

PRISMA HEALTHSM

The Up-to-Date APP

Radiographs

Rapid CXR/Abd Review

Sources

- Learning Radiology- 20 must see cases
- Medscape- Critical Findings on Chest Radiographs & Abdominal Radiographs
- Reading Chest Radiographs in Critically Ill (Annals of Thoracic Medicine)
- Primer on Reading Chest Radiographs- Univ Wash
- Missed Radiologic Injuries in ED- UCSF

Aunt Minnie = Pathognomonic



Cousin Ernie from Christmas Vacation

"**Aunt Minnie**" origin is hazy, but it's believed to have been coined in the 1940s by Dr. Ben Felson, a radiologist at the University of Cincinnati. He used it to describe "a case with radiologic findings so specific and compelling that no realistic differential diagnosis exists."

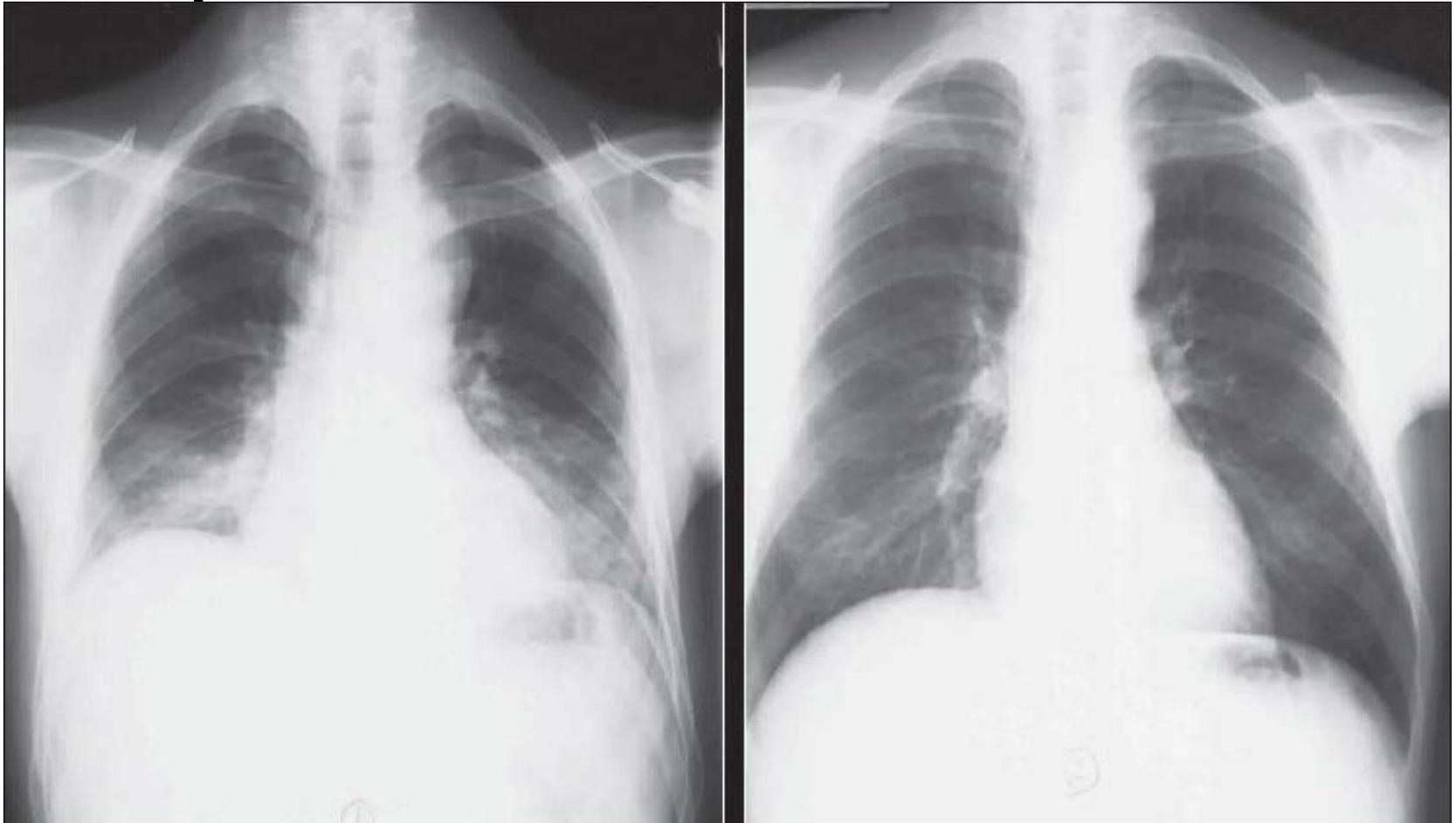
Basic Approach

- Identification
 - Name
 - Date
- Images
 - Look at all images
 - Know what you should have in the study
 - Right vs Left on extremity films
- Comparison
 - Most important film is the old film

Chest Radiographs

- Quality Assessment
 - Inspiration
 - Ribs visible
 - Low Volume mimics (infiltrates and CMG)
 - Exposure
 - Spine visible and peripheral lung markings visible
- Positioning
 - Rotation assess clavicular ends vs spine

Inspiration

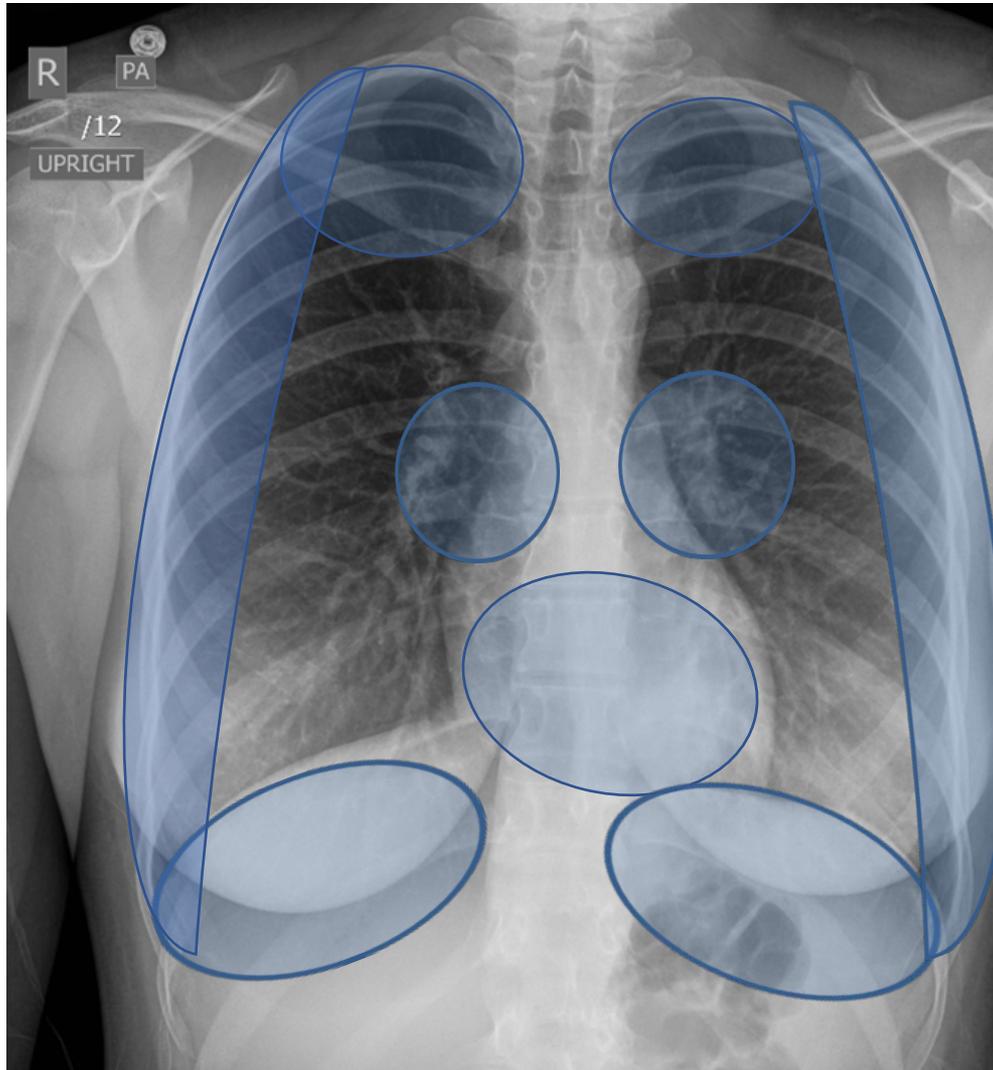


Ann Thorac Med. 2009 Apr-Jun; 4(2): 75–87.

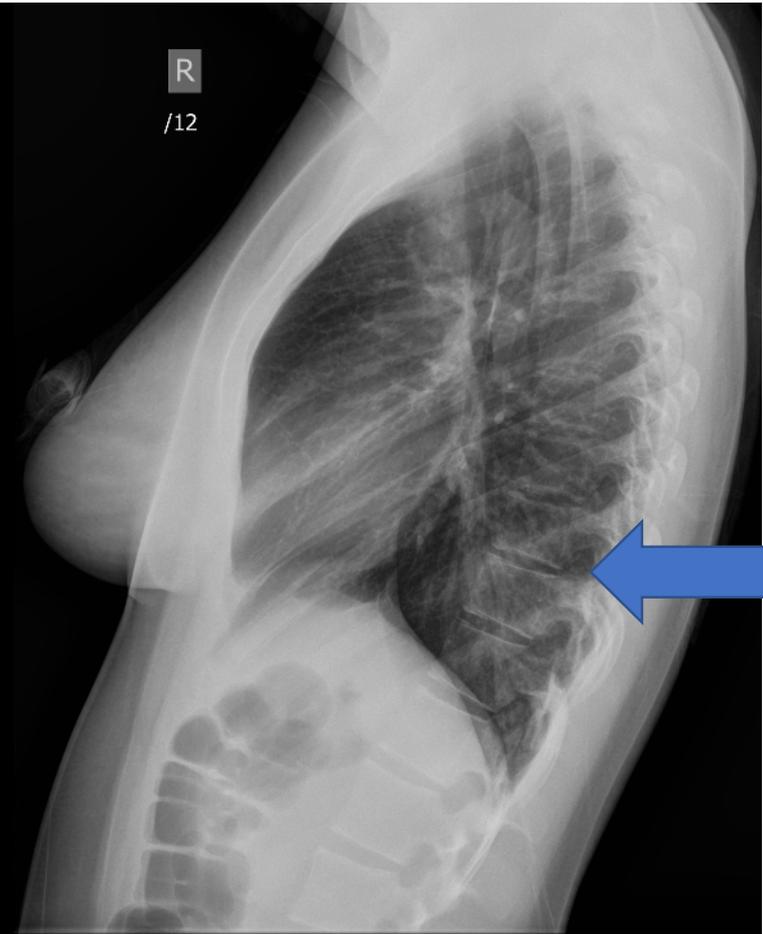
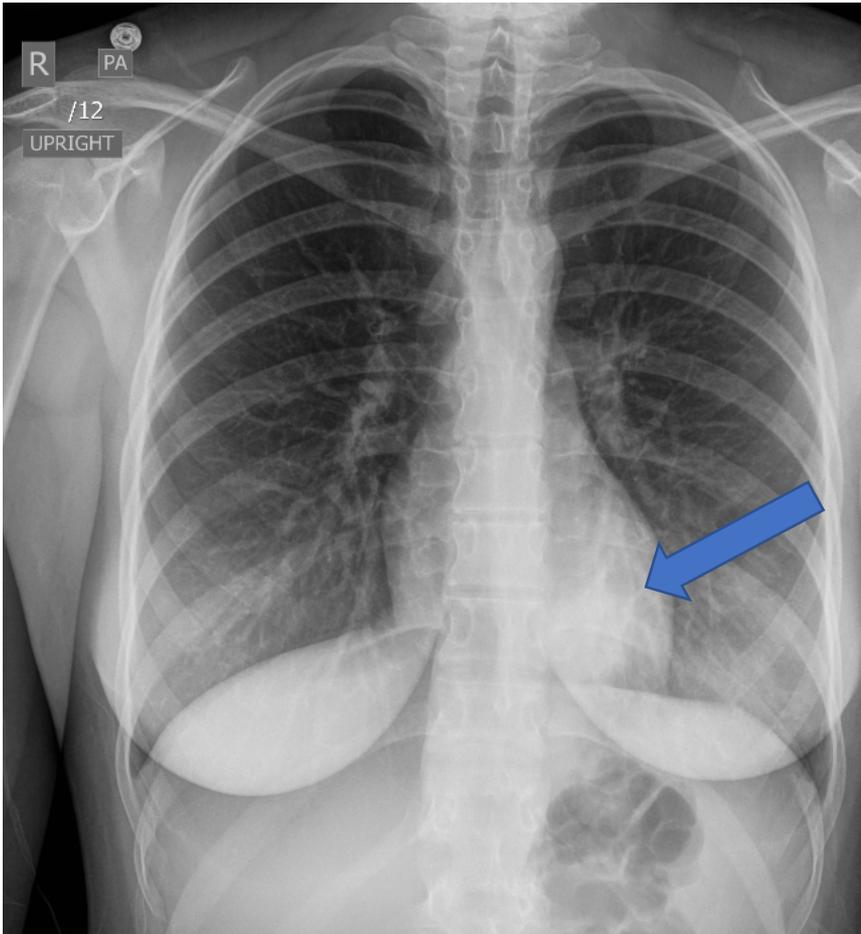
Adequate CXR?

- Exposure: see thru mediastinum to view spine
- Inspiration: 9-10 posterior ribs visible
- Rotation: compare clavicle ends with spinous processes (hilar vessels rotated away magnified)

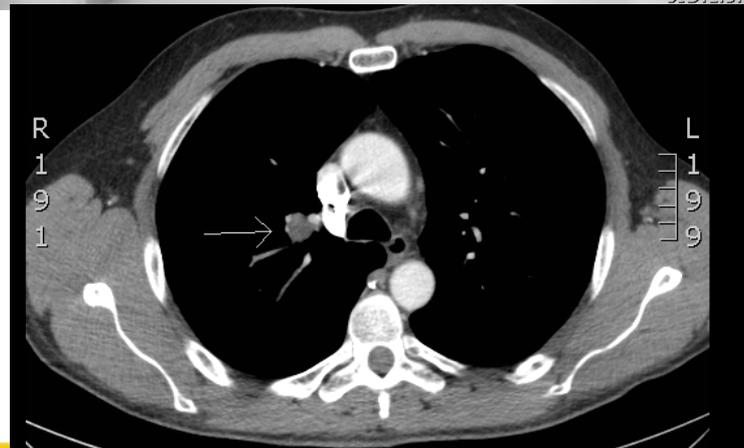
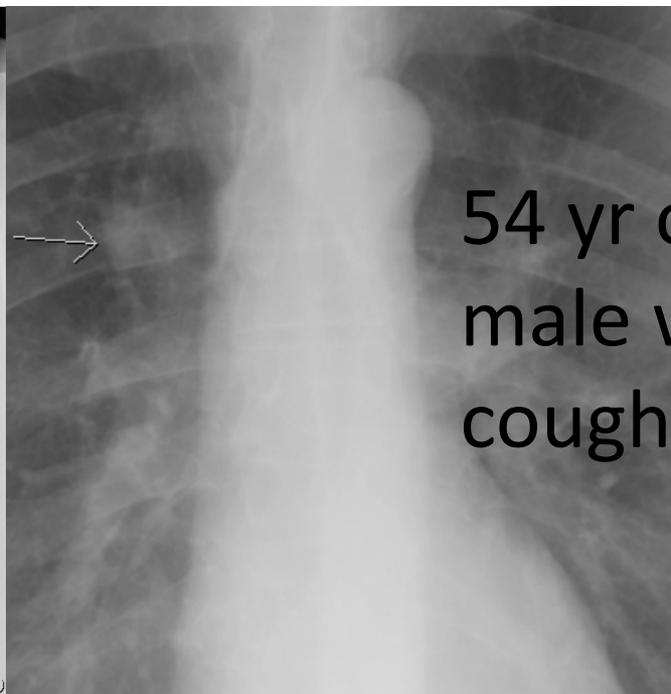
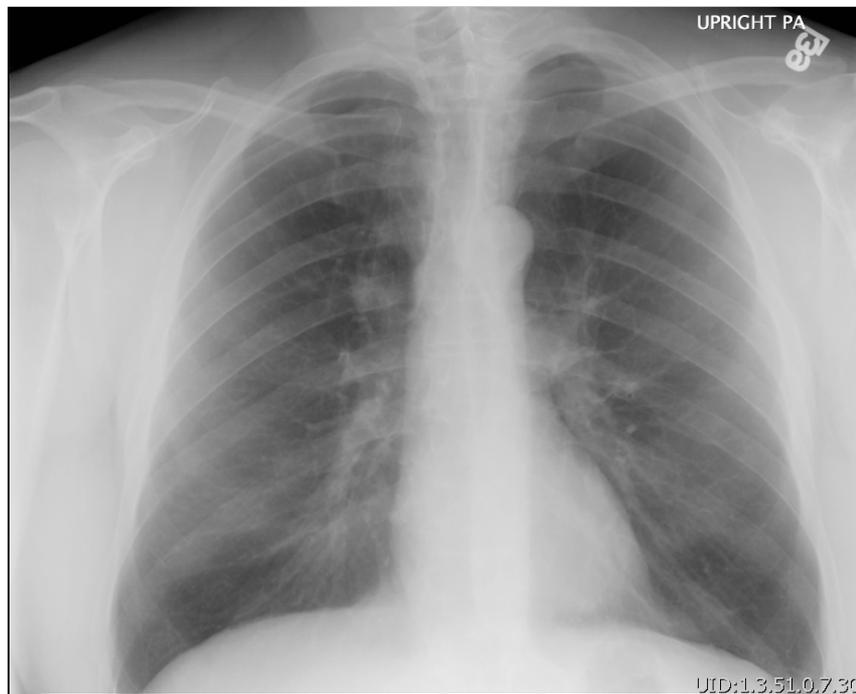
Danger Zones



