Chest Radiograph Interpretation

Demographics

- Patient: name, DOB, hospital number, age, sex
- Previous films

Radiograph detail

- Date
- Type (AP or PA, inspiration or expiration, standing or supine)
- Adequacy (***RIPE***)
    - ***R***otation: medial borders of clavicles equidistant from a spinous process
    - ***I***nspiration: at least 5-6 anterior ribs visible above diaphragm
    - ***P***icture area: lung apices, costodiaphragmatic recesses, scapula out of the way
    - ***E***xposure: vertebral bodies should be just visible through lower part of cardiac shadow

Interpretation (ABCDE)

Briefly mention obvious abnormalities first

Airway

- Tracheal deviation – may indicate rotation, pneumothorax or large effusion

Breathing

- Lung fields (compare in thirds) → **SEE NOTES BELOW FOR HOW TO ANALYSE OF ABNORMALITIES**
    - Air (in pneumothorax)
    - Fluid (in effusions)
    - Consolidation (inflammation in infection)
    - Lobar collapse
    - Lesions (e.g. cancer)
- Pleural thickening
- Hilar region for lymphadenopathy, masses and calcification

Circulation

- Heart size – should be <50% thorax diameter on PA film or <60% on AP film, increased in heart failure
- Heart position – may be displaced if there is lobar collapse or large effusion
- Heart shape and borders (right border = right atrium, left border = left ventricle and atrium)
- Great vessels – the aortic knuckle should be visible
- Mediastinal width <8cm on PA film – may indicate aortic dissection

Diaphragm

- Position and shape – right slightly higher due to liver; flat in COPD
- Costaphrenic angles – blunting indicates effusions
- Air below diaphragm – indicative of abdominal viscus perforation

Extra things

- Bones – trace around ribs for fractures if clinically suspicious
- Soft tissues – look for swelling, subcutaneous air, masses, calcification of aorta

To complete

- "To complete my analysis, I would examine previous films and determine the clinical history"
- Summarise and note differentials

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Analysing Lung Field Abnormalities

Background knowledge

- Four densities on a chest radiograph

  - Bone
  - Soft tissue
  - Fat
  - Air
- Wherever a density changes, a "silhouette" will be seen on the radiograph
- Lung lobes affected/unaffected can be identified by if their borders are affected
  - Diaphragm = lower lobes
  - Cardiac border = middle lobe (R) / lingula (L)
- The hilum is the only attachment of the lungs

Describing the Abnormality

- Density
  - Bone/soft tissue/fat/air density
  - Uniform or non-uniform (i.e. blotchy) density
- Radiograph position
  - Left or right
  - Zone
    - Upper (above 2nd anterior rib)
    - Mid (between 2nd and 4th anterior rib)
    - Lower (lower than 4th anterior rib)
- Anatomical position (lung parenchyma / pleural space)
- Size
- Borders

e.g. "There is a non-uniform soft tissue density in the left lower zone. Anatomically, this is in the lower lobe because the left hemi-diaphragm is not visible."

Diagnosing the Abnormality

- Collapse
  - <u>Uniform</u> soft tissue density (i.e. pure white)
  - Affected lobe is smaller
  - Other structures move into empty space (e.g. heart, other lobes → fissures in abnormal positions, trachea)
- Consolidation
  - <u>Non-uniform</u> soft tissue density (i.e. blotchy white)
  - "Perihilar air-bronchogram" = visible bronchioles penetrating the consolidated areas (therefore, it cannot be collapsed)
- Effusion
  - <u>Uniform</u> soft tissue density (i.e. pure white)
  - Meniscus sign (also, there may be some less dense white above it as the effusion goes posteriorly)
  - Fluid at lung bases if erect or along posterior thorax if supine
- Pneumothorax
  - Normal lung lobes, but they are partially deflated
  - Uniform air density lateral to the pleura (usually at top if erect)
  - Seen better on an expiration film
  - Look very carefully around pleura!

<u>Differentials</u>

- Collapse VS consolidation
  - Collapse is uniform soft tissue density, consolidation is non-uniform
  - It's consolidation if there's perihilar air-bronchogram
- Effusion VS collapse
  - Both uniform soft-tissue density
  - Follow a clear border laterally and look for a meniscus
  - Surrounding structures
    - Pulled towards the space of a collapse
    - Pushed away from an effusion

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Common Cardiorespiratory Conditions with Multiple Abnormalities

- COPD
    - Hyperinflation (>8 anterior ribs visible)
    - Flat hemi-diaphragms
    - Decreased lung markings
    - Black lesions (bulla)
    - Prominent hila
- Heart failure (ABCDE)
    - Alveolar shadowing (Bats wings sign)
    - B-lines (interstitial oedema)
    - Cardiomegaly
    - Diversion of blood to upper lobe
    - Effusion

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