis**[Q].
- **Topical Mitomycin C** can **inhibit fibroblast activity** and **restenosis**[Q]**.**

64. Ans. a. 10% buffered neutral formalin

65. Ans. a. Sarcoidosis *(Ref: Essentials of Chest Radiology by Janette Collins/165)*

Sarcoidosis

- **Sarcoidosis** is a systemic disease characterized by **non-caseating granulomas in multiple organs**
- In **90% of cases**, **symmetrical massive bilateral hilar lymphadenopathy** occur
- The **cardiac border** (**Potato nodes**) or lung involvement is present and can be revealed by chest X-ray or trans-bronchial biopsy

66. Ans. a. Carcinoma

- "In normal persons, a click is felt when larynx is moved from side to side over vertebral column, this is called laryngeal click (post cricoid crepitus) It is absent in post cricoid carcinoma"— Moure's sing

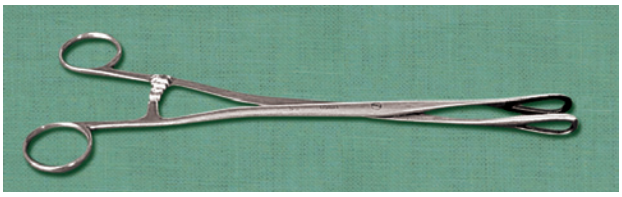
IMAGE BASED QUESTIONS

Image Based Questions

MULTIPLE CHOICE QUESTIONS

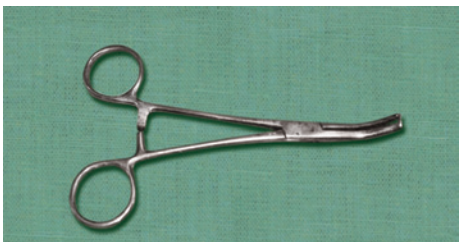
1. What is the name of instrument?

a. Ovum forceps
b. Sponge holding forceps
c. Cord holding forceps
d. Pile holding forceps



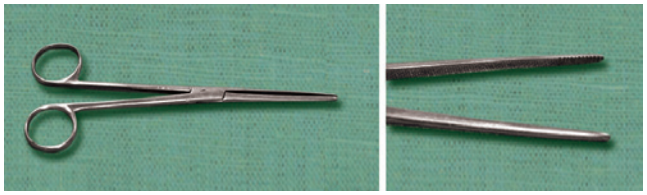
2. What is the name of instrument?

a. Lister's sinus forceps
b. Kocher's hemostatic forceps
c. Babcock's tissue forceps
d. Lane's tissue forceps



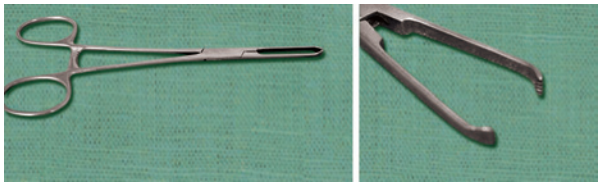
3. What is the name of instrument?

a. Lister's sinus forceps
b. Kocher's hemostatic forceps
c. Babcock's tissue forceps
d. Lane's tissue forceps



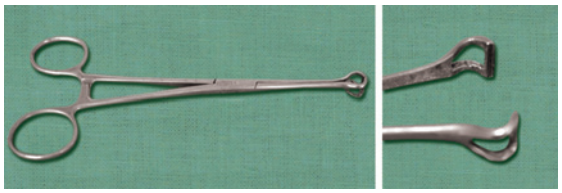
4. What are the uses of this instrument?

a. Used during laparotomy to retract skin margins
b. Used to hold neck of bladder during bladder neck resection
c. Used to hold skin flaps
d. All of the above



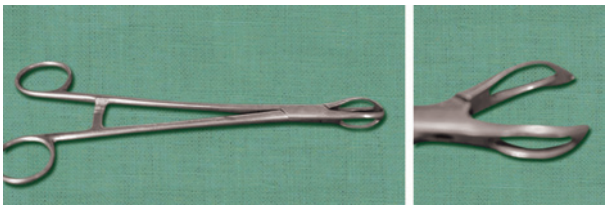
5. What is the name of instrument?

a. Lister's sinus forceps
b. Kocher's hemostatic forceps
c. Babcock's tissue forceps
d. Lane's tissue forceps



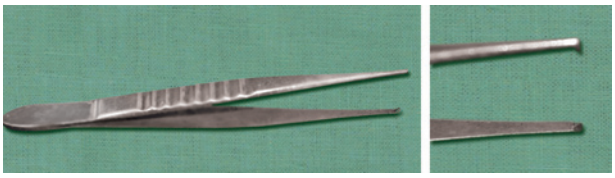
6. What is the name of this instrument?

a. Lister's sinus forceps
b. Kocher's hemostatic forceps
c. Babcock's tissue forceps
d. Lane's tissue forceps



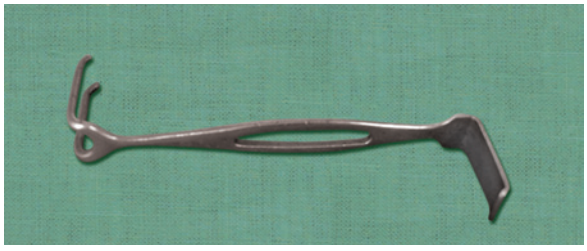
7. What are the uses of this instrument?

a. Used to hold the cut skin margins during suturing
b. Used to hold the linea alba or the rectus sheath during closure of abdominal incision
c. Used to hold the scalp during closure of scalp incision
d. All of the above



8. What is the name of this instrument?

a. Morris retractor
b. Doyen's retractor
c. Czerney's retractor
d. Deaver's retractor

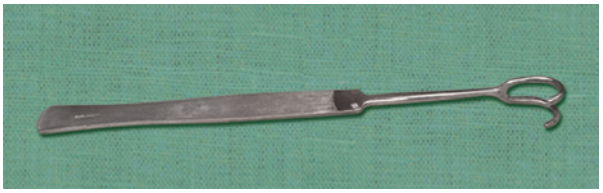


9. What is the name of this instrument?

a. Morris retractor
b. Doyen's retractor
c. Czerney's retractor
d. Deaver's retractor

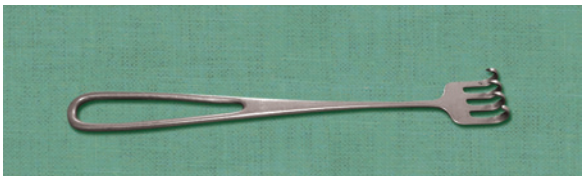
10. What are the uses of this instrument?

a. Used to retract skin flap for excision of sebaceous cyst
b. Used during venesection for retraction of skin
c. Used during tracheostomy for retraction of skin and thyroid insthmus
d. All of the above



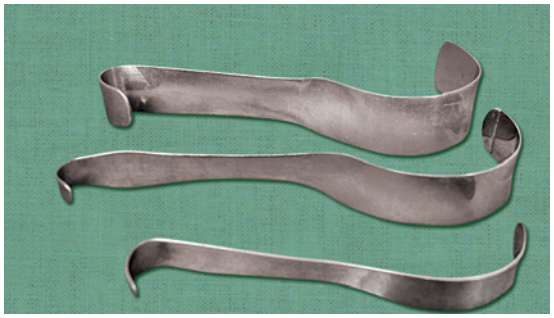
11. What is the name of this instrument?

