Diagnostic Points of Special Pathology

For SEQs and MCQs

4th Year MBBS

Contents

Respiratory System Pathology

1. **Pneumonia**
    - Abrupt onset of high grade Fever
    - Chills
    - Cough
    - Yellow-green/Rusty/mucopurulent sputum
    - Lower Lobe Consolidation
    - Dull on percussion
    - Elevated WBCs
    - Chest pain
2. **Tuberculosis**
    - Fever
    - Night sweats
    - Weight loss
    - Cough with hemoptysis
3. **Emphysema**
    - Barrel shaped chest
    - Prolonged expiration
    - Cough with minimal sputum
    - Weight loss
    - Dyspnea/shortness of breath
    - Pink puffers
    - History of Smoking
4. **Asthma**
    - Attacks with asymptomatic period between the episode
    - History of allergic rhinitis, eczema and family atopy
    - Chest tightness
    - Wheezing
    - Cough with copious amount of water secretion
    - Seasonal based attacks
    - Skin test for mulberry pollen positive
    - Respiratory difficulty/dyspnea
    - Charcot-Leyden Crystals and Curshnmanns spirals
    - Marked Eosinophilia

5. **Idiopathic Lung Fibrosis**
    - Nonproductive cough
    - Honey comb lung

- Dry or Velcro like crackles during inspiration
- Progressive dyspnea
- Patchy interstitial fibrosis

6. **Bronchiectasis**
    - Cough
    - Dyspnea
    - Foul smelling sputum
    - Enlargement of cardiac shadow

7. **Chronic Bronchitis**
    - Chronic productive cough of at least 3 consecutive months for a minimum period of 2 years.
    - Blue Bloaters
    - Increased Reid Index (greater than 50 percent normal 40 percent)
    - Increase in concentration of neutrophils, lymphocytes and macrophages but no eosinophils (in asthma they are present)
8. **Adenocarcinoma**
    - Most common tumor in nonsmokers and female smokers
    - Location: Peripheral
    - Glandular Pattern
9. **Squamous Cell Carcinoma**
    - Most common tumor in male smokers
    - Contains keratin pearls and intercellular bridges
    - Location: Central
10. **Small Cell Carcinoma**
    - Neuroendocrine type
    - Location: Central
    - Several distribution of ulnar nerve due to apical neoplasm (Pancoast tumor/syndrome)
    - Presence of neuroendocrine markers: chromogranin, synaptophysin, CD56

Central Nervous System Pathology

1. **Meningitis**
    - Headache
    - Neck Stiffness
    - Fever
    - Photophobia
    - Vomiting
    - Lumbar Puncture (Cloudy CSF)
    - Bacterial (acute pyogenic) – Increased neutrophils, protein levels and reduced CSF glucose

- Viral (aseptic) – lymphocytosis with normal CSF glucose
- Fungal – lymphocytosis with decreased CSF glucose

2. **Astrocytoma**
    - Malignant tumor
    - Headache
    - Seizures
    - Focal neurologic deficits (weakness in hand/arm)
    - Location: cerebral hemisphere (Grade 4: Glioblastoma Multiform)
    - Extreme necrosis (psuedopalisading) , leaky vessels, hemorrhage, butterfly lesion (Grade 4)
    - Age group 40-60 yr
    - Infiltrative Type of tumor
3. **Oligodendroglioma**
    - Malignant tumor
    - Same features as astrocytoma. Differentiating point is 1p and 19q deletion on genetic study
    - Fried Egg Appearance
    - Calcified mass
    - Location: Frontal Lobe
4. **Pilocytic Astrocytoma**
    - Benign tumor
    - Tumor of childhood
    - Location: Cerebellum (posterior fossa)
    - Rosenthal fibres
    - Cystic lesion with a mural nodule
5. **Medulloblastoma**
    - Malignant tumor
    - Tumor of childhood
    - Location: Cerebellum
    - Sheets of Anaplastic Cells (Blue Cells)
    - Presence of Rosettes
    - Drop metastasis
6. **Ependymoma**
    - Malignant tumor
    - Arises in 4^{th} Ventricle
    - Presence of Perivascular Pseudo rosettes
7. **Meningioma**
    - Benign tumor
    - Seizures
    - Headache
    - Weakness in the right hand/arm

- Mass on dura matter compressing the brain
- Psamomma bodies

8. **Schwannoma**
    - Benign tumor
    - Commonly involves 8th nerve
    - Cells are S-100 positive
    - Seen in neurofibromatosis type 2

