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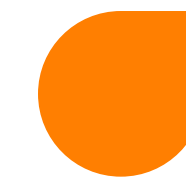
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قسم العلوم الإشعاعية

كلية العلوم الطبية التطبيقية



Chest and Abdomen X-Ray Basic interpretation For Technical Quality





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Chest x-ray (CXR)

Basic interpretation for Technical quality

- ▶ Image Identification
- ▶ Projection & patient position
- ▶ Coverage area
- ▶ Rotation.
- ▶ Penetration.
- ▶ Degree of inspiration.



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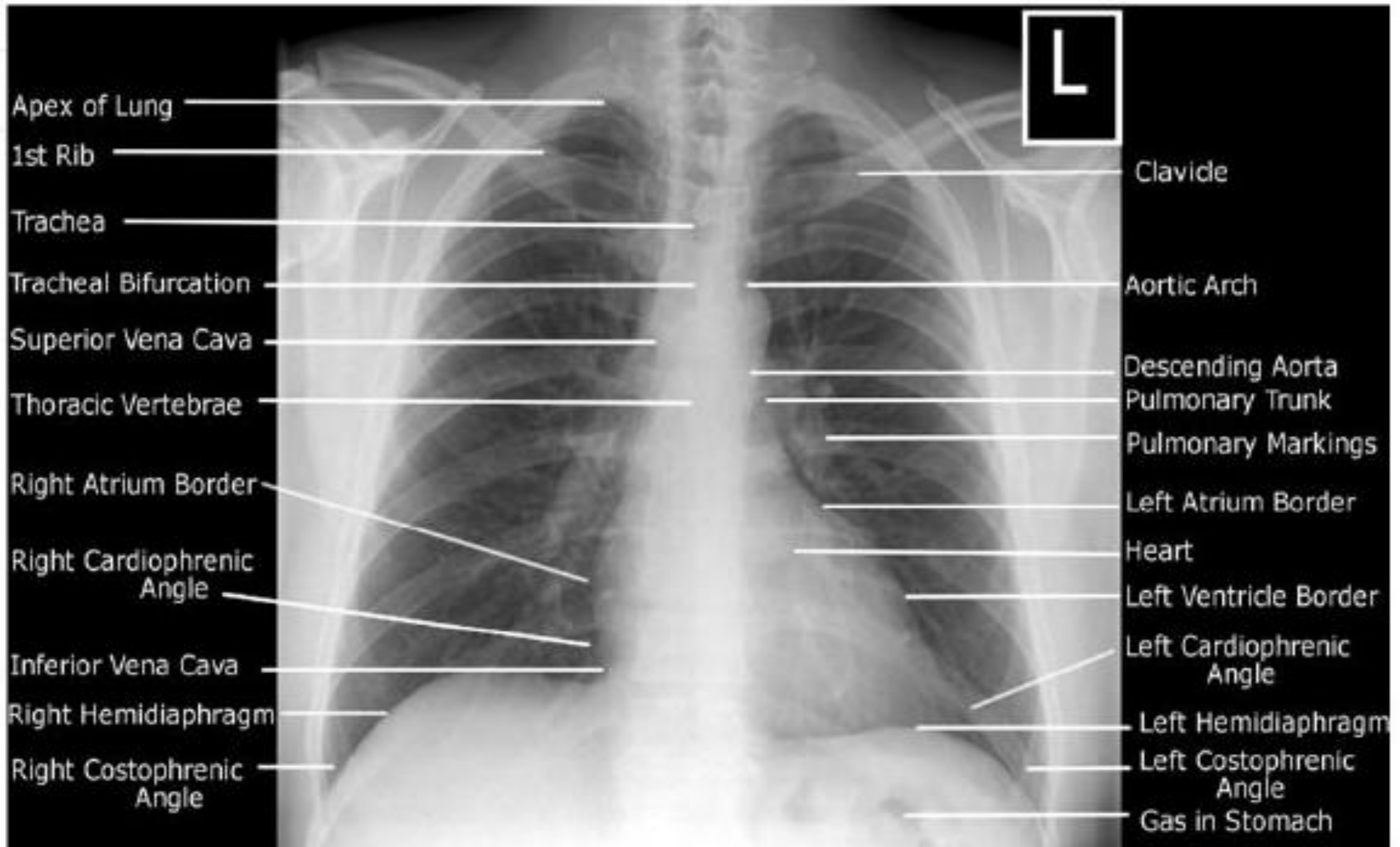
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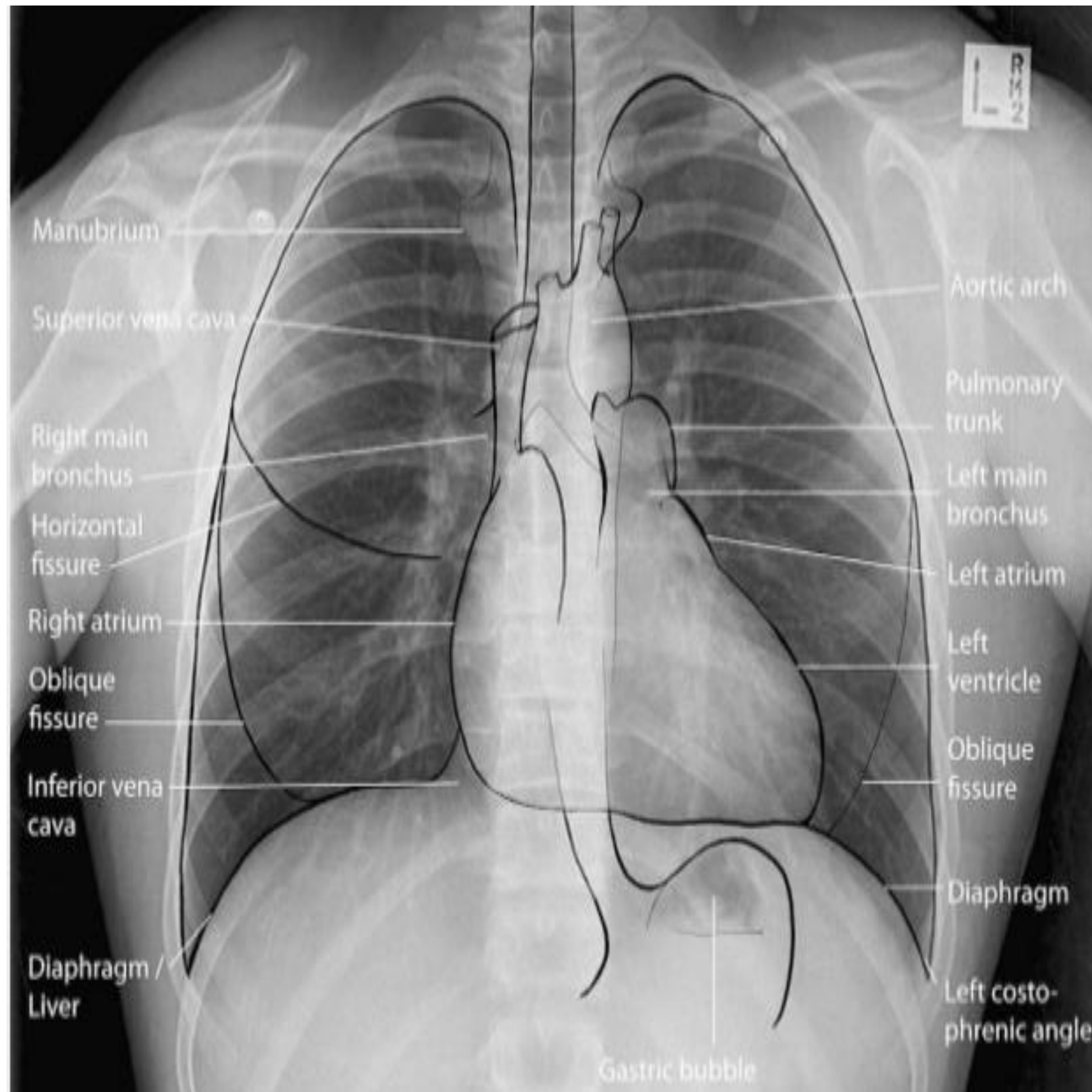
Technical points

- High Kv(110-130) to demonstrate long gray shades in lungs (low contrast), with short time to minimize the motion and loss of sharpness + using grid.
- Using wais shield to cover gonad area
- SID is 180cm to overcome heart magnification.
- CXR should be in erect position (if the patient situation possible)
- Basic views are: PA and lateral. Special views include: AP or PA apical(Lordatic), lateral & dorsal decubitus, AP supine (or semi-erect), and oblique.

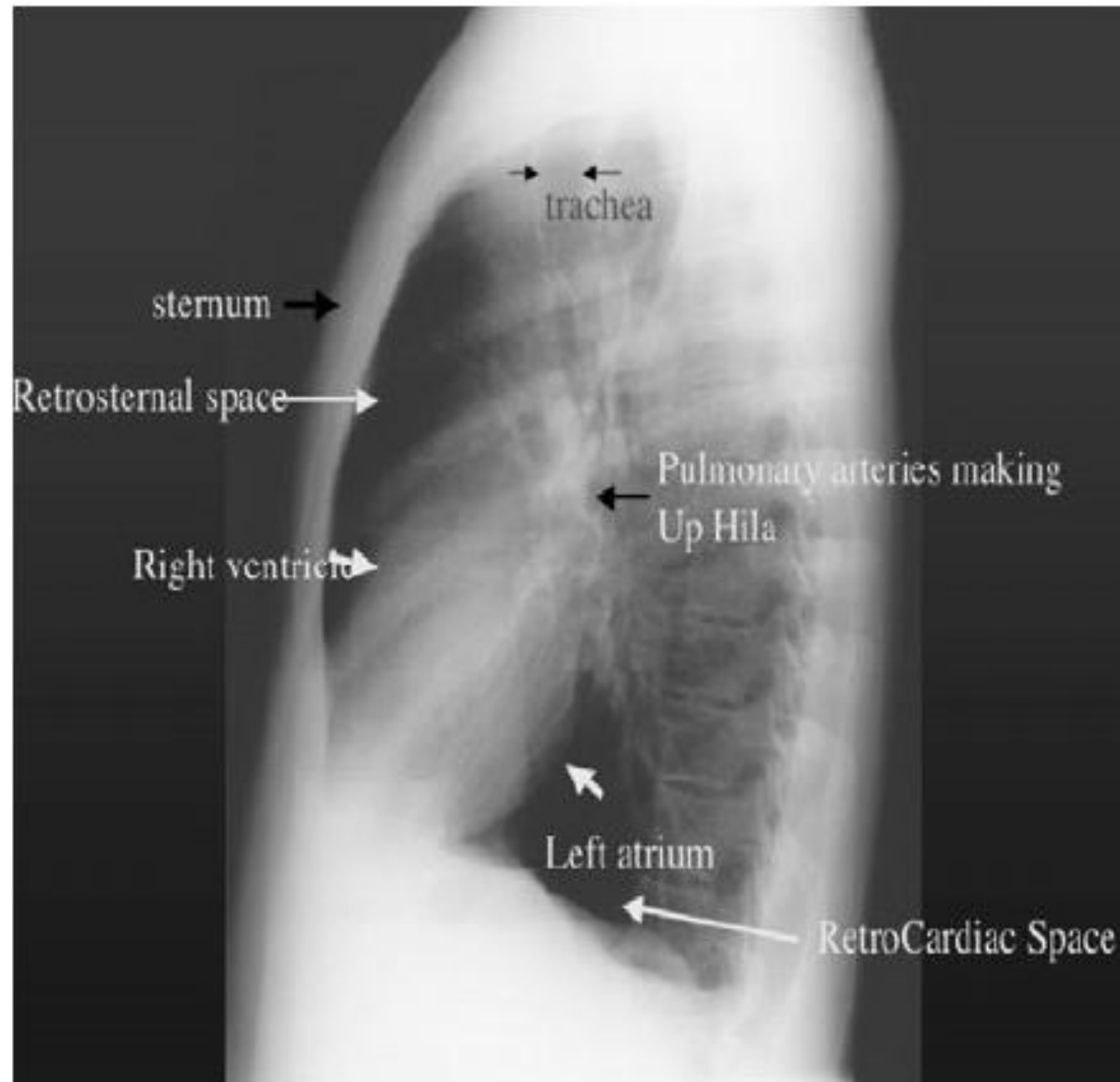
PA Chest (radiographic anatomy)



PA Chest (radiographic anatomy)



Lateral Chest (radiographic anatomy)



Lateral Chest (radiographic anatomy)

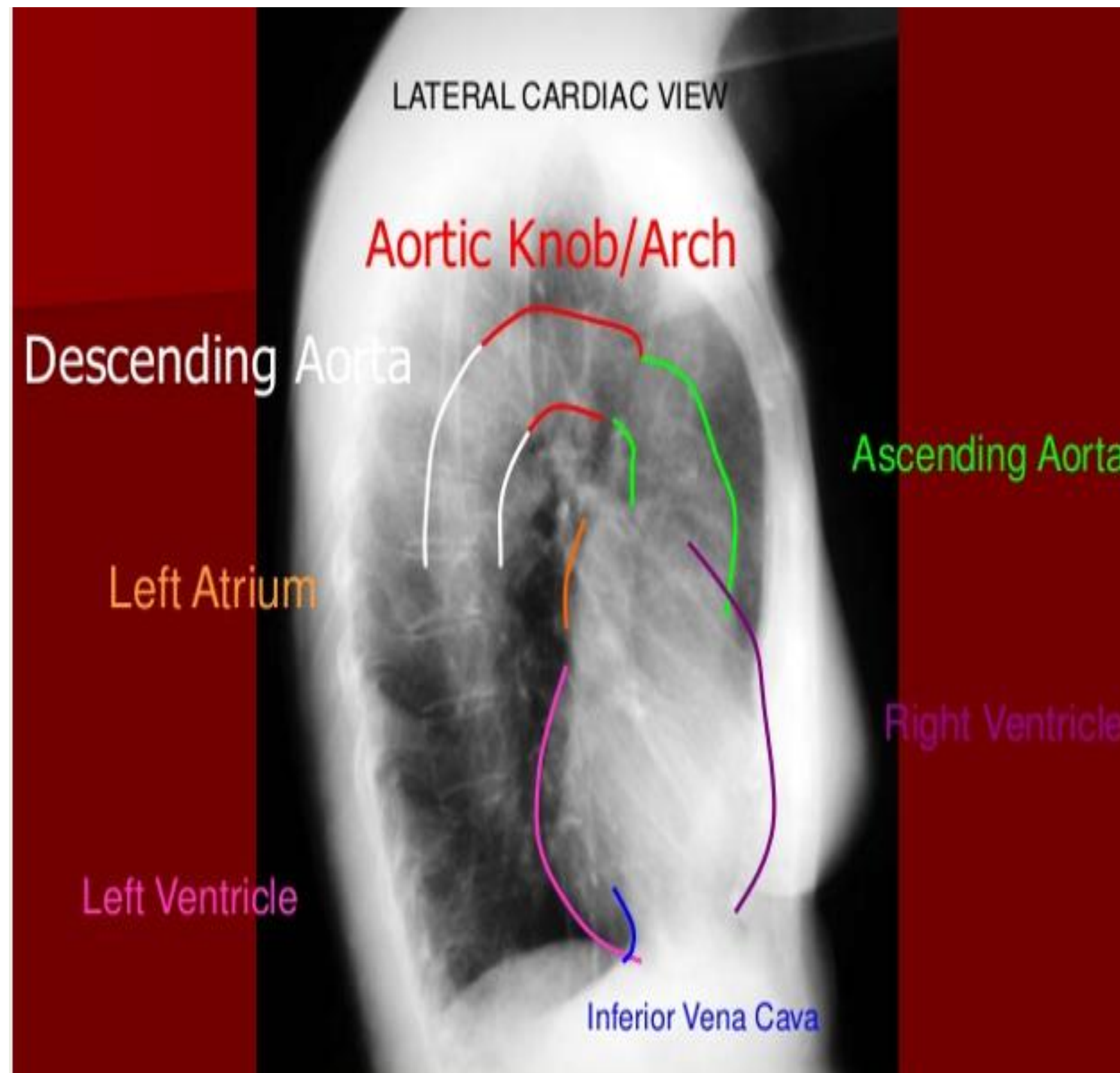


Image Identification

- ▶ Check left/right marker (can be wrong or not visible).