Danger Zones



Danger Zones



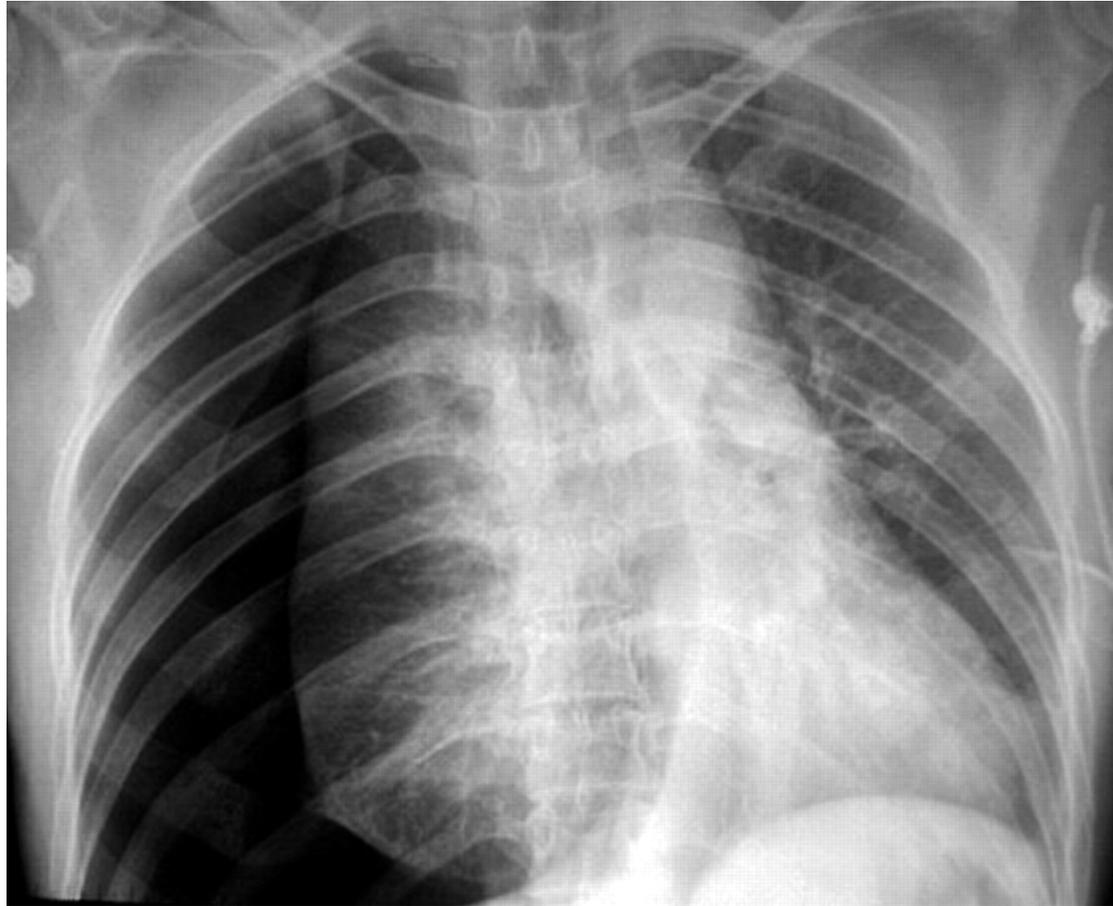
Danger Zones



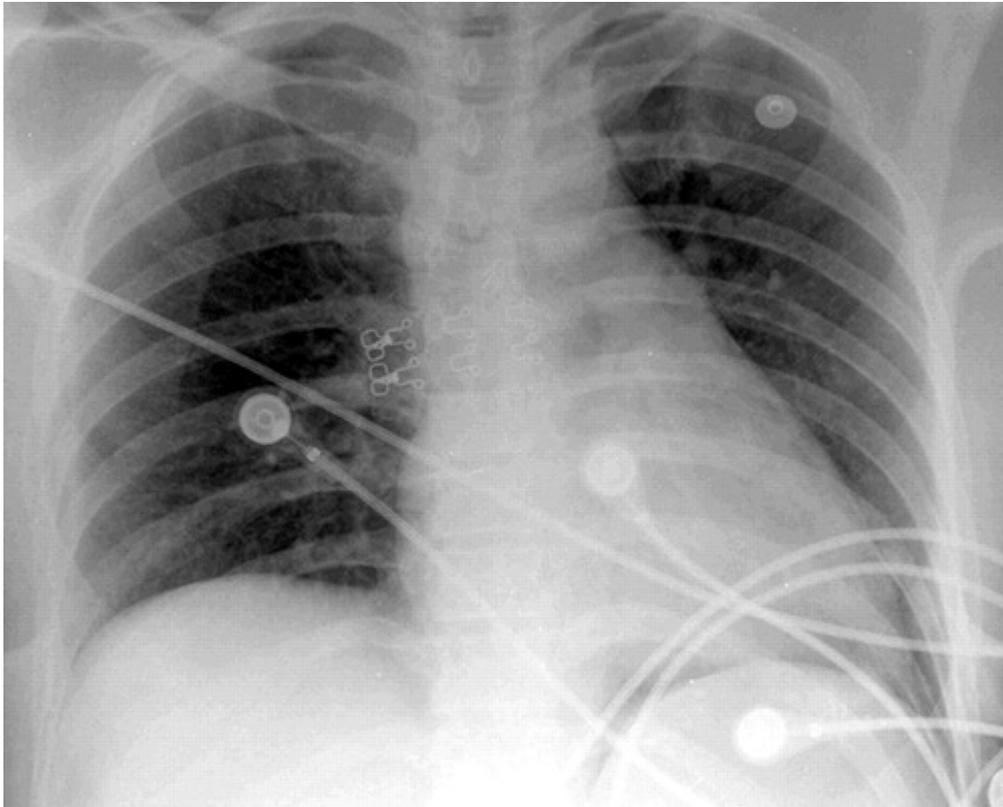
Pneumothorax



Tension Pneumothorax



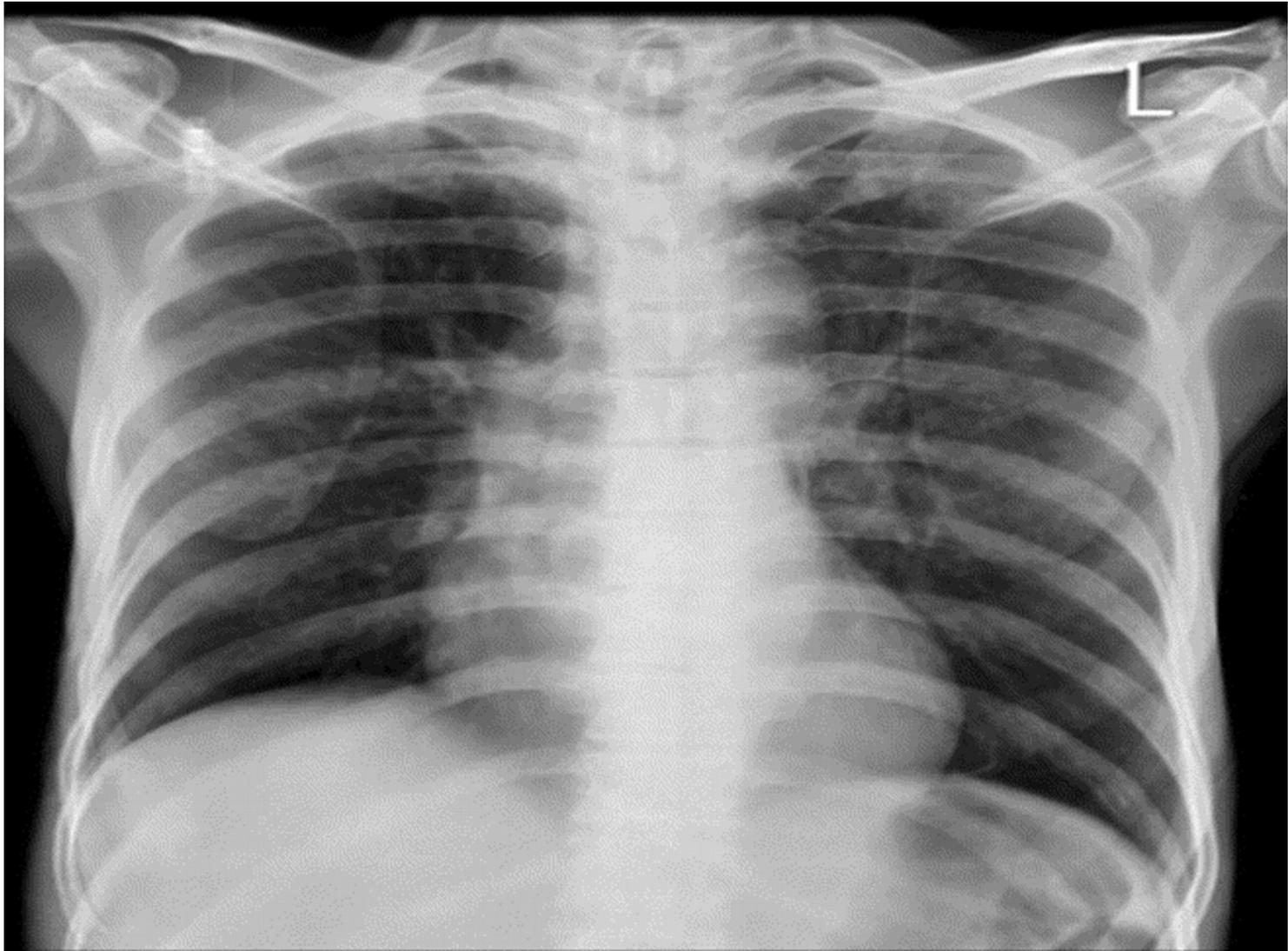
Supine Ptx



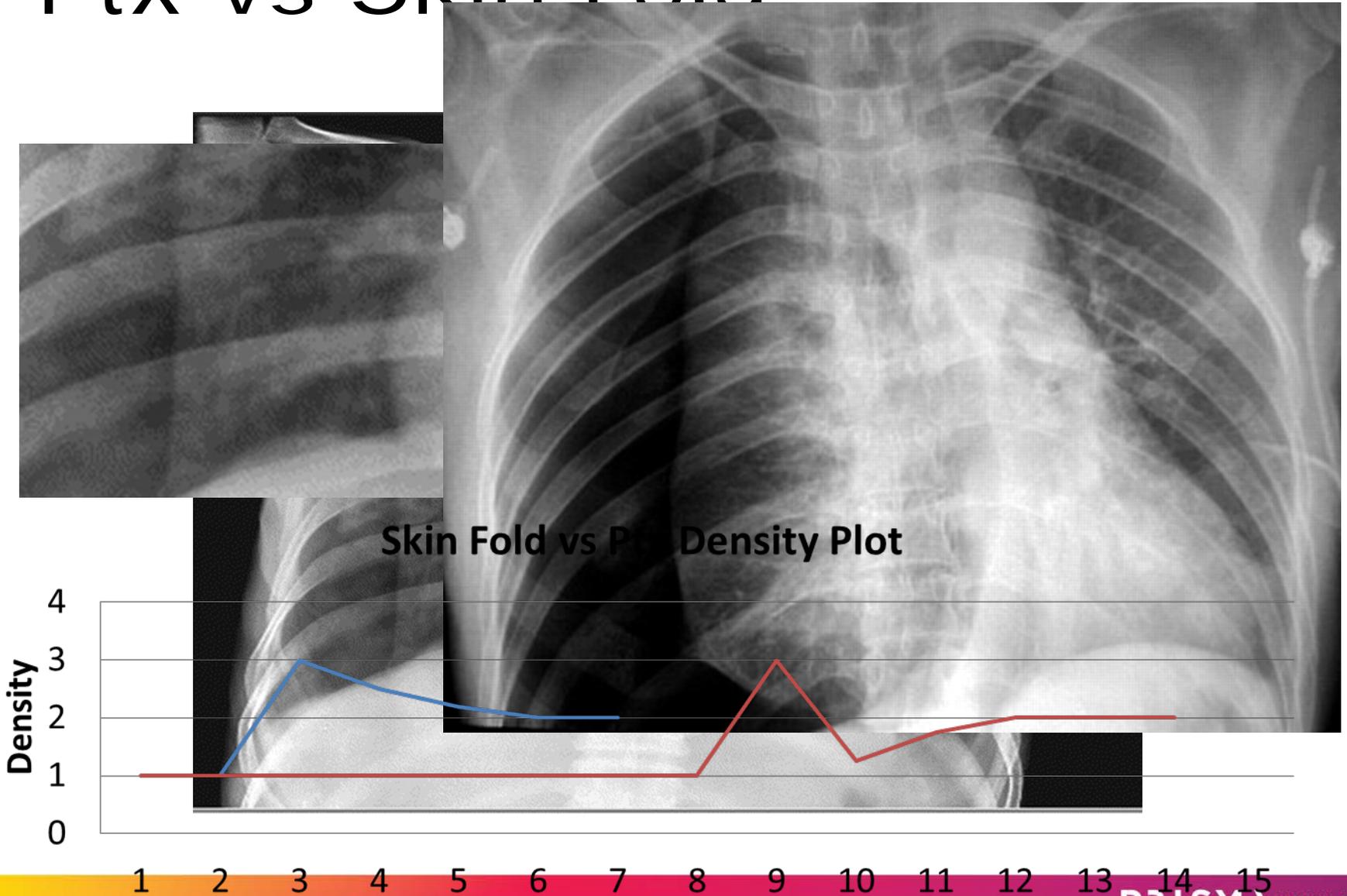
Deep sulcus sign
Sharp medial diaphragm
Sharpened medial margin of
mediastinum



Pneumothorax Mimics



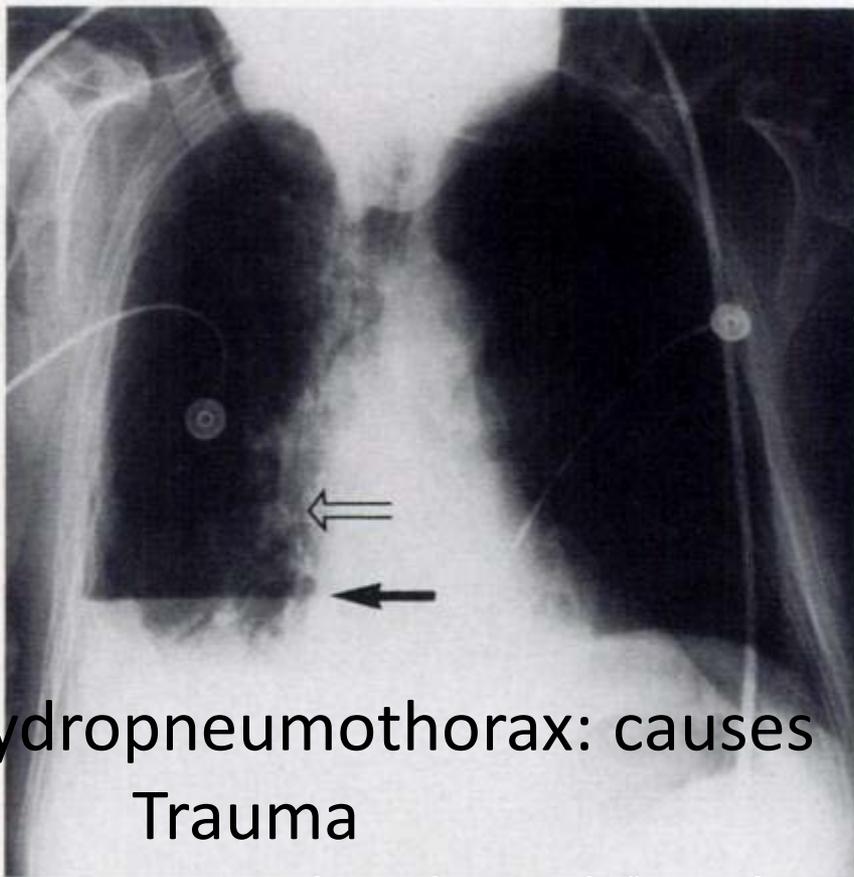
Ptx vs Skin Fold



Why can't we prevent skin folds?



Hydropneumothorax

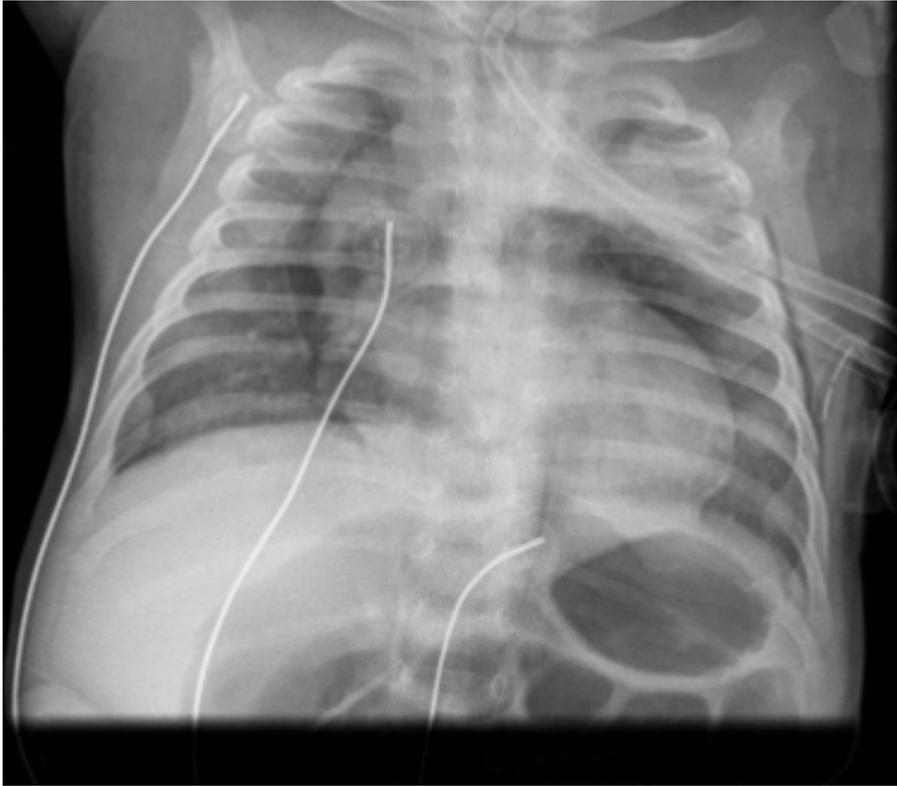


Hydropneumothorax: causes
Trauma
Bronchopleural fistula
Esophageal-pleural fistula

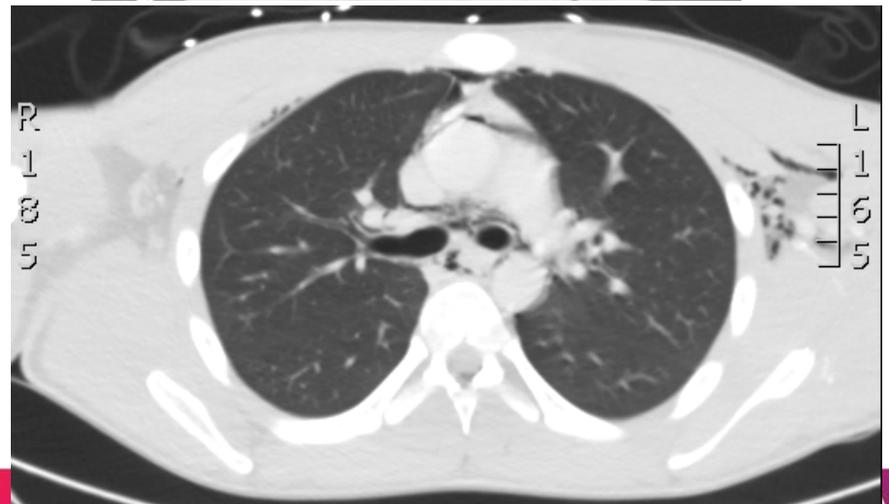
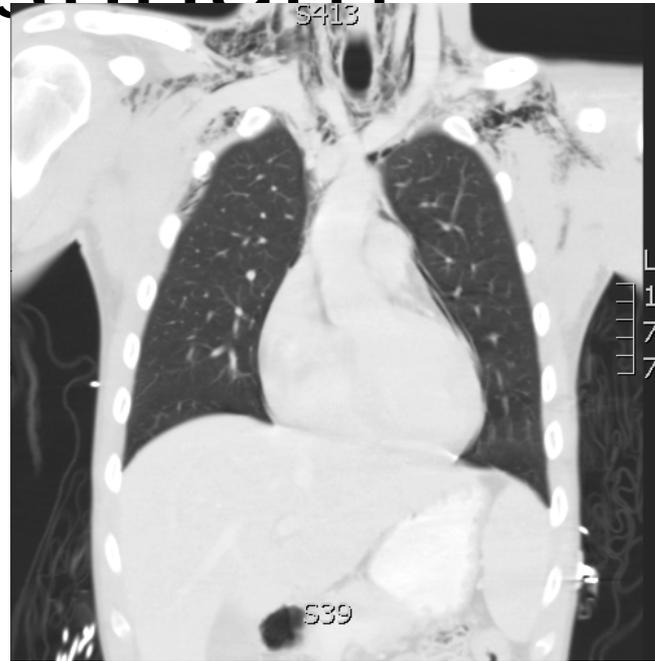
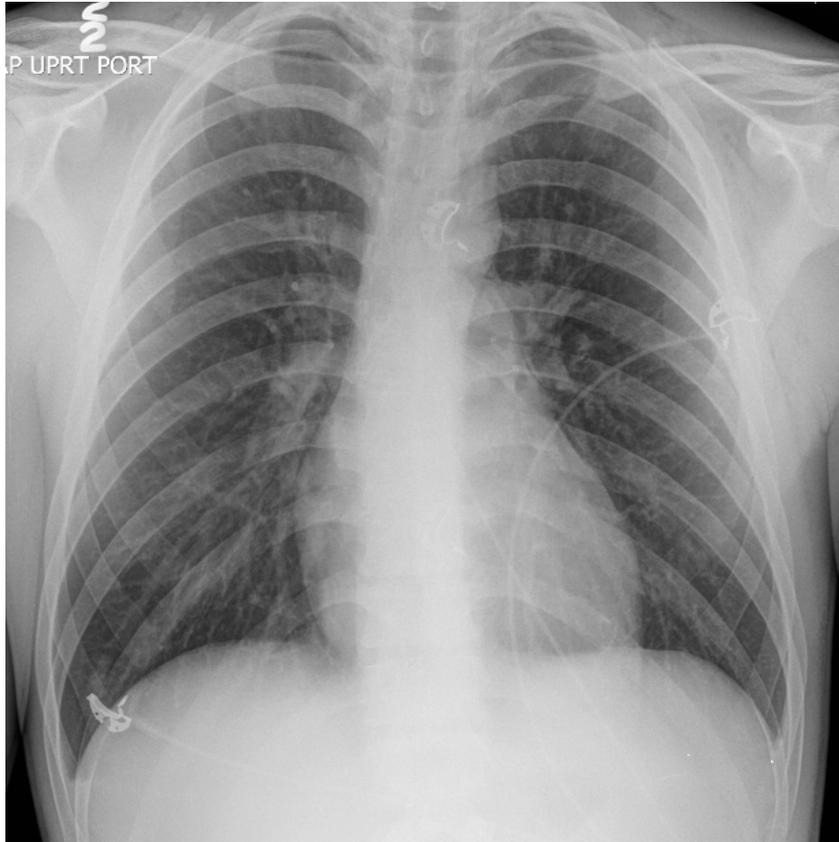


