55 slide

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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

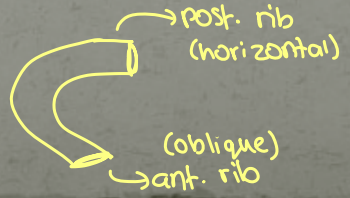
- Minimizes the chance of missing an abnormality.
- Enables a detection of second or related lesions.
- Makes complex images easier to interpret.
- Builds up a mental databank of what is normal.

Systematic Approach

Covers the following:

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

"next page"



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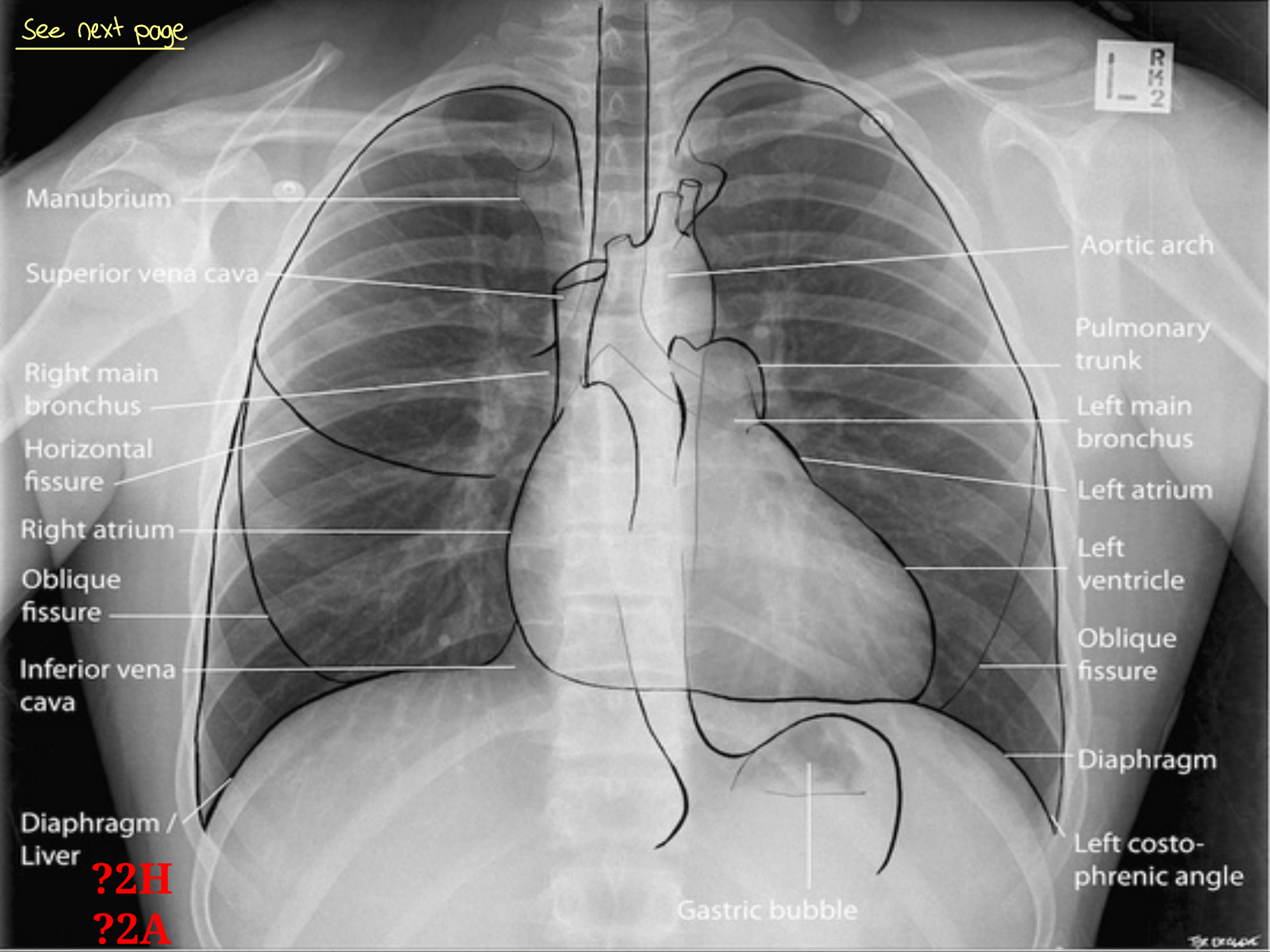
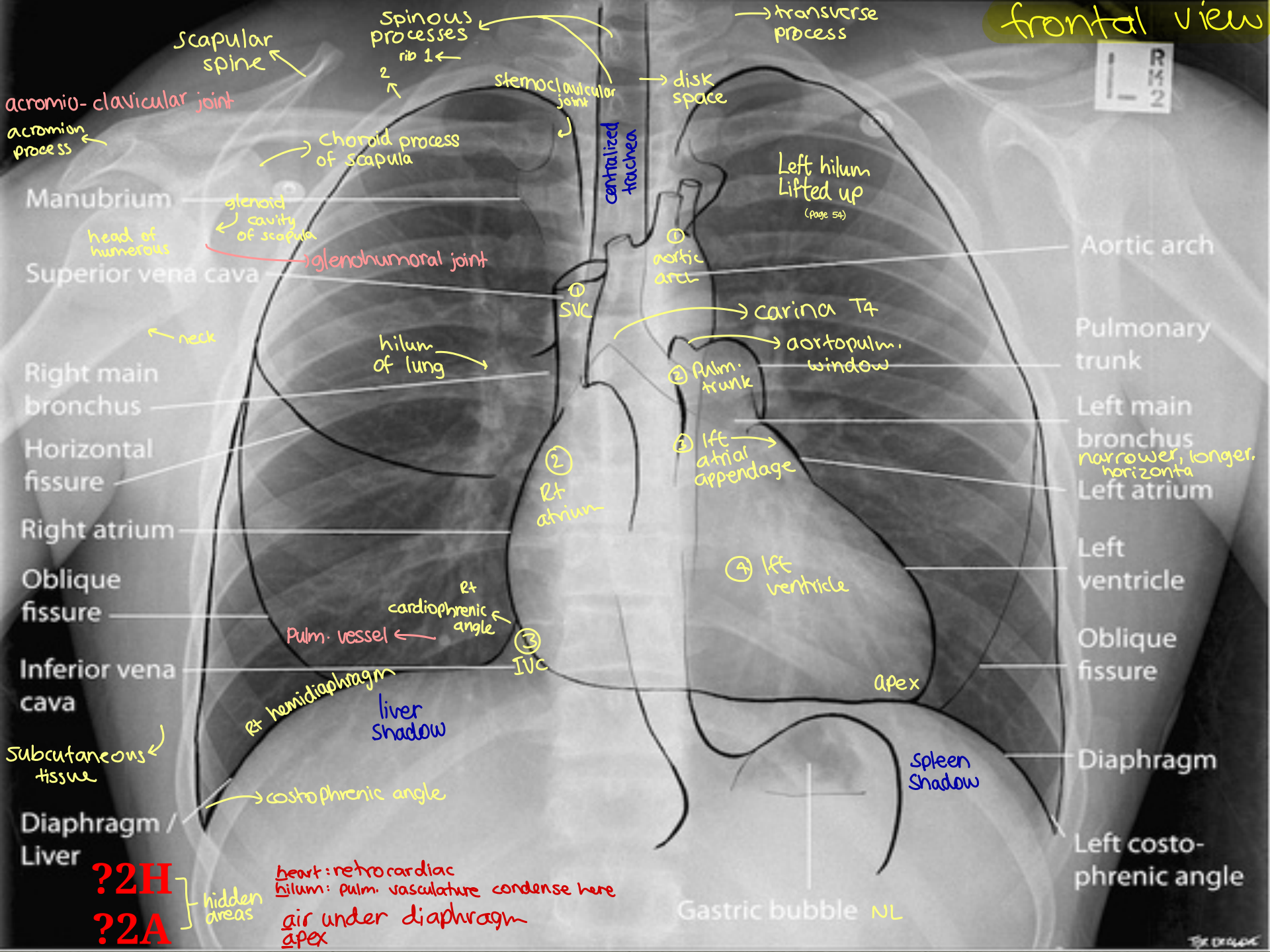
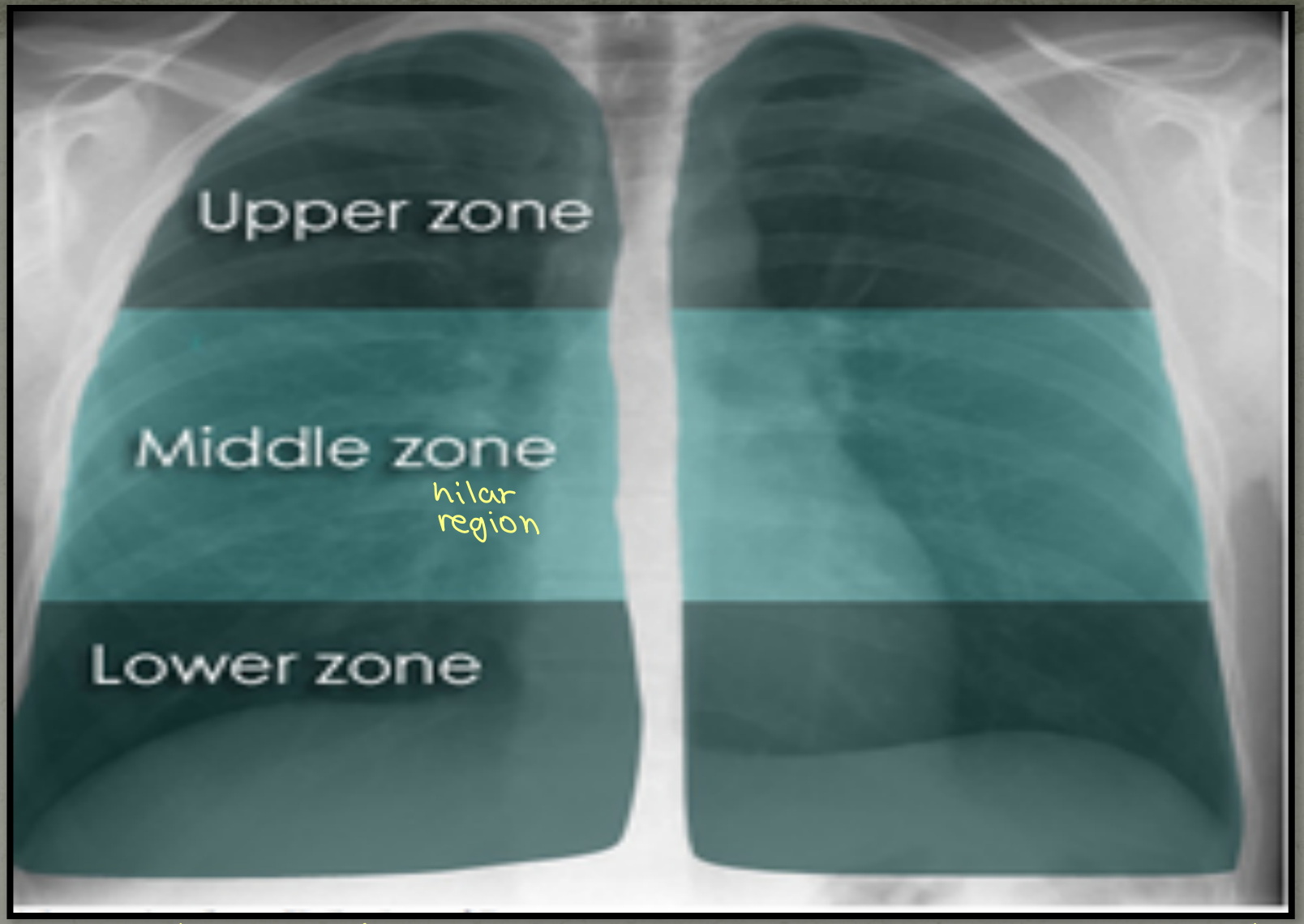



frontal view
Scapular spine
Spinous processes
rib 1
2
transverse process
acromio-clavicular joint
acromion process
sternoclavicular joint
disk space
choroid process of scapula
centralized trachea
Left hilum Lifted up
(page 54)
Manubrium
glenoid cavity of scapula
head of humerous
glenohumoral joint
Superior vena cava
1 SVC
1 aortic arch
Aortic arch
carinca T4
neck
hilum of lung
aortopulm. window
Pulmonary trunk
2 Pulm. trunk
Right main bronchus
Left main bronchus
Horizontal fissure
3 lft atrial appendage
narrower, longer, horizonta
Left atrium
2 Rt atrium
Right atrium
Left ventricle
4 lft ventricle
Oblique fissure
Rt cardiophrenic angle
Pulm. vessel
3 IVC
Oblique fissure
Inferior vena cava
Rt hemidiaphragm
liver shadow
apex
Subcutaneous tissue
spleen shadow
Diaphragm
costophrenic angle
Diaphragm / Liver
Left costo-phrenic angle
?2H
?2A
hidden areas
heart: retrocardiac
hilum: pulm. vasculature condense here
air under diaphragm
apex
Gastric bubble NL

7 true ribs: each one attaches to costal cartilage
3 false ribs 8,9,10 → single costal cartilage
2 floating ribs: doesn't attach to any costal cartilag

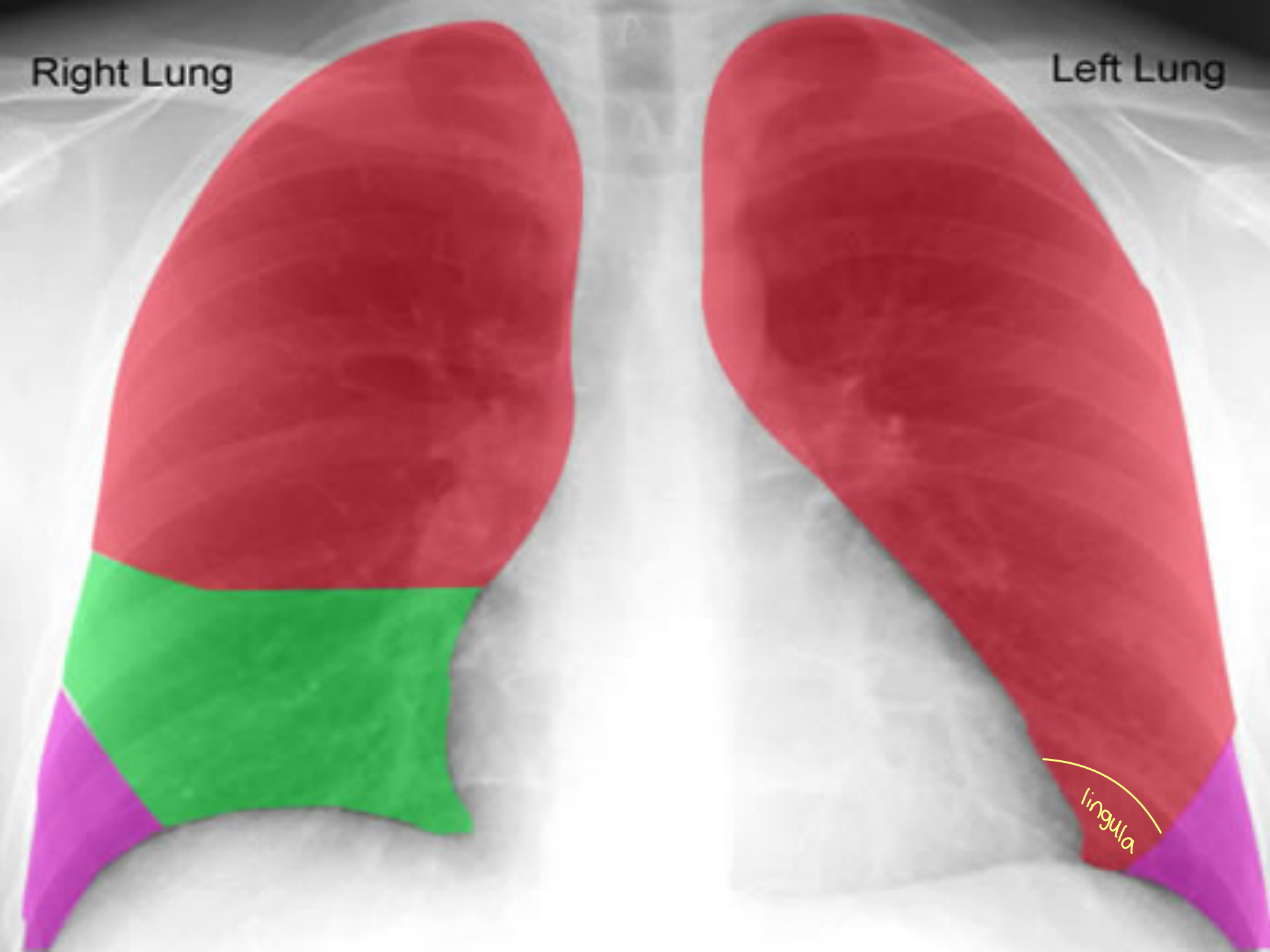
:Heart borders

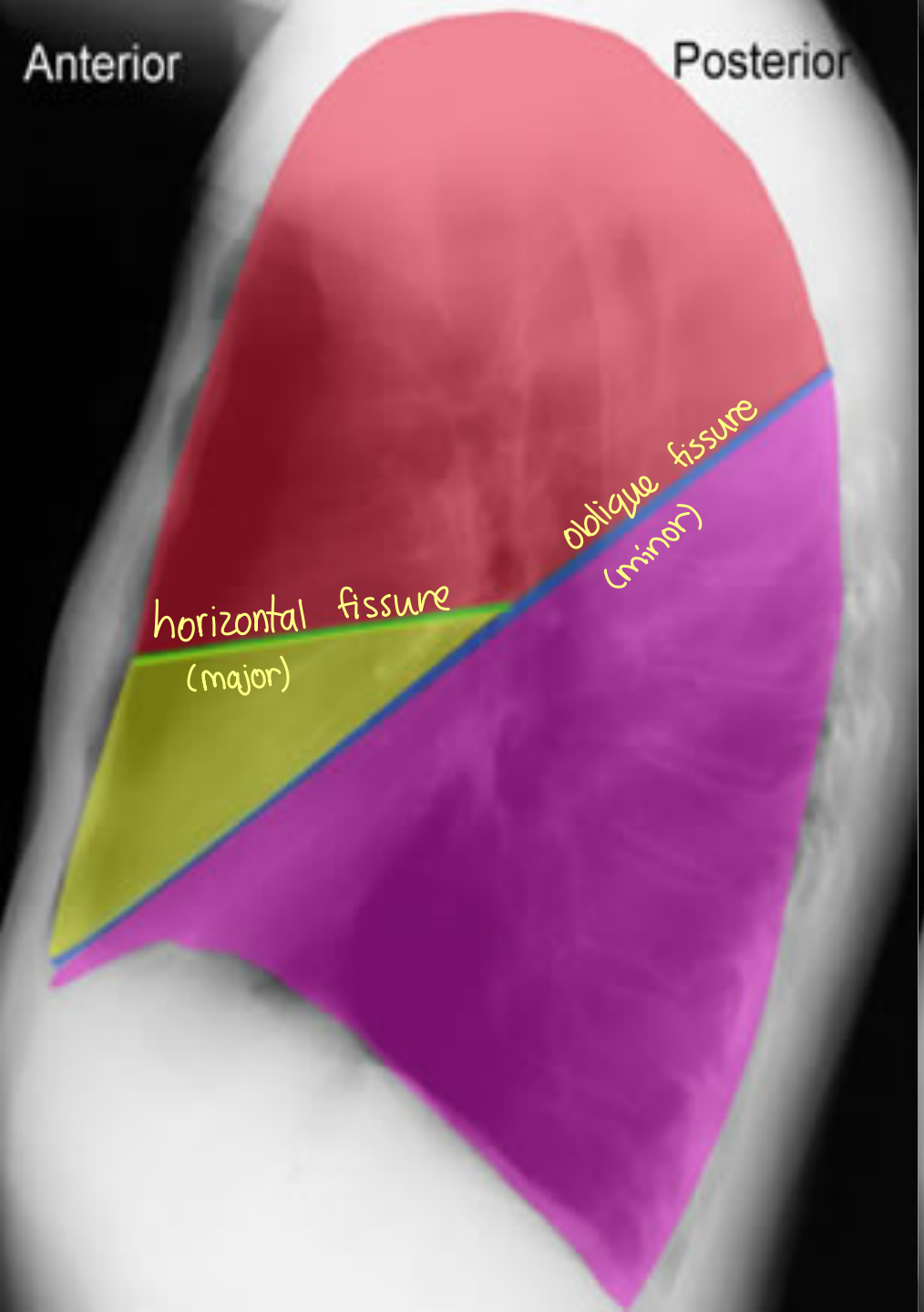
- ***The right border*** is formed by the right atrium
- the superior vena cava entering superiorly, and the inferior vena cava often seen at its lower margin.
- ***The left border*** is formed by the left ventricle and left atrial appendage.
- The pulmonary artery, aortopulmonary window and aortic notch extend superiorly.

