CXR: General Pictures

- ***Normal CXR***

1. cardiac diameter < ½ thoracic width - measured inside ribs
   - PA, inspiratory, erect film
2. ~ 1.5 cm change in diameter between inspiration / expiration
3. right heart border
   i. SVC ± azygous vein
   ii. right PA
   iii. RA ± LA
4. left heart border
   i. aortic arch
   ii. PA / aortic angle
   iii. left PA
   iv. LA appendage
   v. left ventricle

- ***"Apparantly" Normal CXR***

1.	breast shadows	? mastectomy
2.	superior mediastinal masses	
3.	posterior mediastinal masses	- look behind the heart
4.	ribs	- notching, tumours, missing, cervical
5.	bones	- clavicles & hyperparathyroidism - spine
6.	labels	- dextrocardia
7.	beneath diaphragm	- gas, hydatid
8.	lungs	- small pneumothorax - apical lung disease

- ***Respiratory Distress & "Normal" CXR***

1. pulmonary embolism
2. asthma
3. airway obstruction - FB, secretions, ETT cuff, epiglottis, croup, etc.

Coin Lesion on CXR

Single - Common	***Multiple*** - Common
1. 1° carcinoma 2. metastasis 3. hamartoma 4. granuloma 5. tuberculosis	1. metastases 2. granulomata 3. abscesses 4. septic emboli 5. multiple pulmonary emboli 6. hydatid
Single - Uncommon	***Multiple*** - Uncommon
1. hydatid 2. AV malformation 3. abscess 4. pulmonary embolus / infarction 5. adenoma 6. haematoma 7. bronchogenic cyst 8. Wegener's granulomata 9. progressive massive thrombosis	1. AV malformation 2. lymphoma 3. Wegener's granulomatosis 4. rheumatoid lung

Features suggestive of ***malignancy***,

1. male > female
2. smoker
3. age
   - > 70 yrs ~ 50 %
   - 50-70 yrs ~ 25%
   - < 35 yrs < 1%
4. increase size < 2 yrs
5. absence of calcification

Lobar Collapse	Lobar Consolidation
CXR appearances 1. homogeneous opacity 2. ***no*** "air" bronchogram 3. structural displacement - fissures - vessels - mediastinum, trachea 4. elevation of hemidiaphragm 5. compensatory expansion	***Lobar pneumonia*** 1. homogeneous opacity 2. "air" bronchogram 3. no structural displacement *Klebsiella* → bulging fissures 4. "paralysis" of hemidiaphragm 5. ± pleural effusion, cavitation
Common causes 1. sputum retention 2. malposition of ETT 3. mechanical ventilation 4. postoperative - CABG - upper GIT 5. carcinoma, adenoma 6. foreign body	***Bronchopneumoinia*** 1. patchy basal opacities 2. "air" bronchogram 3. clinical signs over affected area

- ***Butterfly Appearance***

1. pulmonary oedema
   i. cardiogenic
   ii. non-cardiogenic
2. pneumonia
3. alveolar proteinosis
4. lymphoma

- ***Reversed Butterfly Appearance***

1. pulmonary eosinophilia
2. sarcoidosis

- ***Bilateral Hilar Enlargement***

1. ***lymphadenopathy***
   i. lymphatic leukaemia
   ii. lymphoma
   iii. Hodgkin's disease
   iv. carcinoma - renal cell
   - melanoma
   - nead/neck carcinoma
   v. sarcoidosis
   vi. infectious mononucleosus
   vii. whooping cough
   viii. primary tuberculosis - rarely, usually unilateral
2. ***vascular***
   i. pulmonary hypertension- chronic lung disease
   - multiple pulmonary emboli
   - primary pulmonary hypertension
   ii. L→R shunts - ASD, VSD
   iii. pulmonary artery dilatation
   - post-pulmonary stenosis
   - congenital large pulmonary artery
   - aneurysm

- ***Cavitating Lesion on CXR***

1. common
   i. carcinoma
   ii. infection - TB, abscess, hydatid
   iii. pulmonary emboli, infarct
   iv. septic emboli, infarct
2. uncommon
   i. lymphoma
   ii. haematoma
   iii. bulla
   iv. pneumatocele
   v. Wegener's
   vi. bronchogenic cyst