Radiographics 1996; 16,197-199

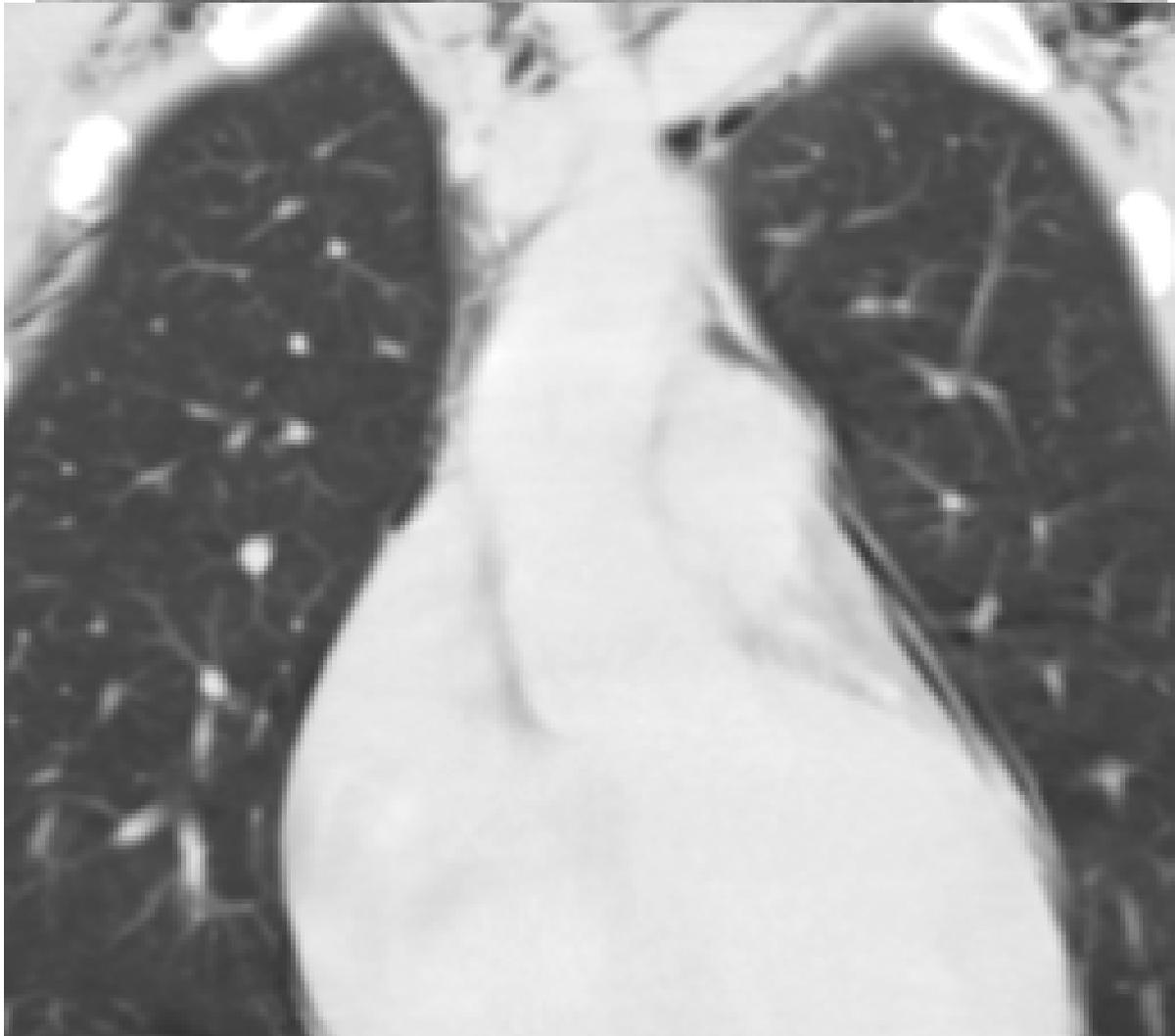
Pneumomediastinum



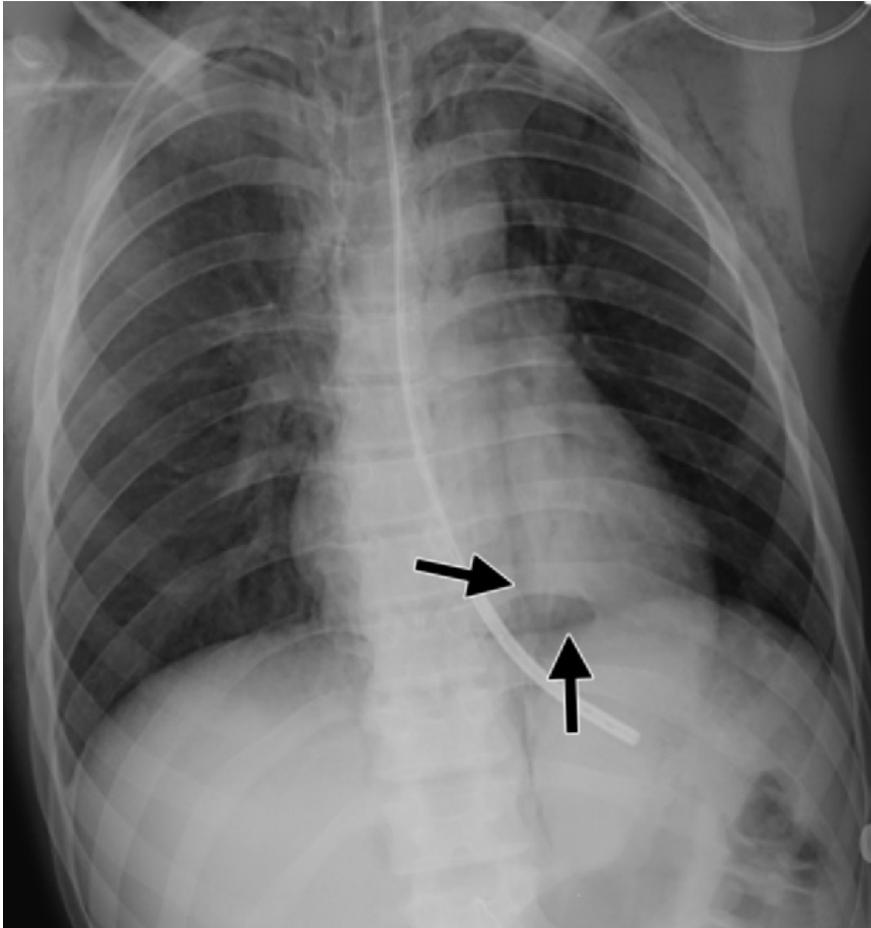
Pneumomediastinum



Pneumomediastinum



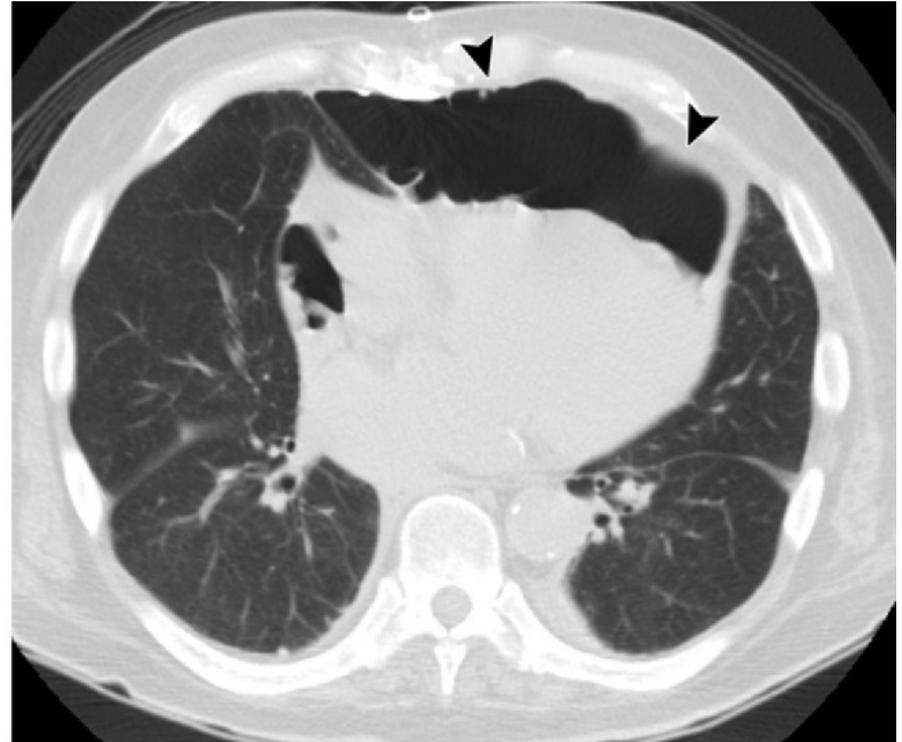
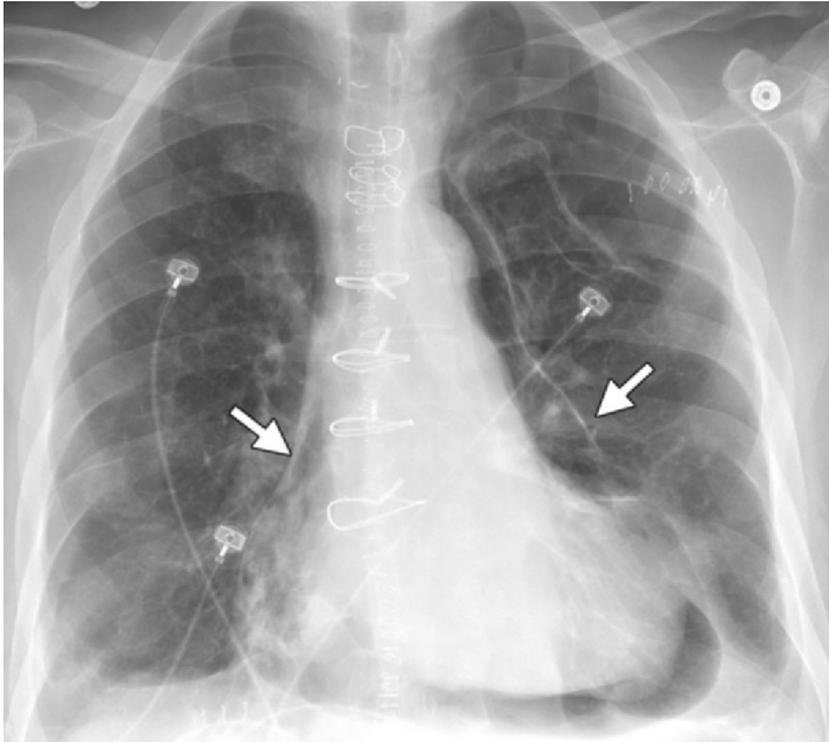
Pneumomediastinum



Causes

1. valsalva against closed glottis (weight lifting, cough, vomiting or labor)
2. Asthma
3. Blunt force chest trauma
4. Infection
5. Dissection from extra-thoracic source (sinus fx or perforated retroperitoneal bowel)
6. Tracheal or esophageal rupture

Pneumopericardium

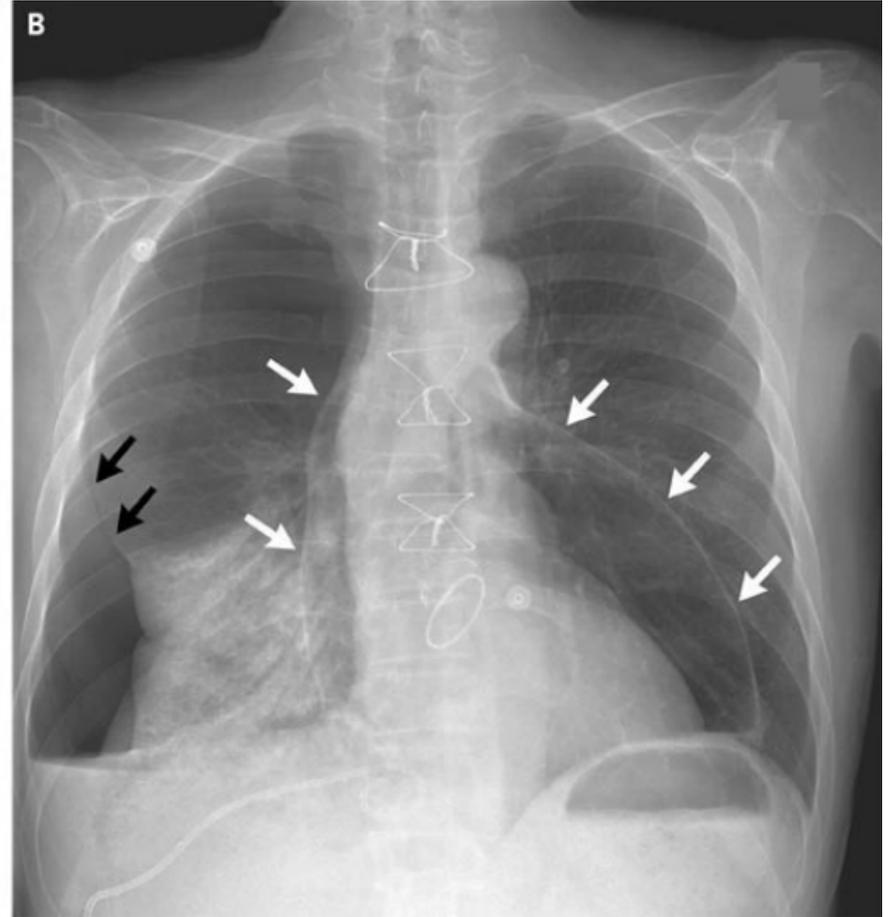
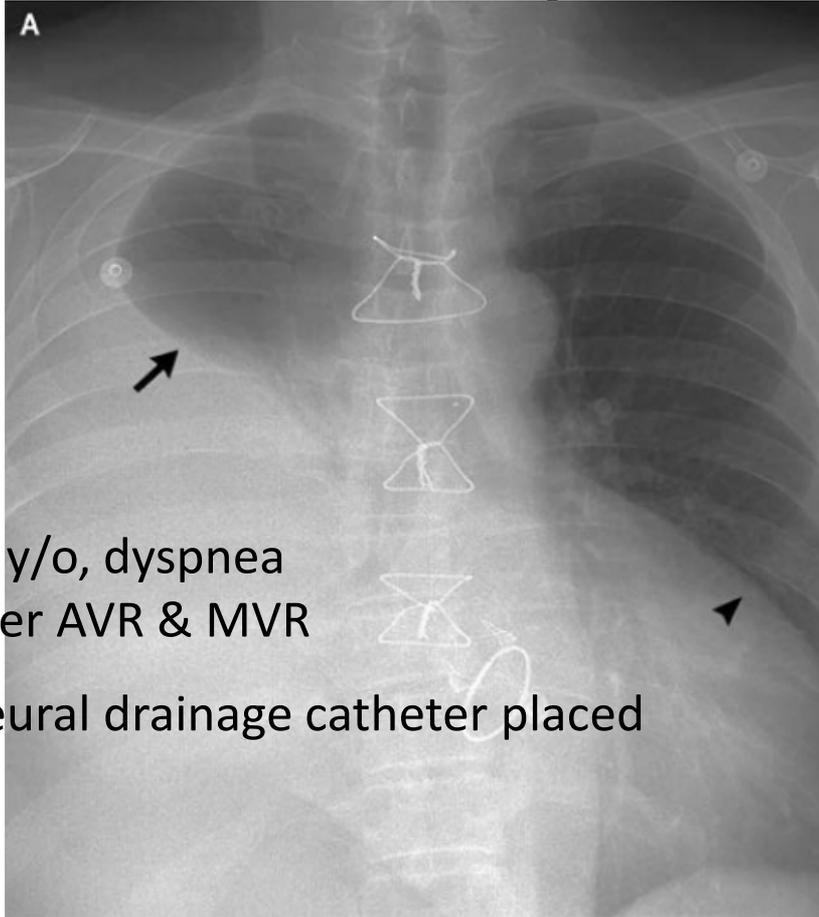


^a Usually asymptomatic and incidental
Rarely may cause tamponade
Distinguish from pneumomediastinum

decubitus views (pneumomediastinum does not quickly re-orient)
air above great vessels in pneumomediastinum

b.

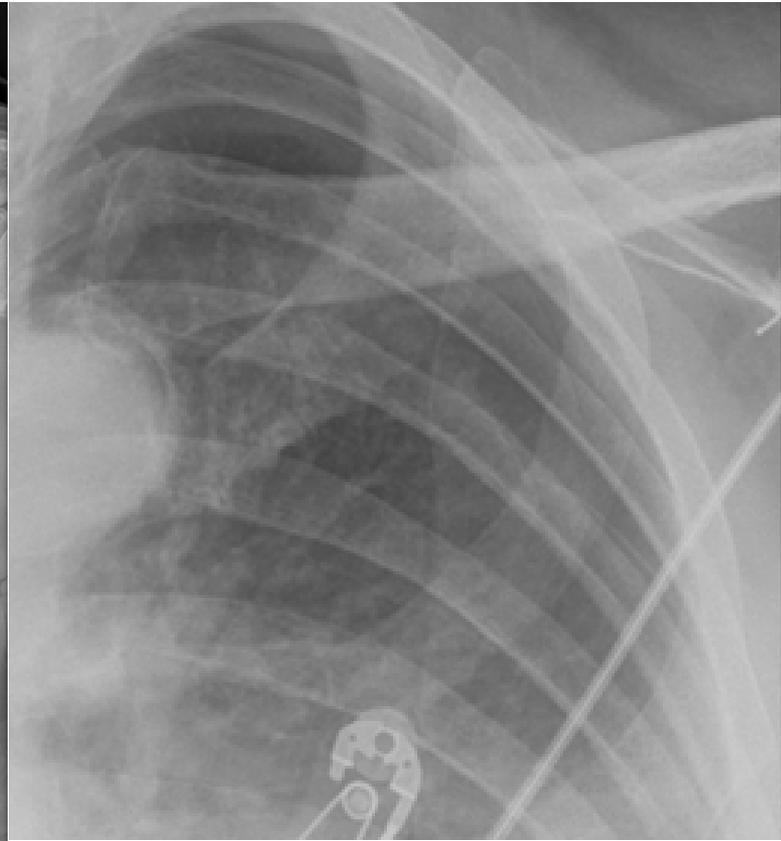
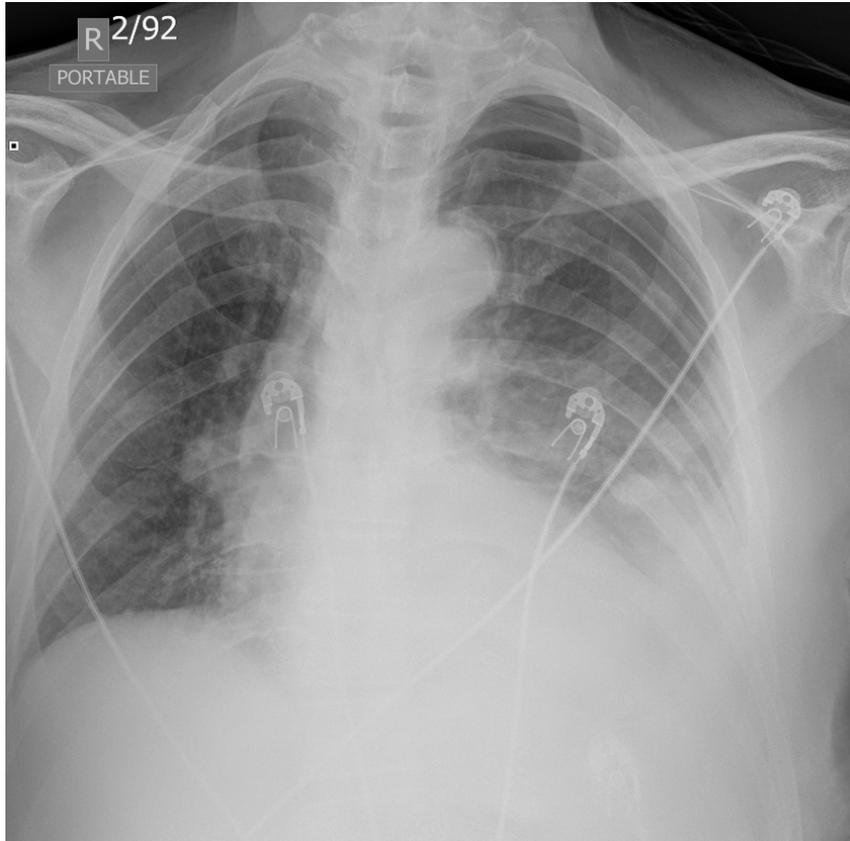
Pneumothorax and Pneumopericardium



