Chest X-rays

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chest x-rays

- The most common radiographs
- They may not have a radiologist report
- The most difficult image to interpret

Systematic Approach

- Minimizes the chance of missing an abnormality.
- Enables a detection of second or related lesions.
- Makes complex images easier to interpret.
- Builds up a mental databank of what is normal.

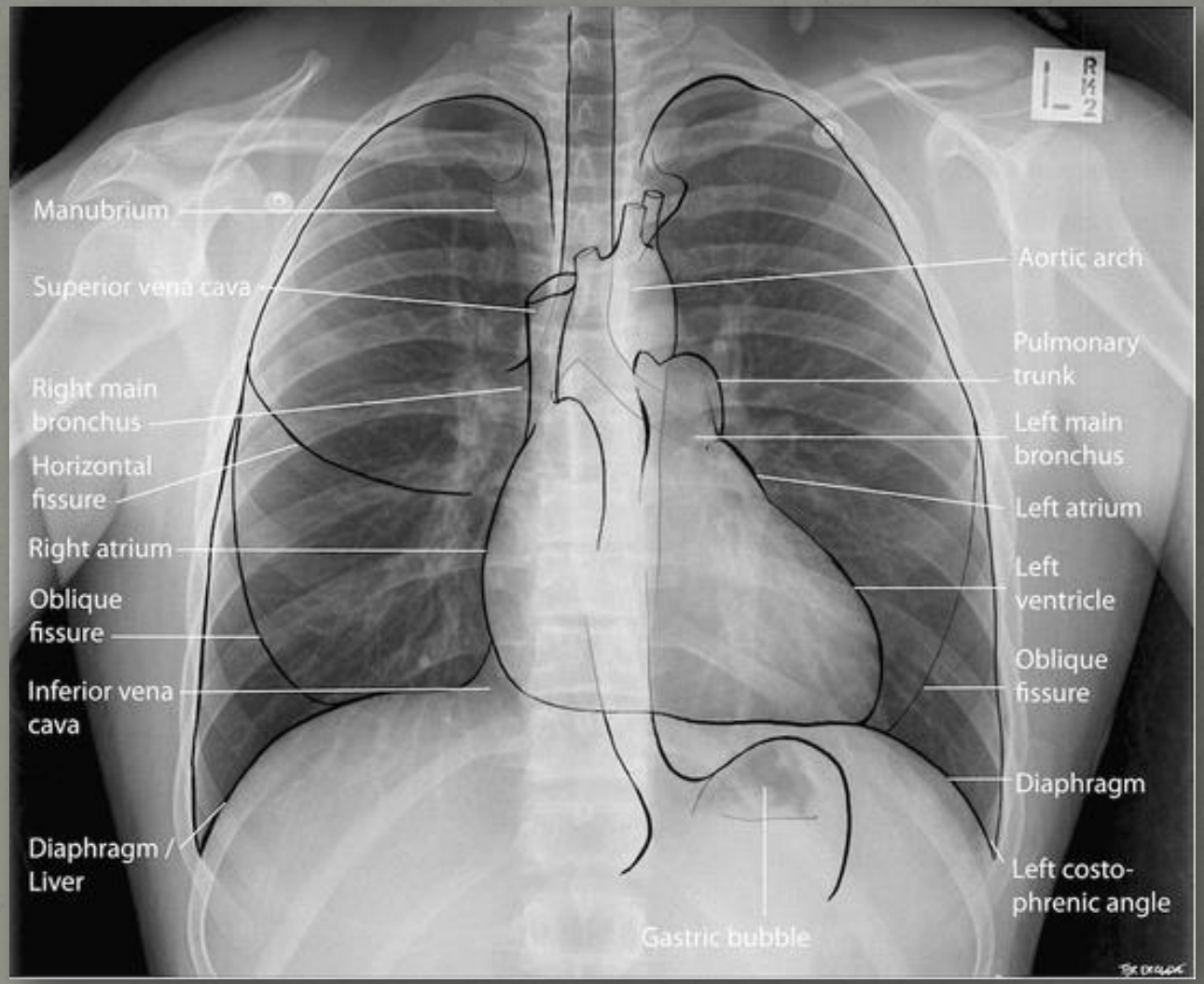
Systematic Approach

Covers the following:

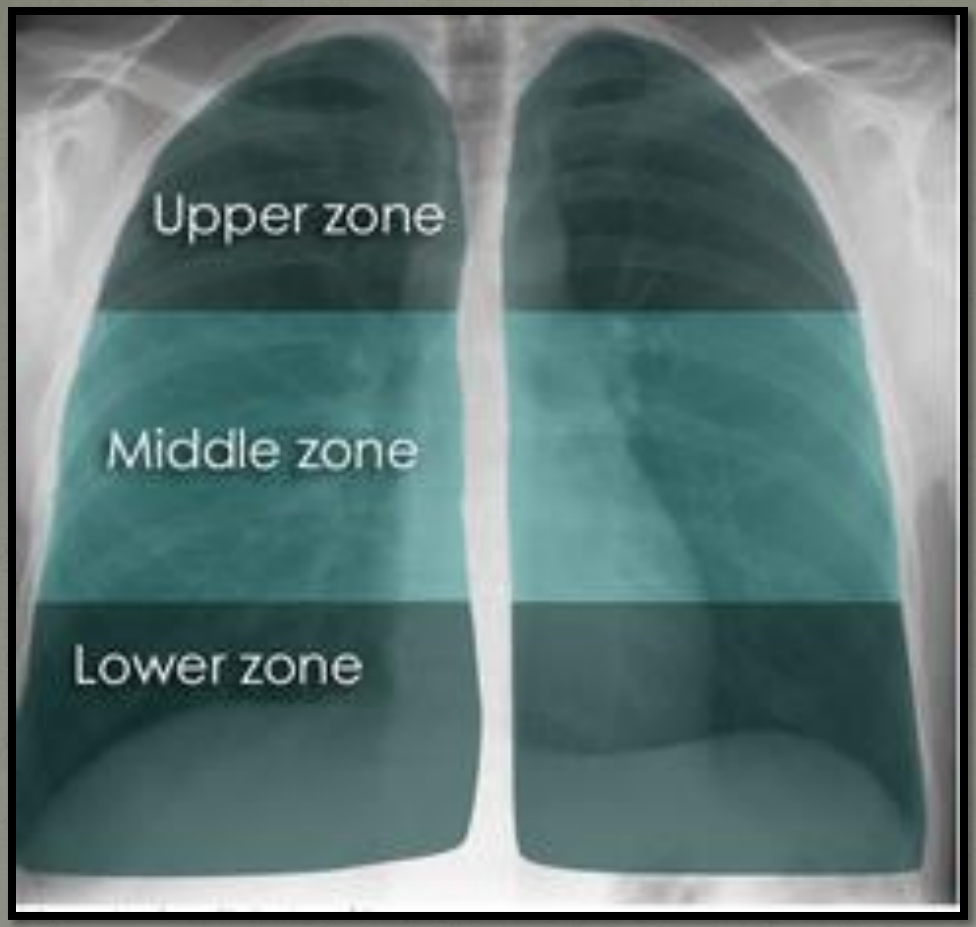
- Documentary evidence of name & age.
- Technical factors.
- Areas of interest:
  - Lungs
  - Pleura
  - Mediastinum & heart
  - Hila
  - Bones
  - Soft Tissues

**Four joints are present in the shoulder: sternoclavicular, acromioclavicular, scapulothoracic, glenohumeral

Right border of the heart ↓ Right atrium



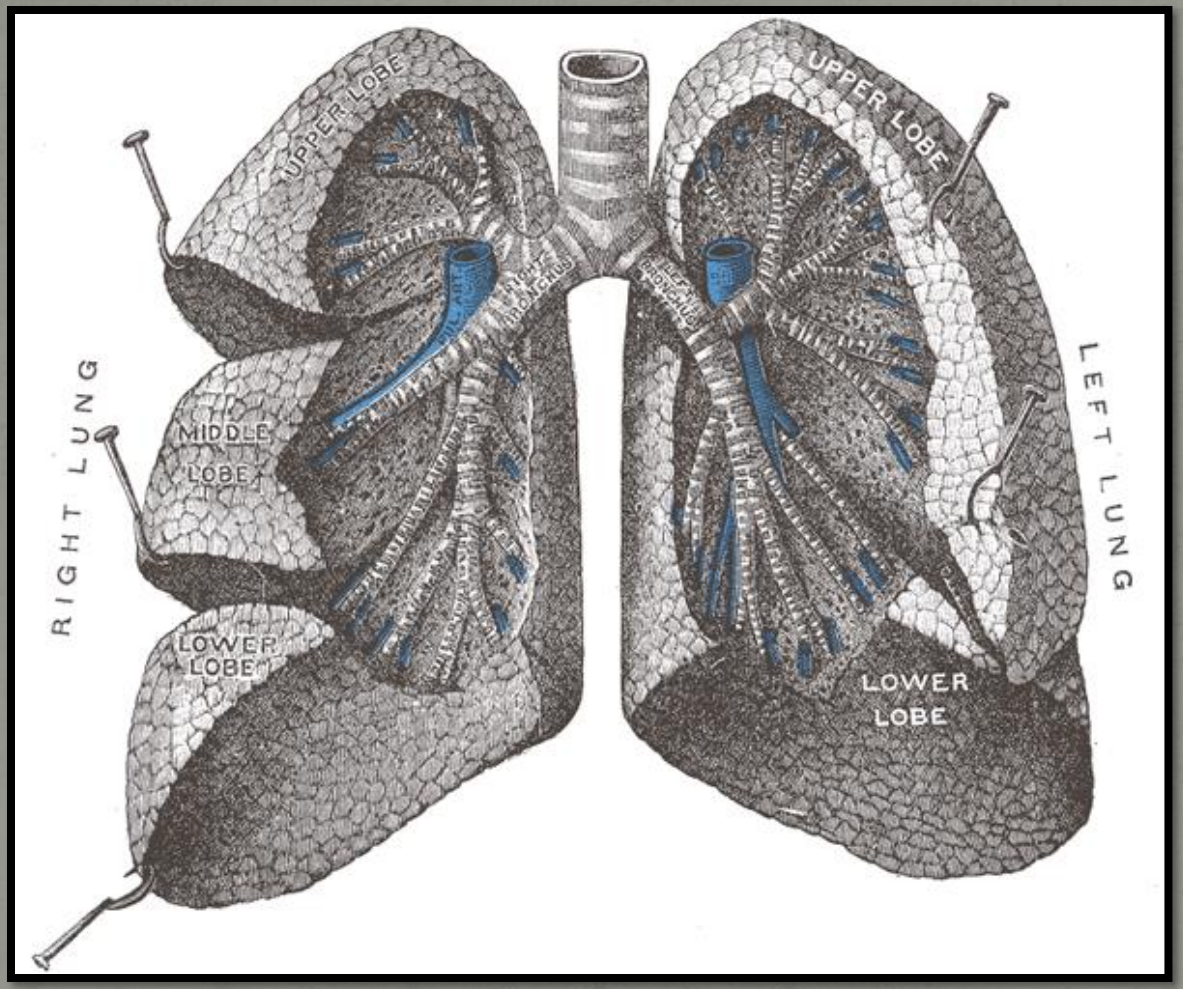
Left border of the heart ↓ Left ventricle + part of the left atrium



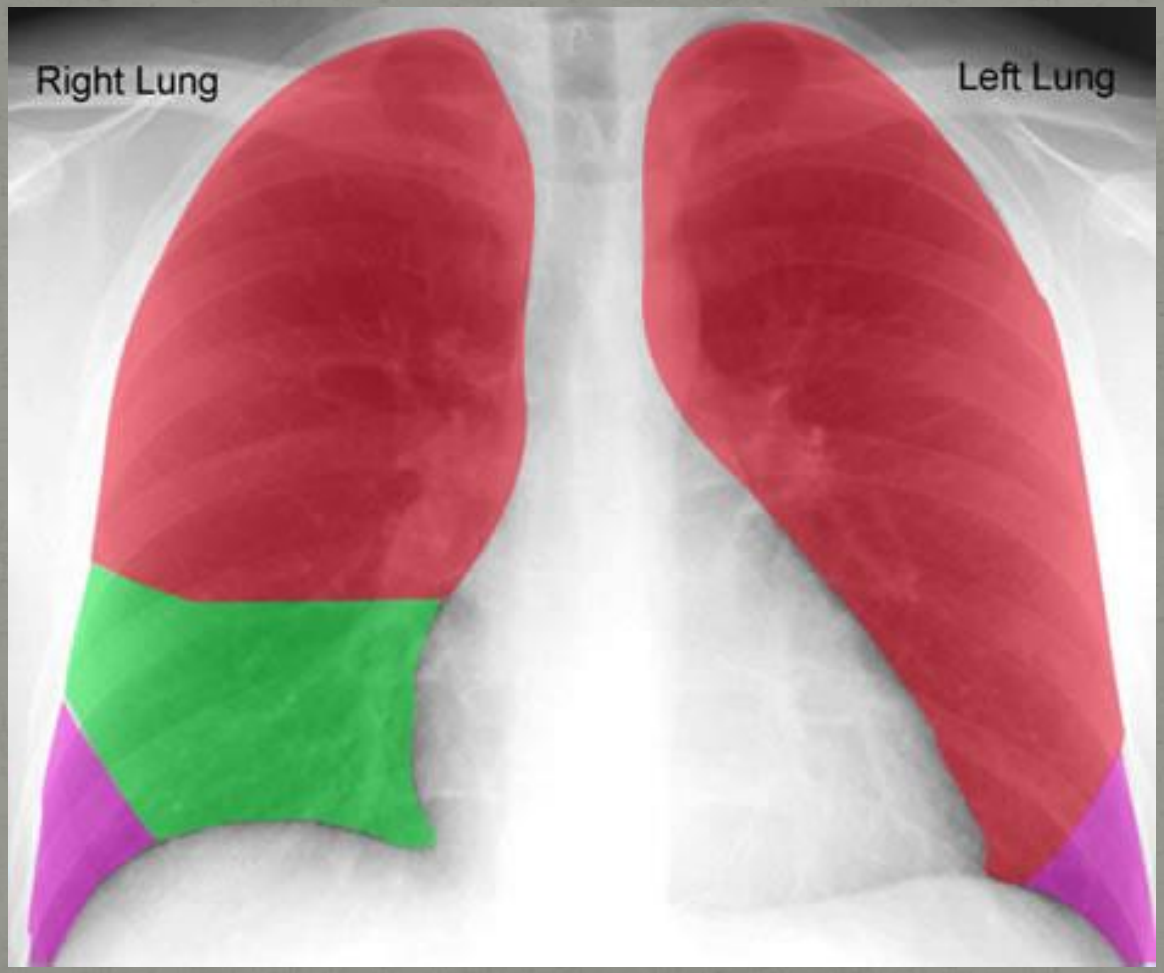
Lateral CXR

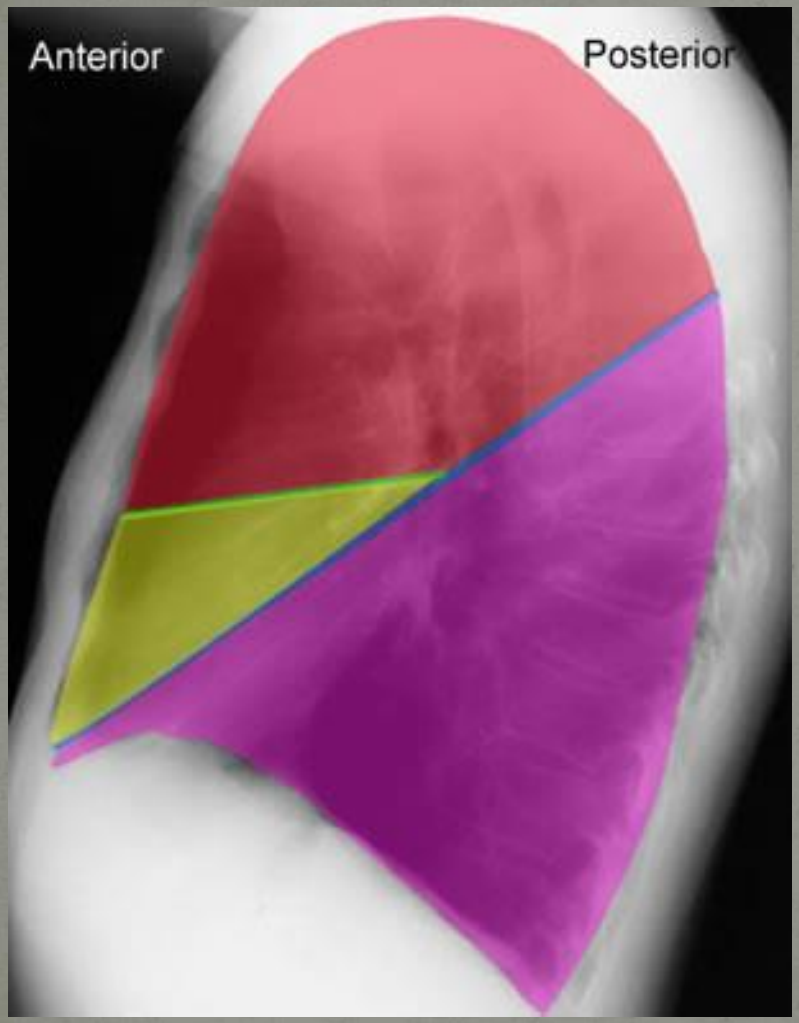
LUNG ZONES ARE NOT EQUIVALENT TO LUNG LOBES