a. Morris retractor
b. Doyen's retractor
c. Volkman's retractor
d. Deaver's retractor



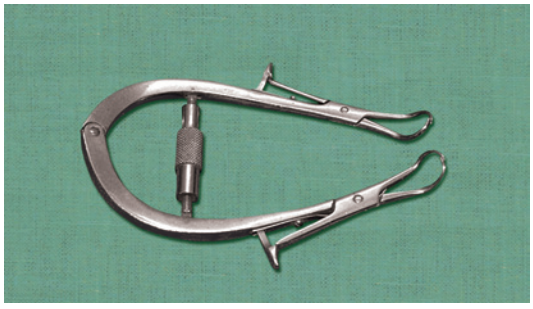
12. What is the name of this instrument?

a. Morris retractor
b. Doyen's retractor
c. Volkman's retractor
d. Deaver's retractor



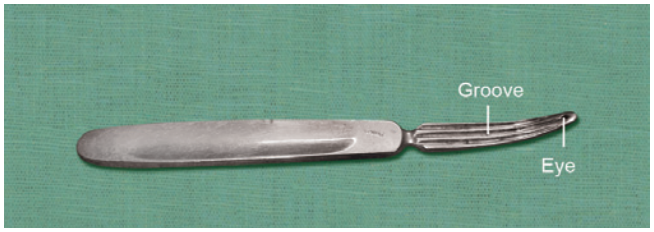
13. What is the name of this instrument?

a. Kocher's thyroid dissector
b. Doyen's retractor
c. Joll's thyroid retractor
d. Deaver's retractor



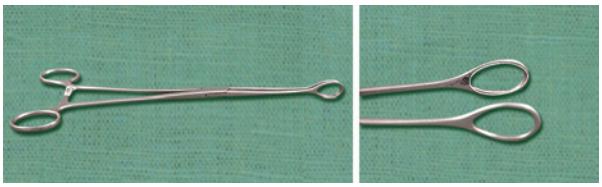
14. What is the name of this instrument?

a. Kocher's thyroid dissector
b. Doyen's retractor
c. Joll's thyroid retractor
d. Deaver's retractor



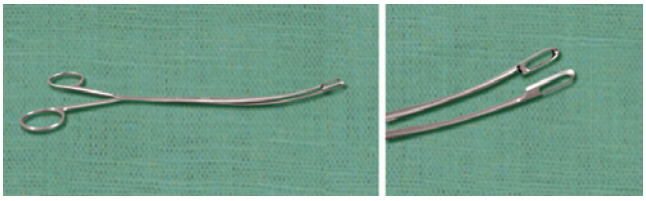
15. What is the name of instrument?

a. Ovum forceps
b. Sponge holding forceps
c. Cord holding forceps
d. Pile holding forceps



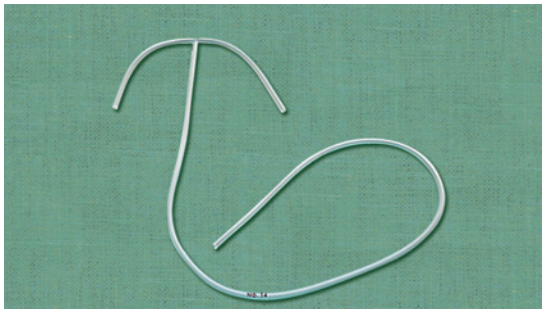
16. What is the name of instrument?

a. Pyelolithotomy forceps
b. Sponge holding forceps
c. Desjardins forceps
d. Pile holding forceps



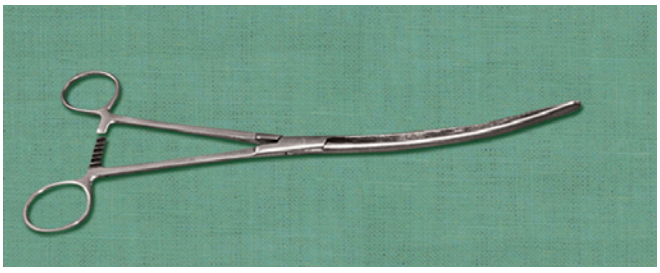
17. What is the name of this tube?

a. Kocher's T-tube
b. Kehr's T-tube
c. Lanz T-tube
d. Mayo's T-tube



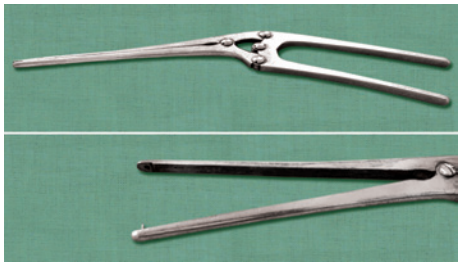
18. What is the name of instrument?

a. Payr's crushing clamp
b. Doyen's intestinal occlusion clamp
c. Hemostatic clamp
d. Vascular clamp



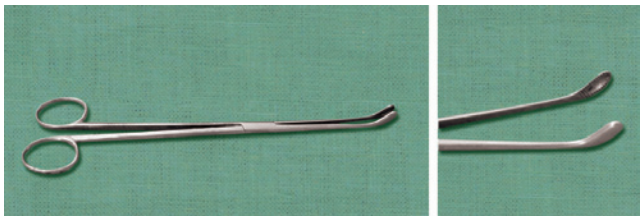
19. What is the name of instrument?

a. Payr's crushing clamp
b. Doyen's intestinal occlusion clamp
c. Hemostatic clamp
d. Vascular clamp



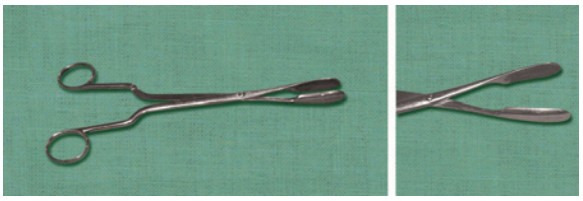
20. What is the name of instrument?

a. Pyelolithotomy forceps
b. Sponge holding forceps
c. Sprapubic cystolithotomy forceps
d. Pile holding forceps



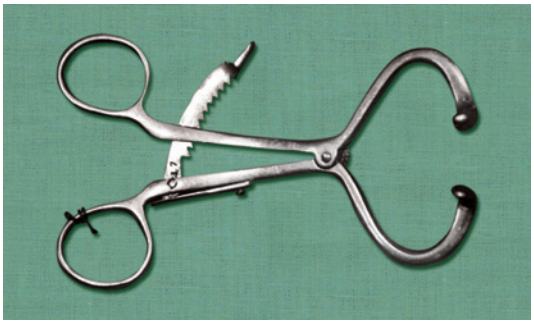
21. What is the name of instrument?

a. Pyelolithotomy forceps
b. Sponge holding forceps
c. Sprapubic cystolithotomy forceps
d. Pile holding forceps



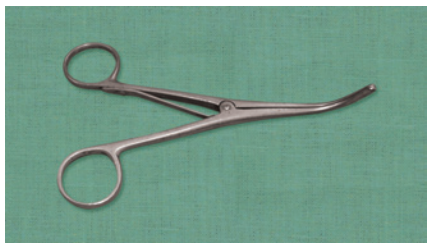
22. What is the name of instrument?

a. Doyen's retractor
b. Doyen's intestinal occlusion clamp
c. Doyen's mouth gag
d. Joll's thyroid retractor