Jason Andrade, M.D., and Eve Aymong, M.D.
N Engl J Med 2009; 361:510

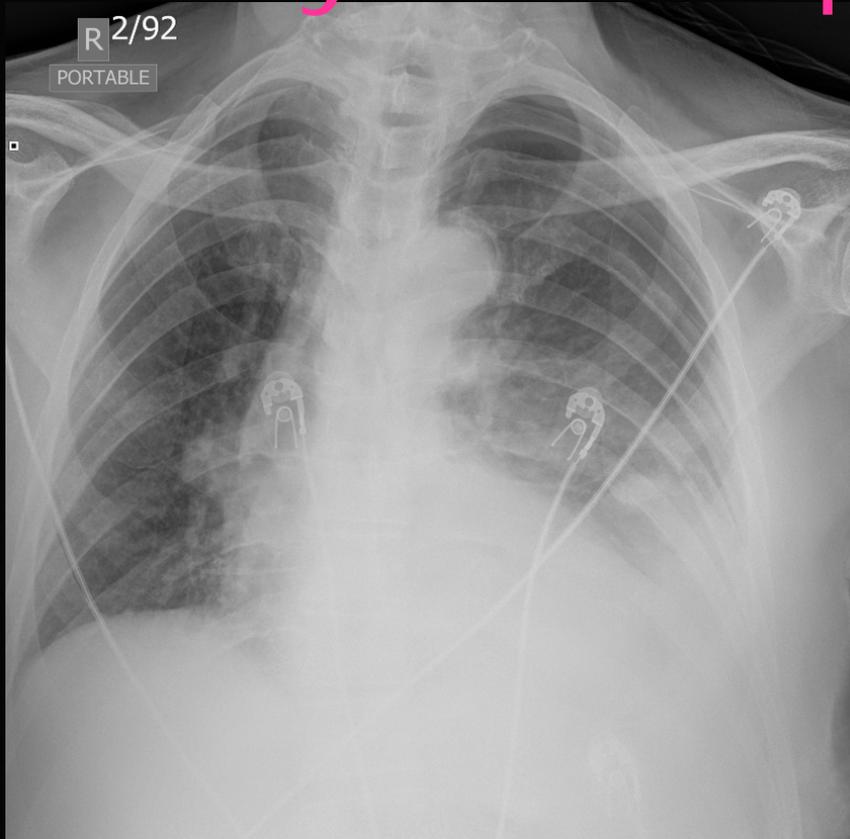
Quiz Case

74 y/o male pt c/o Chest Pain

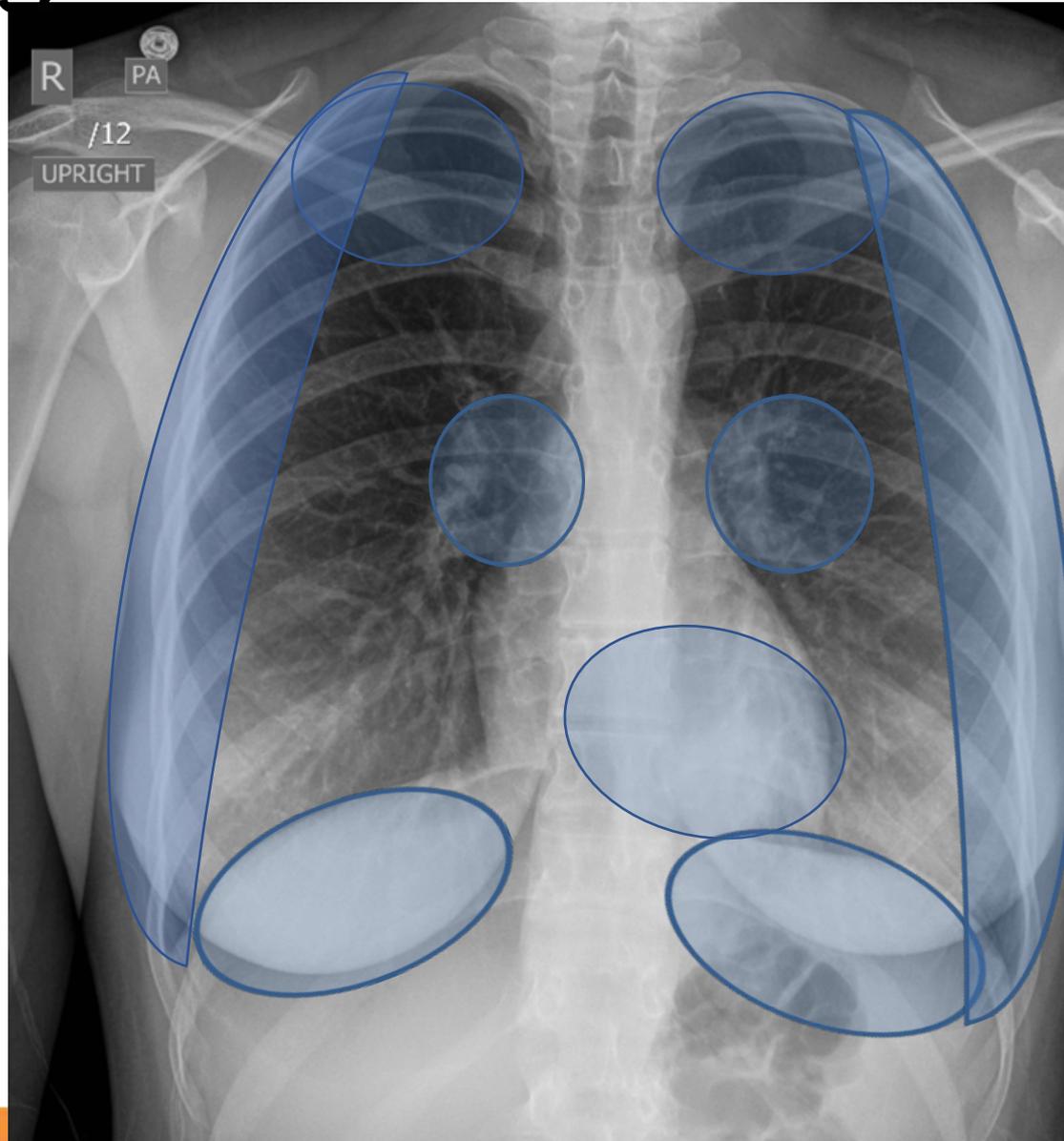


Quiz Case

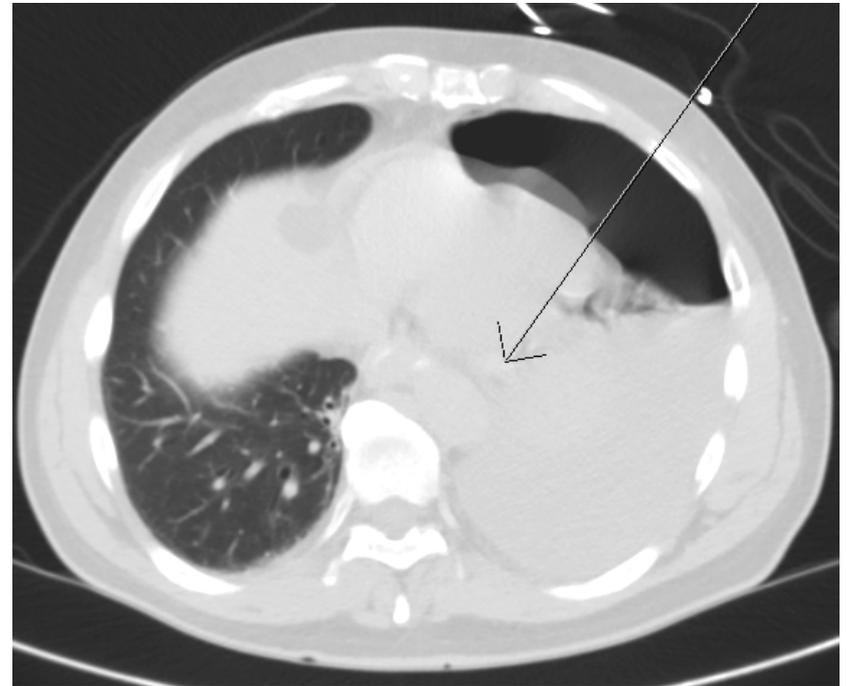
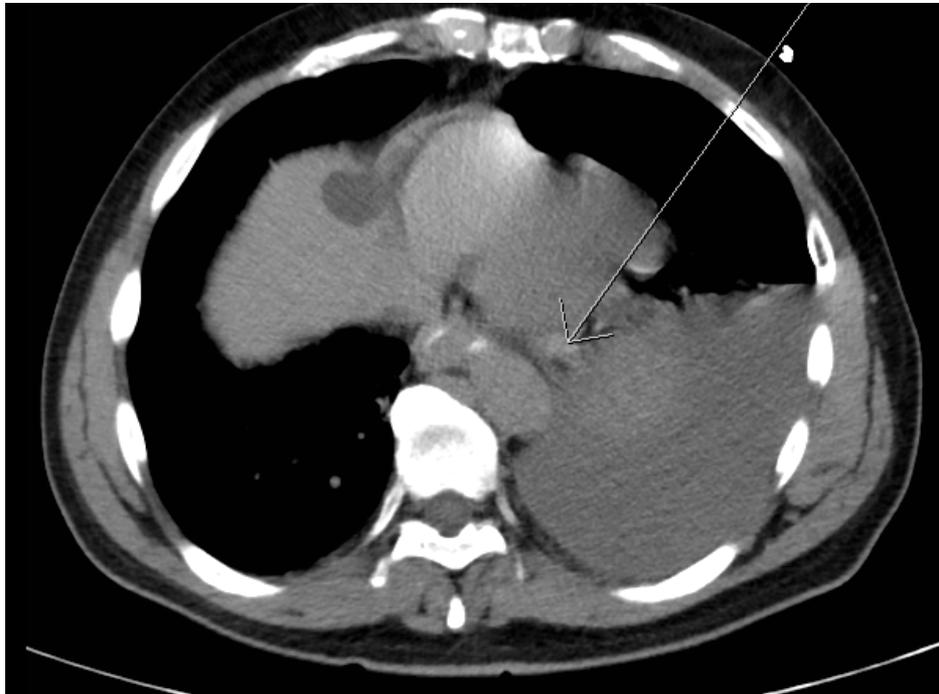
74 y/o male pt c/o Chest Pain



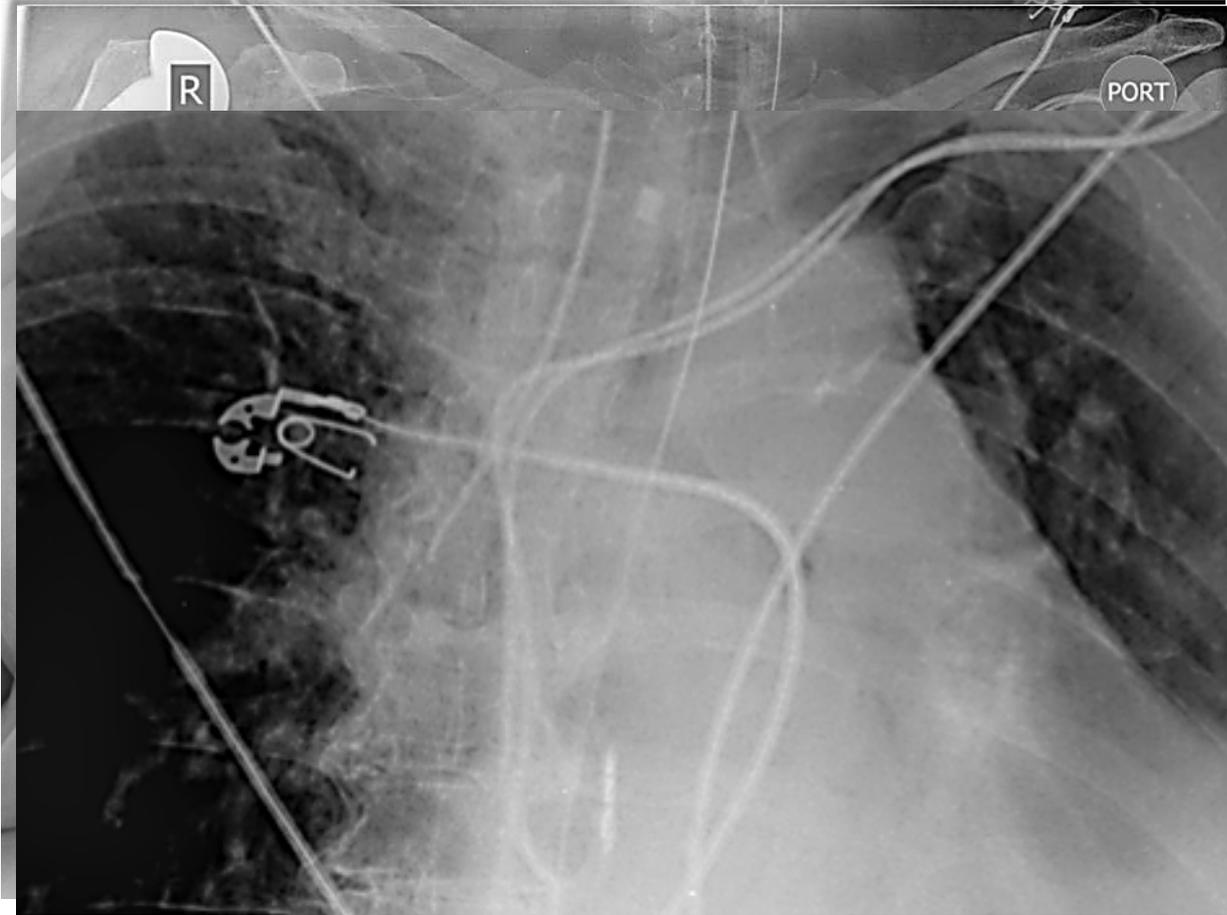
Danger Zones



CT Chest with Oral Contrast

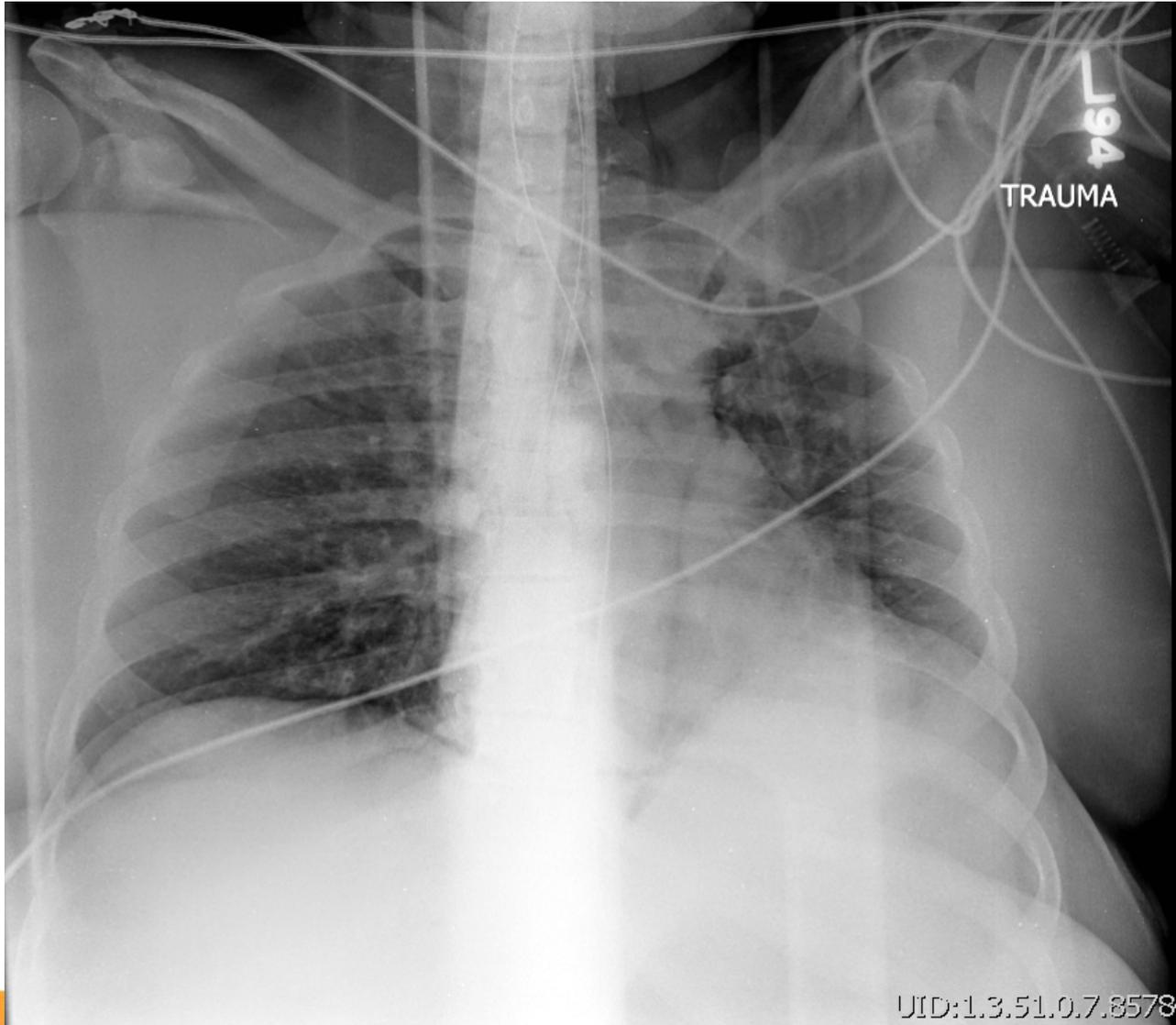


Tubes and Lines



ETT position ideally 4-5 cm from carina but minimum 2cm as tip may move upto 4cm with neck flexion and extension

ETT Position

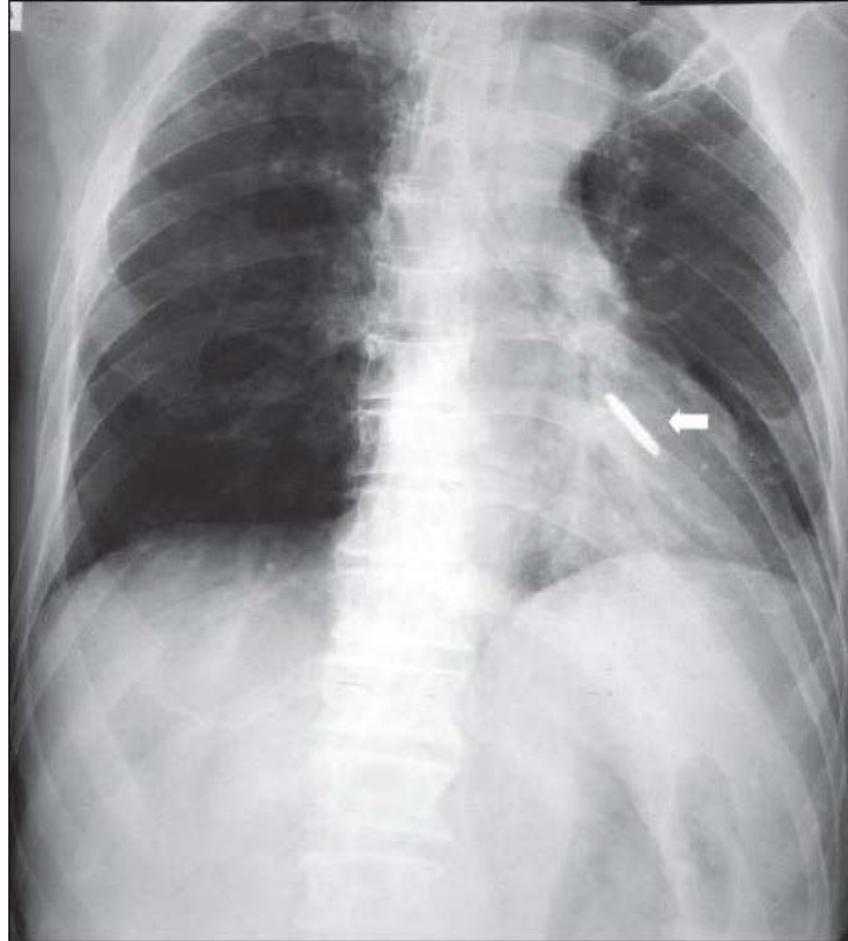


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ETT

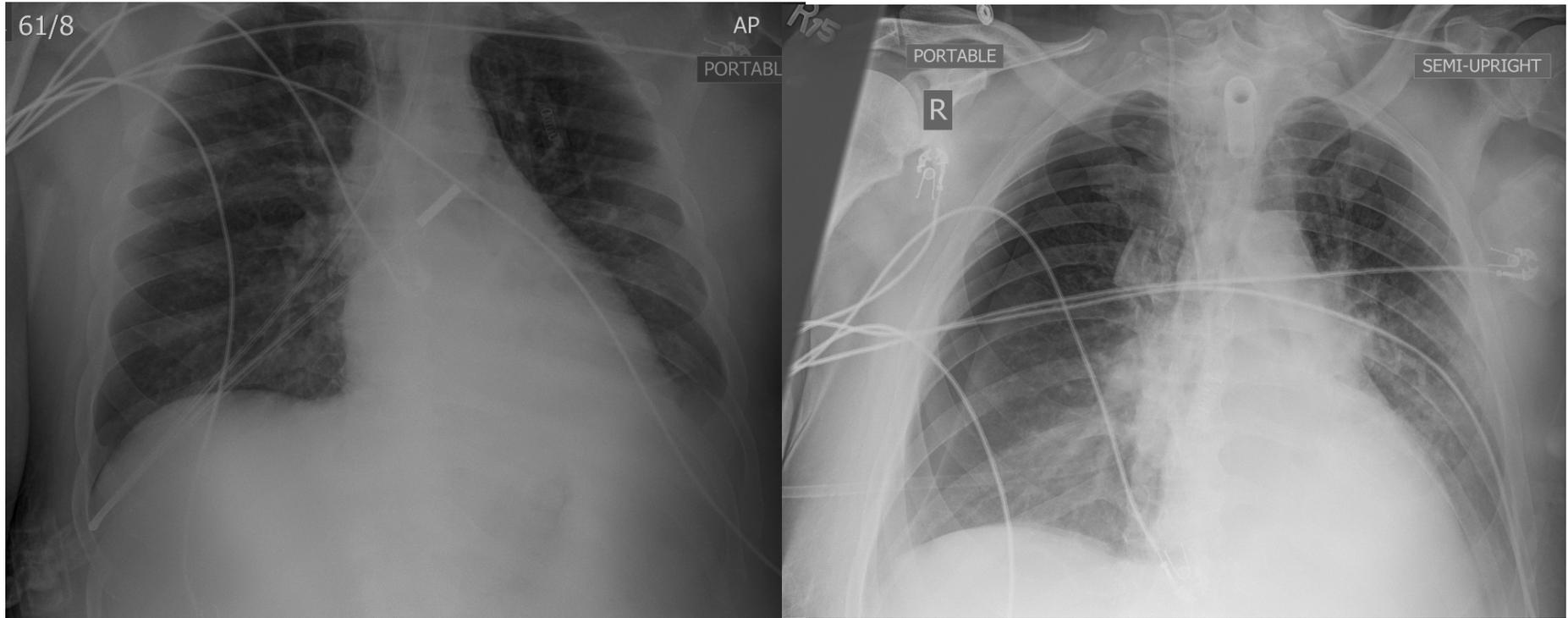


Tubes and Lines



Nasogastric Feeding Tube

Tubes and Lines



History Provided/Reason for exam: Atrial fibrillation

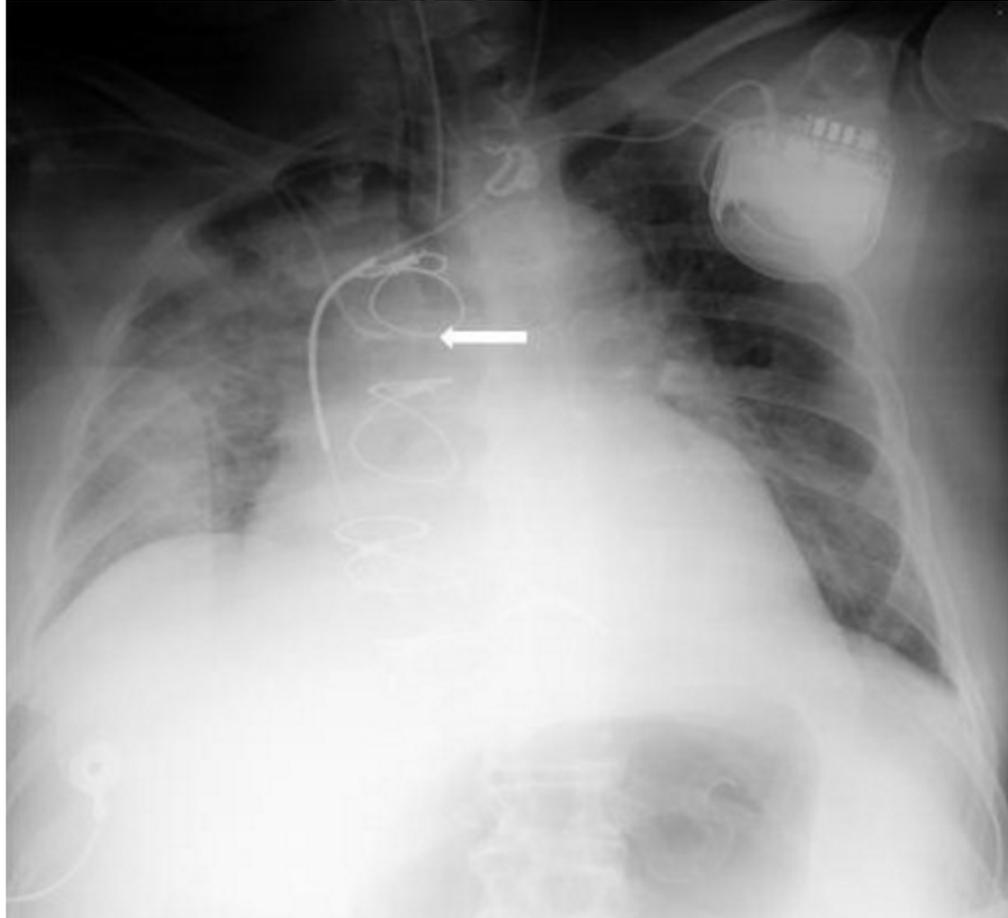
Tube position is so very abnormal it is not recognized as a feeding tube

CVL in Azygos



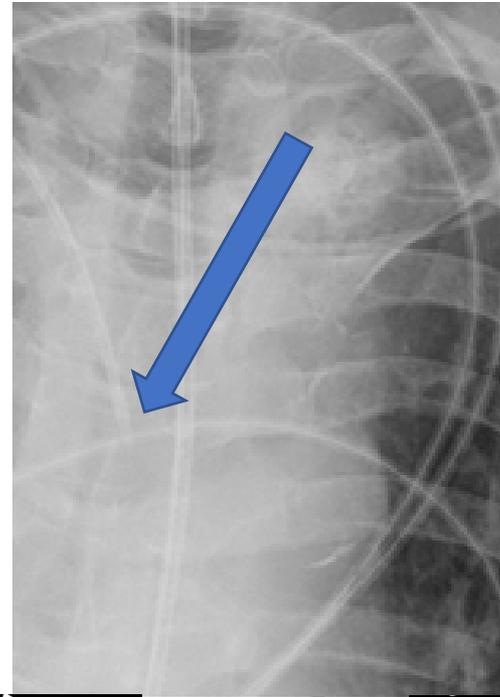
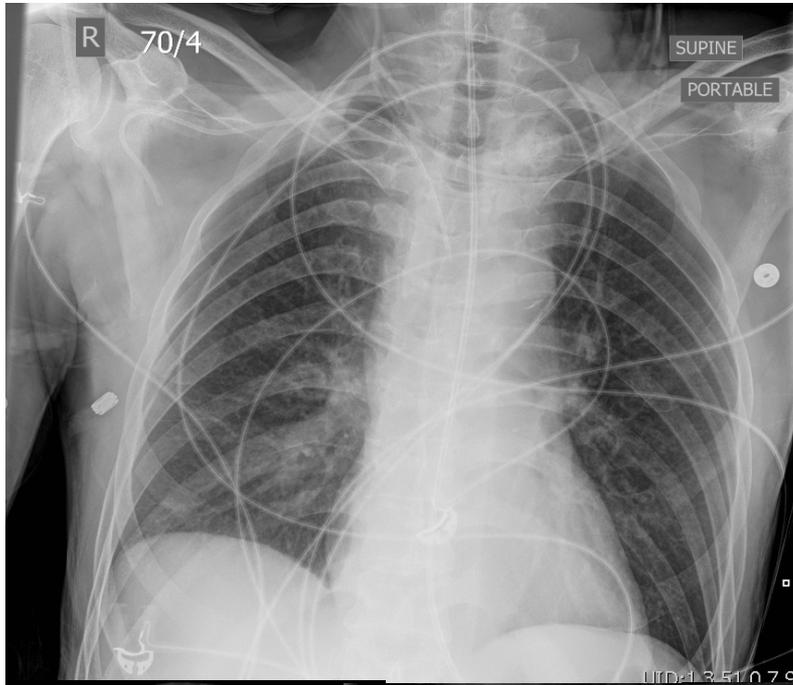
Case courtesy of Dr Jayanth Keshavamurthy, Radiopaedia.org, rID: 27695