Endocrine System Pathology

1. **Hyperthyroidism**
    - Weight Loss
    - Heat intolerance
    - Sweating
    - Tachycardia with increased palpitations
    - Arrhythmia
    - Tremor, anxiety insomnia
    - Diarrhea
    - Oligo menorrhea
    - Hypocholesterolemia
    - Hyperglycemia
    - Osteoporosis
2. **Hypothyroidism**
    - Cretinism-in neonates and infants (Short stature, with skeletal abnormalities, coarse facial features, enlarged protruding tongue)
    - Myxedema-in older children and adults (Weight Gain, slowing of mental activity, muscle weakness, cold intolerance, decreased sweating, bradycardia with decreased cardiac output, oligo menorrhea, hypocholesteremia, constipation)
3. **Hashimotos Thyroiditis (Chronic Lymphocytic Thyroiditis)**
    - Diffused and symmetrical enlargement
    - Painless swelling in the neck
    - Autoantibodies against Thyroglobulin and thyroid peroxidase
    - First symptoms of hyperthyroidism later hypothyroidism (In scenarios symptoms of hypothyroidism are mentioned)
4. **Graves' Disease**
    - Thyrotoxicosis
    - Dermopathy (pretibial myxedema)
    - Ophthalmopathy
    - Autoantibodies against TSH receptors
    - Type 2 hypersensitivity reaction

- Papillae lacking fibro vascular core
- Colloid pale and scalloped margins

5. **Papillary Carcinoma**
    - Most common carcinoma
    - Papillary foci on cut surface is diagnostic
    - Orphan Annie eye nuclei/ Ground Glass
    - Intranuclear inclusions/grooves or pseudo inclusions
    - Psamomma Bodies
6. **Follicular adenoma and carcinoma**
    - Differentiate on the basis of capsular or vascular invasion
7. **Medullary Carcinoma:**
    - Amyloid deposit (due to deposition of calcitonin within the tumor)
    - Polygonal to spindle shaped cells forming nests, trabeculae and also follicles
8. **Cushing Syndrome**
    - Muscle weakness with thin extremities
    - Moon facies
    - Buffalo hump
    - Truncal obesity
    - Abdominal striae
    - Hypertension
    - Osteoporosis
    - Immune suppression
9. **Addison Disease**
    - Hypotension
    - Hyponatremia
    - Hypovolemia
    - Hyperkalemia
    - Weakness
    - Hyperpigmentation
    - Weakness
    - Vomiting
    - Diarrhea
10. **Conns Disease**
    - Hypertension due to sodium retention, hypokalemia and metabolic alkalosis
11. **Pheochromocytoma**
    - Episodic hypertension
    - Headache
    - Palpitations
    - Tachycardia

- Sweating

12. **Diabetes Mellitus**
    - Polydipsia
    - Polyphagia
    - Polyuria
    - Hyperglycemia
    - Weight Loss
    - Low Muscle Mass
    - Specific Symptoms Associated with Diabetic Ketoacidosis: Dehydration, nausea, vomiting, mental status changes, drowsiness, fruity smelling breath (due to presence of ketones particularly acetone)
13. **Hyperparathyroidism**
    - Painful Bones
    - Abdominal Groans
    - Nephrolithiasis (calcium oxalate stones)
    - Nephrocalcinosis (calcification of renal tubules)
    - Depression, seizures
    - Constipation, peptic ulcer disease, acute pancreatitis
    - Osteitis Fibrosa cystica
14. **Hypoparathyroidism**
    - Numbness and Tingling
    - Muscle Spasms (Tetany)- elicited with filling of BP cuff (Trousseau sign) or tapping of facial nerve (Chvostek sign)
    - Cardiac Arrhythmias
    - Increased intracranial pressure and seizures
    - Increase face grimacing
15. **MEN syndrome Type 1 (3Ps)**
    - Parathyroid – Primary Hyperparathyroidism (most common manifestation)
    - Pancreas – Zollinger Ellison Syndrome
    - Pituitary – Prolactin secreting tumors
16. **Men Syndrome Type 2A**
    - Thyroid- Medullary Carcinoma
    - Parathyroid- Primary Hyperparathyroidism
    - Adrenal Medulla-Pheochromocytoma
17. **MEN Syndrome type 2B**
    - Primary hyperparathyroidism is not seen
    - Extra endocrinal manifestations (ganglioneuromas and marfanoid habitus)

Breast Pathology

1. **Non Proliferative Breast Disease**
    - Lumpy bump breast
    - Dense breast with cyst
    - Calcification on mammography
    - Fibrocystic changes
    - Vague nodularity
2. **Ductal Carcinoma In Situ**
    - Firm Mass
    - Limited to the ducts
    - No invasion
    - Extensive Necrosis
    - Pleomorphic cells
    - Hyperchromatic nucleus
    - Areas of calcification
    - Cribriform spaces and papillae
3. **Lobular Carcinoma In Situ**
    - Mucin positive signet ring cells
    - Lack of E Cadherin
    - No calcification
    - Necrosis and secretory activity not seen
    - No cribriform spaces, no papillae
    - Doesn't involve nipple skin
4. **Fibro adenoma**
    - Most common benign tumor of female breast
    - Common in 20s and 30s
    - Well circumscribed
    - Rubbery
    - Grayish white nodules
    - Slit like spaces
    - Freely movable mass
    - Increase in size during menstrual cycle and pregnancy (hormonal responsive)
5. **Phyllodes tumor**
    - Occur in sixties (60s)
    - Leaf like protrusions
    - Extending into cystic spaces
    - Increased stromal proliferation