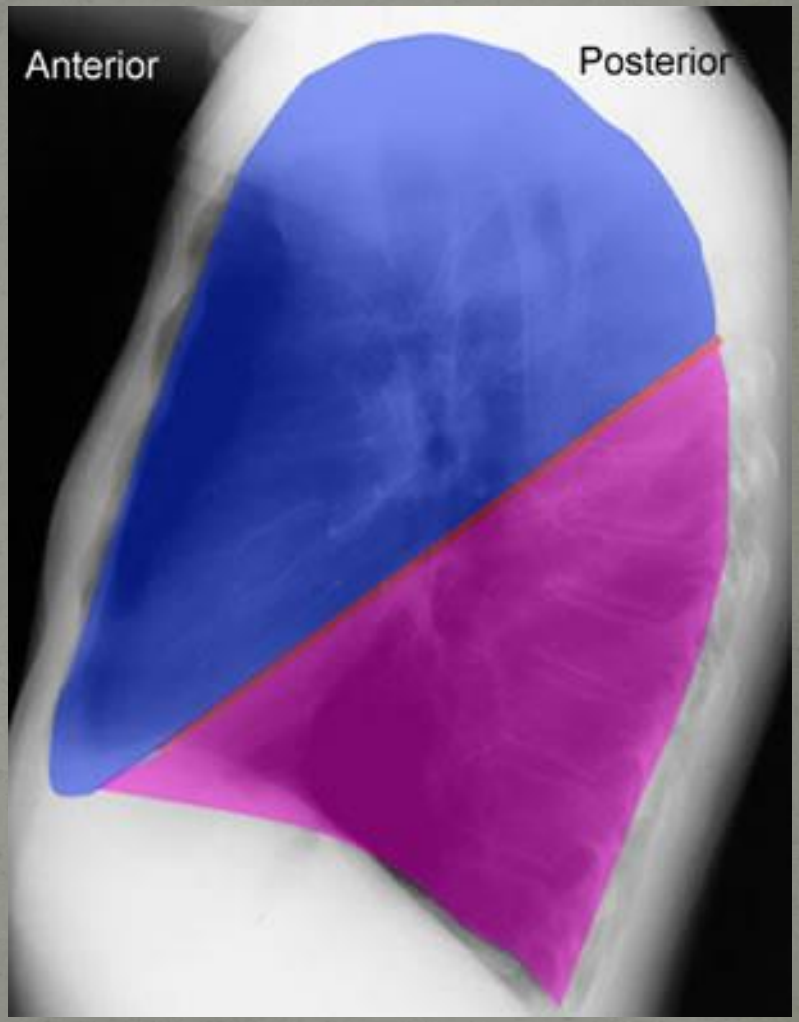
3 lobes

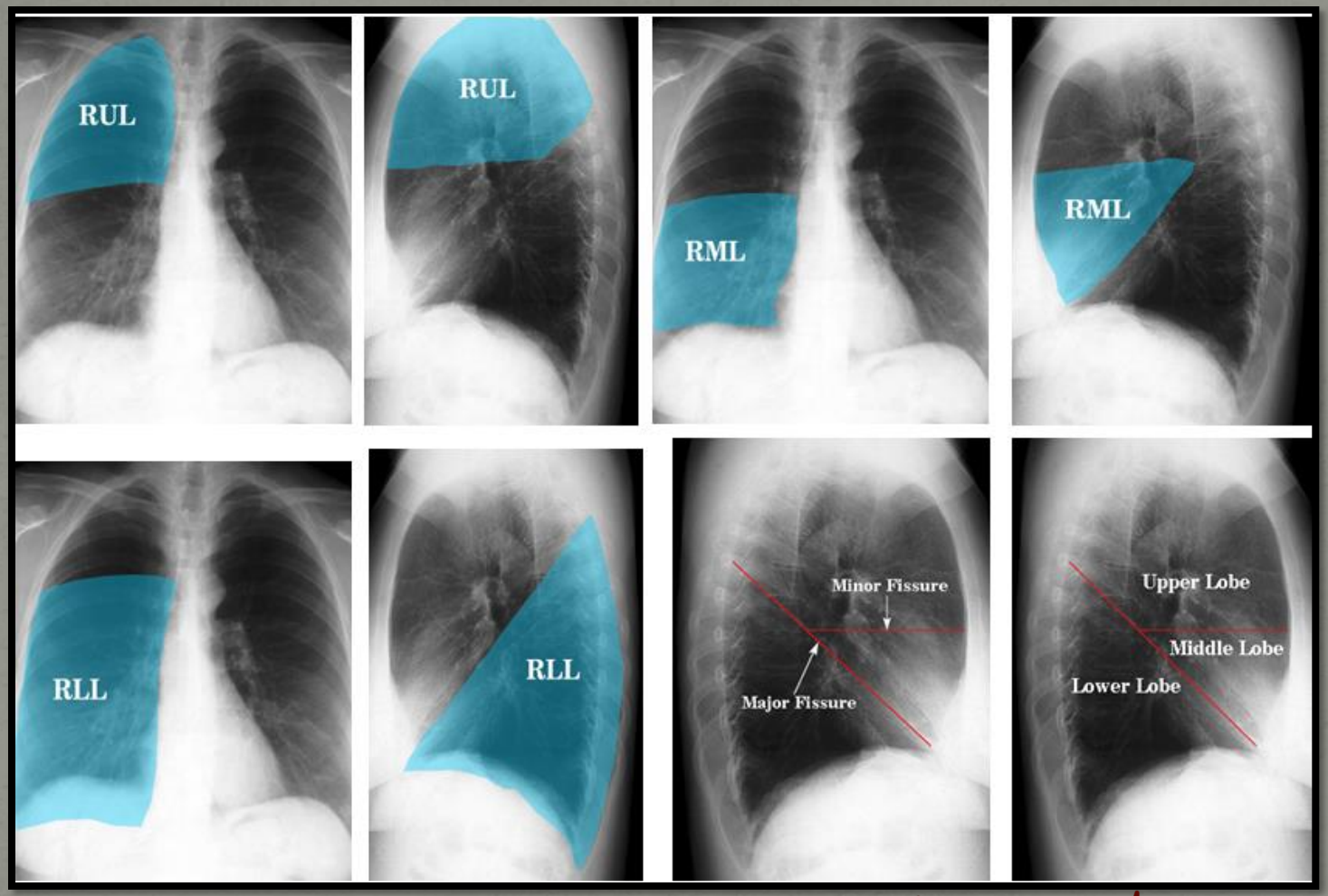


2 lobes instead of a middle lobe we have the lingula)


Right Lung
Left Lung


Anterior
Posterior


Anterior
Posterior



minor = horizontal.
major = oblique.

Systematic Approach

⇨ Do not try to cover two areas such as bones and lungs at the same time

⇨ An Abnormality is one of three things:

- An opacity
- A radiolucency
- A distortion or displacement of a normal structure

A radiolucency :

- An object that allows the x-ray beam to pass with little absorption ⇨ Black object
- Air / gas : most lucent ⇨ low density
- Soft tissue : relatively radiolucent ⇨ low to moderate density (Z for H = 1, C= 6, O=8)

An opacity

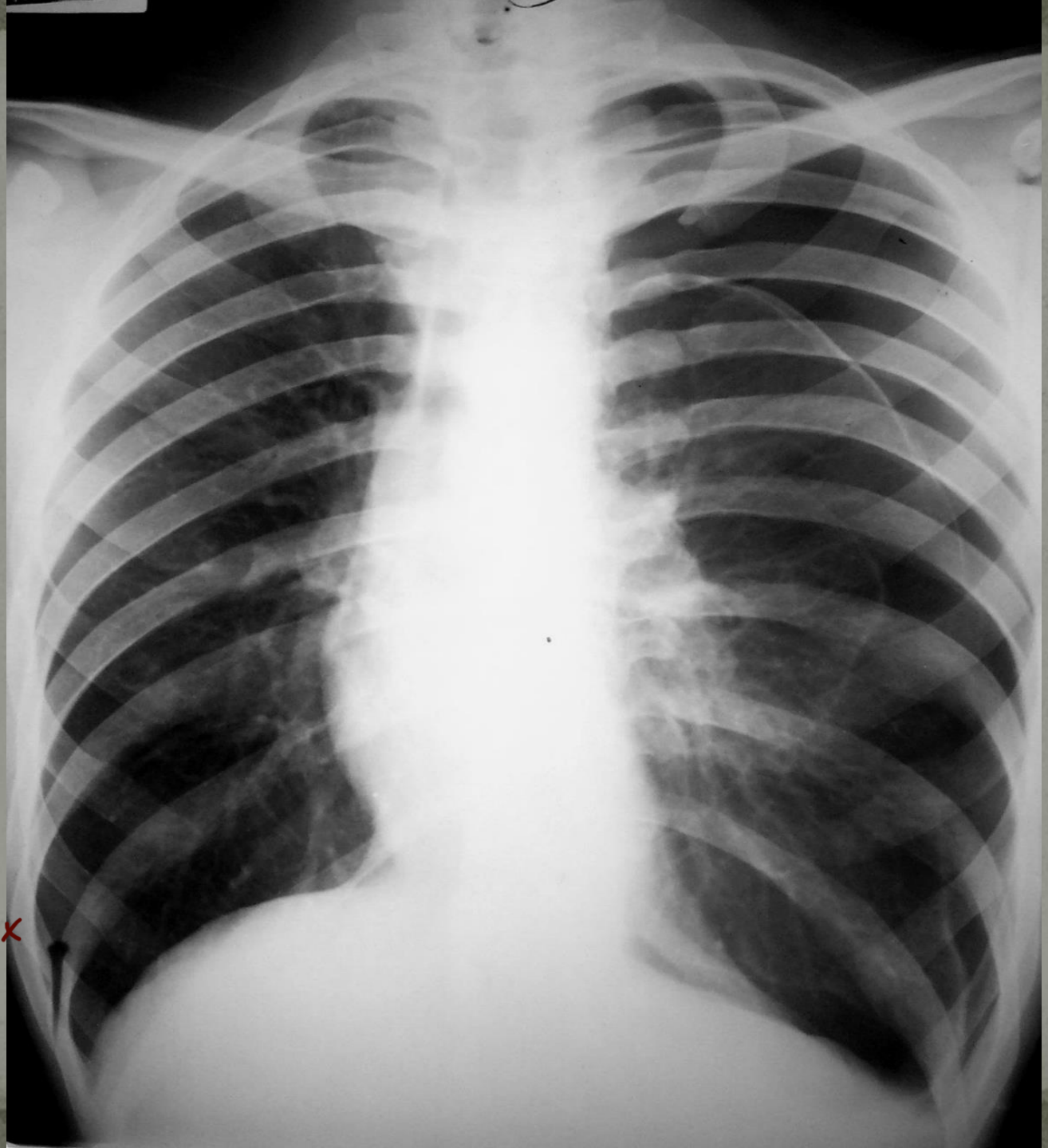
- An object that stops (absorbs) the x-rays ⇨ White object
- Metal
- Bone and calcifications } *HIGH DENSITY*
- Contrast

* PA CXR
* radio-opacity in the upper / middle zone of the LT lung
* no calcification / no air_fluid level / no air bronchograms / well-defined
* possible diagnosis : LT lung tumor

* mediastinal shift to the RT side

* flattening of the diaphragm on the affected side.

* possible diagnosis: LT tension pneumothorax



* PA CXR

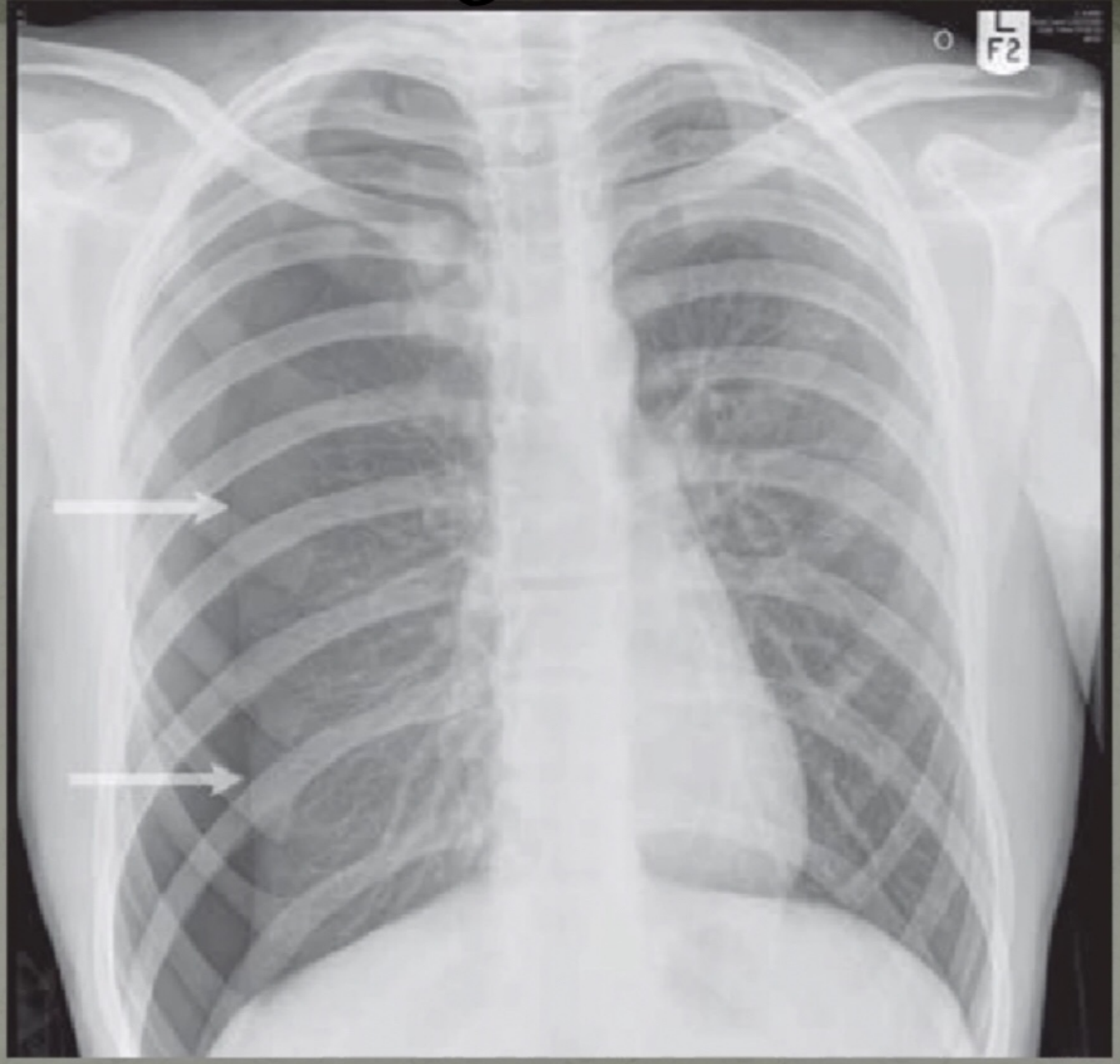
* increased lucency along the full length of the lateral border of the LT lung.