- ***Lung Infections***

1. lobar / segmental - bacterial, atypical
2. expanding lobar - Staph., gram negatives, *Klebsiella*, anaerobes
3. cavitating - Staph., gram negatives, *Klebsiella*, anaerobes, fungi
4. generalised alveolar - bacterial, pneumocystis
5. generalised interstitial - viral, TB, atypical, fungal, pneumocystis
6. crescentic - hydatid, fungal
7. effusion - bacterial, TB
8. extrapulmonary - actinomycosis, hydatid
9. pneumothorax - Staph., *Klebsiella*
10. lymphadenopathy - viral, TB, fungal, actinomycosis

- ***Apical Disease on CXR***

1. TB
2. other infections
3. bronchogenic carcinoma - Pancoast's tumour
4. metastases
5. pleural thickening
6. extra-pleural disease

- ***Peribronchial Thickening***

1. chronic bronchitis
2. asthma
3. oedema
4. bronchiectasis
5. cystic fibrosis

- ***Diffuse Pulmonary Infiltrates***

NB: divide into ***acute*** or ***chronic***,
chronic → ***upper*** or ***lower*** distribution

1. ***acute***
   - i. cardiogenic oedema - LVF, MS
   - ii. ARDS - sepsis, trauma, transfusion reaction, fat emboli, etc.
   - iii. infection - bacterial, viral, fungal, protozoal
   - iv. haemorrhage - contusions, trauma
     - infarction, Goodpasture's, coagulopathy
     - idiopathic haemosiderosis
   - v. aspiration
   - vi. pulmonary eosinophilia
   - NB: in severe COAD the distribution of oedema is ***patchy***
2. ***subacute*** → above plus,
   - i. alveolar proteinosis
   - ii. lymphangitis carcinomatosis
   - iii. malignancy - lymphoma, alveolar cell carcinoma
   - iv. sarcoidosis
3. ***chronic: upper zones***
   - i. aspergillosis
   - ii. ankylosing spondylitis, ulcerative colitis
   - iii. extrinsic fibrosing alveolitis - organic dust inhalation
   - iv. silicosis
   - v. sarcoidosis
   - vi. tuberculosis
   - vii. rare - radiotherapy, histiocytosis X
4. ***chronic: lower zones***
   - i. asbestosis
   - ii. aspiration - chronic, recurrent
   - iii. intrinsic fibrosing alveolitis - RA, SLE, scleroderma, drugs, etc.
   - iv. bronchiectasis
   - v. chronic bronchitis, COAD
   - vi. pulmonary eosinophilia - protozoal, drugs
   - vii. rare - von Recklinghausen's
   - viii. drugs
     - amiodarone, bleomycin, busulphan, methysergide, hydrallazine, procainamide, sulphonamides

- ***Upper Lobe ® SCHART***

1.	S	- silicosis (progressive massive fibrosis) - sarcoidosis
2.	C	- coal workers pneumoconiosis
3.	H	- histiocytosis X
4.	A	- ankylosing spondylitis, aspergillosis
5.	R	- radiation
6.	T	- TB

- ***Lower Lobe ® RASIO***

1.	R	- rheumatoid arthritis
2.	A	- asbestosis
3.	S	- scleroderma
4.	I	- idiopathic
5.	O	- other - busulphan, bleomycin, amiodarone, methotrexate

- ***Diffuse Interstitial Disease + Mediastinal Lymphadenopathy***

1. carcinoma
2. lymphoma
3. sarcoidosis
4. silicosis
5. viral infection

- ***Diffuse Interstitial Disease + Skeletal Abnormality***

1.	ribs	- scleroderma
2.	spine	- ankylosing spondylitys
3.	shoulder joints	- RA, scleroderma, sarcoidosis - hypertrophic pulmonary osteoarthropathy
4.	skull	- tuberous sclerosis, histiocytosis X

- ***Miliary Opacities***

1. miliary pattern
   i. sarcoidosis
   ii. metastases - thyroid, renal, trophoblastic
   iii. TB
   iv. silicosis
   v. chickenpox
   vi. fibrosing alveolitis
   vii. pneumoconiosis
2. dense nodules
   i. silicosis
   ii. chronic haemosiderosis
   iii. metal
   iv. microlithiasis

