

وَقُلْ رَبِّ زِدْنِي عِلْمًا



# RESPIRATORY SYSTEM

HAYAT BATCH



SUBJECT : Clinical sessions

LEC NO. : Lec 2

DONE BY : Noor zamel

<http://www.medclubhu.weebly.com/>

# CHEST IMAGING

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أخصائي الأشعة التداخليه وقسطرة الشرايين  
أستاذ مشارك  
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Done by : Noor Zamel

# CHEST IMAGING

- Chest imaging remains major component of diagnostic radiology.
- The chest x-ray is the most commonly performed diagnostic x-ray examination.
- A chest x-ray makes images of the heart, lungs, airways, blood vessels and the bones of the spine and chest.

# (Anatomy of the lungs)

The Right lung is larger than the left, because most of the heart encroaches on the left lung.

## □ The right lung has three lobes:

- upper lobe
- Middle lobe
- Lower lobe

Minor Fissure ⇒ middle Upper ل fissure

Major Fissure ⇒ middle Upper ل fissure  
lower

## □ The left lung has two lobes:

- upper lobe
- lower lobe

] major Fissure

# Anatomy of the lungs / 2

Adjacent lobes are separated by an interlobar fissure.

## In the right lung:

- ❑ The minor (transverse) fissure separates the upper lobe from the middle lobe.
- ❑ The major (oblique) fissure separates the upper and middle lobes from the lower lobe.

## In the left lung:

- ❖ The major or oblique fissure separates the upper lobe from the lower lobe.

# Segmental anatomy

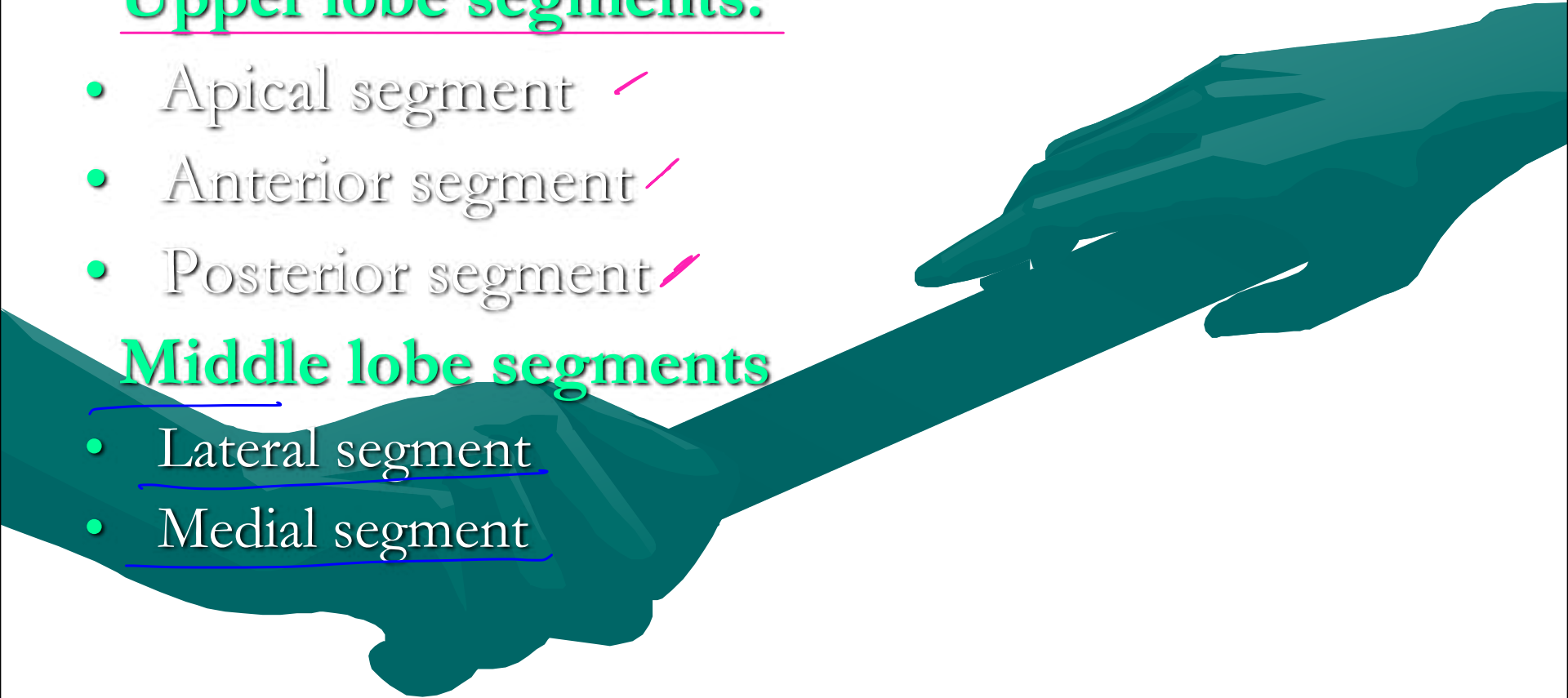
## Segments of the right lung

### Upper lobe segments:

- Apical segment /
- Anterior segment /
- Posterior segment /

### Middle lobe segments

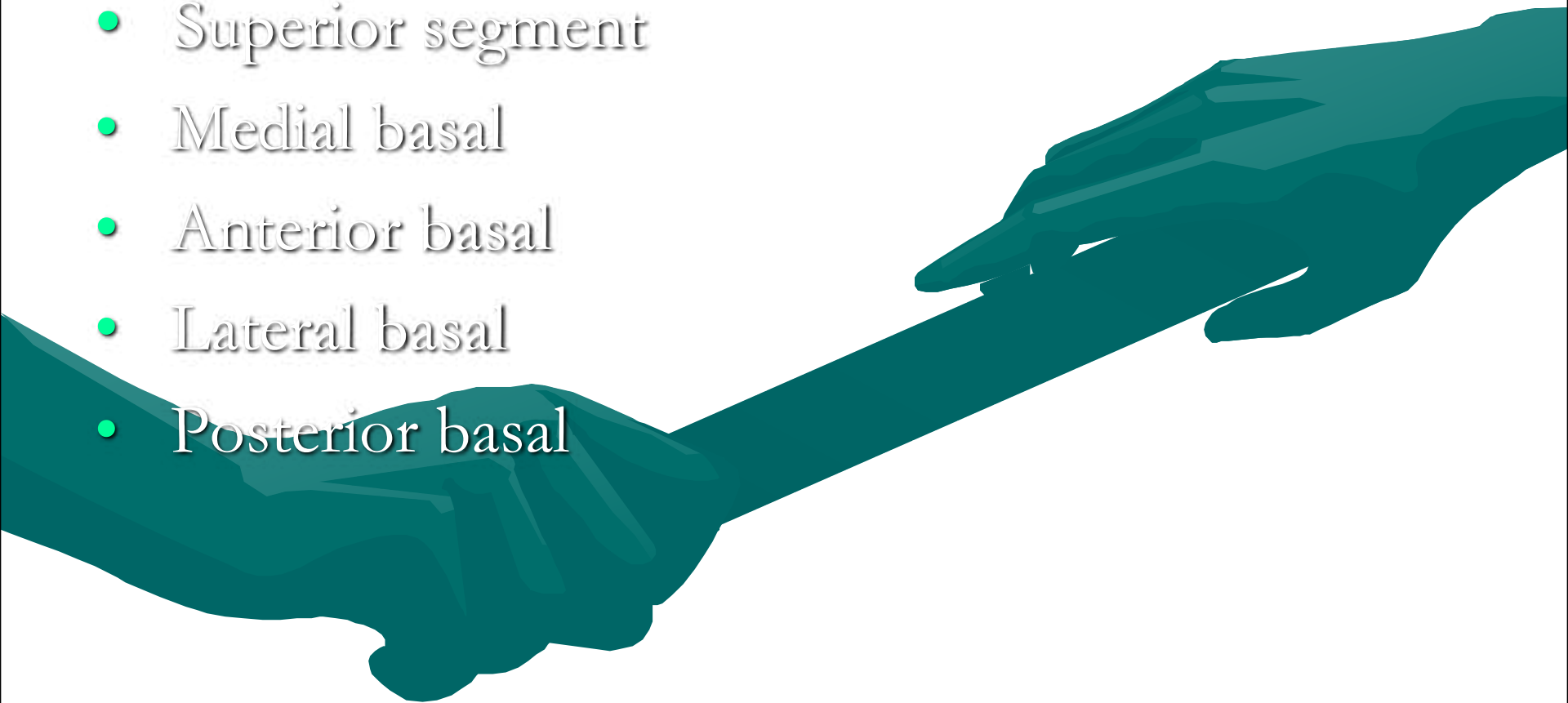
- Lateral segment
- Medial segment



# Segmental anatomy / 2

## Right lower lobe segments:

- Superior segment
- Medial basal
- Anterior basal
- Lateral basal
- Posterior basal



# Segmental anatomy / 3

## Left lung segments:

### Upper lobe

- Apical posterior segment
- Anterior segment
- Superior lingular segment
- Inferior lingular segment

The lingular segment in the left lung is similar in position to the right middle lobe.

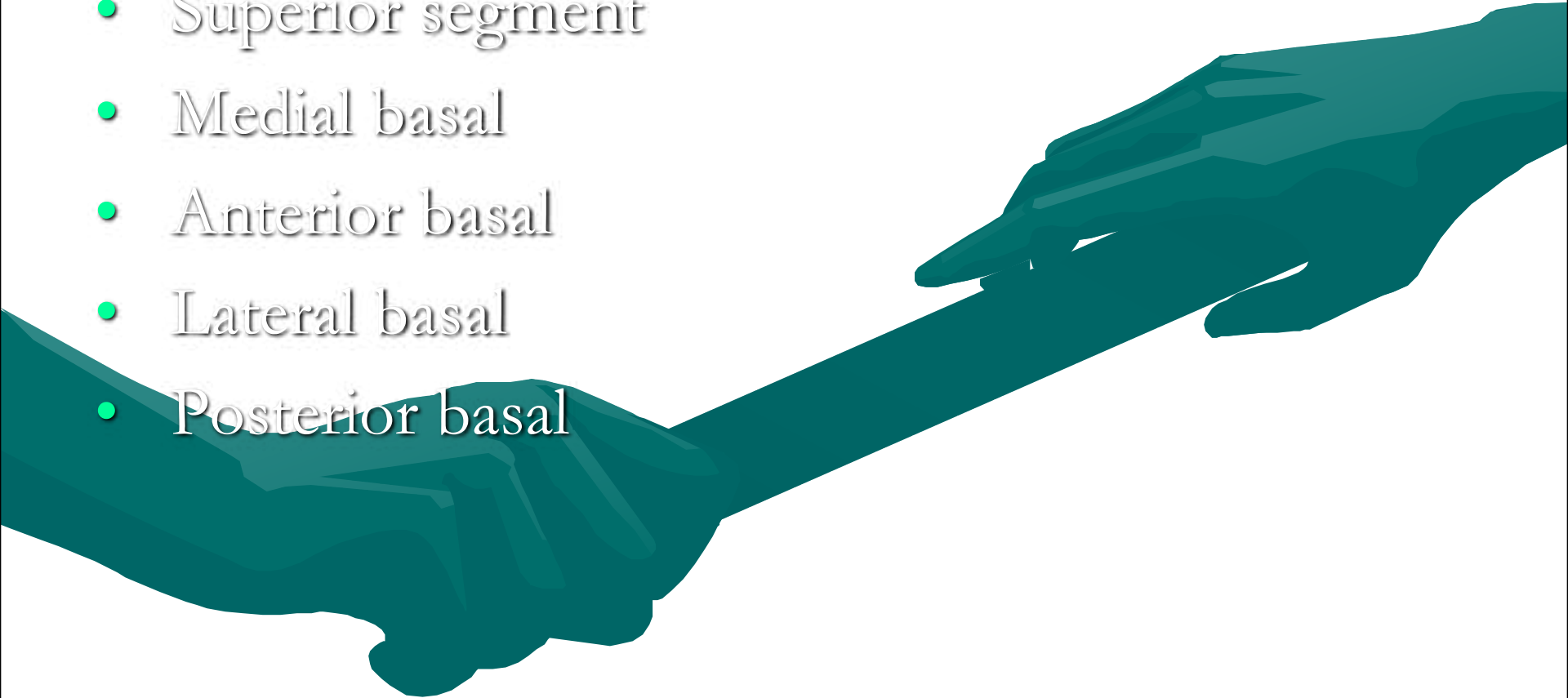
left lingular segment  
right middle lobe



# Segmental anatomy / 4

## Left lower lobe segments:

- Superior segment
- Medial basal
- Anterior basal
- Lateral basal
- Posterior basal



# Routine plain chest radiography:

- ❖ Postero-anterior view (PA)
- ❖ Lateral view.

مصدر الأشعة للرئتين

❑ The term PA refers to the direction of the x-ray beam which traverses the patient from posterior to anterior.

من الخلف إلى الأمام



# PA chest radiography is preferred to AP, why ?

أسباب تفضيلها PA من AP :-

- Less magnification of the heart. \* لا يكون القلب أكثر مظهرًا بشكل واضح \*  
المريض في الصورة بالسلايد قلب فاتح إليه حتى
- More lung fields are visualized. بعد ال Scapula عن ال Lung Fields
- The PA projects the scapula away from the lung fields. ال Apex بعد ال Lung بين أوضح
- The apices of the lungs are closer to the film in the PA and appear more clear ال Apex بعد ال Lung بين أوضح

# Other plain chest radiography:

## ➤ Antero-posterior view (AP)

مرات يستعمل AP لا يكون المريض  
Bed ridden ←

- ❑ very ill patients who are unable to stand.
- ❑ infants and small children.

الإشعة تكون من فوق تحت

## ➤ Inspiration-expiration films

Film ثالث غير ال AP و ال PA  
يكون مع نفس و بدون نفس ←

- ❑ suspected bronchial foreign body aspiration.
- ❑ suspected small pneumothorax.

حتى نشوف الهواء  
بطح دفتون سهوات  
أولا

تفصل ال  
expiratory film  
حتى تكون الرئة  
Deflated  
و سن نعا ال  
lung edge

في خطين

Before reading the x-ray film, the following should be checked:

## Request form

## Technical factors:

Right/left (patient position)

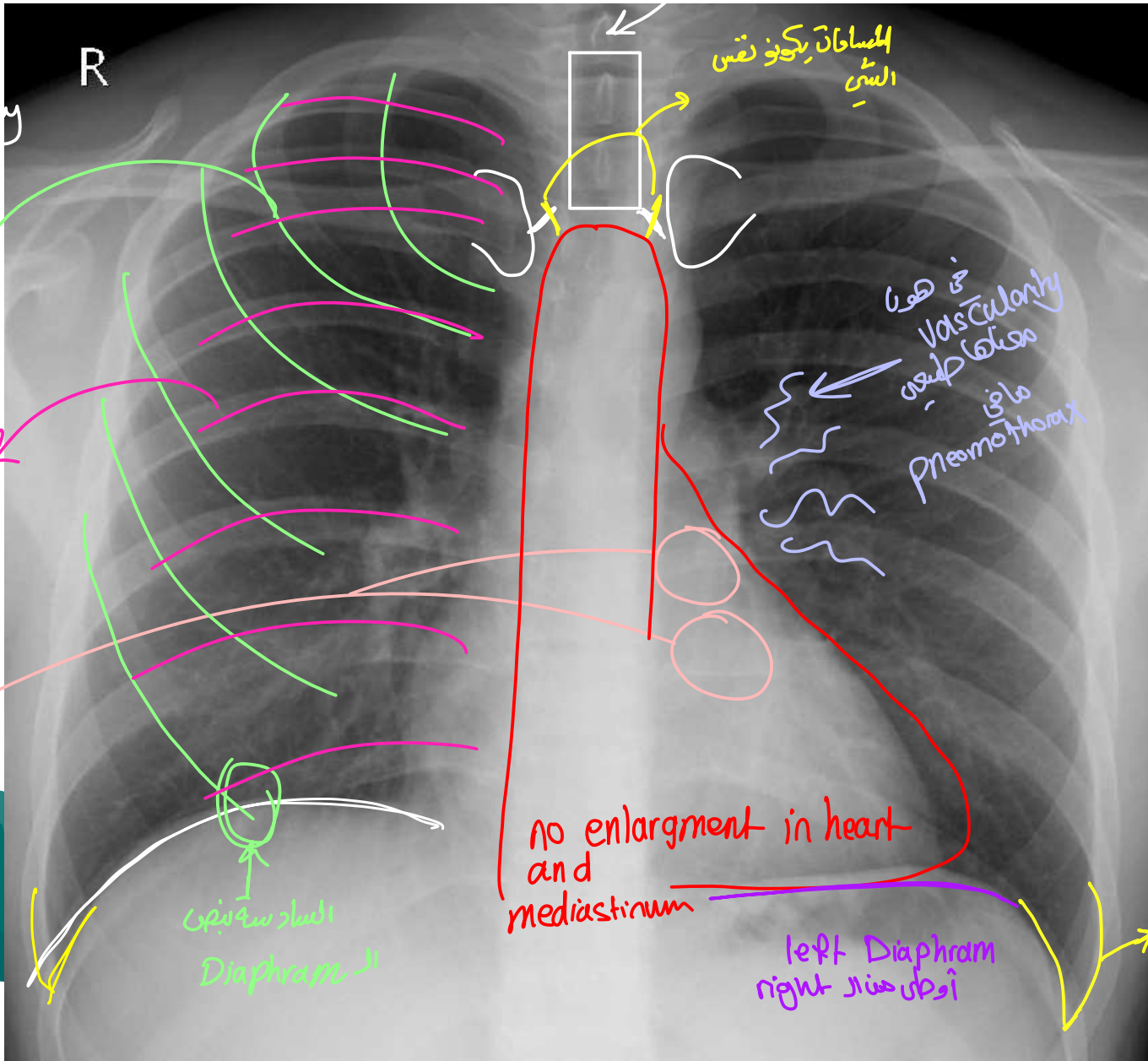
- degree of inspiration.
- exposure (penetration)