* absence of the vascular markings along the aforementioned area.

* markable visceral pleural line.

* simple pneumo-thorax

** described earlier **

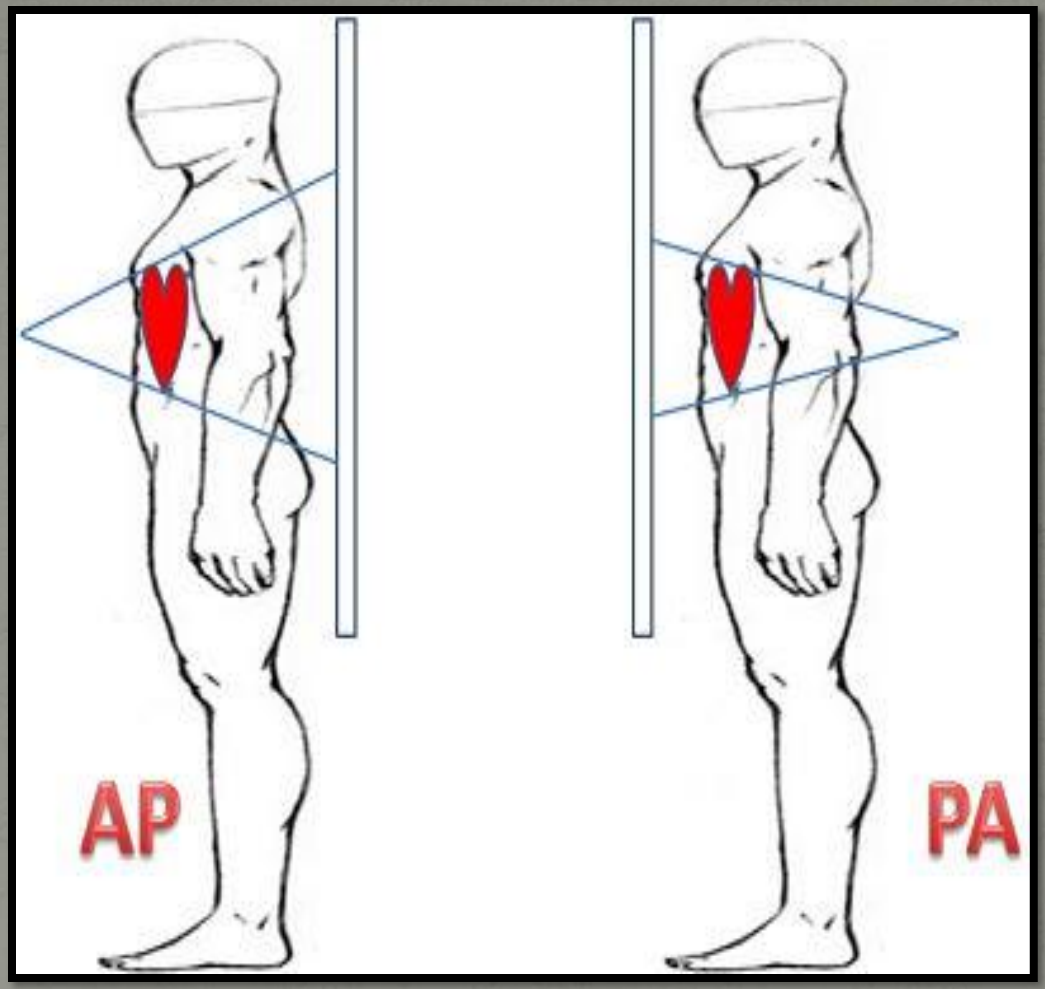


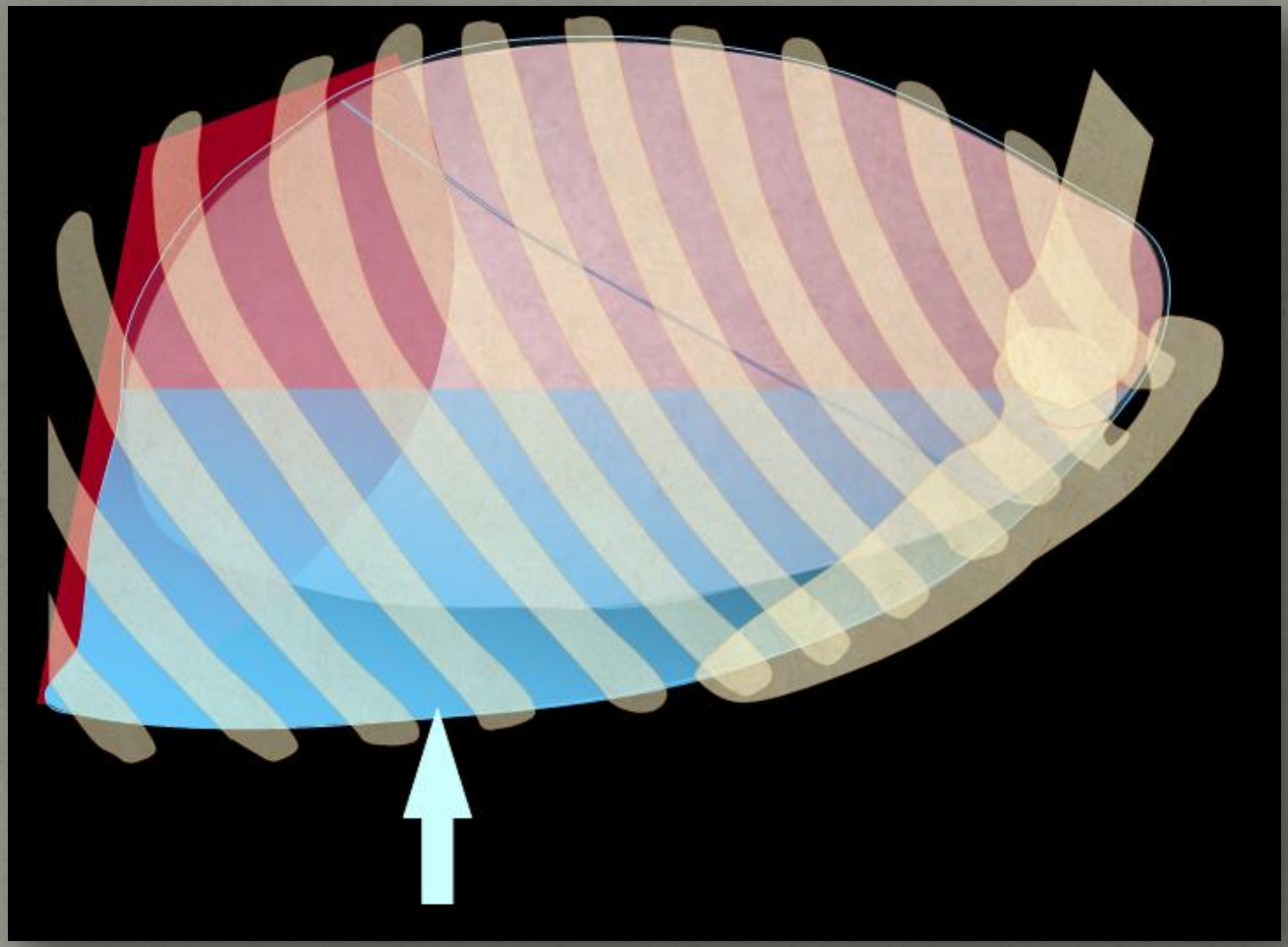
Documentary Evidence

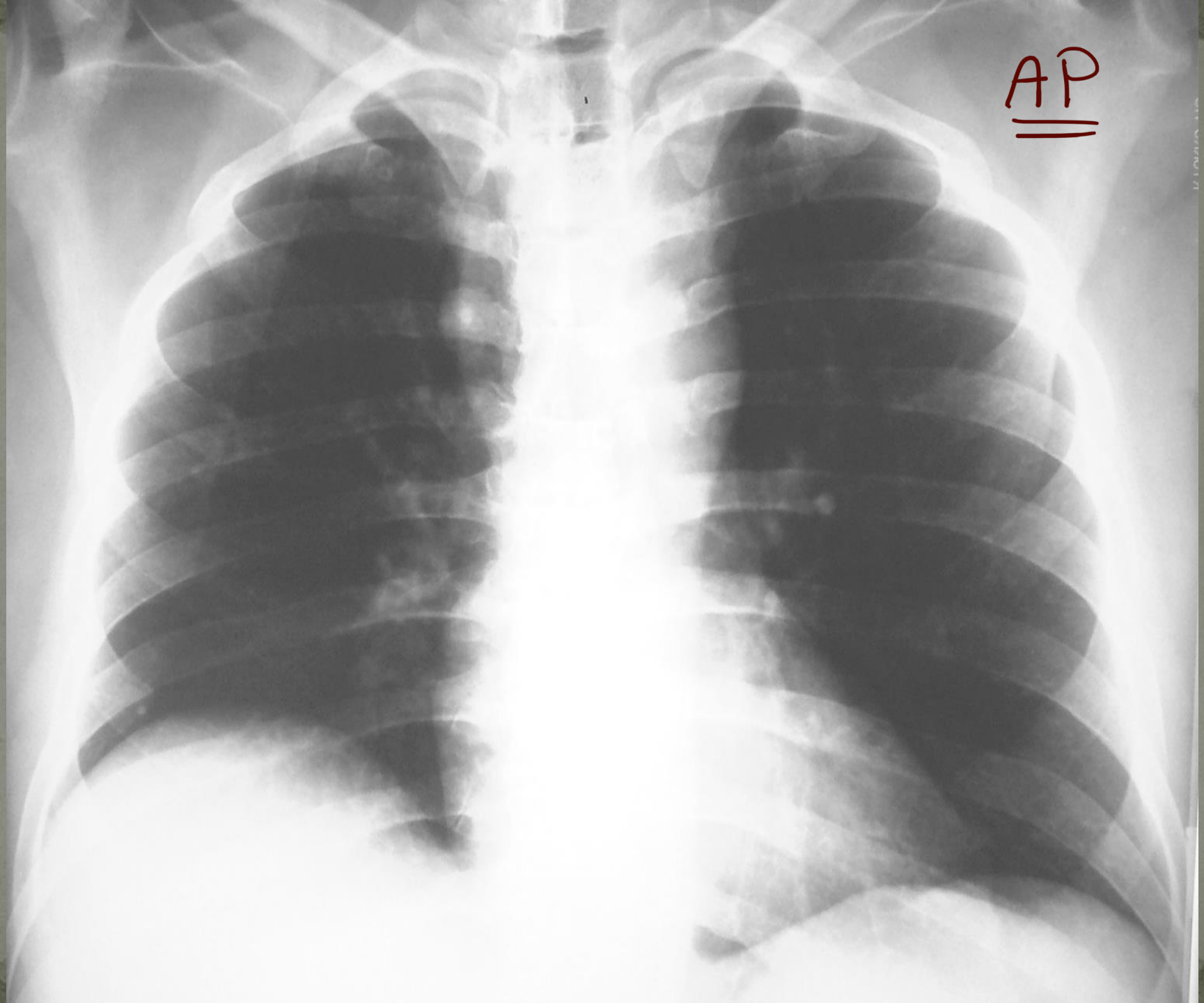
- Check name, age, AP / PA film, portable.

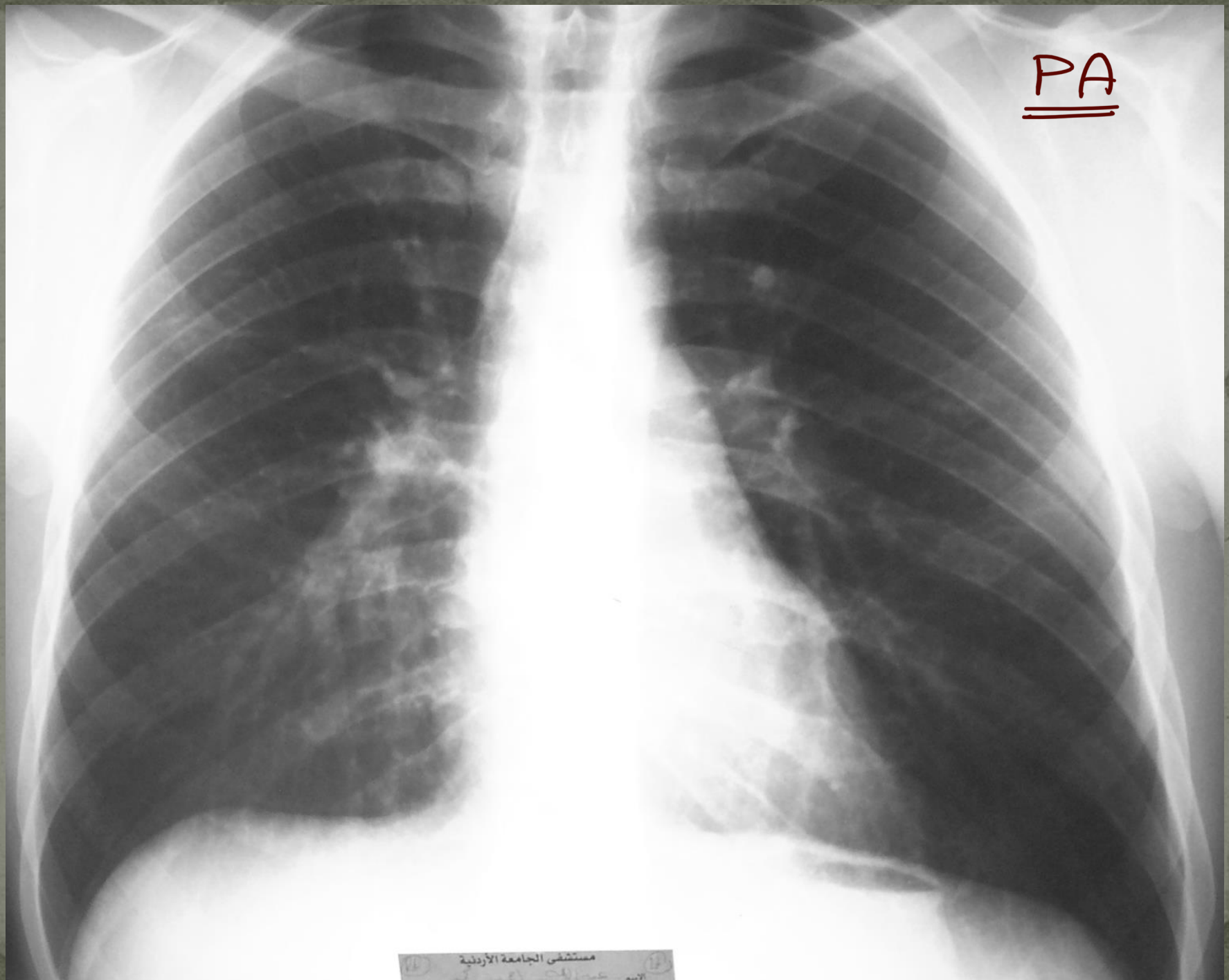
- *Supine /AP film :*
  - Heart size is exaggerated + wider mediastinum
  - Pleural fluid will accumulate posteriorly & give an increased density *to the hemithorax*.
  - A pneumothorax will lie anteriorly & be difficult to detect.
  - Diaphragm will be higher.
  - ⇩ lung volumes.
  - Prominence of the upper zone vessels.