- ***Cardiophrenic Angle Mass***

1. fat pad - obesity, lipoma, steroids
2. hernia of Morgani
3. pericardial cyst
4. pericardial tumour

- ***Hyperinflated Lungs***

1. ***bilateral hyperinflation***
   i. COAD
   ii. asthma
   iii. α_1-antitrypsin deficiency
   iv. cystic fibrosis
   v. bronchiolitis
   vi. aspergillosis
2. ***unilateral hyperinflation***
   i. foreign body with hyperinflation
   ii. pneumothorax
   iii. large pulmonary embolus
   iv. lung cyst, bullae
   v. unilateral emphysema
   vi. post-lobectomy hyperinfaltion
3. ***apparent unilateral hyperinflation***
   i. rotated normal CXR
   ii. increased density on other side
   iii. absent breast
   iv. absent pectoral muscle - congenital, surgical
   v. scoliosis

- ***Pulmonary Oligaemia***

1. low cardiac output
2. R→L shunt - Fallot's, Ebstein's, triology
3. pulmonary artery banding

- ***Pulmonary Plethora***

1. features
   i. ≤ 1:1 distribution of vessel diameter - cf venous hypertension >1
   ii. increase number of hilar vessels
2. causes
   i. hyperdynamic circulation - polycythaemia
      - thyrotoxicosis
      - fluid overload
   ii. L→R shunt - ASD, VSD, PDA
      - partial anomalous pulmonary venous drainage
   iii. bidirectional shunt - transposition, truncus arteriosus
      - partial anomalous pulmonary venous drainage

- ***Massive Lesion On CXR > 6 cm***

1. common
   i. tumour
   ii. infection
   iii. TB
   iv. hydatid
   v. encased effusion
   vi. progressive massive fibrosis
2. uncommon
   i. infection
   ii. bronchogenic cyst
   iii. pulmonary sequestration - aortic, not pulmonary artery supply
3. "air-crescent" sign → cavity +
   i. fungal infection
   ii. clot
   iii. tumour
   iv. hydatid

- ***Mediastinal Masses***

1. ***commonest***
   i. fat deposition - obesity, lipoma, steroids
   ii. vascular
2. ***anterior***
   i. thymus
   ii. thyroid
   iii. other tumour - teratoma, dermoid cyst, lipoma
   iv. ascending aortic aneurysm
   v. lymphadenopathy
3. ***middle***
   i. heart
   ii. aortic arch aneurysm
   iii. pulmonary vessels
   iv. trachea
   v. bronchogenic cyst
   vi. lymphadenopathy
4. ***posterior***
   i. descending aortic aneurysm
   ii. hiatus hernia
   iii. diaphragmatic hernia
   iv. lymphadenopathy
   v. neuroma
   vi. neuroblastoma
   vii. enterogenic cyst

- ***Calcification on CXR***

NB: ***not*** carcinoma, ***not*** hydatid

1. ***localised calcification***
   - i. tuberculosis
   - ii. haematoma
   - iii. hamartoma - popcorn calcification
   - iv. teratoma
   - v. rarely - sarcoid, asbestosis
2. ***diffuse calcification***
   - i. post-varicella pneumonia
   - ii. tuberculosis
   - iii. histoplasmosis
   - iv. silicosis
   - v. chronic haemosiderosis
3. ***hilar calcification***
   - i. lymph nodes
     - tuberculosis
     - silicosis
     - sarcoidosis
     - histoplasmosis
   - ii. pulmonary atherosclerosis
4. ***"eggshell" calcification***
   - i. silicosis
   - ii. sarcoid
   - iii. scleroderma
   - iv. anthracosis
   - v. lymphoma after radiotherapy
   - vi. amyloid
   - vii. histoplasmosis
5. ***pleural calcification***
   - i. tuberculosis
   - ii. empyema
   - iii. haemothorax
   - iv. asbestosis

- ***Extrapleural Mass on CXR***

1. osteomyelitis
2. actinomycosis
3. hydatid
4. tumour 1° or 2°
5. myeloma
6. fracture
7. extramedullary haematopoiesis