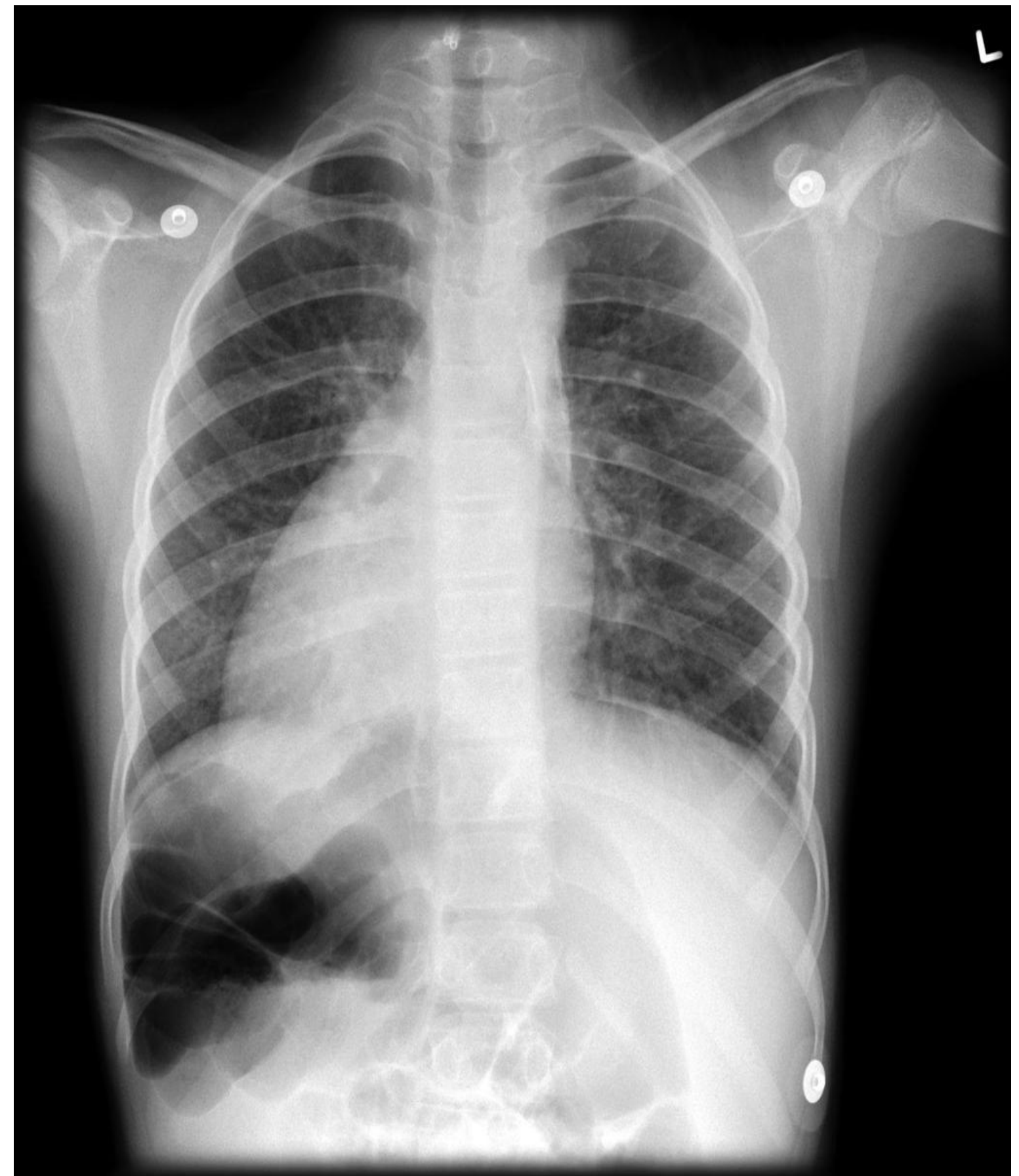


- ▶ Do not assume the heart or the gastric bubble are always on the left:
 - eg. Situs inversus , Dextrocardia
 - The mediastinum can be pushed or pulled to the right by lung pathology.

DEXTROCARDIA

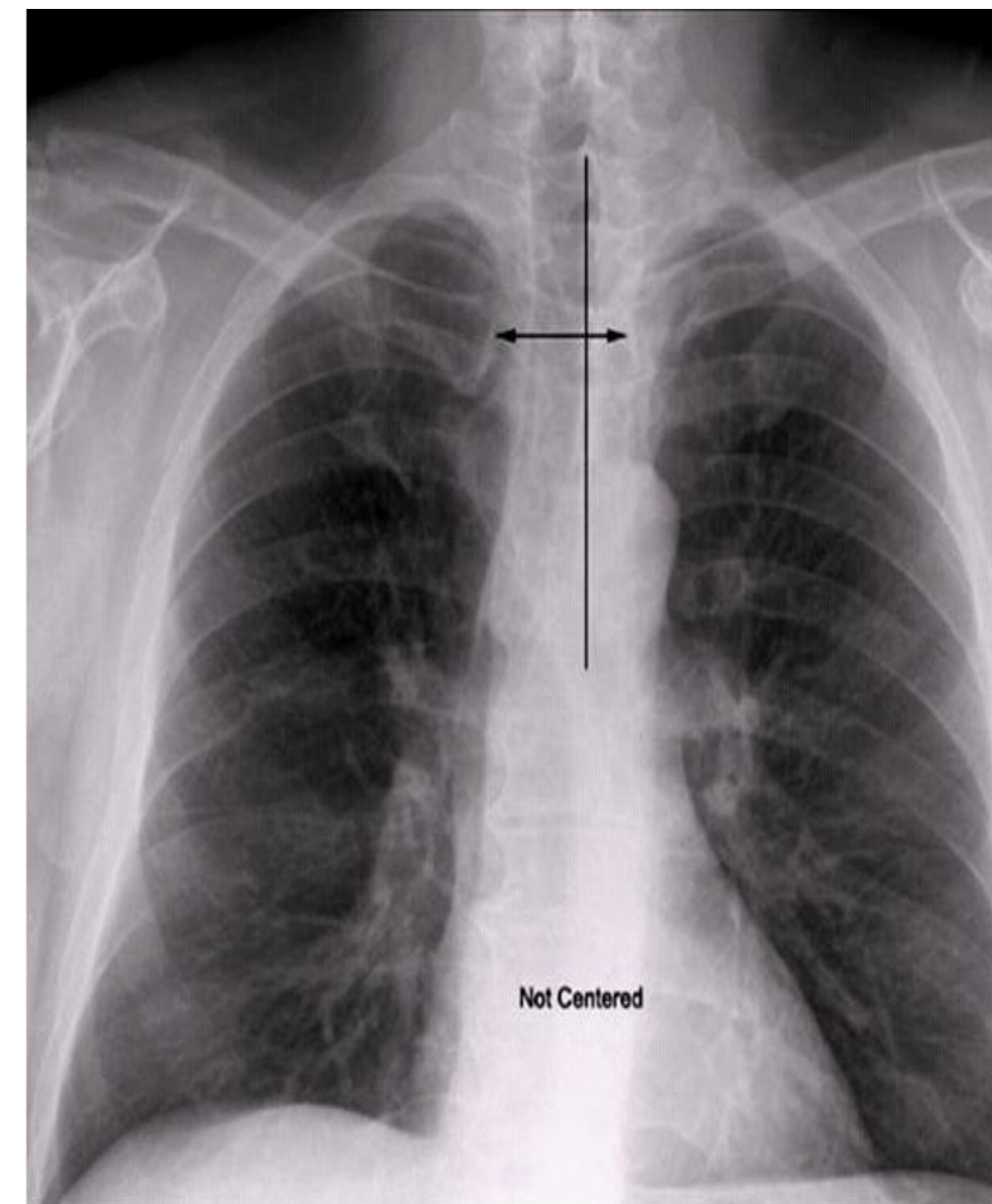
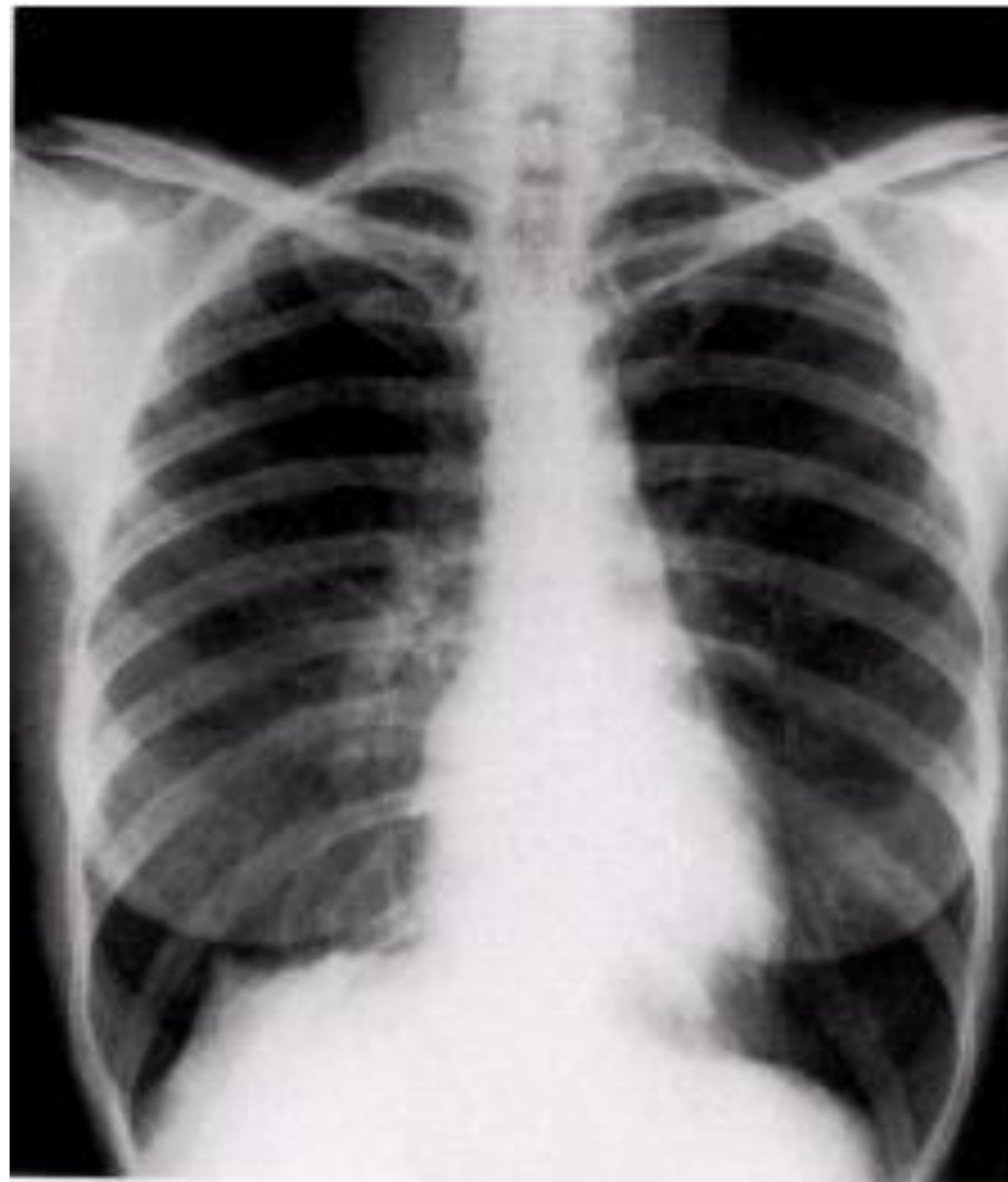


SITUS INVERSUS



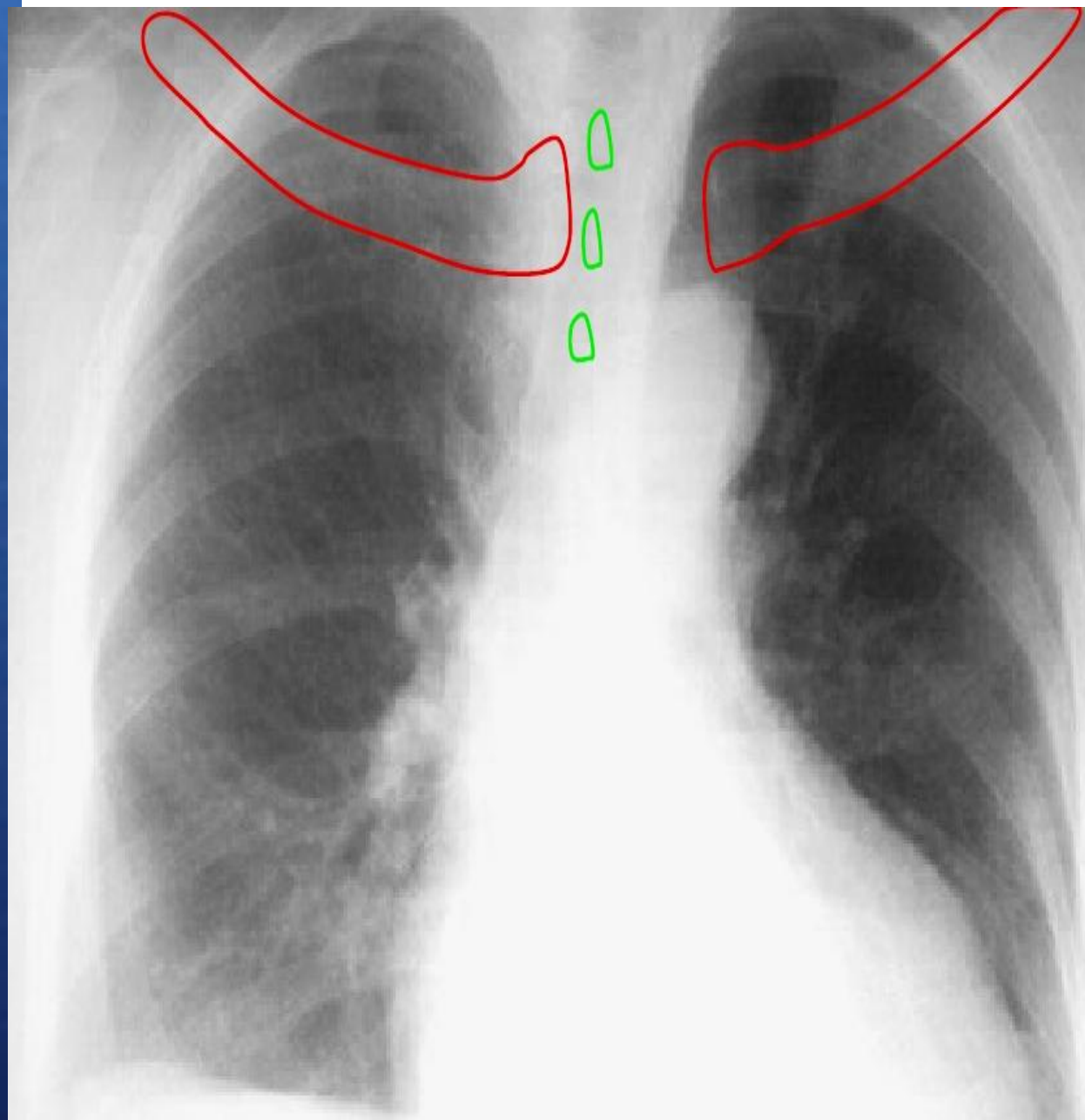
Coverage area:

- ▶ The lung apices, Costophrenic angles, and lateral margin of the ribs should be included in the film.
- ▶ The scapulae should be moved lateral to the lung fields (how?)
- ▶ The spine should be centered on the film