CVL in Azygos Arch

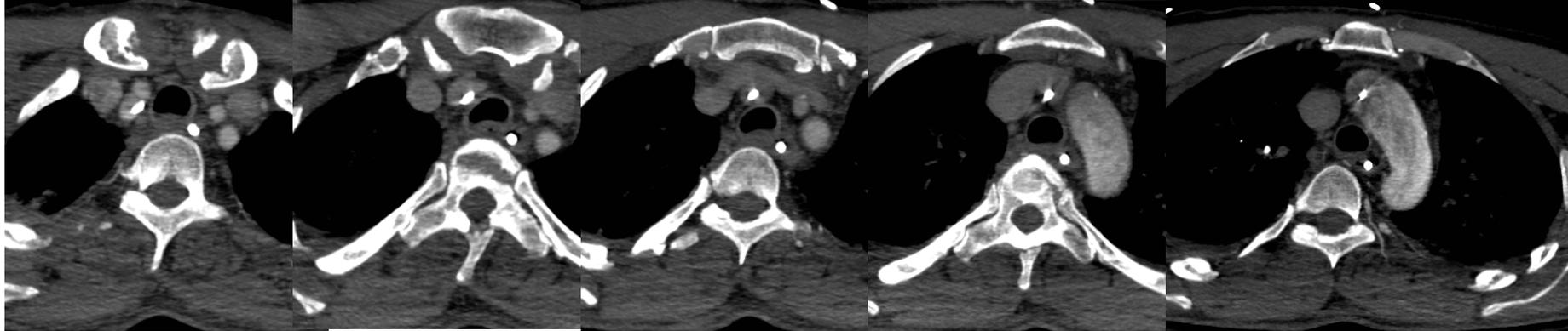


Pulmonary Chronicles Vol 1, No 4 (2013)

Tubes and Lines

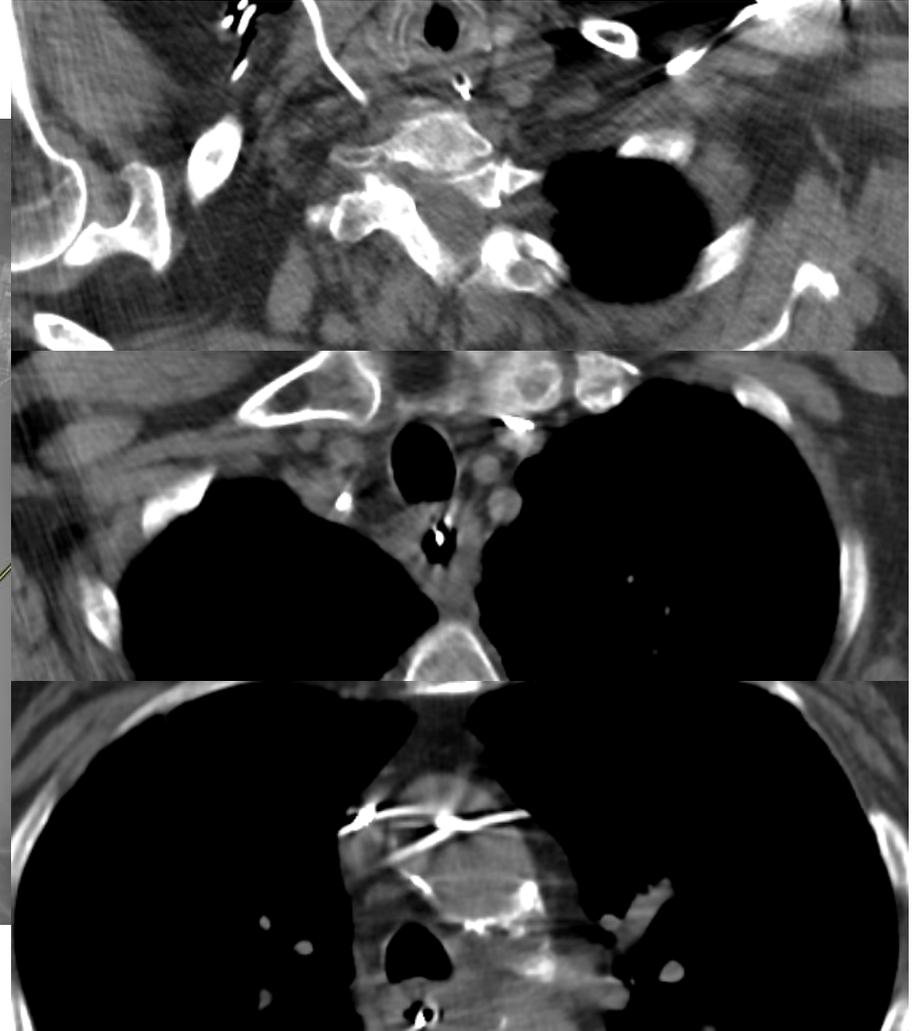
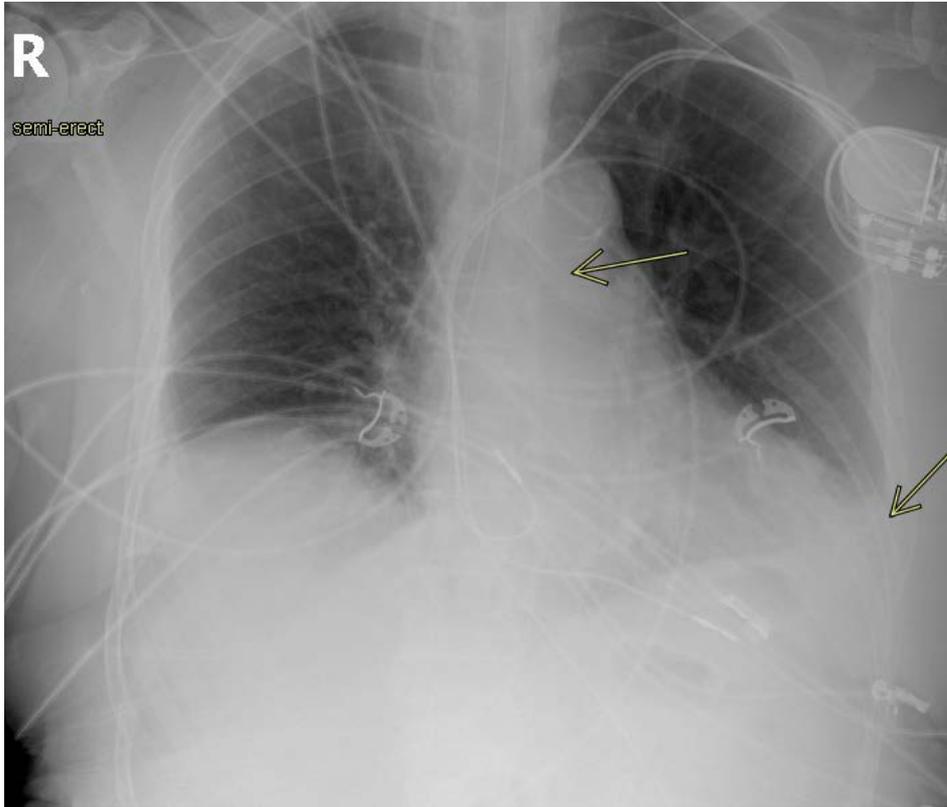


CVL tip is medial to trachea and therefore not likely in SVC, Intrarterial?



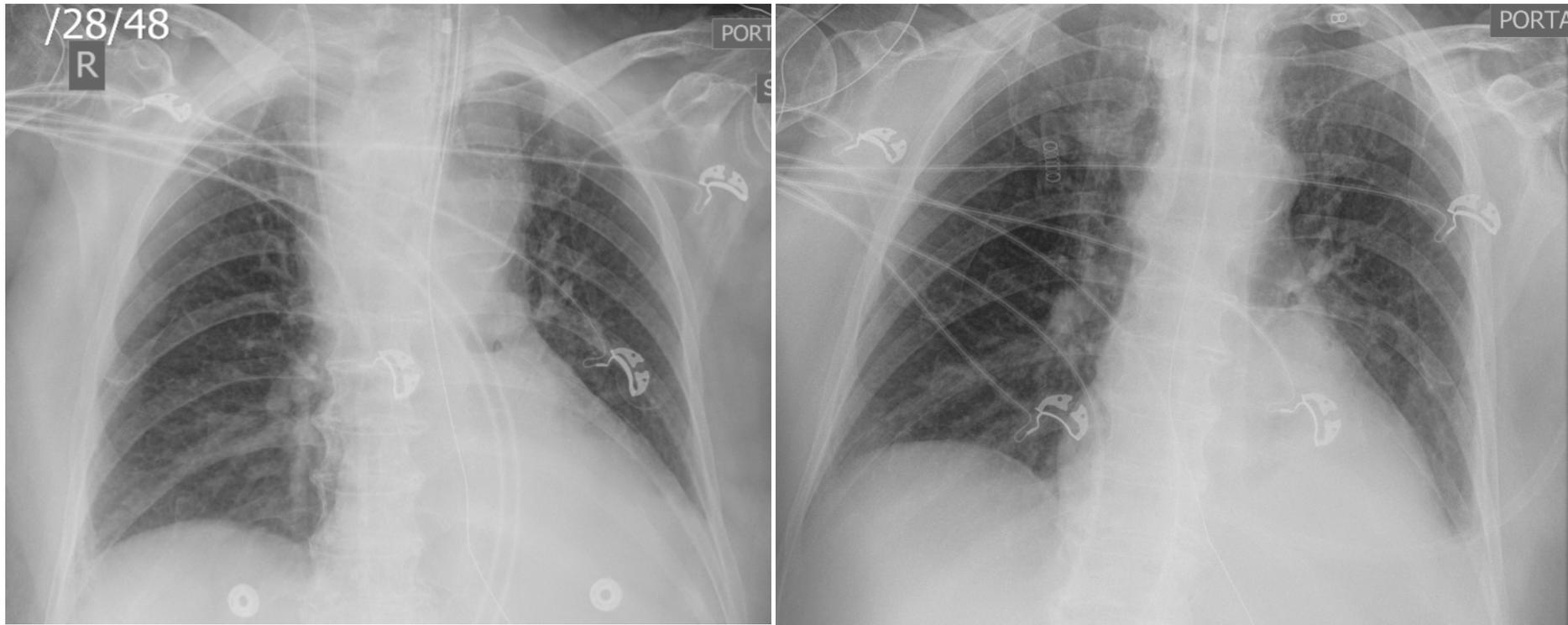
Septic Shock

Rt IJ CVL



Tubes and Lines

CXR after Rt IJ CVL placed with comparison film from the prior day.



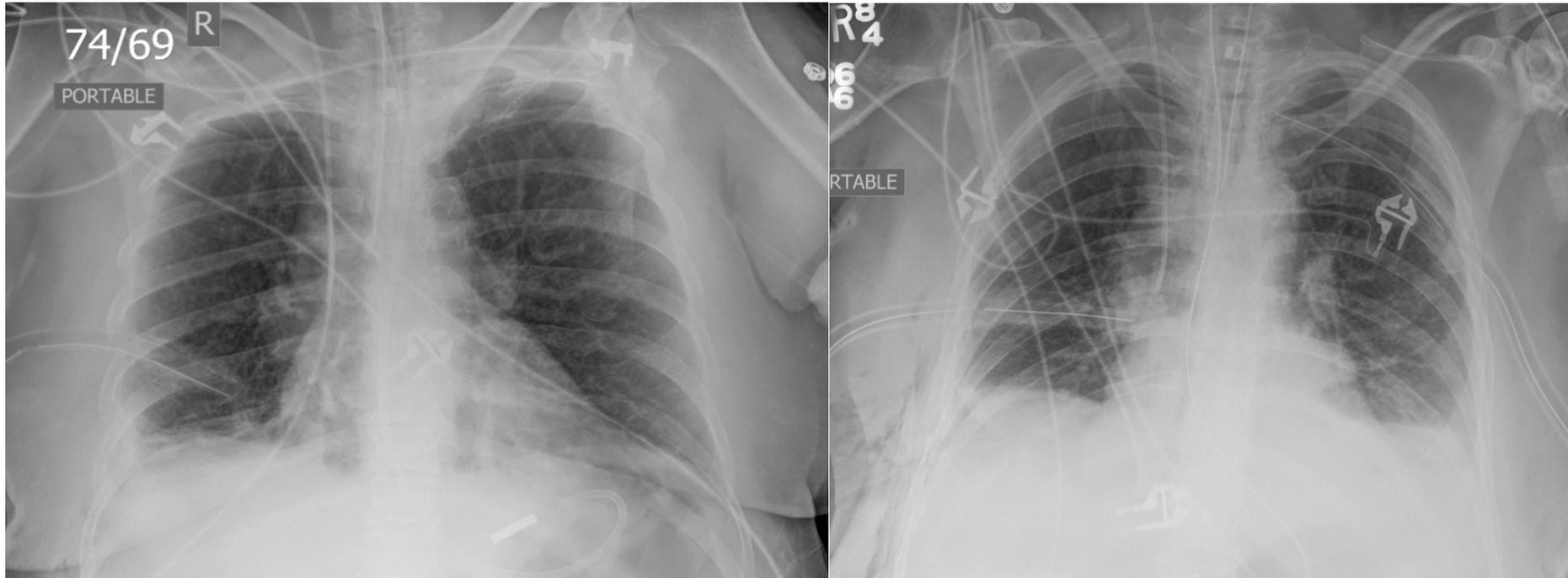
Dx: Mediastinal Hematoma with CVL projecting in satisfactory position

CVL should parallel the right paratracheal stripe and the heart margin

Tip should be at the cavoatrial jxn, CXR landmark catheter crosses the bronchus intermedius

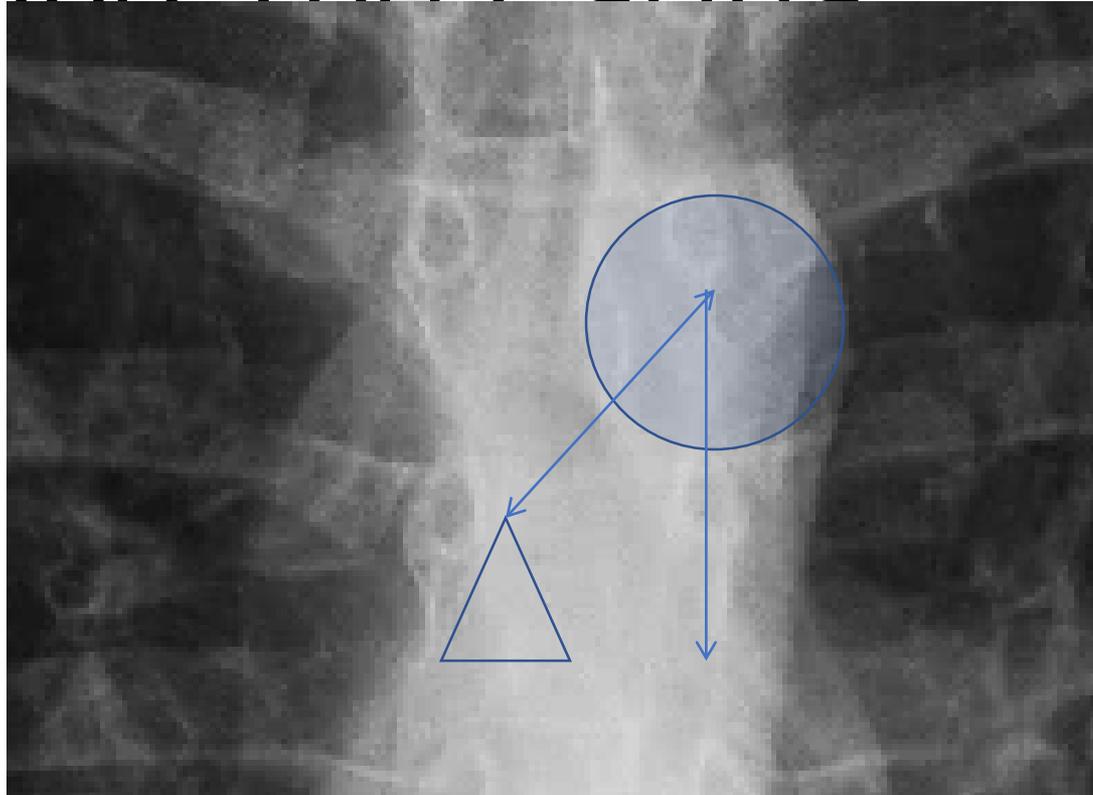
Tubes and Lines

CXR for daily monitoring of intubated pt with previous day's film for comparison

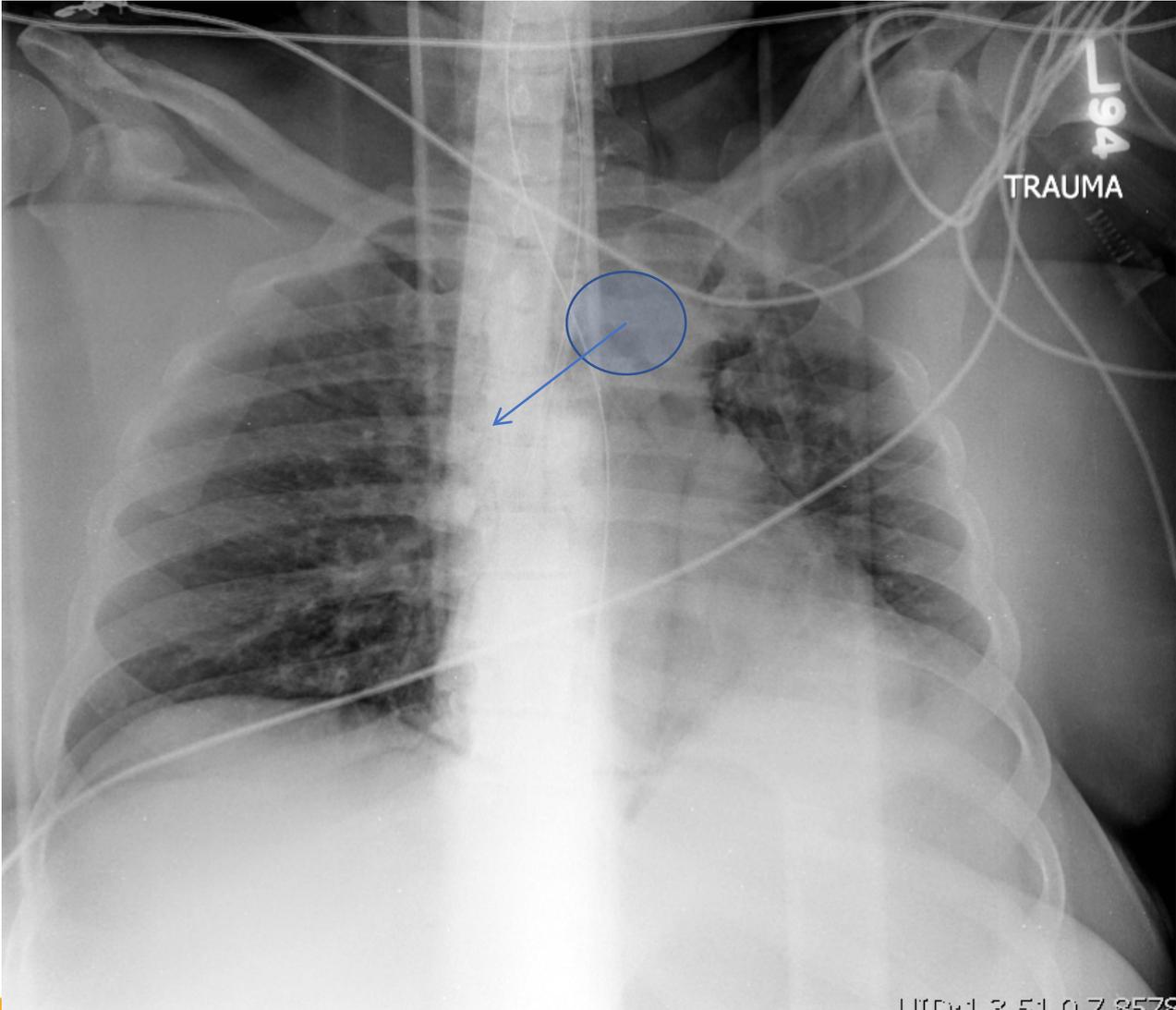


Pleural tube has migrated such that the side hole is no longer in the pleural space
ETT tube has migrated downward such that tip is projecting into the Rt main bronchus