- ***Pleural Effusion***

NB: > 300 ml

1. loss of costophrenic angle
2. upper border meniscus
3. homogenous opacity obscures heart border and diaphragm
4. mediastinal shift
5. increase distance between lung and stomach gas on left.
6. ***lateral decubitus*** reveals change in meniscus and useful for small or unusual effusion

- ***Massive Pleural Effusion***

1. post - thoracotomy / pneumonectomy
2. tumour
3. empyema
4. TB
5. haemothorax
6. ruptured oesphagus

- ***Rib Notching***

1. coarctation of aorta
2. IVC obstruction
3. neurofibromas
4. tuberosclerosis
5. idiopathic

CXR: Specific Pictures

- ***Aspiration Pneumonitis***

1. normal CXR - small aspiration or too early
2. linear (interstitial) densities
3. nodular (alveolar) or patchy infiltrates
4. lobar consolidation / collapse
5. non-cardiogenic pulmonary oedema (ARDS)

- ***COAD / CAL***

1. PA or AP
   i. flattening of diaphragm
   ii. thin heart shadow
   iii. attenuation of vessels
   iv. vessels "pulled" down → "like drooping moustache"
   v. bullae
   vi. bulging of lung edges → between ribs & around heart
2. lateral
   i. flattening of diaphragm
   ii. ↑ AP diameter
   iii. ↑ retrosternal air shadow
   iv. bullae
3. aetiology
   i. smoking
   ii. chronic asthma
   iii. α_1-antitrypsin deficiency
   iv. chronic dust / pollution exposure
   v. cystic fibrosis

- ***Sarcoidosis***

1. bilateral hilar lymphadenopathy
2. opacities spreading from hilum into parenchyma
3. miliary opacities - sarcoid nodules
4. paratracheal lymphadenopathy

- ***Tuberculosis***

1. unilateral hilar lymphadenopathy - 1°TB
   ± calcification
2. primary lesion in middle lobe or apex of lower lobe
3. subapical lesion - opacity
   - cavity
   ± calcification
4. bronchopneumonic changes
5. miliary opacities - obscure normal lung markings
6. acute lung injury, ARDS

- ***Carcinoma***

1. possible CXR features,
   i. consolidation / "pneumonia"
   ii. apical mass ± rib erosion
   iii. cavitating lesion
   iv. lung abscess
   v. lobar collapse
   vi. paralysed hemidiaphragm
   vii. hilar lymphadenopathy
   viii. miliary shadowing from secondaries
2. ***lung metastases***
   i. canon ball opacities
   ii. miliary opacities
   iii. numerous ill-defined opacities
   iv. Kerley B lines - obstructed lymphatics, no cardiomegaly
3. ***central mass*** →
   i. squamous ~ 40%
   ii. anaplastic ~ 40% → large or small cell
4. ***peripheral mass*** →
   i. alveolar cell
   ii. adenocarcinoma
   iii. Pancoast's

- ***Pulmonary Embolus***

1. normal CXR
2. transient unilateral increase in lung lucency
   - Westermark's sign - due to gereralised vasoconstriction
3. unilateral peripheral translucent area
4. pleurally-based, wedge-shaped or 'D'-shaped opacity on lateral CXR
   - Hamptom's hump
   - hazy opacity on PA CXR
5. pleural effusion
6. linear atelectasis
7. raised hemidiaphragm
8. enlargement of hilum
9. RV enlargement, azygos vein dilatiation
10. rarely calcification

NB: ***lower lobe*** more common than upper lobe;
right lung more common than left lung → where the blood goes !

- ***Pulmonary Arterial Hypertension***

1. features
   i. enlarged, well-defined hilar vessels - arise from hilum
      ± calcification
   ii. rapid tapering of vessels
   iii. very few peripheral vascular markings
   iv. no effusions or Kerley lines - ie. no signs of LVF
   v. cardiomegaly - RV & RA
   vi. prominent IVC & SVC
   vii. CXR changes are ***late***
2. causes
   i. L→R shunt
   ii. pulmonary embolism
   iii. cor pulmonale
   iv. mitral stenosis
   v. idiopathic PAH