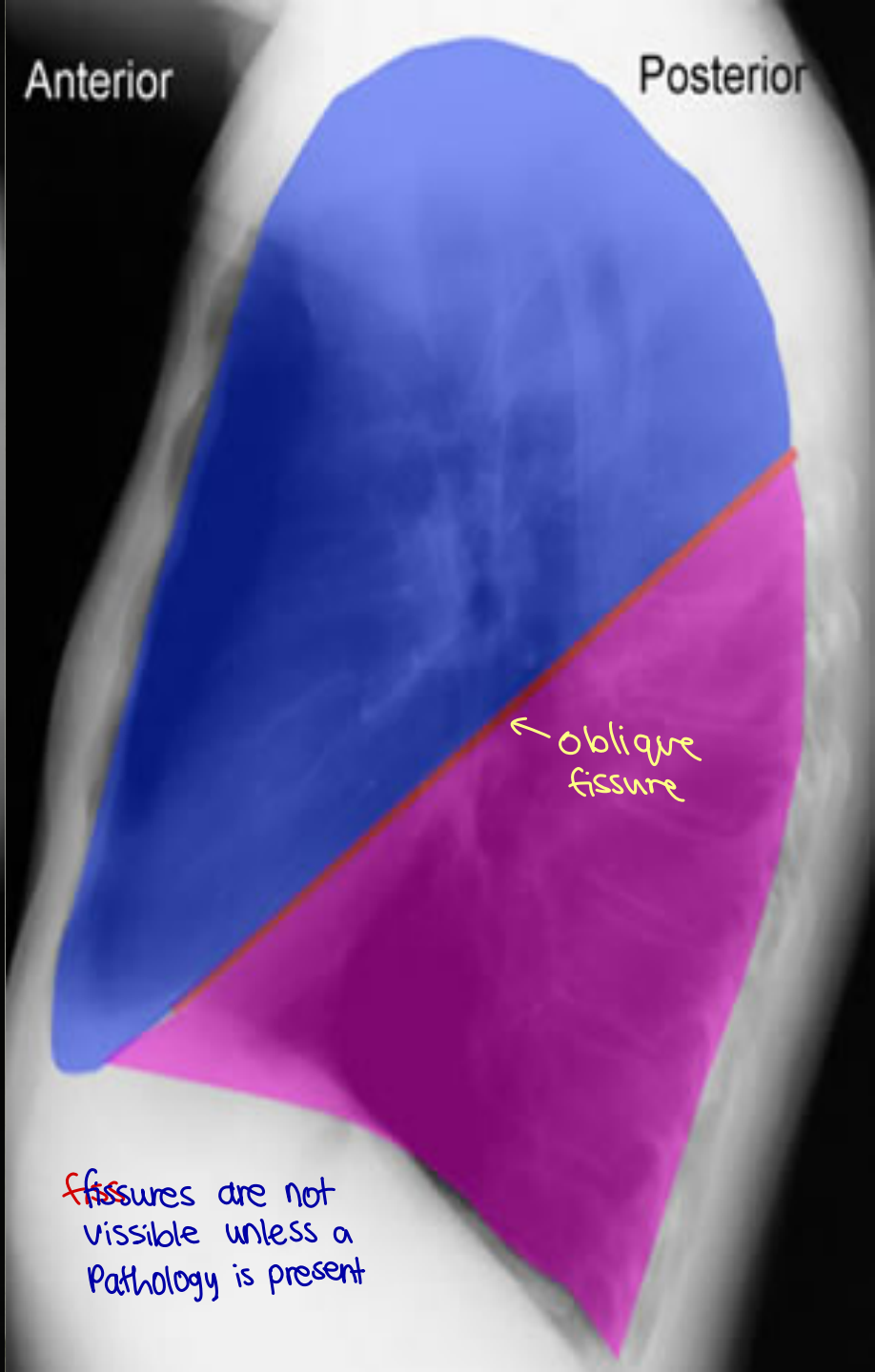


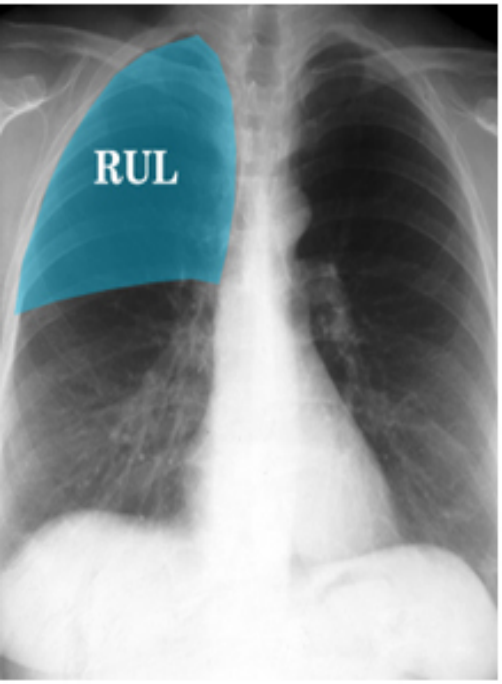
we use terminology of zones in chest x-rays except 2 cases: will be mentioned later

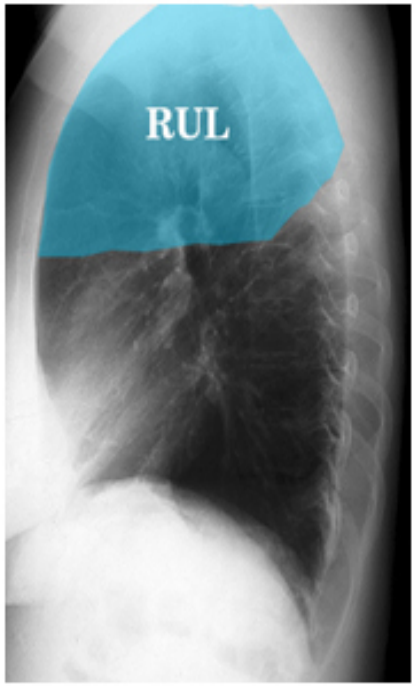
The lung zones do not equate to the lung lobes. For example, the lower zone on the right comprises the .middle and lower lobes

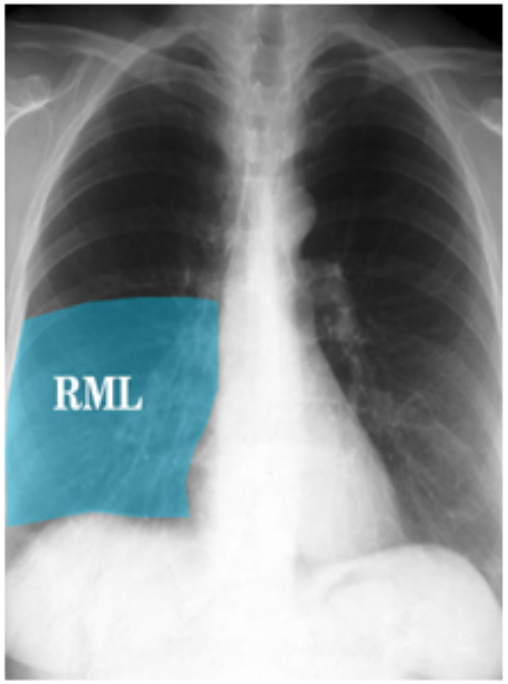

Right Lung
Left Lung
lingula

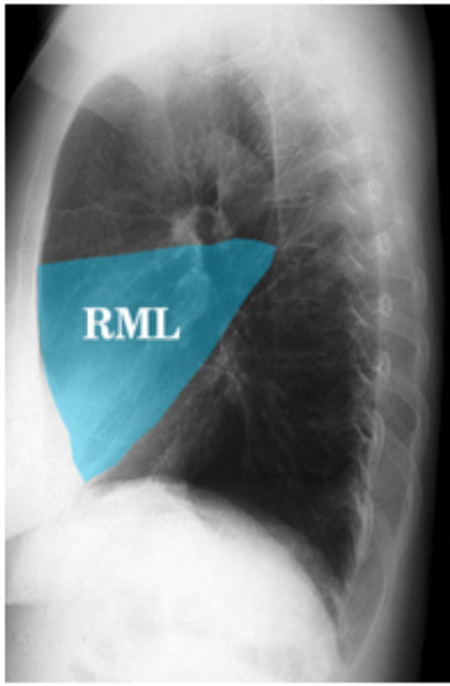

Anterior
Posterior
horizontal fissure
(major)
oblique fissure
(minor)


Anterior
Posterior
oblique fissure
fissures are not visible unless a pathology is present


RUL

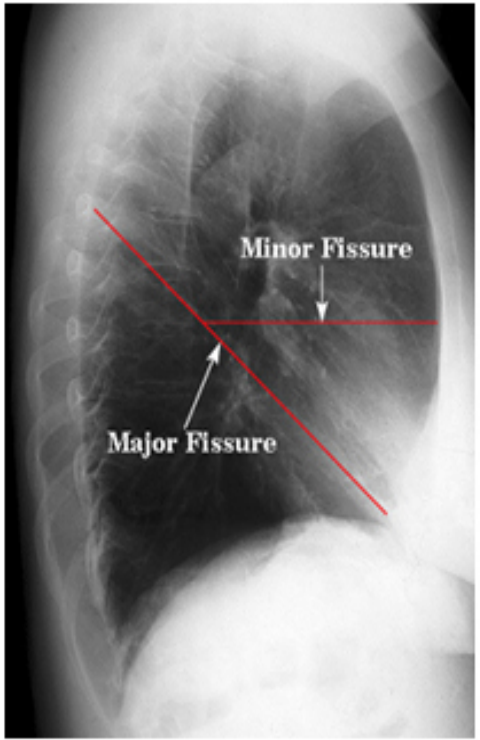

RUL

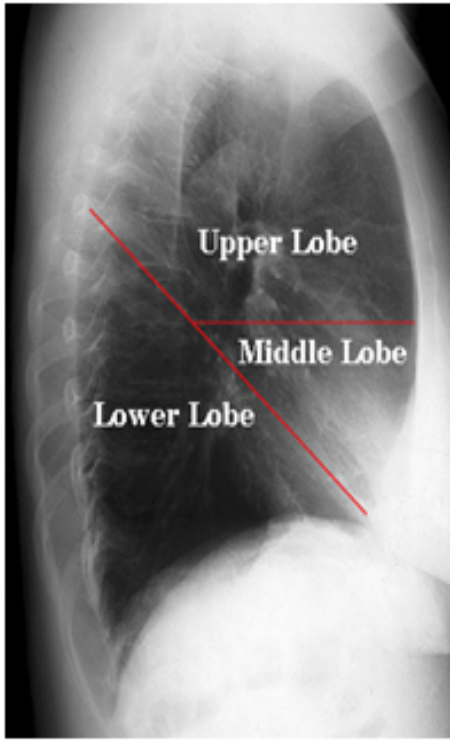

RML


RML


RLL


RLL


Minor Fissure
Major Fissure


Upper Lobe
Middle Lobe
Lower Lobe

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 whitish (effusion)
- A radiolucency blackish (pneumothorax)
- A distortion or displacement of a normal structure (tracheal deviation)

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

*all images should be interrepreted by writing: AP or PA, describe the abnormalities, suggest possible dx.

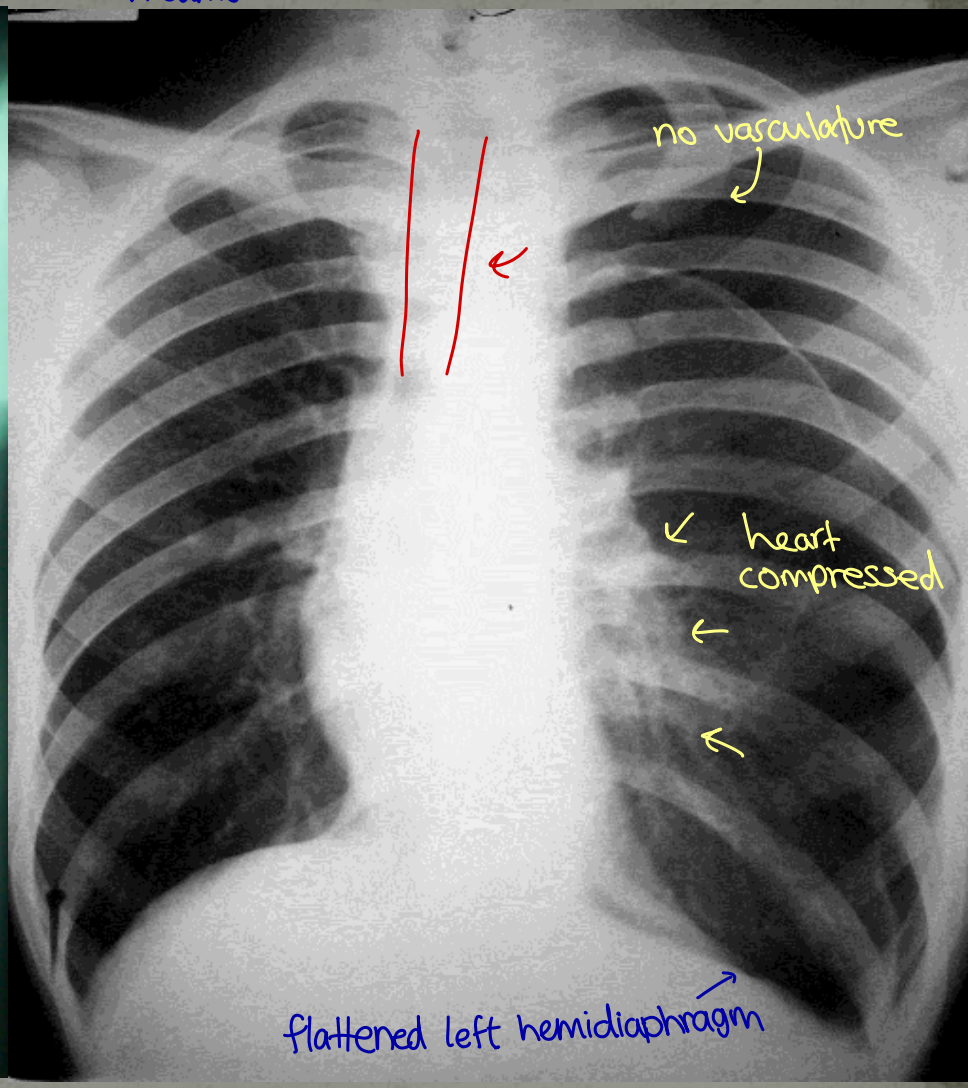
rounded radio-opaque, irregular, with calcific fossi, Left upper/middle zone

★ these 3 must be seen to dx tension Pneumo

- mediastinal shift
- tracheal deviation
- flattening of diaphragm

→ tension pneumothorax

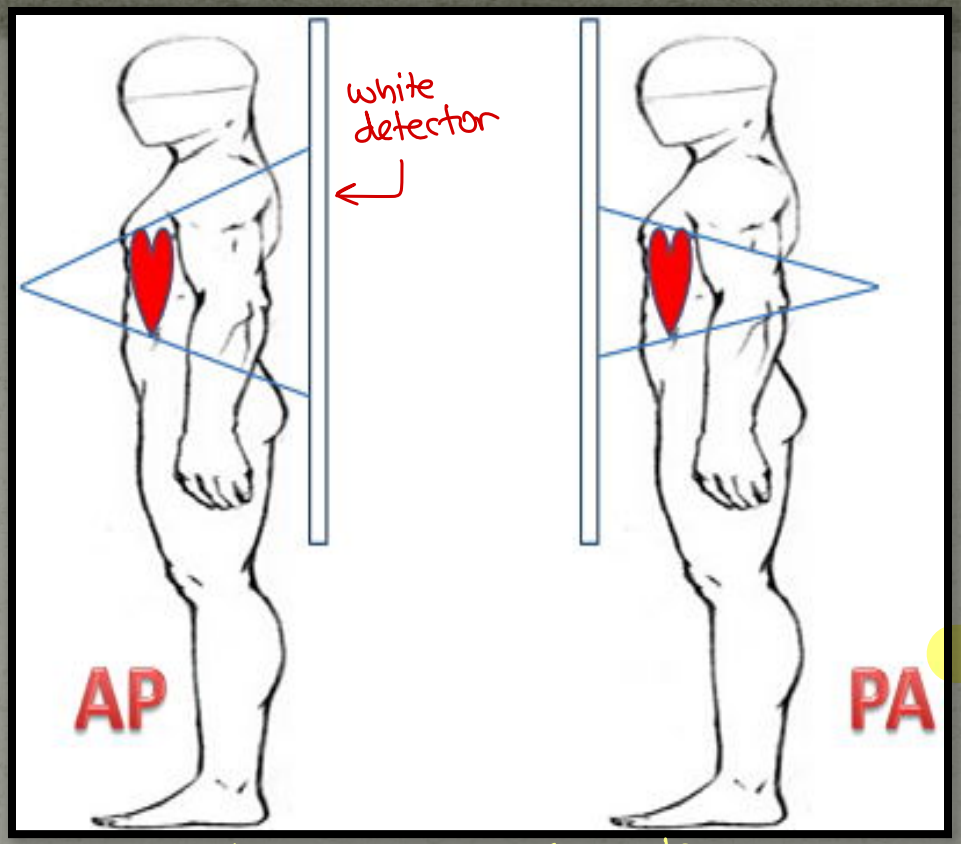
colon ↓



tracheal deviation towards Rt
↓
tension pneumothorax

AP: critically ill pts

*hint: when you see on x-ray tubes & ECG leads, most likely AP



upright PA view

most preferable bc AP the heart will look bigger bc its the 1st thing the beam will hit

