A Picture is Worth a Thousand Words: CXR Interpretation of Hospitalized Child

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Speaker introduction
• Dr. Cathy Woodward has more than 20 years of experience as a nurse practitioner in pediatric critical care. She has daily experience interpreting pediatric chest X-rays. She is a professor of pediatrics at UT Health San Antonio. She has a DNP from Case Western Reserve and her post master’s certificate in PNP acute care from Duke University.

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• No financial disclosures

Learning Objectives
1. Develop a systematic approach to reviewing pediatric chest radiographs.
2. Discuss the normal and abnormal findings on CXR correlated with clinical exam.
3. Describe the expected findings for correctly placed chest, endotracheal and enteral tubes.

What is Normal?
• Air Filled Lungs with lung markings
• Midline trachea
• Right diaphragm higher than left
• Domed diaphragms
• Width of heart less than ½ thoracic cavity
• Crisp interface between mediastinal structures and lungs

AIR IS LUCENT              STUFF IS OPAQUE
Cardiac Silhouette


Normal CXR with Thymus

Characteristics of Normal Thymus

• Soft and molds to the ribs, producing a scalloped border—"wave" sign
• Straight inferior border—"sail" sign—usually right sided
• No mass effect—therefore does not displace the trachea or vessels
• Notches at its junction with the heart
• Homogeneous, soft tissue density
• Varies in size—particularly with different phases of respiration, and in relation to general health
• Most often seen on CXR < 3 years of age
Wave Sign

Abnormal Air

Pneumothorax
- Simple – air collection in the pleural space
- Tension – air enters the pleural space and can’t exit thus increasing the intrapleural pressure
  - Collapse of lung
  - Depression of diaphragm
  - Shift of mediastinum away from affected side
- Ruptured diaphragm
- Subcutaneous emphysema
Atelectasis/Collapse

Abnormal Fluid
- Pleural effusions – fluid in pleural space
- Pericardial effusions – fluid in pericardial space
- Hemothorax – blood in pleural space
- Empyema – pus in pleural space
Pericardial Effusion

Hemothorax

Empyema

Interstitial v. Alveolar Disease

- Normal – alveoli and bronchi appear radiolucent. What we see of lung tissue is mostly vessels filled with fluid.
- Alveolar disease – fluid filled alveoli – fluff
  - Pul edema, pneumonia, pul. hemorrhage
- Interstitial disease – supporting structures become thickened with lung markings more prominent – lines or dots
  - Neoplasms, cardiogenic pul edema, viral pneumonia

Air Bronchograms

- Lucent branching structures surrounded by consolidated fluid filled alveoli.

Alveolar Disease/Consolidation
Wibbly-Wobbly, Timey-Wimey Stuff

- Lines
- Wires
- Coils and stents
- UFO's

Placement of Lines

- ETT – tip of ETT should be between the tip of the thoracic inlet and the carina. Sensitive to flexion and extension of neck
- Tip of umbilical arterial catheter – below T6, above T11, UVC – lower portion of R atrium near IVC junt.
- Central lines – in SVC or IVC – not the right atrium. 1-2 cm outside the cardiac silhouette.
Final Exam