- ***Pulmonary Venous Hypertension***

1. features = upper lobe venous diversion
   i. UL > LL veins
   ii. 1st interspace vessel > 3 mm
   iii. any segmental artery > 5 mm
   - *NB*: ↑ magnification on portable AP films, ∴ may exceed these limits
2. causes
   i. LVF
   ii. mitral stenosis
   iii. left atrial - myxoma, tumour, thrombus
   iv. cor triatriatum
   v. anomalous pulmonary venous drainage
   vi. constrictive pericarditis
   vii. pulmonary venous fibrosis or thrombosis

- ***Fat Embolus***

1. normal CXR in 88%
2. patchy consolidation
3. right heart failure
4. bilateral diffuse infiltrates - ARDS

- ***Lung Infiltrates In Renal Failure***

1. septicaemia
2. bacterial pneumonia
3. cardiogenic shock
4. acute lung injury
   i. ARDS
   ii. MOSF
5. atypical pneumonia - *Legionella*
6. autoimmune disease
   i. Goodpasteur's syndrome
   ii. polyarteritis
   iii. SLE
   iv. Wegener's granulomatosis
7. drug effects

- ***Mesothelioma / Asbestosis***

Def'n: asbestosis →

1. exposure to asbestos fibres
2. restrictive lung defecit
3. radiological changes

• CXR patterns of presentation,

a. peripheral opacities
b. geographical plaques and calcification
c. pulmonary fibrosis
d. bronchogenic carcinoma

- ***Silicosis***

1. numerous small nodules - upper zones
2. pulmonary fibrosis - upper zones
3. egg-shell calcification - DD_X sarcoid

	Asbestosis	Silicosis
interstitial fibrosis	• lower lobes	• upper lobes
PMF	• uncommon	• common
malignancy	• mesothelioma • bronchogenic carcinoma	• uncommon
tuberculosis	• uncommon	• common
calcification	• pleural	• lung, hilar nodes
respiratory failure	• common	• common
other features	• pleural thickening • pleural effusion	• Caplan's syndrome

CXR: Cardiac

- ***Heart Size***

1. ***small heart***
   i. hyperinflated lungs - asthma, emphysema
   ii. hypovolaemia
   iii. Addison's disease
   iv. cachexia, anorexia
   v. normal variant
2. ***massive enlargement***
   i. mitral valve disease
   ii. pericardial effusion
   iii. cardiomyopathy
   iv. Ebstein's anomaly
3. ***moderate enlargement*** → above plus,
   i. ischaemic heart disease
   ii. hypertensive heart disease
   iii. valvular heart disease
   iv. cardiomyopathy
   v. pericardial tumour, cyst
   vi. factitious - supine or AP film
   - raised hemidiaphrams
4. LA enlargement
   i. mitral valve disease
   ii. LVF |
   iii. VSD | → ↑ pulmonary blood flow & LA volume overload
   iv. PDA |

- ***Cardiac Failure CCF***

1. cardiomegaly
2. pulmonary congestion → UL ≥ LL vessels
3. prominent lymphatics
   i. blurring of hilar vessels - dilated lymphatics
   ii. visible lymphatics - Kerley A & B lines
4. interstitial oedema → reticular pattern, Kerley C lines
5. alveolar oedema
   i. diffuse patchy opacities
   ii. "cotton-wool" opacities around bronchi → LL > ML > UL
   iii. blurring of cardiac borders
6. pleural effusion, fluid in lobar fissures

NB: severe CAL → interstitial & vascular changes may not occur
lung fields reflect cardiac function better than heart size does

- ***Pulmonary Oedema***

1. ***chronic / cardiogenic***
   i. septal lines - Kerley's lines
   ii. diffuse reticular pattern
   iii. perivascular and peribronchial cuffing
   iv. subpleural thickening and oedema
   v. perihilar and basal infiltrates
   vi. upper lobe venous distension
   vii. pleural effusion
   viii. air bronchogram rare
2. ***acute and/or non cardiogenic*** - eg. ARDS
   i. pathcy alveolar oedema - not hilar
   ii. air bronchograms
   iii. with well defined cardiac borders and
   iv. no lymphatics nor venous congestion visible
   v. normal cardiac and PA size

NB: ***Kerley's lines***: A & B → septal lymphatics

A. large, 4-6 cm, irregular, radiate from hilum to upper lobes
B. short 1-2 cm, horizontal, basal, touch pleural margin
   transient - fluid
   permanent - MS, tumour, lymphangitis, pneumoconioses
C. fine curvillinear, often generalised, giving reticular pattern