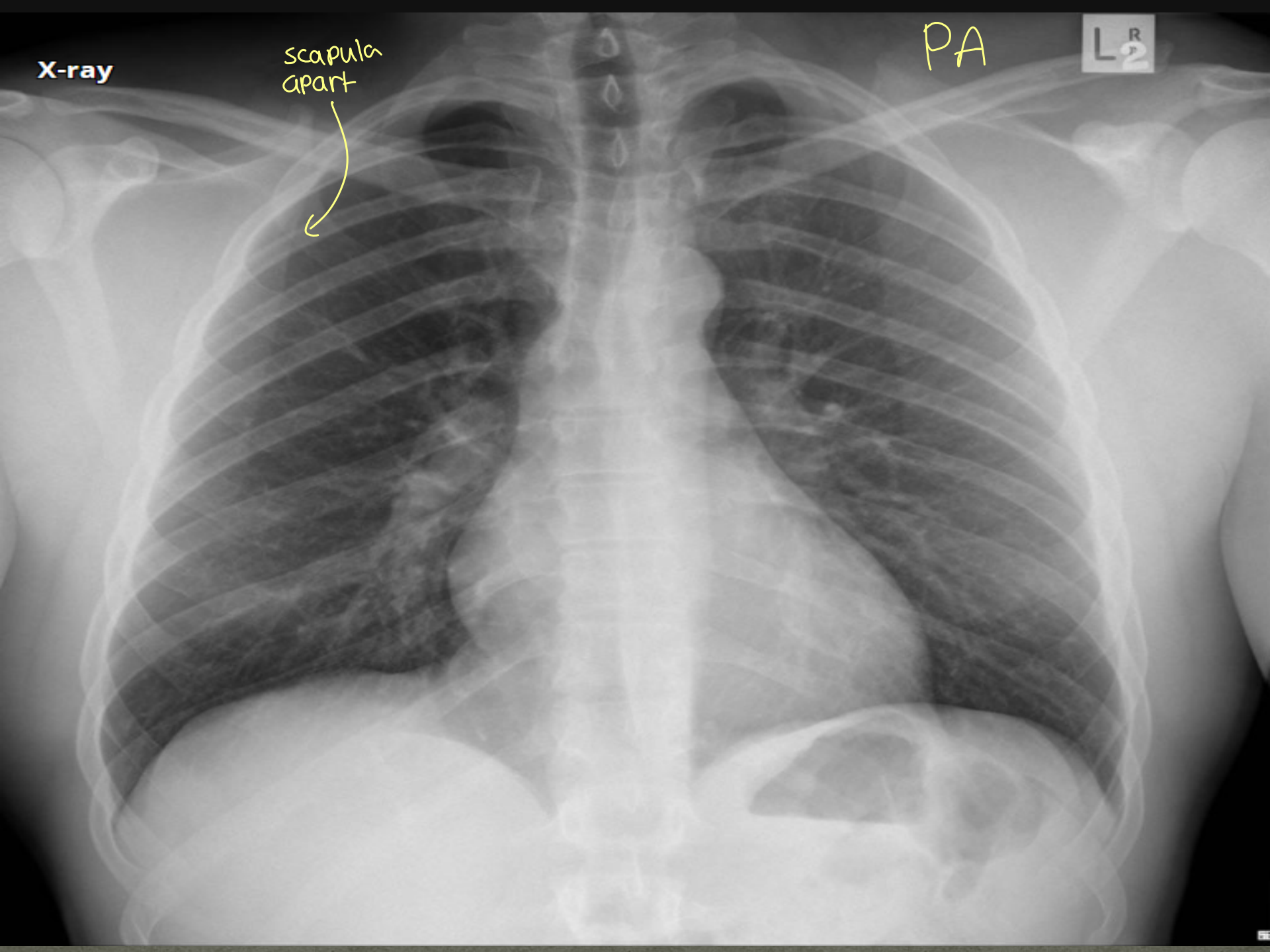
scapula close together

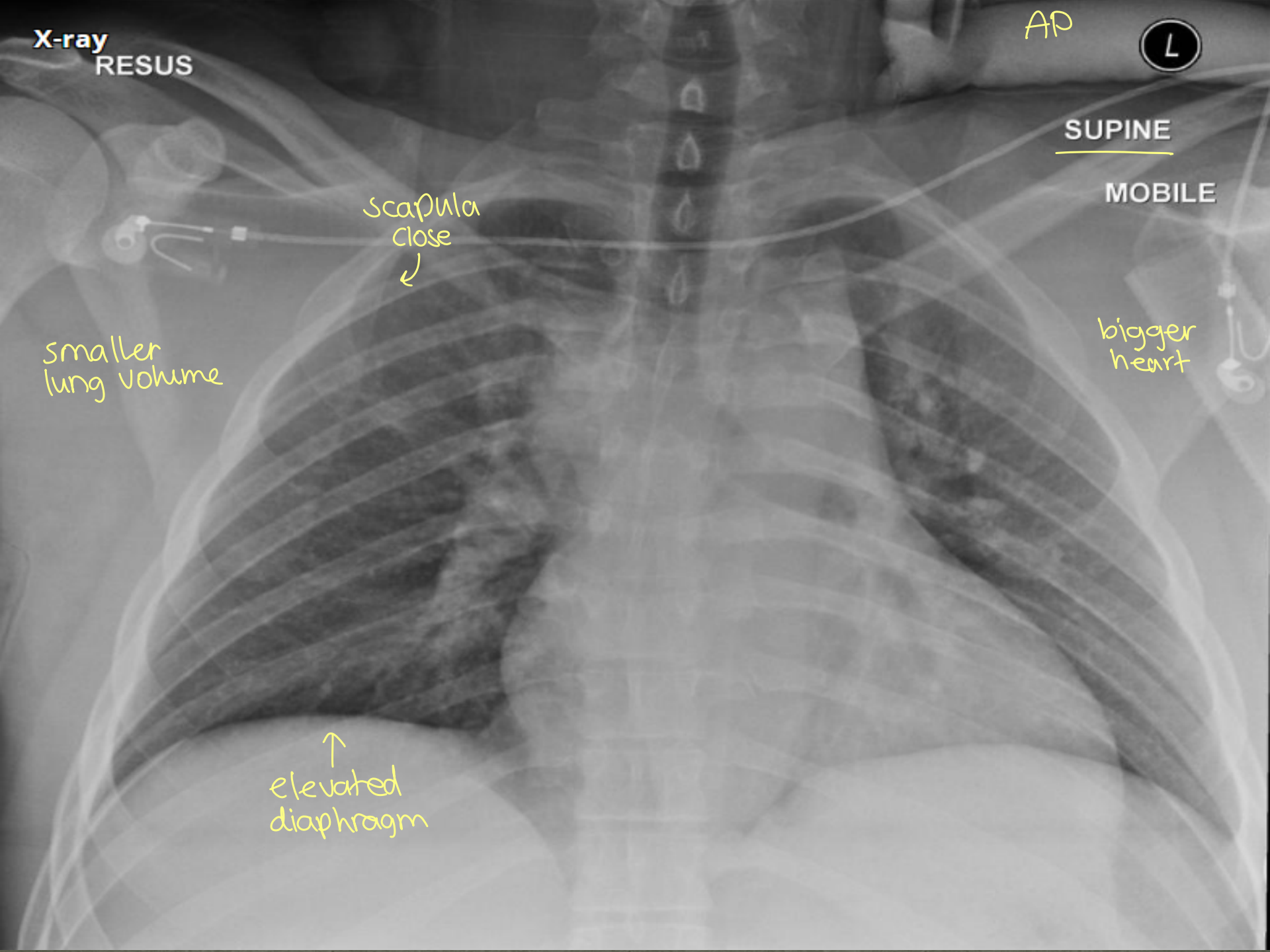
scapula apart

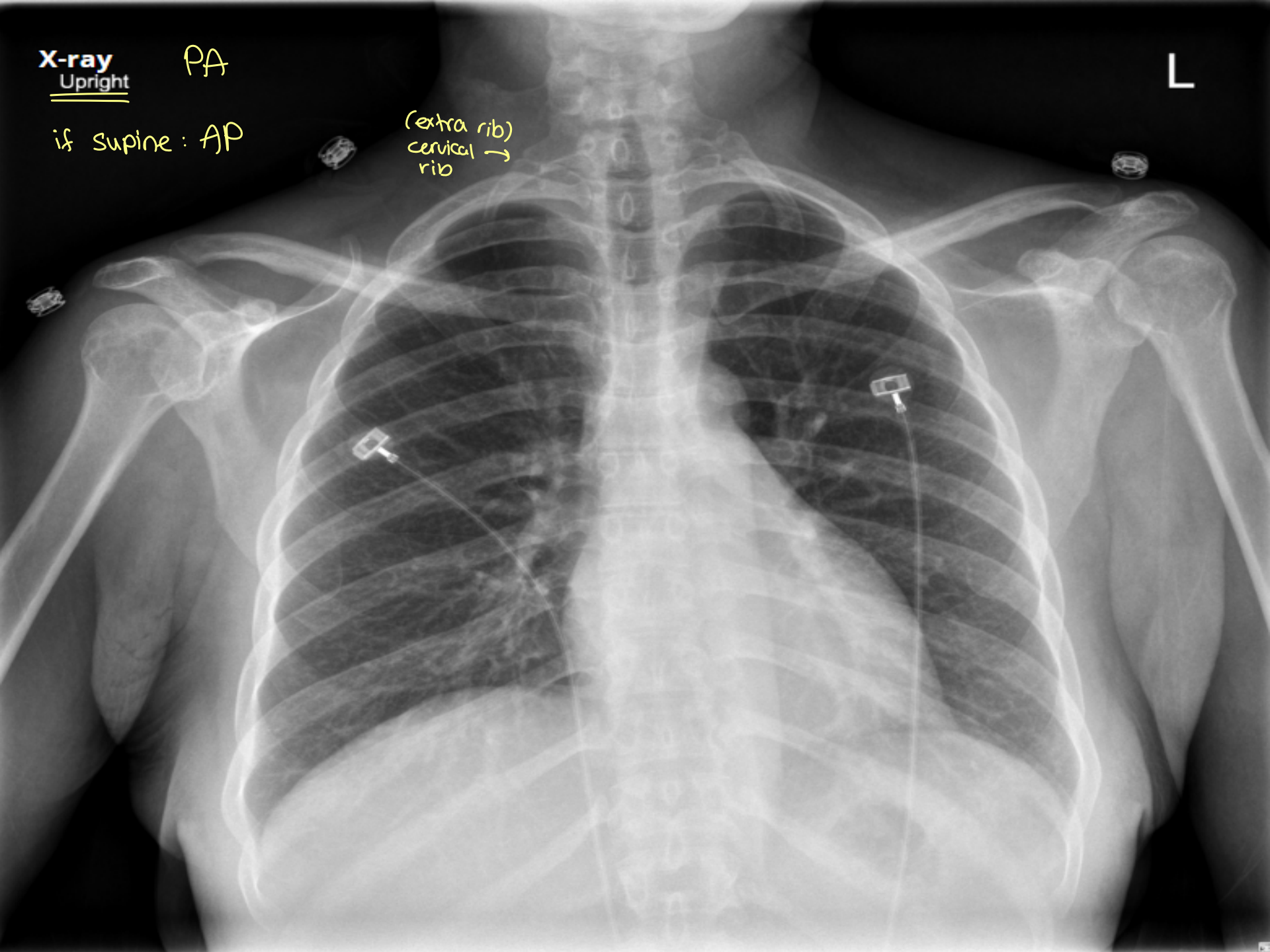
most reliable

?Scapulae
?Clavicles
?Lung fields
?Heart and Mediastinum
?Diaphragm

*important to defferentiate btwn AP & PA


X-ray
scapula apart
PA
L
R


X-ray
RESUS
AP
L
SUPINE
MOBILE
scapula close
smaller lung volume
bigger heart
elevated diaphragm


X-ray
Upright
PA
if supine : AP
(extra rib)
cervical rib
L

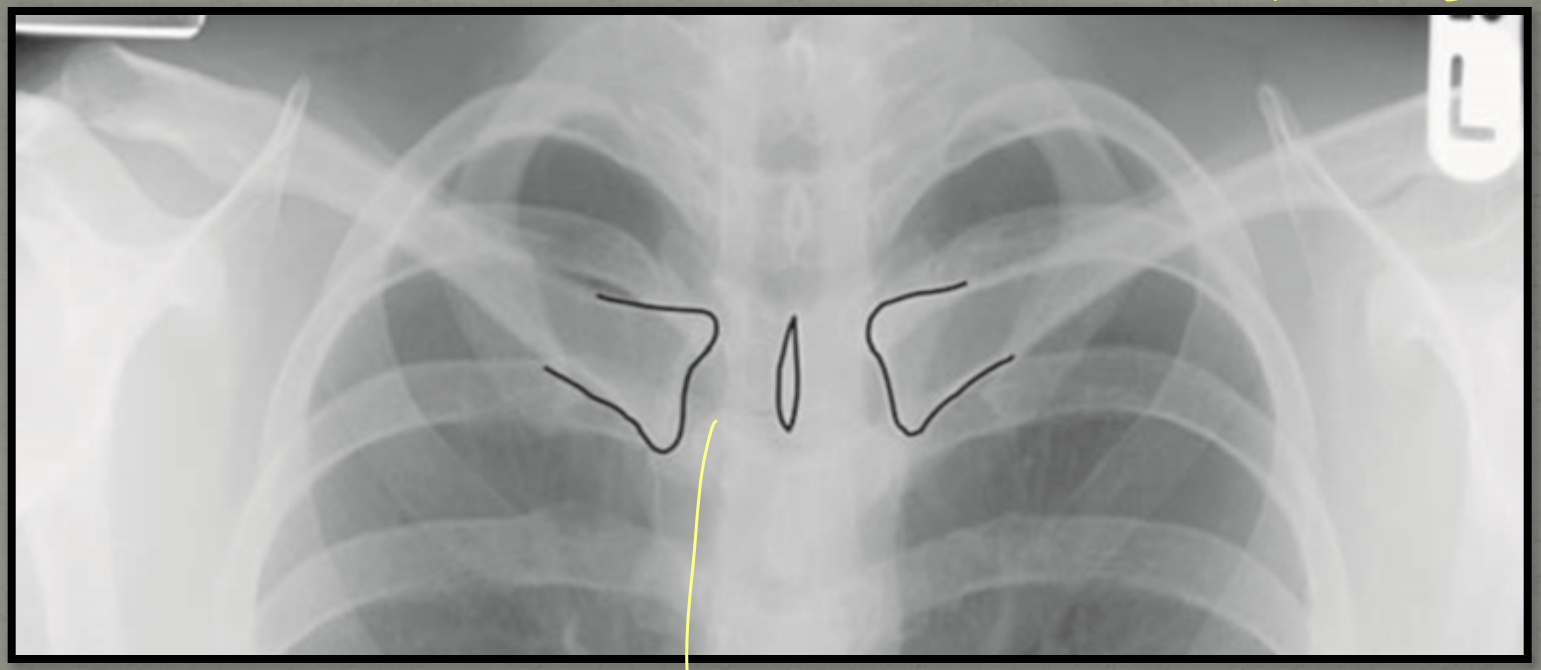
Technical Factors

- Check side marker

Rotation: Look at **medial ends of clavicles** ⇨ related to T4 on PA films. false tracheal deviation

- With a **normal penetration/exposure** of the film the **vertebrae behind the heart should be just visible**

* Sometimes the patient rotates during x-rays. to know it's rotational deviation or true deviation, we must see the distance btwn spinous process & the medial aspect of clavicles, if distances equal, this is true deviation, if not equal → rotational deviation



Medial ends of clavicles are equidistant from .the spinous process

?Importance of rotation in clinical setting

Tracheal deviation (MCC?)

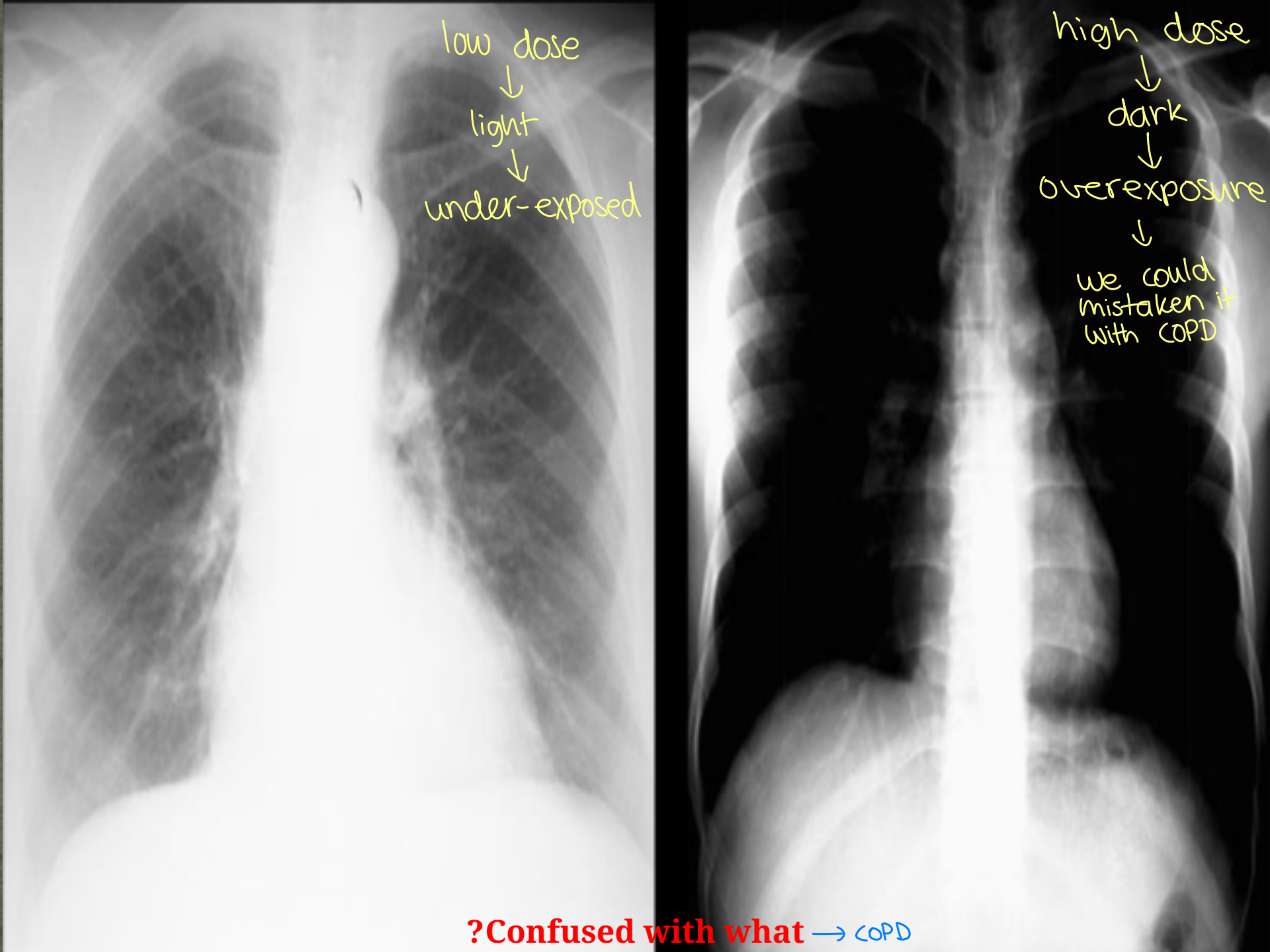
Exposure

* hint: when someone over exposes to the sun he becomes dark & when he under exposes he becomes bright

too dark : over-exposed

too light : under-exposed

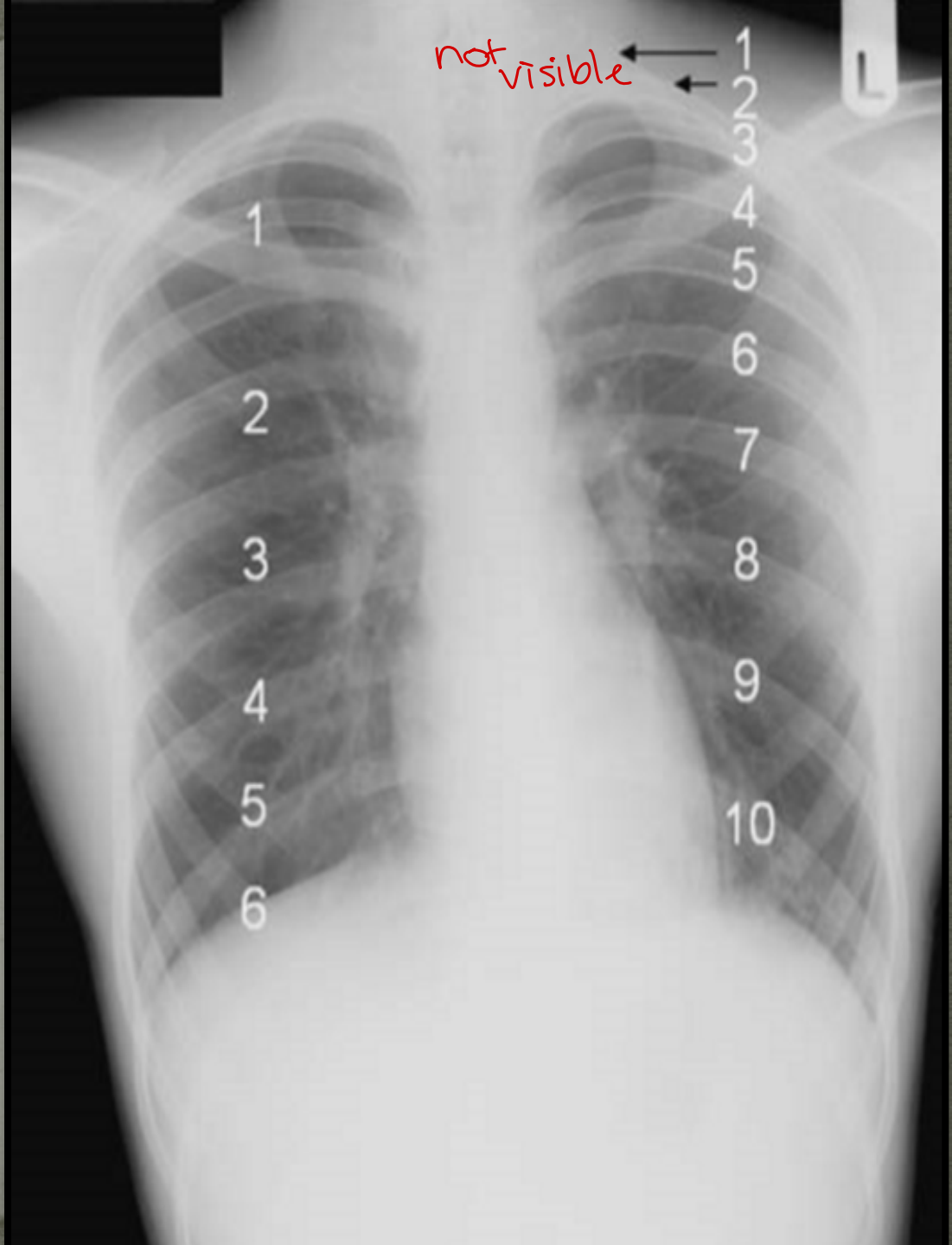
- If the radiograph is too dark it is overexposed, and if it is too light it is underexposed. To help you remember, we can use the toast analogy.
- If we leave bread in the toaster too long (overexposure) it turns black, and if we don't toast it for long enough (underexposure), it remains white.

