Chest and Abdominal Radiography for Medical Students

Kenneth L. Pierce, M.D.
Dept of Radiology
Loyola University Medical Center
Physics

- X-ray imaging
- Shoot electrons at tungsten target
- Emit x-rays (photons)
- Directed at object/detector

Some of the photons absorbed by patient
- Photons that penetrate patient strike detector
- Different tissues have different x-ray absorption - contrast
How to Read a Chest Film

• “See everything on the film, learn all the diseases, and then it’s easy.” Terry Demos
• Probably the most difficult thing in radiology to teach
• Repetition is the key
How to Read Chest Films

• Develop a System
  – Doesn’t matter what it is, just make sure you look at EVERYTHING.
• Look at a lot of films
• Know the limits of the modality
  – Poor positioning, technique, motion, etc.
• Know some basic patterns

What You Should Recognize

• Normal
• CHF
• Consolidation
• Effusions
• Masses
• Atelectasis
• Pneumothorax

Normal

• Hardest film to read
  – Once it’s called normal, out of the system
• Broad range of ‘normal’
  – Between patients, radiologists
• Knowledge comes with experience
CHF

- Thickening of the interlobular septa - Kerley B lines
- Peribronchial cuffing - Wall is normally hairline thin
- Thickening of the fissures - Fluid in the subpleural space in continuity with interlobular septa
- Pleural effusions
Consolidation

- Air bronchogram
  - Bronchi - air filled
  - Alveoli - fluid-filled
- Lobar anatomy
- Silhouette sign
  - No contrast between fluid-filled structures
  - Heart, diaphragm
Effusions

- Fluid in the pleural space
- Pleura can hold a lot of fluid
  - Need around 250 cc’s to see
- Meniscus sign – balloon in a cylinder of water
- Usually free-flowing, but can be loculated, sub-pulmonic, infected
Masses

- Can be round, spiculated, cavitiated, ill-defined, multiple
- Cancer – spiculated, cavitiated, extend to adjacent structures
- Vascular- rounded with linear extensions
- Multiple - metastases
Pneumothorax

- Air enters between visceral and parietal pleura
- Tension – shift of mediastinum, good lung compressed
- Recognize white line of ptx
  - Can be confused with skin fold
Lines, tubes, etc,

- Check for complications
- Must follow anatomy
- Responsible for the bulk of portable ICU films
- “on” or “in” patient
Abdominal Plain Films

- Surgical abdomen, 4 view, flat plate
- 4 view - supine, upright, left lateral decubitus, PA chest
- 2 most important films
  - Supine abdomen
  - Upright chest

Interpretation of Abdominal Film

- Gas Pattern
- Calcification
- Soft tissue
- Bones
- Everything else
Gas Pattern

• Normal
  – Bowel loops air/fluid filled <3cm for small bowel, larger for colon
  – Air in stomach/rectum/cecum
• Abnormal
  – Obstruction
  – Ileus

Obstruction

• Small Bowel
  – Dilated loops > 3cm
  – Air/fluid levels
  – Non-distended colon
• Large Bowel
  – As above
  – Distended colon/non-distended rectum
Causes of Obstruction

- Small Bowel
  - Adhesions – most common
  - Hernia
  - Intussusception
- Large Bowel
  - Mass/tumor - most common
  - Volvulus
  - Hernia
  - Inflammation

Ileus

- Localized
  - Adjacent inflammatory process causing local irritation/dilation
  - Pancreatitis, appendicitis, diverticulitis, ulcer
- Generalized
  - Gas in small and large bowel, symmetric air/fluid levels
  - Post-operative
Calcification

- Urinary stones
  - Kidney, ureteral, bladder
- Gall stones
- Vascular
  - Aortic wall, aneurysm
  - Phleboliths
- Masses
Soft Tissue

• Hepatomegaly/splenomegaly
• Ascites
  – Bulging flanks
• Mass effect
  – Displaced bowel loops
• Psoas sign – loss of psoas shadow – appy
Free Air

- Usually perforated viscus
- Post-op up to a week
- Need only a few cc’s of air to see it
  - Best film? Upright chest
- Air under diaphragm
  - Over liver margin on LLD