- ***Pulmonary Oedema: Acute***

NB: signs usually present in acute pulmonary oedema, alveolar and interstitial oedema with,

1. normal heart size
2. normal PA size
3. no venous congestion
4. normal size azygos vein
5. absence of Kerley's lines

NB: ***all*** but #3 may be present in acute cardiogenic pulmonary oedema

- ***Pulmonary Oedema: Unilateral***

1. pulmonary embolus - on unaffected side
2. re-expansion of collapsed lung or pneumothorax
3. unilateral lung cysts or emphysema - on unaffected side
4. severe cardiomegaly and CCF → R-sided oedema (left PA compressed)
5. patient in lateral position - gravity, dependant side
6. aspiration pneumonitis
7. congenital heart disease and shunt - eg. Fallot's

- ***Mitral Stenosis***

1. signs of high pulmonary venous pressure
   i. Kerly A & B septal lines
   ii. prominent lesser fissure with fluid
   iii. upper lobe venous distension
   iv. pulmonary oedema
   v. dilated left atrium → see over
   vi. straight left heart border & ↑ LA appendage
2. other features
   i. calcified mitral valve
   ii. dilated pulmonary arteries > aortic diameter
   iii. ***normal*** heart size in uncomplicated cases
      - undersized LV but abnormal function

- ***Left Atrial Dilatation***

1. PA or AP CXR
   i. double heart border on right
   ii. loss of LA appendage "trough"
   iii. splayed carina
   iv. cardiomegaly
   v. oesophageal displacement - NGT or barium swallow
   vi. ± pulmonary oedema
2. lateral CXR
   i. posterior bulging of the cardiac border

- ***Fallot's Tetralogy***

1. apex of the heart raised above level of hemidiaphragm
2. pulmonary oligaemia
3. small pulmonary arteries
4. dilated aorta

- ***Atrial Septal Defect ASD***

1. LA dilatation
2. RA dilatation
3. large pulmonary artery
4. dilated UL & LL veins
5. small aortic arch < PA diameter
6. septal defect with mongolism can $\rightarrow$ isolated RUL congestion (mechanism unknown)

NB: $\uparrow\uparrow$ pulmonary blood flow & RV output with ***volume overload***

- ***Eisenmenger's Syndrome***

Def'n: reversal of right → left shunt as a result of pulmonary hypertension

1. large dilated main pulmonary arteries
2. oligaemia of peripheral lung fields
3. small aortic shadow

- ***Coarctation of the Aorta***

1. rib notching → 3^{rd}-7^{th} ribs
2. "wasting" or "3-sign" on descending aorta - pre/post-stenotic dilatation
3. prominent left subclavian artery
4. LAH
5. cardiomegaly → LVH

- ***Pericardial Effusion***

NB: XRay changes late → > 200 ml required

1. "water-bag" cardiomegaly, large globular cardiac shadow
2. acute angle between cardiac shadow and hemidiaphragms.
3. clear heart border - no movement of heart seen to blurr film
4. symmetrical cardiac enlargement
5. clear lungs - no LVF

- ***Constrictive Pericarditis***

1. cardiomegaly
2. pericardial calcification - especially oblique & lateral
3. more common with,
   - chronic idiopathic
   - chronic renal failure
   - rheumatoid arthritis
   - neoplastic
   - tuberculosis
   - irradiation

- ***Patent Ductus Arteriosus***

1. 1-5 as for ASD
2. L atrial dilatation
3. R atrial dilatation
4. R ventricular dilatation
5. large pulmonary artery
6. dilated UL & LL veins
7. large aorta

- ***Right Heart Failure***

1. cardiomegaly - RV + RA
2. SVC and azygos vein distension
3. ± pulmonary artery prominence
4. ***no*** alveolar oedema

Raised ICP

- ***SXR***

1. focal loss of bone density lining pituitary fossa
2. errosion of posterior clinoids
3. diffuse loss of cortical bone
4. > 2 mm shift of calcified pineal on lateral film
5. skull #

- ***CT Scan***

1. compression of lateral ventricles
2. effacement of sulci
3. midline shift
4. loss of grey-white matter differentiation = oedema
5. loss of basal cisternae