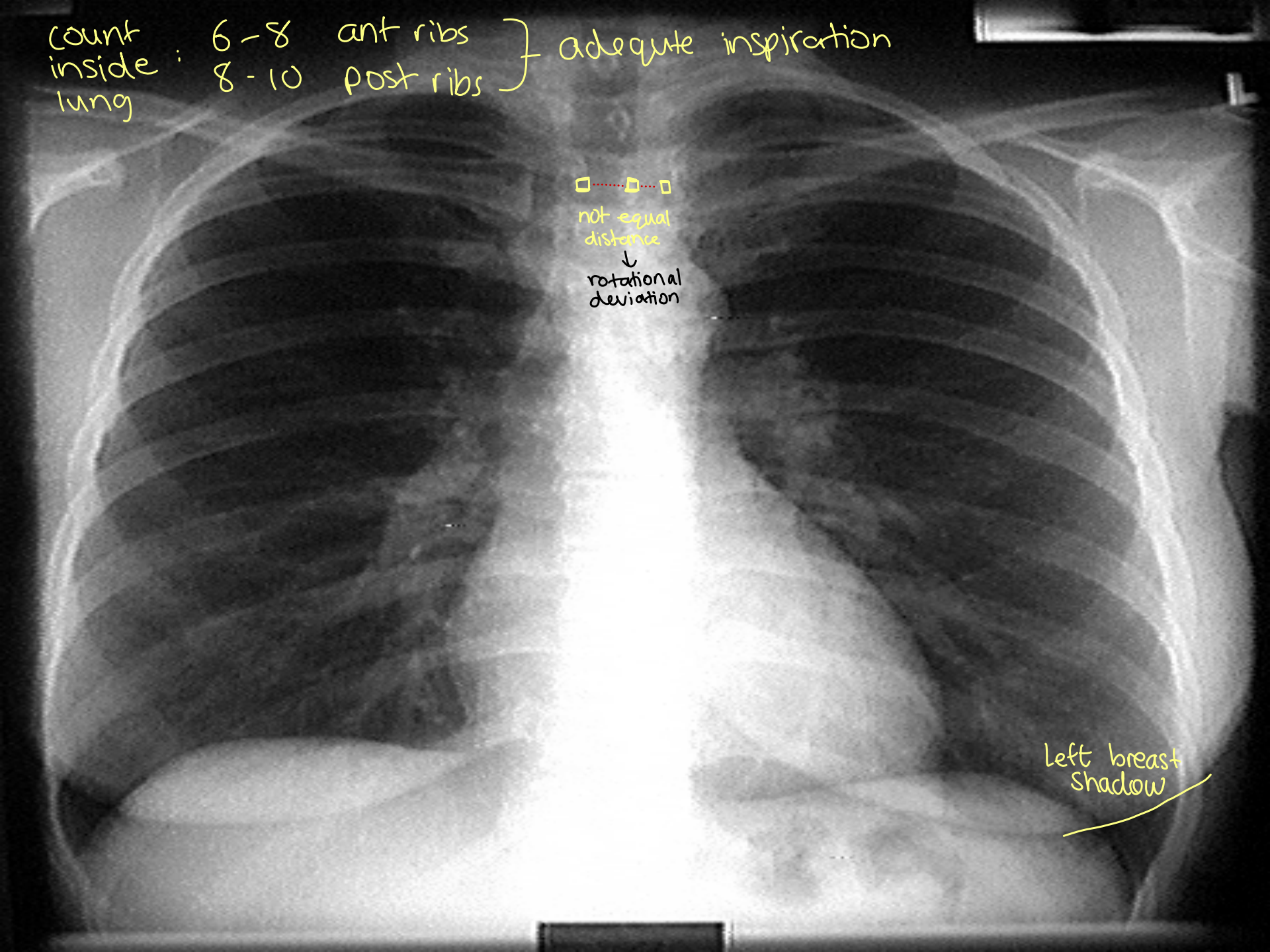


?Confused with what ⟶ COPD

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

* count to know good inspiration
* we should be able to count the number of ribs




count inside lung : 6-8 ant ribs
8-10 post ribs
adequte inspiration
not equal distance
rotational deviation
Left breast shadow

Lungs

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

Pleura

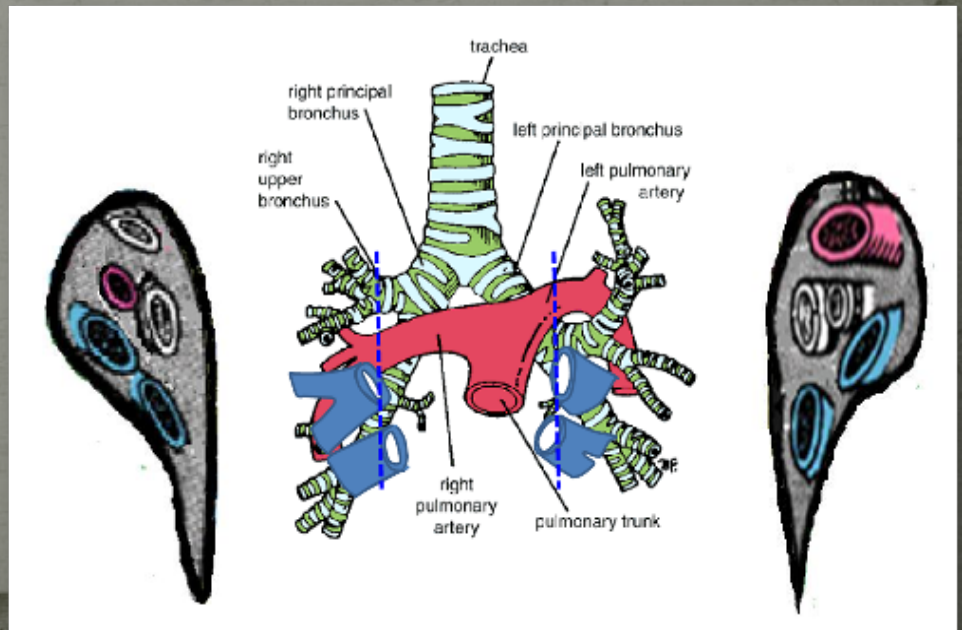
The best place to look for pleura is in profile i.e around the lung margin.

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.



Mediastinum & Heart

Mediastinum: is situated between the lungs in the center of the thorax.

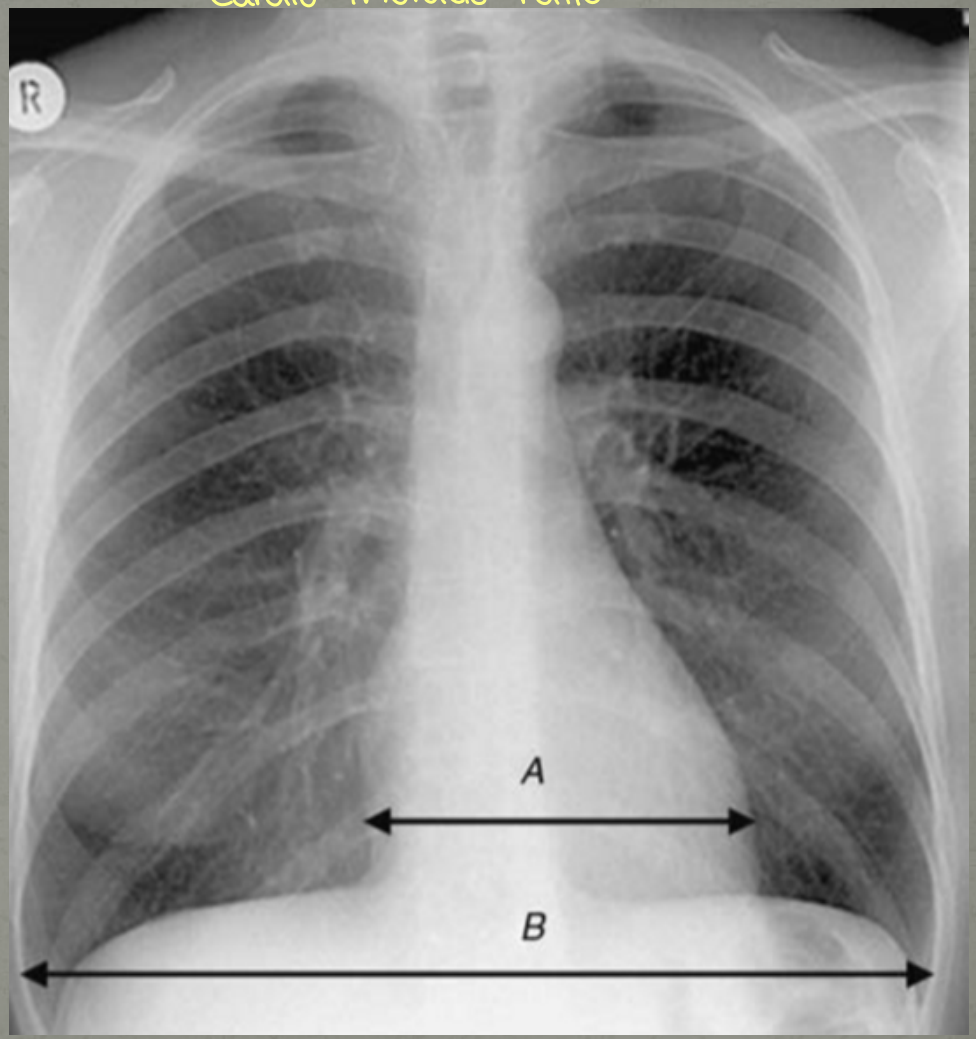
- Boundaries:

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

Cardio-thoracic ratio

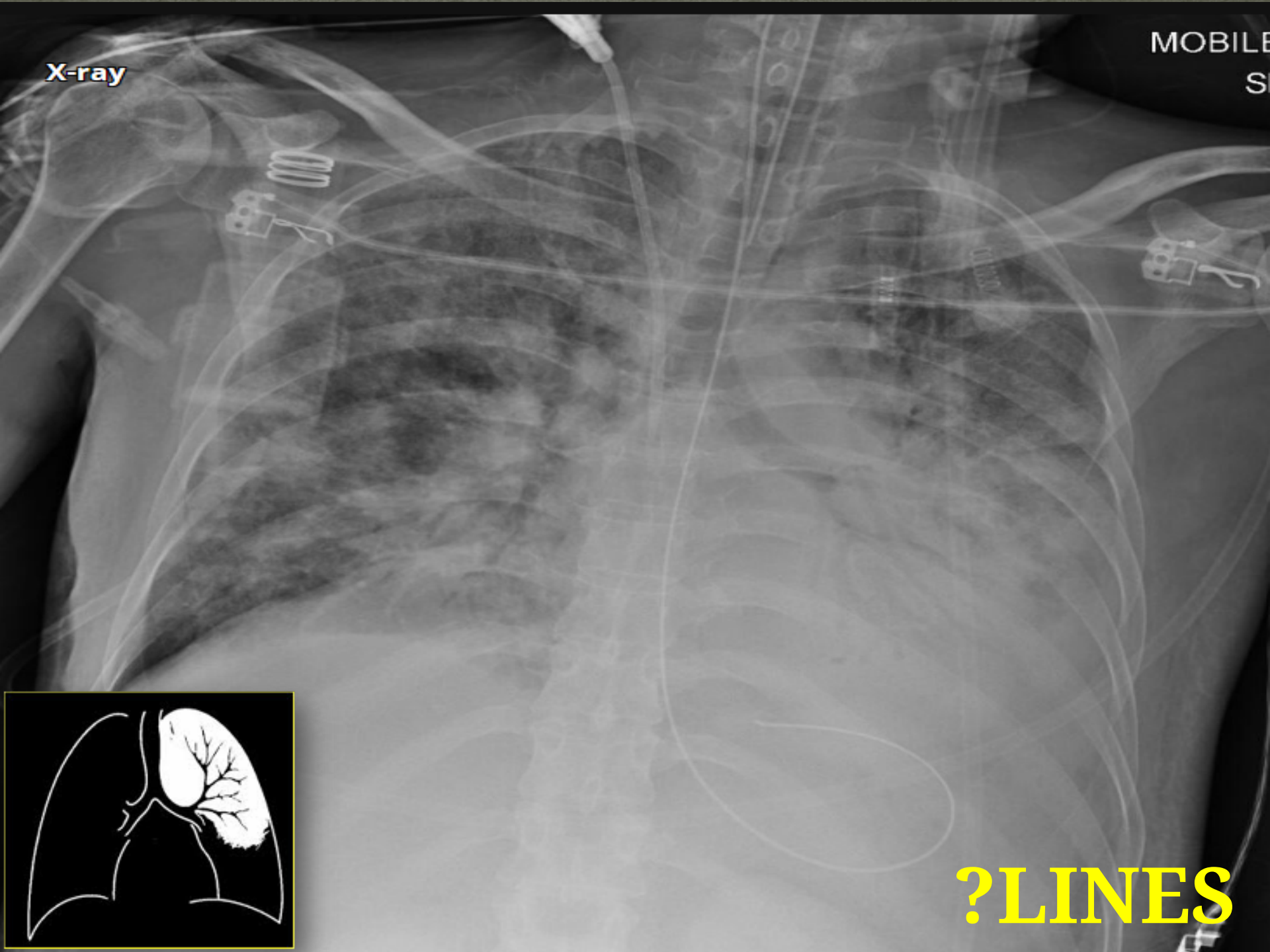


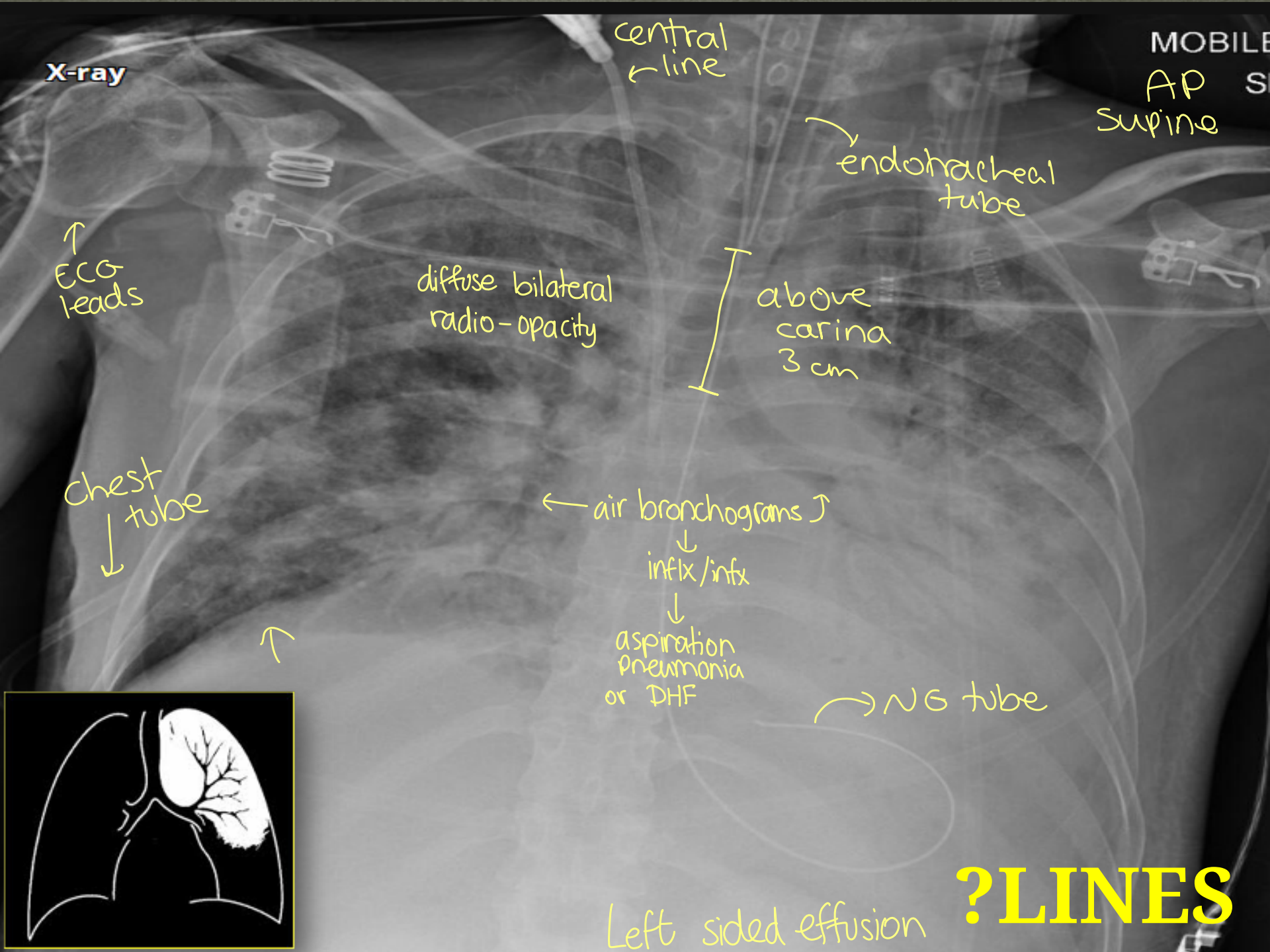
Enlarged heart:

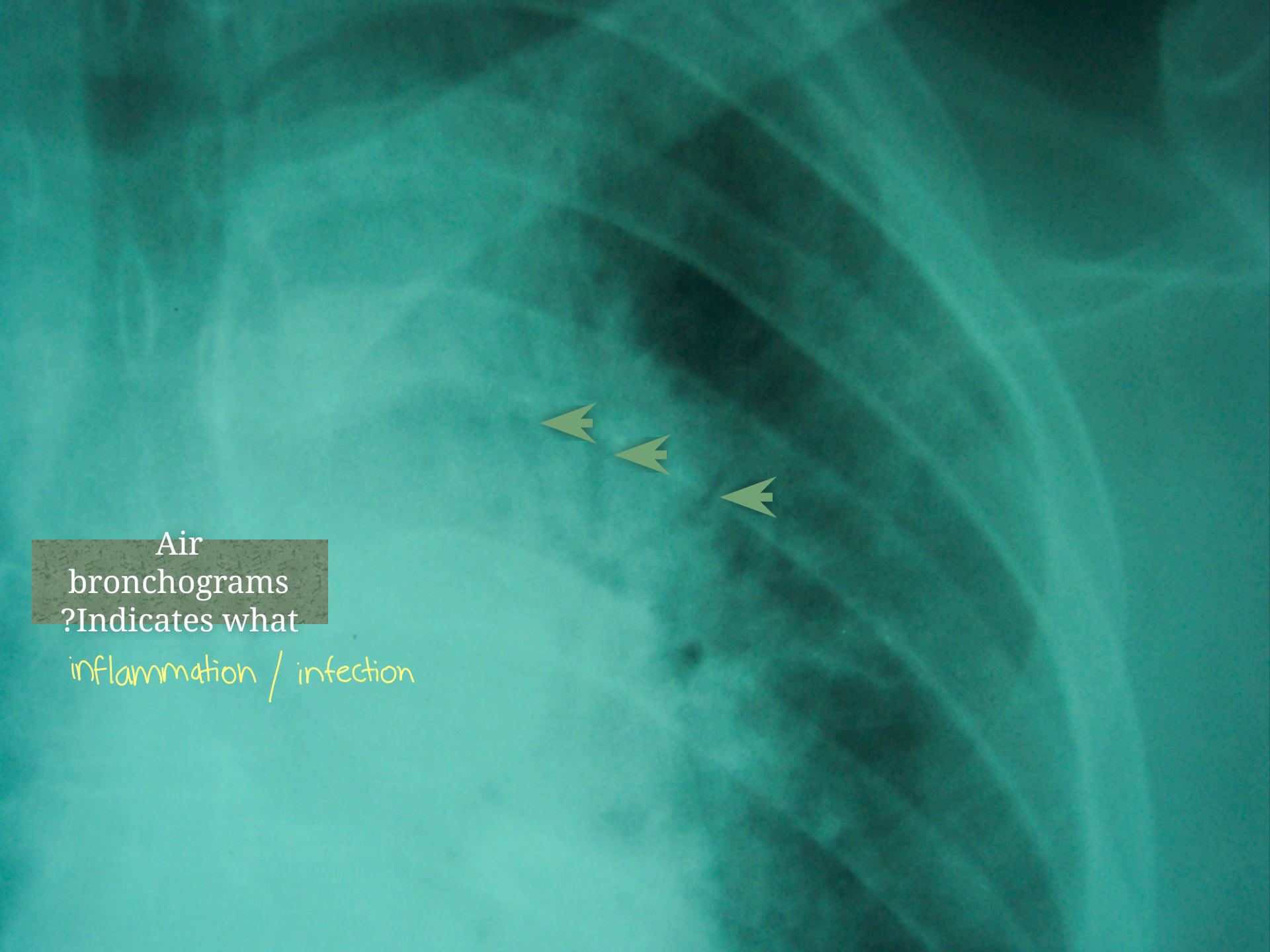
- PA film : Normal CTR <50 %

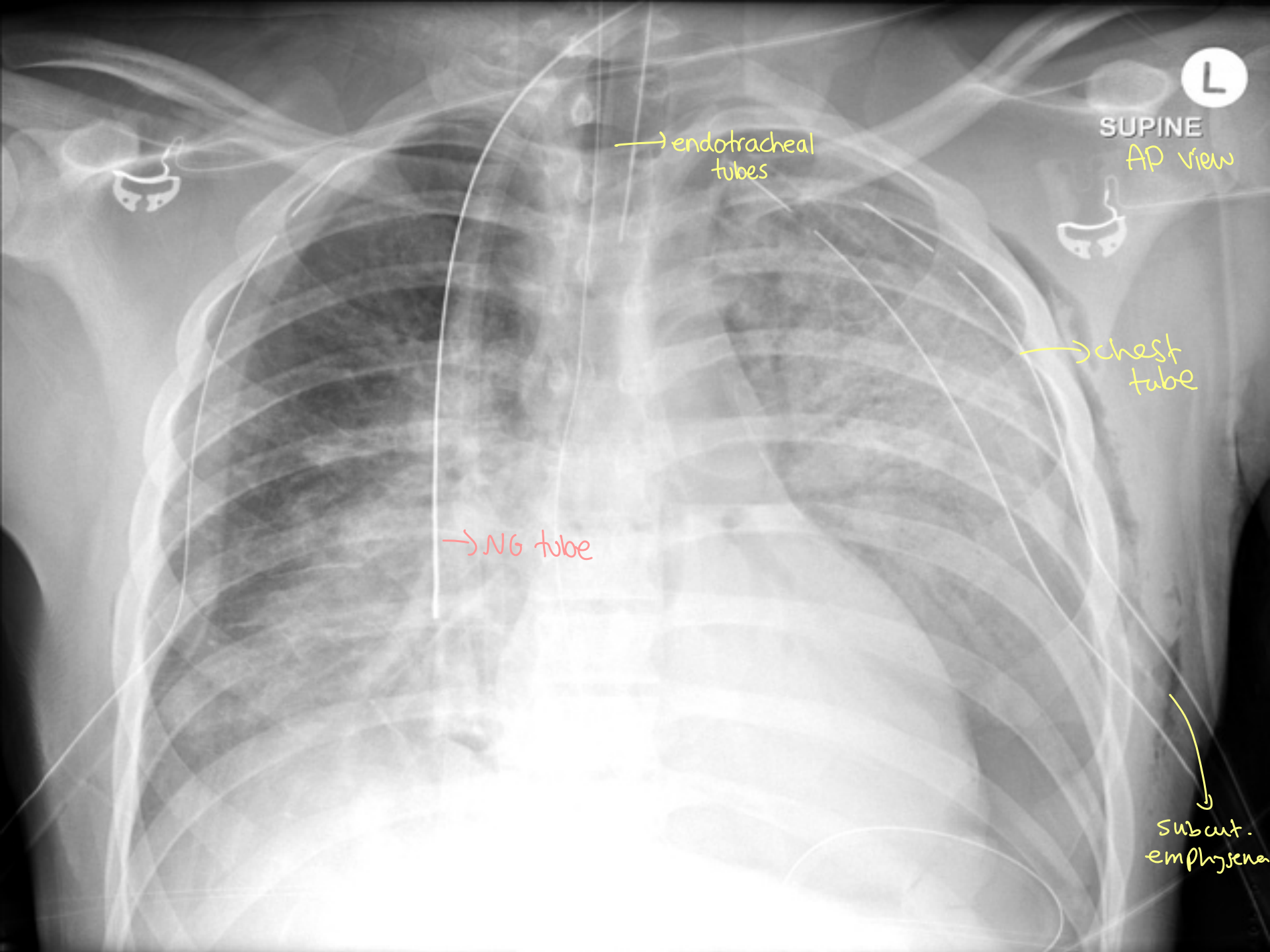
PA view adult

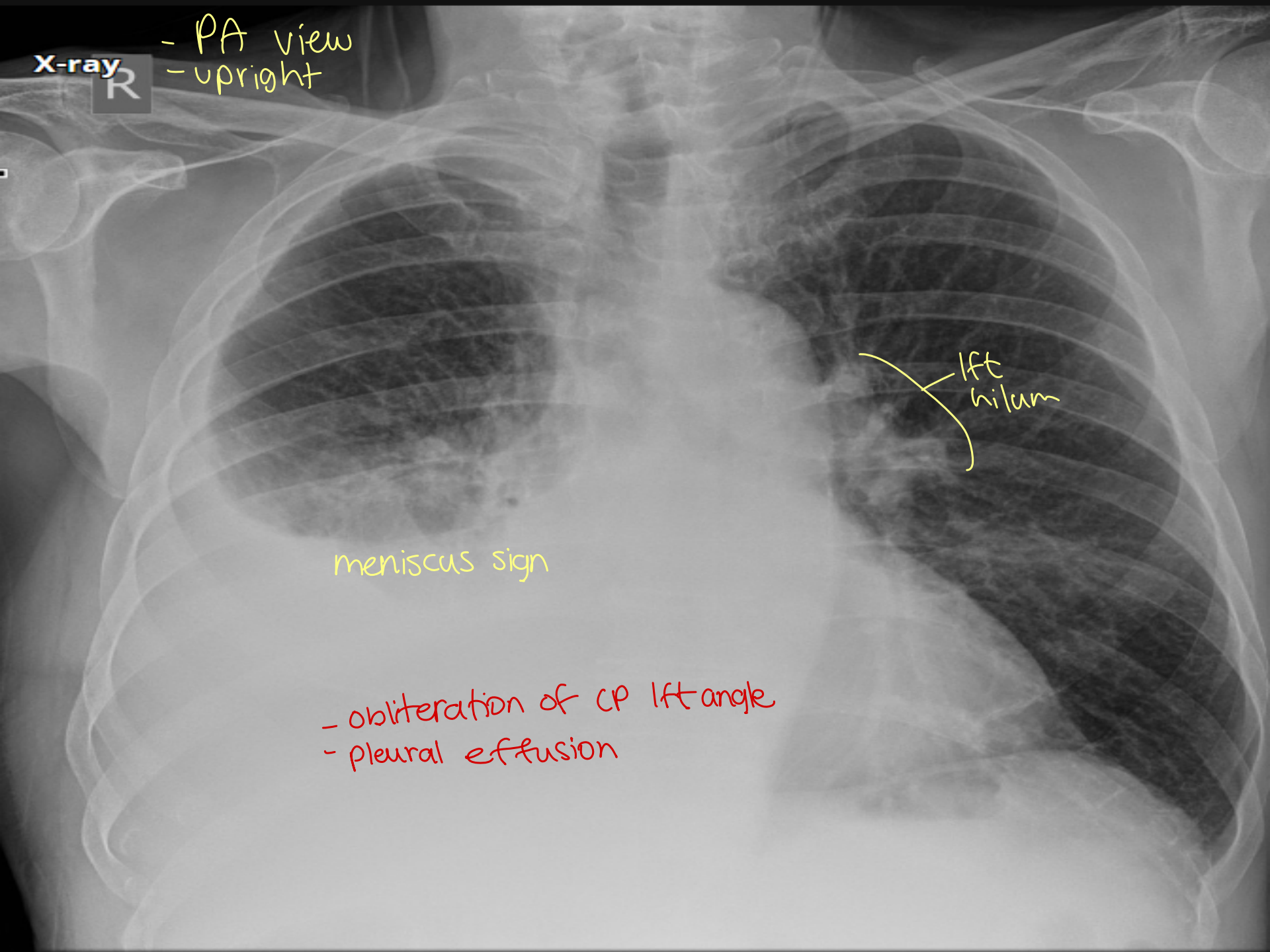
Peds : <65% normal

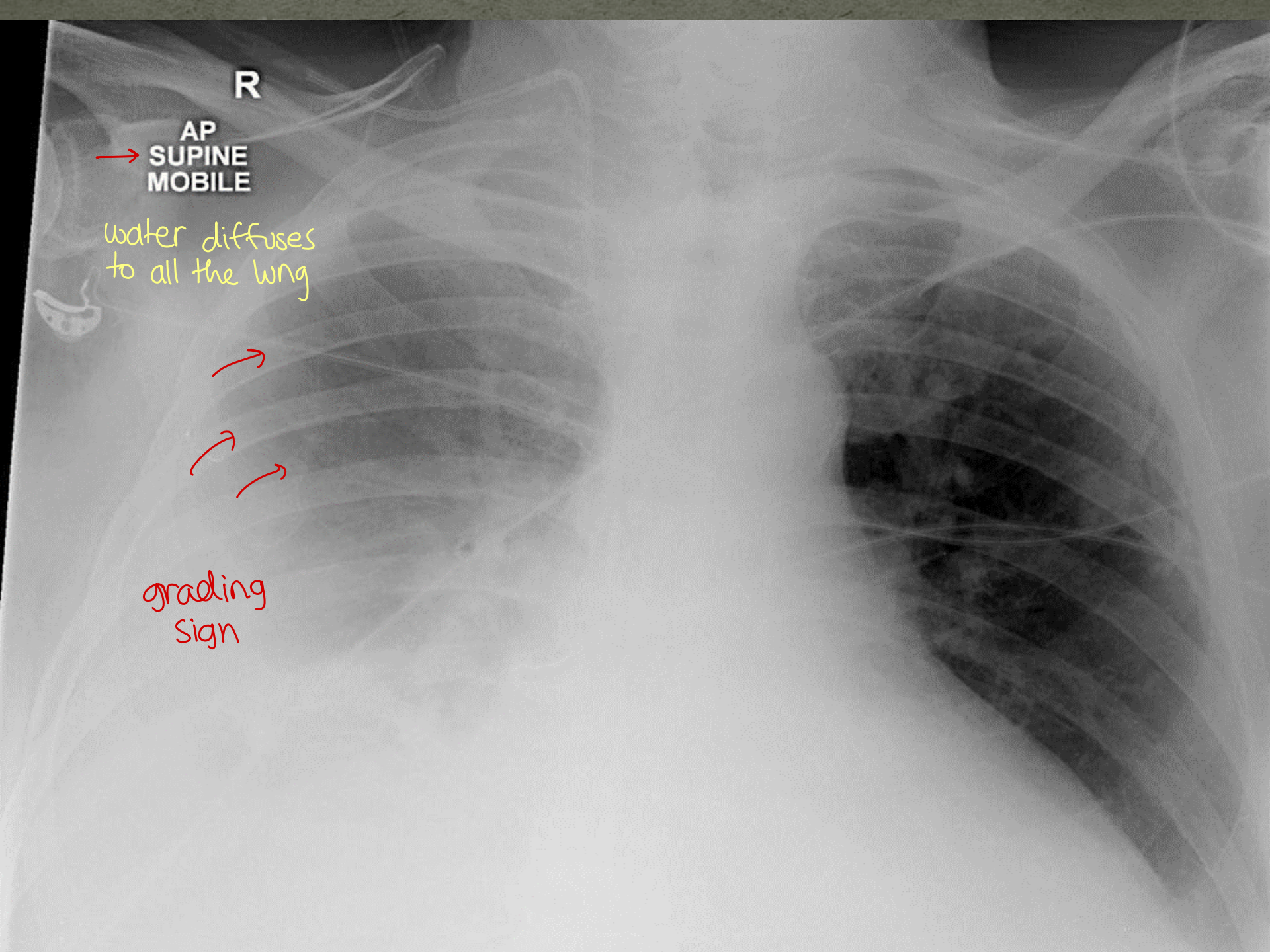

X-ray
MOBILE
S
?LINES

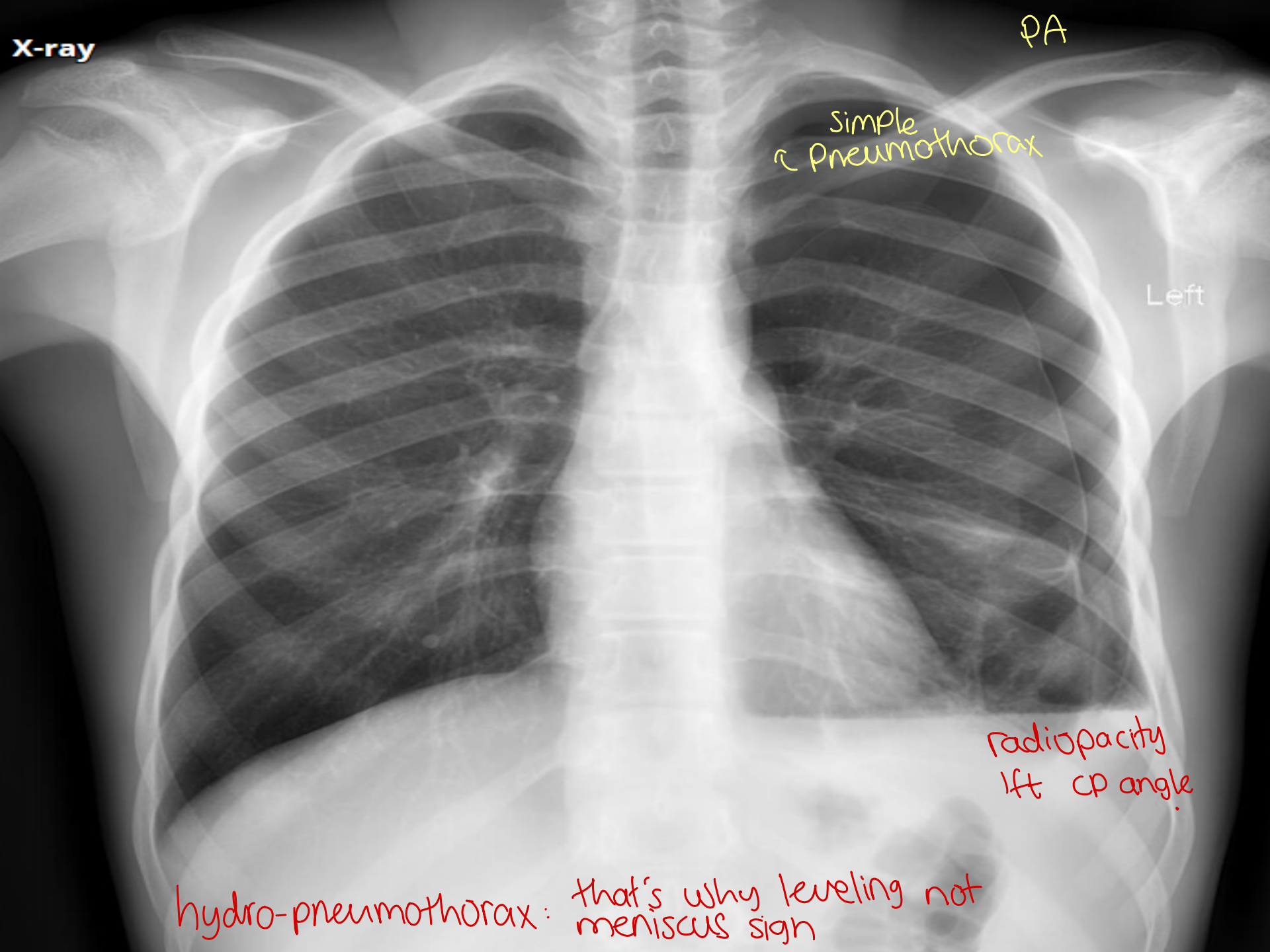

X-ray
central line
MOBILE
AP
Supine
endotracheal tube
ECG leads
diffuse bilateral radio-opacity
above carina 3 cm
chest tube
air bronchograms
infix/infx
aspiration pneumonia or DHF
NG tube
Left sided effusion
?LINES

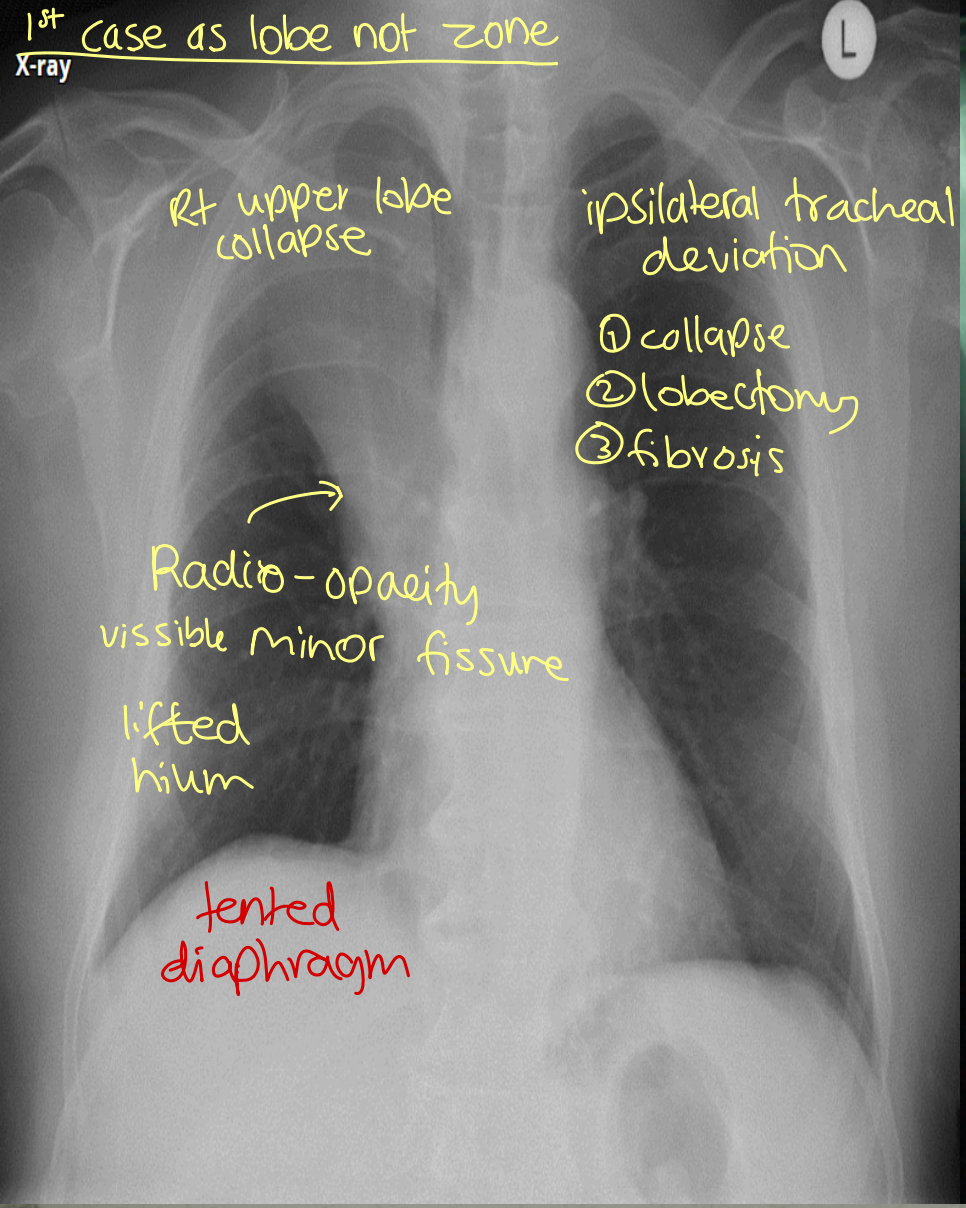

Air bronchograms
?Indicates what
inflammation / infection

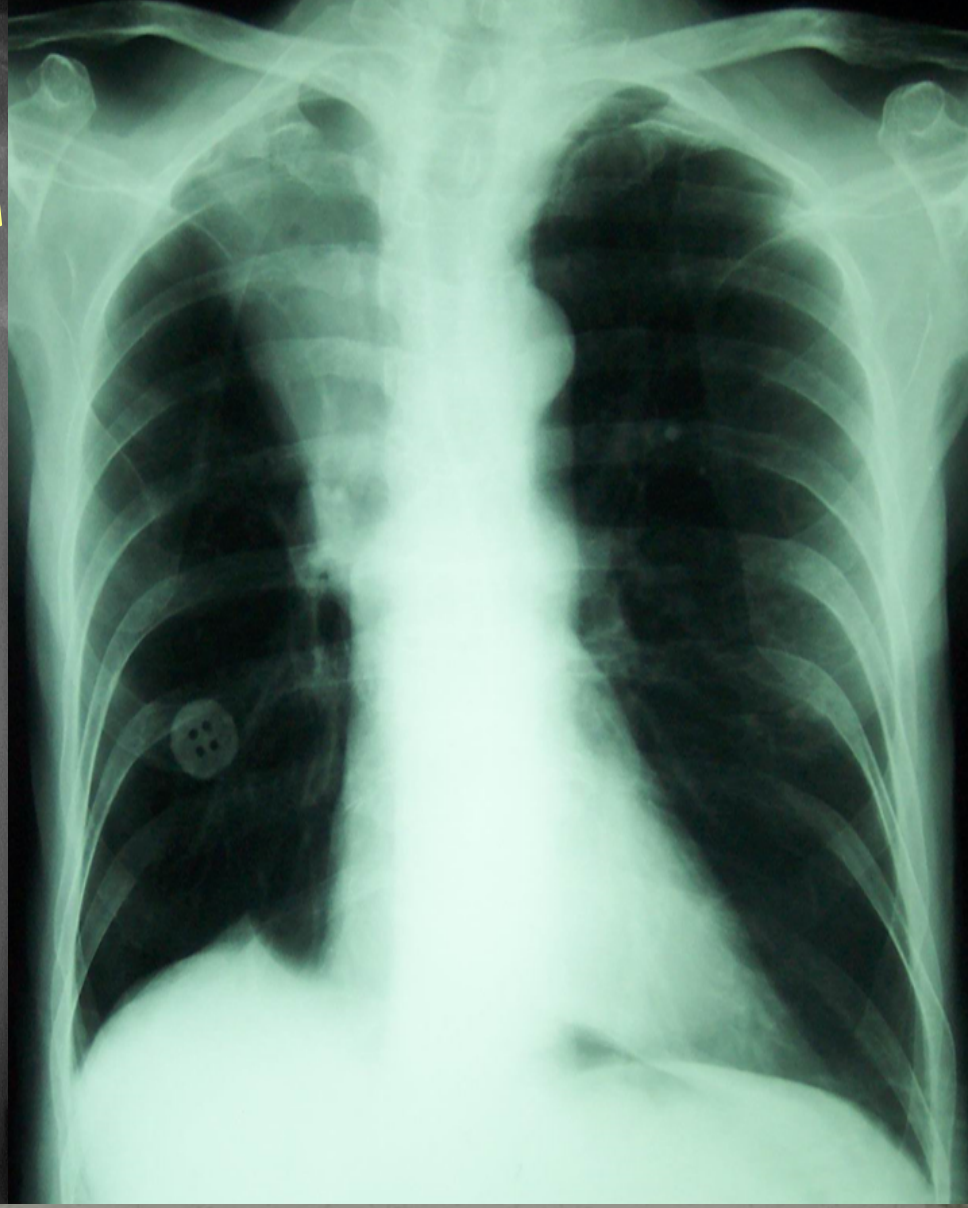

L
SUPINE
AP view
endotracheal tubes
chest tube
NG tube
subcut. emphysema


X-ray
R
- PA view
- upright
lft hilum
meniscus sign
- obliteration of CP lft angle
- pleural effusion