Right/left ⇒ Dextrocardia يعني  
موجة دخاسة لا يكون عن طريق  
ال Apex تبع القلب يكون على اليمين بدل اليسار

→ كمية الأشعة تكون مناسبة وبعبار معين حسب حجم  
المرضى  
+

\* دائماً تجاوز نقل الأشعة عشان ال Cancer

الأمر



Anterior  
الطرف الأمامي  
الضلع 1-7  
والسادسة بنصفه  
Diaphragm

Posterior  
الطرف الخلفي  
1. - 9

Retro cardiac  
Vertebral  
Body  
is just visible  
يلاحظ بين

الضلع  
Diaphragm

No enlargement in heart  
and  
mediastinum

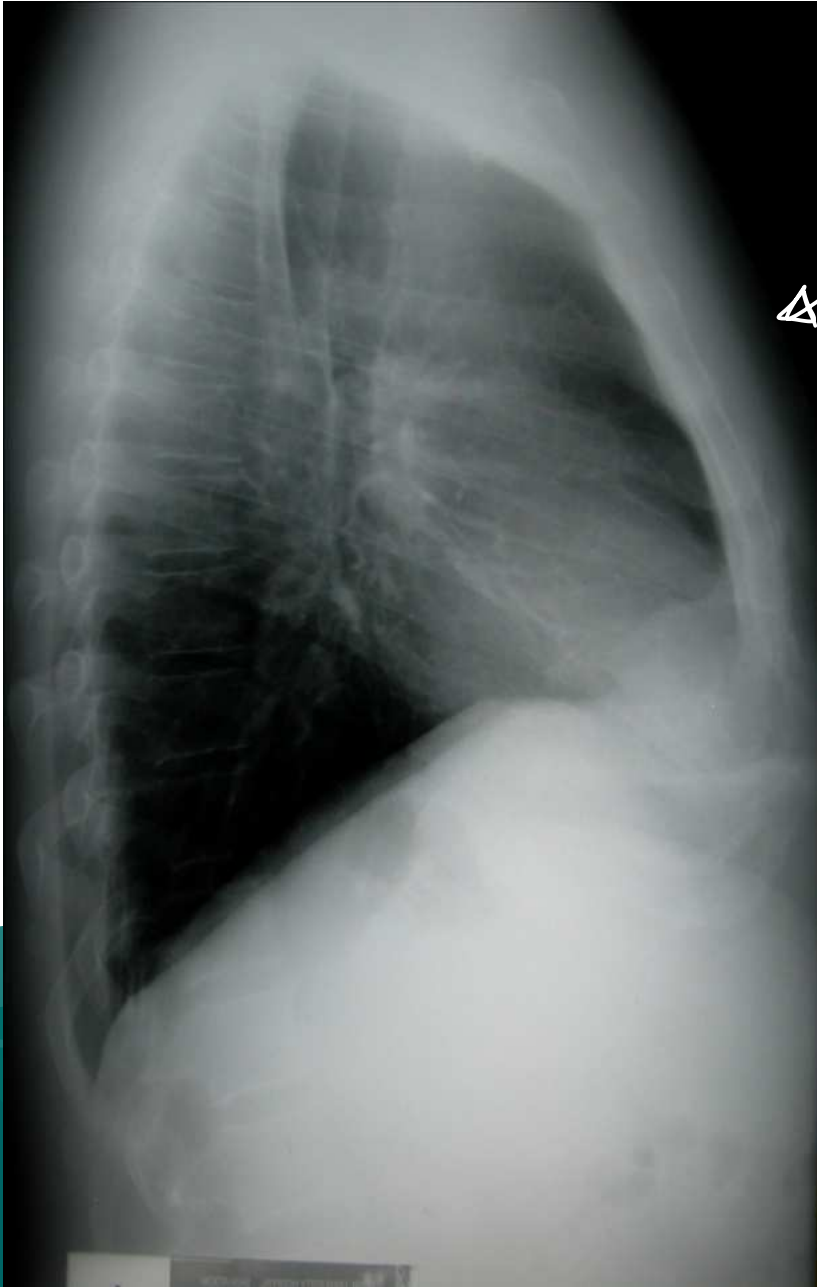
left Diaphragm  
الضلع الأيسر

في هون  
Vasculature  
الوعاء الدموية  
Pneumothorax

المسافات تكون نفس  
الشيء

Costophrenic angle  
يكون Sharp وإذا  
plunged صارت  
يكون إشارة إلى  
pleural effusion

Sharp  
edge





# PNEUMONIA

- Is an inflammation of the lung, which can be caused by a variety of micro-organisms, including bacterias, viruses, and fungi. نوکسے :-
- 1 • Lobar pneumonia: inflammation confined to a lobe of the lung.
- 2 • Bronchopneumonia: refers to bilateral multifocal areas of consolidation. ↳ انفیلٹریشن فی بکون.

Pneumonia can be classified into:

- ❖ **Primary pneumonia** : arising in a normal lung.
- ❖ **Secondary pneumonia**  
result of a disease or abnormality already present in the lung.

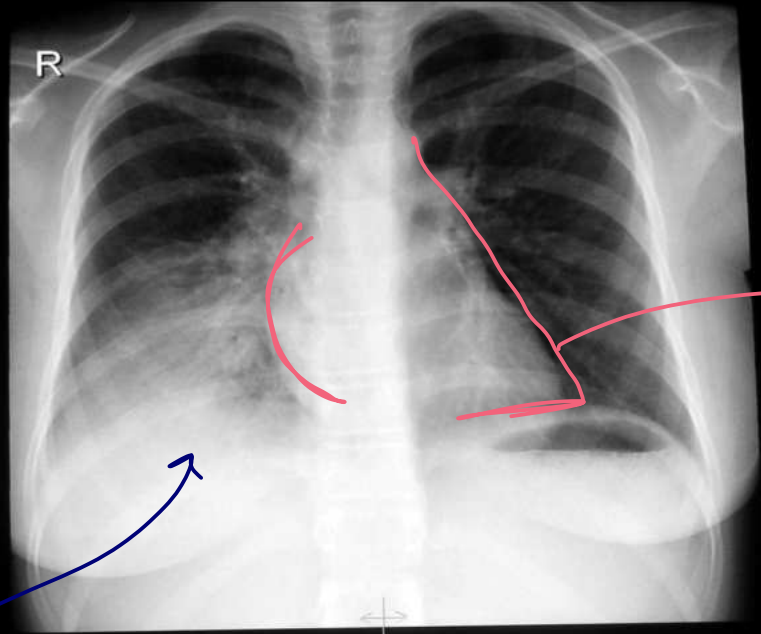
# Pneumonia / 2

- ❖ With treatment most types of bacterial pneumonia can be resolved within 2 weeks.
- ❖ Viral pneumonia may last longer.
- ❖ Mycoplasmal pneumonia may take 4 weeks to resolve completely.

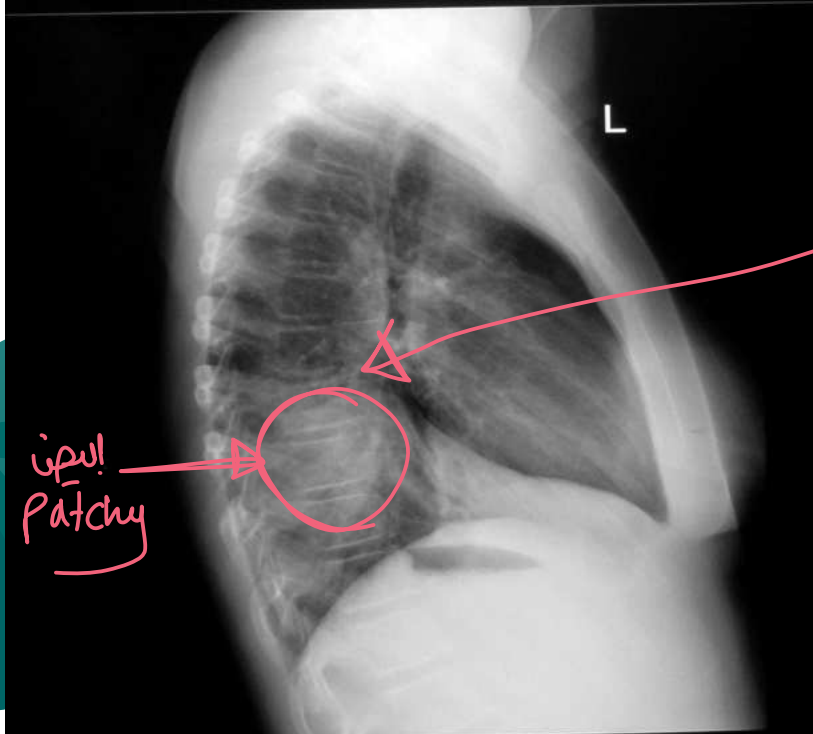
❑ What examinations should be considered in patients with pneumonia that does not resolve as promptly as it should ?

- ✓ CT scan
- ✓ Bronchoscopy

أكثر شيئا يسأله لتتأكد من pneumonia X-ray  
وبعد ال CT scan (التصوير الطبقي)

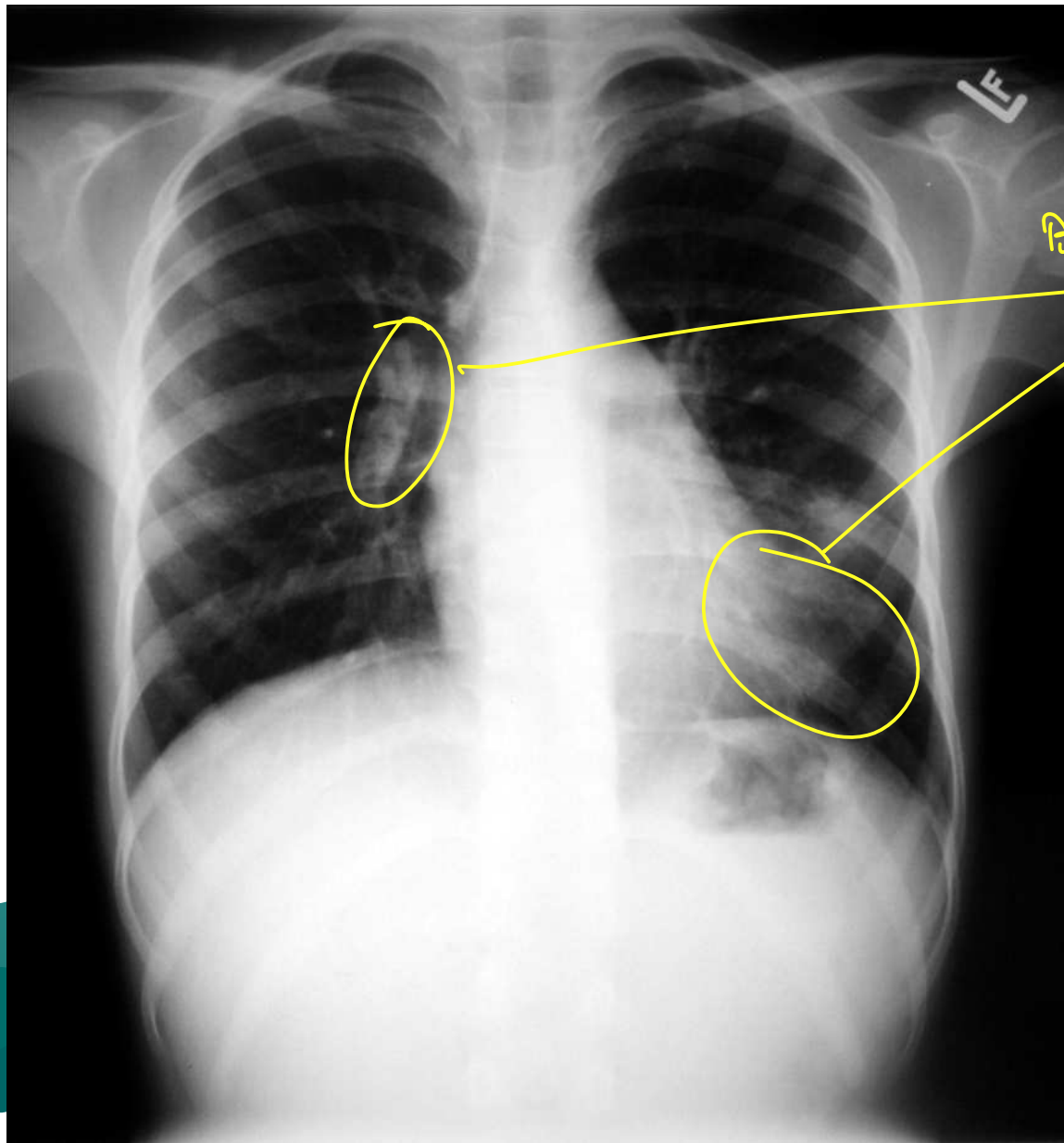


التهاب رئوي  
pneumonia



بقع  
Patchy

إذا قدرنا نرى حدود القلب  
معناها infiltration من  
heart لا posterior  
وللتأكد بين معا الصورة الثانية  
(من posterior)