Vascular Pathology

1. **Atherosclerosis:**
    - Crushing chest pain/difficult breathing/alcoholic/fond of eating red meat/history of any accident
    - Raised plaques (yellow) having a soft cap with fibrous cap
    - Involves large and medium sized arteries (coronary, abdominal aorta, popliteal artery, internal carotid artery
    - Arterial wall thickening and narrowing
2. **Arteriosclerosis:**
    - Involves small sized arteries
    - Two patterns involved: hyaline and hyperplastic
    - Hyaline is due to benign hypertension or diabetes leads to glomerular scaring leads to chronic renal failure (proteins leak into vessel wall)
    - Hyperplastic is due to malignant hypertension gives onion skin appearance. May give rise to fibrinoid necrosis of vessel leading to acute renal failure with flea bitten appearance. (hyperplasia of smooth muscles)
3. **Kaposi Sarcoma**
    - Purple Patches confined to distal extremities
    - Later violaceous raised plaques
    - Patches > Plaques > Nodules
    - Low grade malignant proliferation of endothelial cells
4. Thoracic Aneurysm
    - Tree bark appearance of aorta seen in tertiary syphilis
    - Respiratory difficulties
    - Persistent Cough
    - Pain
    - Cardiac Disease
5. **Abdominal aortic Aneurysm**
    - Pulsatile abdominal mass with flank pain
    - Due to atherosclerosis
    - Compression on ureter or erosion of vertebrae
    - Obstruction of vessels leading to ischemia
6. **Aortic Dissection**
    - Sharp, tearing chest pain radiating to the back
    - Due to hypertension and some connective tissue disorder (Marfan Syndrome and Ehlers Danlos Syndrome)
7. **Giant Cell (Temporal) Arteritis**
    - Fragmentation of internal elastic lamina

- Granulomatous lesion of large vessels
- Fever, Fatigue, Weight Loss
- Facial Pain
- Headache
- Jaw Claudication
- Visual Disturbances
- Temporal artery painful on palpation
- Palpable cord like area on left temple
- Multinucleated Giant Cells
- Age greater than 50

Cardiac Pathology

1. **Myocardial Infarction**
    - Severe acute crushing chest pain radiating to the left arm or jaw
    - Increased Troponin levels
    - Not relieved by nitroglycerin
    - Sweating (diaphoresis)
    - Shortness of breath
2. **Infective Endocarditis**
    - Most common presentation: FEVER
    - Murmurs
    - Osler nodes (painful) , Jane way lesions (painless) , Roth spots, splinter hemorrhages
    - Blood culture positive for infective organism
    - Aortic and mitral most commonly involved but tricuspid in case of IV drug users
    - Underlying valve pathology
3. **Non Infective Endocarditis**
    - Nonbacterial thrombotic: related to some hypercoagulable state
    - Greater chance of giving rise to emboli
    - Endocarditis in SLE/Libman-Sacks Endocarditis: Joint pain, butterfly facial rash, shortness of breath, leg swelling/edema, ANA and Anti double stranded DNA antibodies detected
    - Both result in mitral regurgitation
4. **Acute Rheumatic Fever:**
    - History of pharyngitis 2 to 3 weeks back
    - Fever
    - JONES criteria particularly migratory polyarthritis
    - Friction rub
    - Weak heart sounds/murmur
    - Asch off bodies/Anitschkow cells

1. **Leukoplakia and Erythroplakia**:
    - Leukoplakia are white patches or plaques that can't be scraped out. Differentiating it from Oral candidiasis (thrush) which are white lesions that can be scraped out easily
    - Erythroplakia are vascularized leucoplakias and carry greater incidence of squamous cell dysplasia
2. **Squamous Cell Carcinoma**:
    - Most common type of cancer of oral cavity
    - Location: Base/ventral of tongue, lateral side of tongue, floor of mouth, lower lip, soft palate, gingiva
    - Ulcerating painful mass with indurated or roll margins
    - Cervical nodes are most common sites
3. **Pleomorphic Adenoma**
    - Most common benign tumor of Salivary gland
    - Tumor size not more than 6cm
    - Well circumscribed, painless and mobile, large with acidophilic granular cytoplasm and central nuclei.
    - Location: Angle of Mouth
    - Contains both epithelial and mucoepithelial/mesenchymal cells
4. **Mucoepidermoid Carcinoma**
    - Most common malignant type of salivary gland carcinoma
    - Tumor size not more than 8cm
    - Contains both mucinous and squamous cells
5. **Warthin's Tumor**
    - 2nd most common benign tumor of salivary gland
    - It contains lymphocytes and germinal centers (lymph node like stroma)
    - There is swelling, no nodularity
6. **Barret Esophagus**
    - May result from GERD
    - Tongues of velvety red mucosa extending into lower esophagus from the stomach
    - From stratified squamous epithelium to non-ciliated columnar epithelium with goblet cells
7. **Esophageal Adenocarcinoma**
    - Present in distal third esophagus
    - Difficulty/pain on swallowing
    - Progressive weight loss
    - Chest pain
    - Vomiting
    - Background of Barret Esophagus