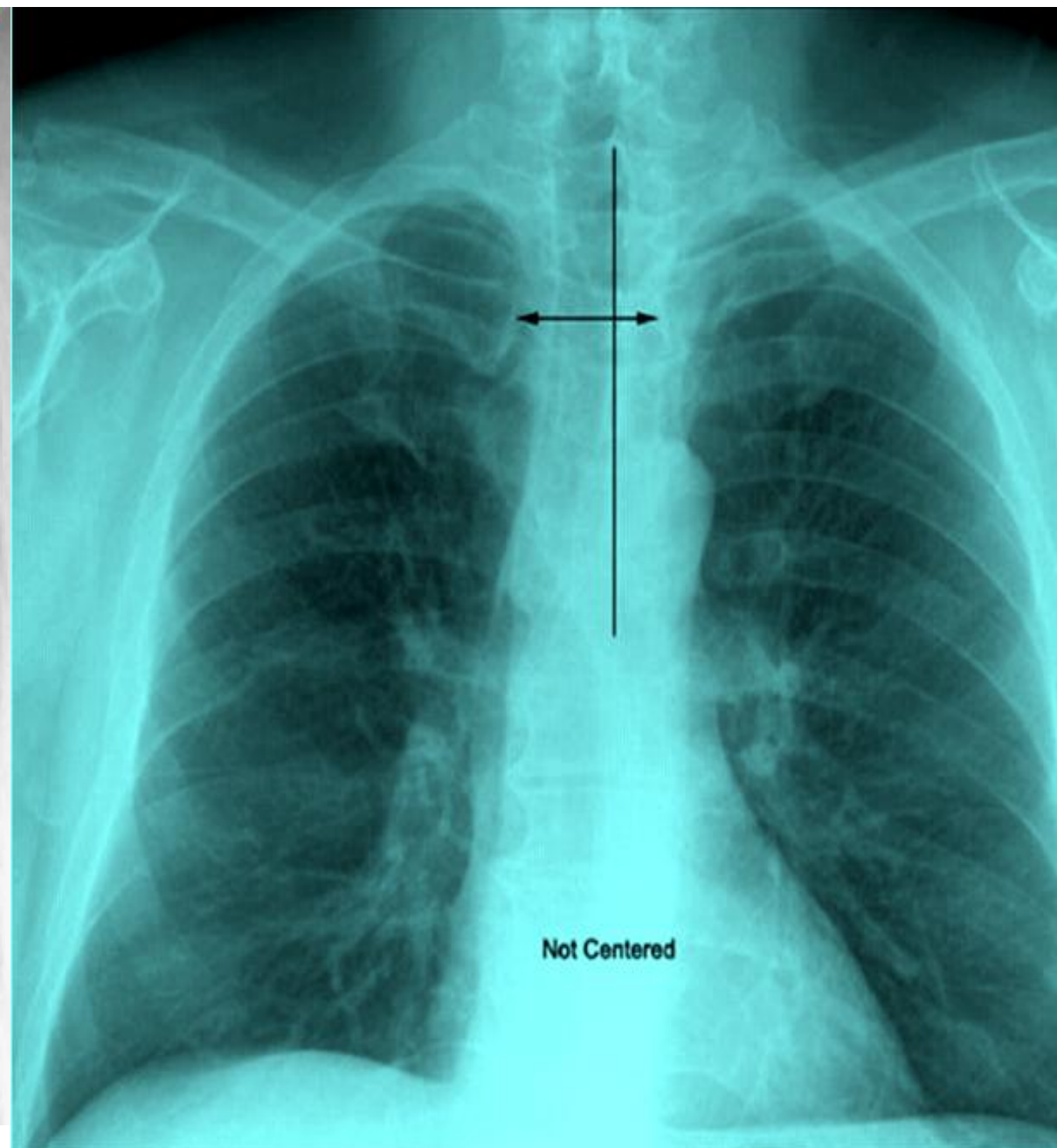


Rotation:

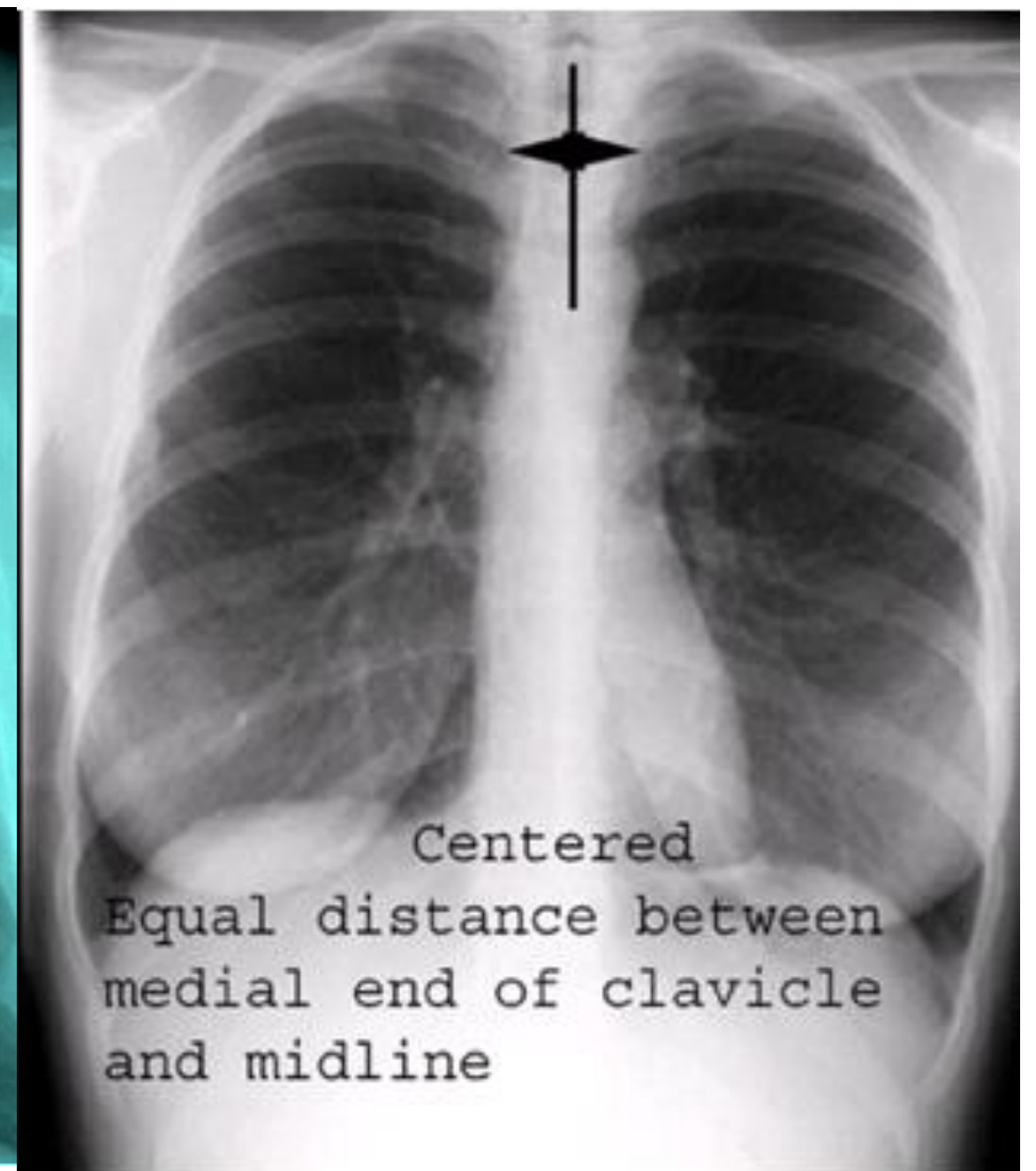
Medial ends of the clavicles should be equidistant from the spinous process of T spine .



X



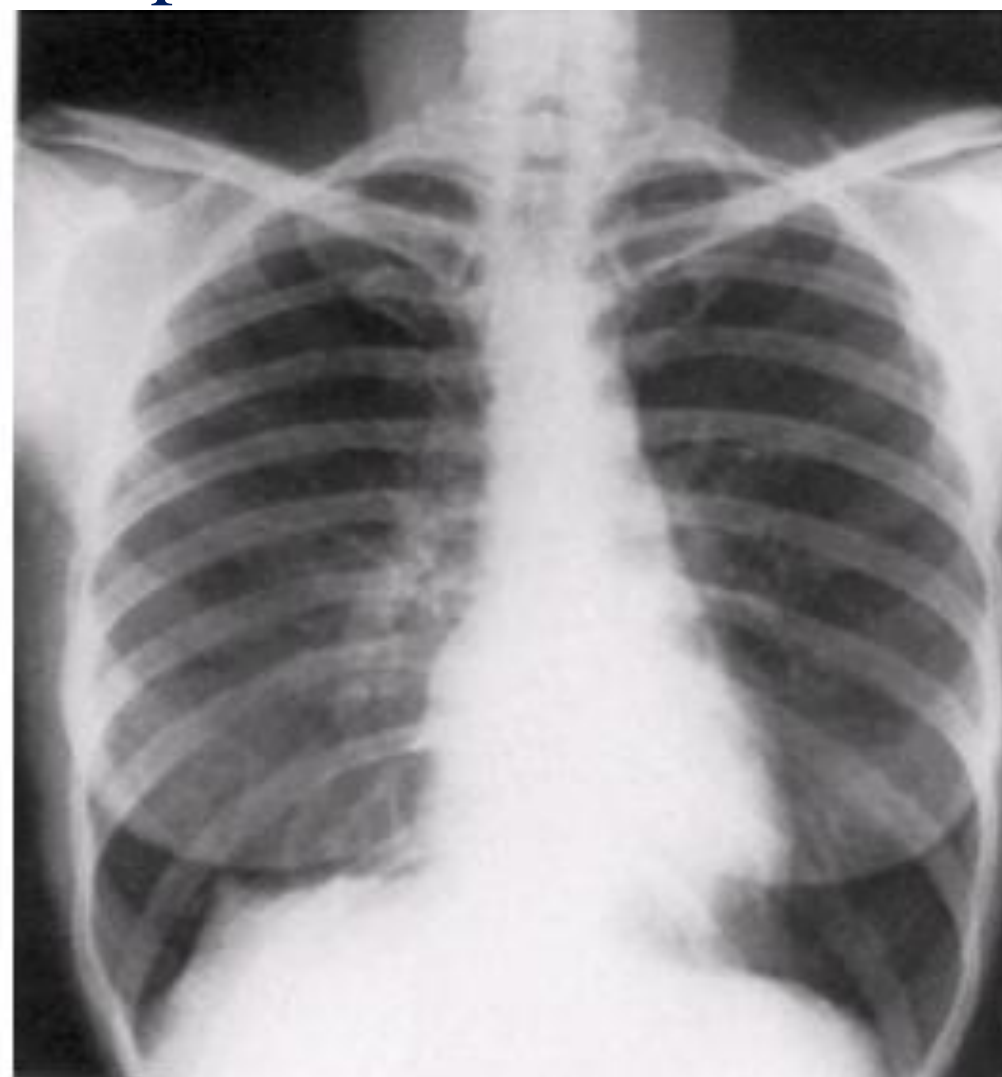
X



OK

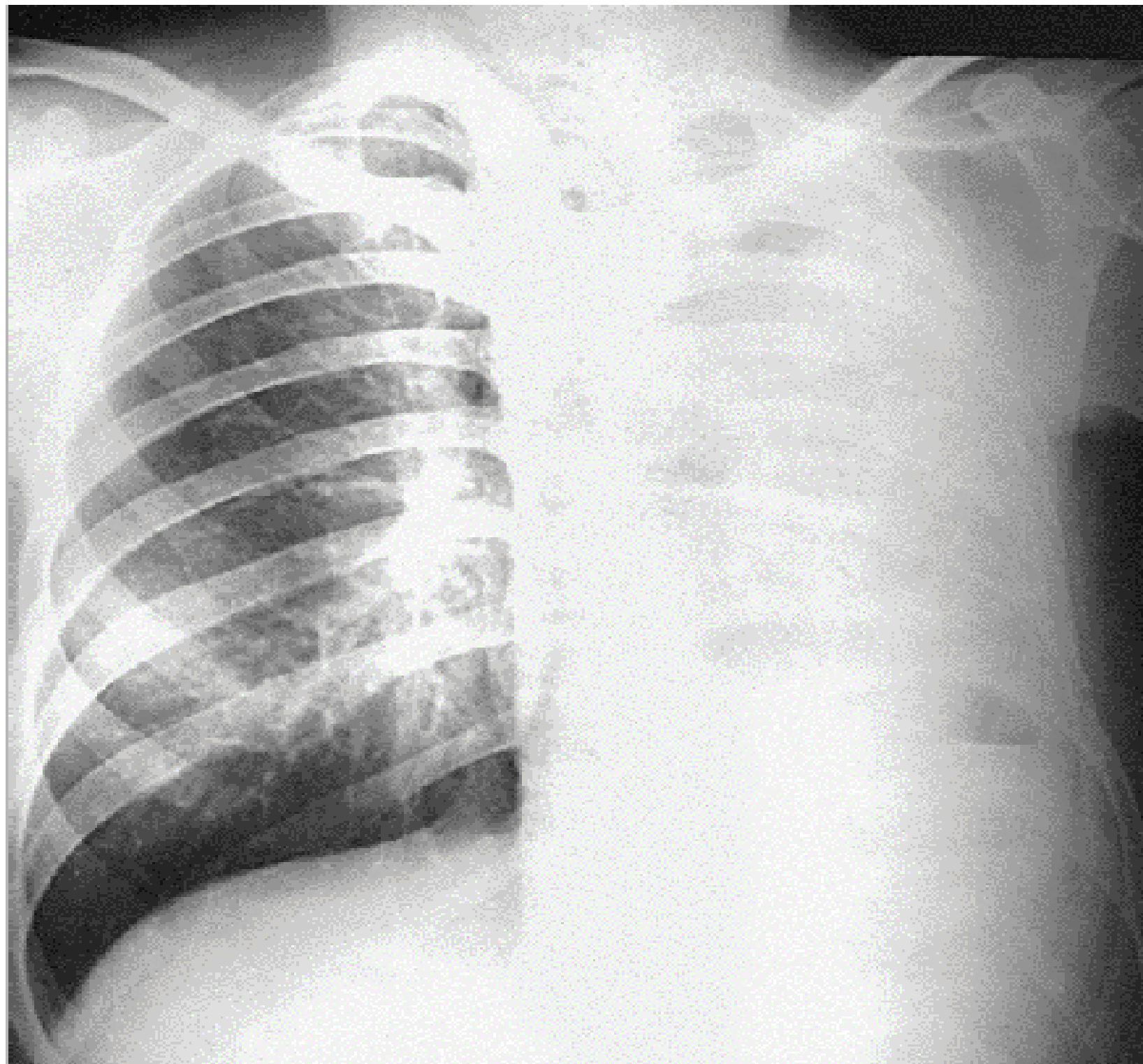
Penetration:

- + Look at the **lower & upper part** of the cardiac shadow.
- + The vertebral bodies should not be visible through the cardiac & pulmonary vessels traced to the edges of the lungs
- + over penetrated \Rightarrow Lung fields darker than normal may miss low density lesions.
- + under penetrated \Rightarrow lung fields will appear falsely white.
- + When comparing x-rays, the level of penetration should be taken into consideration.

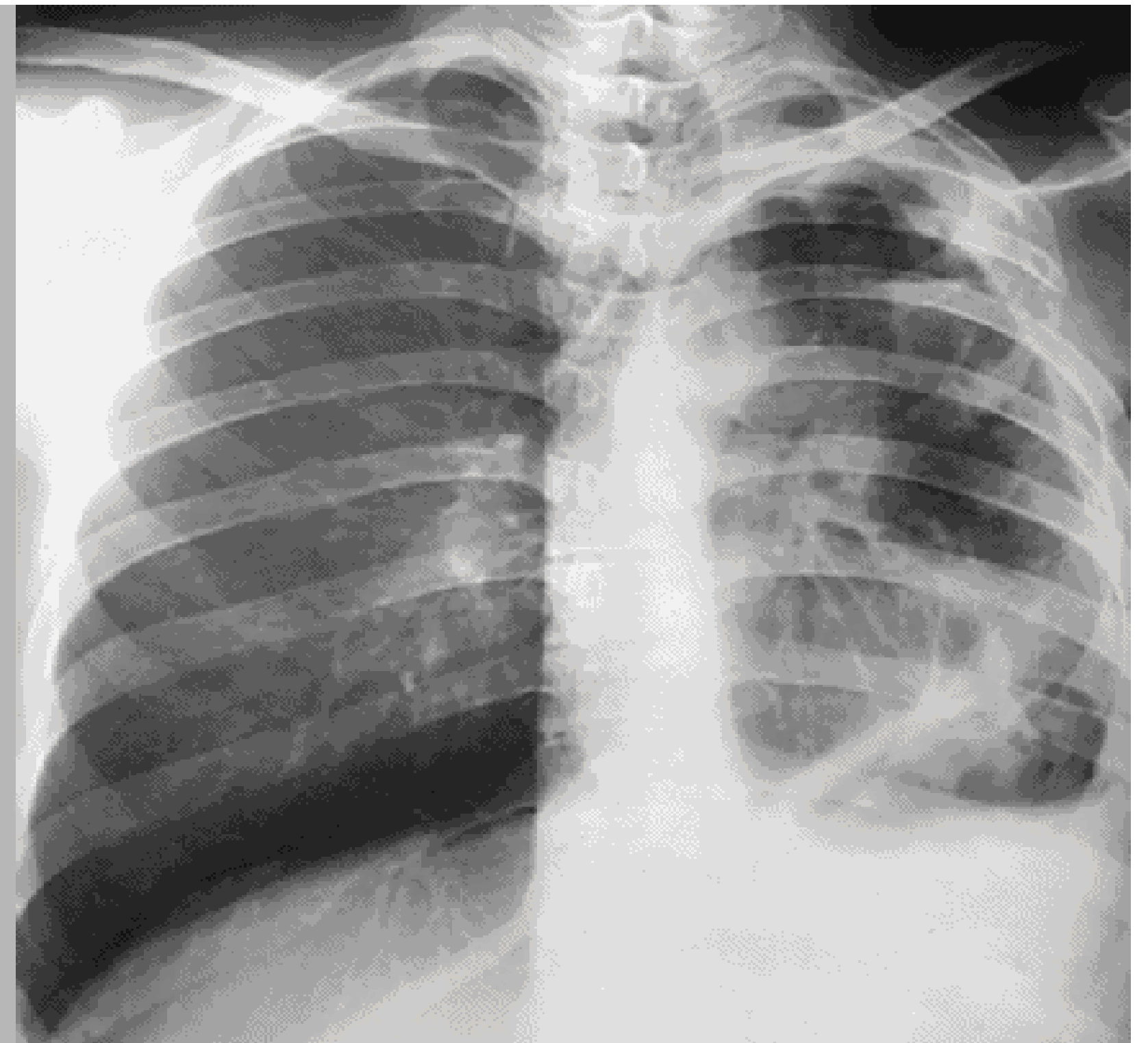


Non-grid

Weak radiations will absorb by bones and other tissues then appears brighter



NON-GRID



GRID

Degree of inspiration:

- ▶ Exposure made in 2nd full inspiration.
- ▶ Count the number of ribs above the diaphragm.