طای

Bronchopneumonia

infiltration ال

موجود

Bilaterally

GHAMDI, ATHEER SULTAN  
107616  
15/07/95  
F, 12Y  
15/07/07  
01:48:30



V033 Thorax pa  
V 125.0  
mAs 1.16

GHAMDI, ATHEER SULTAN  
107616  
15/07/95  
F, 12Y  
15/07/07  
01:48:51



V034L Thorax lat  
V 125.0  
mAs 3.89

SECURITY FORCES P

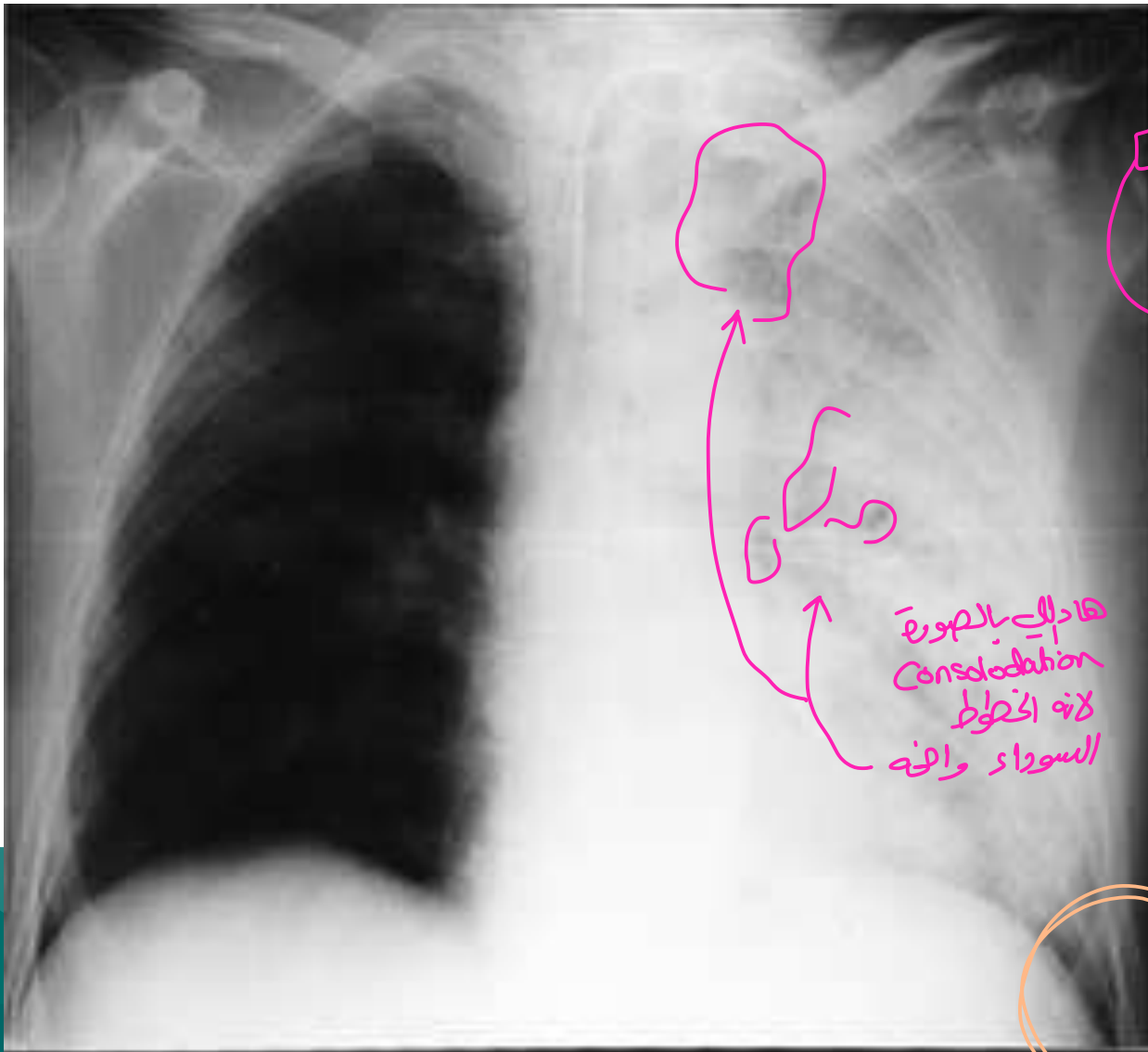
SECURITY FORCE

Scale

Scale







Costophrenic angle نبتائر ال

بميزهم من

air Broncho gram

الكانت هاي الخطوط السوداء

Consolidation

من تكون

هادالك بالصورة  
Consolidation  
لان الخطوط  
السوداء والخبه

ما في plural effusion  
بديل هون  
ما تأثرت

Costophrenic angle

مع انه المريخها واقف  
لكن لو في سوائل (effusion)  
أول اسيرج بين  
بالزاوية من





Pleural effusion

Wedge is

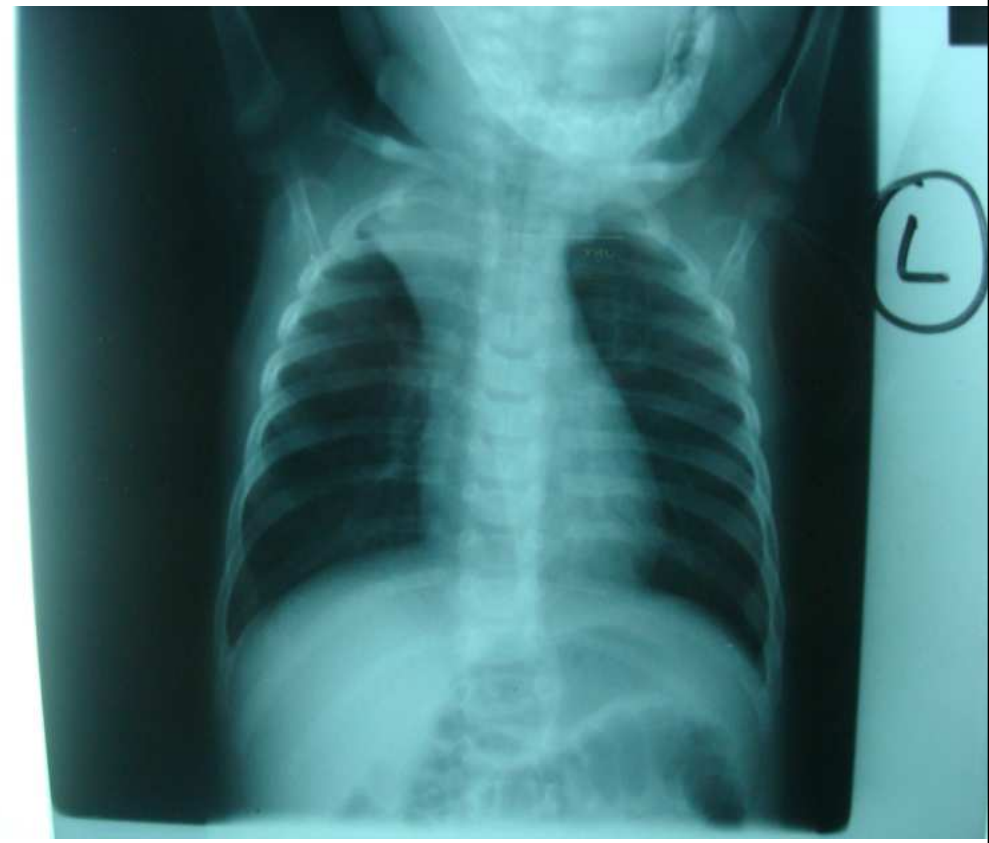
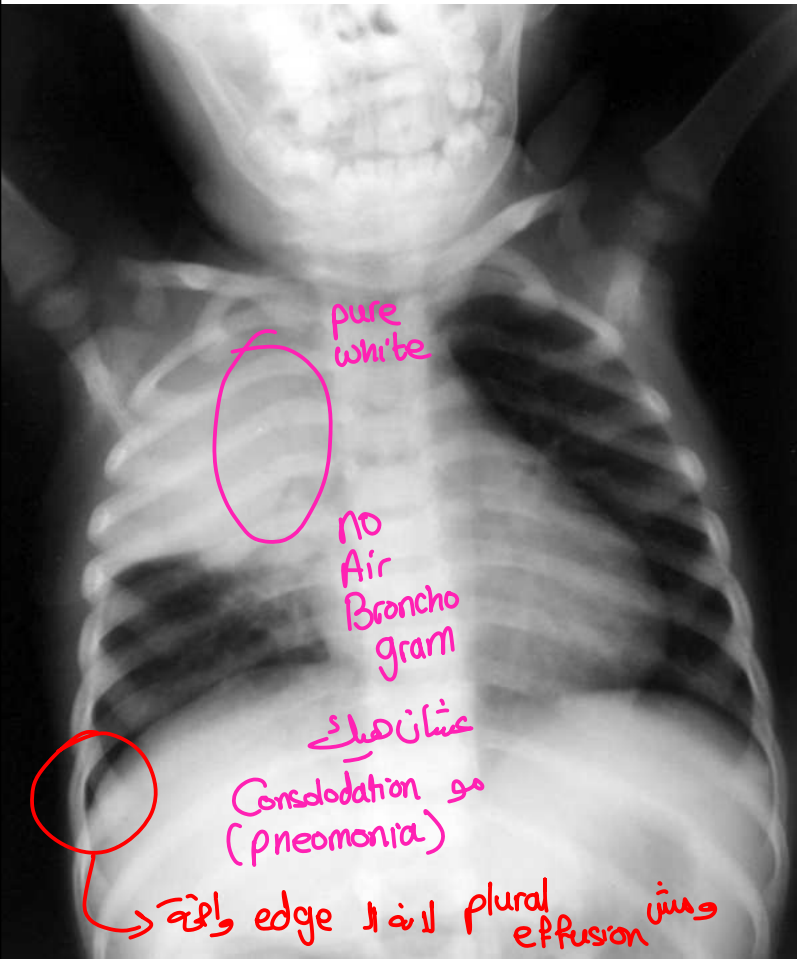
# Pulmonary collapse

- ❖ Pulmonary collapse or atelectasis refers to a decrease in volume of a lung, lobe or segment.
- ❖ Obstruction to flow of air is the most common cause of collapse.
- ❖ Air in the alveoli is absorbed and because no further air enters the alveoli distal to the obstruction, the lung tissue collapses and becomes more opaque

# Pulmonary collapse / 2

❑ Common causes of bronchial obstruction causing collapse:

- Bronchial carcinoma
- Mucus plug (pneumonia, postoperative).
- Foreign body.
- Inflammatory bronchial disease (bronchial tuberculosis).
- Extrinsic compression of airway by tumor or enlarged lymph nodes.



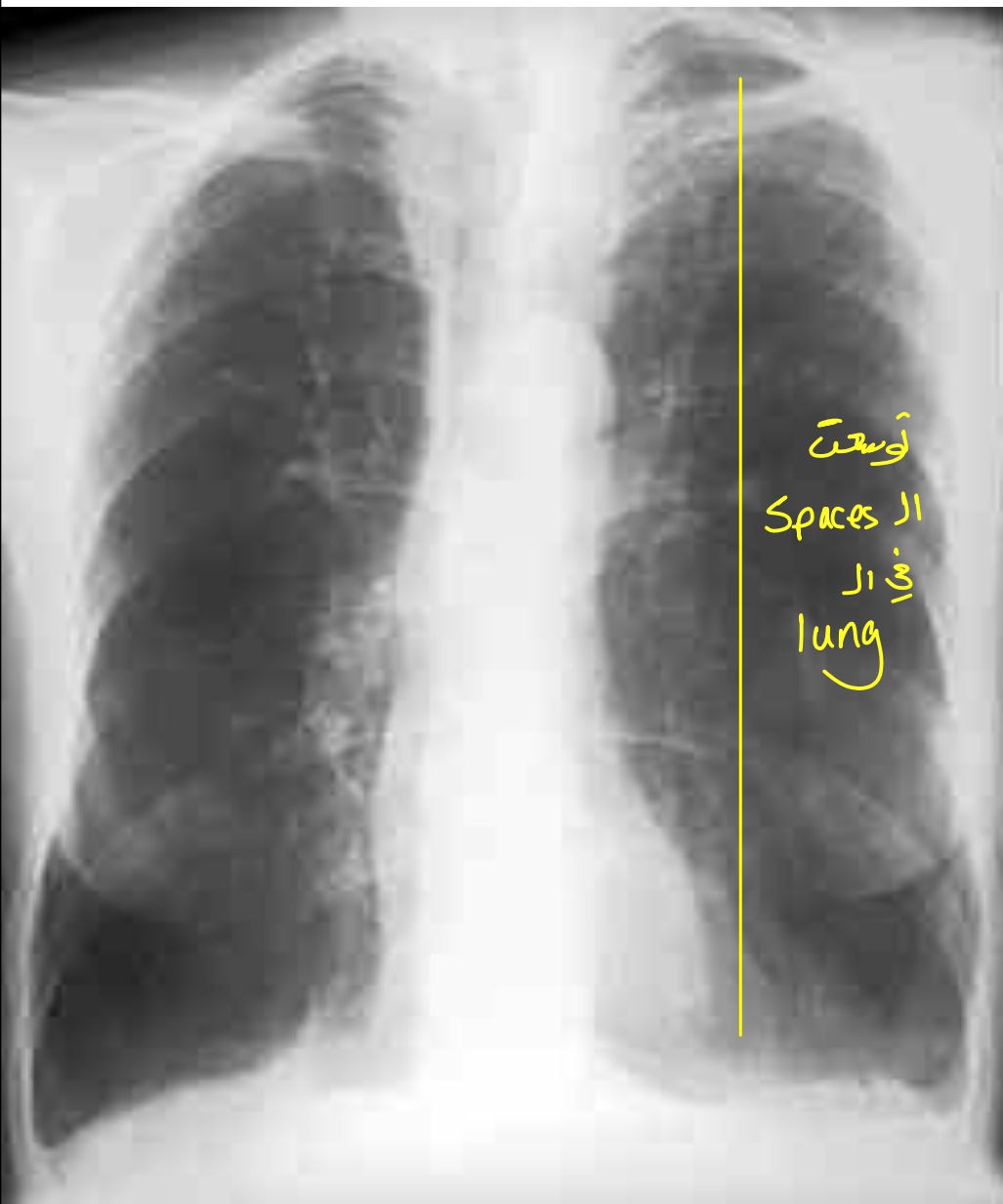
لا يصير Collaps لا lung بتعجزو بتسبب  
اللي حيت المكان الفارغ

# Emphysema

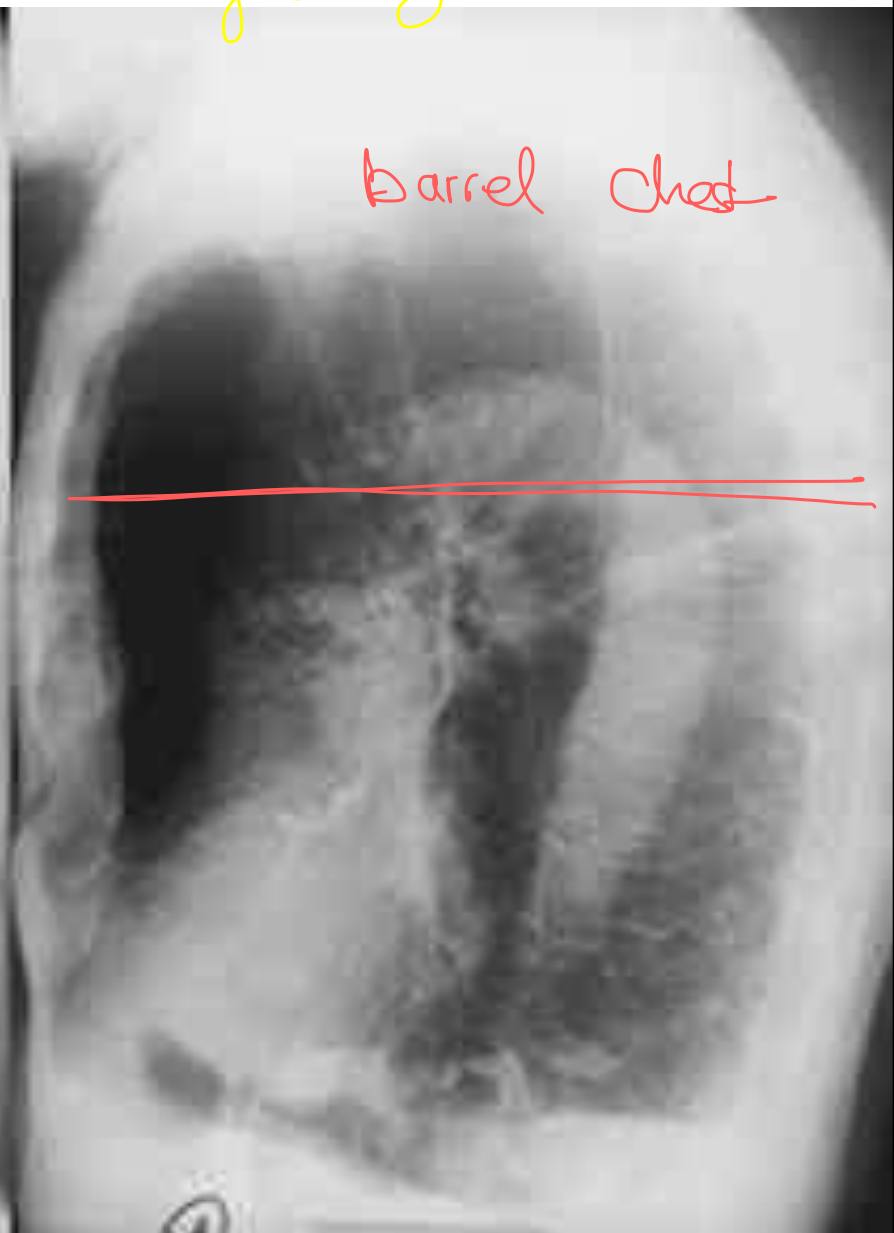
توسع في المساحات  
air spaces

- Is an increase in the size of the air spaces distal to the terminal bronchioles, with dilatation or destruction of their walls.
- The lung appear more translucent with reduction in size and number of the small vascular markings.
- The diaphragms are low and flat.
- The heart shadow is long and narrow.
- The postero-anterior diameter of the chest is increased in the lateral view resulting in barrel chest.

nonfunctioning lung



توسعت  
ال Spaces  
في ال  
lung



Barrel chest

# ***Pleural effusion***

---

Is fluid collection in the space between the parietal and visceral layers of the pleura, usually contains serous fluid, but may have differing contents.

- **Haemothorax**: blood, usually following trauma.
- **Empyema**: purulent fluid (pus).
- **Hydropneumothorax**: fluid and air.

انواع

# Pleural effusion / 2

## Radiological features of pleural effusion on a chest x-ray:

- Homogeneous opacification.
- Loss of the diaphragm outline.
- No visible pulmonary or bronchial markings.
- Concave upper border which appear higher laterally.
- blunting or obliteration of the costophrenic angle.



اهم اشئ في ال  
Plural effusion  
↓

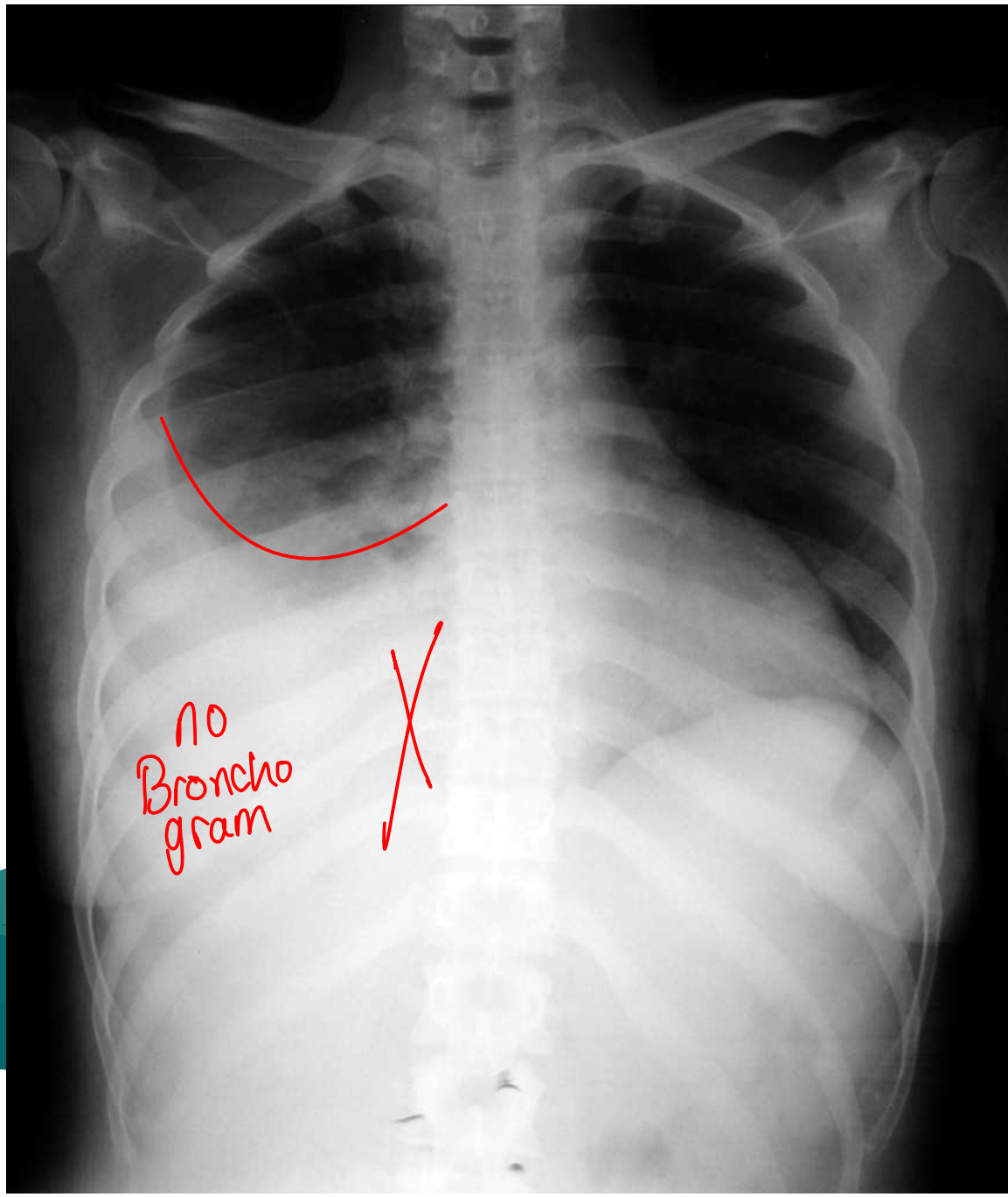
Minescus Sign

دهوء الشئ ال  
الئ بشؤفه في ال

Xray الئة حوءه

دليل سرج على

ال lung effusion



No  
Broncho  
gram



# Pneumothorax

← كَيْتَر صَدْر  
live Saving  
Condition وَتَجَبَّر

- Is the presence of free air in the pleural space, by a tear in either the parietal or visceral pleura.
- The most common cause of pneumothorax is chest injury, but the most common cause of spontaneous pneumothorax is rupture of sub-pleural emphysematous bullae (bleb).