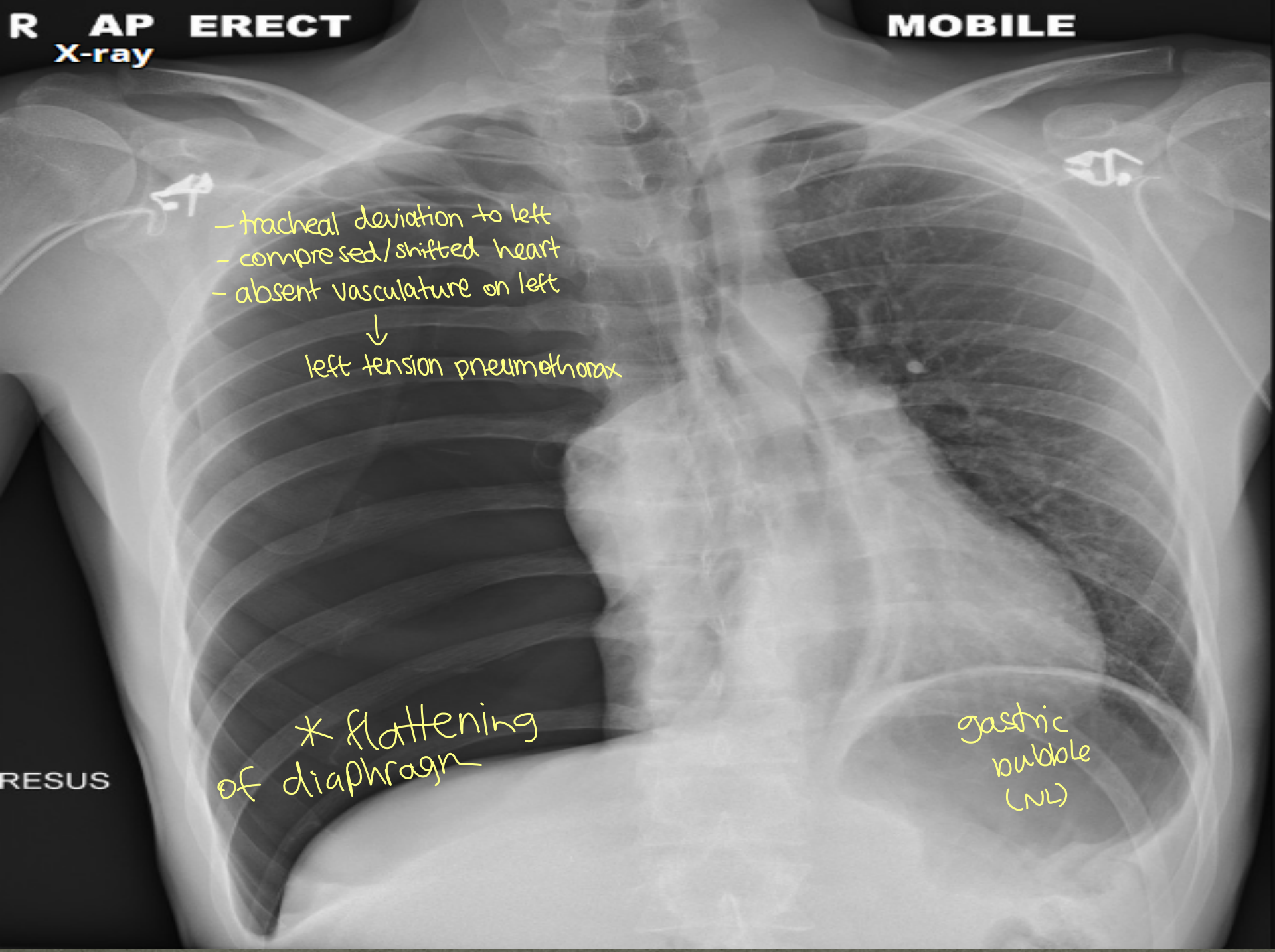

R
AP
SUPINE
MOBILE
water diffuses to all the lung
grading sign

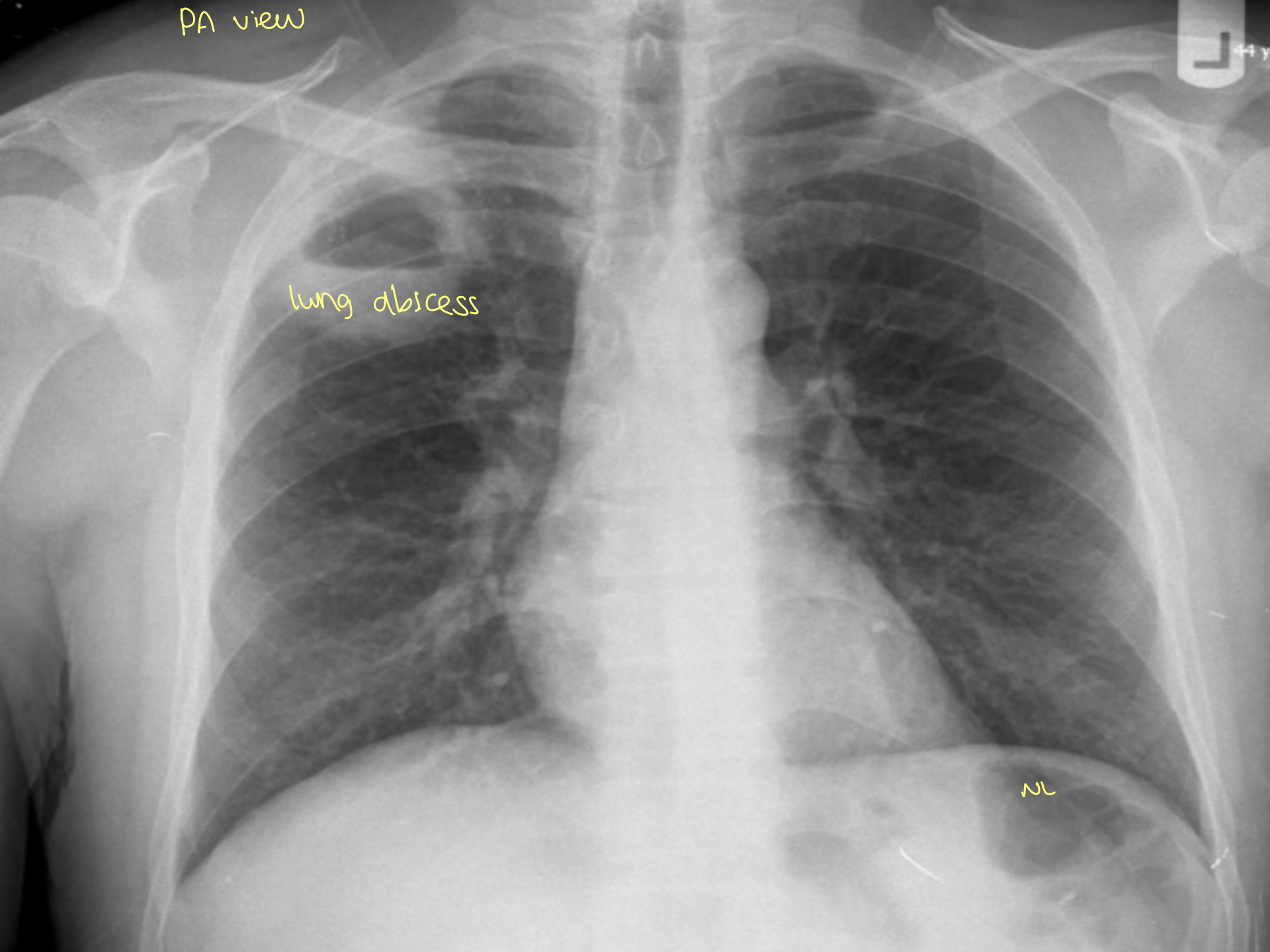

X-ray
PA
Simple Pneumothorax
Left
radiopacity lft CP angle
hydro-pneumothorax: that's why leveling not meniscus sign





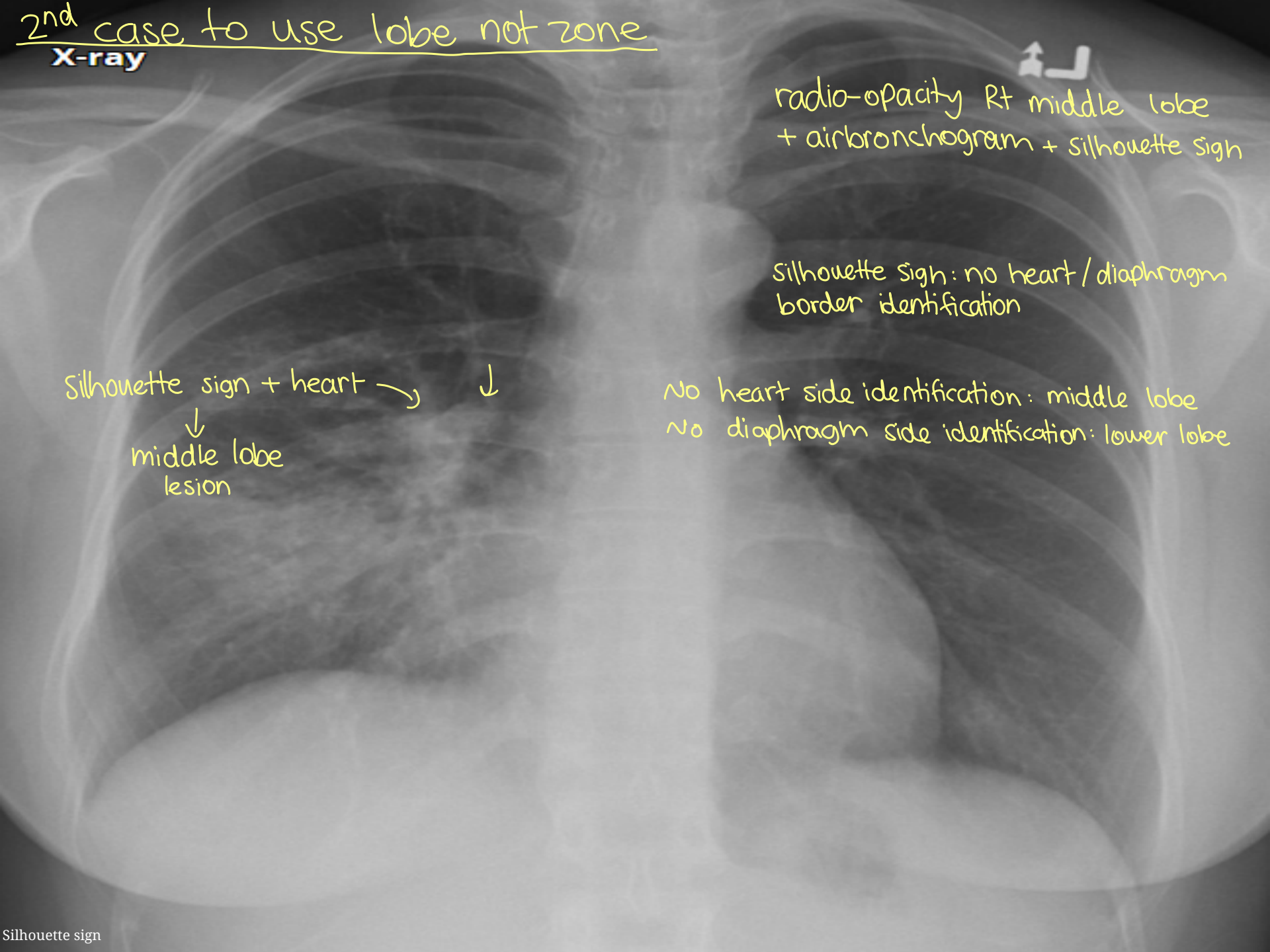
?Diaphragm? ICS
?Hilum? Causes
?Trachea
Horizontal fissure


R AP ERECT
X-ray
MOBILE
- tracheal deviation to left
- compressed/shifted heart
- absent vasculature on left
↓
left tension pneumothorax
* flattening of diaphragm
gastric bubble (NL)
RESUS


PA view
lung abscess
NL

2nd case to use lobe not zone

X-ray



radio-opacity Rt middle lobe
+ airbronchogram + silhouette sign

Silhouette sign: no heart/diaphragm border identification

Silhouette sign + heart → ↓

↓

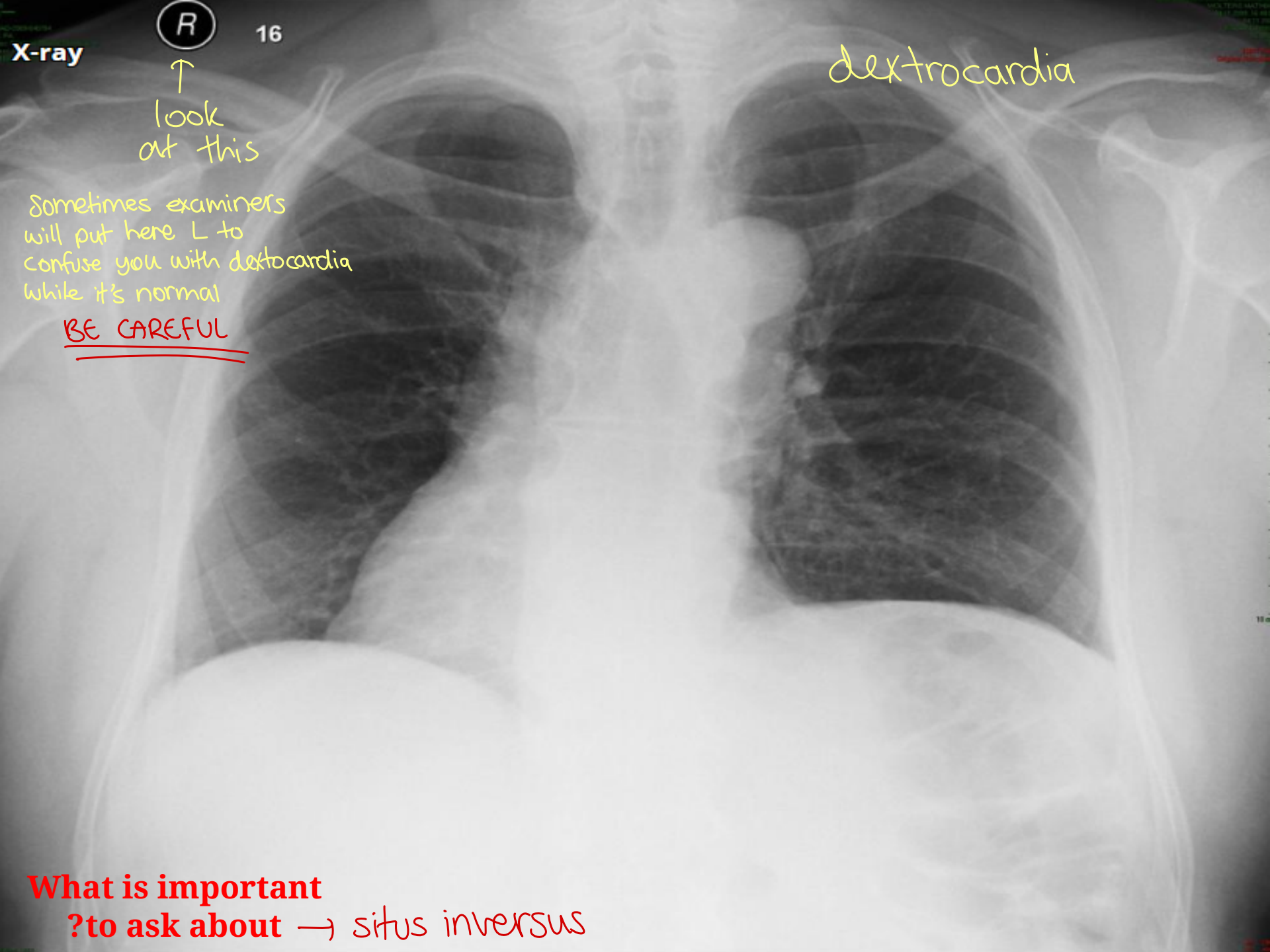
middle lobe lesion

No heart side identification: middle lobe

No diaphragm side identification: lower lobe

Silhouette sign


X-ray
L
silhouette sign + diaphragm
lower lobe lesion



What is important to ask about → situs inversus

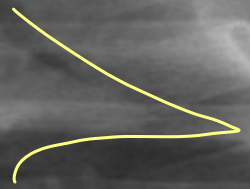

X-ray
- diffuse bilateral radio-opacities
- more evident on left side
- lung mets from RCC
- canon sign