8. **Esophageal Squamous Cell Carcinoma**
    - More common than esophageal adenocarcinoma
    - Upper or middle third of esophagus
    - Due to increased intake of alcohol and tobacco, achalasia
    - Dysphagia
    - Odynophagia
    - Obstruction
    - Additional Symptoms of Cough and Hoarseness of Voice
9. **Acute Appendicitis**
    - Pain radiating from periumbilical area to right lower abdomen/quadrant
    - Tenderness in the lower abdominal area (McBurney Sign)
    - Nausea
    - Vomiting
    - Fever
    - Increased WBC Count
10. **Helicobacter Gastritis**
    - **Epigastric abdominal pain**
    - **Urea breath test is positive**
    - **Curved spiral organism in lumen**
    - **Hyperemic mucosa of pyloric antrum**
    - **Antrum is the most common type**
11. **Peptic Ulcer Disease**
    - Benign: Sharply demarcated punched out defects surrounded by radiating folds of mucosa
    - Malignant: large irregular with heaped up margins
    - Two types: Gastric and Intestinal

	Gastric (distal stomach)	Intestinal (proximal duodenum)
1	Less common	More common
2	Epigastric pain worsens with meal	Epigastric pain improves with meal
3	Lesser curvature of antrum	Anterior duodenum
4	Risk of rupture of gastric artery (left)	Rupture of gastroduodenal artery if present in posterior duodenum
5	Caused by Pylori (75%) NSAIDs, bile reflux	Caused by Pylori(90%) or ZE syndrome

12. **Gastric Adenocarcinoma**
    - **Two types: intestinal and diffuse**
    - **Late symptoms of weight loss, abdominal pain, anemia**

	Intestinal Type	**Diffuse type**
1	More common	Less common
2	Gastric atrophy, intestinal metaplasia	Blood group A
3	M>F	M<F
4	Increased incidence with age	Middle age

5	Gland formation	Poorly differentiated
6	Microsatellite instability APC mutation	Decreased E-cadherin (CDH-1)
7	Exophytic, bulky lesions	Ulcerating lesions with signet ring morphology Desmoplastic reaction and giving appearance of linitis plastic (leather bottle)

13. **Carcinoid Tumor**
    - Malignant proliferation of neuroendocrine cells (low-grade malignancy)
    - Small bowel is the common site
    - Metastasis to liver
    - Bronchospasm
    - Diarrhea
    - Cyanosis
    - Wheezing and Cough
    - Flushing of skin
    - Leads to heart anomalies such as tricuspid regurgitation and pulmonary valve stenosis

14. **Celiac Disease**
    - Muscle wasting
    - Anorexia
    - Diarrhea
    - Abdominal distention
    - Nausea
    - Vomiting
    - Bloating
    - Linked with majorly iron deficiency anemia, minorly with Vitamin B12 Deficiency
    - Lymphocytosis
    - Dermatitis herpetiformis
    - Anti-gliadin IgA and anti-tissue transglutaminase IgA antibodies

15. **Crohn Disease**
    - Intermittent attacks of mild diarrhea (non bloody Diarrhea) , fever and abdominal pain
    - Lower quadrant pain
    - Most common site: terminal Ileum
    - Iron deficiency anemia may develop
    - Skip lesions/fissures may be present
    - Ulcers are deep and knife-like
    - Malabsorption
    - Related to Emotional/Physical stress NSAID use, smoking

- Showing extra intestinal manifestations like uveitis and clubbing of fingers
- String Sign on Imaging
- Non caseating granulomas may develop

16. **Ulcerative Colitis**
    - Involves rectum along with part or whole colon (e.g extending from rectum to splenic flexure/transverse colon or limited to rectum only- written in UQs)
    - Continuous lesion
    - Bloody Mucoid (string Mucoid material) Diarrhea
    - Involving whole colon (pan colitis)
    - Long symptom free period
    - Lead pipe sign due to presence of pseudo polyps
    - Lower abdominal pain and cramps relieved on defecation
    - Mega colon major complication
    - Ulcers Superficial and Broad Based
    - No granulomas
    - Limited to mucosa and submucosa
17. **Colorectal Adenocarcinoma**
    - Right Sided: Raised Lesions, present with iron deficiency anemia (occult bleeding) and vague pain. Common in elderly individuals
    - Left Sided: Napkin ring lesions, left lower quadrant pain and blood streaked stools

Some Important Signs in Whole GIT

- Bird-peak sign (Achalasia)
- Freckle Like Sign (Peutz-Jeghers Syndrome)

Liver, Gallbladder and Pancreas Pathology

1. **Acute Liver Failure**
    - Within 6 months
    - Nausea
    - Vomiting
    - Jaundice and Icterus
    - Fatigue
    - Life threatening conditions such as hepatic encephalopathy, coagulopathy, portal hypertension
    - Hepatorenal Syndrome
2. **Chronic Liver Failure / Cirrhosis**
    - Same Features as Acute Liver Failure
    - Portal Hypertension more worsened and complex (Ascites, congestive splenomegaly/hypersplenism, portosystemic shunts like esophageal varices, hemorrhoids)
    - Hyperestrogenemia/hyperestrinism (Gynecomastia, spider angiomata, palmar erythema)