\* من اهم اسباب الوفاة في حوادث السير

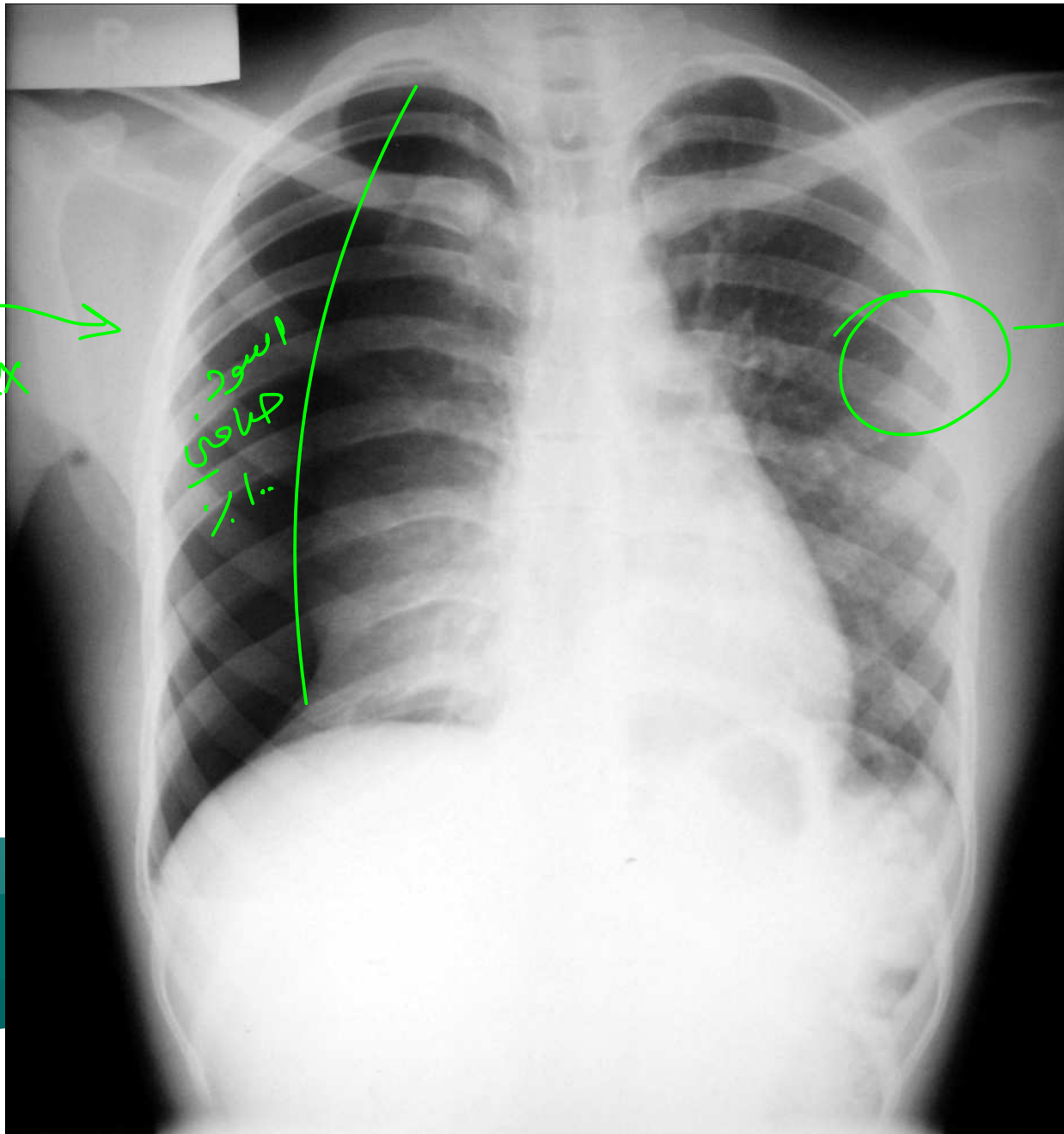
# Radiological features of pneumothorax

اهم الاسماء الى لازم

نتبه عليهم



- **Lung edge**: a thin white line at the lung margin, represent the visceral pleura.
- **Absent lung markings** between the lung edge and chest wall.
- **Mediastinal shift**: occur when a tension pneumothorax develops.



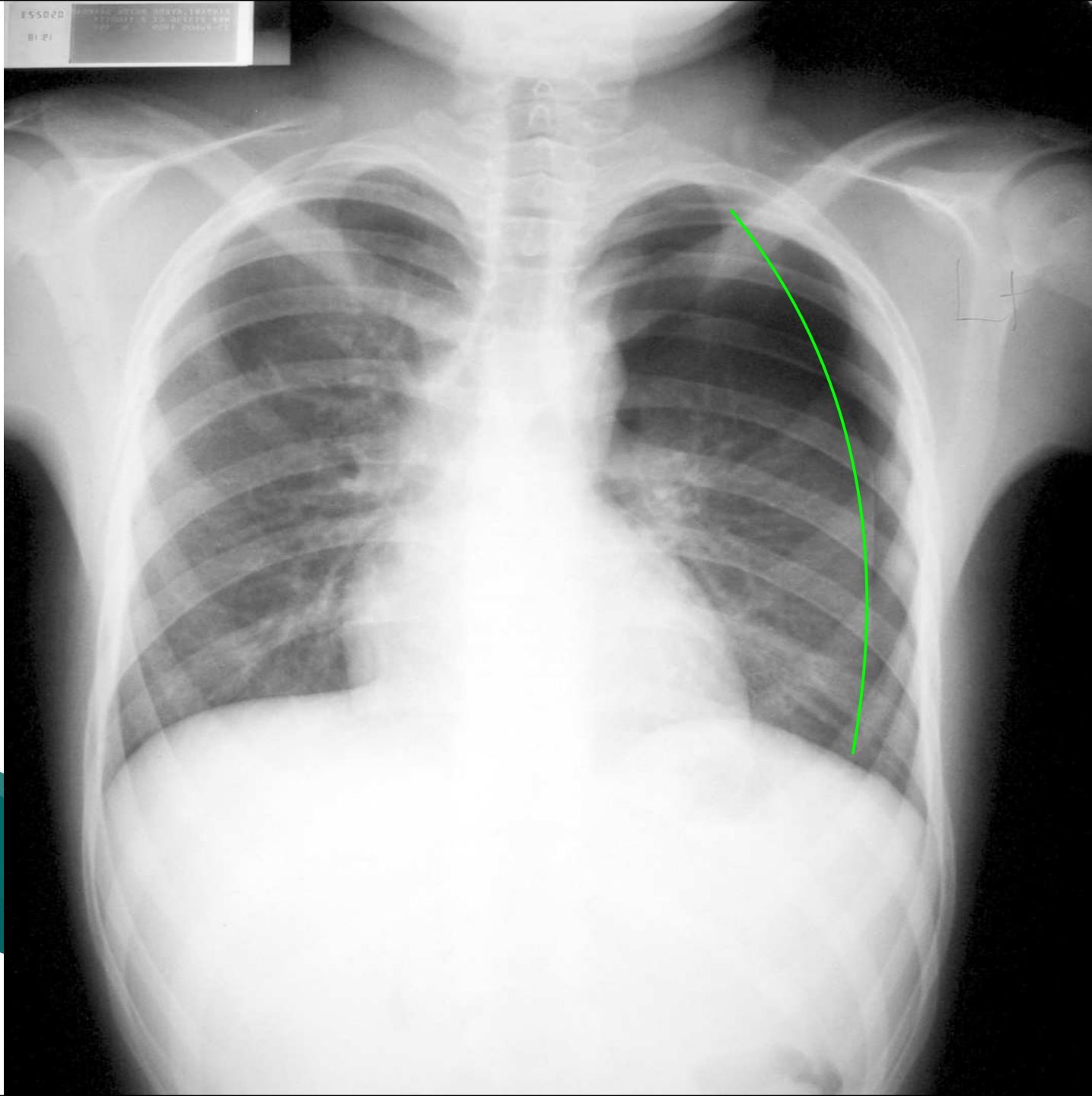
right  
pneumothorax

الصدر  
اليمين  
اليمين



الصدر  
اليسار  
اليسار

ES5020  
172017 0 25-AL 1 590  
01-PI



L +

# WHAT IS SOLITARY PULMONARY NODULE ?

- It must be nodular or roughly spherical.
- Not larger than 3cm in diameter.
- About 40% of solitary pulmonary nodules are malignant.
- A nodule is assessed for its:

## - size

--: malignant st Benign عوامل بتحدد

The larger the nodule, the greater the likelihood of malignancy.

## - Margins

Irregular contour or spiculated margins increase the probability of malignancy

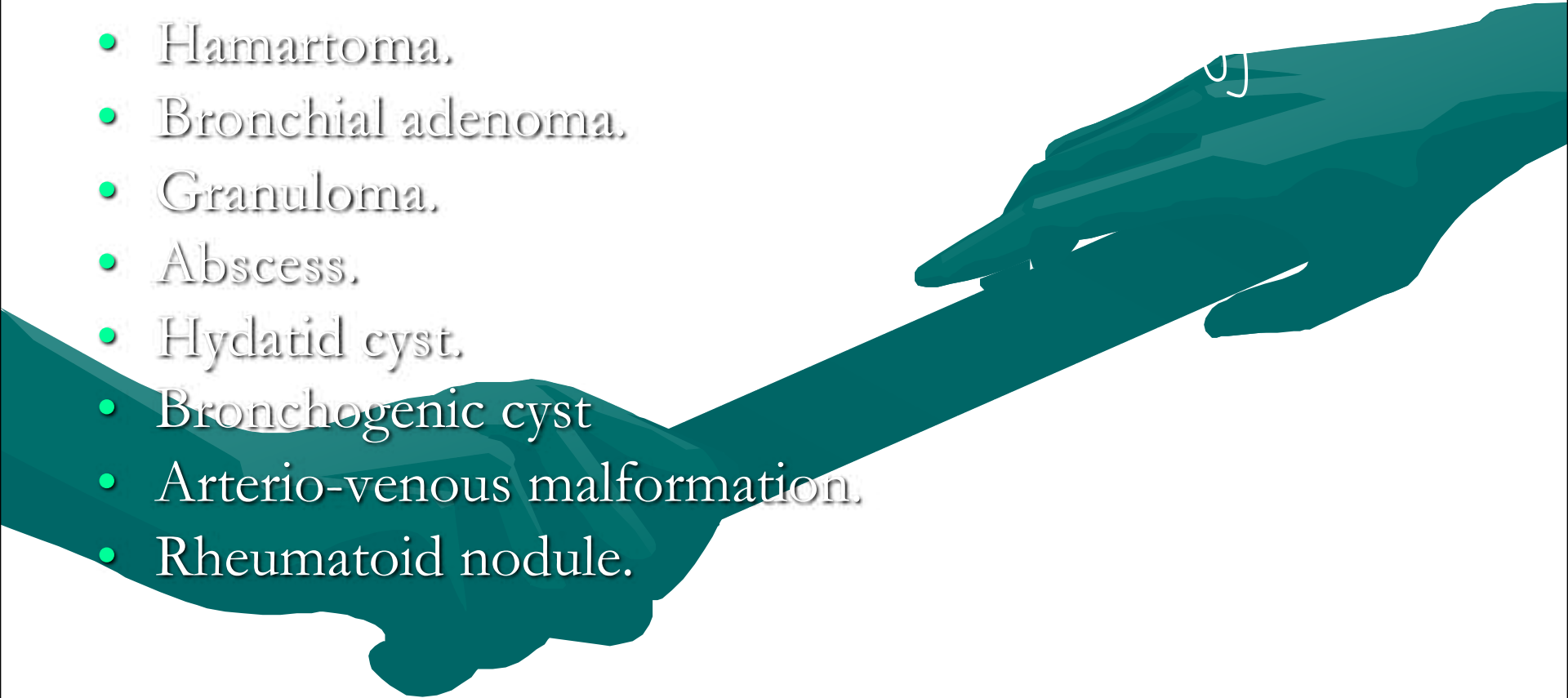
malignant } benign

## - Calcification

The presence of calcification within a nodule are in favor of benign lesion.

# CAUSES OF SOLITARY PULMONARY NODULE

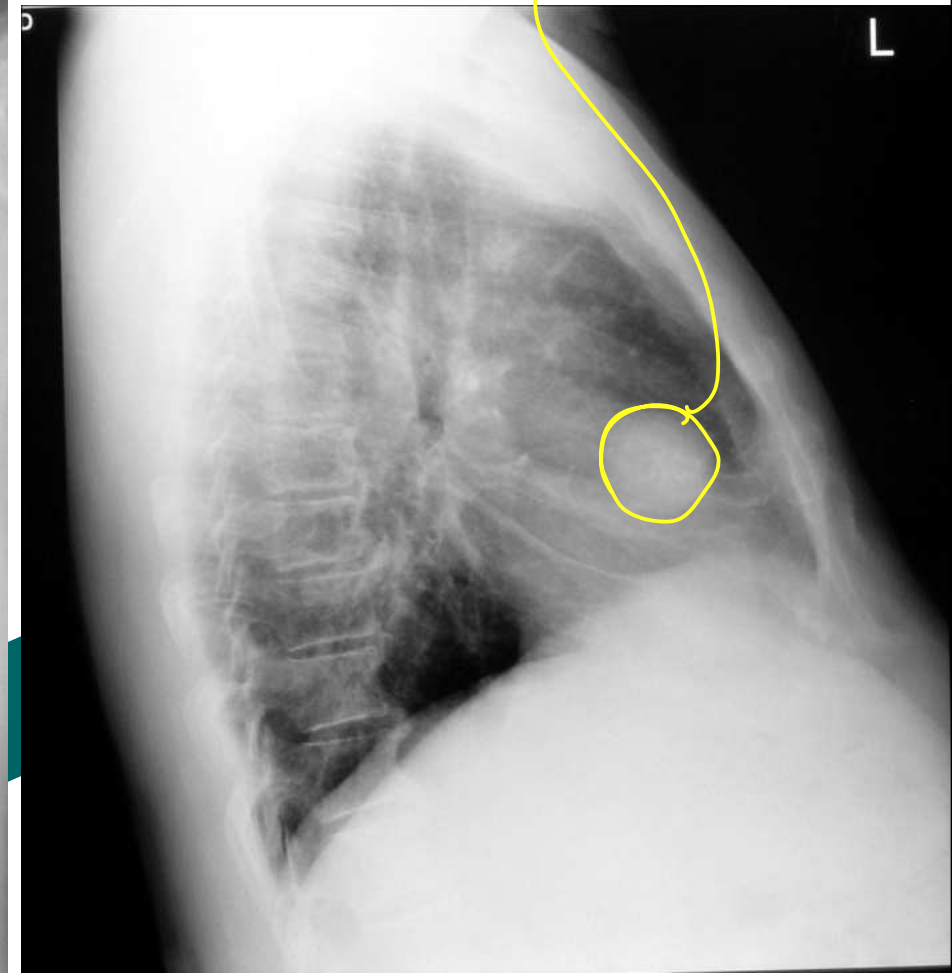
- Bronchial carcinoma.
- Metastasis.
- Hamartoma.
- Bronchial adenoma.
- Granuloma.
- Abscess.
- Hydatid cyst.
- Bronchogenic cyst
- Arterio-venous malformation.
- Rheumatoid nodule.





✓ ( Benign )

Well defined  
لتقدر ترسيم حدودها





# THE MEDIASTINUM

Has  
Differential  
Diagnoses  
!! عوارض

The mediastinum is situated between the lungs and extends from the thoracic inlet superiorly to the diaphragm inferiorly.

The mediastinum is divided into three parts:

## 1- Anterior mediastinum

Is the space in front of the anterior pericardium and trachea.

## 2- Middle mediastinum

Lies within the pericardial cavity.

## 3- Posterior mediastinum

Lies behind the posterior pericardium.

# ANTERIOR MEDIASTINAL MASSES

Terrible

- Lymphoma.
- Thyroid (Retrosternal goiter).
- Teratoma.
- Thymic tumor.
- Pericardial cyst.
- Diaphragmatic hernia (morgagni hernia).

