Chest Radiographs You Need To Recognize

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Disclosures
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Objectives

• Assess the position of lines and tubes
• Identify common and subtle forms of pneumothorax and other barotrauma
• Distinguish between massive effusion and whole lung collapse
• Identify less common presentations of pleural effusions
• Identify various causes of chest pain on plain radiographs

Additional Resources:
A Case

You put a central line into a 24 year-old female with Down’s Syndrome and sepsis. The line goes in smoothly with no problems threading the wire or passing the catheter. You order a post-procedure chest radiograph which shows the following:
The Chest Film
After Reviewing The Chest Film, What Should You Do Next?

1. Give approval to use the line
2. Blood gases off the line and the wrist
3. Remove the line
4. Consult vascular surgery to remove line
5. Consult IR to confirm line position
After Reviewing The Chest Film, What Should You Do Next?

1. Give approval to use the line
2. **Blood gases off the line and the wrist**
3. Remove the line
4. Consult vascular surgery to remove line
5. Consult IR to confirm line position
Issue 1:

Lines and Tubes
Where Your Triple Lumen Catheter Tips Should Be

Caval-atrial Junction
Can You Use This Line?

Situs Inversus
- Dextrocardia
- Elevated left hemidiaphragm
- Bronchiectasis
Determining If The Line Is In An Artery Or Central Vein

• Simultaneous blood gases off the central line and the radial artery
• Transduce a pressure waveform (best done during line placement before guidewire insertion)
Feeding Tube Positioning

Below Diaphragm
Heads left first then goes right
Tip points away from G-E junction

Midline Course

Gastric versus duodenal placement does not change risk of aspiration
Can You Use This Feeding Tube?

The tip points back at the gastro-esophageal junction, which theoretically increases the risk of aspiration.
**Endotracheal Tubes**

- Tip below the clavicles (or < 6 cm above the carina)
- Tip 2-4 cm above the carina
A Case

A 36 year-old female with a history of unprotected intercourse with multiple partners and injection drug use presents with a sudden worsening of dyspnea that had been developing, along with a dry cough, over a three-week period.
The Chest Film
After Reviewing The Chest Film, What Should You Do Next?

1. Ceftriaxone and azithromycin
2. Consult pulmonary for bronchoscopy
3. CT pulmonary angiogram
4. Furosemide
5. Upright chest film
After Reviewing The Chest Film, What Should You Do Next?

1. Ceftriaxone and azithromycin
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Deep sulcus sign
Issue 2:
Air That Should Not Be There
Some Pneumothoraces Are Obvious
Some Are Less Obvious

If unsure: chest ultrasound or non-contrast CT
Pneumothorax Can Look Different In Supine Patients

Deep Sulcus

To confirm the presence of pneumothorax: repeat the film with the patient in an upright position.
Lung Ultrasound For Pneumothorax (M-Mode)

- Sandy Beach Sign: Rules Out Pneumothorax
- Bar Code Sign: Non-specific pleural space issue
What’s Wrong In This Chest Radiograph?

Pneumomediastinum
What’s Wrong In This Chest Radiograph?

Pneumopericardium
What's Wrong In This Film?

Pneumoperitoneum

Generally denotes an abdominal emergency (i.e., call the surgeons!)

Can be seen following PEG placement or laparoscopic surgery
A Case

A 62 year-old female was intubated for respiratory failure secondary to left lower lobe pneumonia. A right subclavian central venous catheter was placed after several unsuccessful attempts on the left. Four hours later you are called to the bedside due to sudden worsening of her hypoxemia and an increase in her static pressure on the ventilator.
Her Chest Film
After Reviewing The Chest Film, What Should You Do Next?

1. Chest CT scan
2. Left-sided thoracentesis
3. Left-sided tube thoracostomy
4. Chest physiotherapy on the left
5. Bronchoscopy
After Reviewing The Chest Film, What Should You Do Next?

