Canadian Family Medicine Clinical Card

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Chest X-Ray Interpretation

Community CXR Indications:
- Symptomatic pts with cardiac or respiratory symptoms
- Following up known pulmonary diseases
- Evaluating malignancies (staging, determining extent of spread)

1. Decide if the CXR quality is suitable for interpretation:

ID, Date
❑ Make sure you have the right CXR.
❑ Know when the X-ray was taken, to compare sequential CXRs for the pt.

Imaging technique: AP or PA?
- Assume PA unless told otherwise.
- PA: clavicles usually more V-shaped.
- AP: clavicles usually more horizontal.
- In babies, AP view is common.
- Only assess heart size on PA view *(AP projection artificially magnifies heart)*.

Rotation/Centering
- CXR is centered when spinous processes are midway between clavicular ends.
- If not centered, normal anatomy can be misinterpreted (i.e. tracheal shifts).

Adequate inspiration? *Count Ribs!*
- Good = 8-10 posterior ribs visible above diaphragm (Remember: ribs 1+2 overlap).
- Inadequate inspiration can be misinterpreted (i.e. as interstitial lung disease).

Adequate exposure?
- Exposure adequate when intervertebral discs can be just barely seen through the cardiac shadow *(can adjust digitally)*.
- Under-exposure creates abnormal whiteness on CXR; over-exposure (x-ray darkening) may hide pathologies.

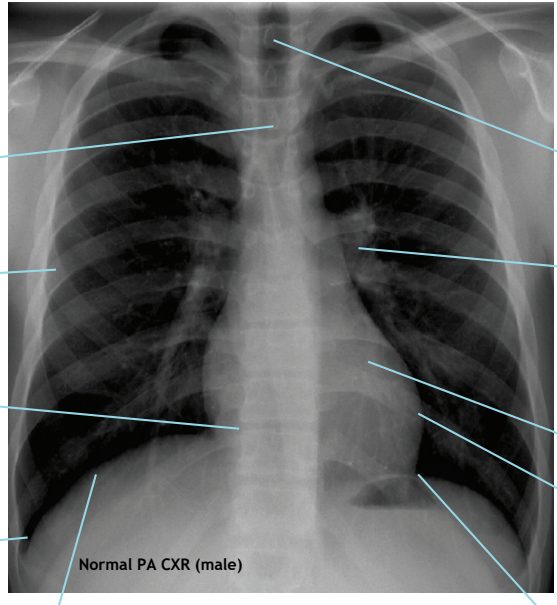
Costo-phrenic angles
- Blunted = pleural effusion >200-400mL.
- Wide = flat diaphragm; suggests air trapping due to obstructive lung diseases.

Hemi-Diaphragms (Right and Left)
- If flat: COPD, asthma exacerbation, foreign body
- Air under R hemidiaphragm: perforated viscous
- Blurred edge of diaphragm: lower lobe airspace disease
- Hemi-diaphragm height: normally R > L (liver underneath)
- If one side abnormally higher: volume loss (atelectasis)

2. Analyze Frontal (PA/AP) CXR:

Bones *(inspect while counting ribs)*: Inspect for **fractures, lesions (lucencies or densities in the bone)**, or rib notching (small grooves along the edges of the ribs, suggestive of aortic coarctation).

Symmetry: are findings similar on both left and right sides?
Pleura: Assess for any pleural lines (suggestive of pneumothorax), masses, thickening, or calcification.



Normal PA CXR (male)

Lung fields - Assess:
❑ Degree of whiteness
❑ Equivalency between right and left sides
❑ Opacifications/Infiltrates
❑ Presence of Kerley A/B lines
❑ Lung apices (above clavicles).
❑ Vasculature (size, position, and whether vascular markings run to the lung periphery)

If infiltrates present, note pattern:
- Lobar, cloud-like densities with air-bronchograms: alveolar/air-space disease (aka consolidation); suggests pus (i.e. pneumonia), blood, water, cells, or protein within alveoli.
- Net-like, reticular: suggests interstitial lung diseases (upper-lobe predominant: inhalational lung injuries; lower-lobe predominant: aspiration, asbestosis, sarcoidosis, etc).

Trachea:
- Find air column, check for tracheal deviation (**tension pneumothorax** or pleural effusion).
- If a patient is intubated, the endotracheal tube tip should ideally be 4cm above the carina.

Hilum:
- Contains 1) pulmonary arteries/veins, 2) main-stem bronchi, 3) lymph nodes.
- Enlarged? (if hilum contour is straight or convex instead of concave, hilum is enlarged).
- Hilum Shifted? Asymmetrical?
- **Unilateral hilar enlargement: 95% malignant**

Heart:
- Size (normal cardiothoracic ratio <0.5 on PA film), shape, and location within mediastinum.

Cardiac Shadows (Right and Left):
- R cardiac shadow = R atrium.
- L cardiac shadow (top to bottom) = aortic arch, L pulmonary artery, L ventricle.
- Assess contour, shape, size, and location.
- White blurring of any cardiac border suggests airspace disease of upper or middle lung lobes.

Cardio-phrenic angles
- Blunted = tumor masses (**lymphoma**, other mediastinal tumors), pericardial fat, pericardial cysts, cardiophrenic space varices, diaphragmatic hernia.

Key References: Raoof S, et al. Interpretation of plain chest roentgenogram. *Chest*. 2012;141(2):545-58. Pineda V, et al. Lesions of the cardiophrenic space: findings at cross-sectional imaging. *RadioGraphics*. 2007;27(1):19-32

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