- Pruritus

3. **Hepatitis**
    - Fever
    - Malaise
    - Nausea
    - Elevated Liver Enzymes ALT>AST
    - Jaundice (mixed CB and UCB)
    - Dark colored Urine
    - Hep A and E come with acute presentations
    - Hep B, C , D are chronic infections
    - There is correlation of Hep B and D
4. **Hemochromatosis:**
    - Cirrhosis
    - Secondary Diabetes mellitus
    - Bronze skin
    - Other findings dilated cardiomyopathy, arrhythmias and gonadal dysfunction
    - Accumulation of brown pigments in hepatocytes
    - Autosomal recessive defects in iron absorption (HFE gene)
    - In late adulthood
5. **Wilsons Disease**
    - In childhood
    - Autosomal recessive defect in copper transport
    - Cirrhosis
    - Neurological Manifestations: chorea, dementia, parkinsonian symptoms)
    - Kayser Fleisher rings in cornea
6. **Primary Biliary Cirrhosis/Cholangitis and Primary Sclerosing Cholangitis**

	Primary Biliary Cholangitis	**Primary Sclerosing Cholangitis**
Clinical	Females>Males Middle Age Fatigue and pruritus Cholestatic labs	Males>Females 20-40s Progressive obstructive jaundice Cholestatic Labs
Site	Intrahepatic	Extrahepatic and intrahepatic
Cause of Obs.	Granulomatous inflammation destroying bile ducts	Fibrosis destroying bile duct
Micro. Features	Florid Duct Lesion (Granuloma)	Concentric onion skin fibrosis around bile ducts
Diagnostic	Anti-mitochondrial antibodies	Beaded appearance of bile ducts
Association	Other autoimmune disorders: Sjogrens Disease	Ulcerative colitis (p-ANCA +ve)
Complication	Cirrhosis	Cirrhosis Cholangiocarcinoma

7. **Hepatocellular Carcinoma**
    - Diffuse nodularity and echogenicity of liver without discrete mass
    - Serum alpha feto protein elevated
    - Fatigue, weight loss, loss of appetite
    - Association with some previous hepatic disease like Hep C
8. **Cholelithiasis (Gallstones)**
    - Asymptomatic but can present with right upper quadrant pain or epigastric pain
    - Two types: Cholesterol stones and pigmented stones

	Cholesterol Stones	***Pigmented Stones***
1	Radiolucent	Radiopaque due to sufficient calcium carbonate and phosphates
2	Pale yellow	Brown black stones
3	Limited to the gallbladder	Anywhere in biliary tree Black one are found in sterile gallbladder bile Brown one are found in infected extrahepatic or intrahepatic ducts
4	Ovoid and firm	Black are small and fragile to touch Brown are soft, greasy, soap like consistency
5	Risk factors: Age, Female gender, obesity, gallbladder stasis	Risk factors: extravascular hemolysis, biliary tract infections (Ascaris lumbricoides) Crohn disease

9. **Acute Cholecystitis**
    - Right upper quadrant pain lasting for about 6 hours radiating to the right shoulder/scapula
    - Fever with increased WBC count
    - Nausea
    - **Increased alkaline phosphatase**
    - Vomiting
    - The right subcostal region is markedly tender and rigid due to contraction of abdominal muscles. Sometimes tender-distended gallbladder is seen
    - Thickened gallbladder wall
10. **Chronic Cholecystitis**
    - Long standing Cholecystitis
    - Herniation of gallbladder mucosa in muscular wall (Rokitansky-Aschoff sinus)
    - Vague upper right quadrant pain particularly after eating
    - Shrunken, hard gallbladder (Porcelain gallbladder)
11. **Acute Pancreatitis**
    - Acute, intense, constant epigastric abdominal pain
    - Radiates to the back
    - Increased levels of amylases(in the first 24 hrs) and lipases (within 72 to 96 hrs)
    - Periumbilical and flank hemorrhages
    - Hypocalcemia
    - Alcoholism

- Use of Thiazide Diuretics (Scenario in the past question)

12. **Chronic Pancreatitis**
    - Persistent or recurrent epigastric abdominal pain
    - Repeated bouts of jaundice and vague indigestion
    - Pancreatic insufficiency and diabetes mellitus
    - Dystrophic calcification; dilatation of pancreatic ducts show a pattern of "chain of lakes"