** The only indication!
taken during expiration when we suspect foreign body aspiration.

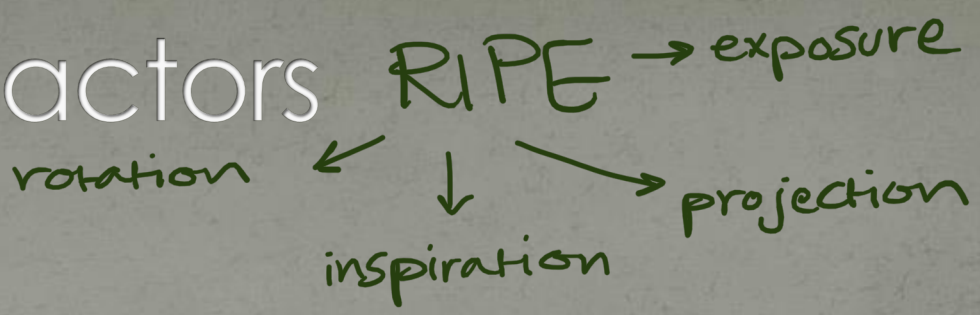

AP
PA



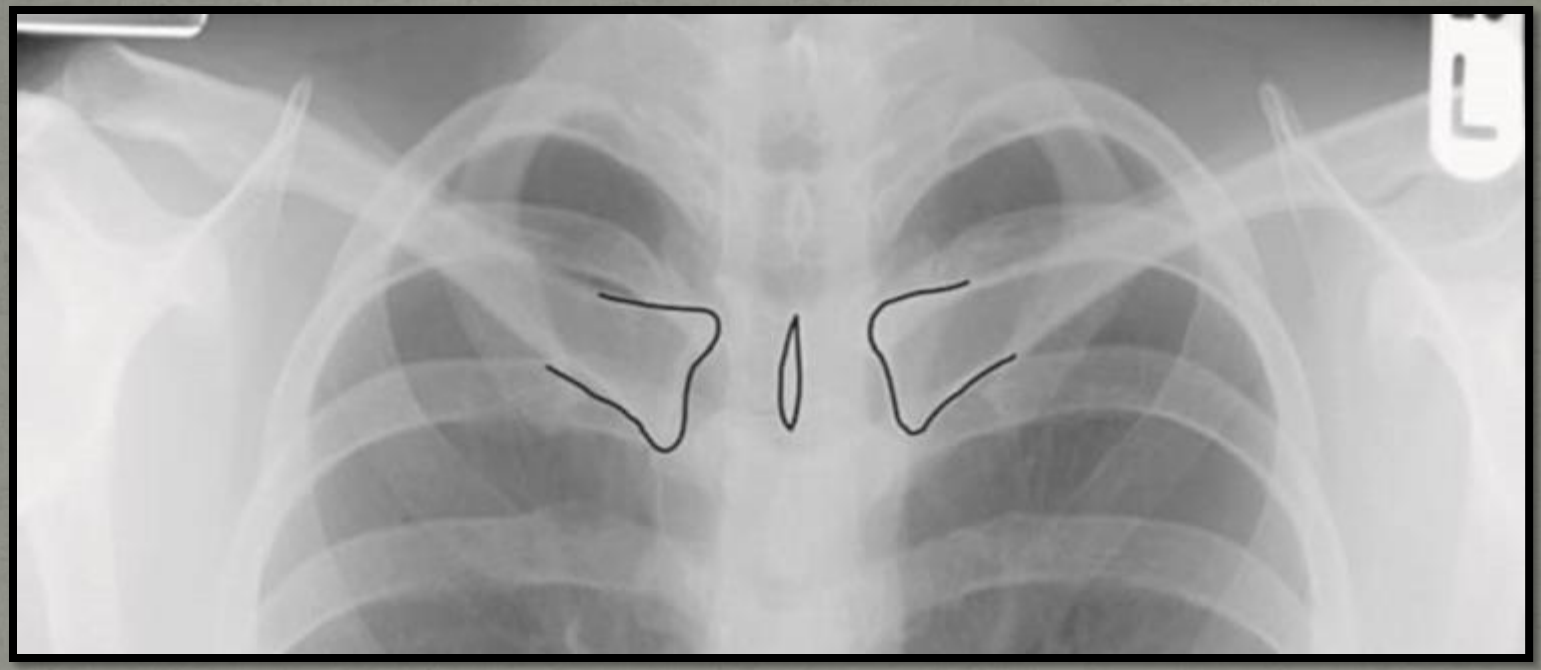

AP


PA
مستشفى الجامعة الأردنية

Technical Factors



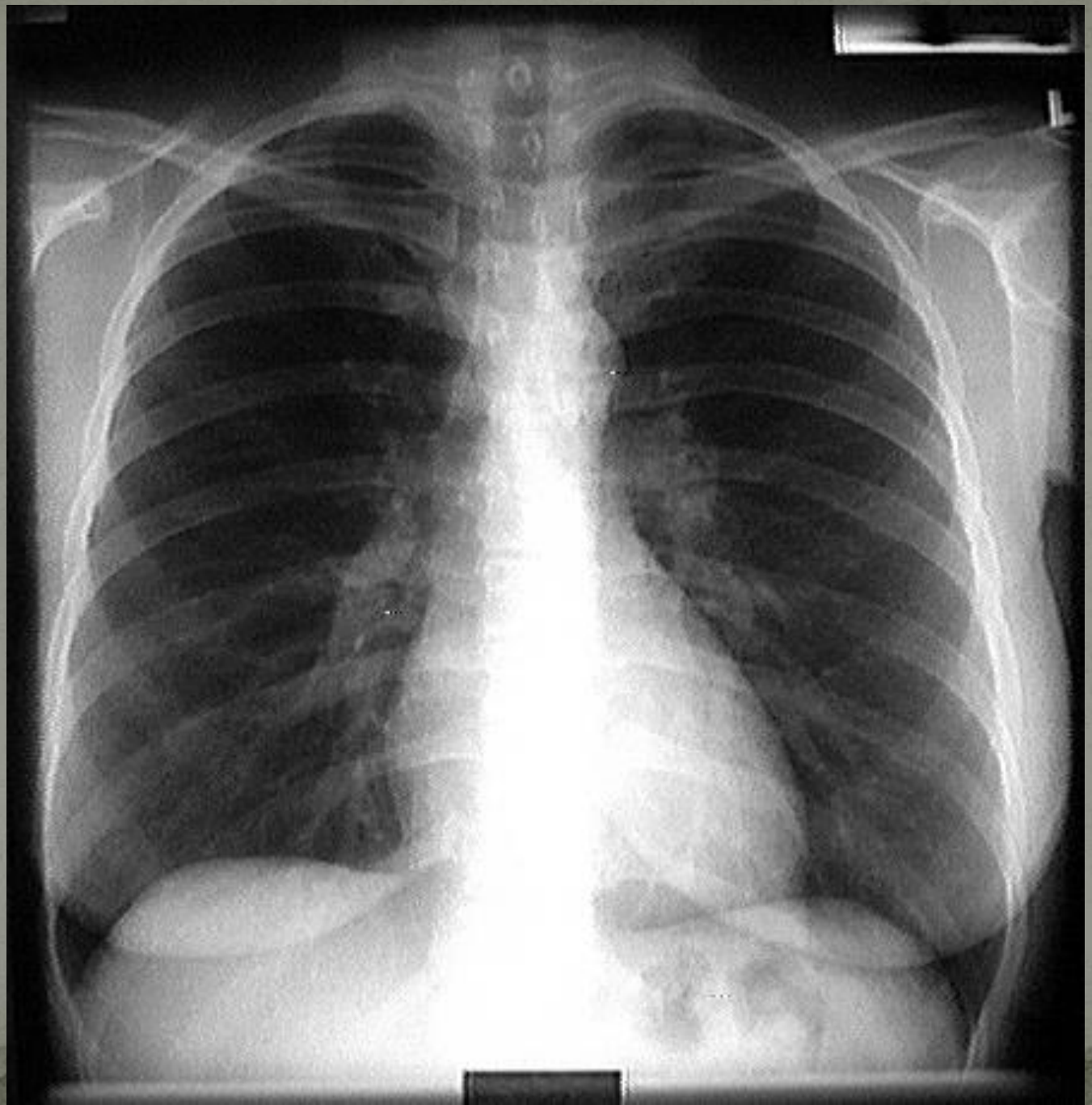
- Check side marker
- Rotation: Look at medial ends of clavicles ⇨ related to T4 on PA films.
- With a normal penetration/exposure of the film the vertebrae behind the heart should be just visible



Medial ends of clavicles are equidistant from the spinous process.

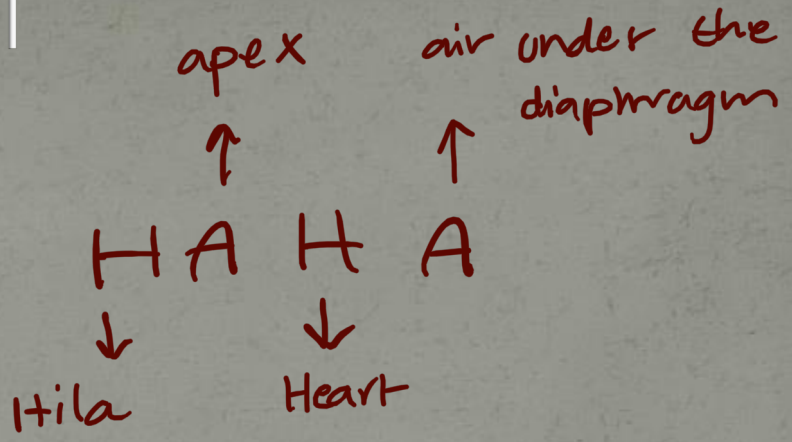
Six complete anterior ribs (and ten posterior ribs) are clearly visible

* Anterior ribs
→ oblique
* Posterior ribs
→ horizontal



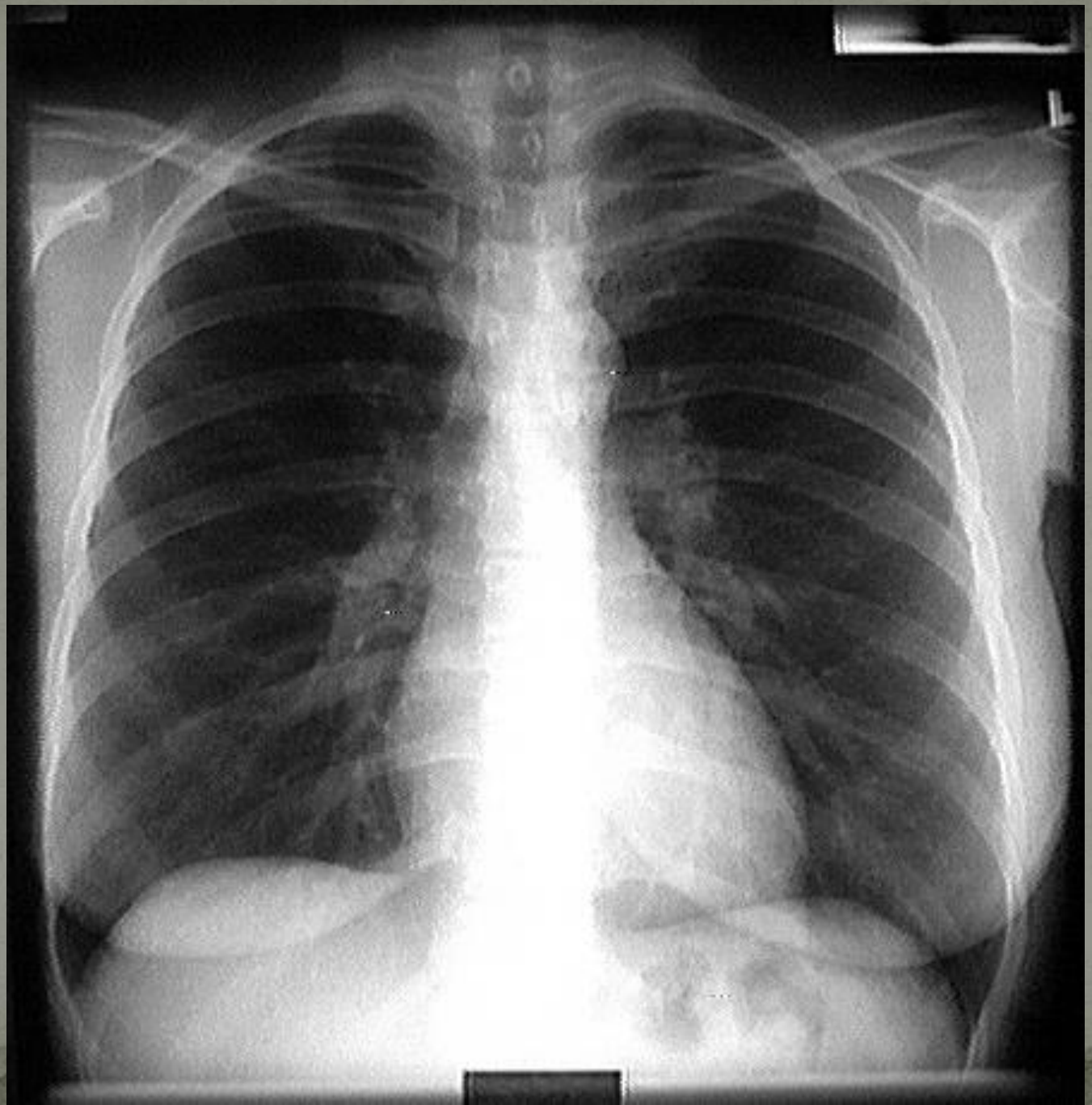
Areas of interest

- Lungs
- Mediastinum
- Hila
- Bones
- Soft tissues



Lungs

- Lung Volumes: the Hemidiaphragms should be at the level of the 6th rib anteriorly or the tenth rib posteriorly