1. Chest CT scan
2. Left-sided thoracentesis
3. Left-sided tube thoracostomy
4. Chest physiotherapy on the left ✪
5. Bronchoscopy
Issue 3: Whole Lung Collapse
Features Of Lung Or Lobar Collapse On Chest Films

• Tracheal deviation toward the collapse
• Mediastinal shift toward the collapse
• Elevated hemidiaphragm
• Decreased vascular markings on side of collapse
• Opposite lung herniates across midline
• Hilar mass or other evidence of cancer
The Unilateral Lung Whiteout

Differential Diagnosis
Massive pleural effusion
Whole lung collapse
The Massive Effusion

Trachea remains on midline or deviates to opposite side of dense opacity

Heart remains in normal position or deviates to opposite side of dense opacity
Whole Lung Collapse

Trachea deviates *toward* the side of the dense opacity

Heart shifts *toward* the side of dense opacity

May see abrupt cut-off in airway

Heart no longer seen to right of spine
Airway Cutoff Sign In Whole Lung Collapse
Another Form Of Collapse You Will See: Right Upper Lobe Collapse

Shifted Position

Normal Position

Tracheal deviation to right

Upward deviation of minor fissure
A Case

A 55 year-old male presents with increasing dyspnea and left-sided pleuritic pain one day after he fell off his horse. A chest radiograph is obtained.
After Reviewing The Chest Film, What Should You Do Next?

1. Ampicillin-Sulbactam
2. Chest CT scan
3. Chest physiotherapy
4. Chest ultrasound
5. Epidural catheter
After Reviewing The Chest Film, What Should You Do Next?

1. Ampicillin-Sulbactam
2. Chest CT scan
3. Chest physiotherapy
4. Chest ultrasound ✪
5. Epidural catheter
Issue 4: Pleural Effusions
The Lung Does Not Always Extend To The Chest Wall

“Pleural Separation”
The Classic Appearance Of A Pleural Effusion

- Homogeneous appearance
- Obscures the hemi-diaphragm and (often) heart border
- Meniscus Sign (----)
The Layering Effusion in Supine Patients

- Fluid layers behind the lung
- Unilateral opacification *without* obscuring vessels
- Can confirm with:
  - Upright or decubitus film
  - Bedside ultrasound
Effusions In Semi-Upright Patients

Pre-chest tube:
Gradient of opacity

Less white

Very white
Another Less Common Appearance: Loculated Effusion
A Case

A 65 year-old male is admitted for an evaluation of chest pain. His ECG and serial cardiac enzymes were negative. You are called to see him at night because he is having more chest pain. His oxygen saturation is 92% on ambient air. You review the chest radiograph from the ED.
After Reviewing The Chest Film, What Should You Do Next?

1. Intravenous furosemide
2. Intravenous levofloxacin
3. Stat echocardiogram
4. CT aortogram
5. CT pulmonary angiogram
After Reviewing The Chest Film, What Should You Do Next?

1. Intravenous furosemide
2. Intravenous levofloxacin
3. Stat echocardiogram
4. CT aortogram ✪
5. CT pulmonary angiogram
Issue 5:
Chest Pain Radiographs
You Should Not Miss
The Normal Aorta

• Aortic arch:
  – Left of midline
  – Not too prominent
• Follow a relatively straight course to the abdomen
• May arc leftward in elderly patients (“ectatic aorta”)
Examples Of Aneurysms And Dissections

Dissections and aneurysms can look alike. Clinical history and CT imaging are needed to differentiate.
65 year-old man with chest pain 3 days after a fall

Subcutaneous air without clear penetrating trauma should raise concern for pneumothorax or pneumomediastinum
55 year-old woman
back pain,
dyspnea, fever
Don’t Forget To Look At The Retrocardiac Space!
Back to the film…

Loss of aortic stripe

Opacity
Take-Home Messages

- If unsure of line or tube placements, do more to confirm positioning
- Common problems can have atypical presentations on chest radiographs
- Use ultrasound, repeat imaging in different positions or CT if unsure of findings
- Be systematic so you can pick up subtle findings

Talk to the radiologists!!!
Thank You!!!

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Best of Luck With Internship!