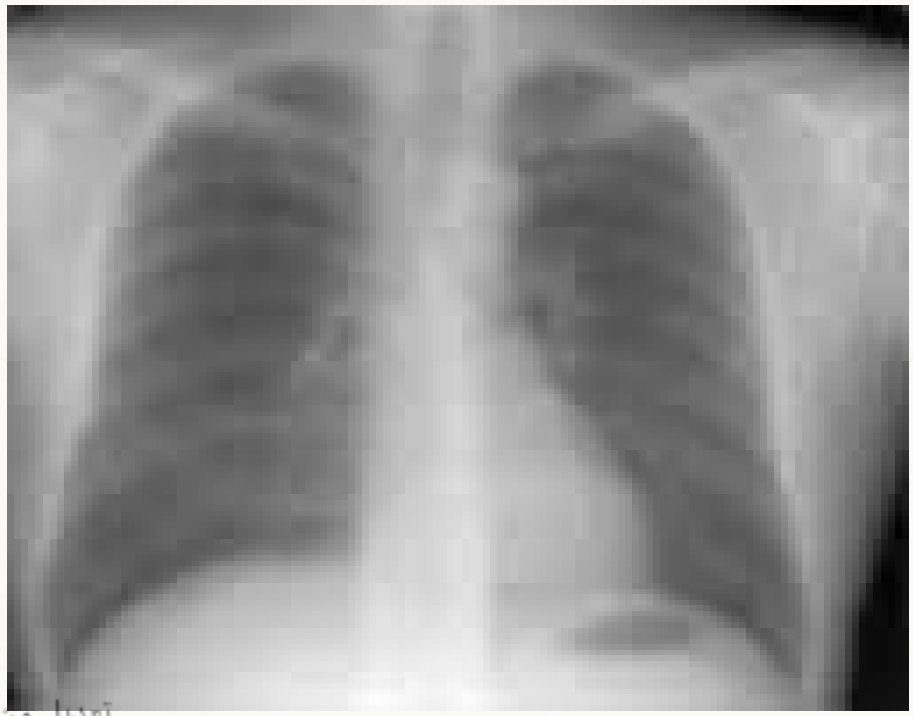
Chest Radiography

By

DR MAHA ALSADIK

Associate Professor of respiratory medicine



- Chest x-ray is the most commonly per ɓrmed diagnostic x-ray examination
- Imaging with x-rays involves exposing a par tof the body to a small dose of ionizing radiation to produce pictures of the inside of the body.

Common Uses of the procedure

To a chest x-ray is per formed to evaluate:

- Lungs,
- Heart
- Chest wall.

Chest x-ray is the first imaging test used to help diagnose symptoms such as:

- Persistent cough.
- Hemoptysis.
- Shortness of breath.
- Chest pain or injur y.

Different parts of the body absorb the x-rays in varying degrees:

- Bone absorbs much of the radiation ⇛ white
- Soft tissue, such as muscle and organs, allow more of the x-rays to pass through them ⇛ shades of gray
- Air not absorb any radiation ⇛ black

Lung tissue absorbs little radiation and will appear dark on the image

- DENSITIES

The 12-Step Program

1. Name
2. Date
3. Old f lms
4. What type of view(s)

} Pre-read

1. Penetratio n
2. Inspiration
3. Rotation
4. Angulation
5. Soft tissues / bony structures
6. Mediastinum
7. Diaphragms
8. Lung Fields