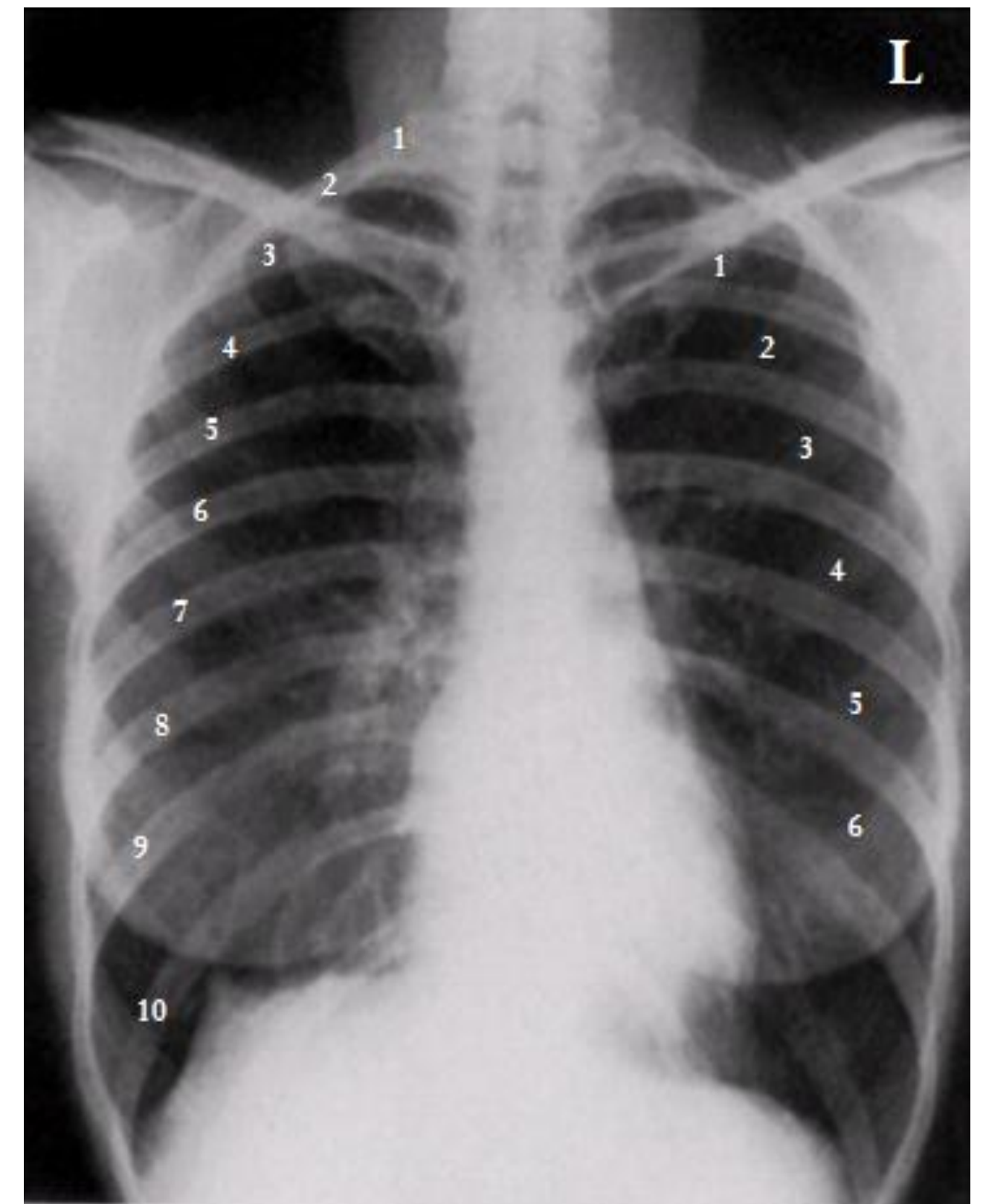
Accurate Inspiration

- Anterior end of 6th rib
- Post end of 10th rib

Should be above the diaphragm.

▶ Poor inspiration will:

- Make the heart look larger
- Give the appearance of basal shadowing
- Cause the trachea to appear deviated to the right.



Projection :

PA (Postero-anterior)



vs.

AP (Antero-Posterior)



AP view

- ▶ The heart appears larger (heart is farther from the film)
- ▶ The clavicles remains at top of lung field
- ▶ Scapula comes in the lung field
- ▶ Diaphragms are higher (usually done in supine position)

Patient position:

Upright



Supine



Upright film

- ▶ Inspiration is greater (abdominal contents are pushing up the lungs and heart in supine position)
- ▶ Normal heart size.



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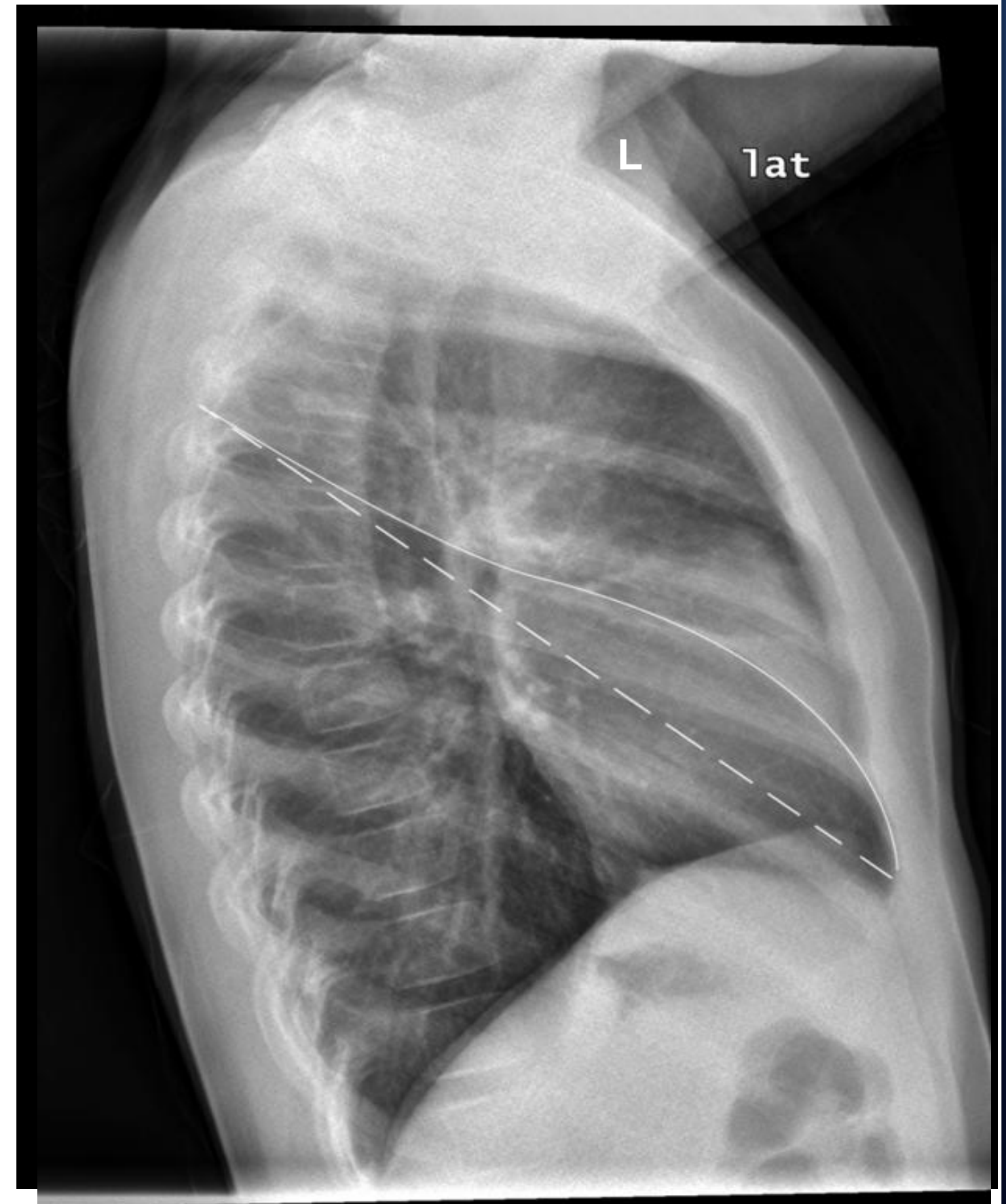
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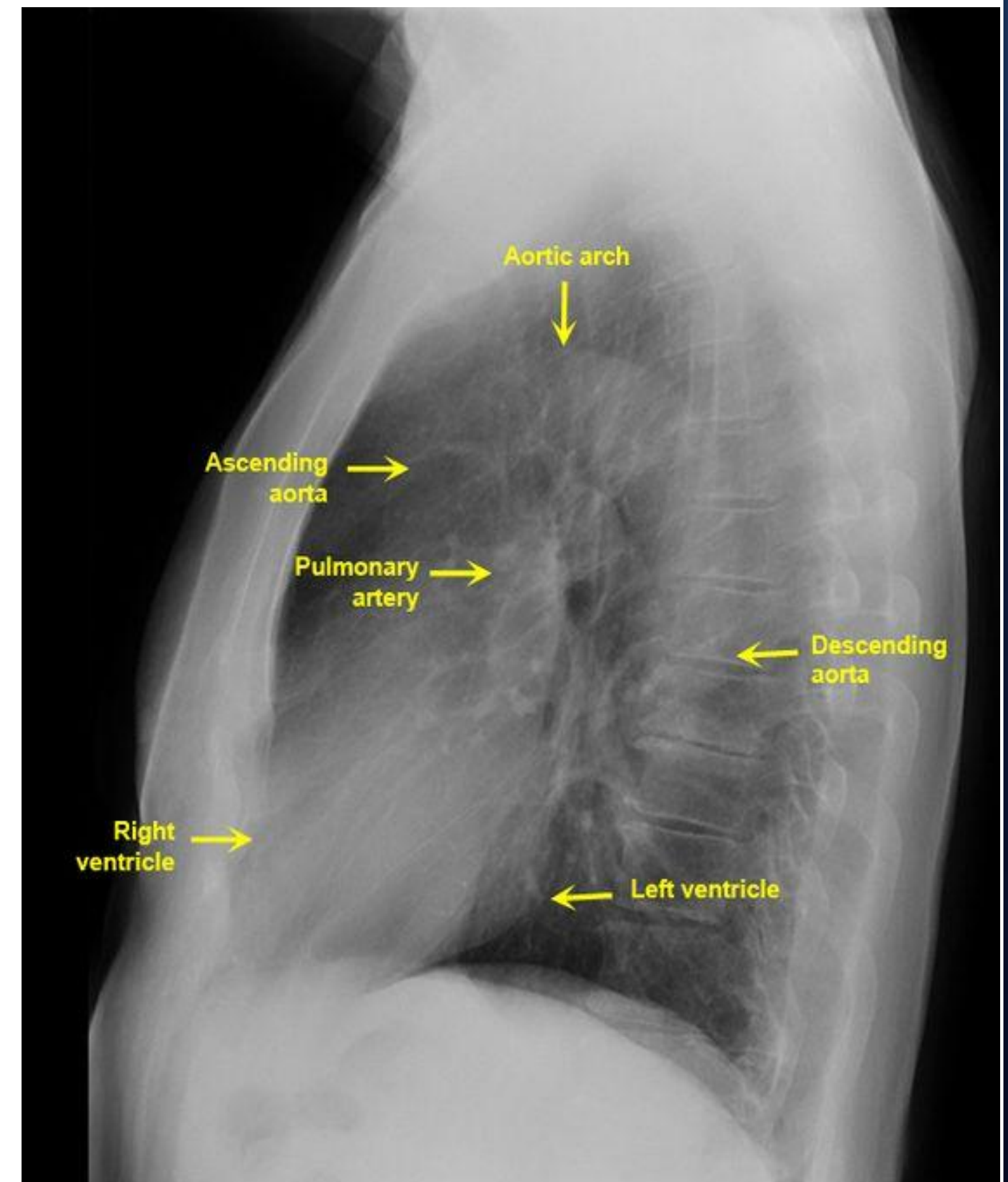
Evaluation of Lateral Chest for Technical quality:

- ▶ The lung apices, Costophrenic angles, spine and sternum should be included in the film.
- ▶ The thorax should be in the center of the collimated area.
- ▶ The heart should adequately penetrated showing sharp outlines, with vascular markings behind the sternum and heart.
- ▶ Patient arms and chin should not superimposed over the upper lung fields



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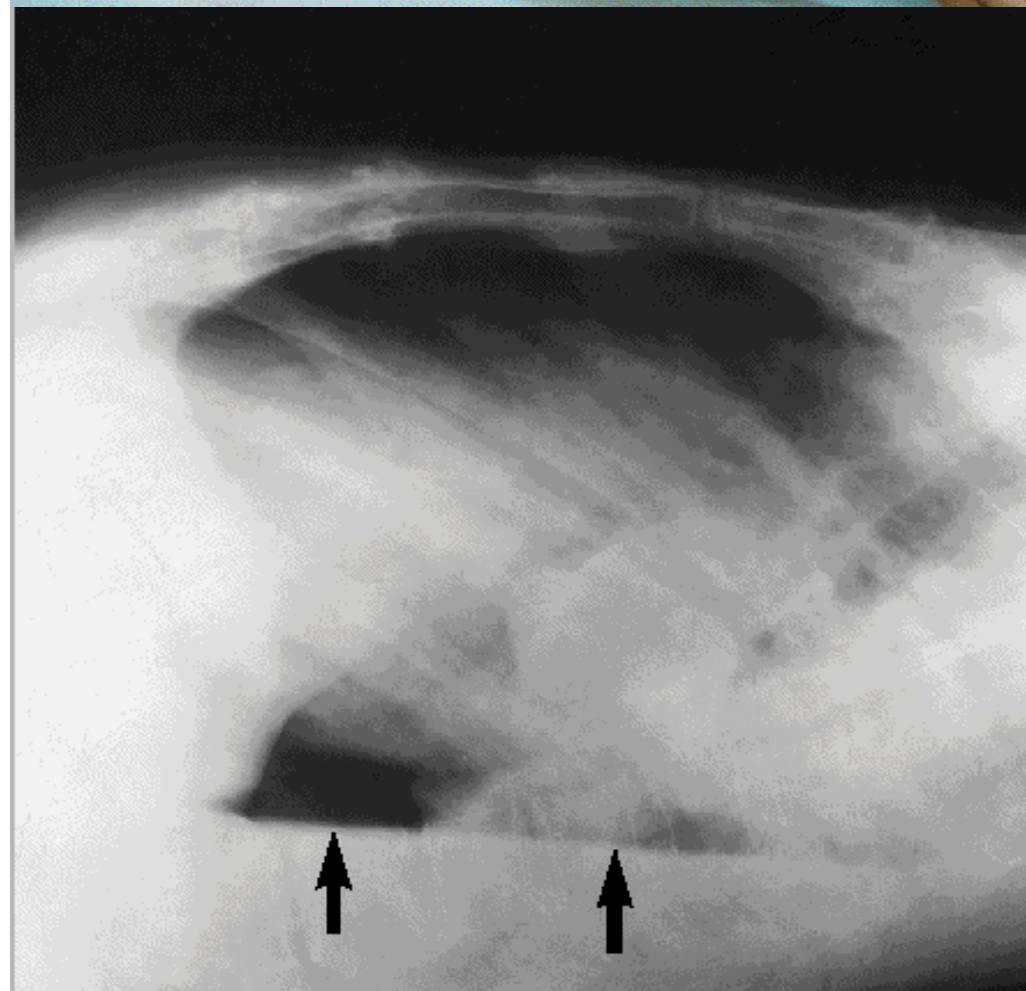


