Pitfalls in Portable Chest Radiology

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Pitfalls in Portable Chest Radiography

- Technical issues: Grids, detectors
- Projection/position variations
- Commonly misinterpreted findings
Portable vs Erect PA Radiography

Patient related differences:
- Semierect posture
- Incomplete lung expansion
- Limited cooperation

Technical Differences:
- Variable distance and alignment
- Limited output > longer exposures
Same Day PCXR & PA
Technique for Portable (Bedside) CXRs

- CR (Storage Phosphor Plates)
  - Use antiscatter grid (8:1) with vertical orientation.
  - 110KV with variable mAs

- DR (CsI Direct Read-Out)
  - Non-grid technique possible in all but large patients
  - 85KV with variable mAs

- Adjust processing parameters for consistent appearance
Misaligned beam with a focused grid > Asymmetric opacity
Pitfall: Grid cut-off

Cause: Unilateral grid cut-off producing unilateral opacity

Remedy: Define extent of abnormal opacity before jumping to conclusions
Image Quality should be similar on PA and Portable CXRs!
No Grid. 85 kVp, 2mAs

8:1 Grid. 115 kVp, 3mAs
Pitfalls in Portable Radiography

- Technical issues
- Projection/position variations
Expiration

Inspiration
Rotation Artifact
Spurious Mediastinal Widening
Mediastinal Hematoma

Post op Day # 1

Post op Day # 2
Sequence of ICU PCXRs - ? Change
Sequence of PCXRs
Effect of Vertical Beam Projection
Pitfalls with PCXRs

- Technical issues
- Projection variations
- Fluid collections
Layered Effusion: No Change
? Pneumonia
Effect of Beam Projection
Pseudotumor: Loculated pleural effusion
Fluid Loculated in Major Fissure
Loculated pleural effusion
48 y/o man with RLL pneumonia
Pleural fluid outlining superior segment of RLL
Pleural effusion outlining superior segments of lower lobes
Pleural fluid in major fissure
“Incomplete Fissure Sign”

- Commonly seen on semi-supine PCXRs
- Fluid outlines superior segment of lower lobe
- Major fissure incomplete in 70%, may contribute to occurrence
Pitfalls with PCXRs

- Technical issues
- Projection variations
- Fluid collections
- Air collections
Pitfall: Pneumoperitoneum

Cause: Non horizontal X-ray beam can mask air-fluid levels and pneumoperitoneum
Pitfall: Pneumoperitoneum

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Remedy: Obtain decubitus view with horizontal beam or CT scan
Deep sulcus
Deep Sulcus Sign
Loculated Anterior Pneumothorax
Skin Fold (S) and Pneumothorax (P)
Skin Fold (S) and Pneumothorax (P)
Pitfall: Skinfold

**Cause:** Skinfold creates a curvilinear opacity simulating pneumothorax

**Remedy:** Recognize typical features
35 y/o with chest pain
Subtle Pneumothorax
Subpleural Air Cyst

**Cause:** Air dissects into subpleural area from ruptured alveoli producing a cystic collection

**Remedy:** Obtain a lateral view to confirm location and configuration
Mechanism of Barotrauma

Alveolar rupture

- Interstitial emphysema
  - Subpleural air cysts
    - Pneumothorax
  - Mediastinal emphysema
    - Subcutaneous emphysema
Patient on ventilator with subcutaneous emphysema
Extrapleural Air and Pneumothorax
S/P stab wound. Extrapleural air with hemothorax
Pitfall: Extrapleural air

**Cause:** Dissection of air into extrapleural space simulating pneumothorax

**Remedy:** Be alert for extrapleural air in patients with pneumomediastinum and subcutaneous emphysema
Pneumomediastinum
Pneumomediastinum
Pneumomediastinum

- Spontaneous
  - Asthma
  - Child birth

- Traumatic
  - Surgery
  - Penetrating trauma
  - Esophageal fistula
Pneumopericardium
Pneumopericardium

- Almost never spontaneous in adults
- Most often due to cardiothoracic surgery
- Does not extend to upper mediastinum
- Not usually clinically significant
Patient with Aspiration Pneumonia
Previous Day
Partial atelectasis causes rotation of major fissure
Fissure seen end-on simulates pneumomediastinum
Partial atelectasis of LLL: “Pseudopneumomediastinum”
Conclusions

- Variations in beam projection and patient position account for many pitfalls
- Always interpret portable CXRs in context of series when possible
- A repeat PCXR will often clarify ambiguous findings