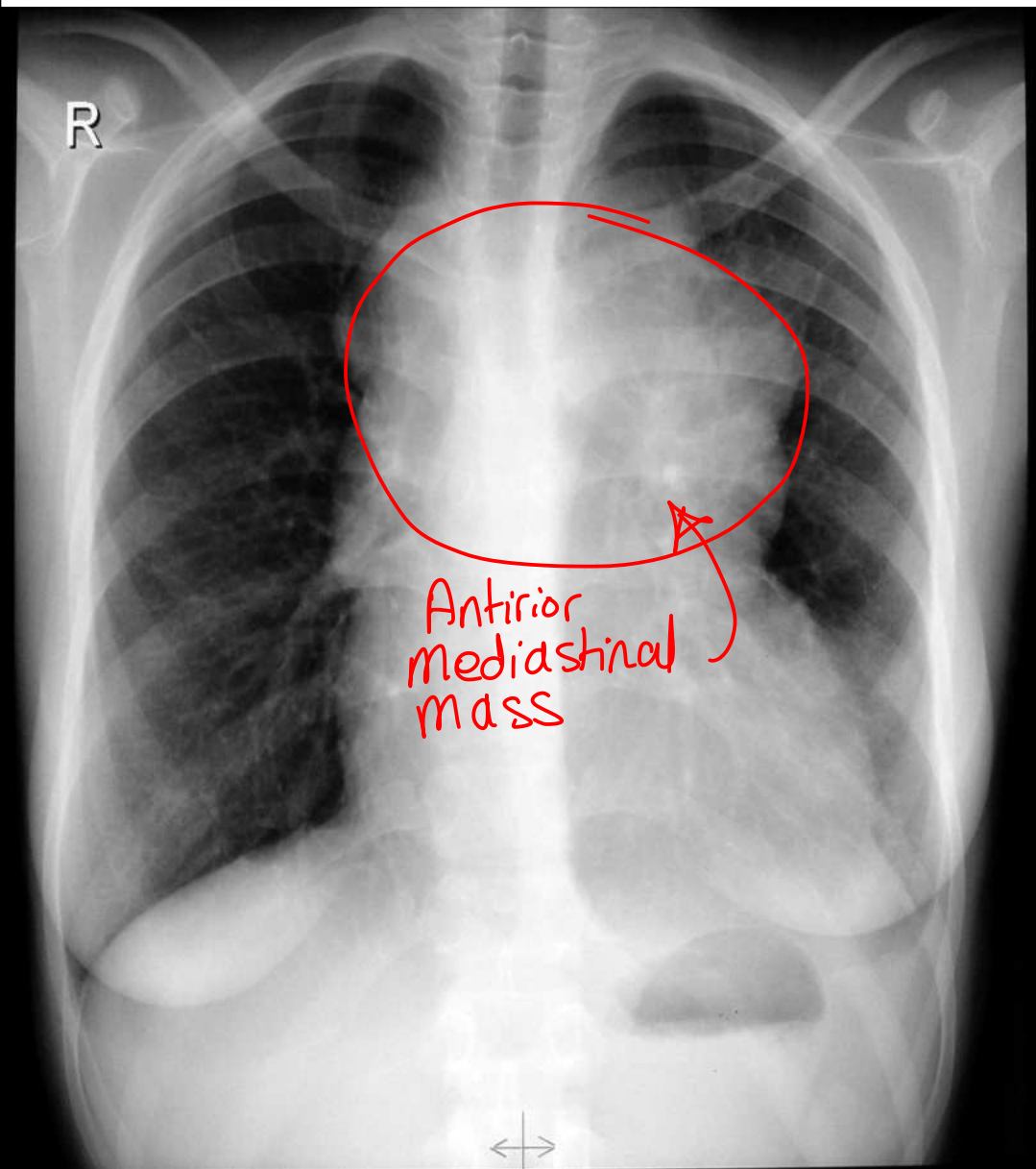
4 T



# MIDDLE MEDIASTINAL MASSES

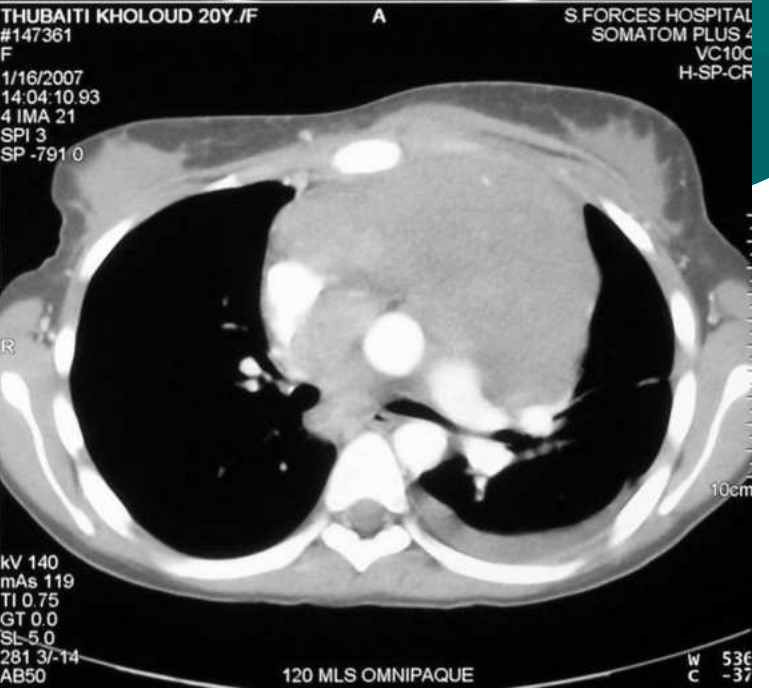
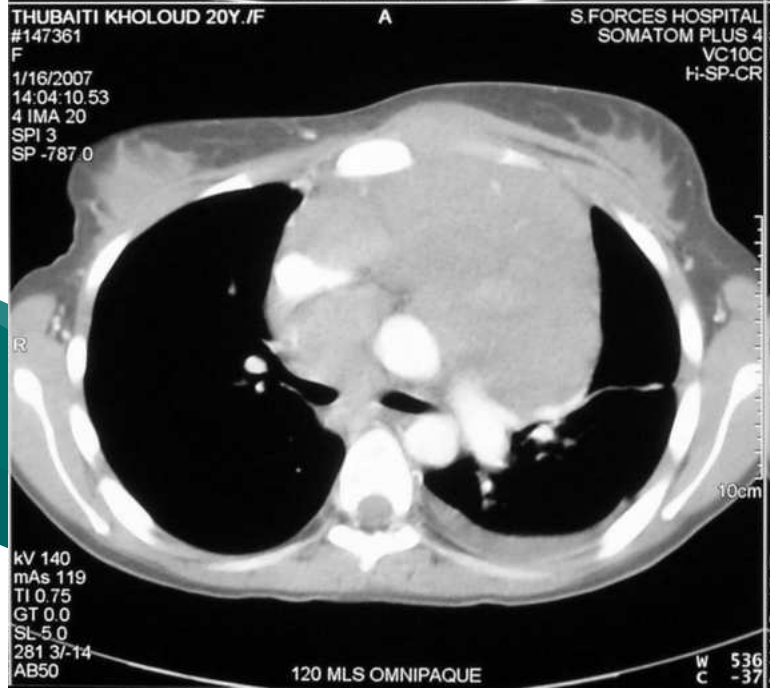
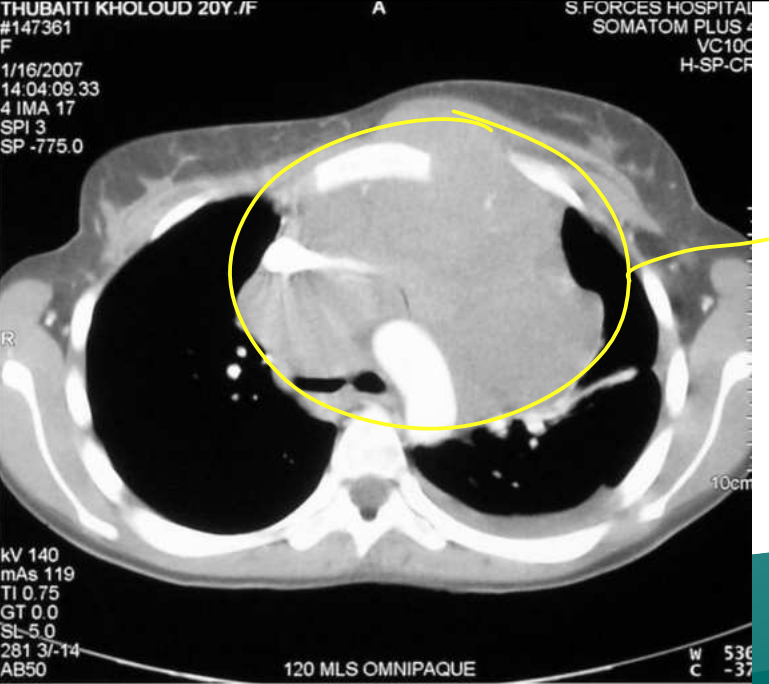
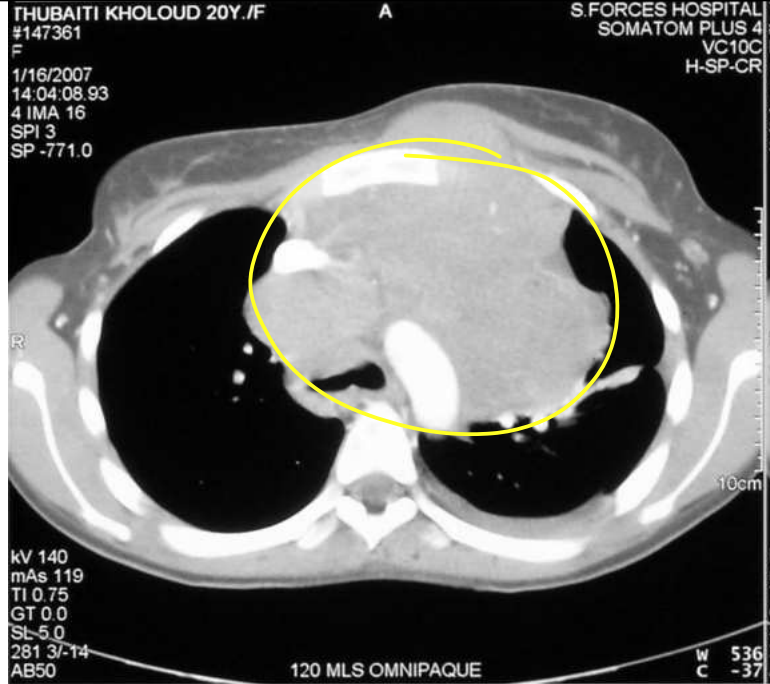
- Lymph node enlargement:
  - lymphoma
  - primary tuberculosis
  - sarcoidosis
- Bronchogenic cyst.
- Aneurysm of aortic arch.





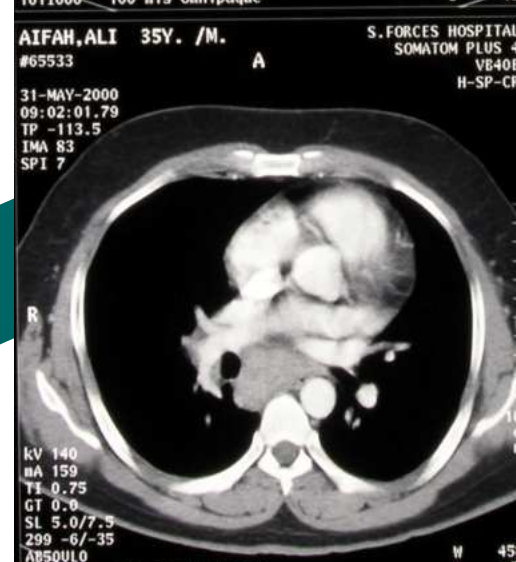
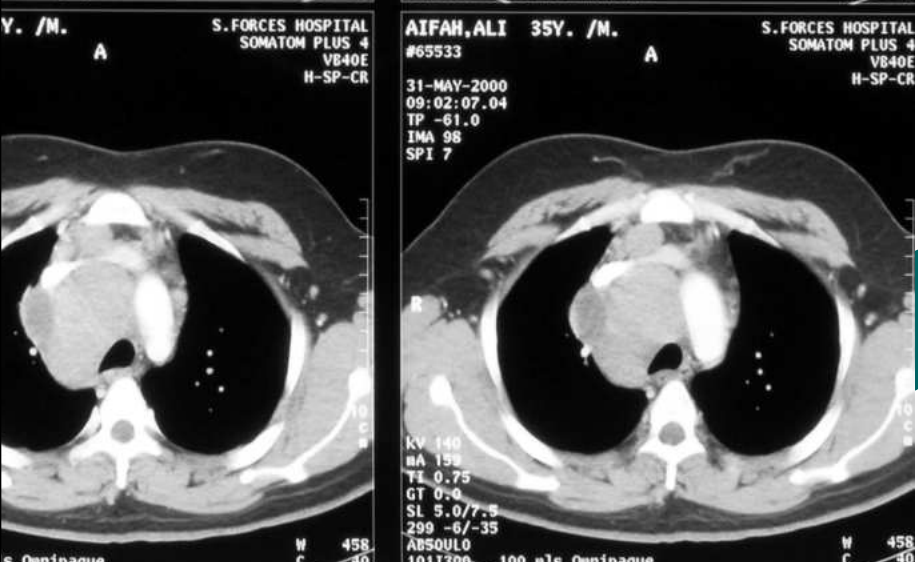
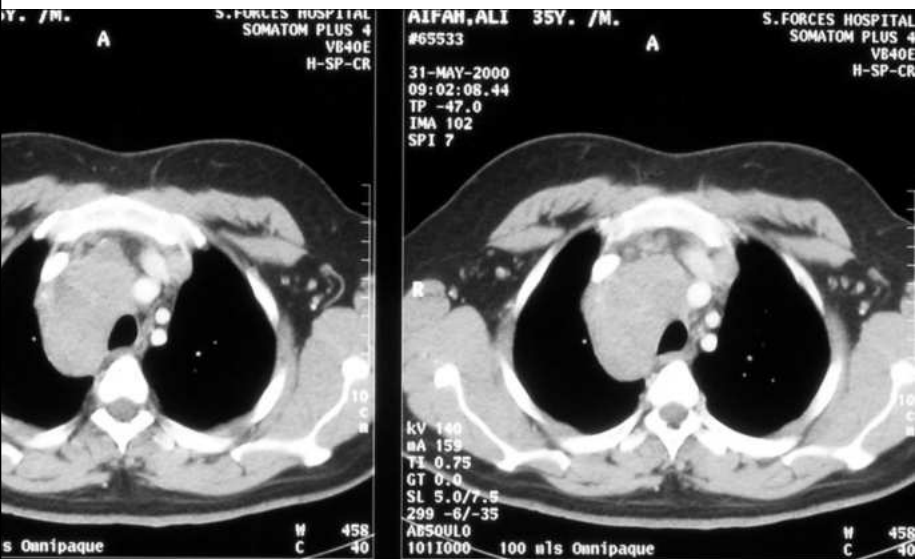
CT scan

التهاب رئوي  
وغيره  
لازم  
Biopsy





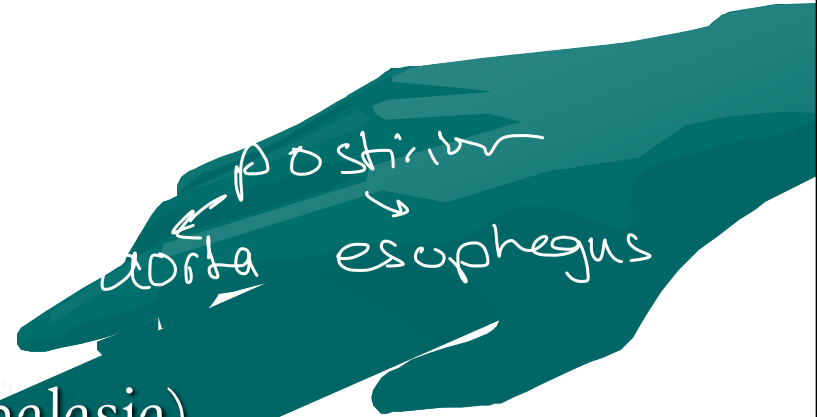


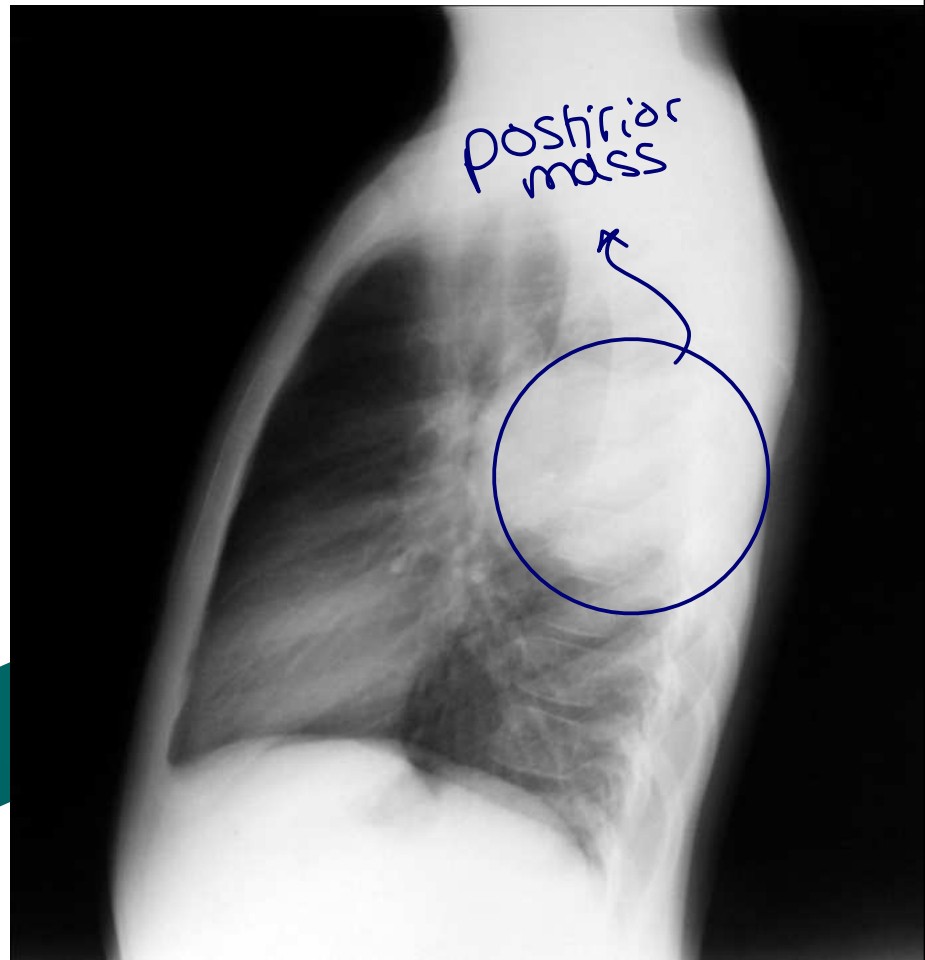
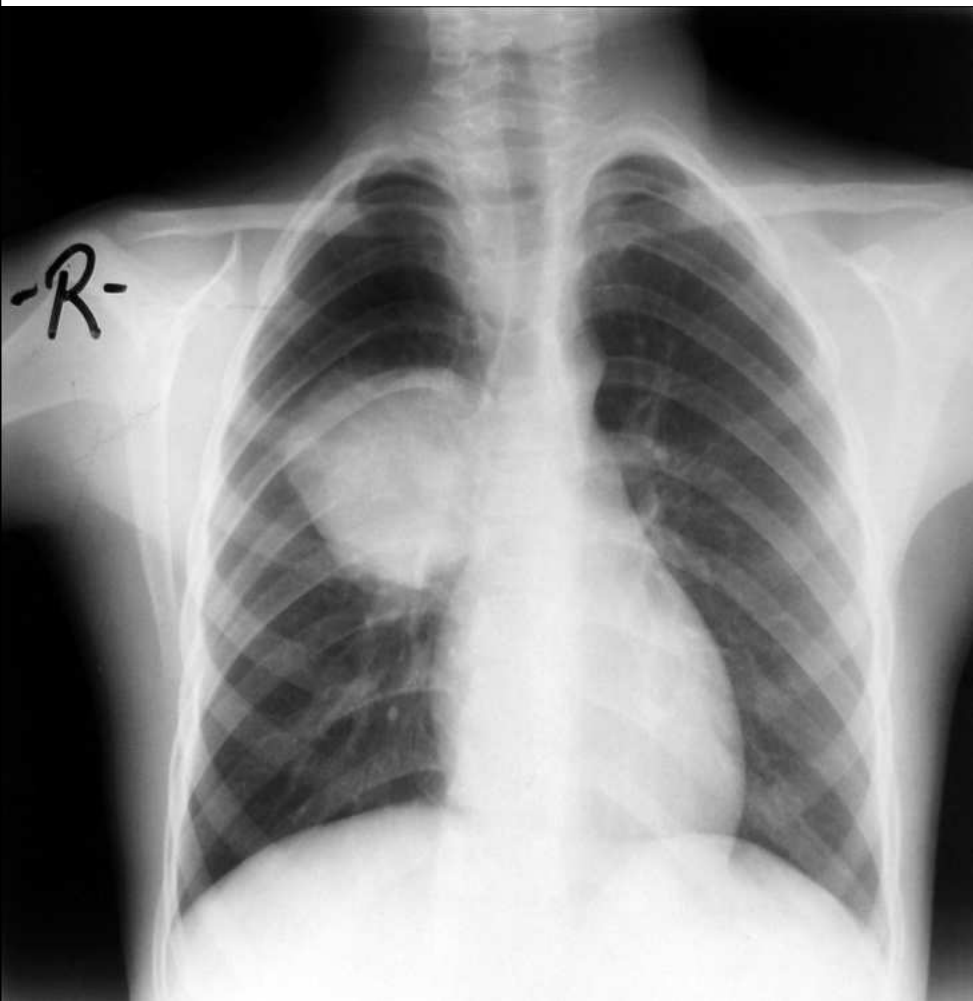