23. What is the name of instrument?

a. Aneurysm needle
b. Cervical dilator
c. Tracheal dilator
d. Urethral dilator

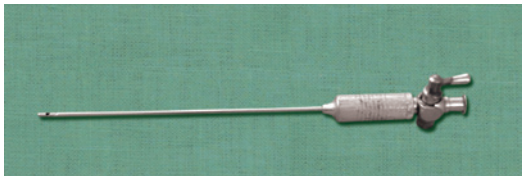


24. What is the name of instrument?

a. Aneurysm needle
b. Veress needle
c. Tracheal dilator
d. Urethral dilator

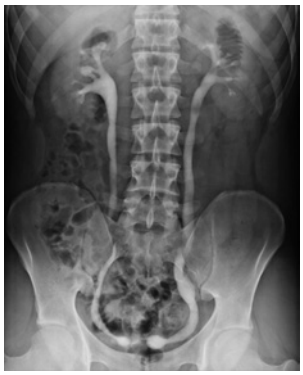
25. What is the name of instrument?

a. Aneurysm needle
b. Veress needle
c. Tracheal dilator
d. Urethral dilator



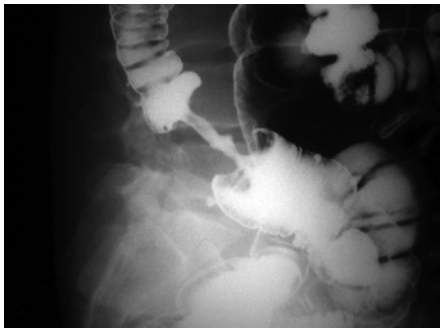
26. This characteristic appearance is seen on IVP in:

a. Tuberculosis
b. VUR
c. Ureterocele
d. Ureteric stone



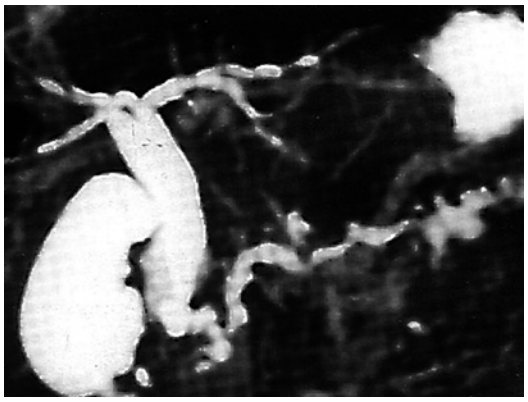
27. On barium enema, this appearance is seen in:

a. Ischemic colitis
b. Carcinoma colon
c. Colonic diverticula
d. Colonic polyposis



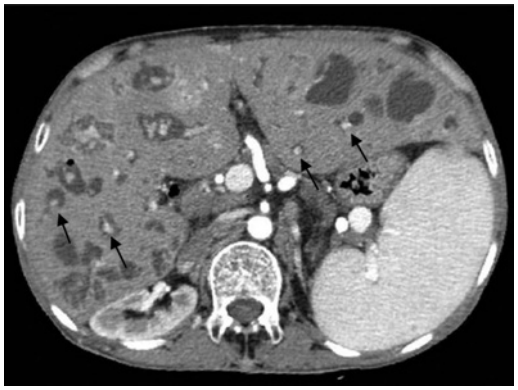
28. Above mentioned ERCP is highly suggestive of:

a. Acute pancreatitis
b. Chronic pancreatitis
c. Carcinoma Pancreas
d. Cholangiocarcinoma



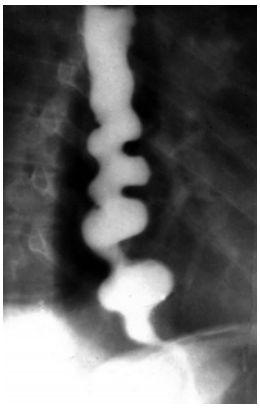
29. A 10 years old female preseneted witrh recurrent attacks of cholangitis. CECT was done, the diagnosis on the basis of CECT is:

a. Type 1 choledochal cyst
b. Type 3 choledochal cyst
c. Type 4 choledochal cyst
d. Type 5 choledochal cyst



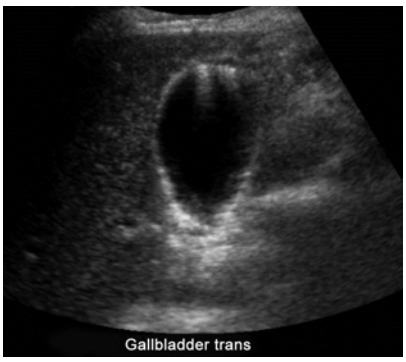
30. This characteristic appearance is seen on barium swallow in:

a. Achalasia cardia
b. Nutcrackers esophagus
c. Diffuse esophageal spasm
d. Hypertensive LES



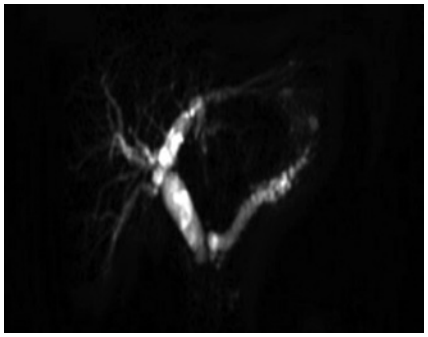
31. This incidental finding on ultrasound abdomen is suggestive of:

a. Gall bladder stone
b. Gall bladder polyp
c. Adenomyomatosis
d. Xanthgranulomatous cholecystitis



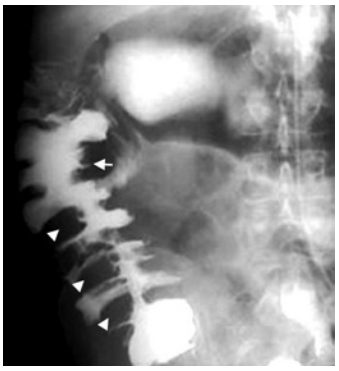
32. A 60-year old chronic smoker preseneted with jaundice, anorexia and weight loss. ERCP was done. The diagnosis on the basis of ERCP findings:

a. Choledochal cyst
b. Cholangiocarcinoma
c. Carcinoma pancreas
d. Chroinc pancreatitis



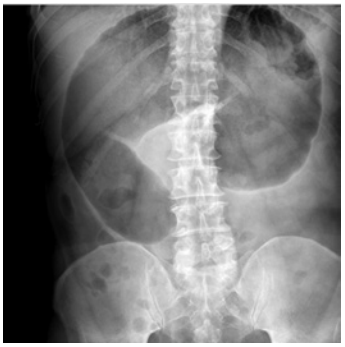
33. This characteristic appearance is seen on barium enema in:

a. Colonic polyps
b. Colonic diverticula
c. Ischemic colitis
d. Carcinoma colon



34. This characteristic appearance is seen in:

a. Gastric volvulus
b. Small intestinal volvulus
c. Cecal volvulus
d. Sigmoid volvulus

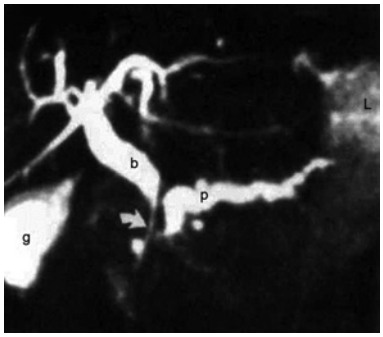


35. This characteristic appearance is seen on Barium swallow in:

a. Achalasia cardia
b. Carcinoma esophagus
c. Leiomyoma
d. Diffuse esophageal spasm