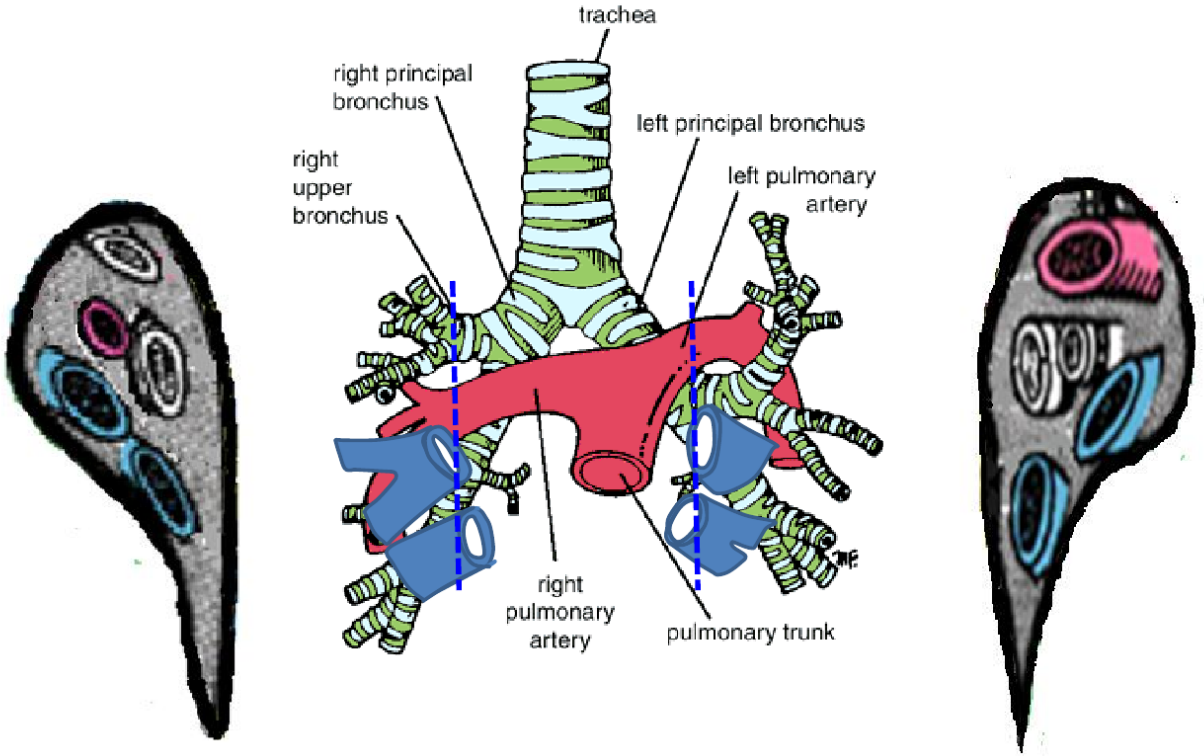


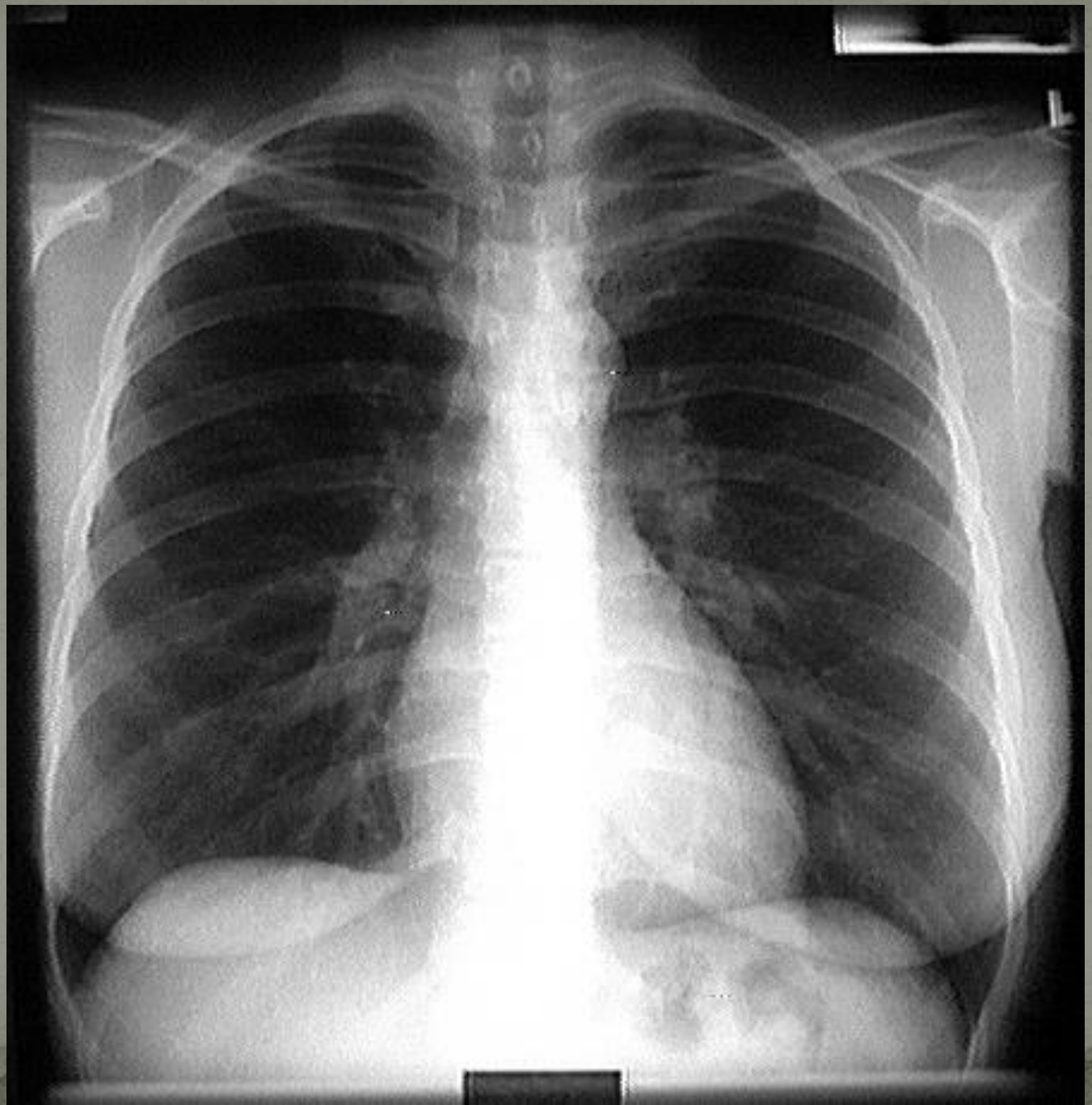
Note: good exposure as no more than 1/3 of the spine is showing behind the heart

Air bronchograms

Hila

- Each hilum is the result of the density of the pulmonary artery & the superior pulmonary vein.
- The **LT hilum is 1cm higher than the RT** because the left pulmonary artery arches up & over the left main bronchus.
- **Distortion**: Hila may be pulled up or down by fibrosis or collapse of the lung.
- **One hilum Bigger or Denser than the other**:

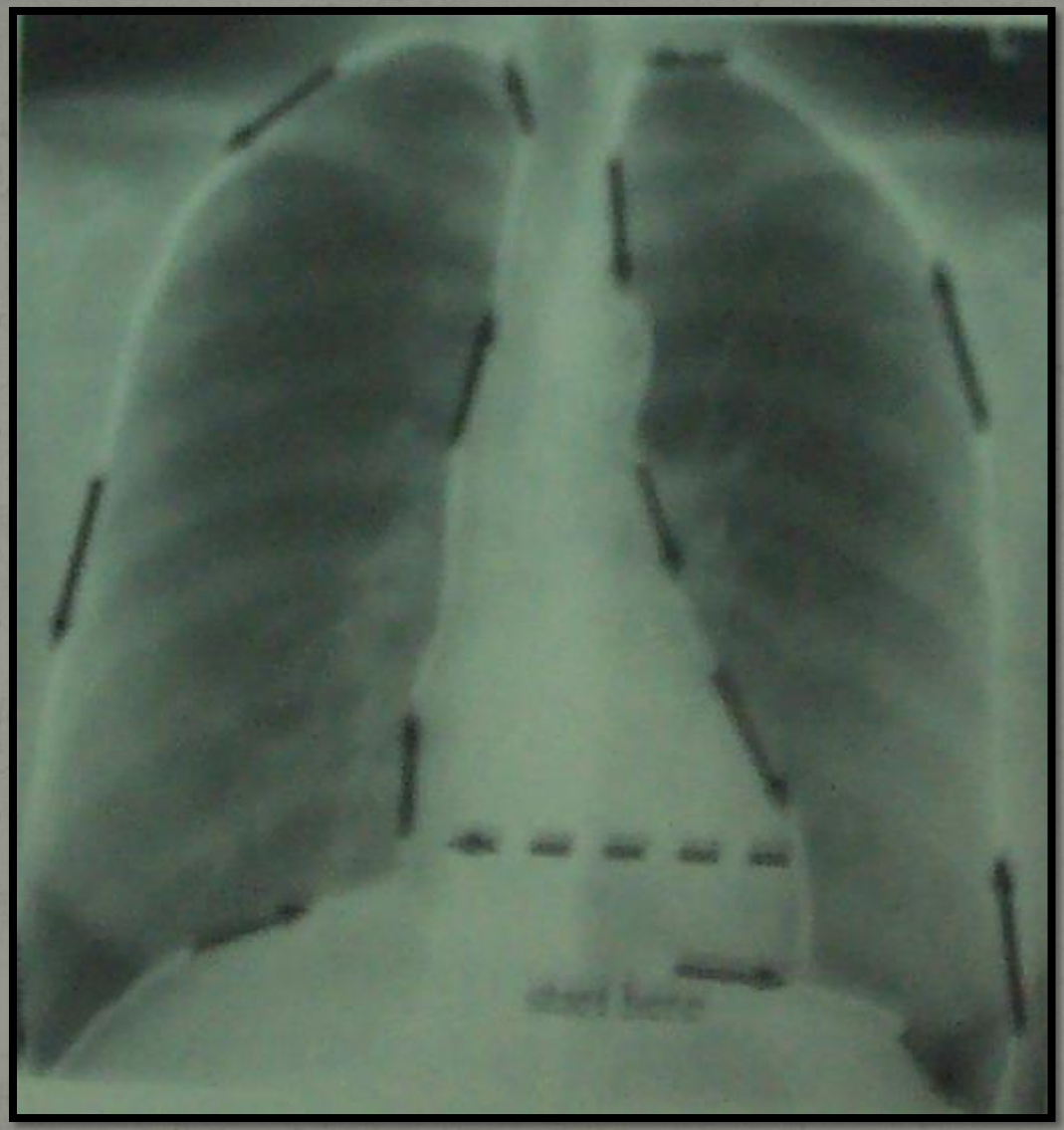

trachea
right principal bronchus
left principal bronchus
right upper bronchus
left pulmonary artery
right pulmonary artery
pulmonary trunk



Pleura

The best place to look for pleura is in profile i.e around the lung margin.

Pleura



Mediastinum & Heart

- **Mediastinum**: is situated between the lungs in the center of the thorax.
- Boundaries:
- **Divisions**: *Radiologically into 3 parts:*
  - Ant :in front of the ant. Pericardium & trachea
  - Middle :within the pericardial cavity including trachea
  - Post :behind post pericardium & trachea.
  - Sup.Mediastinum

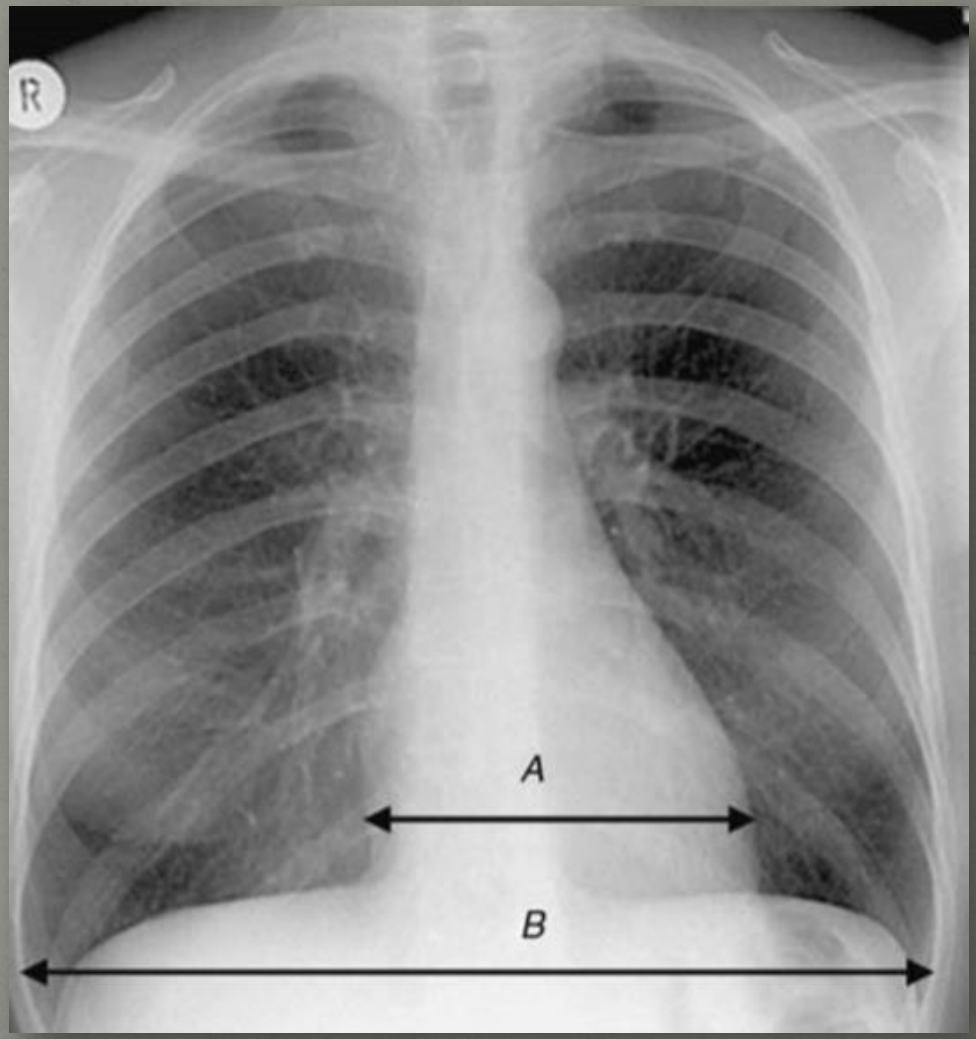
Mediastinum & Heart

Enlarged heart:

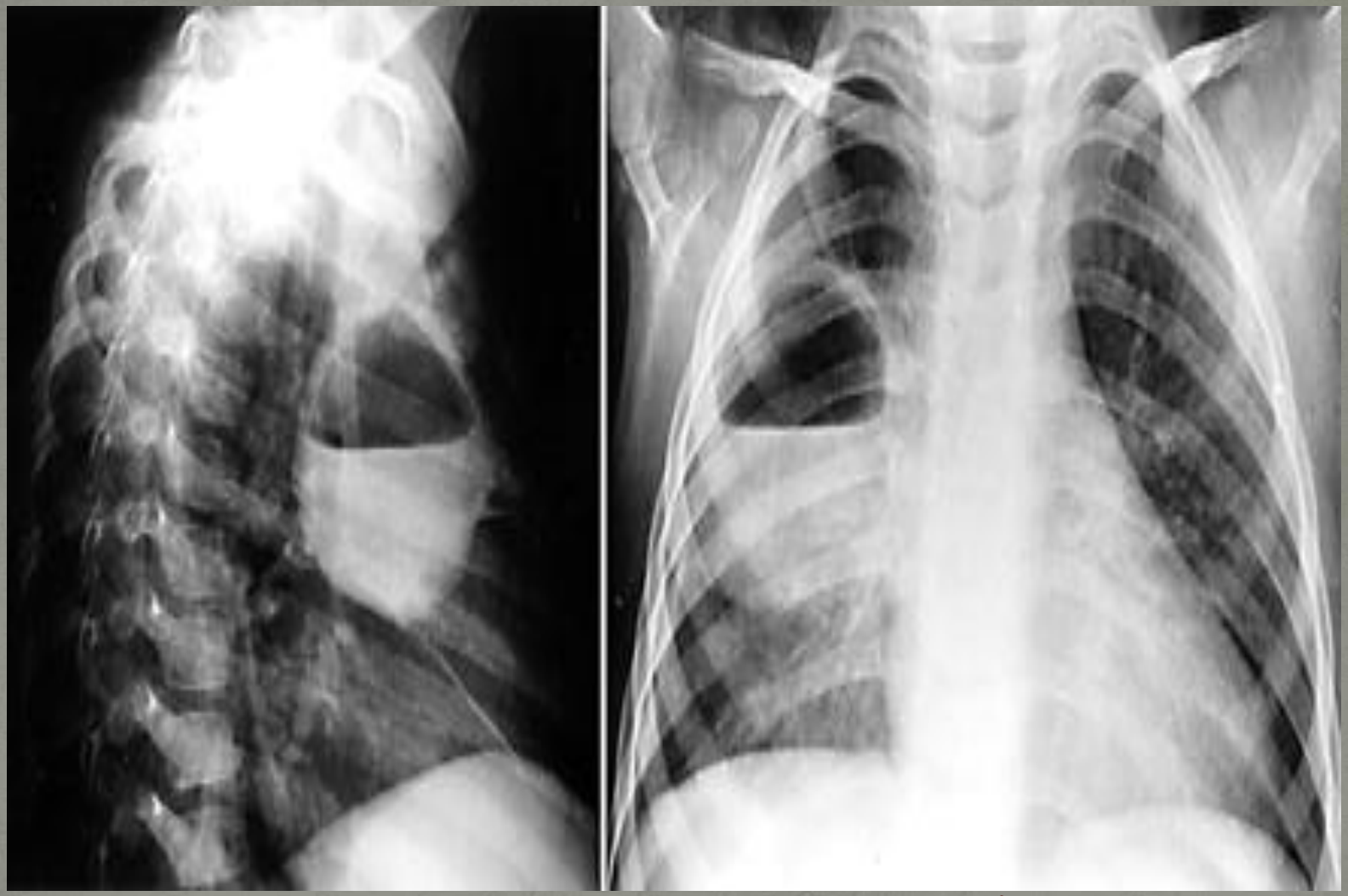
- PA film : Normal
  CTR <50 %

2/3 LT

1/3 RT



* PA CXR / * cavitation, radio-opacity in the middle zone of the RT lung (from the lateral CXR → middle lobe) / * no calcification or air bronchogram / * well-defined / * there is an air-fluid level