Decubitus position

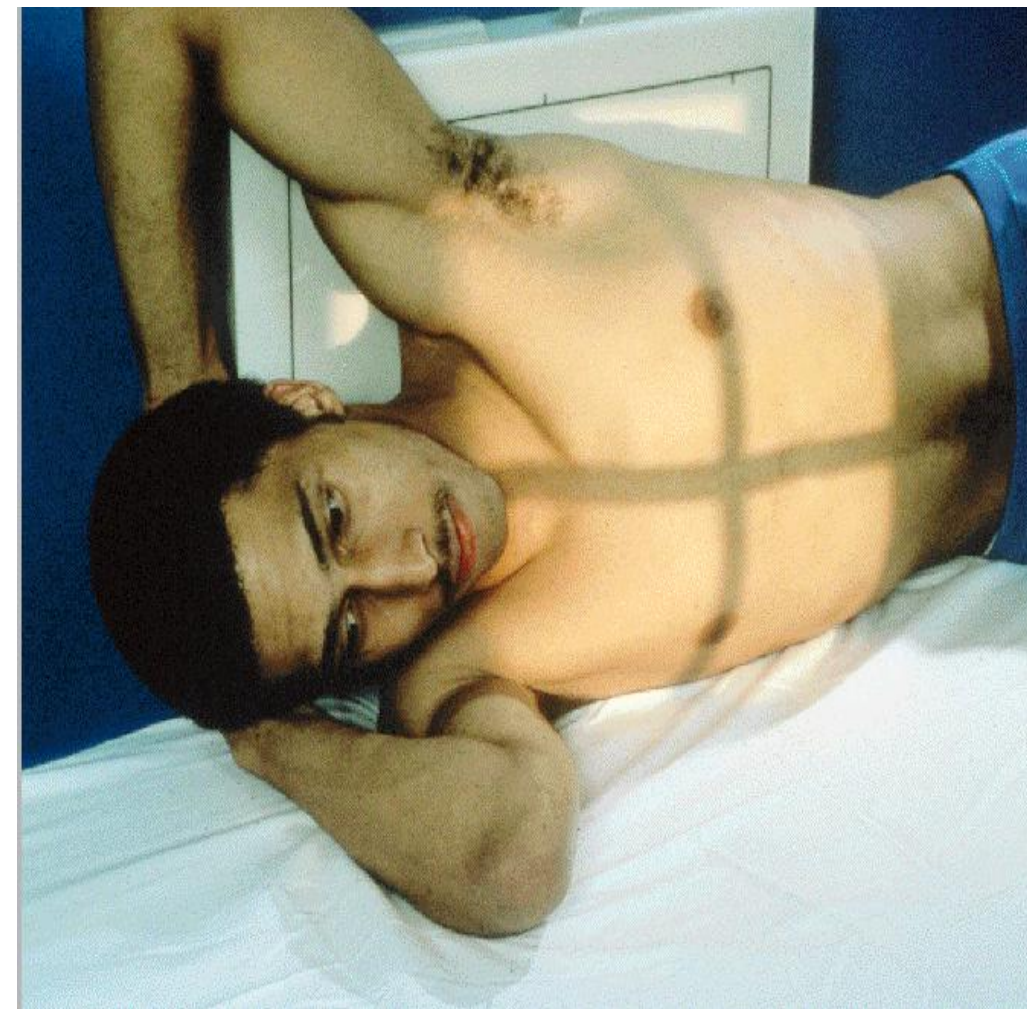
For patients who unable to stand to demonstrate air-fluid level
e.g: pneumothorax, small pleural effusions



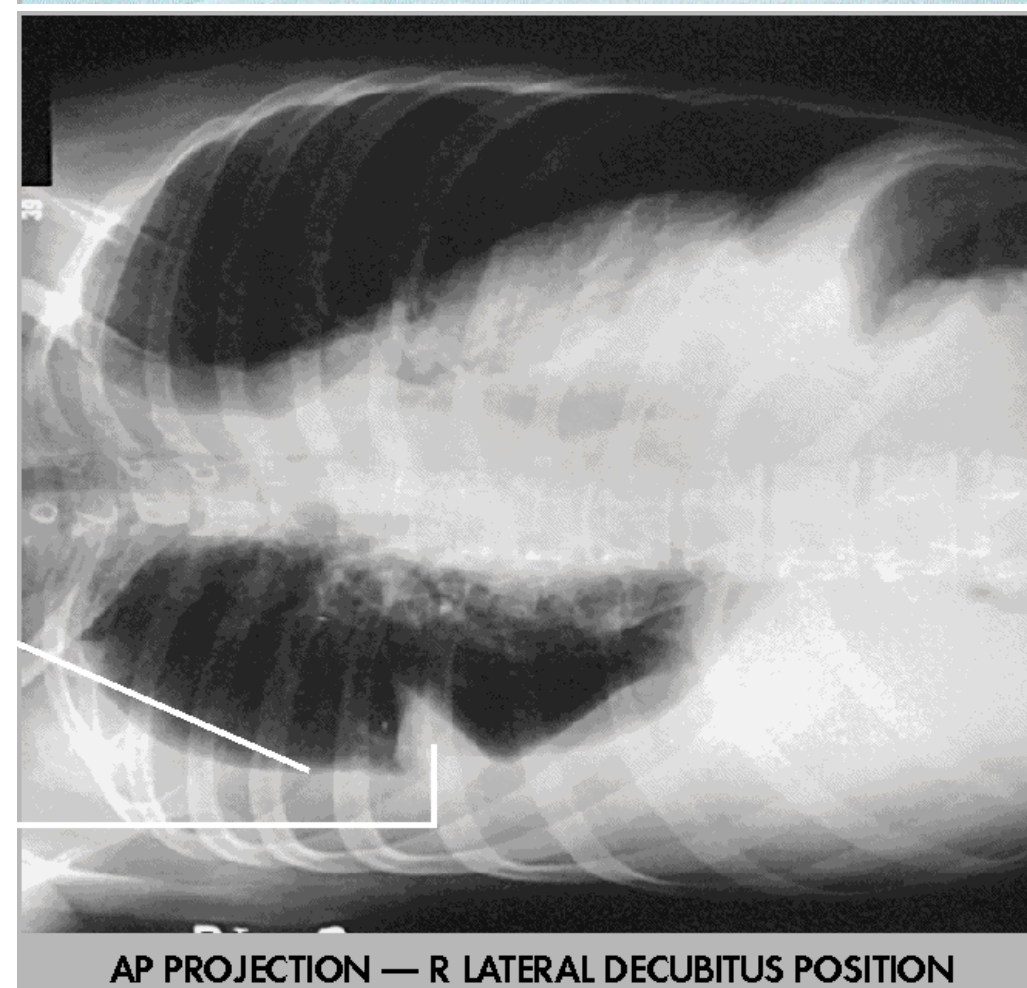
Position:
Dorsal decubitus



projection:
R lateral



Position:
R lateral decubitus



projection:
AP

Apical lordotic position

When the area of interest is the lung apices.

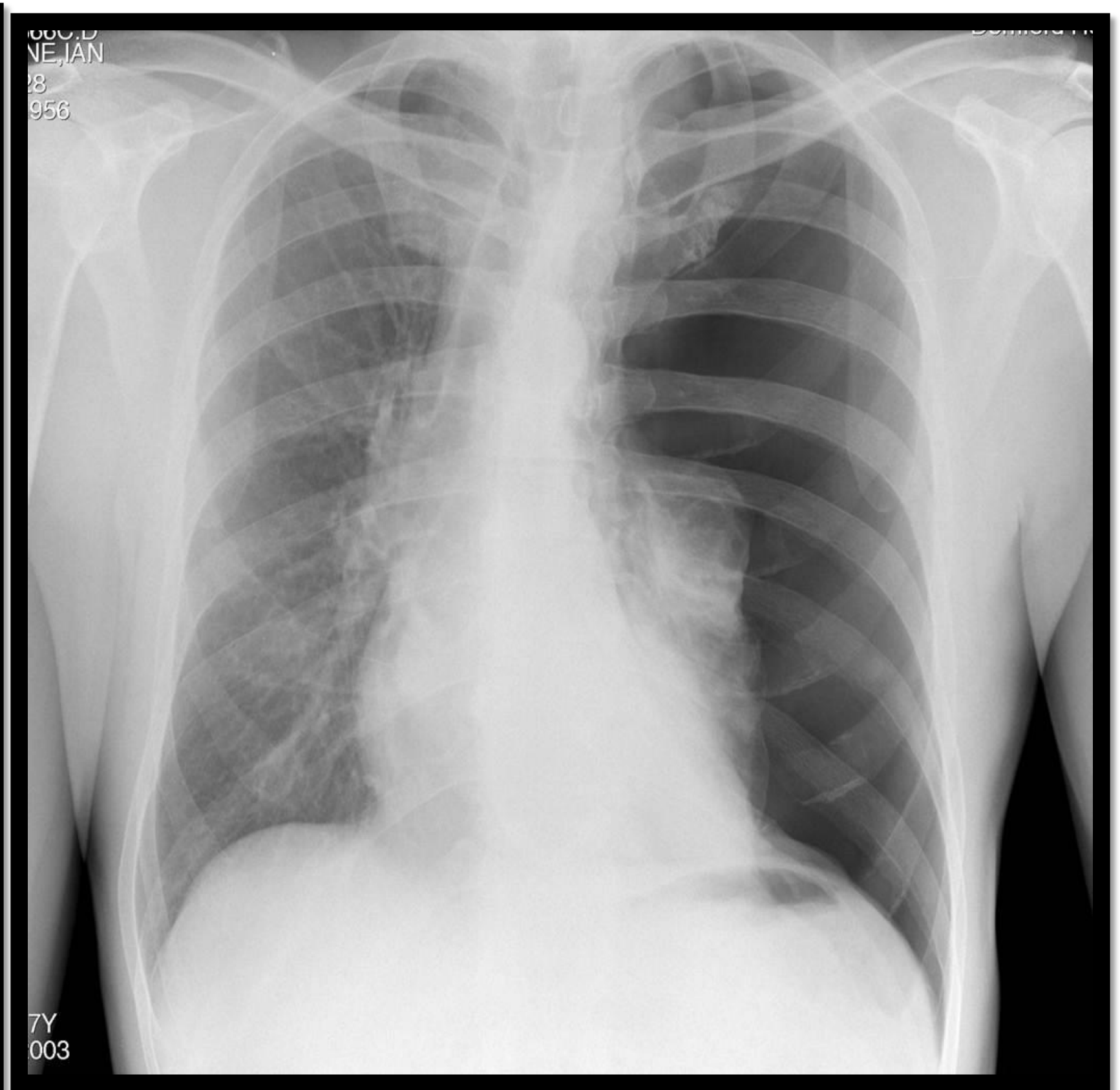
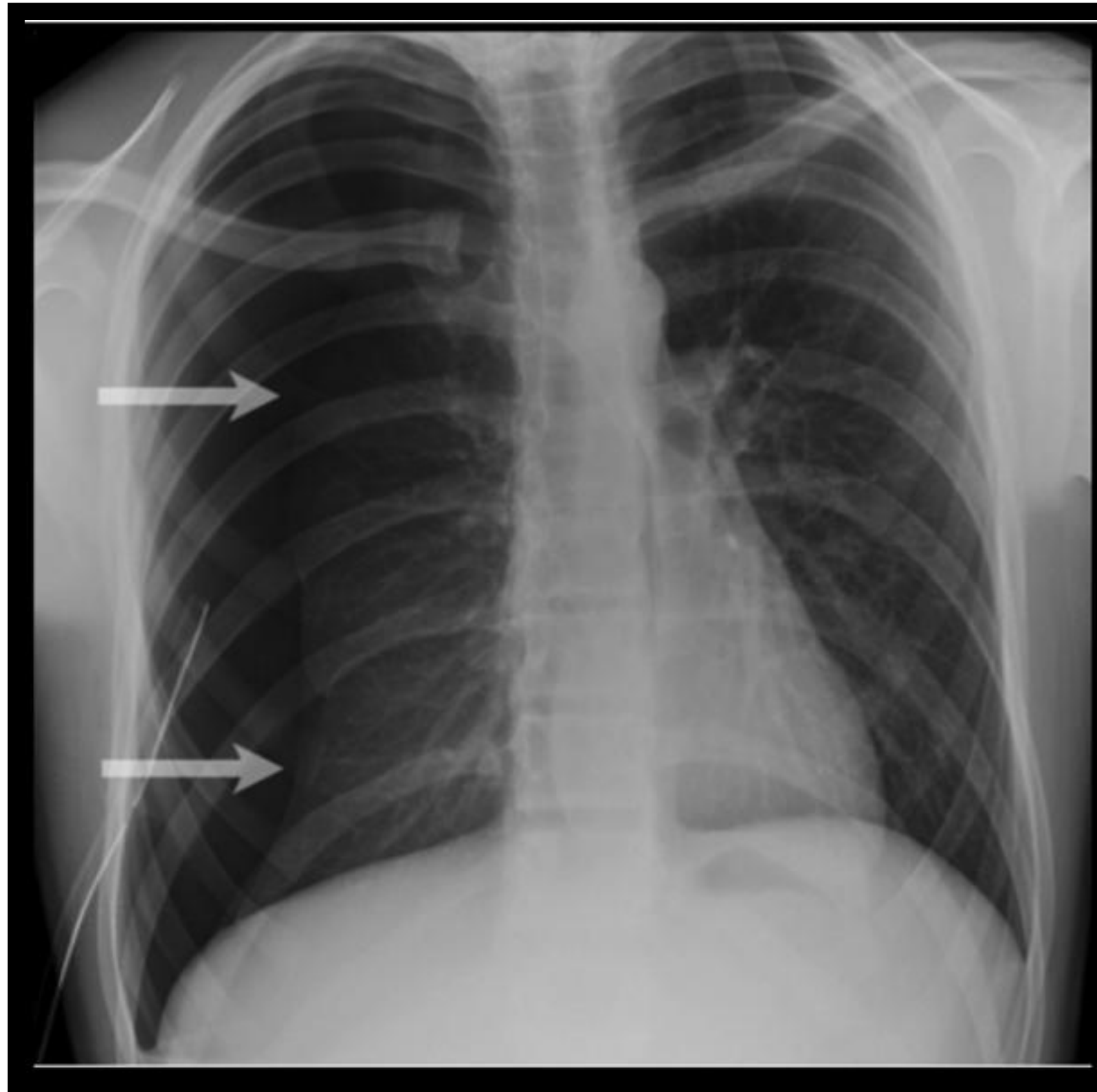


Some Chest abnormalities



Pneumonia (lung infection)

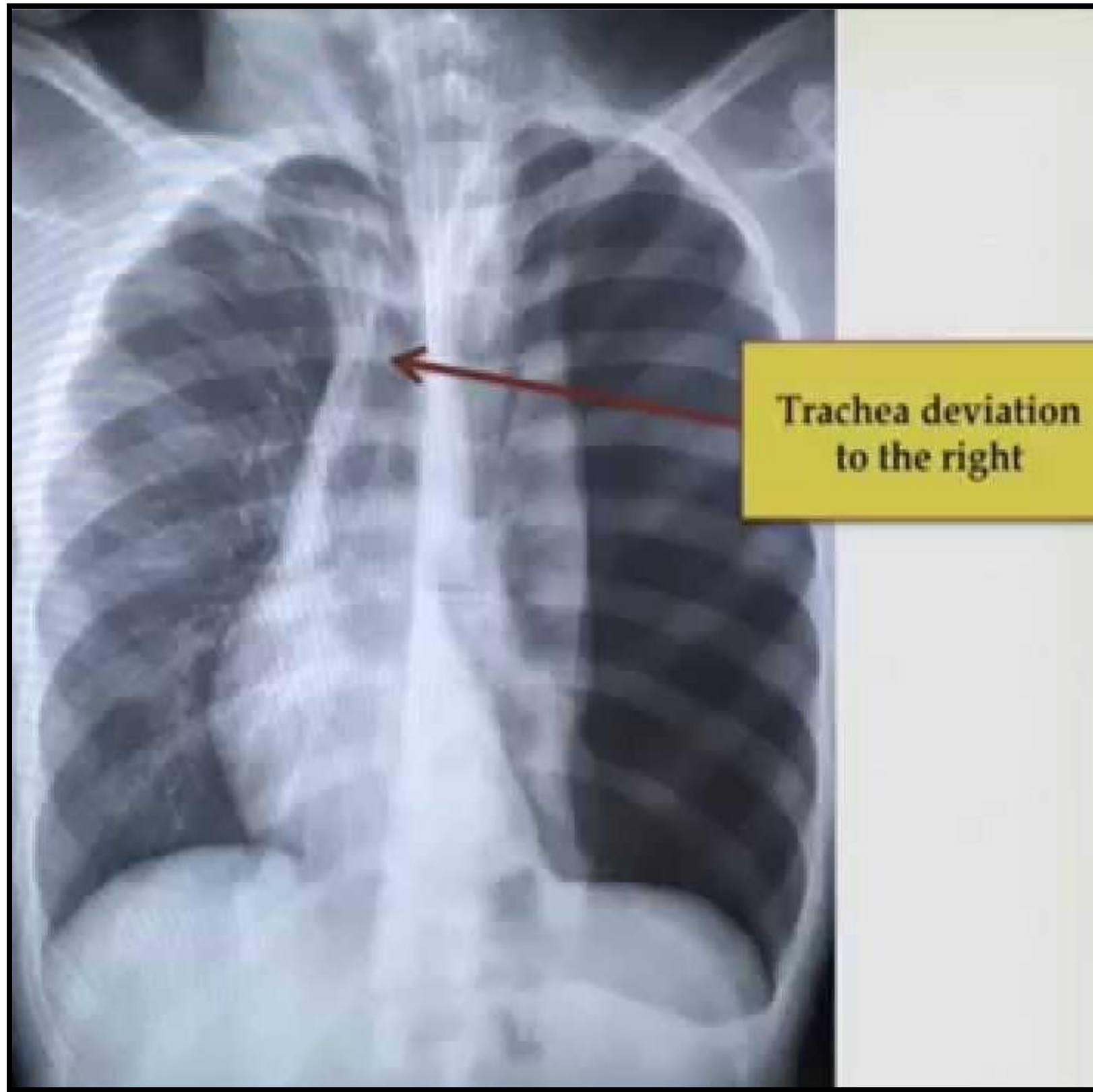
A space occupying lesion (differ from a mass -masses are generally more well-defined)



Tension pneumothorax

Pneumothorax

- Collection of free air in the thoracic cavity which occur spontaneously(no reason), or as a result of underlying lung disease that causes the lung to collapse.
- Visible pleural edge (arrow) & lung markings not visible beyond this edge.