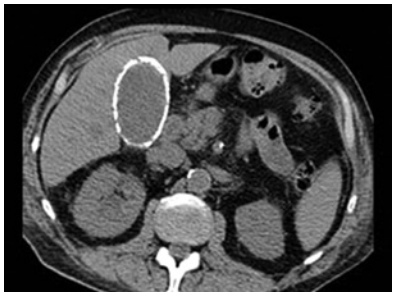
36. A 60-year old male shambhu presented with painless progressive jaundice. On examination, gall bladder was palpable. MRCP image is given. On the basis of findings of MRCP, most probable diagnosis is:

a. Hilar cholangiocarcinoma
b. Distal cholangiocarcinoma
c. Carcinoma gall bladder
d. Carcinoma pancreas



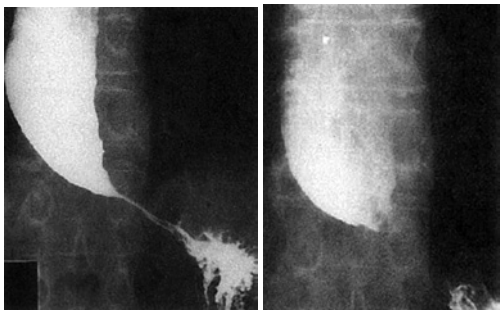
37. Incidental finding in a female patient of age 56 years who underwent the CECT abdomen is suggestive of:

a. Carcinoma gall bladder
b. Gall bladder polyp
c. Porcelain gall bladder
d. Gall stone



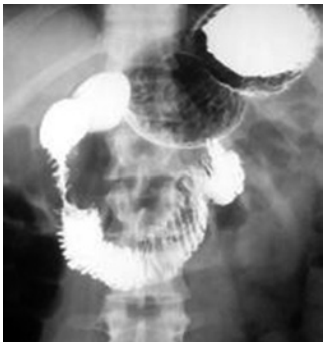
38. This characteristic appearance is seen on barium swallow in:

a. Carcinoma esophagus
b. Achalasia cardia
c. Nutcrackers esophagus
d. Diffuse esophageal spasm



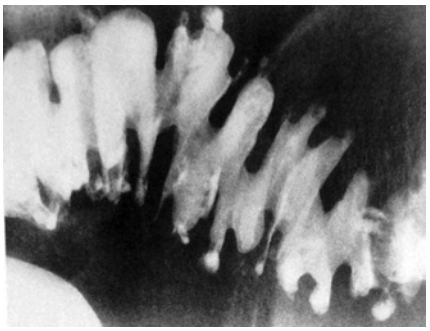
39. This characteristic appearance is seen in:

a. Duodenal adenocarcinoma
b. Distal cholangiocarcinoma
c. Ampullary carcinoma
d. Carcinoma head of pancreas



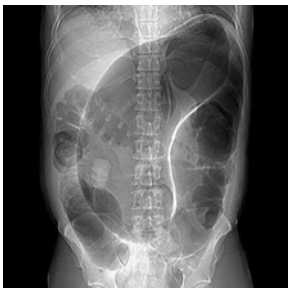
40. This characteristic appearance is seen on barium enema in:

a. Colonic polpys
b. Colonic diverticula
c. Carcinoma colon
d. Ischemic colitis



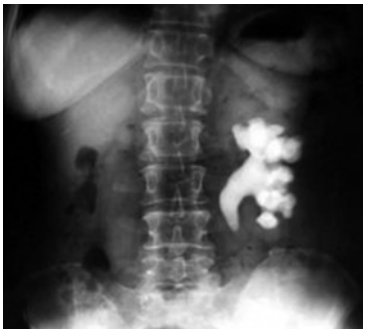
41. This characteristic appearance is seen in:

a. Gastric volvulus
b. Small intestinal volvulus
c. Cecal volvulus
d. Sigmoid volvulus



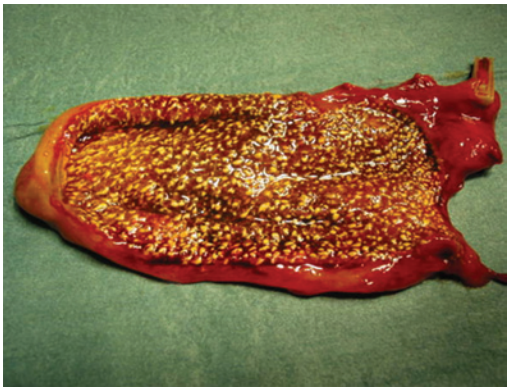
42. Ramesh, 30-year old male presented with repeated attacks of renal colics. X-ray KUB was done. Findings are suggestive of:

a. Calcium oxalate stone
b. Uric acid stone
c. Struvite stone
d. Cystine stone



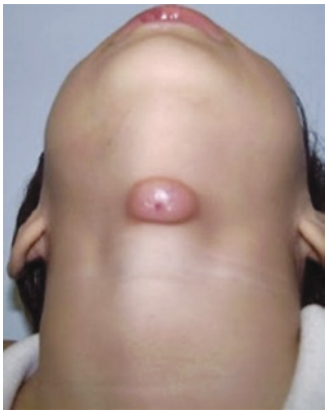
43. Gross appearance of gall bladder specimen is suggestive of:

a. Emphysematous cholecystitis
b. Xanthgranulomatous cholecystitis
c. Gall bladder cholesterolosis
d. Adenomyomatosis



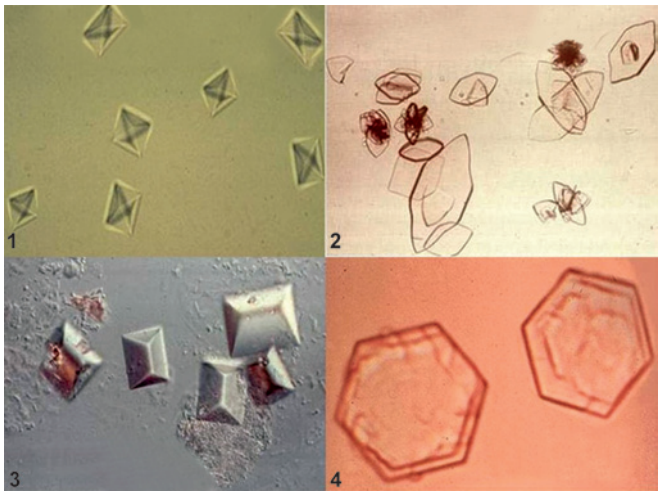
44. A 10-year old child presented with midline sweeling in anterior postion of neck. Most probable diagnosis is:

a. Thyroglossal cyst
b. Thyroglossal fistula
c. Cold abscess
d. Acute lymphadenitis