* possible diagnosis : RT middle lobe cyst / abscess

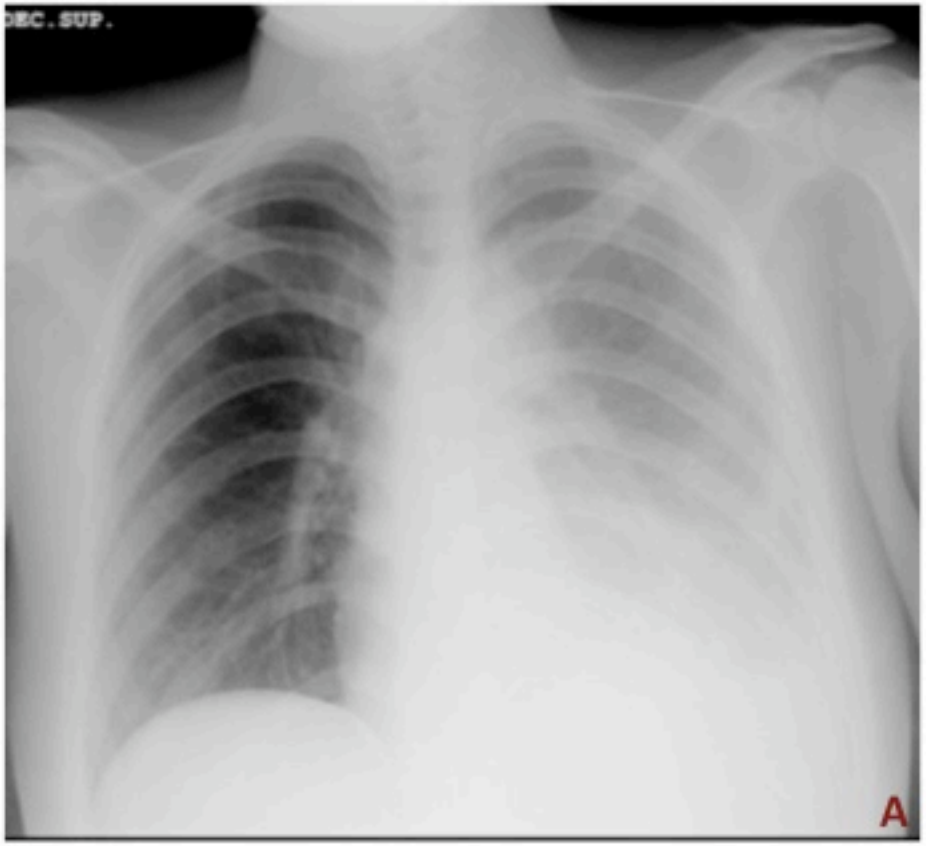

L
V82
UPR

* PA CXR / Erect
* radio-opacity in the middle / lower zone of the LT lung
* no calcification, air bronchogram, or air-fluid level
* well-defined upper margin (meniscus sign)
* silhouetting of the heart left border & blunting of the costophrenic angle.

** possible diagnosis: massive LT pleural effusion

** Massive VS mild:
if the fluid > ½ of the heart length = massive

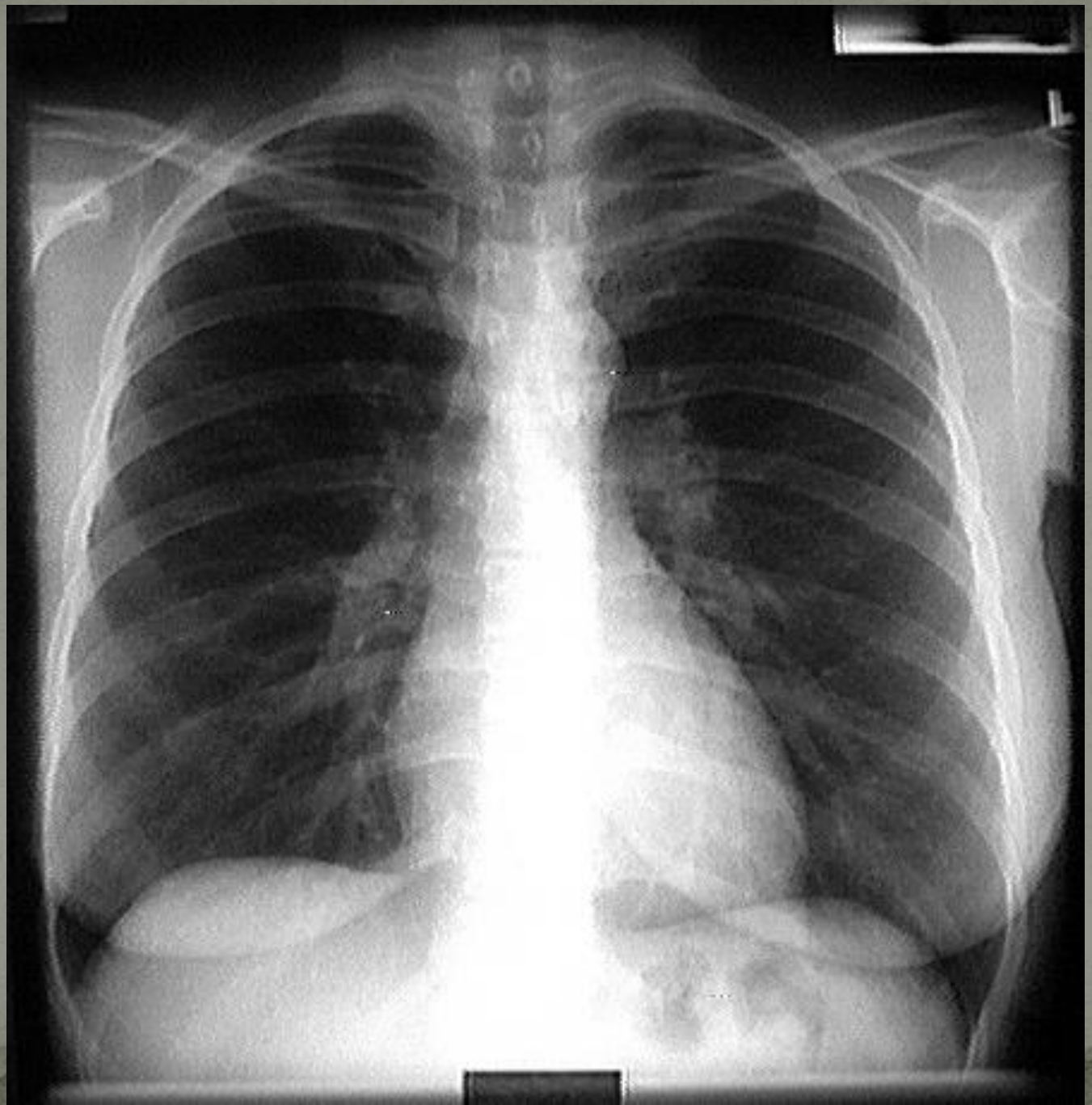
** If supine → grading sign



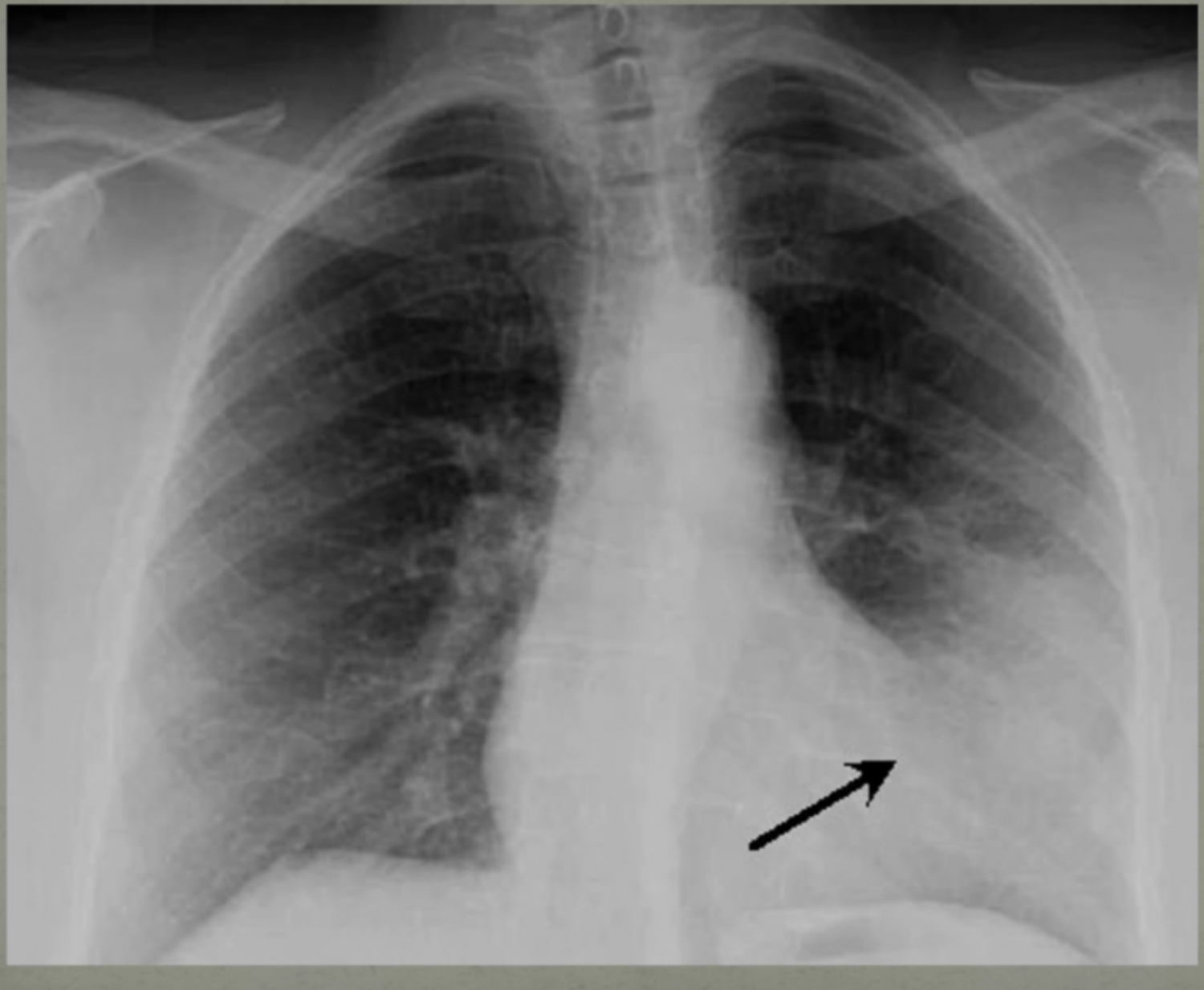
grading sign

Free fluid in supine AP chest view

A. Unilateral left pleural effusion: hazy increased density of the hemithorax, obscuring ipsilateral hemidiaphragm.



* PA CXR
* bilateral lowering & flattening of the diaphragm
* wider space between the ribs
* 8+ of the anterior ribs are showing bilaterally
* possible diagnosis: COPD (hyper-inflation)