Finding The Carina



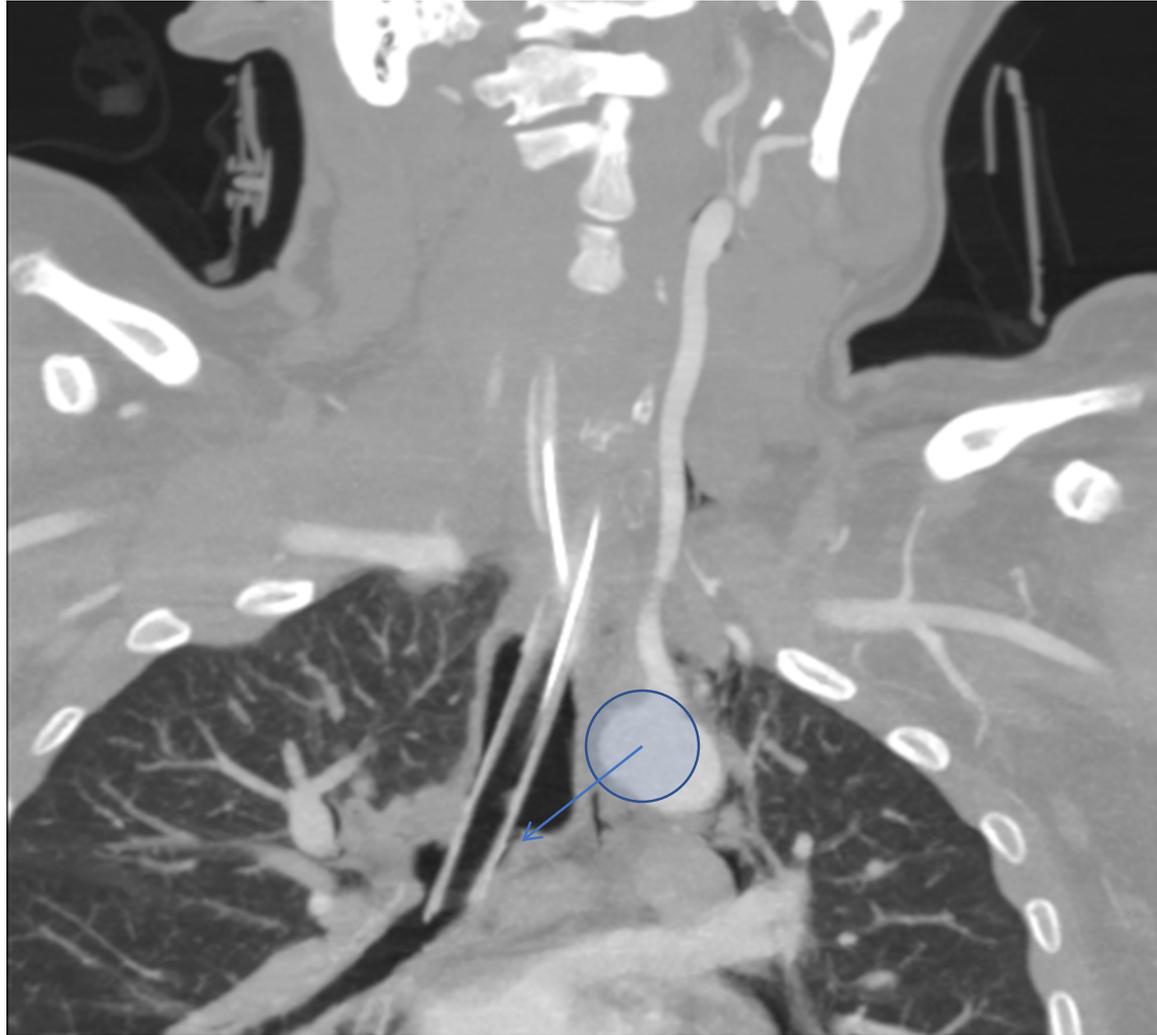
45 degree angle from Center
of aortic arch to carina



194
TRAUMA

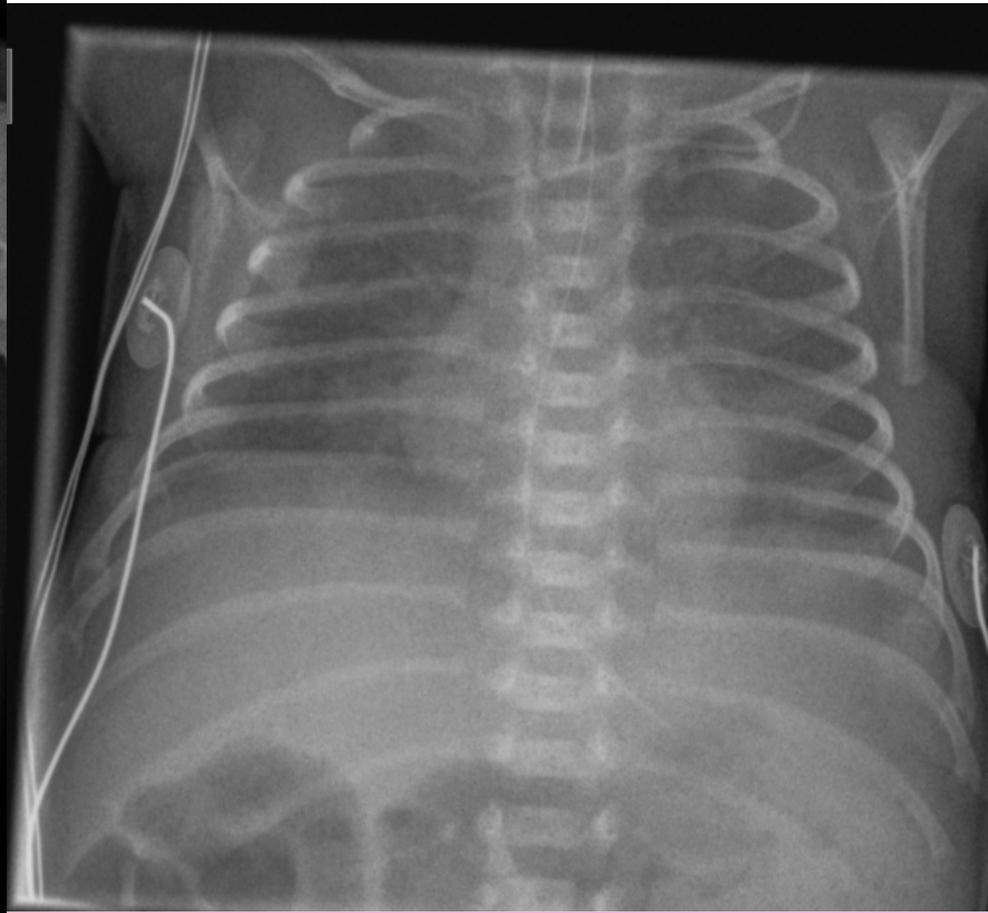
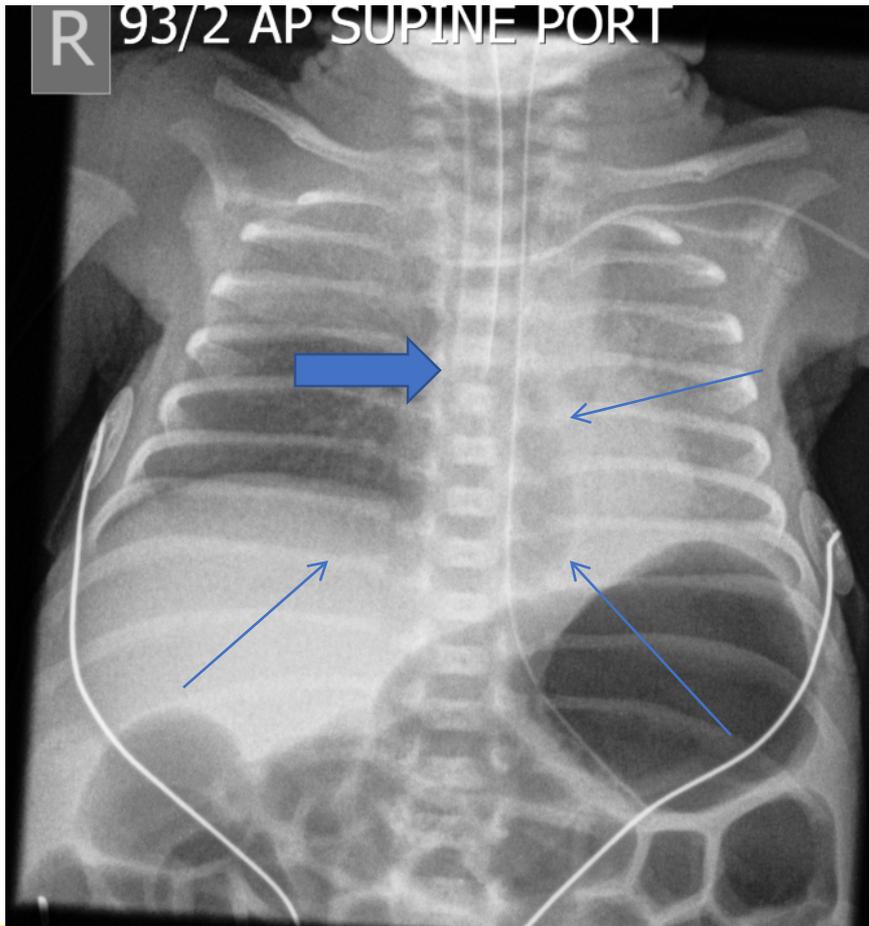
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Aortic Arch 45 Degrees to Carina

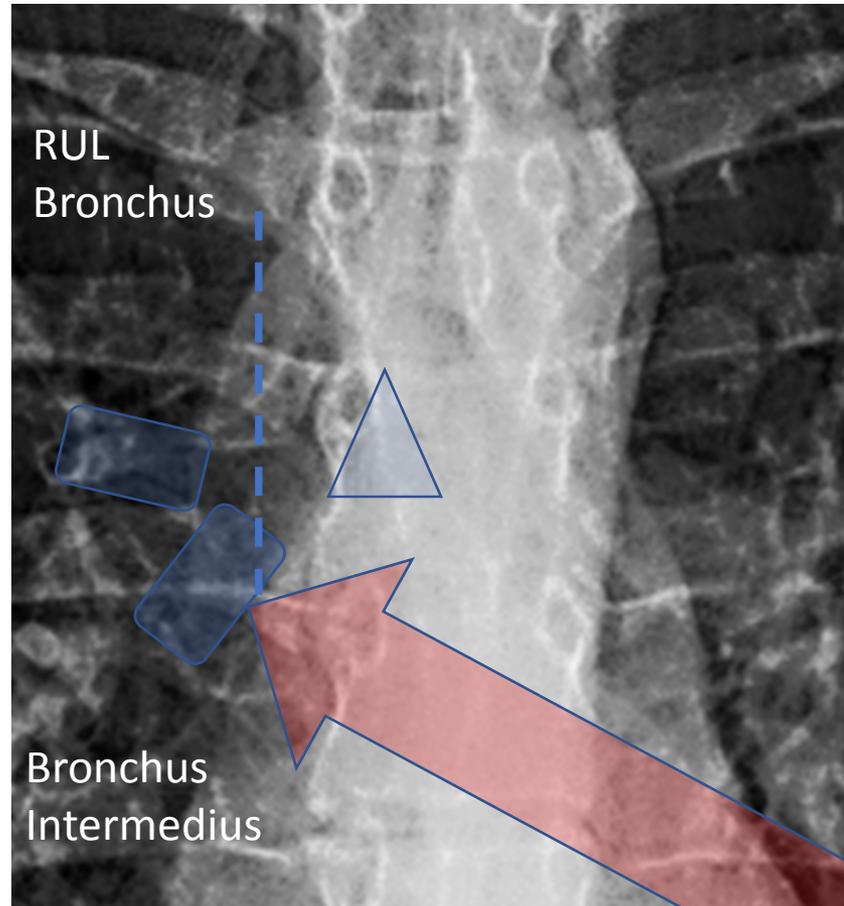


Quiz 2

Neonate Increasing O2 requirements



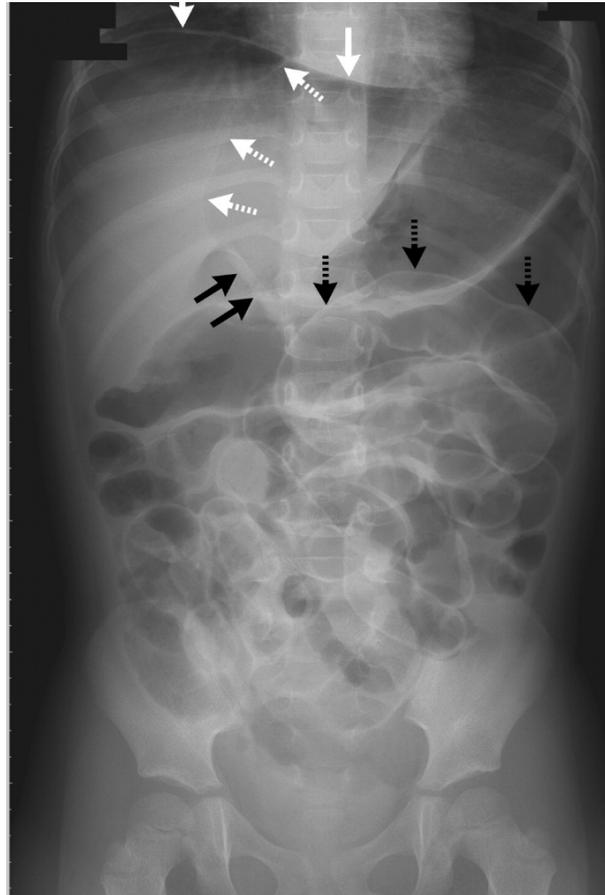
Finding the Cavoatrial Jxn



Abdomen

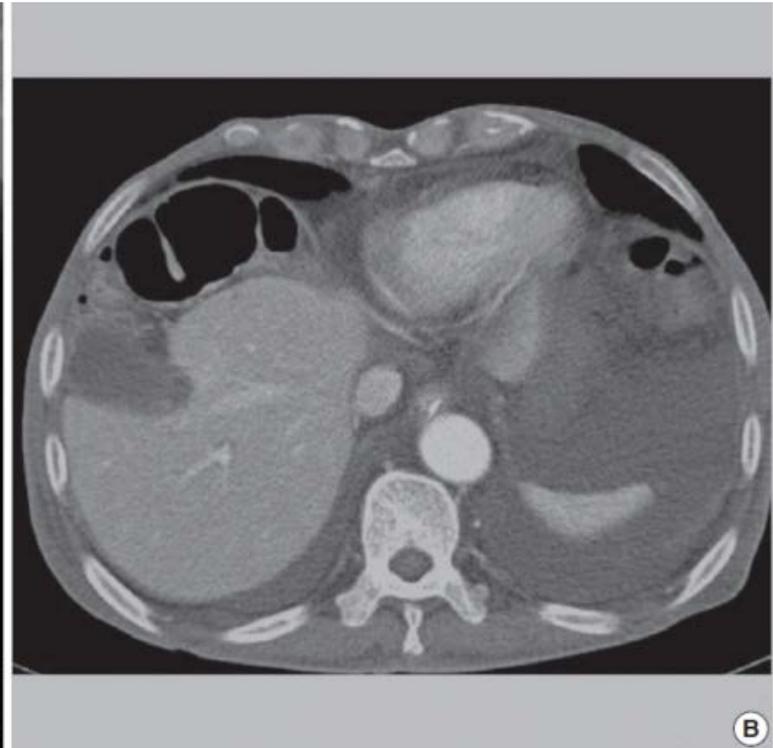
- Erect or decubitus views
 - Needed to assess for pneumoperitoneum
 - Domes of both diaphragms visible

Pneumoperitoneum



N Engl J Med 2010; 362:2410 [June 24, 2010](#)

Chiliaditi Syndrome



Pneumoperitoneum

Chiliditi
Syndrome

A

B

Linear
atelectasis

C

SBO

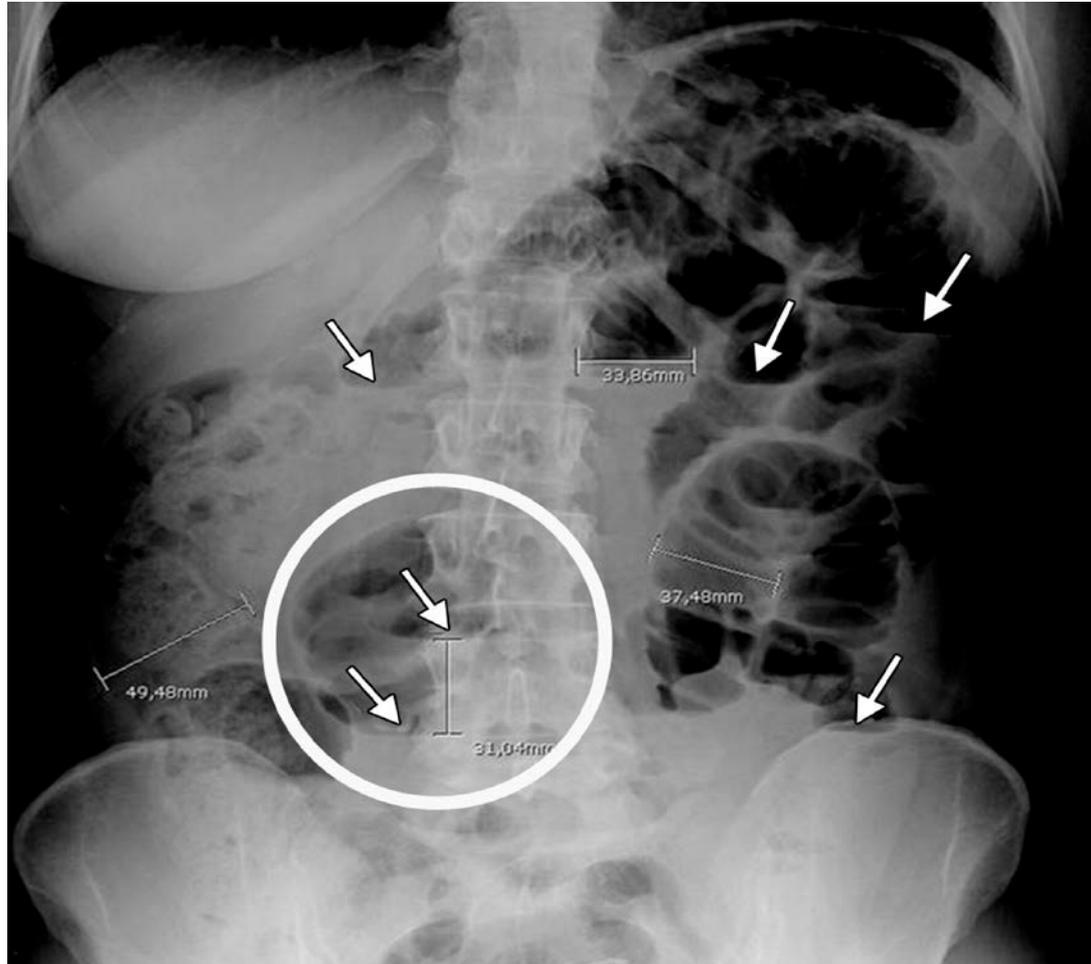


Figure 2. High-grade SBO. Published in: Ana Catarina Silva; Madalena Pimenta; Luis S Guimaraes; *RadioGraphics* 2009, 29, 423-439.

Small Bowel Obstruction

- Key radiographic signs b/n high-grade SBO vs low-grade SBO
 - maximal dilated loops averaging 36 mm in diameter and exceeding 50% of the caliber of the largest visible colon loop
 - >2 air-fluid levels
 - air-fluid levels wider than 2.5 cm
 - air-fluid levels differing more than 2 cm in height from one another within the same small bowel loop

SBO

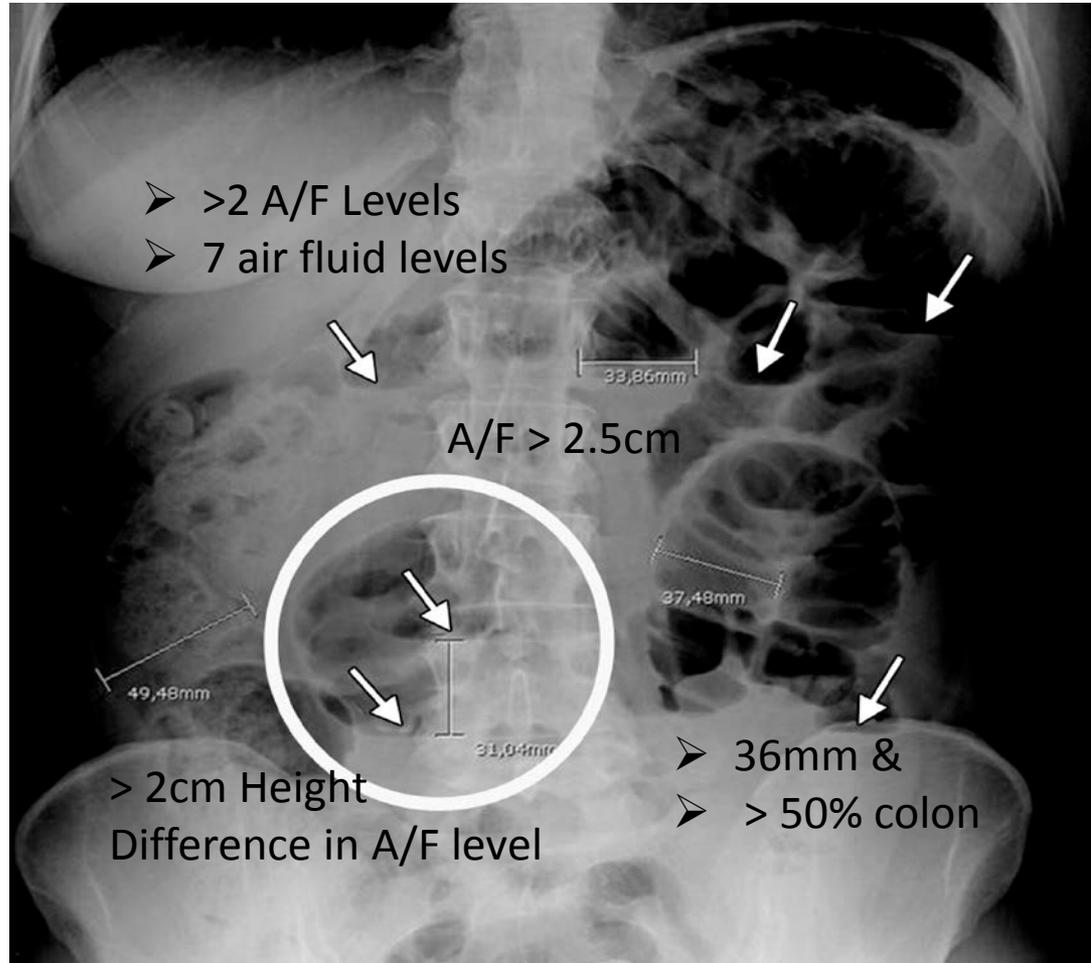
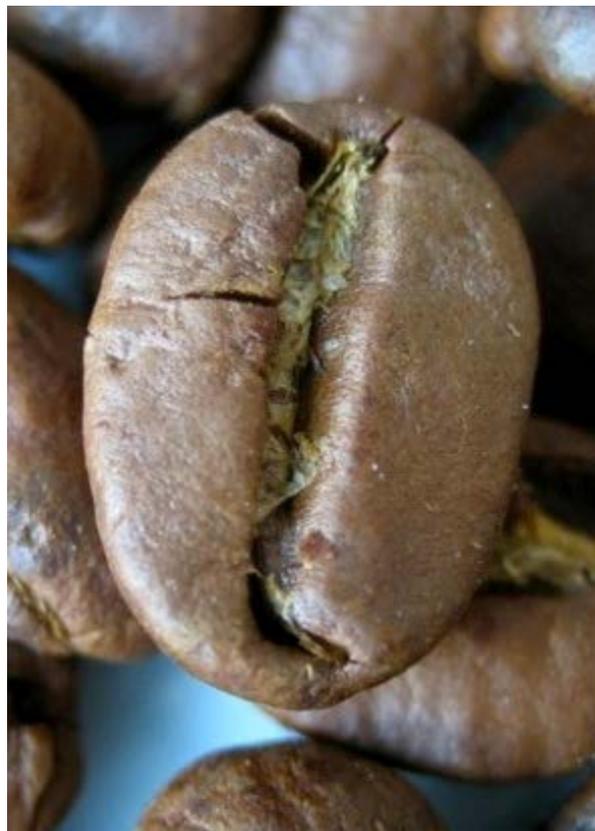


Figure 2. High-grade SBO. Published in: Ana Catarina Silva; Madalena Pimenta; Luis S Guimaraes; *RadioGraphics* 2009, 29, 423-439.