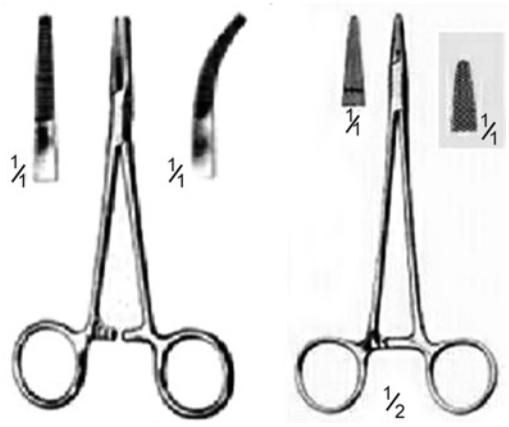
45. Correct order of stones on the basis of images of crystals:

a. Calcium oxalate, struvite, uric acid, cystine
b. Calcium oxalate, uric acid, struvite, cystine
c. Uric acid, calcium oxalate, struvite, cystine
d. Struvite, uric acid, calcium oxalate cystine



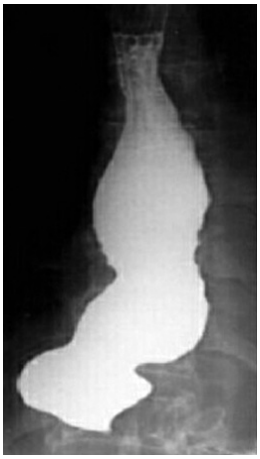
46. Identify these two surgical instruments: **(APPG 2015)**

a. Sponge holder and Allis forceps
b. Needle holder and ovum forceps
c. Thumb forceps and Sponge holder
d. Artery forceps and needle holder



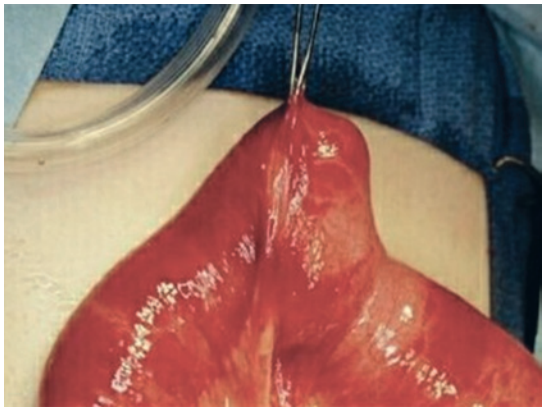
47. What is the diagnosis of barium esophagogram? (APPG 2015)

a. Achalasia cardia
b. Hiatus hernia
c. Diffuse esophageal spasm
d. Reflux esophagitis



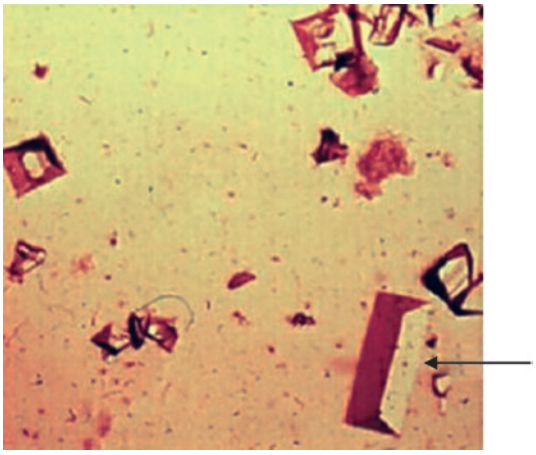
48. What does the intra-operative photograph above depicts?

a. Transverse colon **(APPG 2015)**
b. Fallopian tube
c. Meckels diverticulum
d. Intussusception



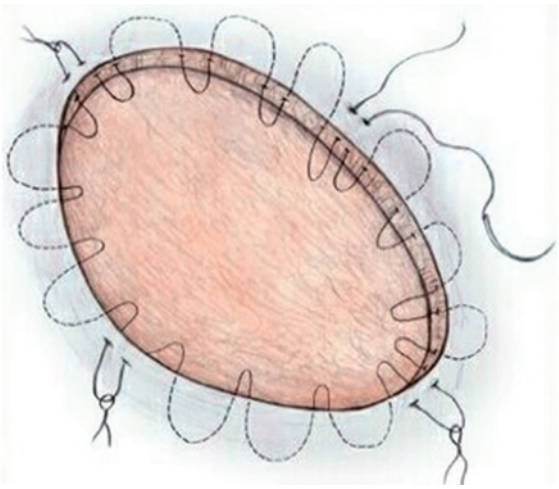
49. Identify the crystals depicted in urine microscopy: (APPG 2015)

a. Oxalate crystals
b. Cystine crystals
c. Struvite crystals
d. Uric acid crystals



50. What type of suture is this? (APPG 2015)

a. Purse string suture
b. Halsted's suture
c. Pare suture
d. Mattress interrupted sutures



EXPLANATIONS

1. **Ans. b. Sponge holding forceps**

Rampley's Sponge Holding Forceps

- Used for cleansing the skin with swab dipped in antiseptic solution during all operations
- Used for removing laminated membrane and the daughter cysts during operation of hydatid cyst
- Used to hold the fundus and Hartmann's pouch of gall bladder during cholecystectomy
- Used to swab an abscess cavity

2. **Ans. b. B. Kocher's hemostatic forceps**

Kocher's hemostatic forceps

- Used during appendectomy to crush the base
- Used to hold perforating vessels during mastectomy
- Used during subtotal thyroidectomy
- Used to hold bleeding vessels while operating on palm and sole

3. **Ans. a. Lister's sinus forceps**

Lister's sinus forceps

- Used for incision and drainage of abscess by Hilton's method
- May be used to hold a guaze swab to clean the abscess cavity

4. **Ans. d. All of the above**

Allis Tissue Forceps

- Used during laparotomy to retract skin margins
- Used to hold neck of bladder during bladder neck resection
- Used to hold skin flaps while excising lipoma, sebaceous cyst or LN
- Used during thyroid operations, neck dissection to hold the margins of skin while raising skin flaps

5. **Ans. c. Babcock's tissue forceps**

Babcock's tissue forceps

- Used during appendectomy
- Used during gastrectomy, gastrojejunostomy to hold the margins of stomach while applying the occlusion clamps
- Used during small and large intestine resection anastomosis to hold the margins of gut
- Used to hold the cut margins of bladder during suprapubic cystolithotomy

6. **Ans. d. Lane's tissue forceps**

Lane's tissue forceps

- Used during submandibular or parotid gland excision to hold the gland during dissection from the adjacent structures
- During mastectomy, it may be used to hold the breast while dissecting it off from the pectoral fascia
- May be used to fix the draping sheets and suction tubes to the draping sheet

7. **Ans. d. All of the above**

Toothed dissecting forceps

- Used to hold the cut skin margins during suturing
- Used to hold the linea alba or the rectus sheath during closure of abdominal incision
- Used to hold the scalp during closure of scalp incision

8. **Ans. c. Czerney's retractor**

Czerney's retractor

- Used for tissue retraction appendectomy, thyroidectomy, mastectomy and inguinal hernia operation

9. **Ans. a. Morris retractor**

Morris retractor

- Used for tissue retraction appendectomy, thyroidectomy, mastectomy and inguinal hernia operation

10. **Ans. d. All of the above**

Double hook retractor

- Used to retract skin flap for excision of sebaceous cyst
- Used during venesection for retraction of skin
- Used during tracheostomy for retraction of skin and thyroid insthmus

11. **Ans. c. Volkman's retractor**

Cat's paw or Volkman's retractor

- Used for retraction of skin flaps or fascia for operation at the surface, e.g. excision of the sebaceous cyst, lipoma, dermoid.