- ***Hydrocephalus CT Scan Criteria***

1. distended anterior horns
2. enlargement of temporal horns
3. enlargement of 3rd ventricle
4. normal or absent sulci - ie. no sign of cerebral atrophy
5. ± enlargement of basal cisterns and 4th ventricle
6. ± periventricular deceased density $\rightarrow$ communicating hydrocephalus

Cerebral CT Scan

1. subarachnoid haemorhage
   i. blood around cortex & along falx
   ii. blood across tentorium
   iii. ventricular blood
   iv. may have associated intracerebral blood or oedema
2. extradural haemorrhage
   i. convex (***biconvex***) bulging opaque swelling
      • classical shape does not occur post-surgically
   ii. limited by suture lines
   iii. associated oedema and midline shift common
3. subdural haemorrhage
   i. concave irregular swelling
      • opaque → blood, ∴recent
      • dark → liquid, ∴old, usually > 2-4 weeks
   ii. ventricular compression less common
   iii. often associated intracerebral haemorrhages
4. cerebral atrophy
   i. reduced width of cortical grey matter
   ii. prominent sulci
   iii. enlargement of ventricles
5. hydrocephalus
   i. dilated ventricles
   ii. no prominence of sulci
6. tumour
   i. irregular mass - may be isodense
      ± necrosis
   ii. displaced ventricles
   iii. enhancement with contrast
   iv. surrounding oedema
7. cerebral infarction
   • area of decreased density within brain substance
   • usually within the territory of a major vessel
   • reduced density & mild mass effect may be seen as early as 6 hrs, usually > 24 hrs
8. cerebral oedema
   • may be focal or generalized, with loss of grey/white matter differentiation
   • may be ***normal*** in the presence of marked oedema & raised ICP

9. abscess
    - low density lesion which has peripheral enhancement on contrast
10. encephalitis
    - the majority have no CT abnormalities
    - HSV characteristically results in bilateral (initially unilateral) reduction in density and surrounding compression of the temporal poles
    - basal ganglia may appear more distinct due to ↑ contrast
11. meningitis
    - the majority have no CT abnormalities
    - meningeal enhancement may be seen with contrast

AXR: Specific Pictures

- ***AXR Review***

1. soft tissues
   - liver edge, spleen edge, psoas margins, renal outlines
2. gas shadows
   i. within bowel lumen
   ii. within bowel wall
   iii. outside bowel lumen
   - peritoneal cavity
   - biliary tree
   - renal system
   - uterus
   - subcutaneous
3. bone outline
   - vertebral abnormalities - bodies, disc spaces, transverse processes
   - ribs
4. abnormal shadows

- ***Paralytic Ileus***

1. increased air fluid levels predonimantly in small bowel
2. gas visible throughout GIT
3. gas in rectum
4. no signs of mechanical obstruction (hernia, volvulus)

- ***Small Bowel Obstruction***

1. many gas / fluid levels
2. dilated small bowel > 2.5cm diameter
3. colon empty
4. central dilated bowed
5. many ***plica semilunares*** visible
6. "stacked coins" appearance
7. "string of beads" signs
8. look for hernia → gas below ***inguinal ligament***

NB: gas in biliary tree + SBO at Mekel's → gall-stone ileus
gasless abdomen → full of fluid

- ***Large Bowel Obstruction Plain AXR***

1. enlarged bowel - peripheral with ***haustra***
   > 5 cm
   caecum > 11 cm → imminent perforation
2. multiple air-fluid levels - less than with SBO
3. SBO usually absent if ileocaecal valve competent
4. sigmoid volvulus → "coffee bean" shadow
5. causes
   i. tumour
   ii. diverticular disease
   iii. toxic megacolon
   iv. pseudo-obstruction
   v. Hirshprung's disease

NB: if in doubt, ***barium enema*** will exclude pseudo-obstruction

- ***Ischaemic Bowel Plain AXR***

1. thickened bowel wall
2. linear gas streaks in bowel wall
3. "thumb-printing" in bowel wall - mucosal oedema
4. not distended, often constricted
5. "picket-fence"' on barium study - leaking contrast
6. gas in portal veins
7. distribution
   i. inferior mesenteric → colon beyond splenic flexure
   ii. superior mesenteric → small bowel, ascending and transverse colon