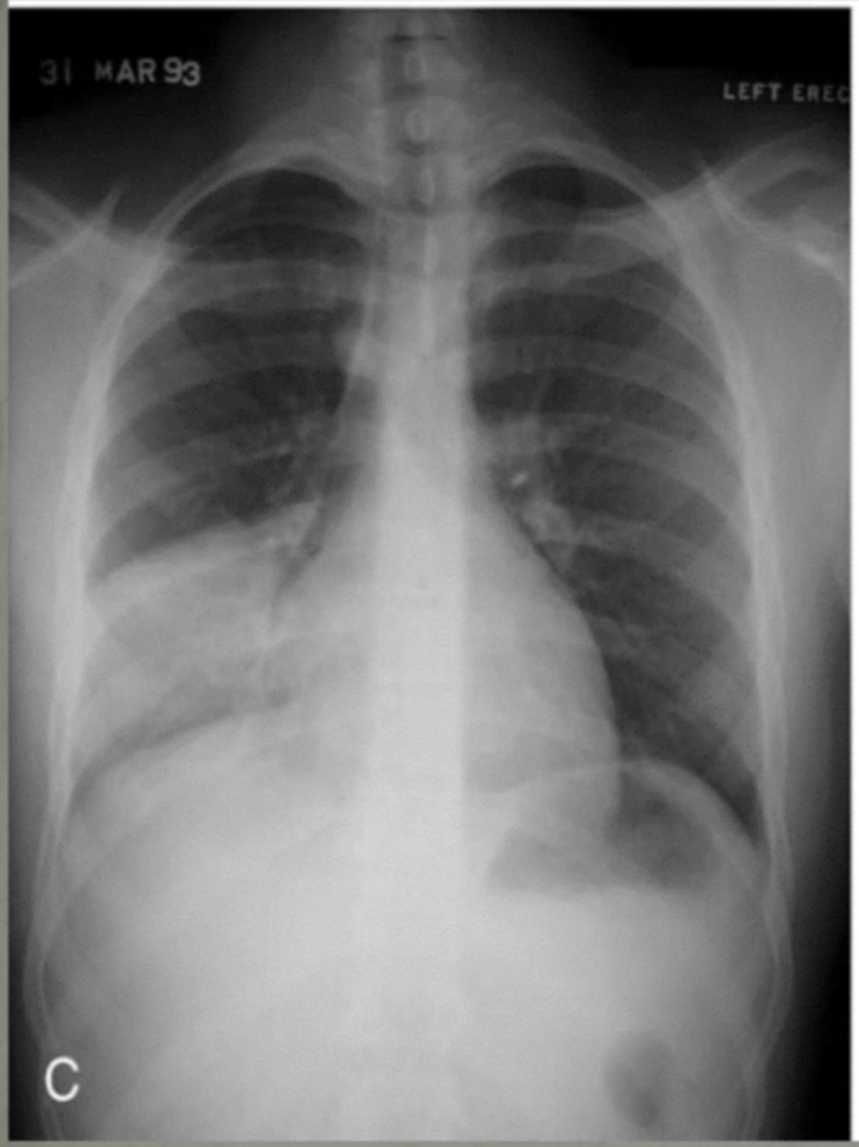


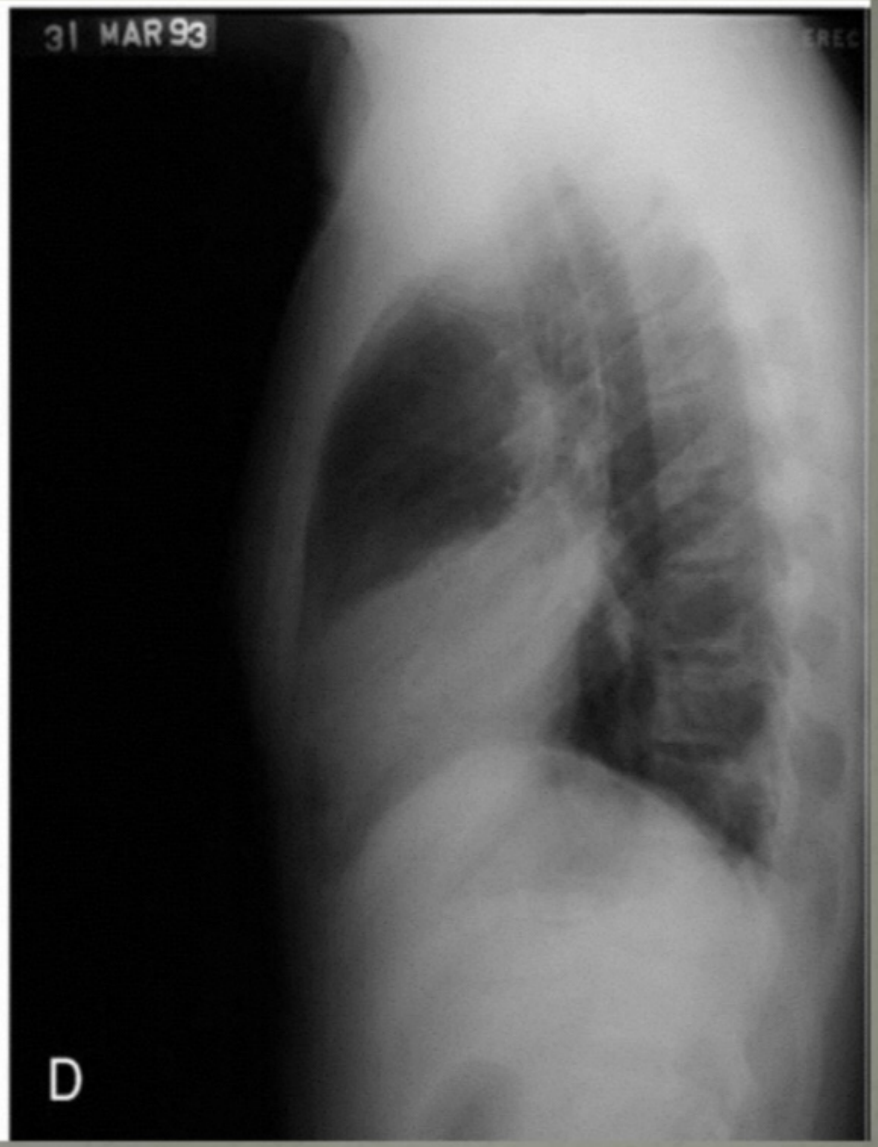
* PA CXR
* radio-opacity in the lower zone of the LT lung.
* positive for air-bronchogram
* ill-defined
* no calcification or air-fluid level
* there is silhouetting of the LT border of the heart but no blunting of the costophrenic angle or LT hemi-diaphragm.

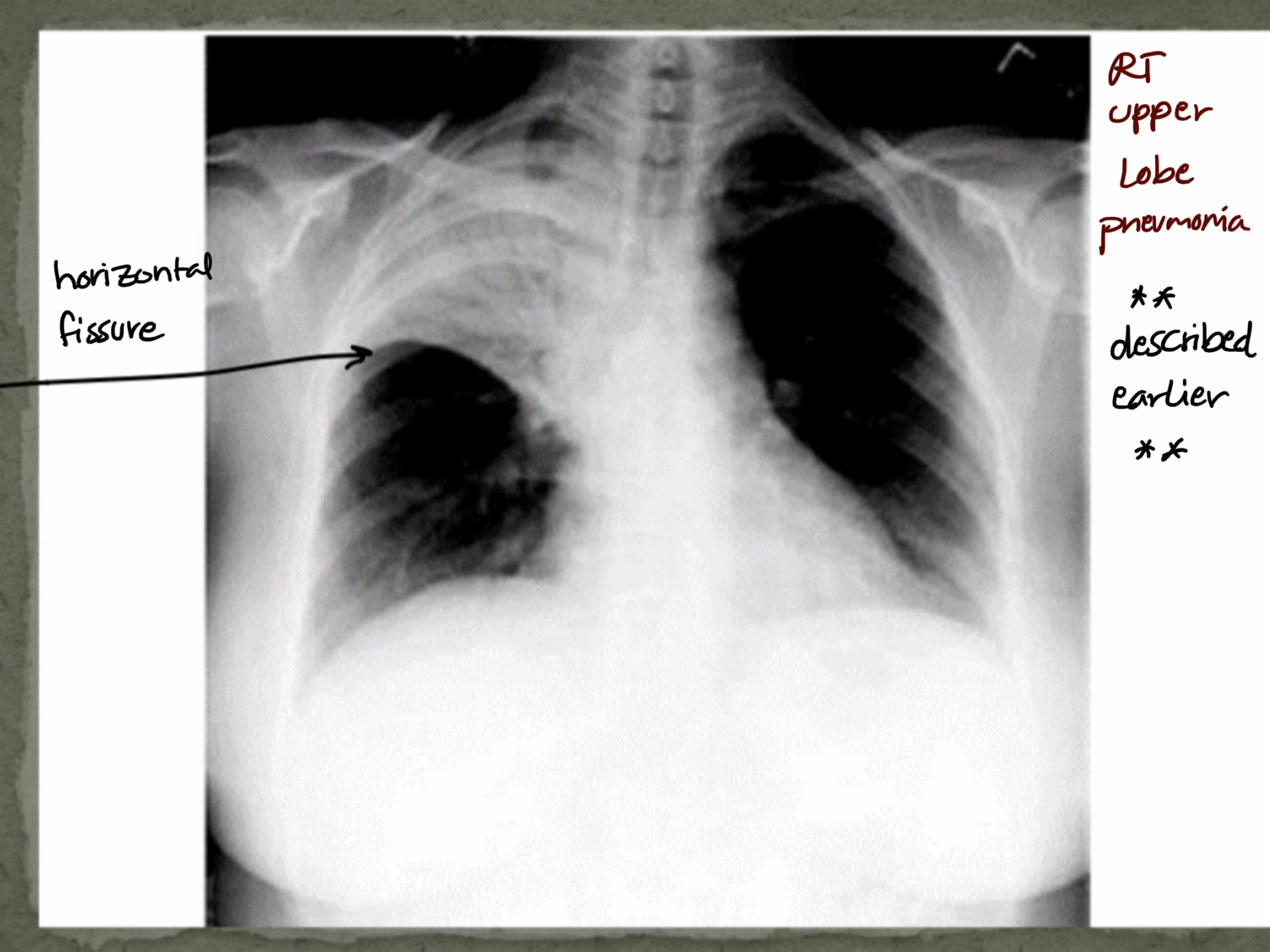
** Possible diagnosis: pneumonia in the lingula of the LT lung.

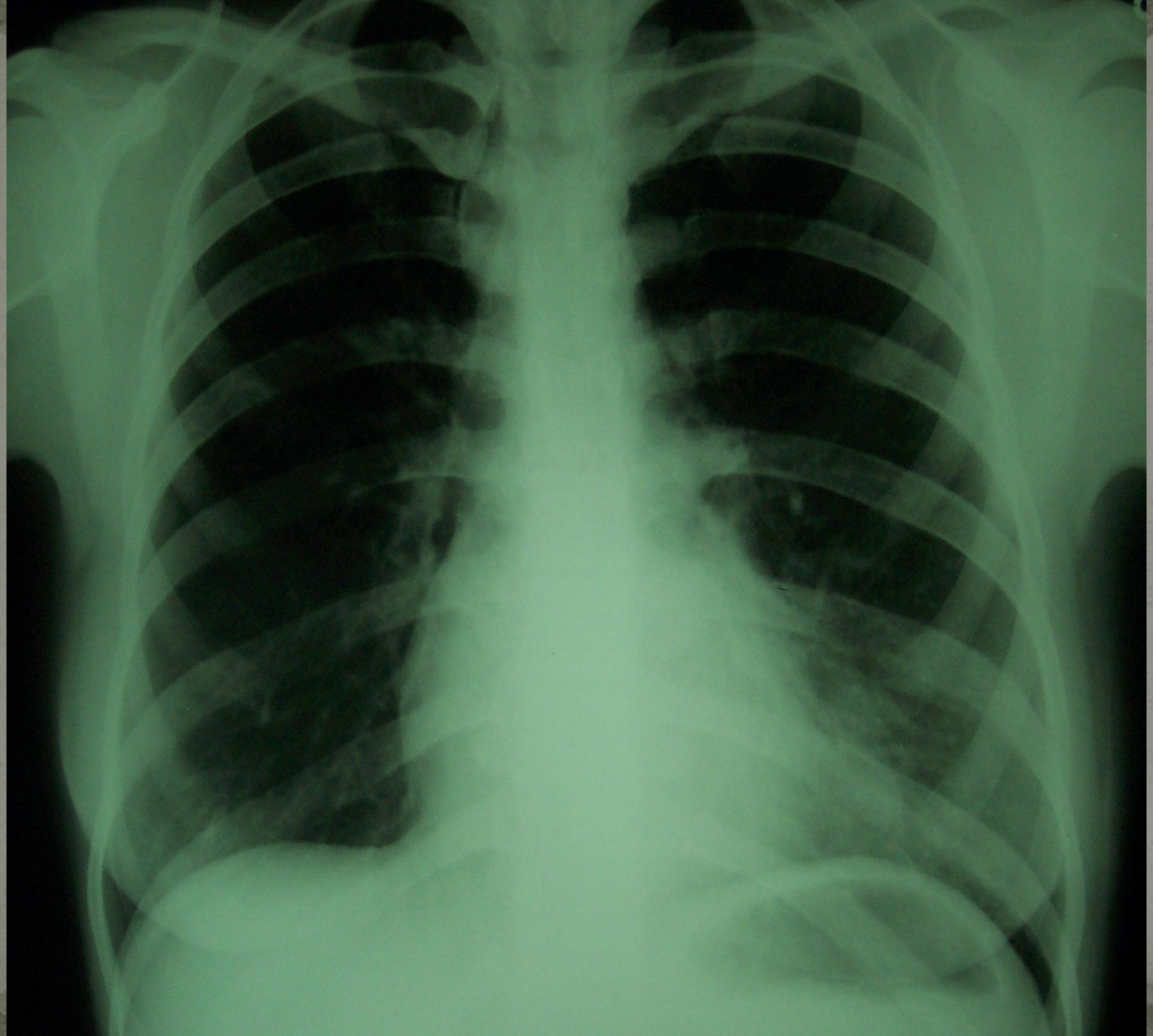
** If the opacity is silhouetting the heart but sparing the diaphragm + costophrenic angle → the pathology is in the middle lobe / lingula not the lower lobe.

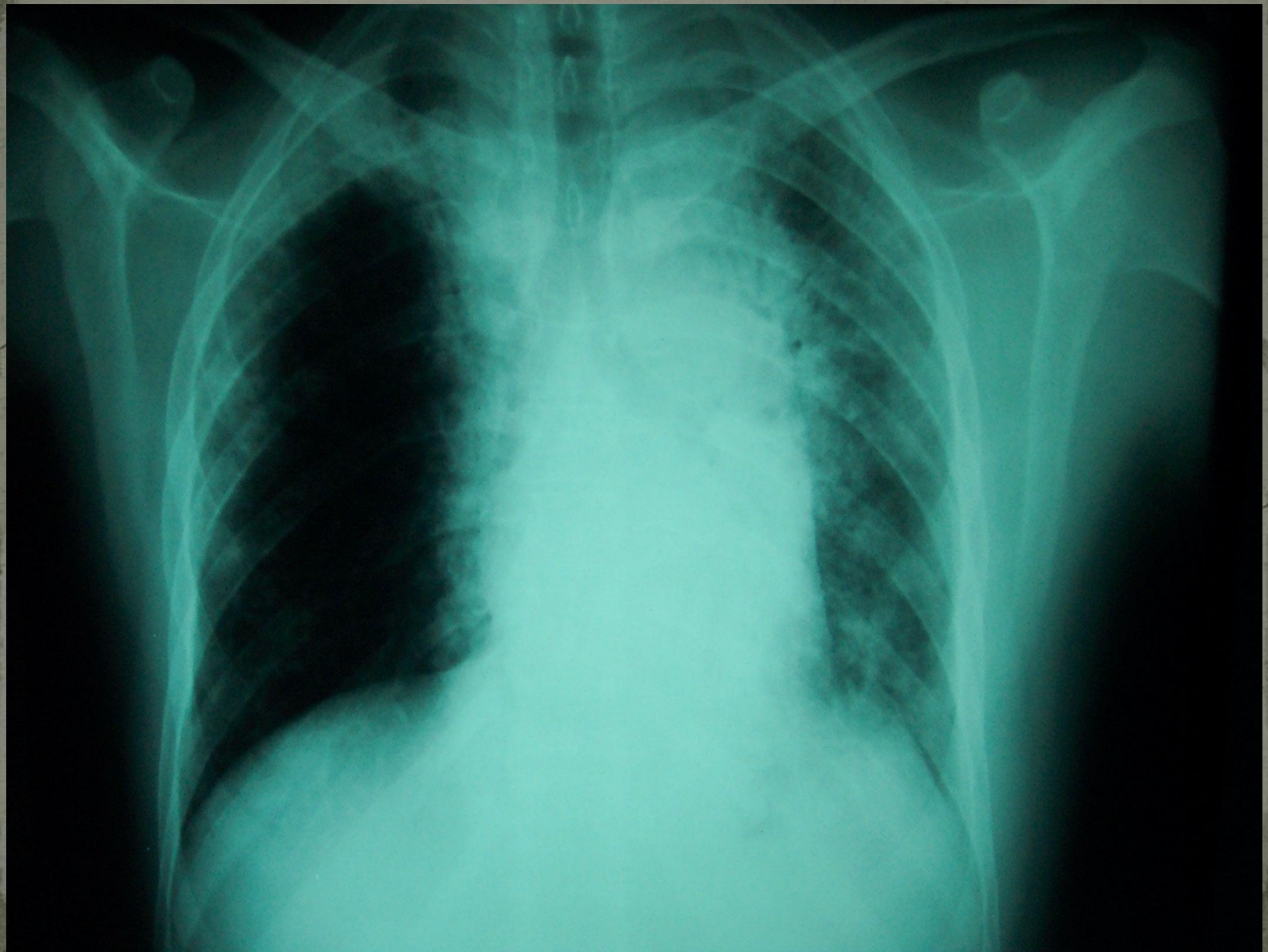
* RT middle lobe pneumonia ** described earlier **