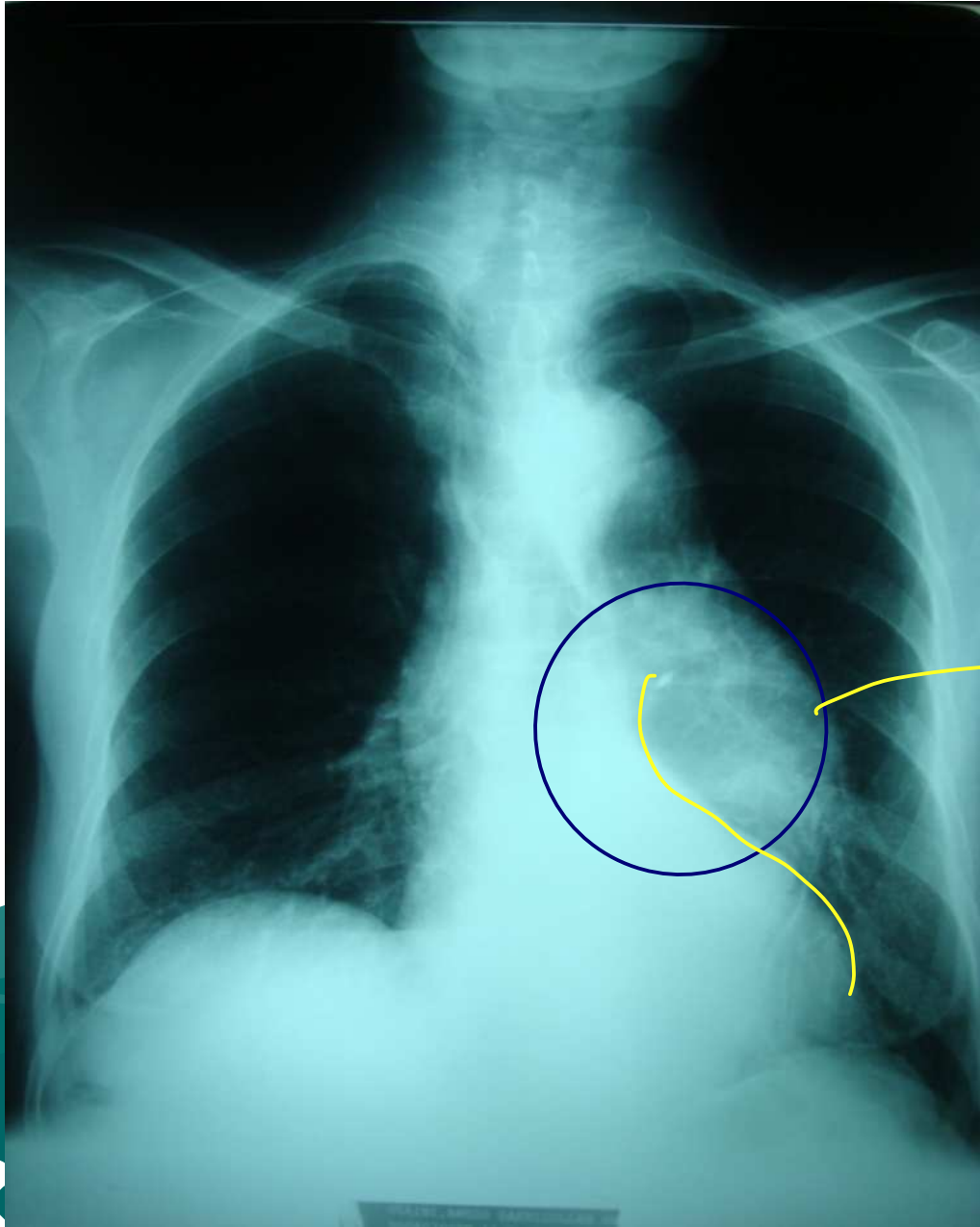
# POSTERIOR MEDIASTINAL MASSES

أولاً ما سنرى posterior بين الأorta و esophagus

- Neurogenic tumors
  - Neurofibroma
  - Ganglioneuroma
- Aneurysm of descending aorta.
- Hiatus hernia.
- Dilated esophagus (especially achalasia).
- Paravertebral mass or abscess.







بجائے قدرتا نرسیم  
حدود ال Heart  
معنا فال Mass  
Posterior

CT  
aortic  
Aneurysm

SOMATOM DR H SFH RIYADH  
OTAIBI AWEDH DAKHILULLAH 97Y.&403008 HC3  
17-AUG-97 1 27  
08:33:04 H/SP  
DA0:039  
SCAN 61  
CAL.REQ.



LEFT  
5 CM

TI 4  
KV 125  
AS .21  
SL 8  
GT 0  
TP 105  
W 400  
C 40  
100MLS/OMNIPAQUE/BOLUS  
INFUSION GASTROGRAFIN

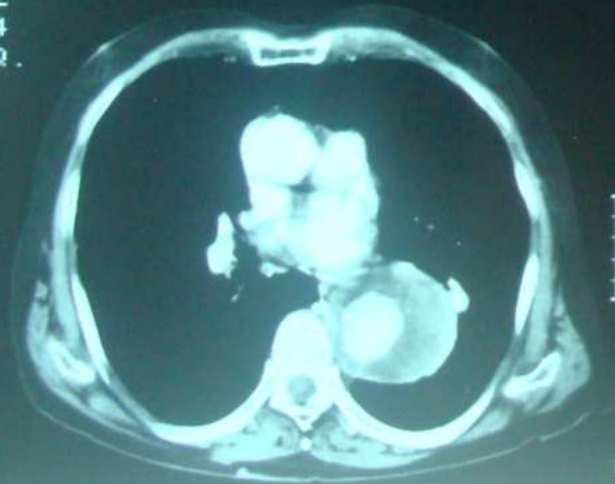
SOMATOM DR H SFH RIYADH  
OTAIBI AWEDH DAKHILULLAH 97Y.&403008 HC3  
17-AUG-97 1 27  
08:33:12 H/SP  
DA0:040  
SCAN 62  
CAL.REQ.



LEFT  
5 CM

TI 4  
KV 125  
AS .21  
SL 8  
GT 0  
TP 113  
W 400  
C 40  
100MLS/OMNIPAQUE/BOLUS  
INFUSION GASTROGRAFIN

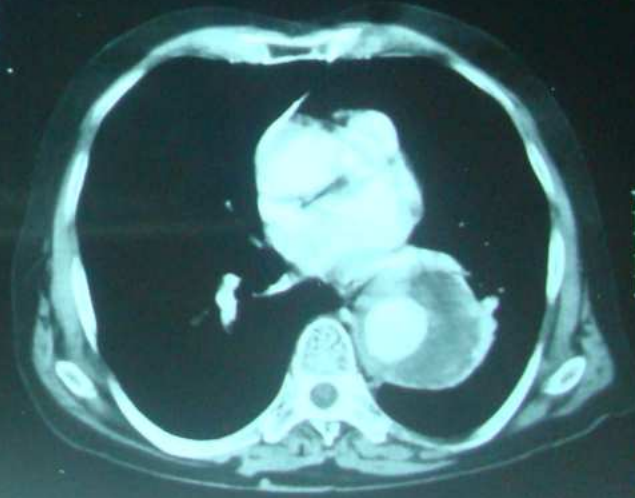
SOMATOM DR H SFH RIYADH  
OTAIBI AWEDH DAKHILULLAH 97Y.&403008 HC3  
17-AUG-97 1 27  
08:33:29 H/SP  
DA0:042  
SCAN 64  
CAL.REQ.



LEFT  
5 CM

TI 4  
KV 125  
AS .21  
SL 8  
GT 0  
TP 129  
W 400  
C 40  
100MLS/OMNIPAQUE/BOLUS  
INFUSION GASTROGRAFIN

SOMATOM DR H SFH RIYADH  
OTAIBI AWEDH DAKHILULLAH 97Y.&403008 HC3  
17-AUG-97 1 27  
08:33:37 H/SP  
DA0:043  
SCAN 65  
CAL.REQ.



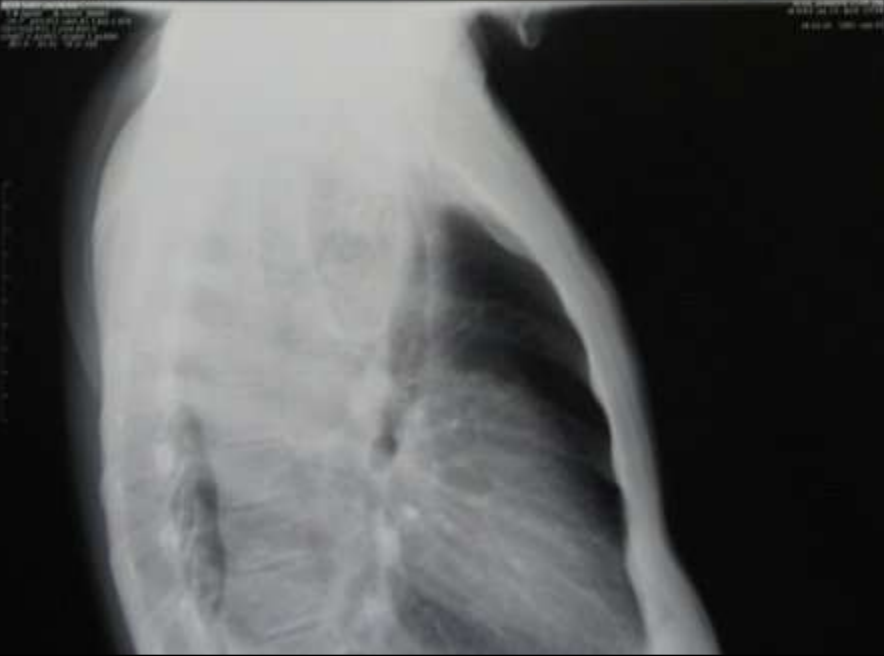
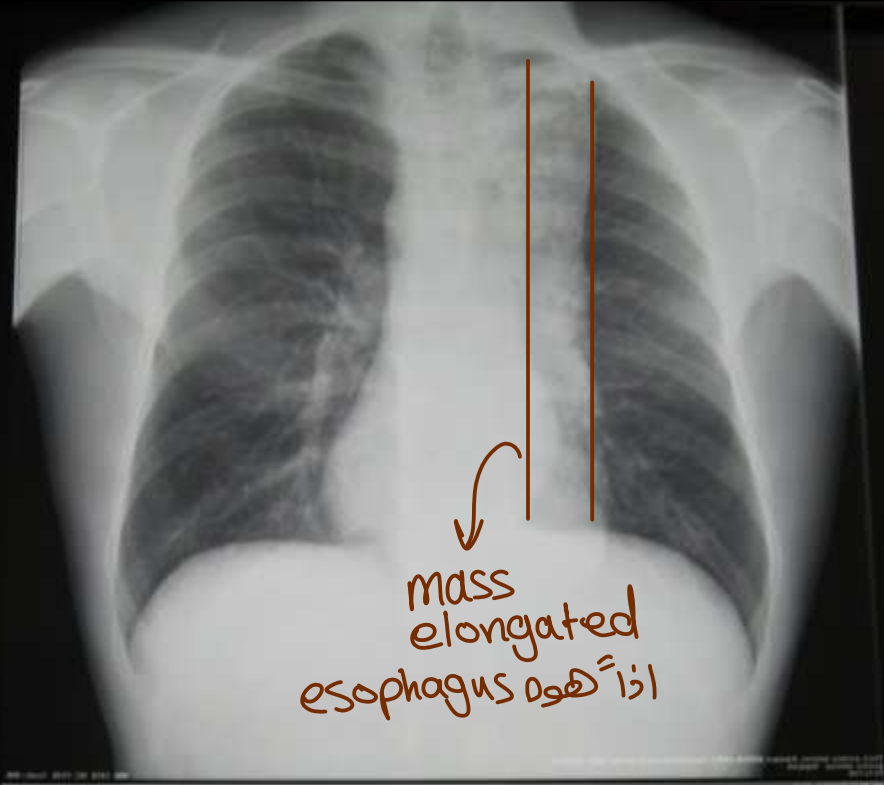
LEFT  
5 CM

TI 4  
KV 125  
AS .21  
SL 8  
GT 0  
TP 129  
W 400  
C 40  
100MLS/OMNIPAQUE/BOLUS  
INFUSION GASTROGRAFIN





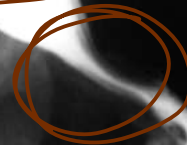
hiatus  
hernia





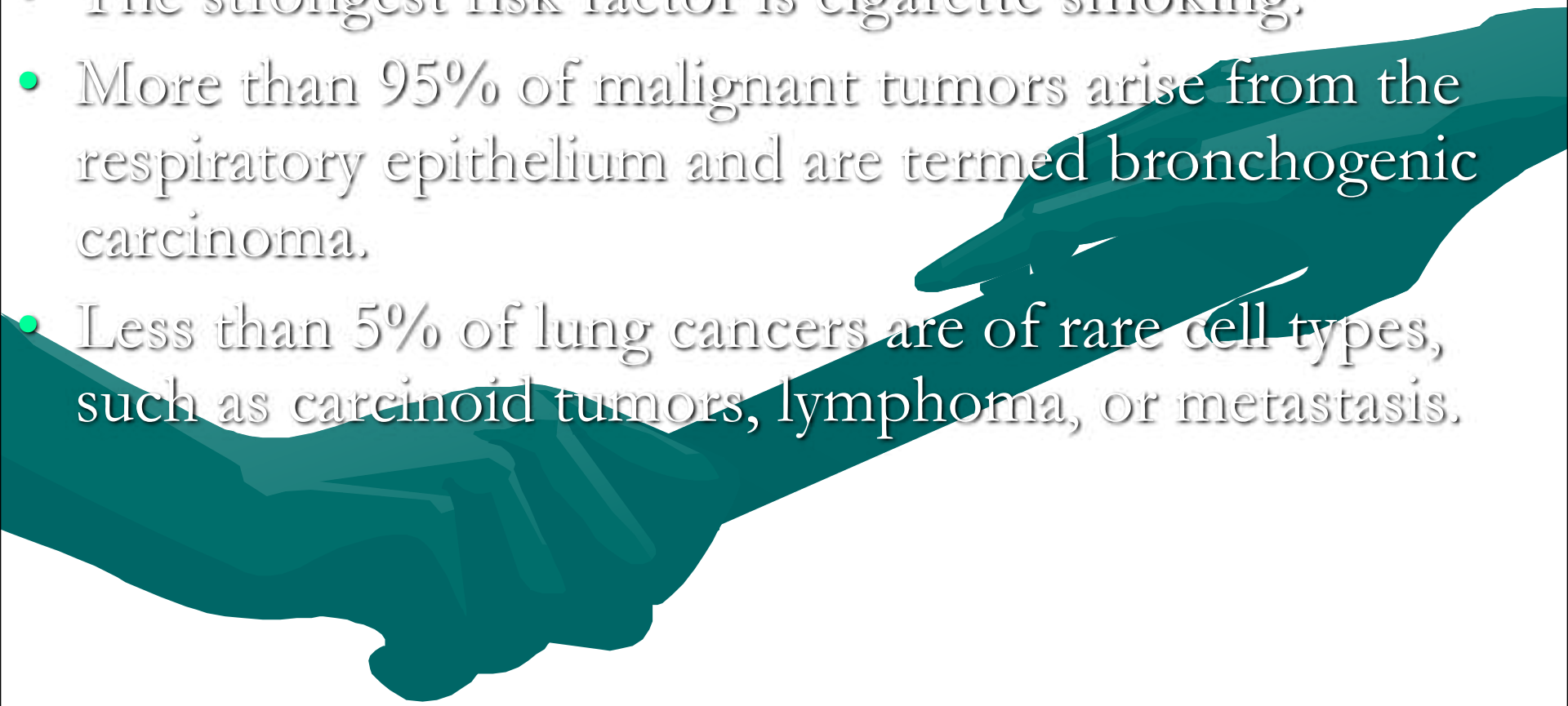


→ failure of  
the lower  
esophageal  
sphincter  
to relax





# TUMORS OF THE LUNG

- Lung cancer is the commonest fatal malignancy.
  - The strongest risk factor is cigarette smoking.
  - More than 95% of malignant tumors arise from the respiratory epithelium and are termed bronchogenic carcinoma.
  - Less than 5% of lung cancers are of rare cell types, such as carcinoid tumors, lymphoma, or metastasis.
- 
- A stylized teal graphic of two hands shaking, positioned diagonally across the lower half of the slide. The hands are rendered in a solid teal color with a slight gradient, giving them a three-dimensional appearance. The background of the slide is white with a faint, light blue grid pattern.