Sigmoid Volvulus



Sigmoid volvulus



Balloon Animals and Bowel Torsion



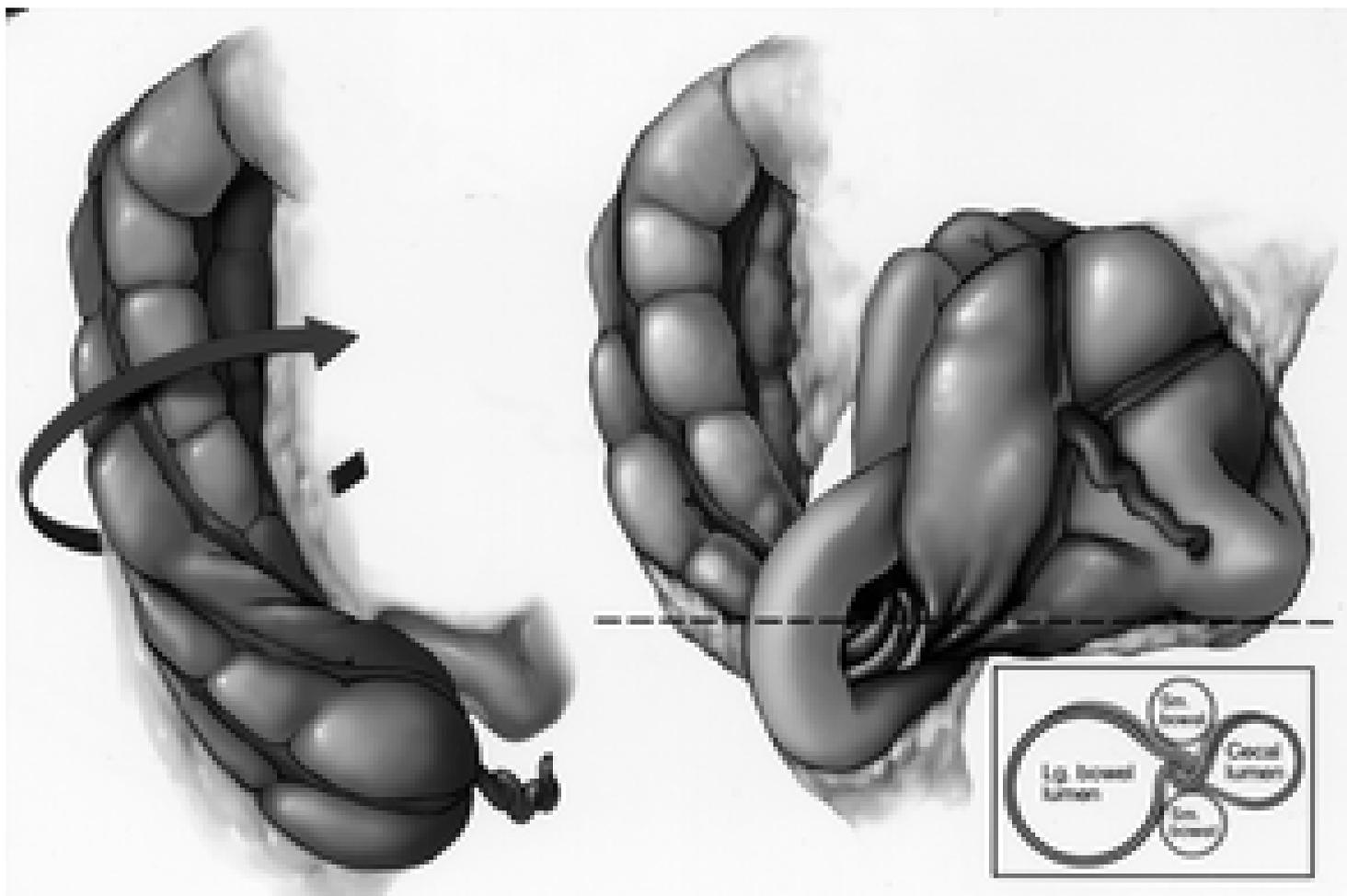
Sigmoid volvulus



Cecal Volvulus

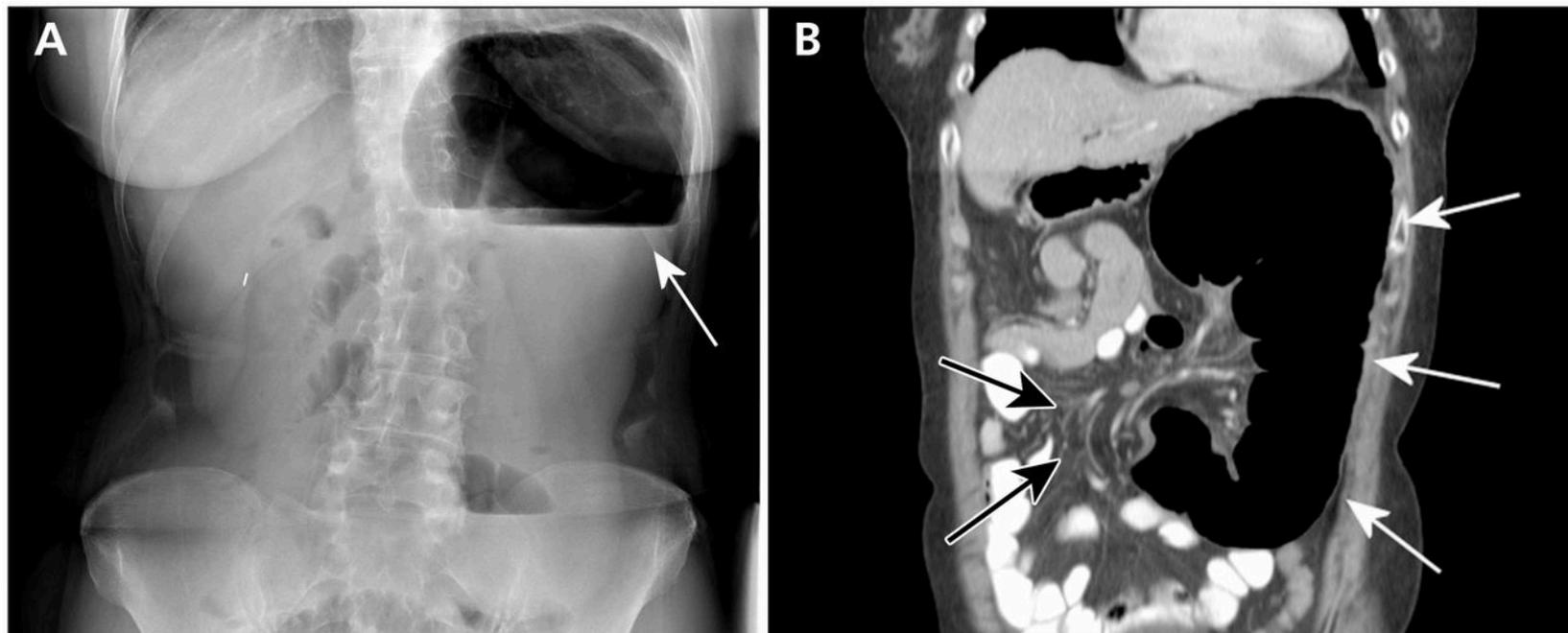


Cecal Volvulus



American Journal of Roentgenology. 2001;177: 95-98.

Cecal Volvulus

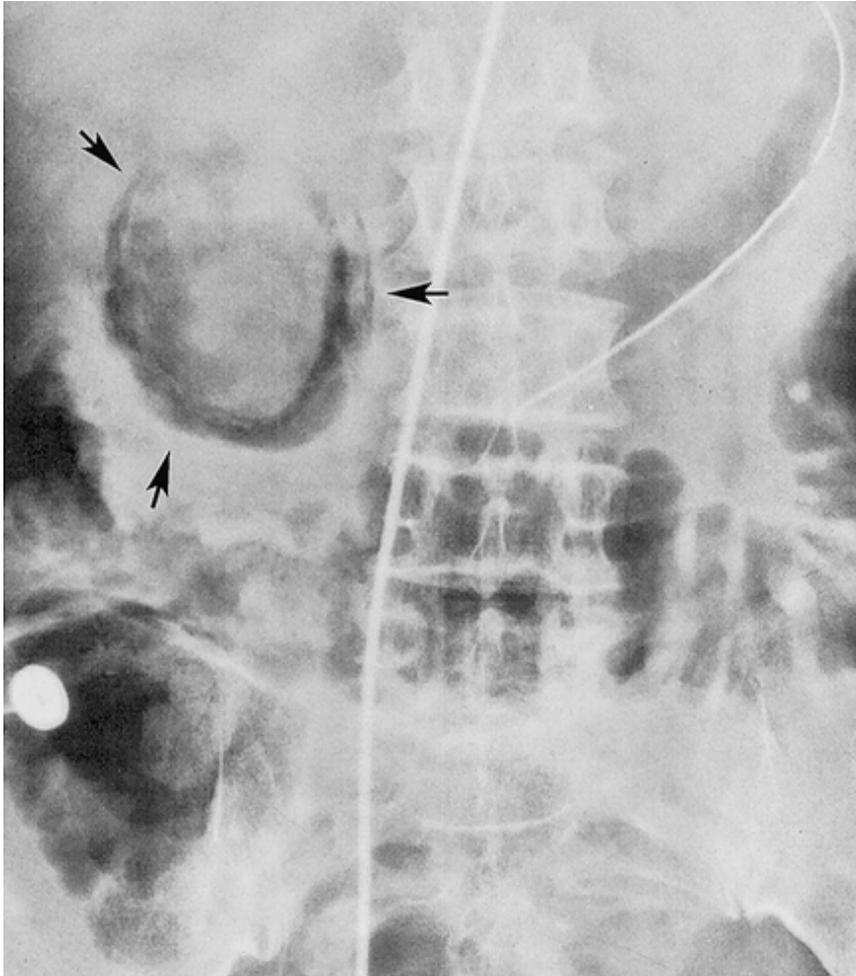


Stefanie Y. Lee, and Mousumi Bhaduri CMAJ 2013;185:684

Cecal Volvulus

- Cecal volvulus accounts for about 1% of intestinal obstructions and 10%–40% of cases of colonic volvulus. The second most common type of colonic volvulus (after sigmoid volvulus)
- Assoc. lack of normal retroperitoneal attachments of the right colon
- Signs and symptoms may be acute or insidious, including nonspecific abdominal pain, distension, nausea, vomiting and constipation, the intensity of which depend on the degree of obstruction and ischemia
- TX: surgical resection

Emphysematous Cholecystitis



Men 2x Women

Majority have DM and Atherosclerotic Dz
Vascular compromise of cystic duct
thought to be contributing

Increased acalculous and perforated
cases

Stages

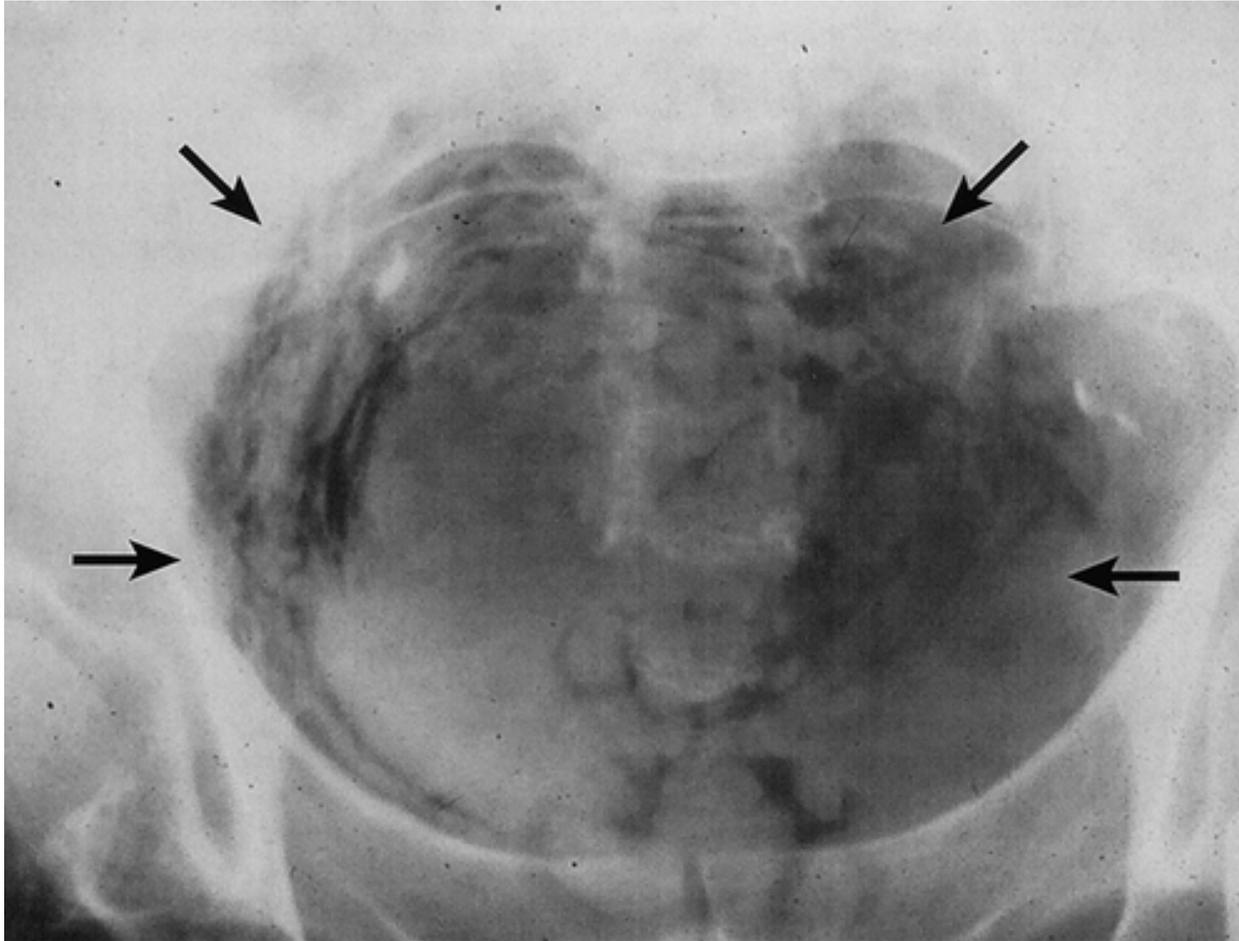
1. Gas in lumen
2. Gas in gallbladder wall
3. Gas in pericholecystic tissues

Tx: Cholecystectomy (possible temporary
cholecystostomy)

Px: 15% Mortality (4% or less for typical
acute cholecystitis)

Radiographics 22;3,543-61

Emphysematous Cystitis



50% of pts DM

M/F ½

Increased in Elderly
Diabetic Pts

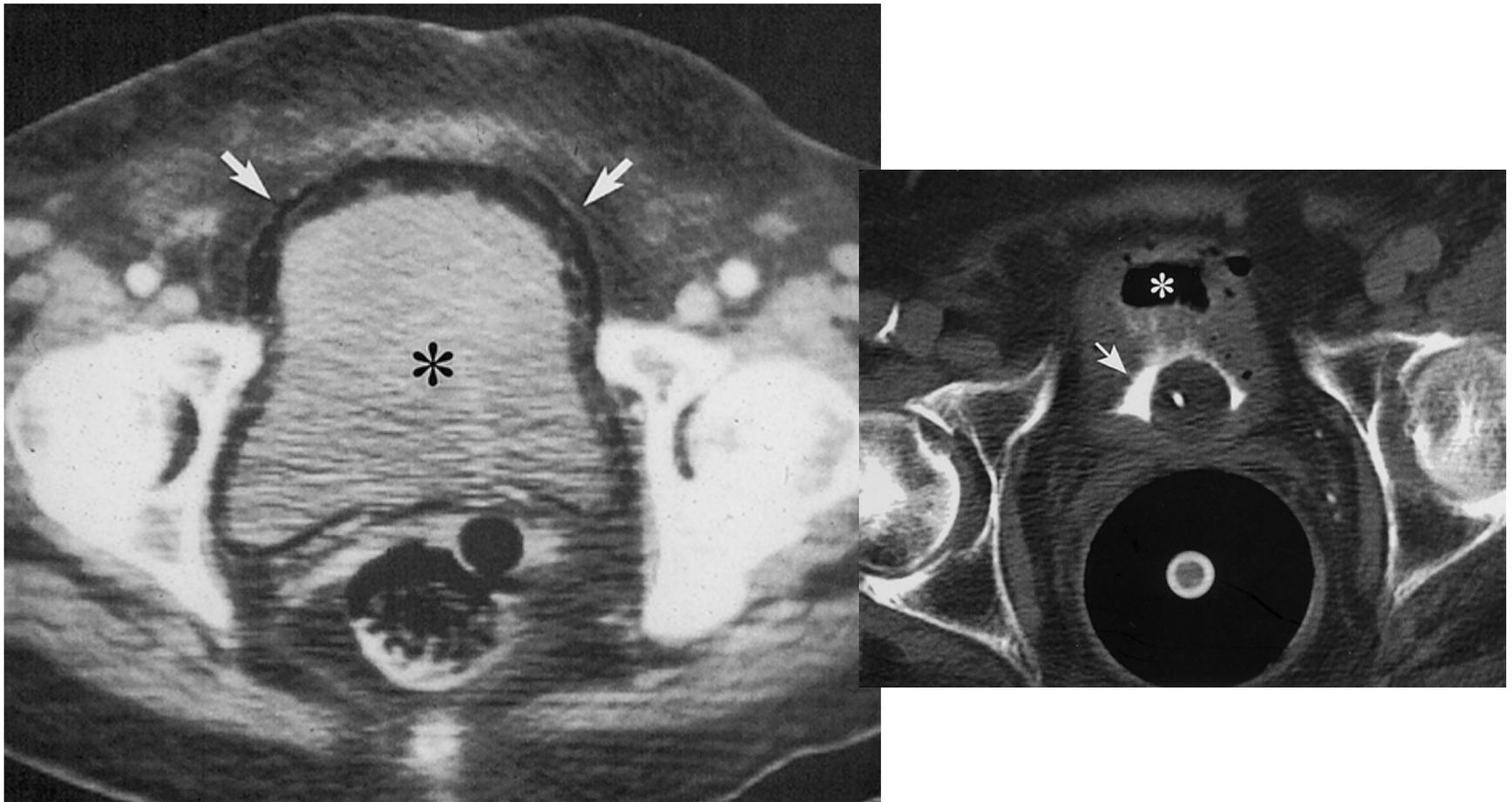
Tx: Abx

Ddx: fistula to bladder
from bowel, bladder
instrumentation,
pneumatosis intest, or
gas gangrene uterus

Imaging: CT to confirm

RadioGraphics 2002; 22:543–561

Emphysematous Cystitis



RadioGraphics 2002; 22:543–561

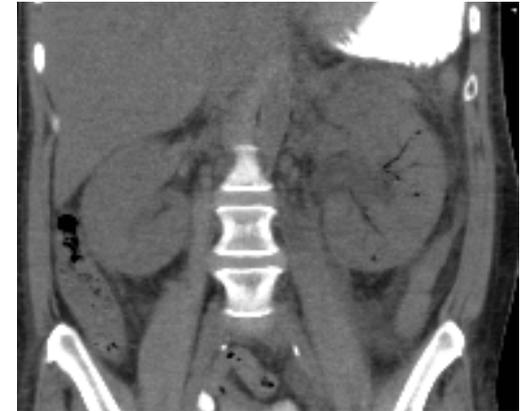
Emphysematous Pyelonephritis



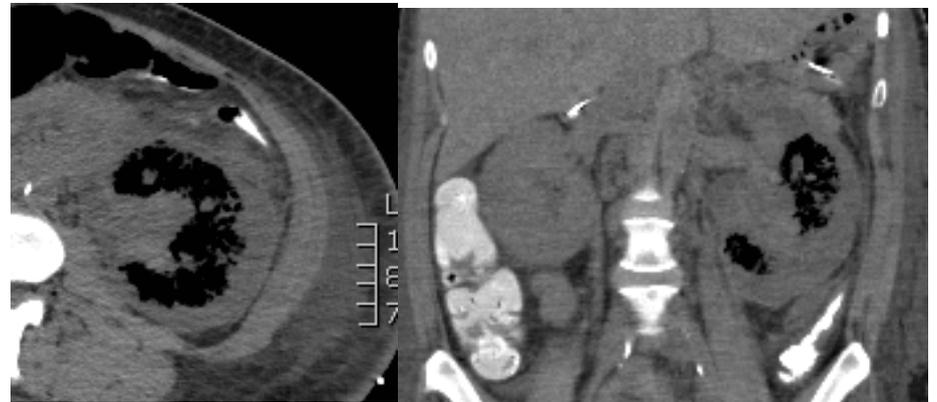
Emphysematous Pyelonephritis



Study done without IV contrast due to impaired renal fxn



5 Days Later



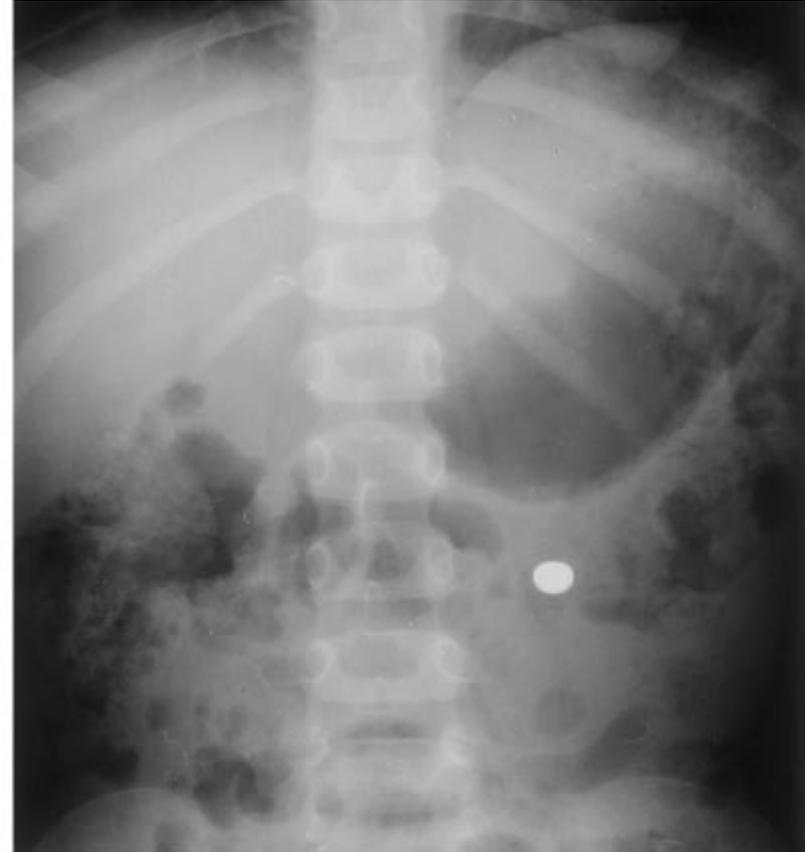
Emphysematous Pyelonephritis

- life-threatening necrotizing infection of the kidneys characterized by gas formation within or surrounding the kidneys.
- ~ 90% pts poorly controlled DM. Nondiabetic patients are typically either immunocomp or have associated urinary tract obstruction secondary to uroliths, neoplasm, or sloughed papilla. Most common organisms *E coli*, *K pneumonia*, and *Proteus mirabilis*
- Without early therapeutic intervention, the condition becomes rapidly progressive, generalizes to fulminant sepsis, and carries a high mortality rate.