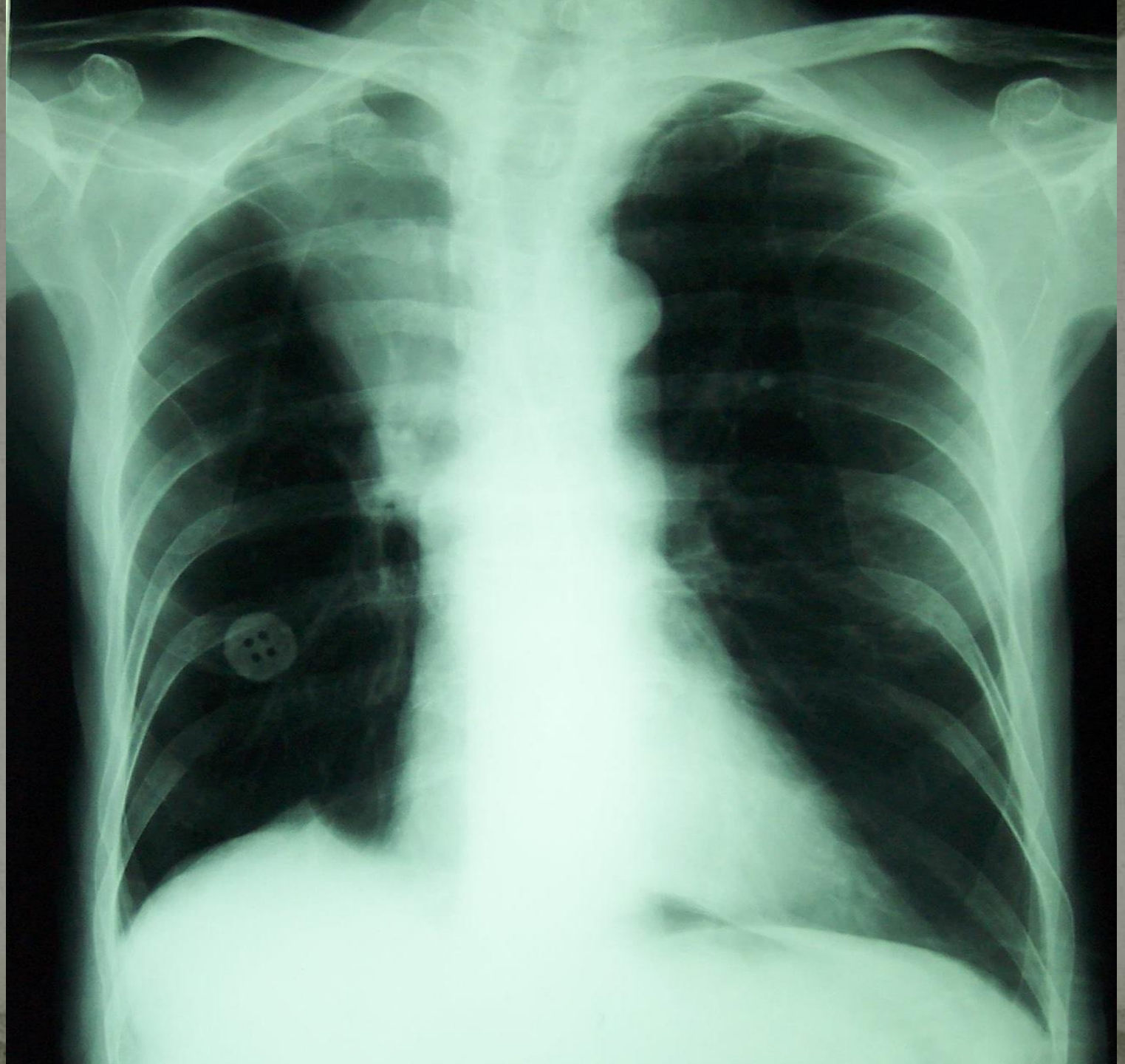

horizontal
fissure
RT
upper
Lobe
pneumonia
**
described
earlier
**





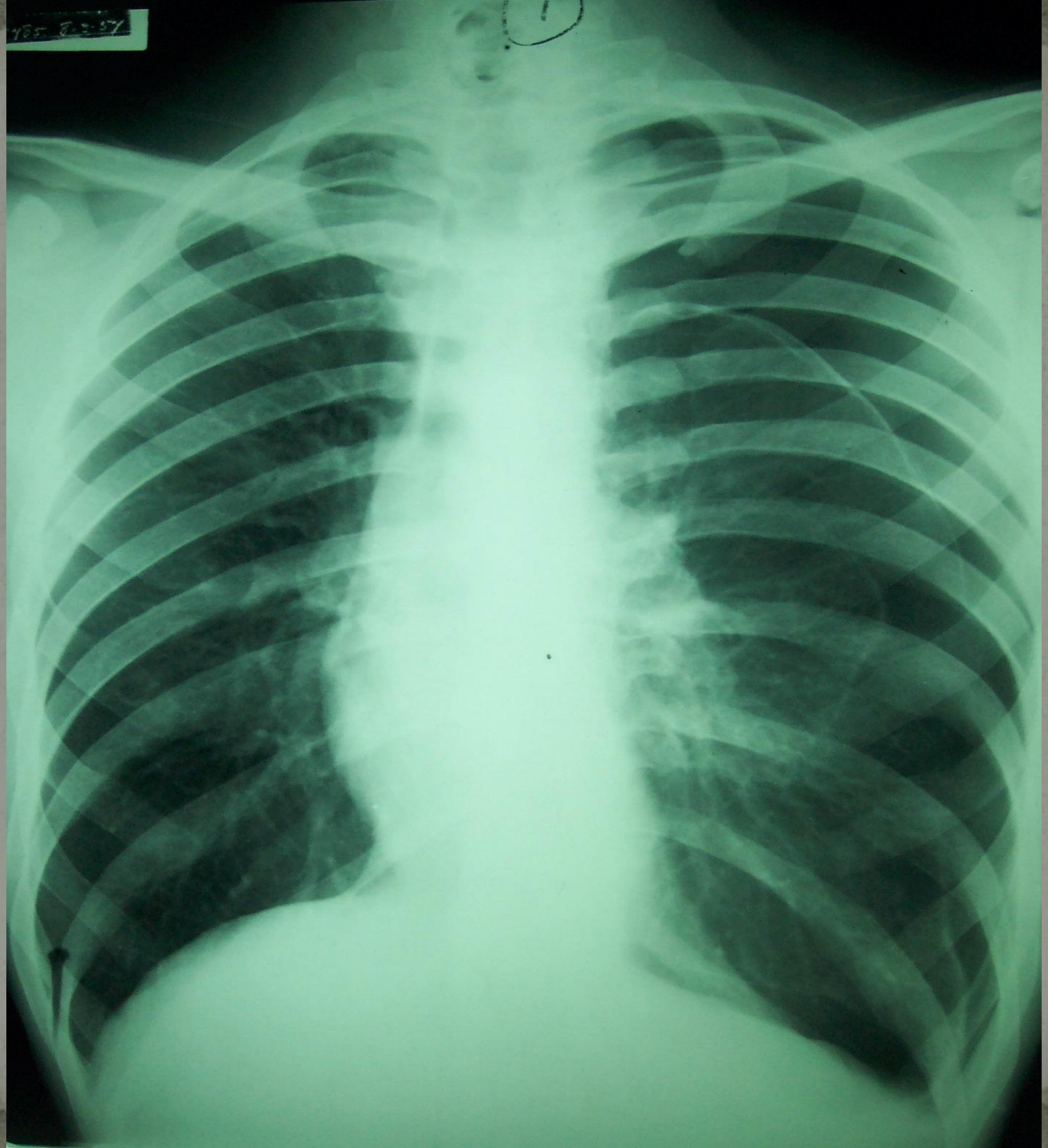
* PA CXR
* Bilateral paramediastinal opacification, more prominent on the LT side
* positive for air bronchogram
* no air-fluid level, no calcification
* ill-defined

** Possible diagnosis: radiation pneumonitis

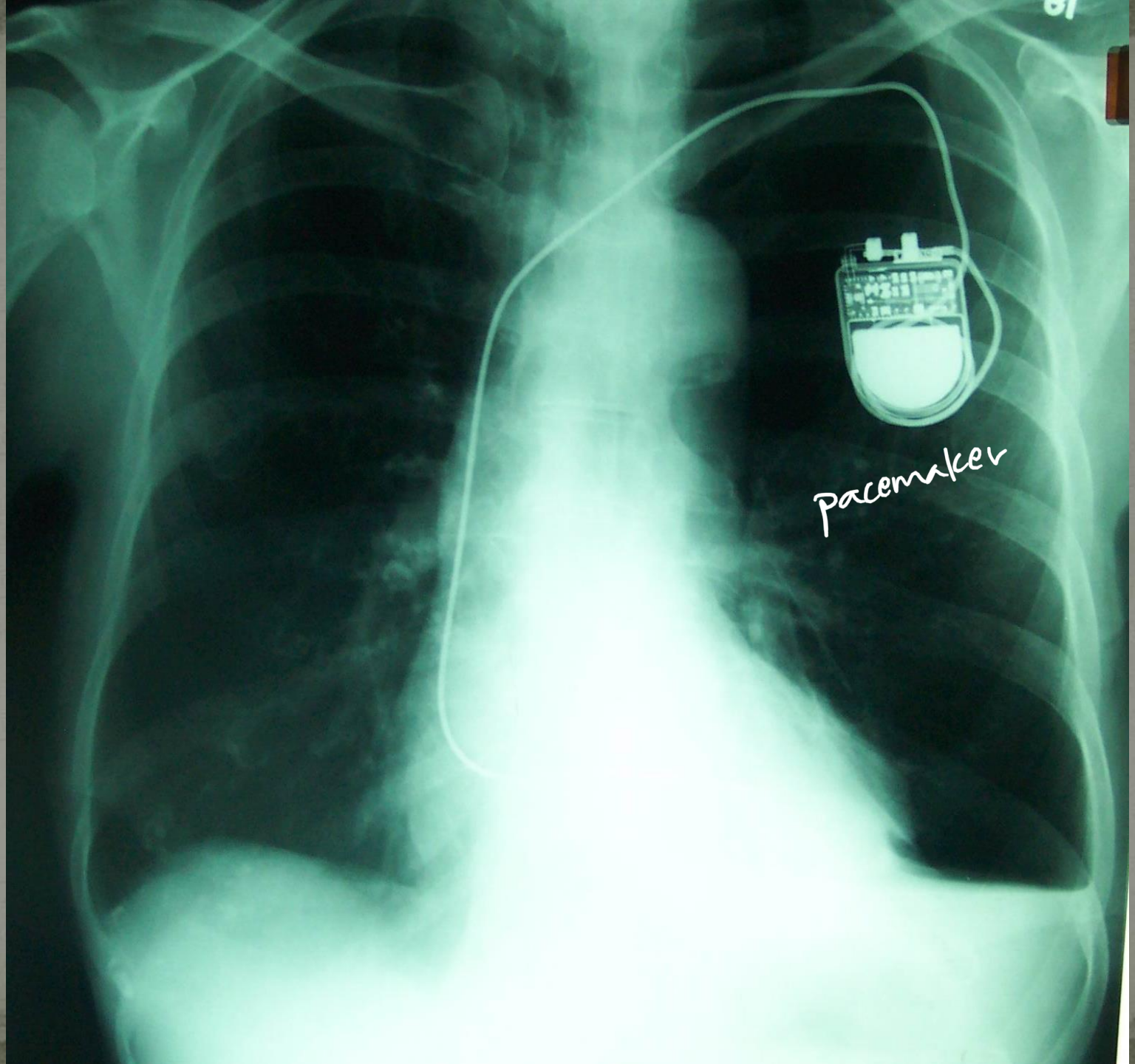


* PA CXR
* radio-opacity in the upper RT zone
* no air-fluid level, calcification, or air bronchogram
* ill-defined
* abnormal elevation + enlargement of the RT hilum
* elevation / notching of the RT hemidiaphragm
(Hoft sign)
* displacement of the horizontal fissure
* tracheal deviation to the RT side

** Possible diagnosis: collapse of the RT upper Lung Lobe



** described earlier **

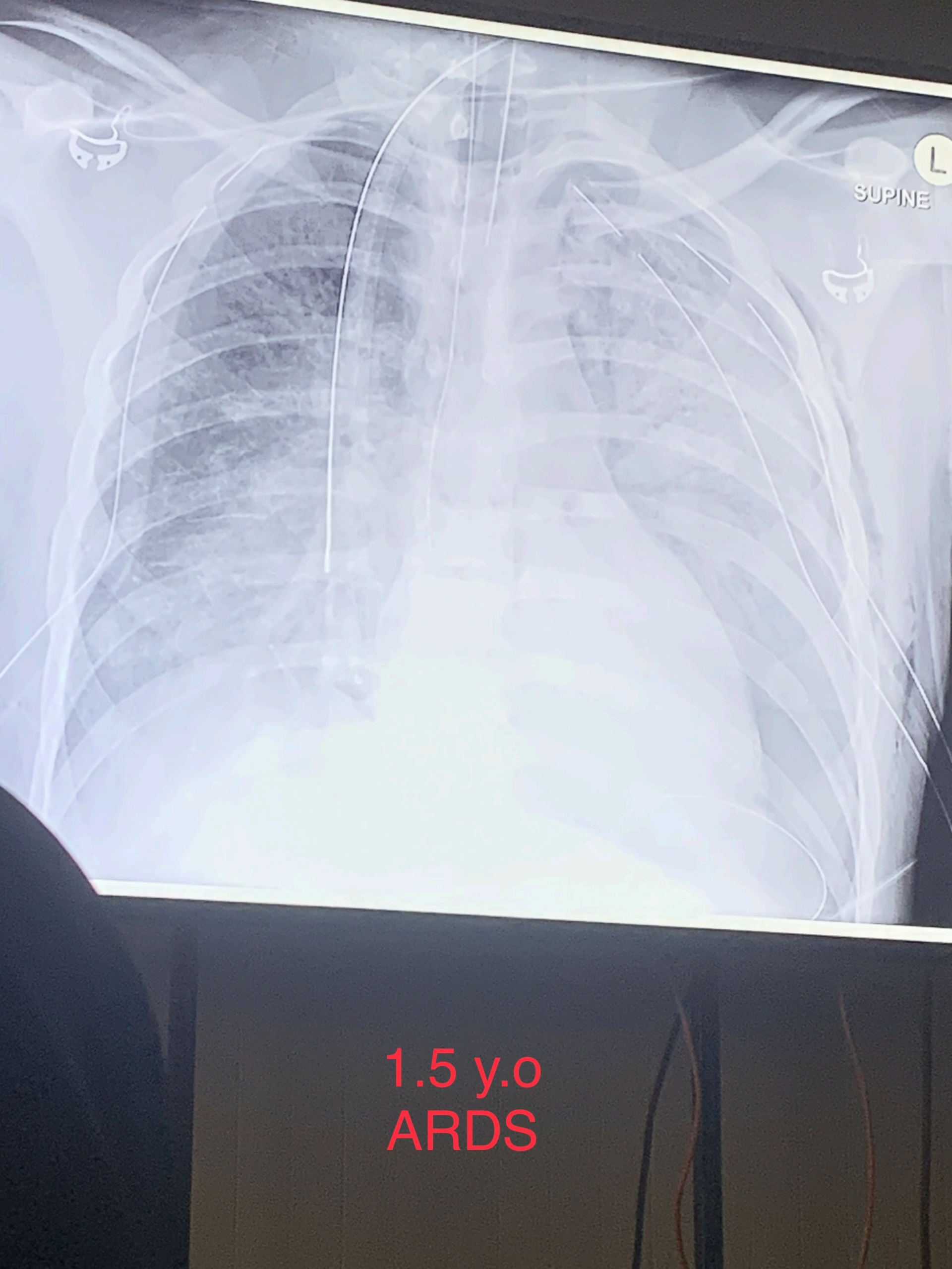


** mild LT pleural effusion in the lower lobe

** described earlier **

* For the sake of the exam:

1- Pleural effusion (mild / massive) ± cardiomegaly
2- Peumonia (Lobar / diffuse)
3- Lung collapse
4- Pneumothorax (simple / tension)
5- COPD
6- Cavitation (cyst / abscess)
7- Mass (tumor)
8- Radiation pneumonitis
9- ARDS (toddlers)


L
SUPINE
1.5 y.o
ARDS