Male Genital System and Lower Urinary Tract Pathology

1. **Benign Prostatic Hyperplasia**
    - Occurs in in the inner transitional/periurethral transitional zone
    - Urinary urgency
    - Hesitation
    - Poor urinary steam
    - Nocturia
    - Occurs in the age 40 and continues to increased incidence with age
    - PSA slightly elevated
2. **Prostatic Carcinoma**
    - Common cancer from 65 to 75 yrs of age
    - Occurs in the outer peripheral zone
    - A massive increase in PSA levels
    - Worsening back pain
    - Increased are of uptake in thoracic and lumbar vertebrae
    - Irregular nodules
3. **Seminomas**
    - Presented in old age; 40-50 yrs
    - Lobules separated by intervening fibrous septa
    - Minimally elevated hCG
    - Spread to para-aortic lymph nodes
4. **Spermatocytic tumor**
    - Same features as seminoma except they lack lymphocytic infiltrate, granulomas and syncytiotrophoblast
5. **Yolk sac tumor:**
    - Children younger than 3 years of age
    - Large and well demarcated
    - Lace-like (reticular) pattern
    - Structures resembling primitive glomeruli called Schiller-Dural bodies
    - Eosinophilic hyaline globules containing alpha-1-antitrypsin and alpha-fetoprotein
6. **Transitional cell (urothelial) carcinoma**
    - Painless hematuria

- Seen in older adults
- History of smoking
- Ulcerating mass (flat or papillary) in the bladder wall

Female Reproductive System Pathology

1. **Surface Epithelial Ovarian Tumors**

   My (Mucinous) Sister (Serous) Began (Brenner Tumor) Experience (Endometrioid Tumor) Cancer

   - Most common type of ovarian tumors
   - May be benign, borderline and malignant
   - Main be serous(most common) or mucinous
   - Benign Lesions are simple cysts lined by flat cells seen in premenopausal women (30-40 yr)
   - Malignant lesions are complex cysts with irregularities, thick shaggy lines seen in post-menopausal women (60-70 yr)

     Serous tumors are 25% bilateral and mucinous tumors are less likely to be bilateral
   - Serous tumors consists of epithelial cells lined with ciliated columnar feature and mucinous tumors show the feature of non-ciliated columnar cells
   - Endometrioid tumors are endometrial gland like and usually malignant
   - Brenner tumors show bladder like transitional epithelium and mostly benign
   - CA-125 is a serum marker

2. **Germ Cell Tumors**

   Doctor (Dysgerminoma) Examined (Endodermal Sinus Tumor) the (Cystic Teratoma) Cancer (Choriocarcinoma)

3. **Sex Cord-Stromal Tumors**

   She (Sertoli-Leydig Cells) Felt (Fibroma) Good (Granulosa Theca Cells)

4. **Preeclampsia**

   - Hypertension, edema and proteinuria associated with pregnancy, DIC
   - Eclampsia is preeclampsia with seizures/convulsions due to renal function impairment

5. **Hydatidiform Mole**

   - Uterus is much larger than normal pregnancy
   - hCG levels are higher than expected at that time of gestation
   - Grape like masses in vagina (also seen in embryonal rhabdomyosarcoma)
   - Fetal heart sound absent
   - Snow storm appearance on ultrasound
   - Choriocarcinoma is a complication

6. **Endometriosis**

   - Dysmenorrhea
   - Pelvic pain
   - Pain during defecation, urination
   - Abdominal pain

- Yellow brown gun powder nodules / chocolate cyst
- Peanut sized nodule (given in past scenario)

7. **Endometrial Hyperplasia and Carcinoma**
    - Hyperplasia is due to excess of estrogen relative to progestin
    - May lead to endometrial carcinoma
    - Endometrial carcinoma has two types: Endometrioid and serous
    - Involves mutation in PTEN gene
    - Both present with postmenopausal bleeding
8. **Leiomyoma**
    - Benign tumor
    - Multiple masses
    - Usually occur premenopausally
    - Menorrhagia with or without metrorrhagia
    - Increased size in pregnancy, shrinks on menopause
9. **Leiomyosarcoma**
    - Solitary
    - Postmenopausal women
    - Don't arise from leiomyoma
10. **Cervical Intraepithelial lesions/Carcinoma**
    - Use of pap smear
    - Association of HPV
    - History of multiple sexual partner/sex worker
    - Dysplastic changes
    - Vaginal discharge
    - Atypical cells
    - Irregular exophytic lesions around cervical os

RBCs WBCs and Bleeding Disorders

General Features of Anemia

Weakness, Fatigue, Dyspnea, Pale conjunctiva and skin, headache and lightheadness.

Microcytic Anemia

MCV: <80 micro m3

1. **Iron Deficiency Anemia**
    - Most common type of anemia
    - Due to decreased iron
    - Different cause in different age. In adults, PUD in males and menorrhagia in females
    - Anemia
    - Koilonychia
    - Pica

- Microcytic hypochromic RBCs

2. **Sideroblastic Anemia**
    - Defective protoporphyrin synthesis
    - Congenital Cause: ALAS deficiency
    - Acquired Cause: Alcoholism, lead poisoning, Vit B6 deficiency
3. **Thalassemia**
    - Due to defective globin chain synthesis
    - Two types alpha (due to gene deletion on chromosome 16) beta (due to gene mutation on chromosome 11)
    - Most severe form (Beta major) presents with crewcut appearance on skull x-ray and chipmunk facies, hepatosplenomegaly
    - Microcytic hypochromic RBCs with target cells and nucleated RBCs
    - Electrophoresis shows HbF and HbA2 with little or no HbA