Trachea deviation
to the right



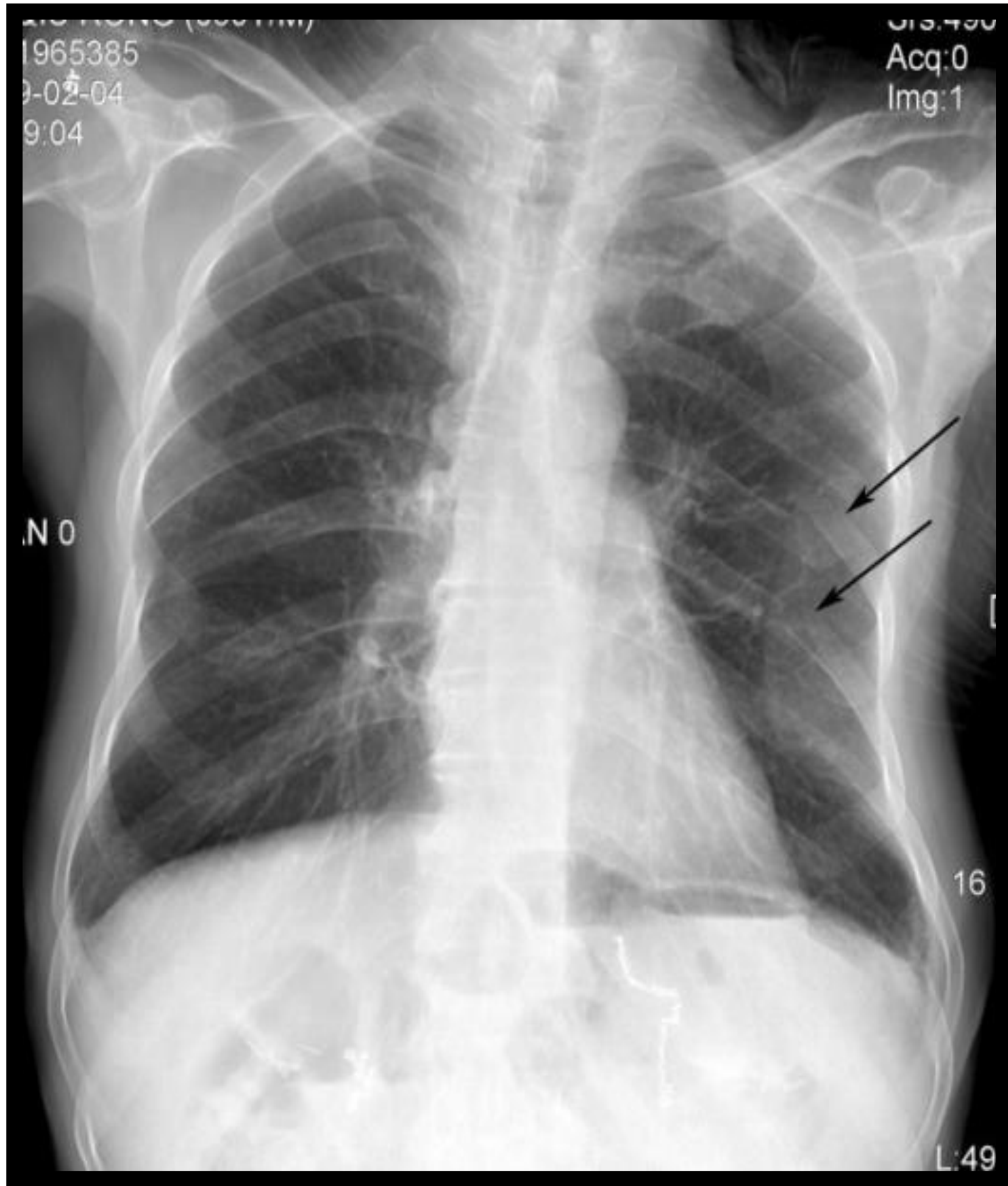
(pt. has hx of primary)



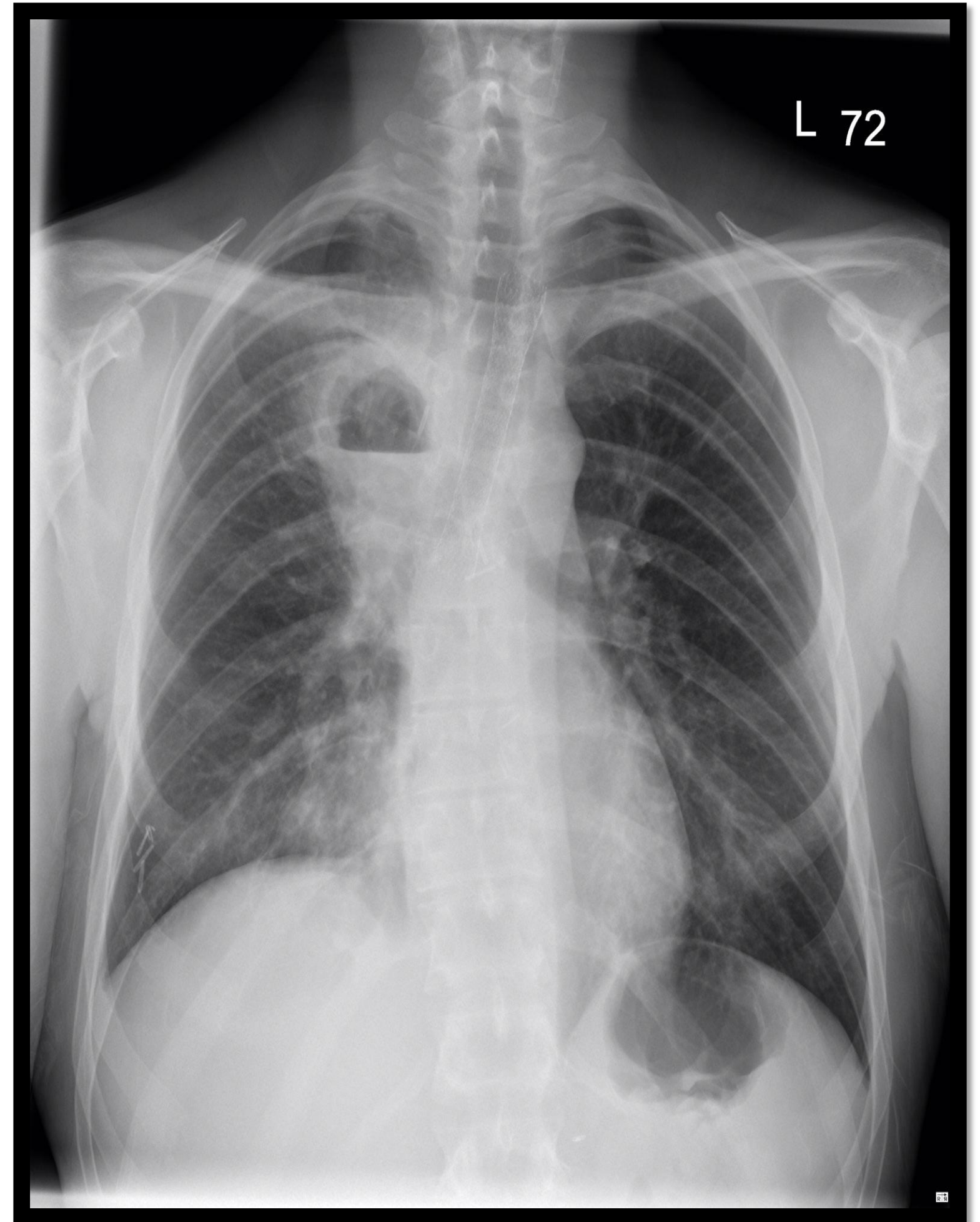
Cannon ball



Metastatic Lung Cancer



Fracture of the left 6th and 7th ribs

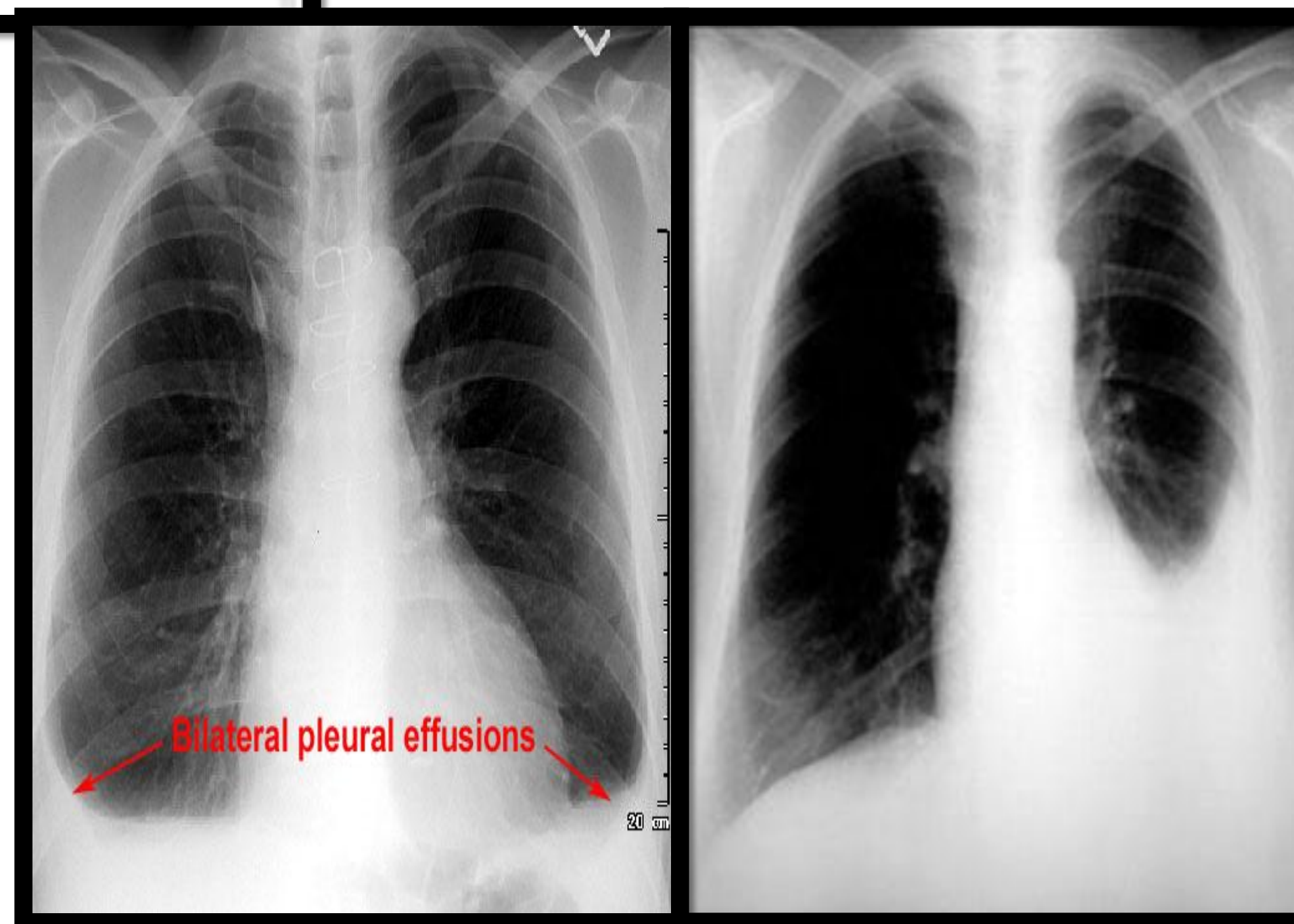


Lung abscess
(Thick wall- fluid level)



Lung Mass

Pleural effusion





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Abdomen x-ray

Basic interpretation for Technical quality

- ▶ Image Identification
- ▶ Coverage area
- ▶ Projection & patient position.
- ▶ Rotation.
- ▶ Penetration.
- ▶ Motion.
- ▶ Bowel preparation



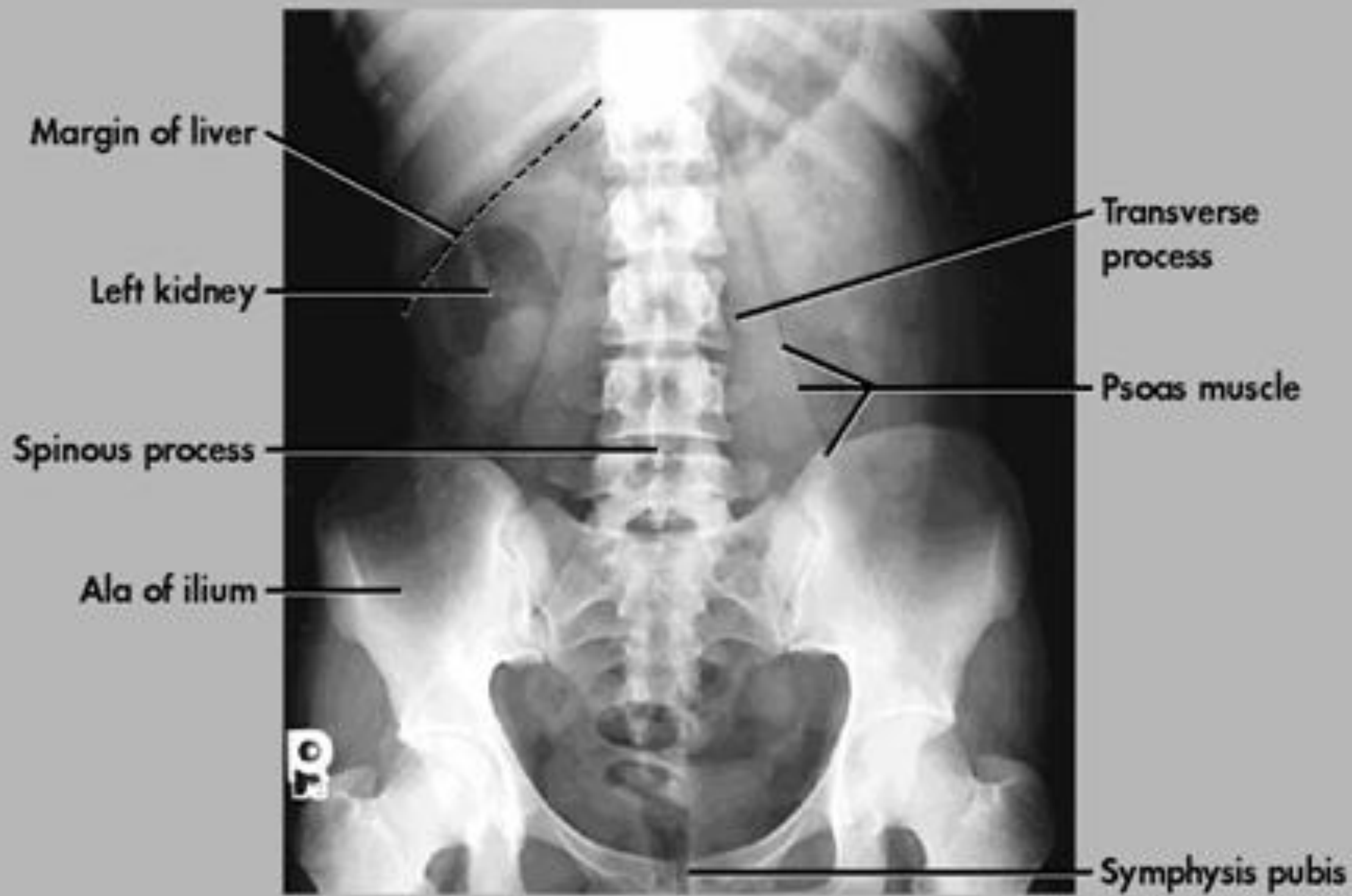
Technical points

- Moderate image contrast by using medium kV range (70-80) & short exposure time to freeze involuntary organ movements.
- SID is generally 40 inches (100 cm).
- Exposure is made on full arrested expiration
- Abdominal basic view is: AP supine . While special views are: AP erect, PA prone, lateral recumbent and decubitus .
- Acute abdomen required several projections (series): PA erect chest , AP plain supine abdomen, AP erect abdomen (alternatively lateral decubitus if pt. is too ill to stand).