Foreign Bodies



a.



b.

Batteries

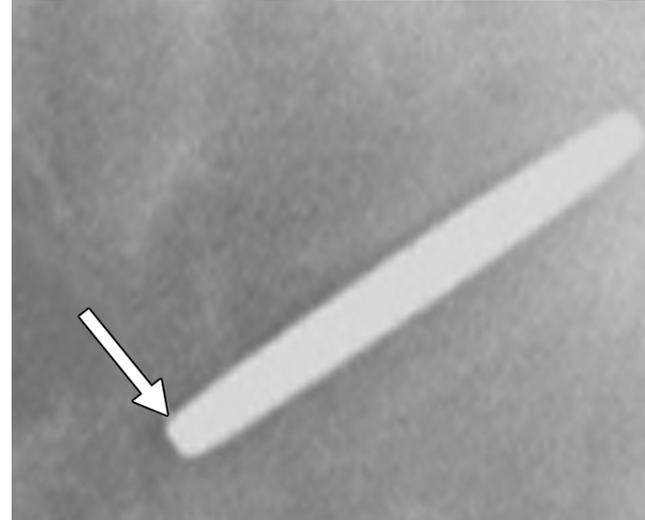
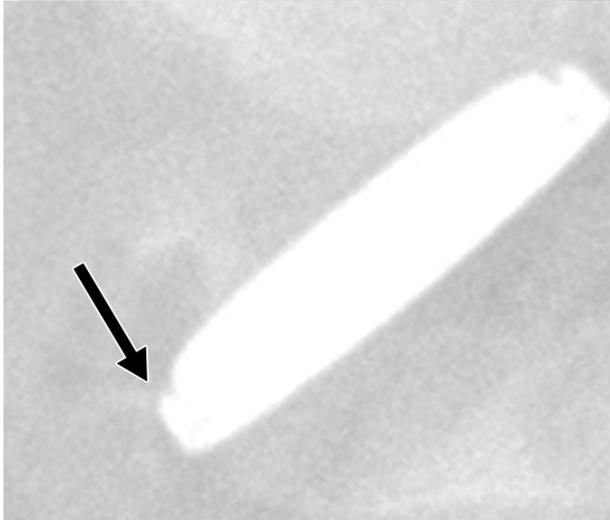
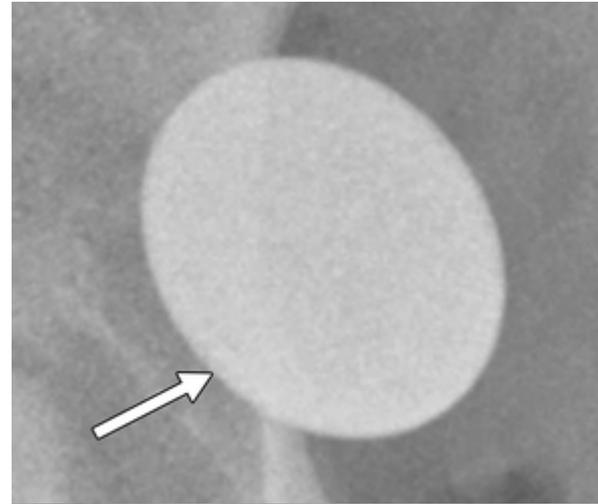
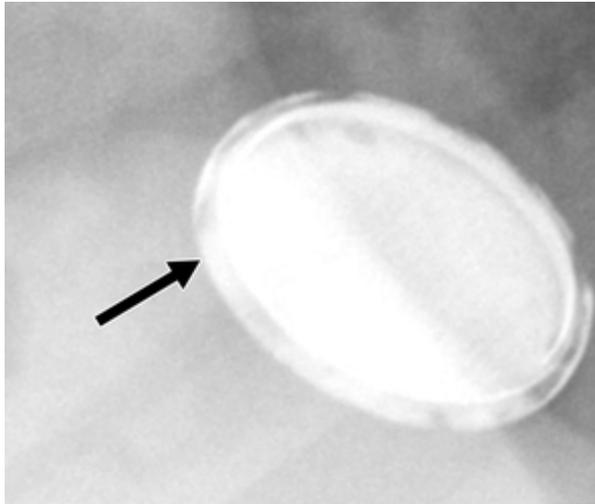
- The treatment for watch battery ingestion is controversial. Most authorities avoid surgery or endoscopy in routine cases in which the battery is found in the stomach.
- Evidence for lack of progression through the gastrointestinal tract is cause for concern and intervention.
- Batteries usually can be removed from the esophagus, stomach, and duodenum by endoscopy
- Disk batteries impacted in the esophagus are considered to be especially dangerous and should be removed promptly.

RadioGraphics 2003; 23:731–757

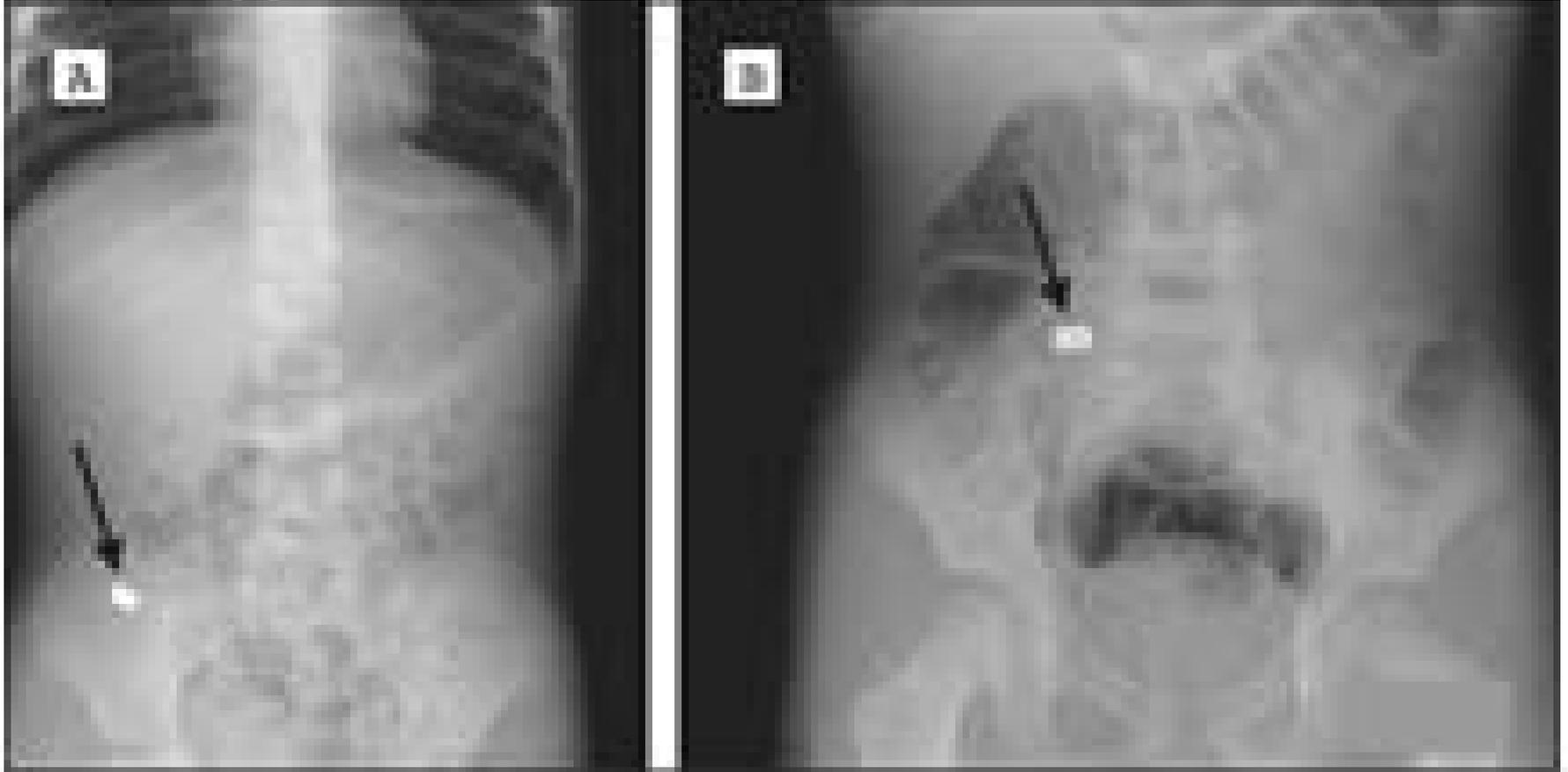
Battery Ingestion

- 6.7-fold increase of button battery ingestions with major or fatal outcomes from 1985 to 2009 (National Poison Data System).
- Ingestions of 20- to 25-mm-diameter cells increased from 1% to 18% of ingested button batteries (1990–2008), paralleling the rise in lithium-cell ingestions (1.3% to 24%).
- Outcomes worse for large-diameter lithium cells (≥ 20 mm) and children who were younger than 4 years. The 20-mm lithium cell was implicated in most severe outcomes.
- Severe burns with sequelae occurred in just 2 to 2.5 hours. Most fatal (92%) or major outcome (56%) ingestions were not witnessed
- 27% of major outcome and 54% of fatal cases were misdiagnosed, usually because of nonspecific presentations.
- Injuries extended after removal, with delayed esophageal perforations, tracheoesophageal fistulas, fistulization into major vessels, and massive hemorrhage.

Battery vs Coin

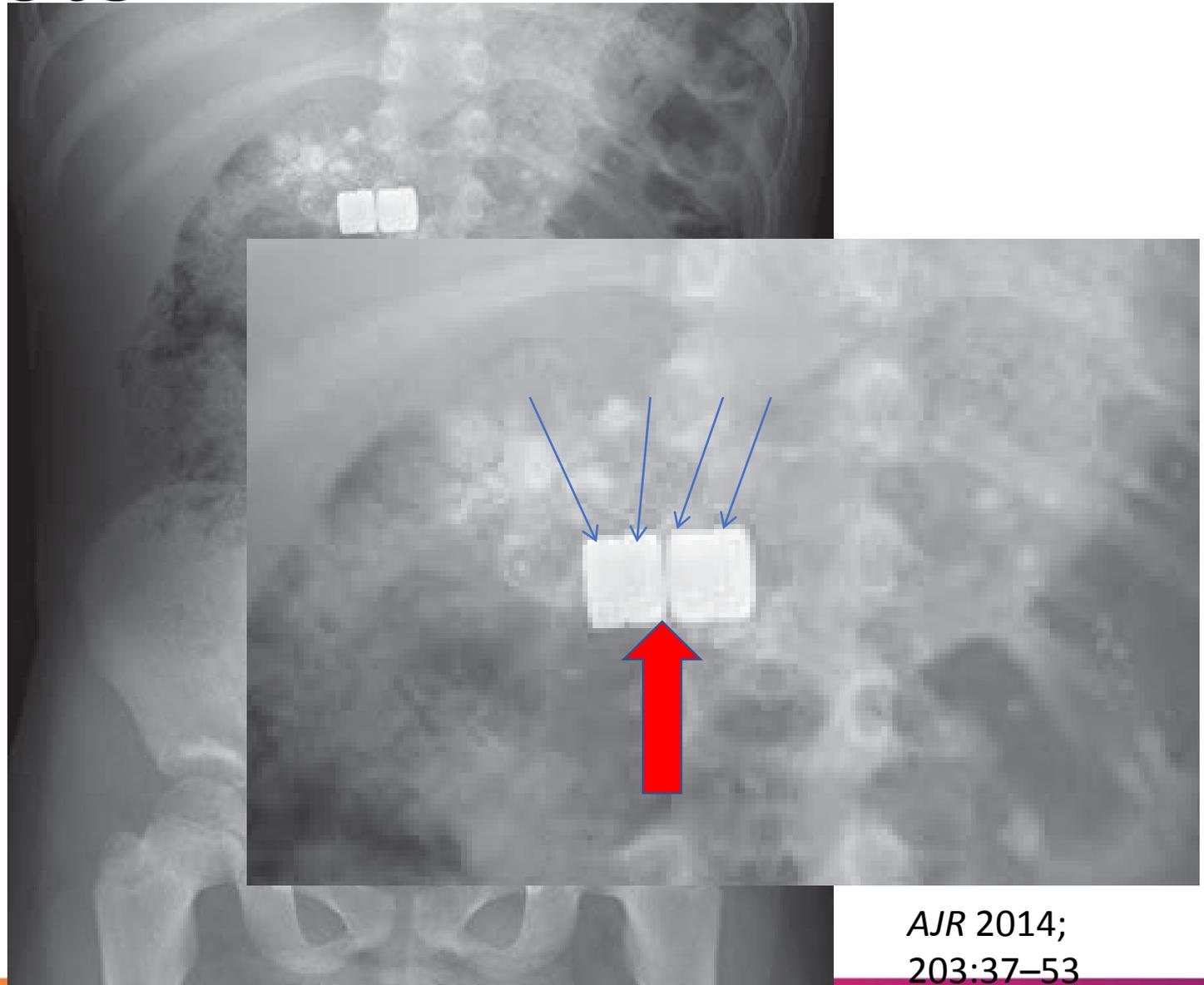


Magnets



Abdominal radiographs taken at presentation show what appears to be the 2 magnets stuck together in the cecum (A, arrow) and at 5 hours later when the magnets have not shifted upward as would be expected if in the cecum (B, arrow).

Magnets

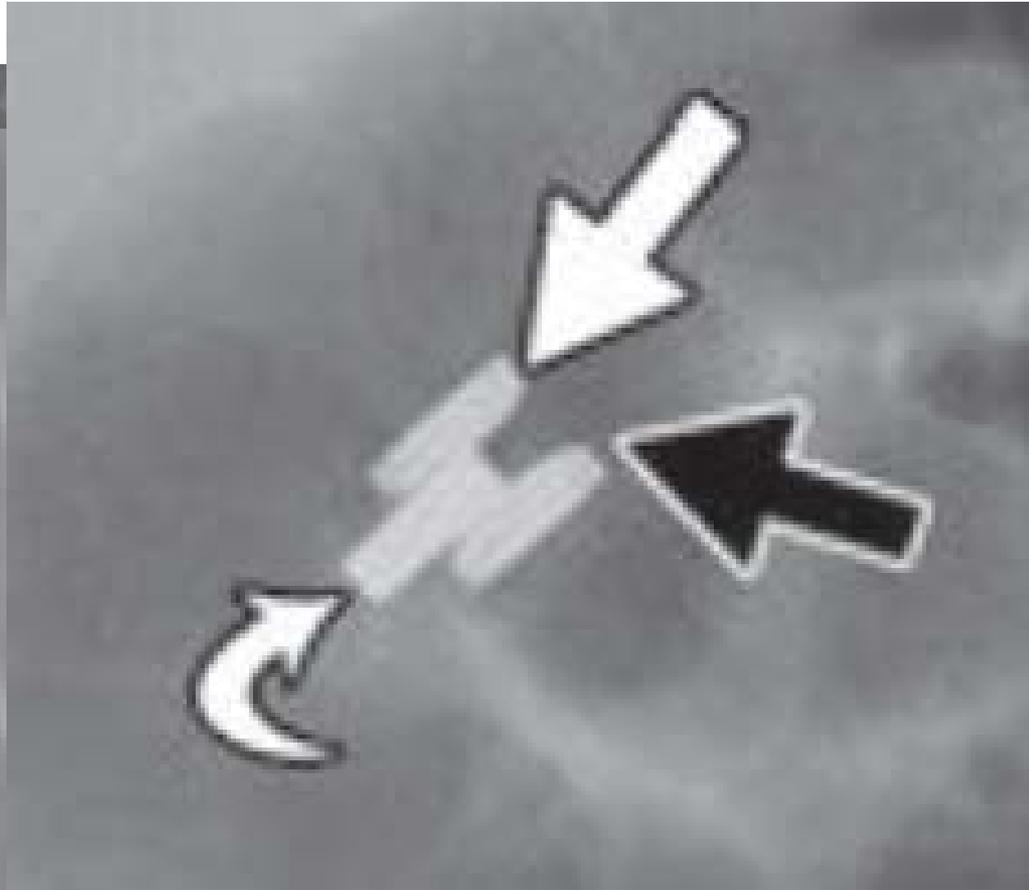
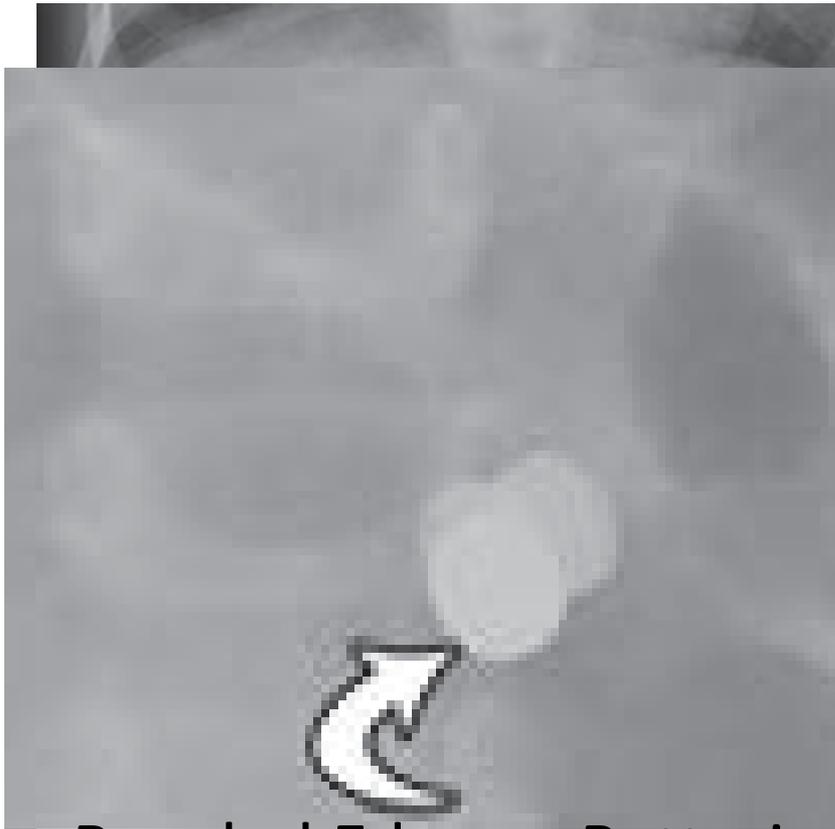


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Magnets

- Magnet ingestion can be confounded by **stacked magnets, which can simulate a single object**
- **Magnifying** object on radiograph helps to appreciate **notches** between the pieces, improving the detection of multiple magnets
- Fluoroscopy and low-dose limited-field CT are potential adjunct modalities useful for problem solving
- **Gap between magnets** on an imaging study raises the possibility of entrapment and ischemic damage to the interposed bowel wall and should trigger emergent surgical evaluation
- **Failure of a magnet to move** through the lumen on sequential radiographs should also prompt surgical or endoscopic evaluation
- Magnets within endoscopic reach are a reason for urgent endoscopy

Quiz Case

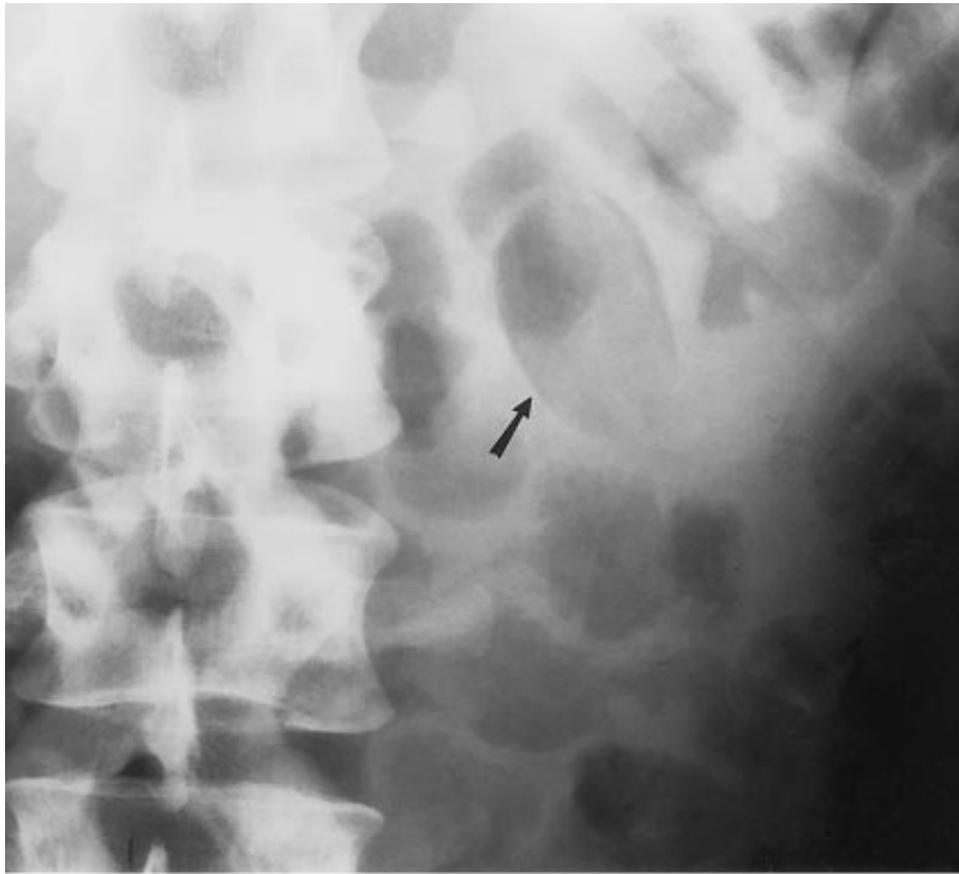


Beveled Edges = Batteries

2 batteries held together by magnet with bowel perforation and fistula

AJR:203,
July 2014

Foreign Bodies



*Ingested Drug Packets for Smuggling
Ovoid or Cylindrical
Radiolucent or Dense*