Macrocytic Anemia

MCV: >100 micro m3

4. **Megaloblastic Anemia**
    - Due to folate or vitamin B12 deficiency
    - Folate Deficiency caused by: poor diet, increased demand and folate antagonist
    - Vitamin B12 Deficiency causes include: Pernicious anemia, pancreatic insufficiency, damage to terminal ileum
    - Clinical presentation: Macrocytic RBCs with segmented neutrophils, glossitis, subacute combined degeneration of spinal cord (Vit B12 deficiency)
    - Normal methyl malonic acid in folate deficiency (increased in Vit B12 deficiency)

Normocytic Anemia

MCV: 80-100 micro m3

5. **Sickle Cell Disease**

- Autoimmune disorder (autosomal recessive)
- Presence of 2 abnormal beta genes
- Needle like/banana shaped or sickled cells
- Presentation of anemia and jaundice with increased unconjugated bilirubin
- Swelling of hands and feet/acute chest syndrome/auto splenectomy

6. **Acute Lymphoblastic Leukemia**
    - Presents in people under 15 years of age; more particularly with Downs Syndrome
    - B type common of all with markers C10,19,20
    - T type with markers C2-8
    - PAS positive for tDT (DNA polymerase)

- lymphadenopathy
- splenomegaly
- neutropenia
- anemia
- tumor cells have scant basophilic cytoplasm and nuclei with delicate, finely stippled chromatin and small nucleoli

7. **Chronic Lymphoblastic Leukemia**
    - Coexistence of CD5 and CD20 markers
    - Seen in adults greater than 50 yrs
    - infections (hypogammaglobinemia)
    - generalized lymphadenopathy
    - fragile smudge cells
    - lymphocytosis
8. **Acute Myeloid Leukemia**
    - Presents in old age (50-70 Yrs)
    - Auer Rods
    - MPO positive
    - Fatigue, fever, spontaneous mucosal and cutaneous bleeding
    - Typical features as ALL
    - Characterized by t(15:17) translocations
9. **Chronic myeloid leukemia**

- Myeloproliferative disorder
- BCR-ABL fusion gene abnormality producing active BCR-ABL tyrosine kinase. It's a t(9:22) translocation
- Other myeloproliferative disorders are BCR-ABL negative (have JAK2 kinase mutations) like polycythemia vera, essential thrombocytopenia, myelofibrosis
- Fatigability
- Weight loss
- Weakness
- Sometimes the first symptom is a dragging sensation in abdomen caused by splenomegaly (in scenario of past)

10. **Non-Hodgkins Lymphoma** (all are CD20+)

i. **Follicular Lymphoma**

- Proliferation of small B cells
- Translocation of BCL2 t(14:18)
- Painless lymphadenopathy in late adulthood
- Progress to diffuse large B cell lymphoma

ii. **Mantle Cell Lymphoma**

- Same as above type except expands into mantle zone

- Translocation in cyclin D1 t(11:14)
- Involves liver, spleen, bone marrow

iii. Marginal Zone Lymphoma

- Same symptoms as above 2 except expands into marginal zone and causes swelling of salivary gland, thyroid or orbit (Hashimoto thyroiditis/Sjogren syndrome/H.pylori gastritis)

iv. Burkitt Lymphoma

- Intermediate B cell neoplasia
- In children and young adults
- Extra nodal mass
- In Africans, at angle of jaw
- In Sporadic cases, abdomen involvement
- Translocation of c-myc gene t(8:14)
- Stary-sky appearance
- Associated with EBV virus

11. Hodgkin Lymphoma

- Reed-Sternberg cells
- Mixed inflammatory infiltrate
- Binucleate cells
- Painless lymphadenopathy with B symptoms (nausea, weight loss, chills, night sweats)
- Owl-eyed nuclei
- 5 types: most common nodular sclerosis; involves supraclavicular, cervical mediastinal nucleus
- Positive for CD15 and CD30

12. Multiple Myeloma

- Bone pain with hypercalcemia
- Punched out lesions in skull and vertebrae
- Increased antibodies in serum and BJ proteins in urine are diagnostic
- Rouleaux formation due to increased serum protein
- Primary amyloidosis: Free light chains circulate in serum
- High IL-6
- Translocations that fuse IgH locus on chromosome 14 to oncogenes such as cyclin D1 and D3

Musculoskeletal System Pathology

1. Osteoarthritis

- Wear and tear injury
- Chondrocyte degeneration
- Usually old presentation in the 60s

- Common joints effected: knee, hip, lower lumbar spine, DIP, PIP
- Morning stiffness worsening with time
- Cartilage floating in joint space (joint mice)
- Osteophytes- At PIP (Bouchard nodes) At DIP (Heber den nodes)

2. **Rheumatoid Arthritis**
    - Autoimmune disorder
    - Fever
    - Weight loss
    - Fatigue
    - Myalgia
    - Malaise
    - Periarticular and juxta-articular osteopenia (given in scenarios)
    - Narrowing of joint space
    - Joint effusions
    - Swelling of joint
    - Fusion of Joints
    - Stiff joints in the morning; improve on activity
    - Involves majorly small joints of hands and feet. DIP is spared
    - In women of late child bearing age
    - Inflammation of synovium

