Introduction

- Diagnosis in chest radiography is challenging given its 2D technique
  - Low contrast ratio relative to CT and MRI
- Signs are characteristic and reproducible imaging patterns in thoracic diseases
  - Aid in conveying complex imaging pattern quickly
  - Often suggest specific diagnosis or narrow differential diagnosis

Objectives

- Recognize important signs in chest radiography
- Understand the underlying augmentations in anatomy which cause these signs
- Recall differential diagnosis / diagnoses or clinical ramifications of specific signs

Outline

- Pulmonary signs
  - Silhouette
  - Air bronchogram
  - Air crescent and Monod
  - Hampton hump
  - Deep sulcus
  - Signs of lobar atelectasis
    - S sign of Golden
    - Luftschel
    - Flat waist

Outline

- Extra-pulmonary signs
  - Cervicothoracic and thoracoabdominal
  - “Cervicothoracoabdominal”
  - Hilum overlay and hilar convergence
  - Scimitar
  - Doughnut
  - Incomplete border
- Cardiac and aortic signs will not discussed
Silhouette Sign

- Four basic radiodensities
  - Air, fat, water/soft tissue, metal/bone
- Loss of normal interface when two areas of similar radiodensity contact each other (Silhouette sign)
  - First described by Felson 1950
- Basis upon which rest of chest radiography based

Air Bronchogram Sign

- Branching tubular lucent regions within opacified lung
- Suggest parenchymal disease
  - Pulmonary edema, pneumonia, aspiration, hemorrhage, low-grade adenocarcinoma, lymphoma, or atelectasis (non-obstructive)
- Effectively excludes pleural, extrapleural, or mediastinal process
Air Crescent and Monod Sign

- Air crescent sign: Crescent of gas surrounding necrotic focus of infection
  - Invasive aspergillosis
  - Neutropenic patients
  - Improvement of granulocytic function
- Monod Sign: Crescent of gas surrounding mycetoma
  - Different patient population and clinical presentation
Hampton Hump Sign

- Pulmonary infarction
  - Initial pulmonary hemorrhage may evolve into infarction
- Risk factors
  - Distal arteries (bronchial arteries collaterals)
  - Underlying malignancy
  - High embolic burden
  - Heart failure

Deep Sulcus Sign

- Pneumothorax on supine radiograph
  - Often occult (30% miss rate)
- Air rises
  - Most nondependent portion of thorax: anteromedial, subpulmonic, and lateral basilar space
S Sign of Golden

- Lobar collapse
  - Classically, right upper lobe (RUL) from lung cancer obstructing RUL bronchus
  - Elevation of minor fissure
  - Medial displacement of RUL
  - Proximal mass prevents collapse of central portion of RUL

Luftsichel Sign

- "Air sickle"
  - Left upper lobe (LUL) collapse
    - Overinflation of superior segment of left lower lobe
    - Insinuates between atelectatic LUL and aortic arch
Flat Waist Sign
- Flattening of contours left mediastinum
  - Aortic arch
  - Pulmonary artery
- Left lower lobe collapse
  - Leftward deviation and rotation of heart

Extrapulmonary Signs

Cervicothoracic Sign
Thoracoabdominal Sign
- Cervicothoracic Sign
  - If mediastinal mass well defined superior to clavicles, must be posterior
  - Anterior mediastinal mass silhouetted by soft tissues of the neck
- Thoracoabdominal Sign
  - If mediastinal mass extends below dome of diaphragm must be posterior
  - Anterior mediastinal masses silhouetted by diaphragm
“Cervicothoracoabdominal” Sign
- Convex interface along the right aspect of mediastinum
  - From lower cervical neck, through thorax, terminates in upper abdomen
- Esophageal dilation
  - Achalasia
  - Pseudoachalasia

Hilar Overlay Sign
Hilar Convergence Sign
- Hilar Overlay Sign
  - If hilar vessels project through mass, implies that mass is either anterior or posterior to hilum
- Hilar Convergence Sign
  - If vessels converge on hilar opacity, likely enlarged pulmonary artery
  - If vessels course through opacity, likely nodule/mass
Scimitar Sign
- Anomalous vein (PAPVR) resembling Turkish sword, drains into IVC most often
- Part of scimitar syndrome (hypogenetic lung syndrome)
  - Small right lung
  - Dextroposition of heart
  - Systemic arterial supply from aorta

Doughnut Sign
- Normal lateral radiograph: Inverted horse shoe configuration
- Opacification of normally clear infralobar window
- Subcarinal and inferior hilar / peribronchial lymphadenopathy

Incomplete Border Sign
- Signals extrapulmonary nodule or mass
- Curved nature of chest wall
- Tapered margins of extrapulmonary lesions
  - Margins of nodule or mass partially tangent to x-rays and partially en-face
A 65-year-old man is evaluated with frontal chest radiograph; he has been complaining of a chronic cough for 2 months. There is veil-like opacity overlying the left hemithorax with mild leftward mediastinal shift and superior displacement of the left hemidiaphragm. A thin curvilinear area of lucency is present adjacent to the aortic arch. What is the next best step in management?

- Antibiotics
- Watchful waiting
- PET/CT
- Sniff test
- Chest CT
Conclusion

- Signs valuable
  - Quickly convey complex imaging pattern
  - Often suggests a specific diagnosis or narrows differential diagnosis
  - Mnemonic tools

Acknowledgements:
Gerald F. Abbott, MD

Thank You