AP supine abdomen Radiographic Anatomy

- 1, 11th rib.
- 2, Vertebral body (T12).
- 3, Gas in stomach.
- 4, Gas in colon (splenic flexure).
- 5, Gas in transverse colon.
- 6, Gas in sigmoid.
- 7, Sacrum.
- 8, Sacroiliac joint.
- 9, Femoral head.
- 10, Gas in cecum
- 11, Iliac crest.
- 12, Gas in colon (hepatic flexure).
- 13, Psoas margin.





Margin of liver

Left kidney

Spinous process

Ala of ilium

Transverse process

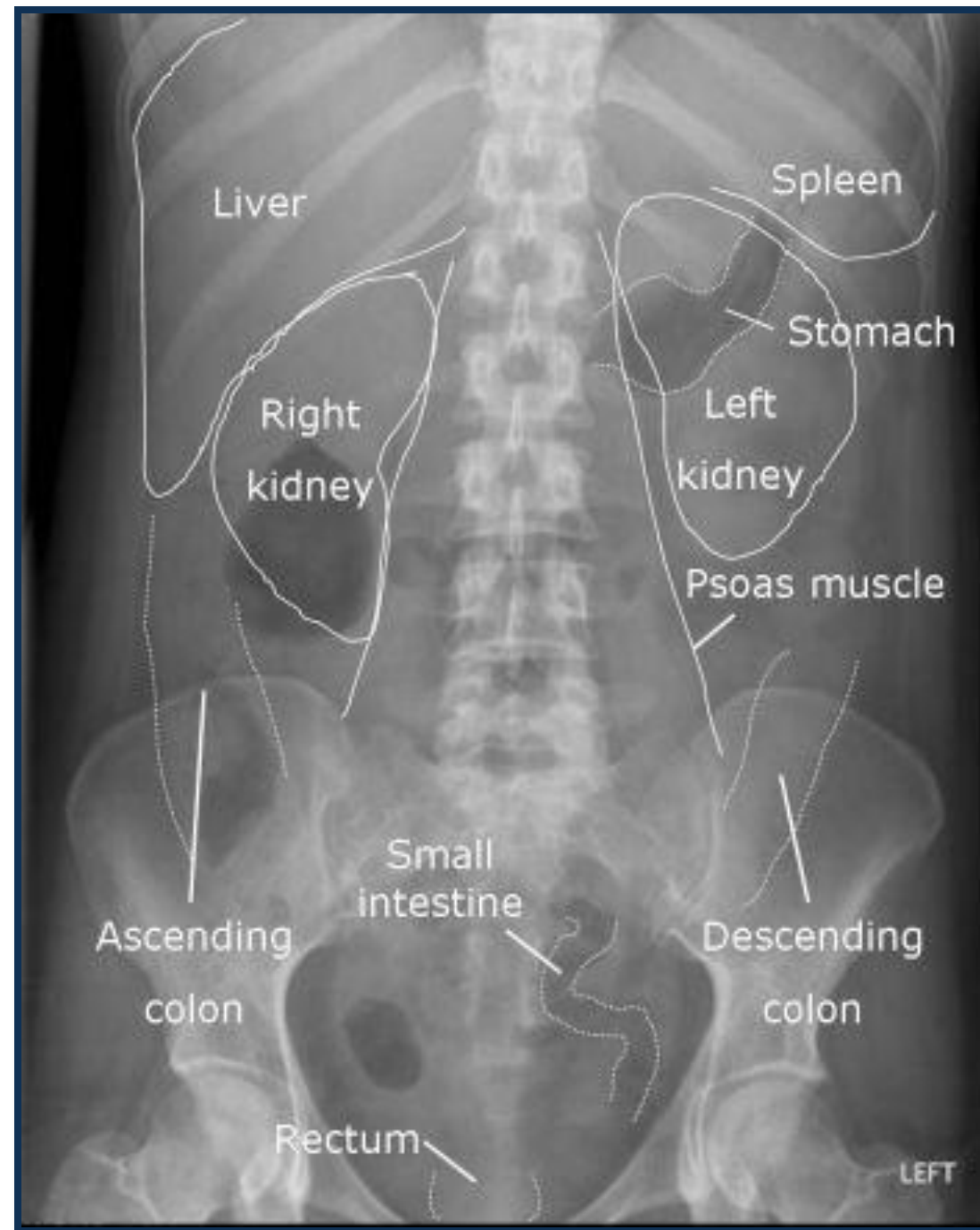
Psoas muscle

Symphysis pubis

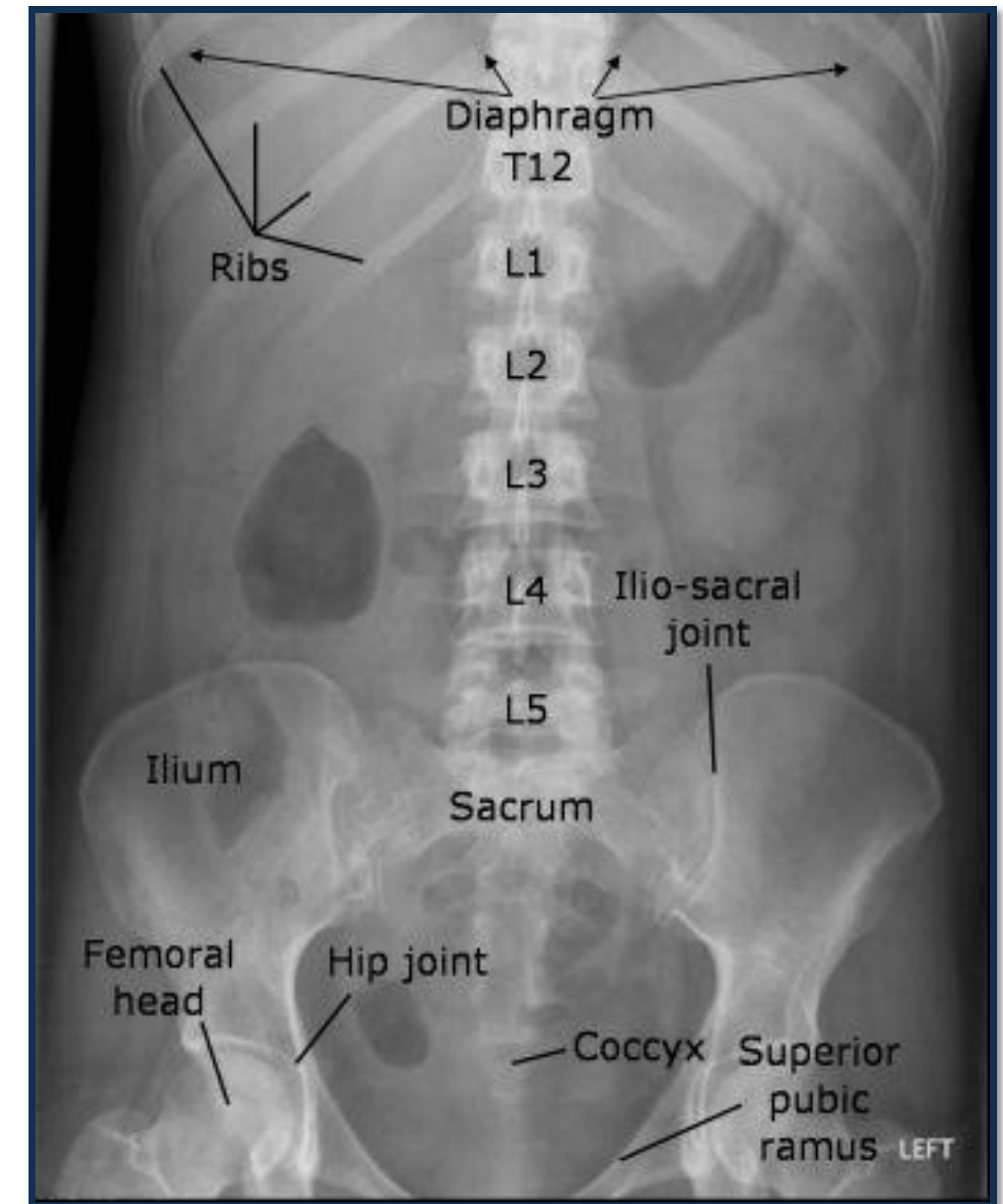
AP ABDOMEN



Abdominal X-ray



Soft tissue organs and structures of the abdomen

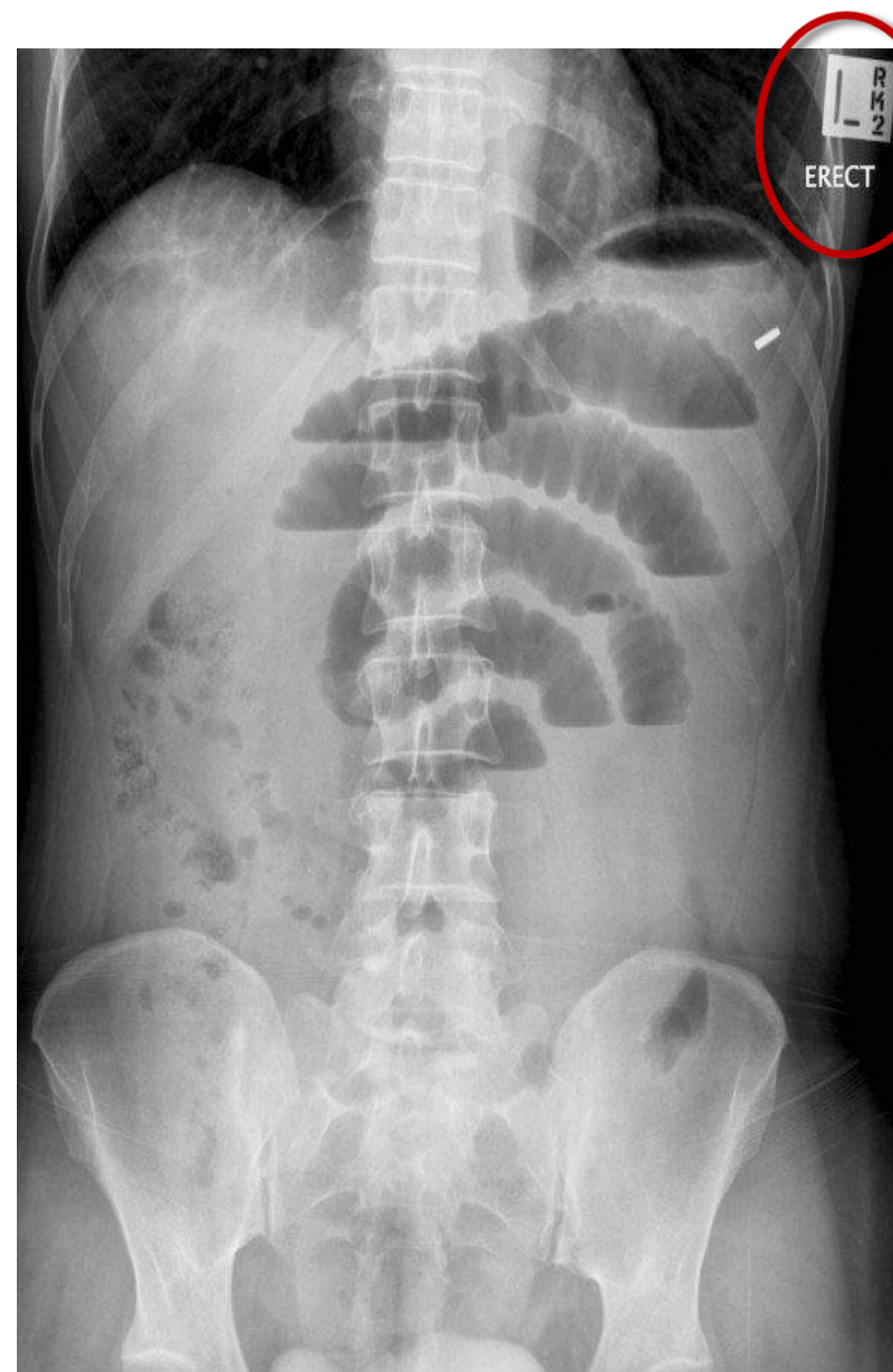


Bony structures of the abdomen

Image Identification:

Appropriate markers should be placed indicating:

- R and L
- supine, upright or, decubitus positions



Coverage area:

Image should include the area from the diaphragm to the upper border of the symphysis pubis.



X



OK



OK

Projection & patient position:

► Look to the marker + air-fluid level

AP supine (KUB)



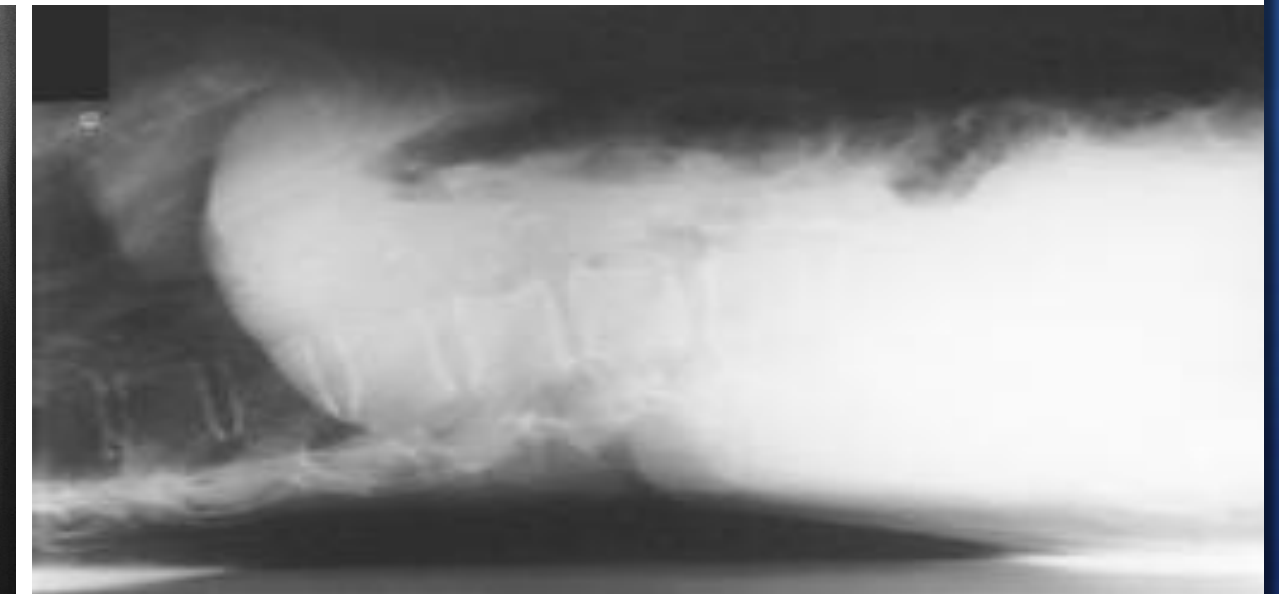
AP erect



Lat recumbent



Lat projection (dorsal decubitus)