12. **Ans. d. Deaver's retractor**

Deaver's retractor

- Used during cholecystectomy for retraction of right lobe of liver
- Used during pancreaticojejunostomy for retraction of stomach
- Used during kidney operations to retract the abdominal wall

13. **Ans. c. Joll's thyroid retractor**

Joll's thyroid retractor

- Self retaining retractor used during thyroid operations to retract skin flaps

14. **Ans. a. Kocher's thyroid dissector**

Kocher's thyroid dissector

- Used during thyroid surgeries, used to dissect the superior thyroid pedicle

15. **Ans. d. Pile holding forceps**

Pile holding forceps

- Used during pile operation to hold the pile mass

16. **Ans. c. Desjardins forceps**

Desjardins choledocholithotomy forceps

- Used during choledocholithotomy for stone removal
- Used during laparoscopic cholecystectomy for stone removal
- May also be used during removal of kidney, ureteric or bladder stone

17. **Ans. b. Kehr's T-tube**

Kehr's T-tube

- Following choledochotomy, the bile duct is closed over a T-tube, as primary closure of bile duct is associated with higher incidence of leakage
- Used to drain bile duct following repair of bile duct injury. The T-tube acts as a stent and is usually kept for 4-6 weeks

18. **Ans. b. Doyen's intestinal occlusion clamp**

Doyen's straight intestinal occlusion clamp

- Used for gut resection and anastomosis

19. **Ans. a. Payr's crushing clamp**

Payr's gastric crushing clamp

- Used during partial gastrectomies

20. **Ans. a. Pyelolithotomy forceps**

Pyelolithotomy forceps

- Used to hold the stone during nephrolithotomy, pyelolithotomy or ureterolithotomy

21. **Ans. c. Sprapubic cystolithotomy forceps**

Sprapubic cystolithotomy forceps

- Used for suprapubic cystolithotomy

22. **Ans. c. Doyen's mouth gag**

Doyen's mouth gag

- Used to open mouth during intra-oral operations like glossectomy, cleft palate operation, excision of intraoral ranula

23. **Ans. c. Tracheal dilator**

Tracheal dilator

- Used during tracheostomy

24. **Ans. a. Aneurysm needle**

Aneurysm needle

- Used during venesection to pass ligature around the vein

25. **Ans. b. Veress needle**

Veress needle

- Used for induction of pneumoperitoneum during laparoscopic surgeries

26. **Ans. c. Ureterocele** *(Ref: Smith 17/e p560-561; Campbell 10/e p3240-3259; Bailey 26/e p1286, 25/e p1290)*

- **IVP**: Typical **Adder head** or **Cobra head** or **Spring onion appearanceQ** is diagnostic of ureterocele

Ureterocele
• **Diagnosis** • **USG:** Hydroureteronephrosis, cyst in bladder • **IVP:** Typical **Adder head** or **Cobra head** or **Spring onion appearanceQ** is diagnostic of ureterocele • **MCU:** A **smooth filling defectQ** in the trigonal area • **Cystoscopy: Enlarging and collapsing cystsQ** as urine flows

27. **Ans. b. Carcinoma colon** *(Ref: Sabiston 19/e p1350-1353; Bailey 25/e p1179-1184; Shackelford 7/e p2051-2058)*

- **Barium enema**: "**Apple core**" or "**napkin ring**" **lesion**, caused by a **constricting carcinoma**Q

Carcinoma Colon

Diagnosis:
• **Barium enema: "Apple core"** or **"napkin ring" lesion**, caused by a **constricting carcinoma**Q
  • **Gold standard for diagnosis of colon cancer**Q.
  • **Permits biopsy of the tumor to verify the diagnosis**Q
  • Inspect entire colon to **exclude metachronous polyps or cancers**Q
  • **Incidence** of a **synchronous cancer** is about **3%**Q.
• **Tumors causing complete obstruction: Water-soluble contrast enema** is useful in to **establish** the **anatomic level** of the **obstruction**Q.

28. **Ans. b. Chronic pancreatitis** *(Ref: Sabiston 19/e p1521; Schwartz 9/e p1183; Bailey 26/e p1128, 1135, 1138, 25/e p1141; Shackelford 7/e p1123, 1136-1137)*

- **Chain** of **lakes appearance**Q **or String** of **pearl appearance**Q **or Beaded appearance**Q **is characteristic of chronic pancreatitis.**

Radiological Appearance		
Acute Pancreatitis	**Chronic Pancreatitis**	**CA Pancreas**
• **Renal halo** signQ • **Gasless abdomen**Q • **Ground glass appearance**Q • **Colon cut off** signQ • **Sentinel loop**Q	• **Chain** of **lakes appearance**Q • **String** of **pearl appearance**Q • **Beaded appearance**Q • Numerous **irregular calcifications**Q are pathognomonic (on X-ray)	• **Double contour** of medial border of duodenal C loop • **Double duct sign**Q • **Dilated / widening** of **duodenal C loop**Q • **Mucosal irregularity**Q • **Scrambled egg appearance** • **Inverted / reverse 3 sign** of **Frostberg**Q • **Rose thorning** of **medial wall** of **2nd** part of duodenumQ

29. **Ans. d. Type 5 choledochal cyst** *(Ref: Sabiston 19/e p1504-1505; Schwartz 9/e p1119; Bailey 26/e p1106, 25/e p1119; Blumgart 5/e p717; Shackelford 7/e p1402-1403)*

- Central dot sign is seen in **Caroli's disease (Type V Choledochal cyst).**

Caroli's disease (Type V Choledochal cyst)
Diagnosis: • **CT findings**: Portal vein radicals can be seen after enhancement within dilated intra-hepatic bile ducts (**central dot sign**)Q.

30. **Ans. c. Diffuse esophageal spasm** *(Ref: Sabiston 19/e p1028-1032; Schwartz 9/e p851-853; Bailey 26/e p1017, 25/e p1039; Shackelford 7/e p142-143)*

- **Corkscrew** or **rosary-bead** esophagus, **segmental spasm** or **pseudodiverticulosis** appearanceQ **is characteristic of diffuse esophageal spasm.**

Diffuse Esophageal Spasm

Diagnosis:
• **Barium swallow**:
  - Corkscrew or rosary-bead esophagus, segmental spasm or pseudodiverticulosis appearanceQ
  - Due to presence of tertiary contractionsQ
  - Indicative of advanced diseaseQ
• **Manometry** is **gold standard test** for diagnosisQ.
  - Classic manometry findings: Simultaneous, multipeaked contractions of high amplitude (>120 mm Hg) or long duration (>2.5 sec).
  - These erratic contractions occur after more than 20% of wet swallows.

31. **Ans. c. Adenomyomatosis** *(Ref: Sabiston 19/e p1505; Bailey 26/e p1109, 25/e p751, 1122; Shackelford 7/e p1364)*

- The presence of cholesterol crystals in these sinuses in adenomyomatosis can result in **"diamond ring sign"**Q**, "V-shaped"**Q**,** or **"comet-tail" artifacts**Q on **USG**.

Gall Bladder Adenomyomatosis
Diagnosis: • **USG:** The presence of cholesterol crystals in these sinuses can result in **"diamond ring sign"**Q**, "V-shaped"**Q**,** or **"comet-tail" artifacts**Q on **USG**. • **Adenomyomatosis** appears as a **sessile polyp** with characteristic **microcysts** on USG and is often **>10 mm**Q. • **Cholecystography** is more specific for diagnosis.