- ***Portal Venous Gas***

1. necrotising enterocolitis
2. ischaemic bowel
3. abdominal abscess
4. septicaemia
5. bowel obstruction
6. iatrogenic - air enemas, H_2O_2 enema

NB: distribution - peripheral to within 2 cm of liver edge

Trauma

- ***Pneumothorax CXR***

1. translucent area superiorly without lung markings
2. lung edge visible
3. subcutaneous or medastinal air
4. # ribs
5. mediastinal shift towards affected side
6. IC tube

- ***Pneumothorax Aetiology***

1. common
   i. trauma
   ii. idiopathic
   iii. IPPV
   iv. ruptured bulla/cyst
   v. asthma, COAD
2. uncommon
   i. pulmonary fibrosis
   ii. cavitating lesion
   iii. ostersarcoma

- ***Pulmonary Barotrauma***

1. pulmonary interstial emphysema (PIE)
   i. small parenchymal cysts
   ii. linear air streaks radiating towards hilum
   iii. perivascular halos
   iv. intraspetal air
   v. pneumatoceles
   vi. subpleural air
2. pneumothorax
   i. tension
   ii. loculated - anteriorly or subpulmonic
3. mediastinal emphysema
4. subcutaneous emphysema
5. pneumoperitoneum

- ***Pulmonary Contusion***

1. immediate (< 6 hrs) ill-defined density or consolidation
2. improves by 48 hrs; clears by 10 days
3. +/- # ribs

- ***Lung Infiltrates Post-Traumatic***

1. days 1-2
   i. contusion, laceration
   ii. pulmonary haemorrhage - often well circumscribed
   iii. pulmonary thrombosis
   iv. aspiration
   v. fluid overload
2. days 2-3
   i. fat embolism
   ii. acute lung injury - ARDS
   iii. fluid overload
3. days 7-14
   i. pulmonary embolism
   ii. nosocomial pneumonia
   iii. ruptured diaphragm
   iv. aspiration

- ***Pneumomediastinum***

1. common
   i. pulmonary interstitial emphysema - IPPV
      - asthma
      - COAD
   ii. ruptured oesophagus
   iii. ruptured bronchus
2. uncommon
   i. cervical subcutaneous emphysema
   ii. retroperitoneal emphysema
   iii. pericardial gas
      - does not extend beyond pericardial reflections
      - gas beneath heart

- ***Thoracic Aortic Rupture***

1. ***highly suggestive***
   i. abnormal aortic contour
   ii. oesophageal displacement to right
   iii. obliteration of aorto-pulmonary window
   iv. left bronchus displaced ***inferiorly***
   v. fractured 1st or 2nd ribs
2. ***low association***
   i. widened superior mediastinum - present in only ~ 30%
   ii. tracheal deviation to right
   iii. apical capping
   iv. left pleural effusion
   v. SVC displacement

- ***Diaphragmatic Rupture***

1. early CXR features
   i. bowel or stomach in thorax
   ii. "pseudo-haemopneumothorax" → air fluid level of stomach in chest
   iii. NG tube in L hemithorax
   iv. CXR often ***normal***, \ with signs of major chest injury → high suspicion
2. later CXR features
   i. persistently elevated hemidiaphragm
   ii. persistent lower lobe collapse
3. may appear as → gastric dilatation
   high hemidiaphragm
   loculated pbeumothorax
   subpulmonic haematoma

- ***Oesophageal Rupture***

1. left pleural effusion
2. mediastinal emphysema
3. subcutaneous emphysema
4. mediastinal air/fluid level

- ***Raised Hemidiaphragm***

1. collapsed LL
2. subpulmonic effusion
3. phrenic nerve palsy
4. lung resection
5. diaphragmatic rupture
6. subphrenic mass - abscess, ascites, pancreatitis, hepatomegaly, tumour
   - obesity, pregnancy
7. idiopathic

Other Pictures

- ***Rheumatoid Arthritis***

1. soft tissue swelling
2. periarticular osteoporosis
3. narrow and irregular joint space
4. periarticular errosions
5. subluxation
6. affects PIP, MCP & wrist - but ***not DIP***
7. DD_X
   i. psoriasis
   ii. scleroderma