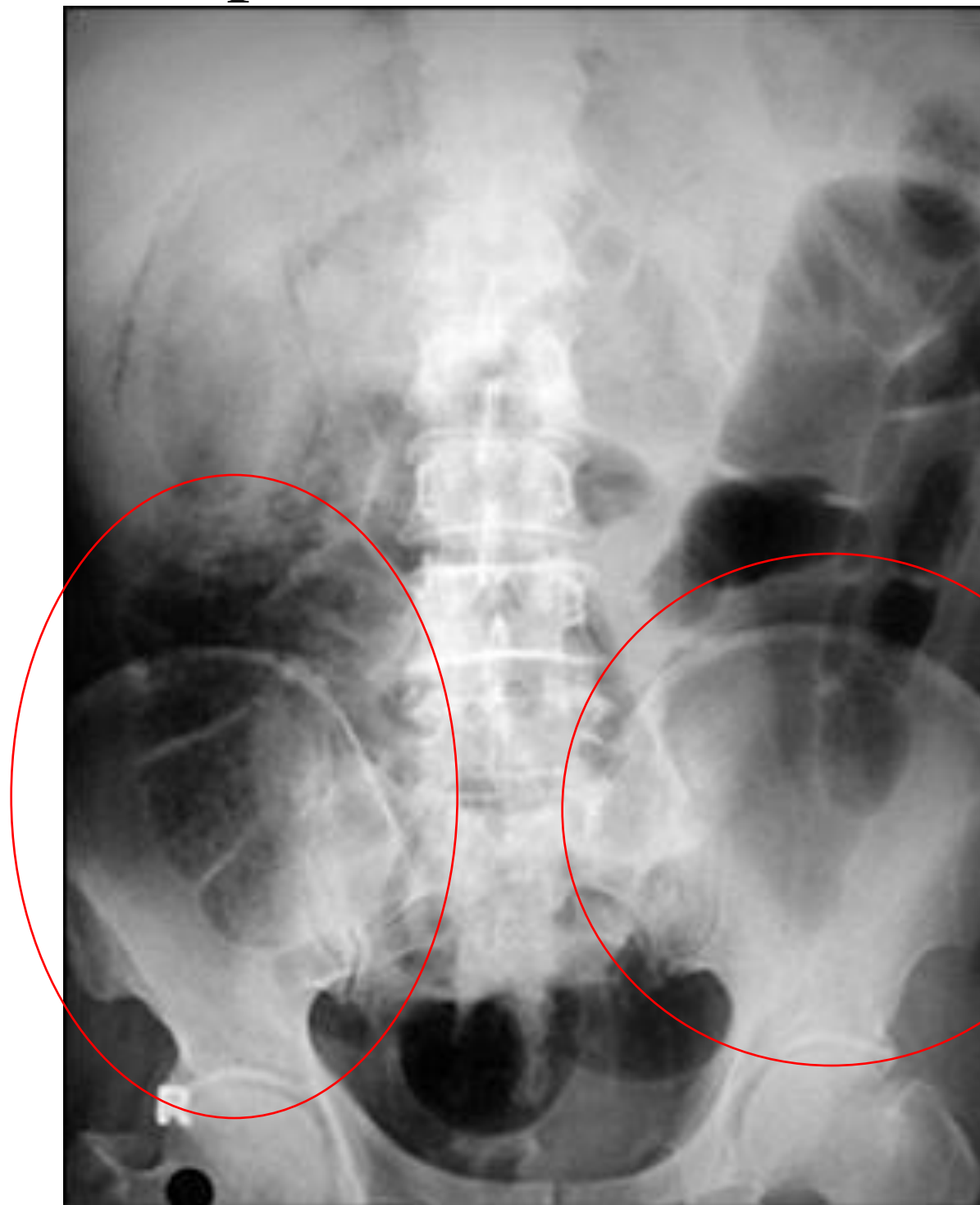


AP projection (lateral decubitus)

Rotation:

➡ No rotation:

Spinous processes in the center of the vertebral column with Symmetric iliac wings and ischial spine.



X



OK

Penetration :

Correctly exposed radiographs should faintly visualize

- The lower liver margin, and kidneys outline,
- The lateral borders of psoas muscles
- Transverse processes of L. vertebrae.

X



OK

Motion:

❖ No motion

- Ribs and gas bubble margins should appear sharp.
- The diaphragm should appear sharp in an upright film.



X



OK

Bowel Preparation:

- Abdomen area should be clear from Shadow of fecal masses and gases.
- In acute abdomen never prepare the patient.



Example of faeces and it's typical mottled appearance 7



X



OK

Some abdominal abnormalities



Gallstones



Calcification in kidney & pelvic area (need IVU ,CT scan or US)





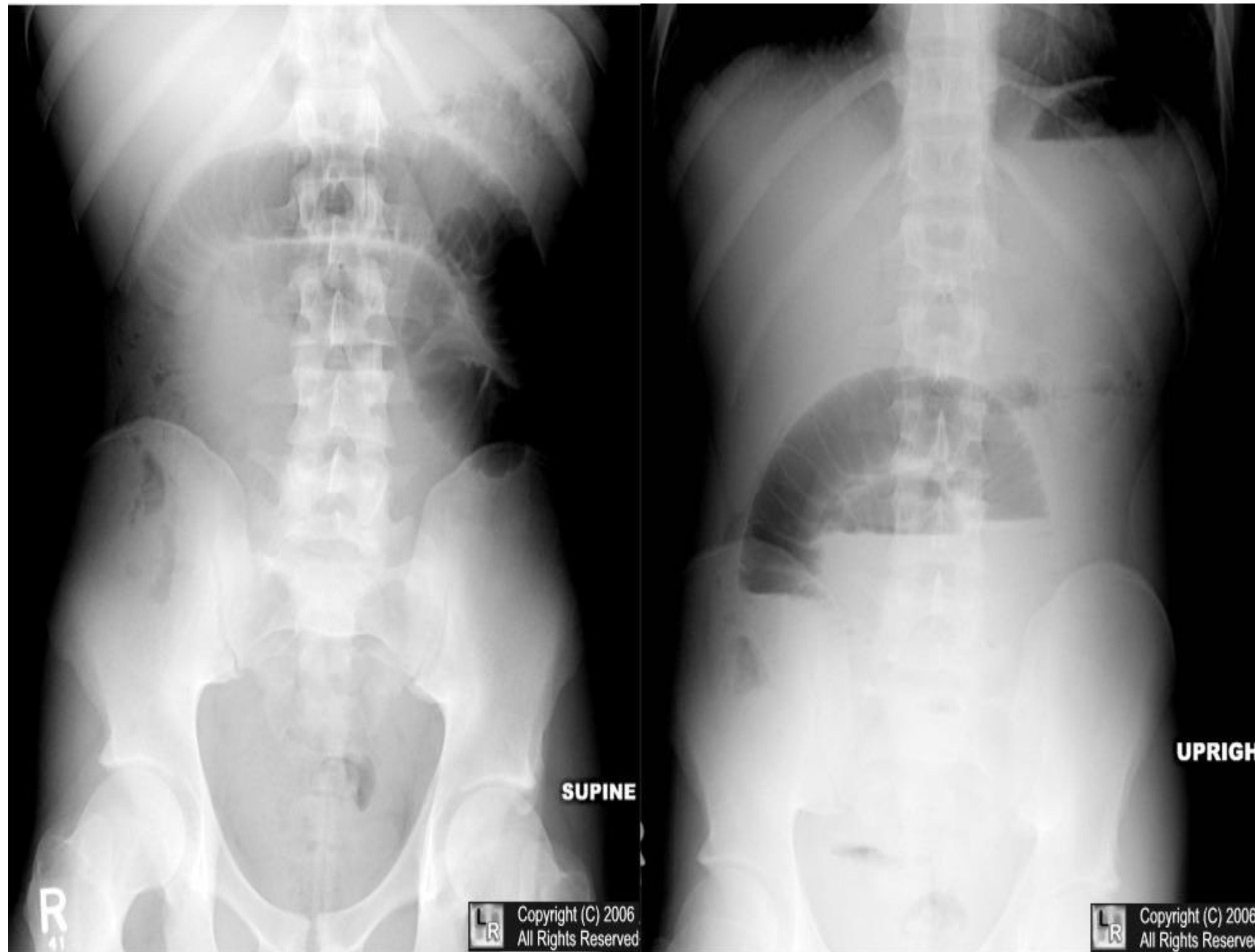
Calcified gallbladder wall



Intra-uterine contraceptive device (IUCD).

Supine

Erect

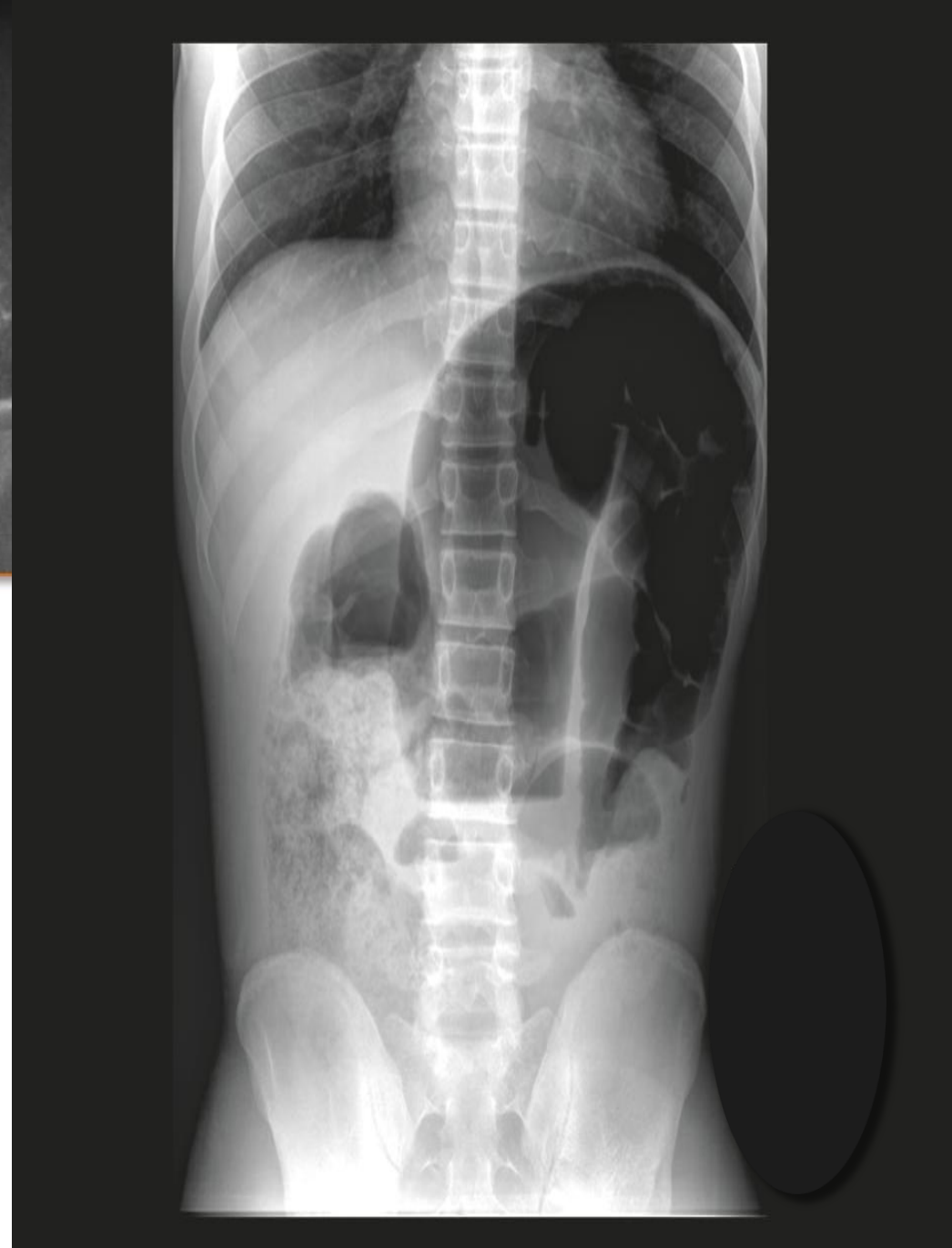


Small Bowel Obstruction(SBO)

Left shows several dilated loops of small bowel in the upper abdomen. The small bowel is disproportionately dilated compared the large bowel which is collapsed. The right demonstrates multiple air-fluid levels in the dilated loops in a typical configuration of a small bowel obstruction



Small bowel obstruction (note the dilated loops of small bowel giving a “coiled spring” appearance)



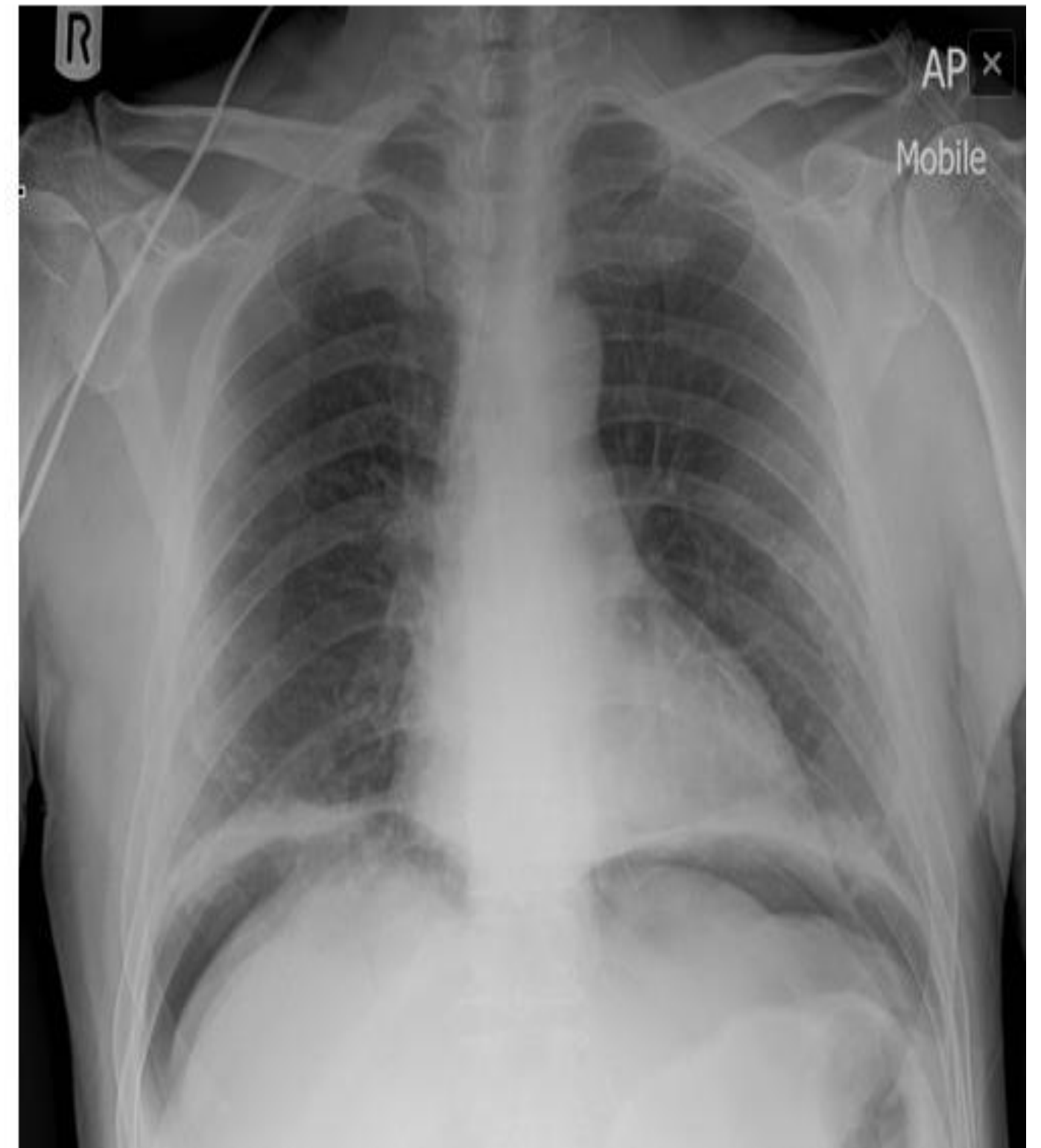
Sigmoid Volvulus



Caecal Volvulus



Ascities



Pneumoperitoneum (free gas under diaphragm)

It caused by perforated abdominal viscus (*e.g. perforated bowel, perforated duodenal ulcer*) and recent abdominal surgery.



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Extremities Technical points

- kV should be lower to medium (50 – 70) KVp for optimal contrast and density will allow visualization of bony cortical margins soft tissue structures.
- No grid used, except for knee and femur.
- Using the special gonad shields over pelvic region, or the whole body lead apron as necessary + immobilization if necessary.
- SID is generally 40 inches (100 cm).



TASK

- Define pleural effusion ?
- And what are the most radiological criteria may appears on erect and lateral decubitus CXR?

TASK

- Define ascites ?
- And what are the most radiological criteria may appears on plain AXR?