32. Ans. c. Carcinoma pancreas *(Ref: Sabiston 19/e p1535-1544; Schwartz 9/e p1220-1225; Bailey 26/e p1137, 25/e p1149-1152; Blumgart 5/e p919-925; Shackelford 7/e p1190-1196)*

- **Double duct sign** on **ERCP** is highly suggestive of **pancreatic head cancer**Q.

33. Ans. c. Ischemic colitis *(Ref: Sabiston 19/e p1335-1337; Schwartz 9/e p1057; Bailey 26/e p1174)*

- **Thumb printing**Q (due to **mucosal edema** and **submucosal hemorrhage)**Q **is characteristic feature of ischemic colitis.**

Colonic Ischemia

Diagnosis:
• **Abdominal X-ray**: **Thumb printing**Q (due to **mucosal edema** and **submucosal hemorrhage)**Q.
• **CT scan**: Nonspecific **colonic wall thickening** and **pericolic fat stranding**Q.
• **Angiography** is usually **not helpful**Q because major arterial occlusion is rare.
  • Sigmoidoscopy: Characteristic dark, hemorrhagic mucosaQ
  • Risk of precipitating perforation is high, so sigmoidoscopy is relatively contraindicatedQ in ischemic colitis.

34. Ans. c. Cecal volvulus *(Ref: Sabiston 19/e p1315-1316; Schwartz 9/e p1055; Bailey 26/e p1188)*

- **Cecal volvulus: Distended cecum** assumes a **gas-filled comma shape** or **kidney bean shape**Q**, the concavity of** which faces **inferiorly and to the right.**

Cecal volvulus
Diagnosis: • **Abdominal X-ray: Dilated cecum, displaced to the left** side of the abdomen. • **Distended cecum assumes a gas-filled comma shape or kidney bean shapeQ, the concavity of which faces inferiorly and to the right.** • **Haustral markings** in the **distended loop** indicate that the dilated bowel is colon. • **Torsion results in small bowel obstruction**Q (radiographic pattern of SBO)   • **Contrast enema** is used to **confirm the diagnosis** and to **exclude** a **carcinoma of the distal bowel** as a **precipitating cause** of the volvulusQ

35. Ans. c. Leiomyoma *(Ref: Sabiston 19/e p1047-1048; Schwartz 9/e p874; Bailey 26/e p1004)*

- **Barium swallow** is **IOC** for leiomyoma (**classical, smooth, contoured, punched-out defect**)Q

36. Ans. b. Distal cholangiocarcinoma *(Ref: Sabiston 19/e p1508-1512; Schwartz 9/e p1162; Bailey 26/e p1114-1116)*

Cholangiocarcinoma
Clinical Features: • **Painless jaundice** (**70-90%**) is **MC symptom**Q of cholangiocarcinoma, followed by **pruritus** (66%), **abdominal pain**, **weight loss** (30-50%), **fever** (20%). • Gall bladder is palpable in distal cholangiocarcinoma

Diagnosis:
• **MRI/MRCP** is an **ideal imaging**Q modality for cholangiocarcinoma.
• **Duplex ultrasonography** and **MRCP** are the principal radiographic techniques used to image hilar cholangiocarcinoma.
• **MDCT** is the **first examination** in the pre-operative management of **hilar cholangiocarcinoma**Q
  Radiological Features of Cholangiocarcinoma
  • **Concentric stricturing**Q**,** which sometimes appears **shouldered**, polypoid appearance is rare
  • Mucin producing cholangiocarcinoma can produce **strand-like filling defects**Q caused by mucin
  • Length of stricture is **at least 1 cm**
  • **Golf-tree appearance** is seen in **papillary cancer**Q involving extra-hepatic bile duct.

37. Ans. c. Porcelain gall bladder *(Ref: Sabiston 19/e p1481, 1506; Schwartz 9/e p1143; Bailey 26/e p1116)*

Porcelain Gallbladder
Pathology: • **Calcium salt deposition** within the wall of a **chronically inflamed gallbladder**Q
Clinical Features: • Most porcelain GB **(90%) are associated with gall stones**Q. • Mean age of patients is **54 years** (38-70 years). • Patients are usually **asymptomatic** and the condition is usually **found incidentally on plain abdominal radiographs, sonograms** or CT images.
Diagnosis: • In porcelain GB, **plain radiographic findings** are usually **straight forward**Q. • **CT scan** is **diagnostic** in cases of **doubt**

38. Ans. b. Achalasia cardia *(Ref: Sabiston 19/e p1025-1028; Schwartz 9/e p857-860; Bailey 26/e p1014-1017)*

Achalasia Cardia

Diagnosis:
• **Barium swallow:**
  • **Dilated esophagus** with a **distal narrowing**Q
  • **"Bird's beak"**, **"Pencil-tip"** or **"Rat's tail" appearance**Q
  - **Sphincter spasm** and **delayed emptying** through the LES
  - **A lack of peristaltic waves** in the **body** and **failure of LES relaxation**Q
  - **Lack of a gastric air bubble**Q on the upright portion is a result of the tight LES not allowing air to pass easily into the stomach.
  - Massive esophageal dilation, tortuosity, and a **sigmoidal esophagus (megaesophagus)** in **advanced stage**Q
• **Manometry** is **gold standard test** for diagnosis.

39. Ans. d. Carcinoma head of pancreas *(Ref: radiopaedia.org/articles/frostburg-inverted-3-sign-1)*

- **Frostburg inverted 3 sign** is a sign seen on a **barium examination** where there is **effacement and distortion of the mucosal pattern** on the **medial wall of the second part of the duodenum** due to **focal mass** and **local edema**. It is **most commonly associated with carcinoma of the head of the pancreas**.

40. Ans. b. Colonic diverticula *(Ref: Sabiston 19/e p1309-1310; Schwartz 9/e p1038-1041; Bailey 26/e p1170-1173)*

Colonic Diverticula
Diagnosis: • **Barium enema** is **investigation of choice** for **colonic diverticulosis**Q**.** • **Thickening** of the **circular muscle fibres** develops a **concertina** or **saw-tooth appearance on barium enema**Q**.**

41. Ans. d. Sigmoid volvulus *(Ref: Sabiston 19/e p1314-1315; Schwartz 9/e p1055; Bailey 26/e p1190)*

- **Sigmoid volvulus: Markedly dilated sigmoid colon** with the **appearance of a bent inner tube** or **coffee bean appearanceQ.**

Sigmoid volvulus
Radiological (X-ray) Characteristics: • **Markedly dilated sigmoid colon** with the **appearance of a bent inner tube or coffee bean appearance**Q**.** • **Inferior convergence** of the dilated loop **points towards left side of pelvis.**   • **Contrast enema** demonstrates the **point of obstruction** with the pathognomic **'birds beak'** or **'bird of prey'** or **'ace of spades' sign**Q**.**

42. Ans. c. Struvite stone ***(Ref: Smith 17/e p249-254; Campbell 10/e p1296-1302; Bailey 25/e p1295-1300)***

Struvite stones (Infection stones)
• Composed of **calcium, ammonium, magnesium phosphate (Triple phosphate stones)**Q • Tend to grow in **alkaline urine**Q**,** especially with **Proteus infection** and **fill whole** of the **PCS**, forming **staghorn calculi**Q • Formed in **high urinary concentration** of **ammonia** • Most of the **stag horn calculi** are **silent**Q and cause **progressive destruction** of **renal parenchyma**Q.