Difference in morphology of osteoarthritis and rheumatoid arthritis

Osteoarthritis	Rheumatoid Arthritis
Bony spur	Pannus formation
Subchondral sclerosis	Inflammatory process occurs
Osteophytes	Fibrous ankylosis
Thinned and fibrillated cartilages	Bony ankylosis
Subchondral cyst	Cartilage is eroded

3. **Gout**
    - Due to hyperuricemia
    - Hyperemia, warmth and tenderness of joint
    - Painful arthritis of toe (metatarsopharyngeal joint)
    - Binge drinking
    - Needle shaped crystals in synovial fluid as compared to rhomboid crystals in pseudo gout
    - Negative birefringence test under polarized light
4. **Osteomyelitis**
    - Bacterial infection
    - Fever
    - Chills
    - Malaise

- Leukocytosis
- Draining Sinuses
- Throbbing Pain
- Usually occurs in children

5. **Osteosarcoma**
   - Seen in teenagers
   - Arises in metaphysis of long bones (distal femur/proximal tibia/ region of knee)
   - Lifting of periosteum
   - Sun burst appearance
   - Codman triangle
   - Mixed lytic and blastic cells
6. **Ewing Sarcoma**
   - Seen in males (<15 yr of age)
   - Arises in the diaphysis of long bones
   - Onion skin appearance on X-rays
   - 11:22 translocation

Renal Pathology

1. **Nephrotic Syndrome**

i. **Minimal Change Disease**
- Most commonly presented in children
- Effacement of foot processes
- Oval fat bodies in urine
- Improves on course of corticosteroids

ii. **Focal segmental glomerulosclerosis**
- Mostly common presented in adults
- Doesn't improve with corticosteroids
- Focal and segmental sclerosis and hyalinosis
- May be associated with HIV/Heroine abuse

iii. **Membranous nephropathy**
- Adult age presentation between 30-60 yr
- Subepithelial deposits
- Diffuse thickening of capillary wall
- Spike and dome appearance
- Granular deposits containing complements and antibodies

iv. **Membranoproliferative glomerulonephritis (type 1)**
- Subendothelial deposits
- Proliferation of mesangial, endothelial and infiltrative leukocytes
- Tram track appearance (double contour of capillary wall)

- Splitting of GBM

v. **Dense Deposit Disease and C3 glomerulonephritis**

- Mesangial, intramembranous, subendothelial electron deposits (waxy) deposits

2. <u>Nephritic Syndrome</u>

i. **IgA Nephropathy**

- IgA immune complex deposition in mesangium

ii. **Rapidly Progressive Glomerulonephritis**

- Subsequent proliferation of parietal epithelium (crescents)
- Features of nephritic syndrome

iii. **Hereditary Nephritis (Alport Disease and Thin Basement Membrane)**

- Thinning of GBM
- Basketweave appearance

iv. **Poststreptococcal glomerulonephritis**

- 2-3 weeks After group A beta hemolytic streptococcal infection of skin/pharynx
- Usually in children
- Hematuria-smoky brown (cola colored urine)
- Proteinuria
- Hypertension
- Subepithelial humps
- Increased cellularity

3. <u>Acute Tubular Injury/Necrosis</u>

- BUN:Cr less than 15
- Two etiologies: ISCHEMIC (patient comes with history of trauma, might be in state of shock & may be hypotensive and NEPHROTOXIC
- Granular casts and renal tubular epithelial cells in urine
- Hyperkalemia (metabolic acidosis)
- Most commonly effected site: Proximal convoluted tubule

4. <u>Chronic Kidney Failure/Disease</u>

- Azotemia (Increase nitrogen waste levels in the blood)
- Hypocalcemia
- Hyperphosphatemia
- Hyperkalemia
- Metabolic acidosis
- Salt and water retention
- Hypertension
- Acquired cystic kidney disease occurs in patients with end stage renal disease

5. <u>Autosomal Dominant (Adulthood) Polycystic Disease</u>

- Congenital bilateral disorder of enlarged kidneys in renal cortex and medulla
- No symptoms until 40 yr

- Flank pain or heavy, dragging sensations
- Intermittent gross hematuria
- Hypertension and urinary infections
- Large kidney as readily palpable abdominal masses
- In children, autosomal recessive polycystic disease

6. Acute Pyelonephritis

- Onset is sudden
- Pain at costovertebral angle
- Chills
- Fever
- Nausea
- Dysuria, frequency and urgency
- Urine is turbid due to pus (pyuria)
- Leukocytosis and WBC cast

7. Renal Cell Carcinoma

- Adult age
- Painless hematuria
- Weight loss, Fever
- Dull flank pain
- Palpable abdominal mass
- Associated with paraneoplastic syndrome
- Greater risk in smokers
- Occupations with exposure to cadmium/petroleum

8. Wilms Tumor

- Commonest in children
- Involves lower pole of kidney
- Triphasic morphology
- Palpable mass in abdomen
- Malignant in nature
- Weight loss
- Unilateral flank mass with hematuria and hypertension