X-ray

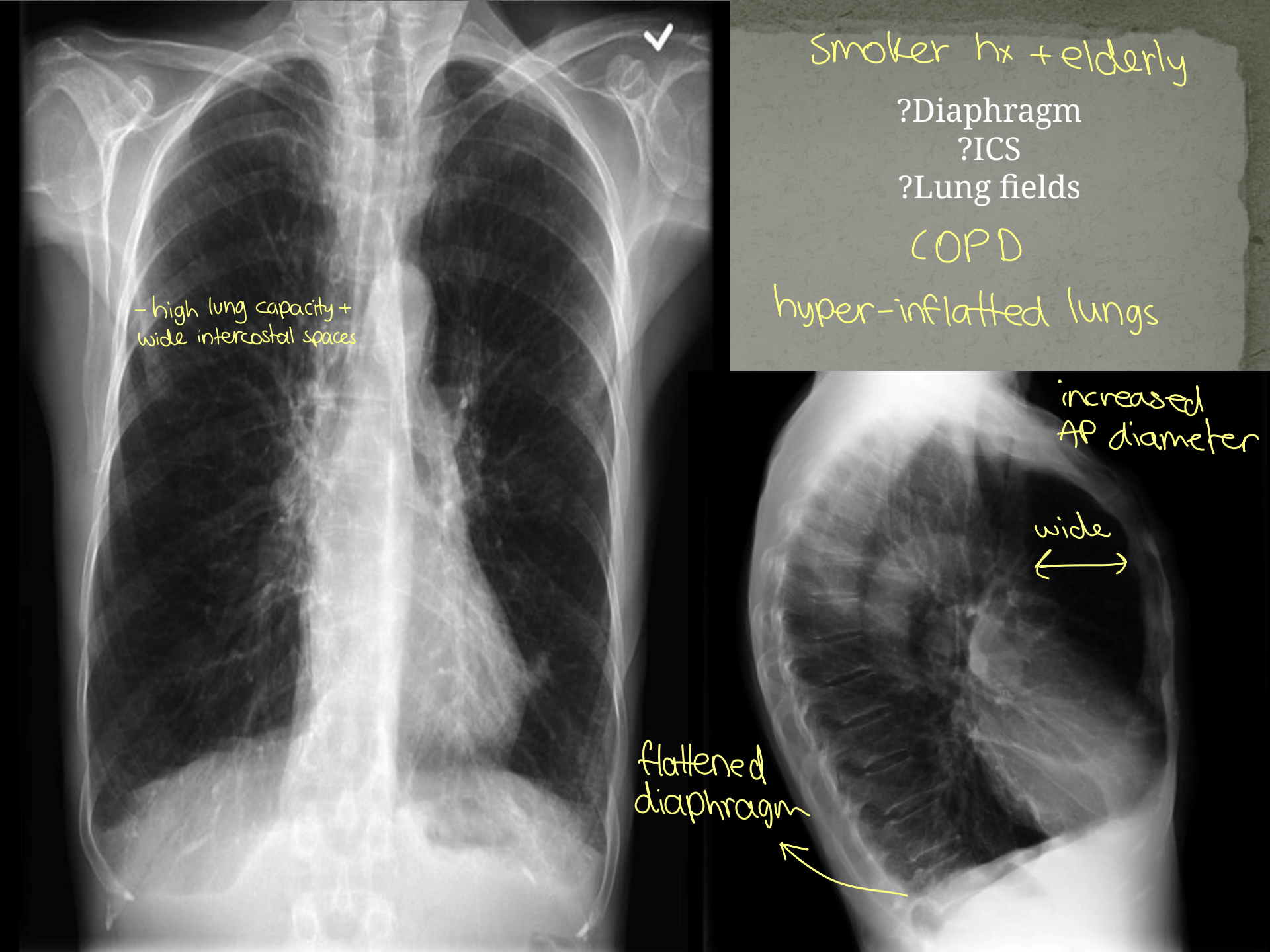
Peds

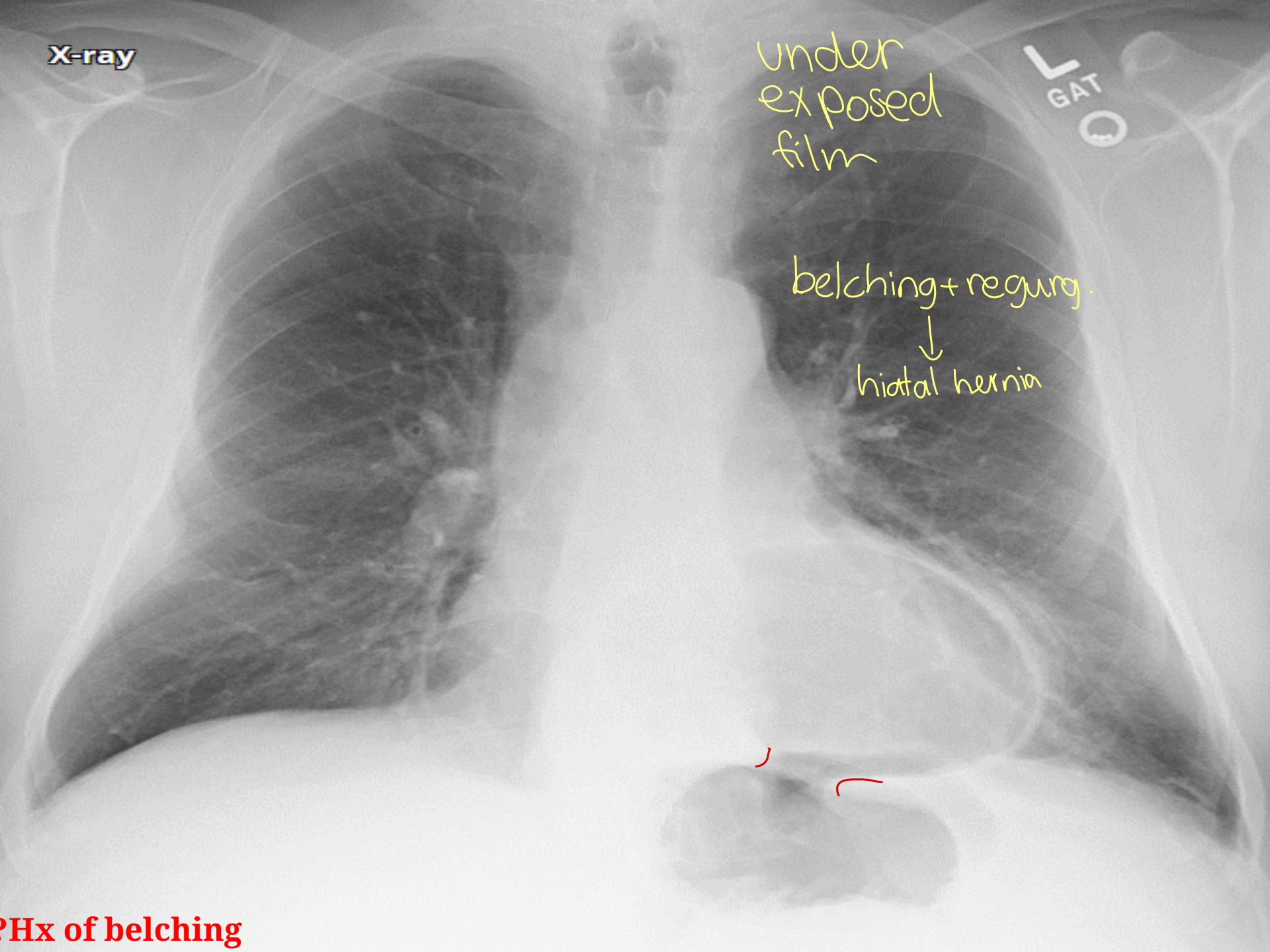
R

- radio-opacity
- sail sign
- normal thymus gland
- lft upper zone

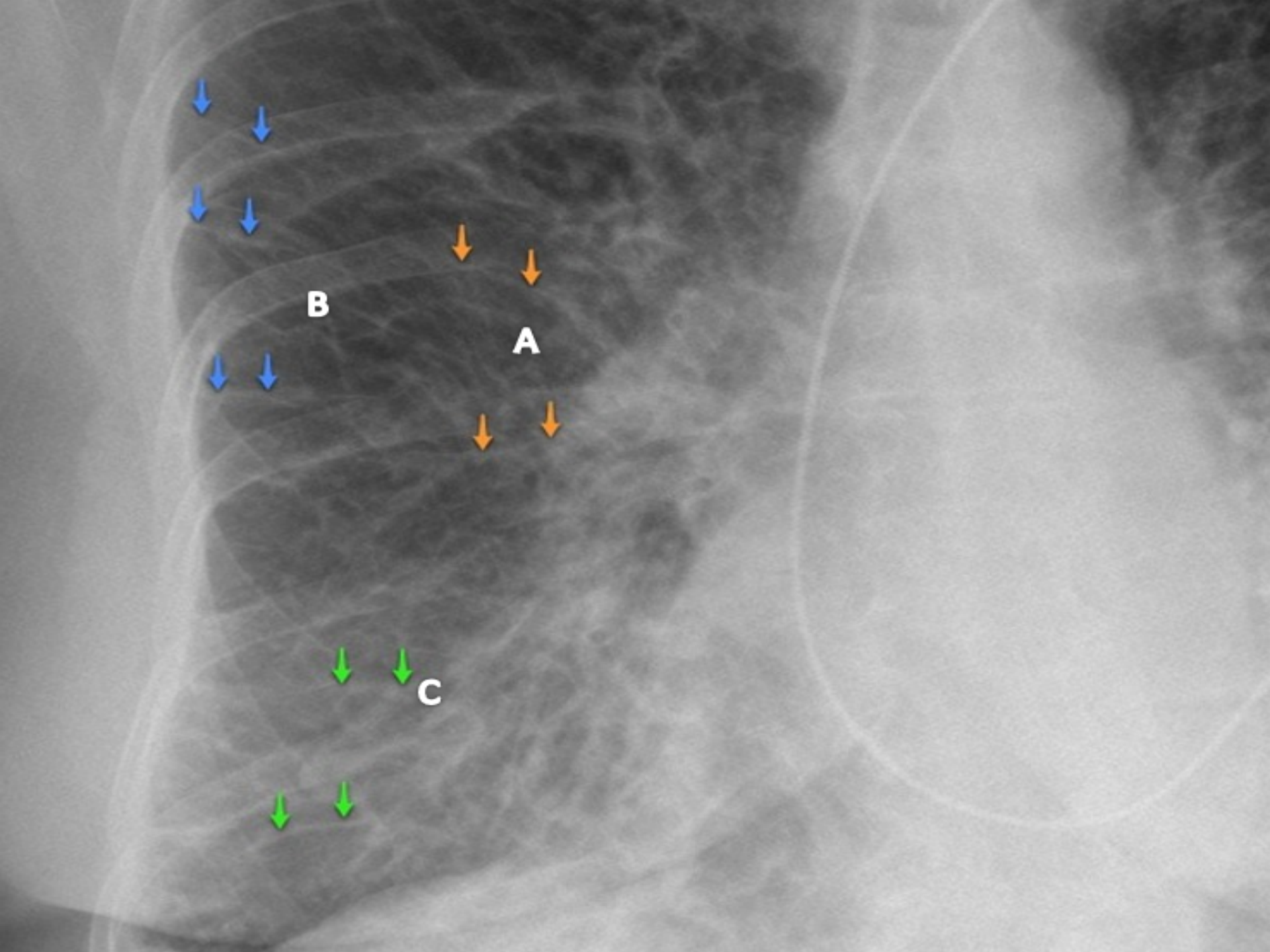


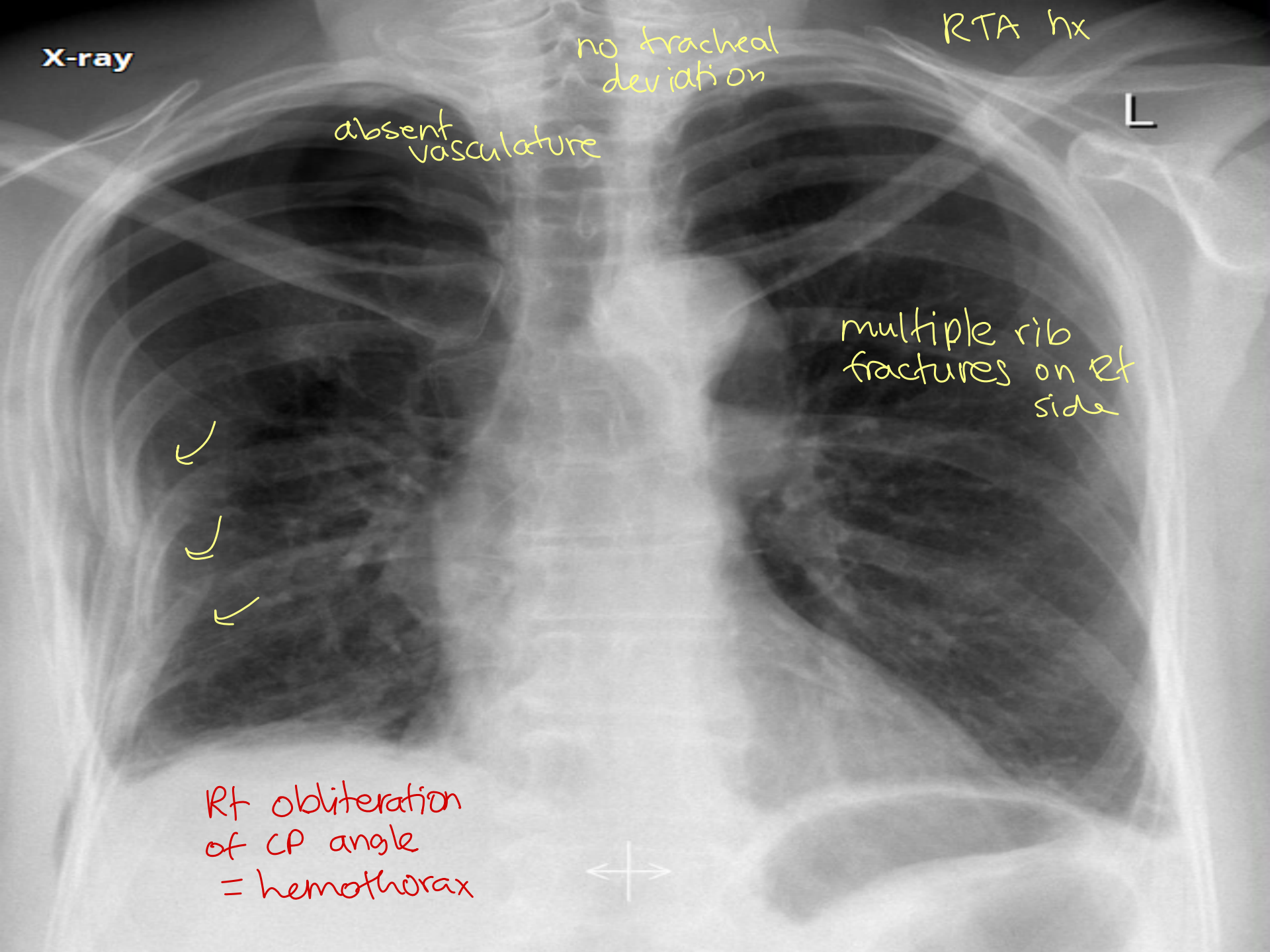
normally horizontal rib

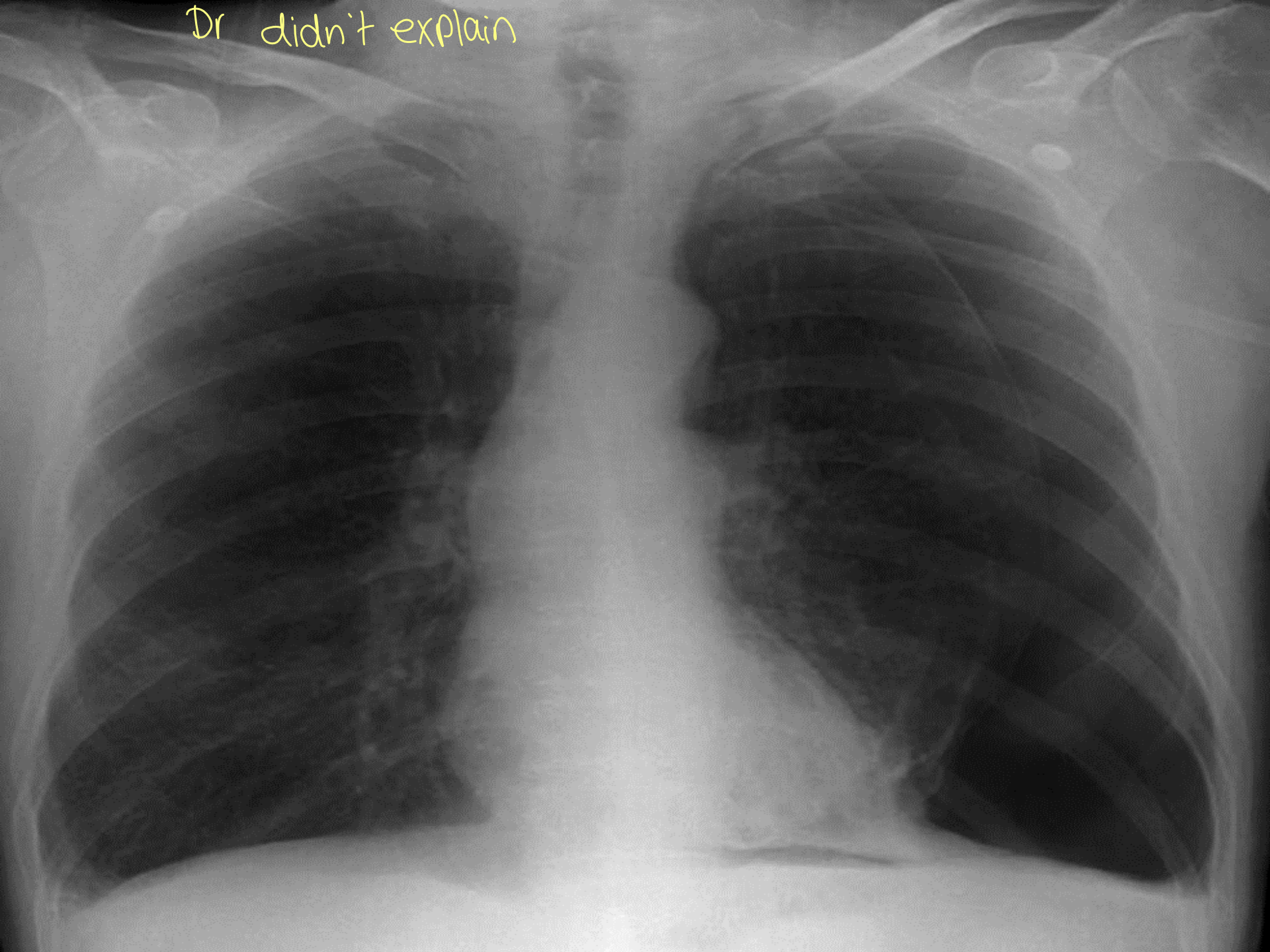

Smoker hx + elderly
?Diaphragm
?ICS
?Lung fields
COPD
hyper-inflatted lungs
- high lung capacity +
wide intercostal spaces
increased
AP diameter
wide
flattened
diaphragm