43. Ans. c. Gall bladder cholesterolosis *(Ref: Bailey 26/e p1108, 25/e p1122)*

Strawberry Gallbladder (Cholesterolosis)
• It is an **acquired**Q histologic abnormality of the gallbladder epithelium that results in an **excessive accumulation** of lipid (**cholesterols esters** and **triglyceride**) Q within epithelial macrophage of the GB wall. • **Cholesterol stones** are found in **half** of the **cases**Q.
• Pathology: • **Gross Appearance:** The mucosa has **pale**, **yellow streaks** running longitudinally giving rise to the term **strawberry gallbladder**Q (although the mucosa is usually bile stained rather than red). • **Diffuse form** ("strawberry gallbladder"): **GB mucosa** is **brick red** and speckled with **bright yellow flecks** of lipidQ. • **Localized form: Solitary** or **multiple "cholesterol polyps"** studding the gallbladder wallQ.

44. Ans. a. Thyroglossal cyst ***(Ref: Schwartz 9/e p1344; Sabiston 19/e p813-814)***

Thyroglossal cyst
• It is **cystic swelling** developed in the remnant of the **thyroglossal duct** or **tract** • It may be **present** in **any part** of the **thyroglossal tract**Q (thyroglossal tract extends from foramen caecum to the isthmus of thyroid)

Thyroglossal cyst
Clinical Features: • It is a **midline swelling**Q, except in the region of the thyroid cartilage, where the thyroglossal tract is pushed to one side, usually to the left. • Though it's a **congenital swelling**Q most common **age of presentation** is between **15-30 years**Q. • Cyst can be **moved sideways** but not vertically. • Peculiar characteristic which helps in distinguishing thyroglossal cyst from other neck swelling - **Moves up with protrusion of tongue**Q as the thyroglossal tract is attached to the tongue. - **Moves with deglutition**Q so do all thyroid swellings, subhyoid bursitis.

45. Ans. b. Calcium oxalate, uric acid, struvite, cystine *(Ref: Smith 17/e p260-270; Campbell 10th/1287-1293, 1371-1373; Bailey 26/e p1293)*

Crystal	Appearance
Calcium oxalate monohydrate	**Dumbbell** or hourglassQ
Calcium oxalate dehydrate	**Enveloped** or **bipyramidal**Q
Calcium phosphate (apatite)	**Amorphous**Q
Brushite	**Needle shaped**Q
Struvite	**Coffin lid**Q
Uric acid	Multifaceted, irregular plates or rosettesQ
Cystine	**Hexagonal** or benzene ringQ

46. Ans. d. Artery forceps and needle holder

47. Ans. a. Achalasia cardia *(Ref: Sabiston 19/e p1025-1028; Schwartz 9/e p857-860; Bailey 26/e p1014-1017)*

- **Massive esophageal dilation, tortuosity, and a sigmoidal esophagus (megaesophagus) is seen in advanced stage**Q **of achalasia cardia.**

48. Ans. c. Meckels diverticulum *(Ref: Sabiston 19/e p1268-1270; Schwartz 9/e p1002-1004, 1435; Bailey 26/e p1169-1170)*

Meckel's diverticulum

- **Most commonly** encountered **congenital anomaly** of the **small intestine**Q
- Occur **2%** of the **population**Q.

Rule of two in Meckel's diverticulum	
• **2% prevalence**Q • **2 inch in length**Q • **2 feet** proximal to **ileocecal valve**Q	• Half of these who are **symptomatic** are **<2 yrsQ of age**

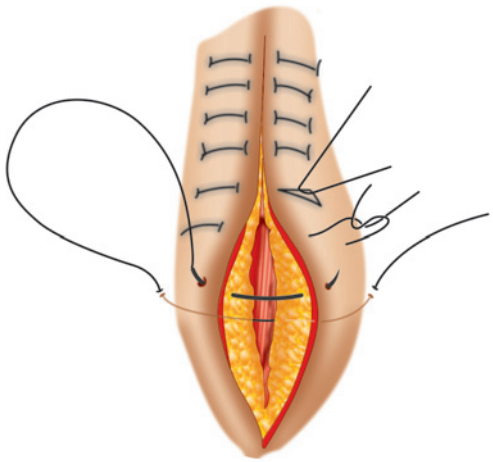
- **True**Q **diverticulum** as it has **all the 3 layers** of the intestineQ.
- Located on the **antimesenteric border** of the **ileum 45 to 60 cm proximal** to the **ileocecal valve**
- Results from **incomplete closure** of **omphalomesenteric** or **vitellointestinal duct.**
- An **equal incidence** among **men** and **women**Q.

- **MC heterotopic tissue: Gastric mucosa** (50%)Q >Pancreatic mucosa (5%) >colonic mucosa (rarely)

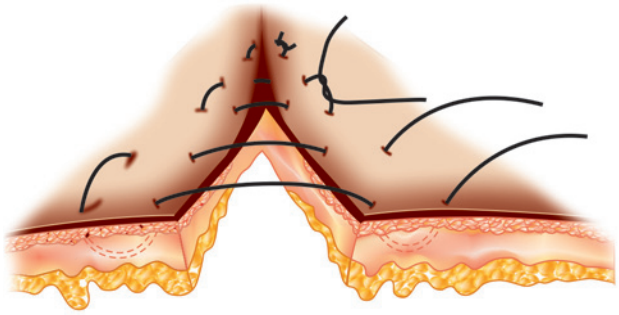
49. Ans. c. Struvite crystals

50. Ans. a. Purse string suture

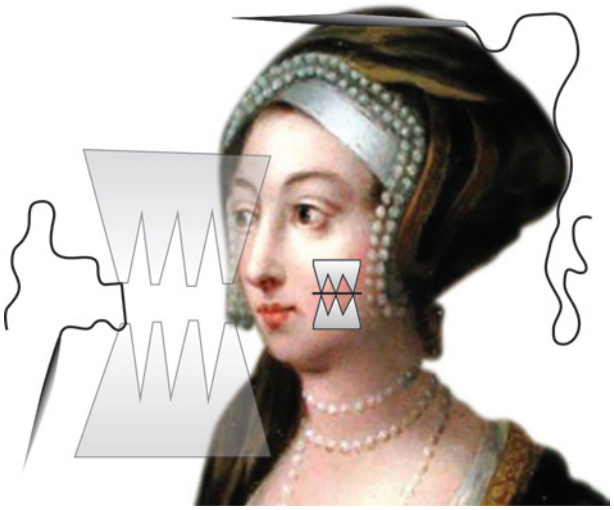
- **Purse string suture:** A surgical suture **passed as a running stitch in and out along the edge of a circular wound** in such a way that **when the ends of the suture are drawn tight the wound is closed like a purse.**



- **Halsted's suture pattern:** An **interrupted suture pattern most useful in the suturing of friable tissues**. The **needle is passed in and out of the skin on one side of the incision,** then **across the incision** and the **suture is repeated on the other side.** A pass is made at right angles to the suture and then a repeat of the stitch made back across the incision and the two ends tied.



- **Pare suture:** The **approximation of the edges of a wound by pasting strips of cloth to the surface** and **stitching them instead of the skin.**



- **Mattress interrupted sutures:** A suture made with a **double stitch** that **forms a loop about the tissue on both sides of a wound and produces eversion of the edges**.