# Types of lung cancers

## 1- Adenocarcinoma

- ❖ Is the most common type of lung cancer, making up 30-40% of all cases.
- ❖ Usually arise peripherally as solitary pulmonary nodule.

The alveolar cell carcinoma is a subtype of adenocarcinoma and arise within the alveoli producing areas of consolidation and the appearance resemble bronchopneumonia.

# Types of lung cancers / 2

## 2- Squamous cell carcinoma

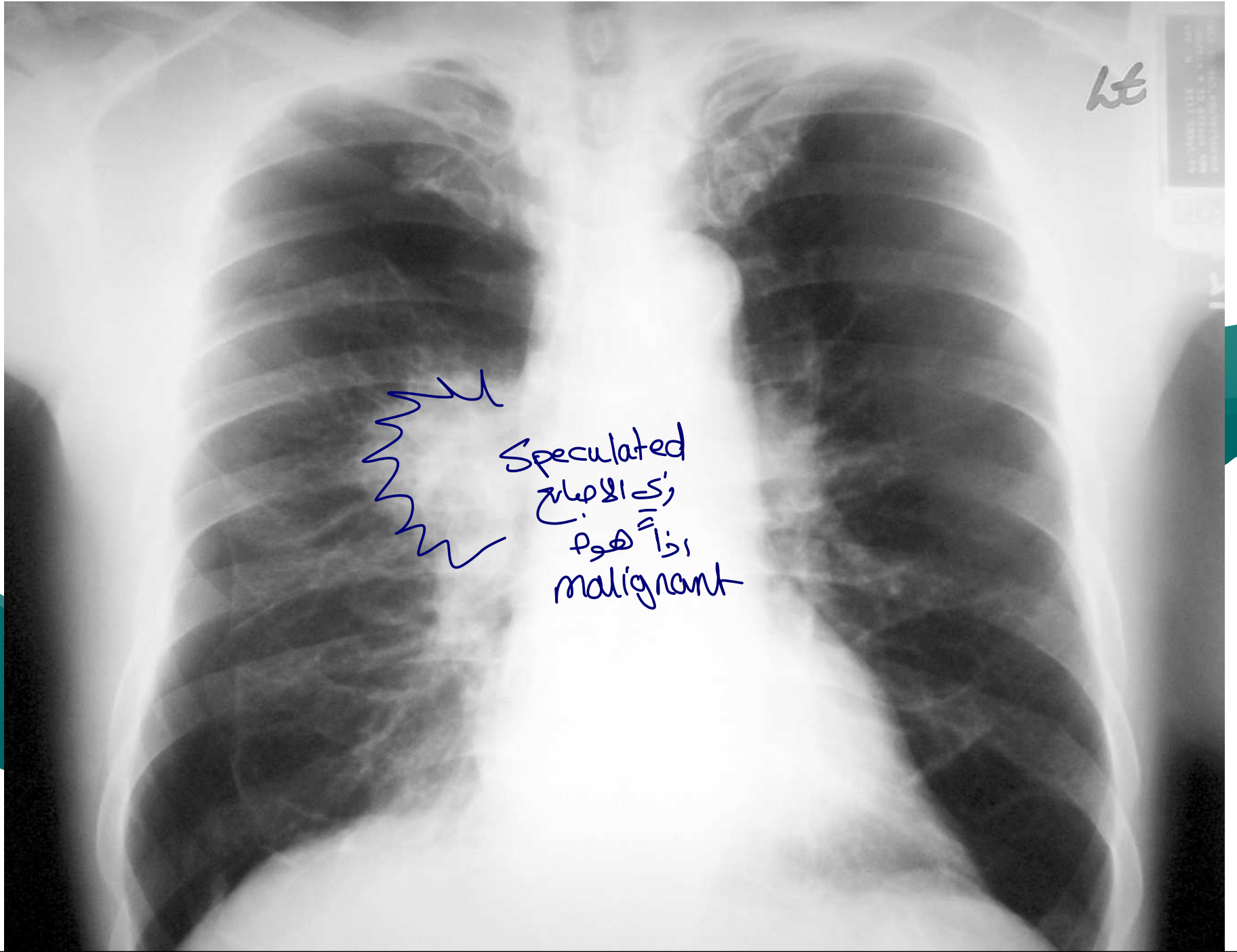
- They typically occur in central bronchi.
- Grow slowly and cavitate more often than other cell types.

## 3- Small (oat) cell carcinoma.

- Are usually central in location.
- Have the fastest rate of growth.
- Typically associated with mediastinal adenopathy.

## 4- Large cell carcinoma.

- Usually arise at the periphery of the lung.
- The growth is relatively rapid.



LT



Speculated  
الحدود  
إذا هو  
malignant

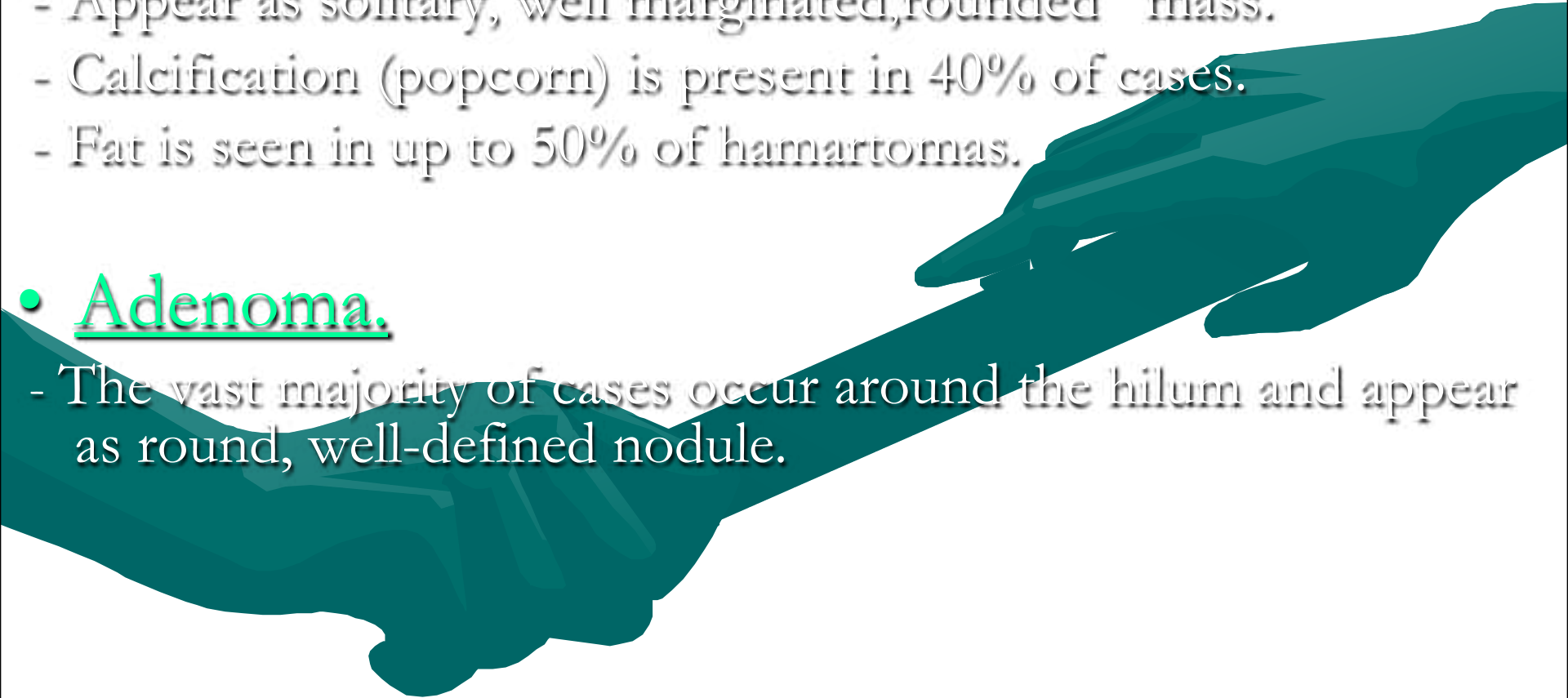
# BENIGN TUMORS OF THE LUNG

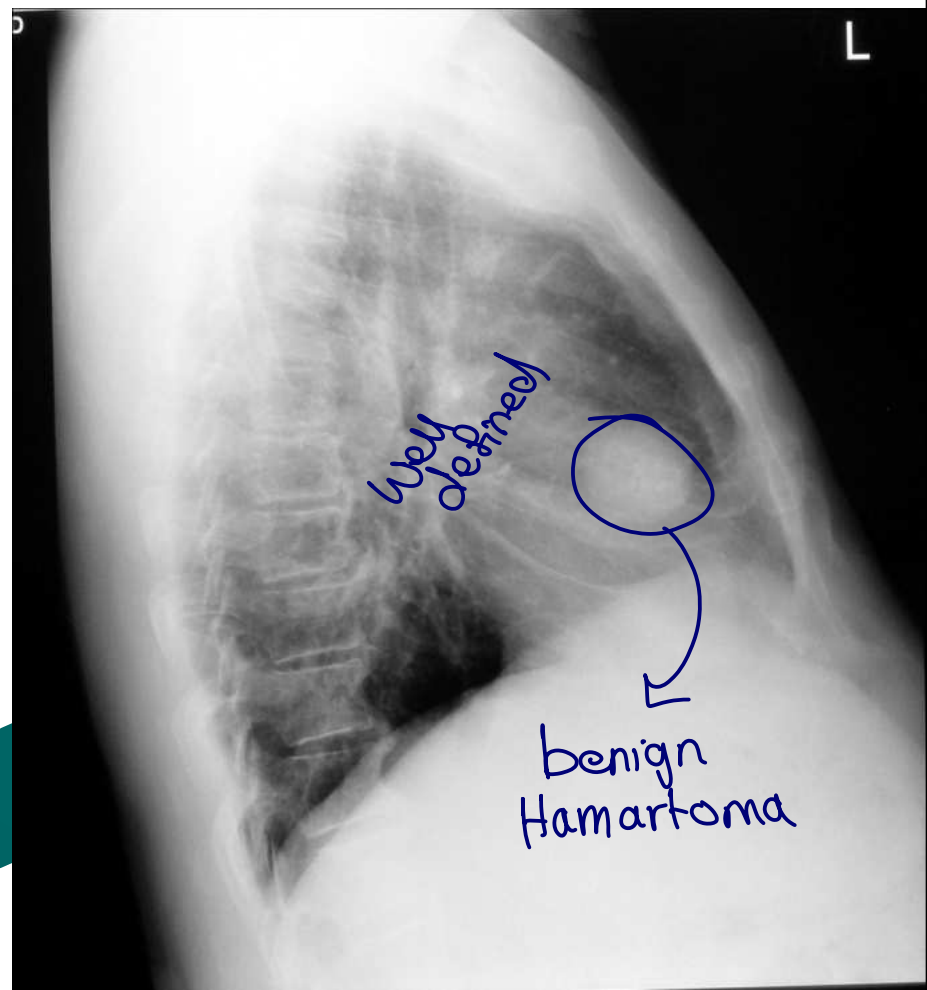
- Hamartoma.

- Is the most common benign tumor of the lung.
- Appear as solitary, well marginated, rounded mass.
- Calcification (popcorn) is present in 40% of cases.
- Fat is seen in up to 50% of hamartomas.

- Adenoma.

- The vast majority of cases occur around the hilum and appear as round, well-defined nodule.





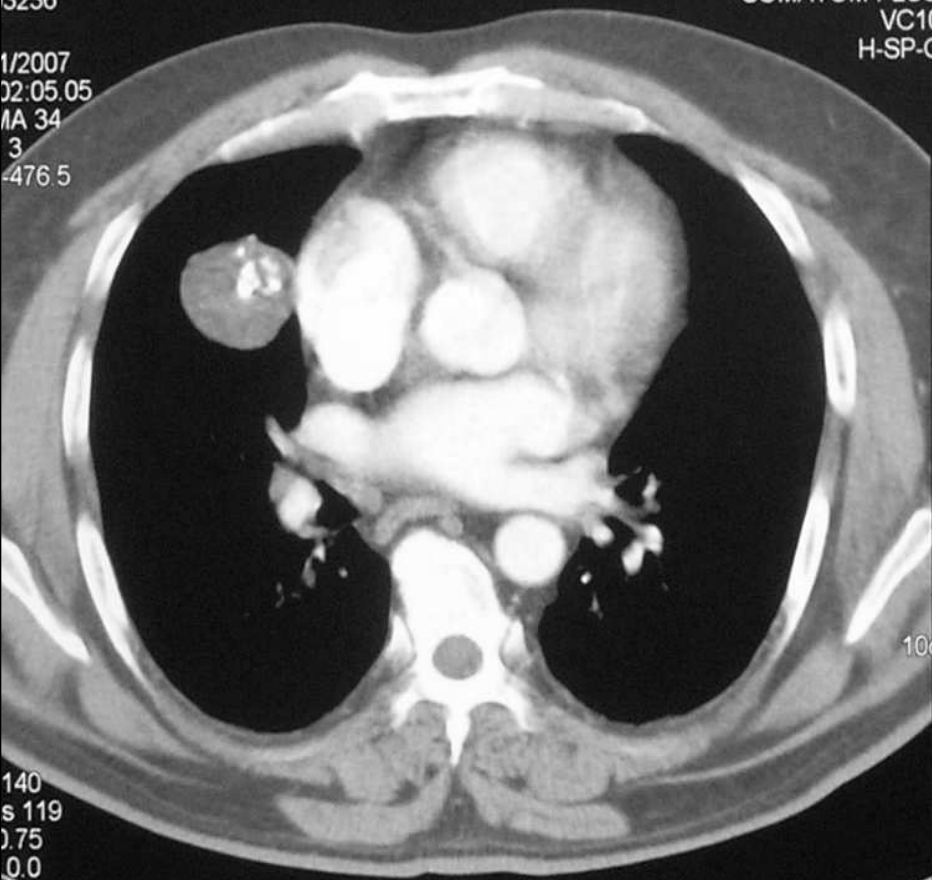


MARI, ABDULRAHMAN 67Y/M  
3236

A

S. FORCES HOSPITAL  
SOMATOM PLUS 4  
VC10C  
H-SP-CR

1/2007  
02:05.05  
MA 34  
3  
476.5



10cm

140  
s 119  
.75  
0.0  
5.0  
)-8/-35  
50

100 MLS OMNIPAQUE

W 458  
C 20

ASMARI, ABDULRAHMAN 67Y/M

A

S. FORCES HOSPITAL  
SOMATOM PLUS 4  
VC10C  
H-SP-CR

#593236  
M  
3/31/2007  
10:02:05.45  
3 IMA 35  
SPI 3  
SP -480.5



R

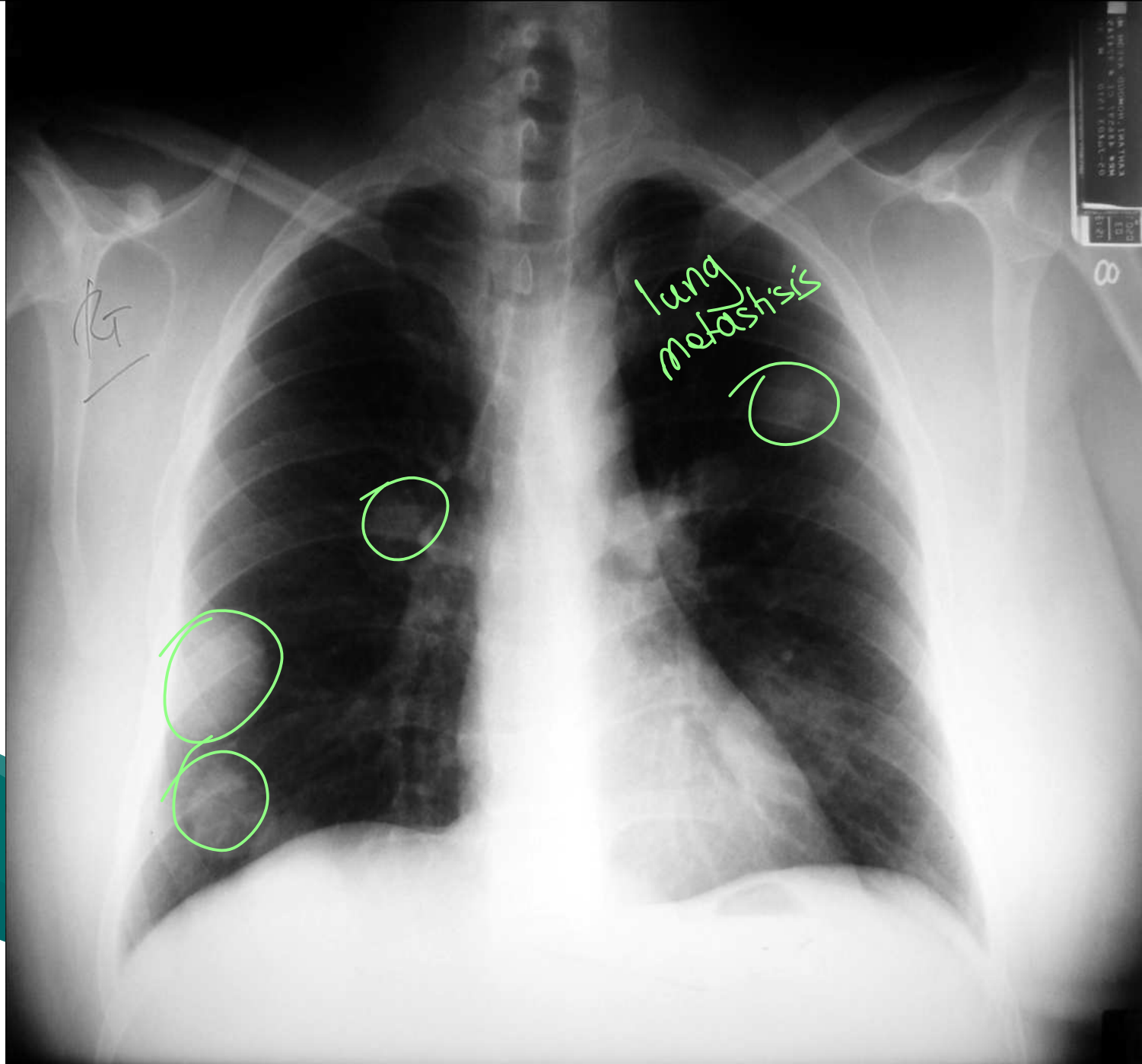
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mAs 119  
TI 0.75  
GT 0.0  
SL 5.0  
320 -8/-35  
AB50