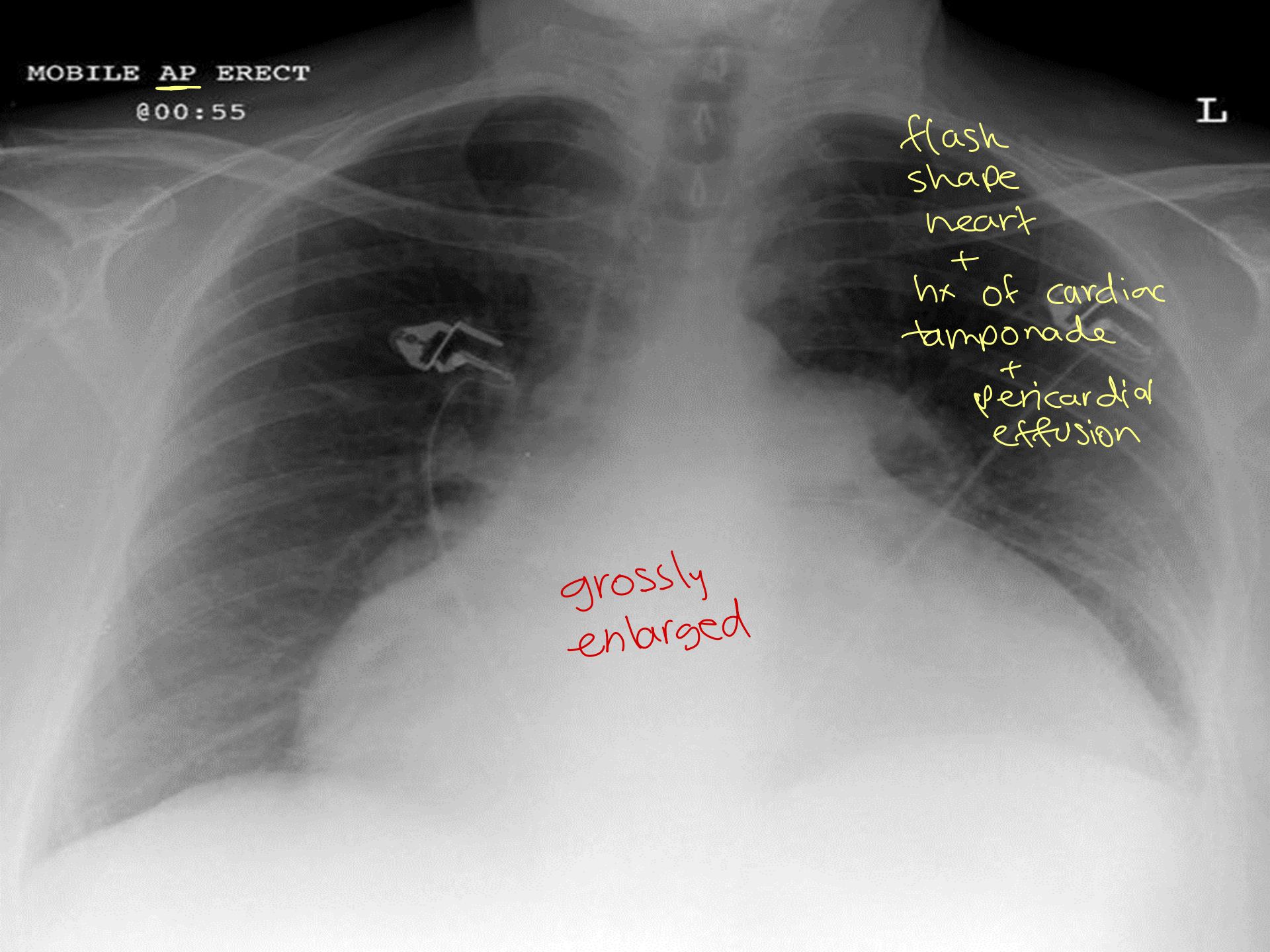


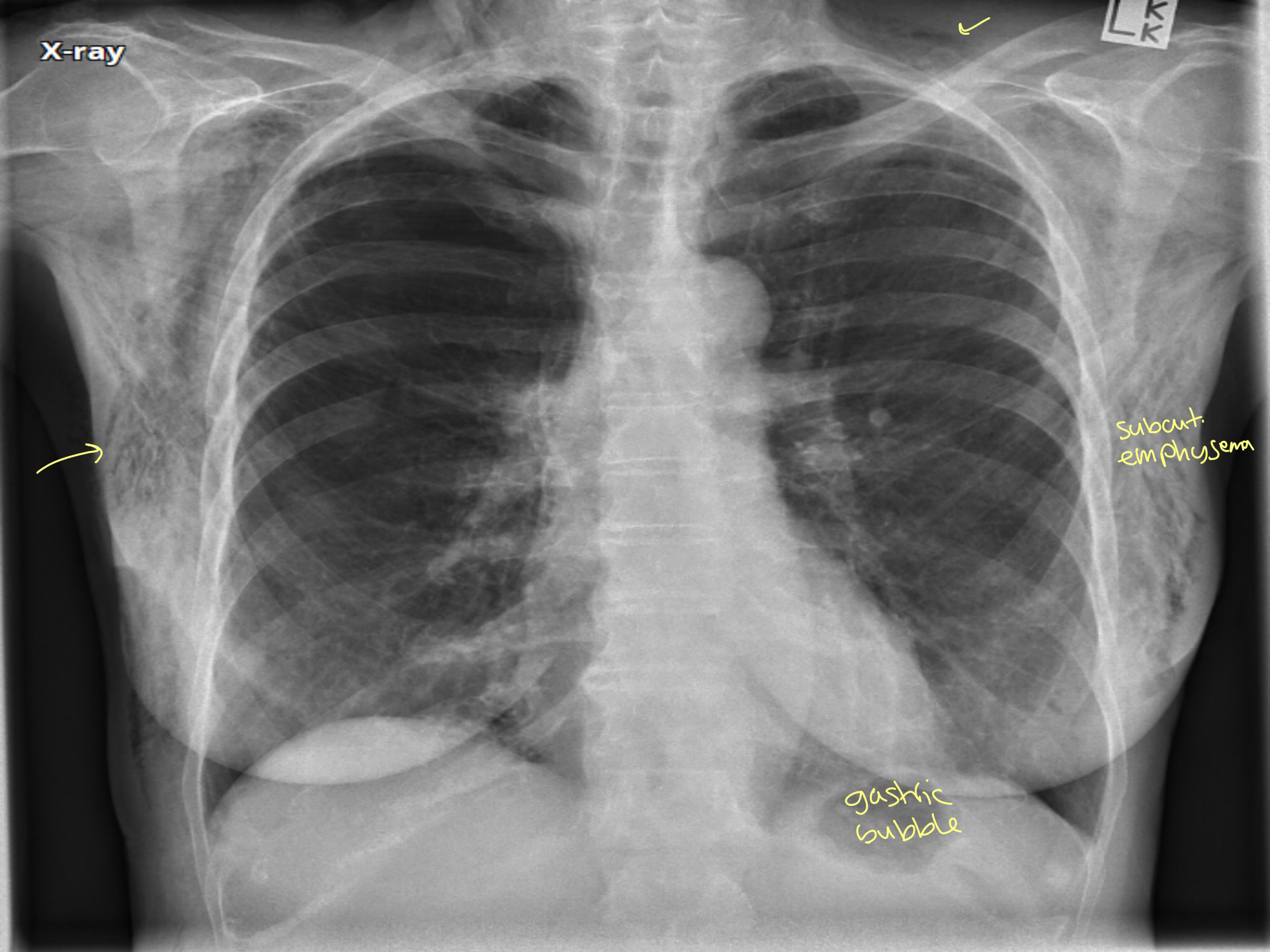
?Hx of belching

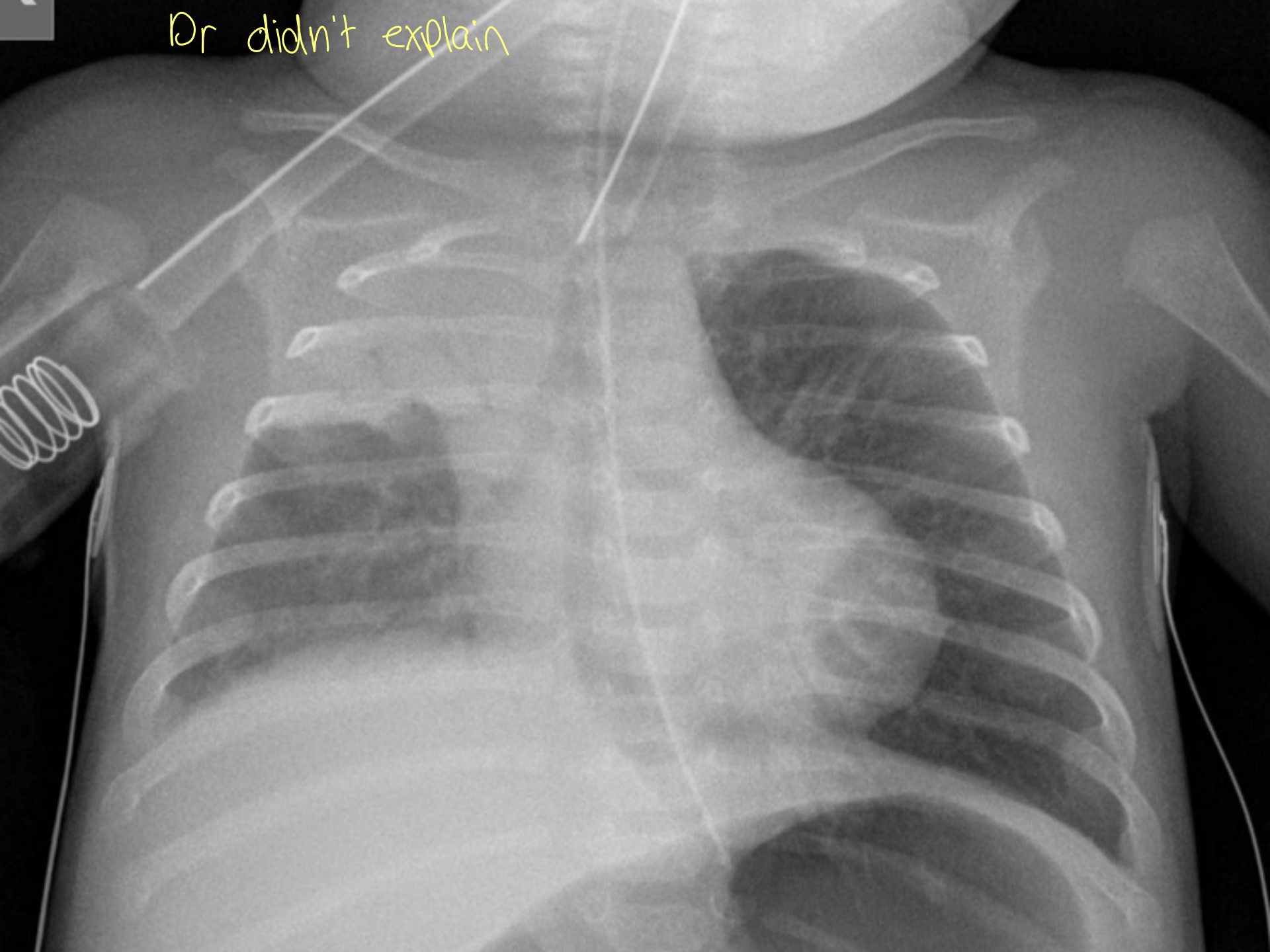

B
A
C

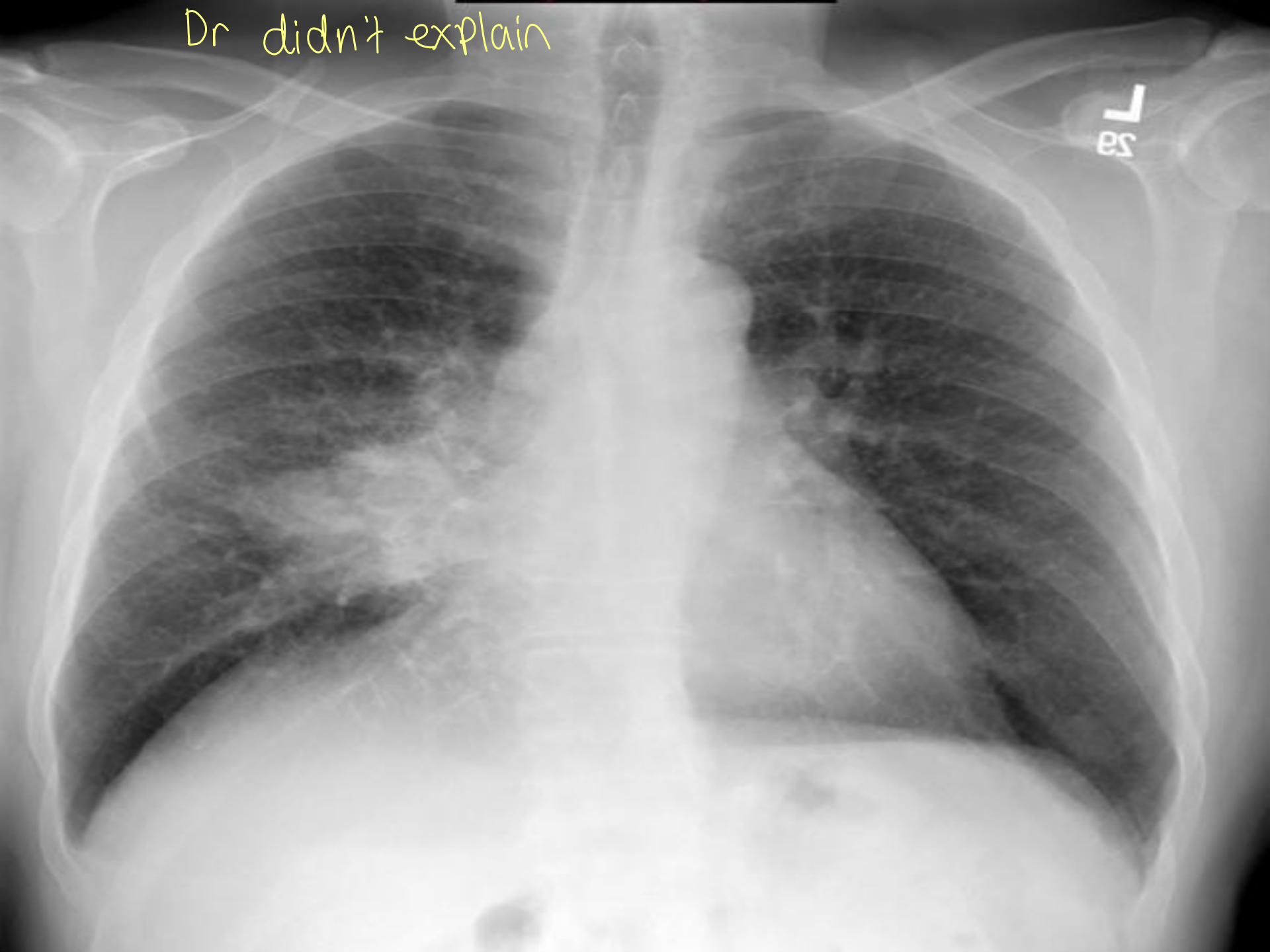

X-ray
no tracheal deviation
RTA hx
L
absent vasculature
multiple rib fractures on Rt side
Rt obliteration of CP angle = hemothorax

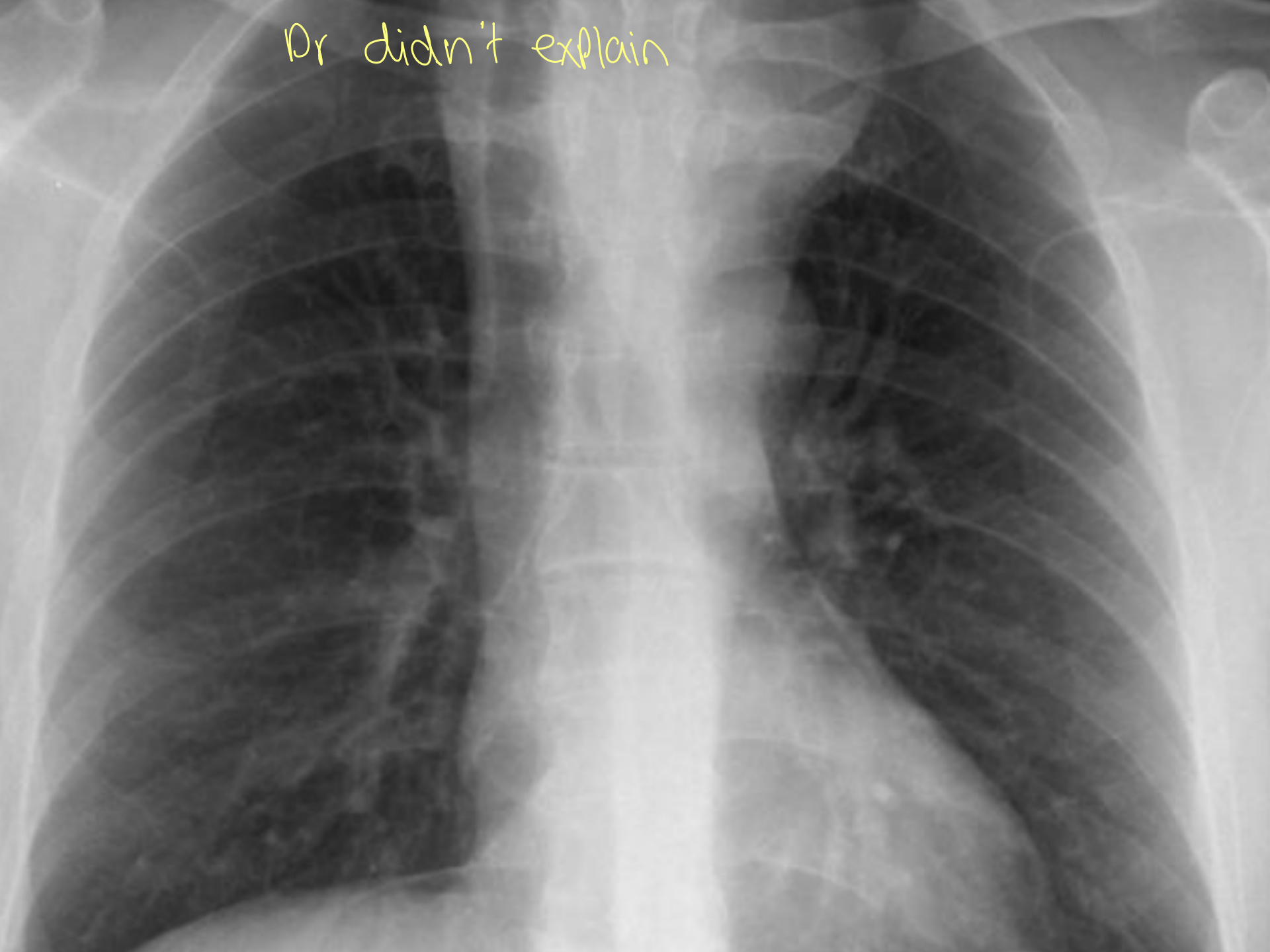

Dr didn't explain

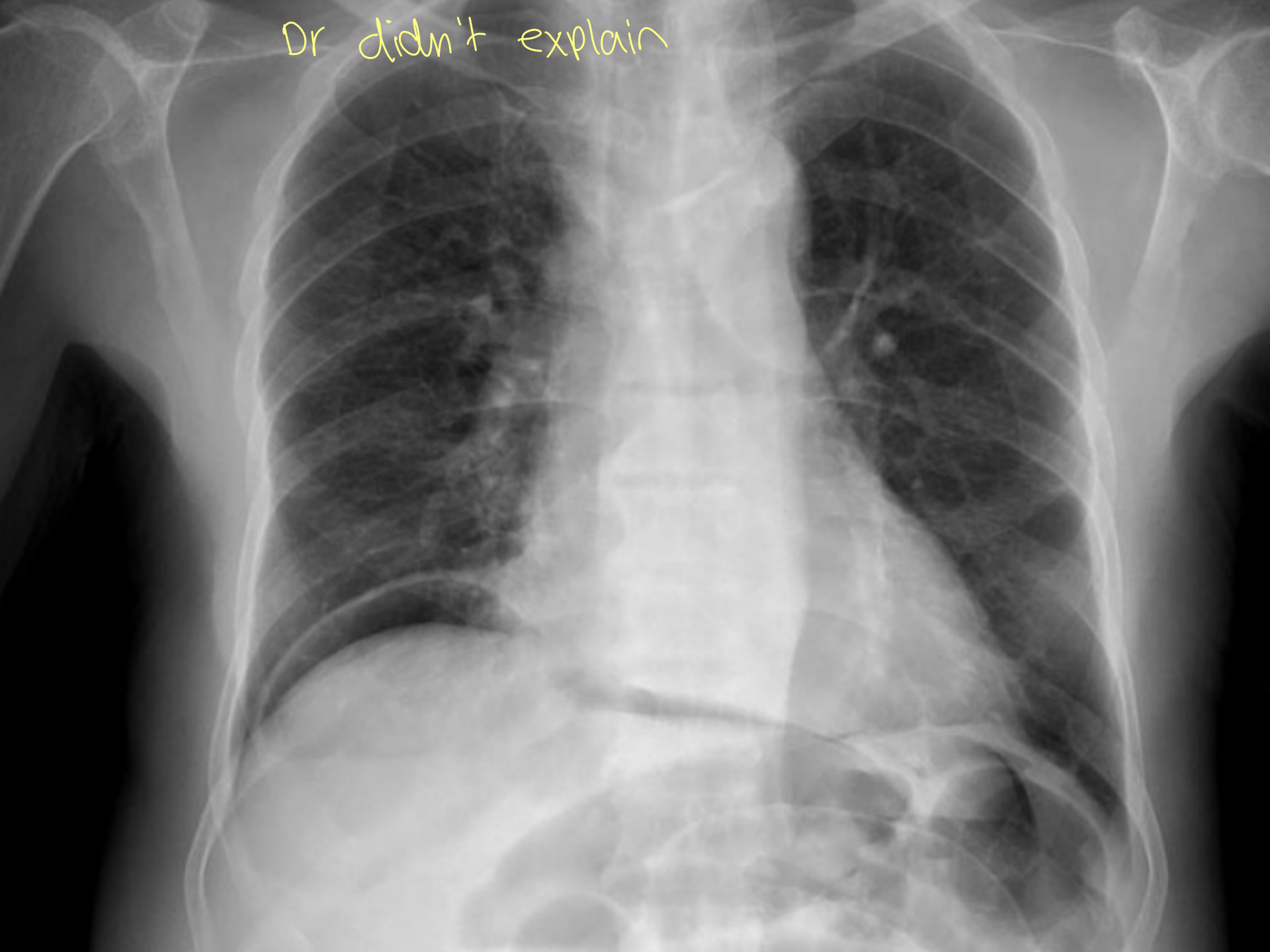

MOBILE AP ERECT
@00:55
L
flash shape heart + hx of cardiac tamponade + pericardial effusion
grossly enlarged

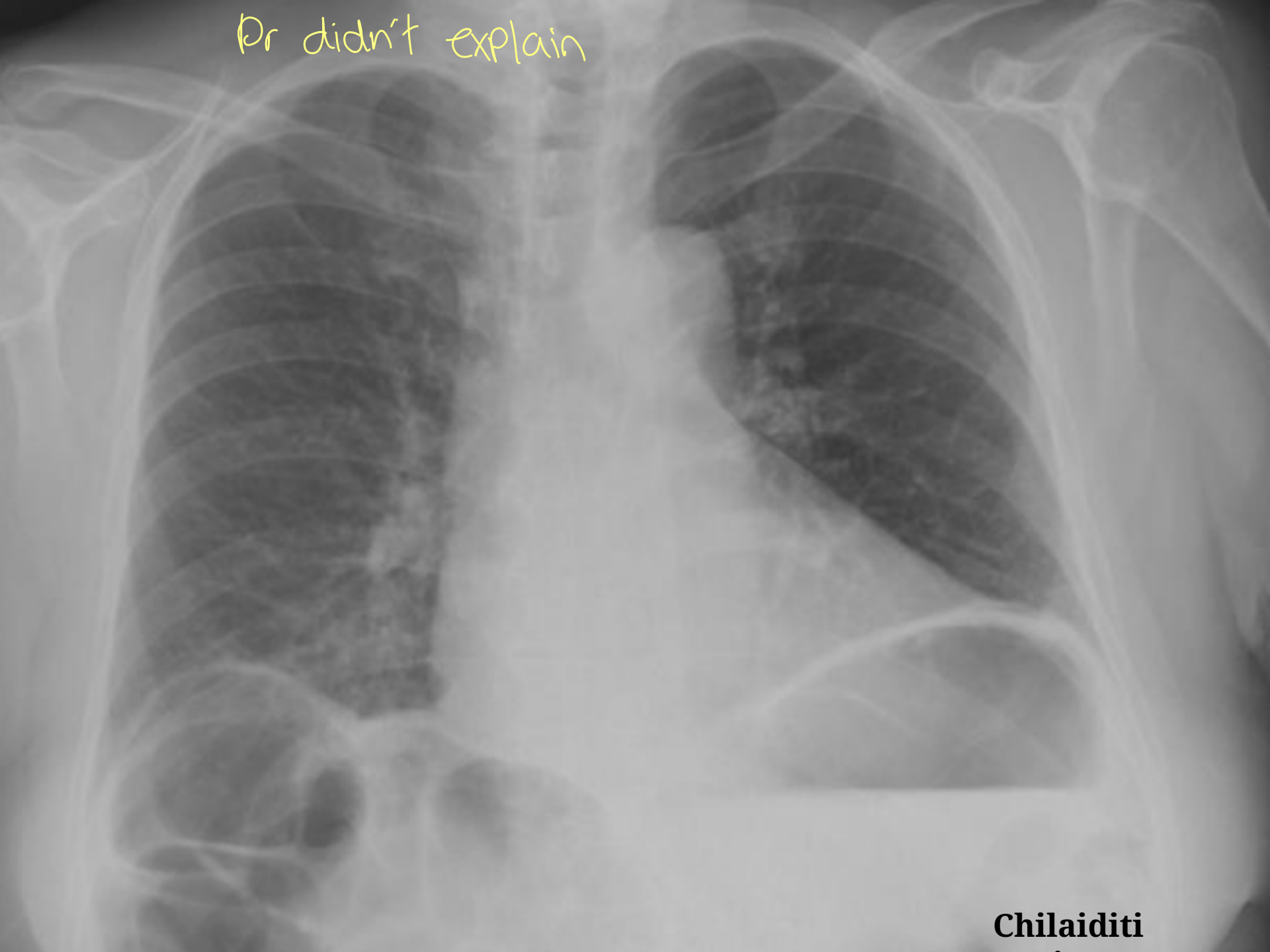

X-ray
subcut. emphysema
gastric bubble


Dr didn't explain


Dr didn't explain


Dr didn't explain


Dr didn't explain


Pr didn't explain
Chilaiditi