Chest X-rays and Case Studies

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No disclosures.

Outline
• Importance of history
• Densities delineated on radiography
• An approach to the pediatric chest plain film
• Cases
History

- Gestational age
- C-section vs vaginal delivery
- Meconium staining
- Known pre-existing conditions
- Signs and symptoms
- Other relevant clinical findings

Densities delineated on radiography

- Air
- Fat
- Soft tissue/Fluid
- Bone
- Metal

Densities
Silhouette Sign

- Obscuration of the interface between structures of normally different densities due to development of a new abutting abnormal opacity

Normal Interfaces

- Soft tissue and air
  - Heart and lungs
  - Diaphragm and lungs
  - Aorta and lungs

Silhouette Sign
An approach to the chest radiograph

• Positioning
• Support devices/post-procedural changes
• Cardiome diastinal silhouette
• Lungs
• Pleura
• Upper abdomen
• Bones
• Soft tissues

Normal chest

Positioning: supine, centered (spine midline, symmetric anterior ribs)

Normal chest

Positioning: centered (spine midline)
Normal chest

Positioning: centered (symmetric anterior ribs)

Normal chest

Support Devices: None

Normal chest

Cardiac silhouette: not enlarged with sharp borders, normal contour and position
Normal chest

Cardiac silhouette: non-enlarged (width < 55% thoracic cage)

Normal chest

Mediastinum: midline, normal thymus, no abnormal soft tissue density or air

Normal chest

Lungs (expansion): 5th – 6th anterior ribs at the level of the dome of the diaphragm, diaphragm not flattened
Normal chest

**Lungs:** no abnormal opacities or lucencies

Normal chest

**Pleura:** no blunting of the costophrenic angles or other evidence of fluid, no abnormal lucency (air)

Normal chest

**Upper abdomen:** *left stomach,* no abnormal lucency (free air)
Normal chest

Bones: no fractures or other lesions, normal mineralization

Normal chest

Soft tissues: no evidence of swelling or masses

Case 1
Case 1

- Apparent extensive opacification of the left lung

- Positioning: asymmetric ribs, right heart border barely visible

- Leftward rotation
Case 1 (Same patient)

Rotated left Centered

Case 2

Endotracheal tube (ETT) in right main bronchus, left lung collapse
Case 2

- Appropriate ETT position

Case 3

Case 3
Case 3

- Ideal PICC position with tip at **superior cavoatrial junction**

- Superior cavoatrial junction: 2 vertebral body levels below **carina**

Malpositioned PICCs
Case 4

Enteric tube in bronchial tree with likely intrapulmonary administration of tube feeds

Case 4

• Appropriate enteric tube position
Case 5

- UAC high (T2)
- UVC in liver
- UAC ideal position (T6-10)
- UVC ideal position (*inferior cavoatrial junction)

Case 6
Case 6

- Mediastinum: right sail-shaped soft tissue density (sail sign)

Case 6

Normal thymus

Thymus indentation sign
Thymus wave sign
Thymus sail sign
Case 7

Spinnaker Sail Sign

Pneumomediastinum
Case 8

Suspicious for a mediastinal mass (lymphoma)
Case 9

- Cardiac silhouette: enlarged
- Lungs: thickened interstitium, nothing focal/confluent

Cardiomegaly with likely pulmonary edema.
Case 10 (Same patient)

Expiratory Normally expanded

Case 11

• Newborn with respiratory distress
Case 11

- Diffuse granular opacities
- Air bronchograms

Case 11

- Classic respiratory distress syndrome (**surfactant deficiency disorder**) in a preterm infant

Case 11

- Radiographic findings highly **nonspecific**
- Neonatal pneumonia
- Transient tachypnea of the newborn
Full term neonate with tachypnea after being delivered via C-section. Follow up radiograph obtained 2 days later.

Transient tachypnea of the newborn (diagnosis of exclusion)

Case 12

- 41-week neonate with “stained” amniotic fluid and respiratory distress
Case 12

- Coarse perihilar streaky opacities

Case 12

Meconium aspiration

Case 13 (Cough and fever in ED, January)
Case 13

- Increased perihilar markings, hyperinflation, absence of consolidation or effusion

Case 13

RSV Bronchiolitis

Case 14

...
Case 14

Lung opacities: thickened interstitium, focal sublobar opacity (likely right middle lobe)

Pleura: fluid on the right with extension to minor fissure, smaller amount on the left

Case 14

- Bilateral pleural effusions.
- Pulmonary edema or bronchiolitis
- Right lower lung pneumonia and/or atelectasis.

Case 15
Case 15

- Rightward rotation (asymmetric ribs, see more of the right heart)
- High catheter position
- Pleura: small amount of air on the left

Case 15

Small left pneumothorax

Decubitus view can confirm the presence of a pneumothorax.
Case 16

- Preterm infant with worsening respiratory distress.

Case 16

- Large amount of left pleural air
- Rightward mediastinal shift
- Granular lung opacities

Case 16

- Tension pneumothorax
Case 17

- Preterm infant with shock

Case 17

- Large amount of air around the heart
- Diffuse granular opacities
- High UVC

Case 17

Pneumopericardium with likely tamponade
Case 18

- Abdominal lucency suspicious for pneumoperitoneum
- Need left lateral decubitus or crosstable lateral view
Case 19

- Left lower lobe wedge-shaped opacity
- Volume loss

Case 19

Left lower lobe atelectasis
Case 20

• 10-year-old female with cough and fever.

Case 20

• Right middle lobe rounded focal opacity
• No significant volume loss

Case 20

Pneumonia
Case 21

- Cough and fever.

Case 21

- Confluent left lower lung opacity
- Gas
- Left pleural effusion

Case 21

- Necrotizing pneumonia/abscess
- Parapneumonic effusion/empyema
Case 22

- Toddler, presented to the ED with coughing, choking, and wheezing

Case 22

- Hyperexpanded right lung or hypoexpanded left lung?

Case 22

Frontal supine  Decubitus with left side down
Case 22

Frontal supine
Decubitus with right side down

Case 22

Foreign body aspiration

Case 23
**Case 23**

- Posterior rib fractures of varying chronicity

**Case 23**

- Non-accidental trauma

**Summary**

- Interpreting chest radiographs can be challenging.
- Several nonspecific findings
- Correlation with history and clinical findings essential
- Consistent systematic approach to maximize efficiency, minimize missed findings
- Recognition of emergencies critical
- Don’t forget about NAT!
Thank you!