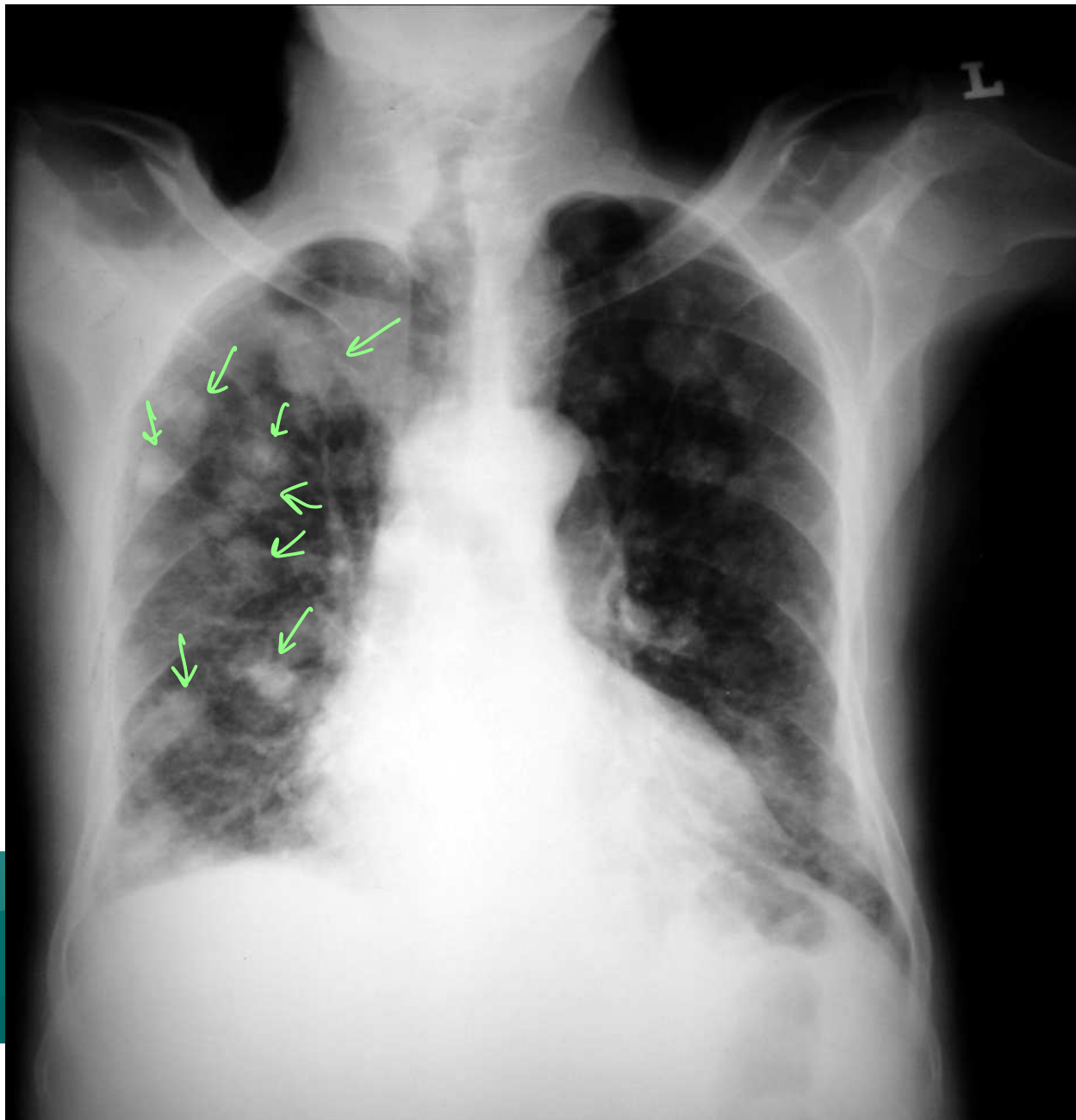
100 MLS OMNIPAQUE

W  
C

# Lung metastasis

- The commonest primary tumors producing lung metastasis are breast, renal tract, thyroid, bone, and testicular tumors.
- Metastasis to the lung are usually bilateral and tend to be peripheral and more numerous at the lung bases.
- Lung metastasis are spherical in shape with a well-defined margin.





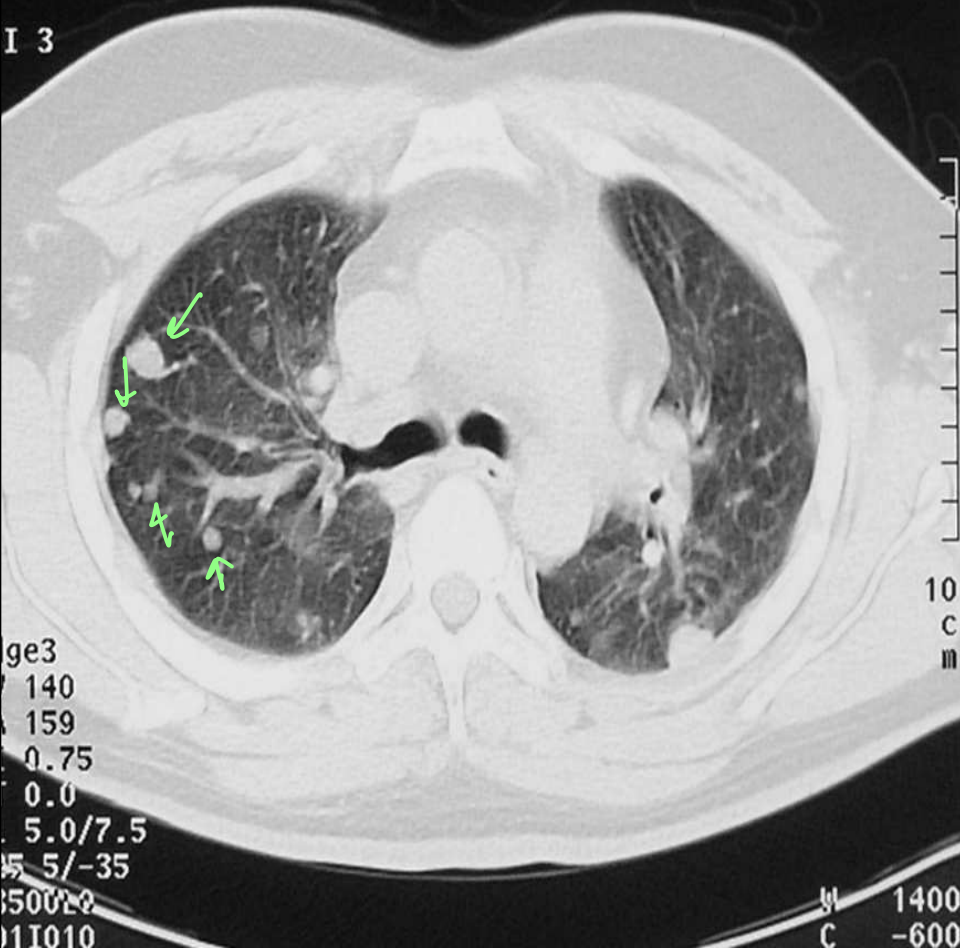
SAQER, ABDULLAH 40Y/M  
#86830

S. FORCES HOSPITAL  
SOMATOM PLUS 4  
VC10C  
H-SP-CR

-MAR-2006  
11:40:52.19  
-268.5

A

I 3



SAQER, ABDULLAH 40Y/M  
#286830

S. FORCES HOSPIT  
SOMATOM PLUS  
VC1  
H-SP-

28-MAR-2006  
11:40:52.59  
TP -272.5

A

SPI 3



200



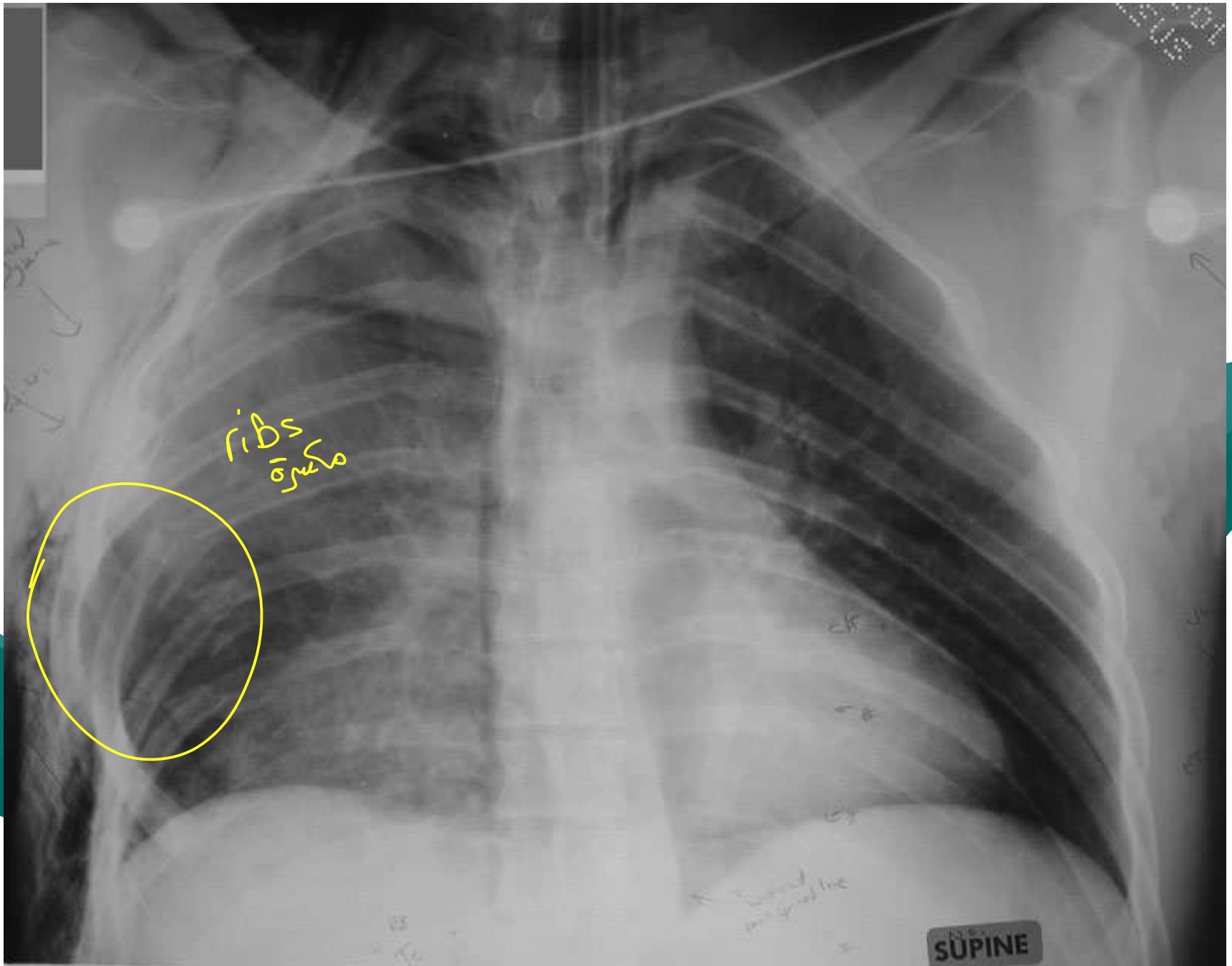
# Chest trauma

- ❑ Chest trauma can be as blunt or penetrating.
- ❑ Penetrating chest trauma can injure vital organs such as the heart and lungs.
- ❑ The common clinical problems associated with chest injury include pulmonary contusion, pneumothorax and hemothorax.
- ❑ Fractures of the lower ribs may be associated with diaphragmatic tears and spleen or liver injuries
- ❑ Fractures of the upper ribs can be associated with injuries to adjacent great vessels.

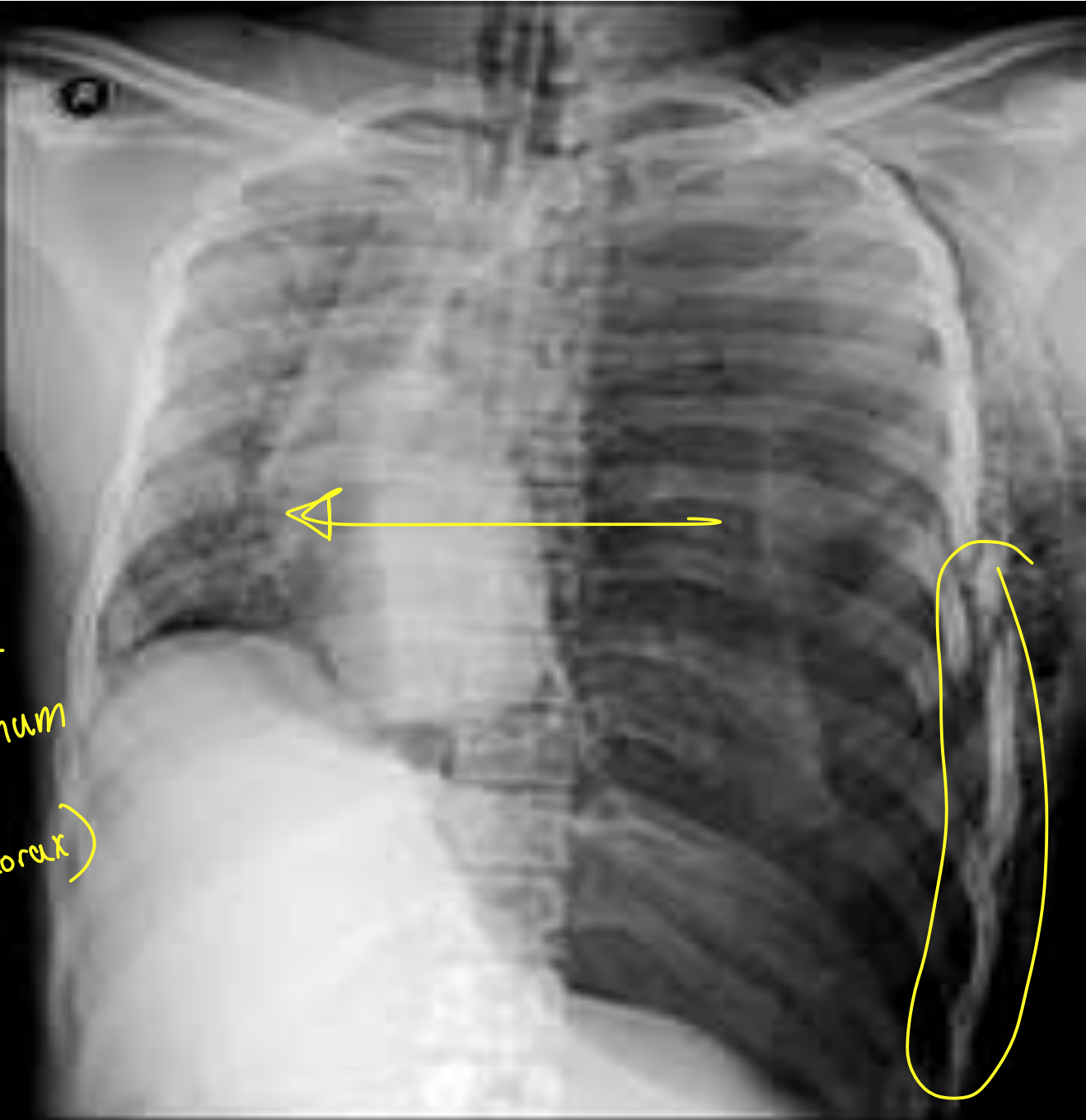
# Chest trauma / 2

What is the ABCDE approach to guide the radiographic search for thoracic injury ?

- Air : extra pulmonary ( pneumothorax, subcutaneous emphysema, pneumomediastinum).
- Bones – rib fracture, thoracic spine, scapula and sternum fractures.
- Contusions and lacerations in the lung.
- Diaphragm - rupture.
- Effusions – hemothorax.







Shift of  
the  
mediastinum  
(tention  
pneumothorax)

A scenic landscape featuring a large body of water in the foreground, a dense forest of evergreen trees in the middle ground, and snow-capped mountains in the background. The scene is framed by dark evergreen branches on the right and bottom edges. The text "Thank You" is overlaid in the center in a large, red, sans-serif font with a white outline.

Thank You