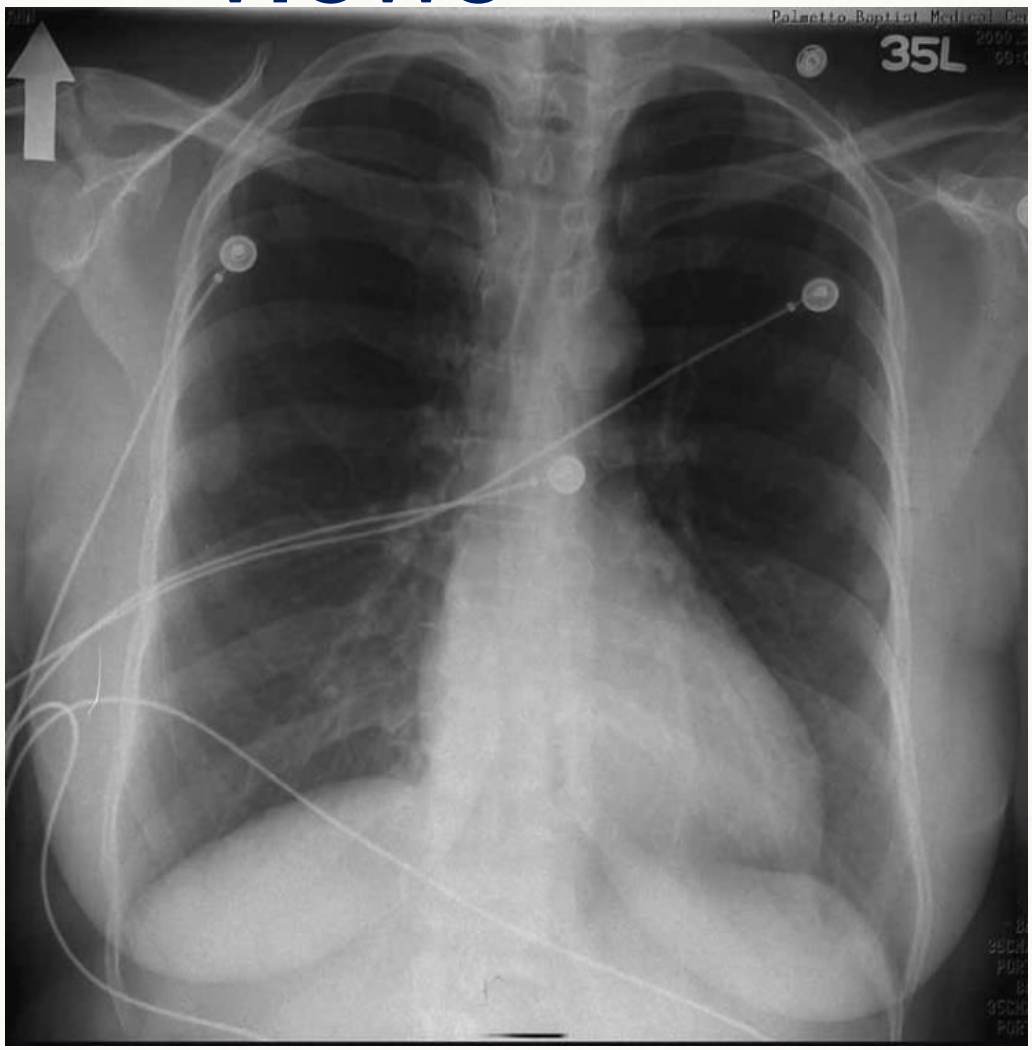
} Quality Control

} Findings

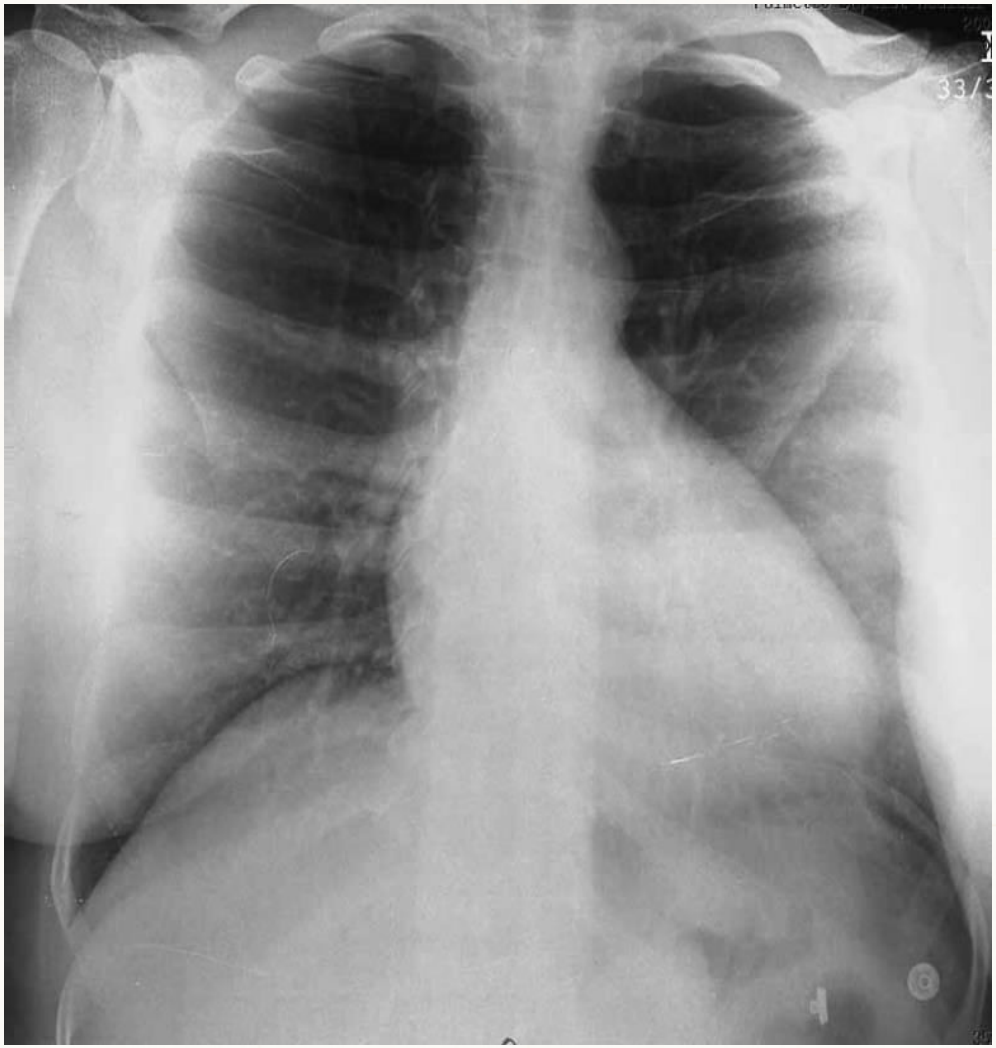
Pre-Reading

1. Check the name,
2. Check the date
3. Obtain old f lms if available
4. Which view(s) do you have?
    1. PA & lateral view.
    2. AP view.
    3. Lateral Decubitus,
    4. Oblique view.
    5. Lordotic view.
    6. Kyphotic view.

Types of views



PA



AP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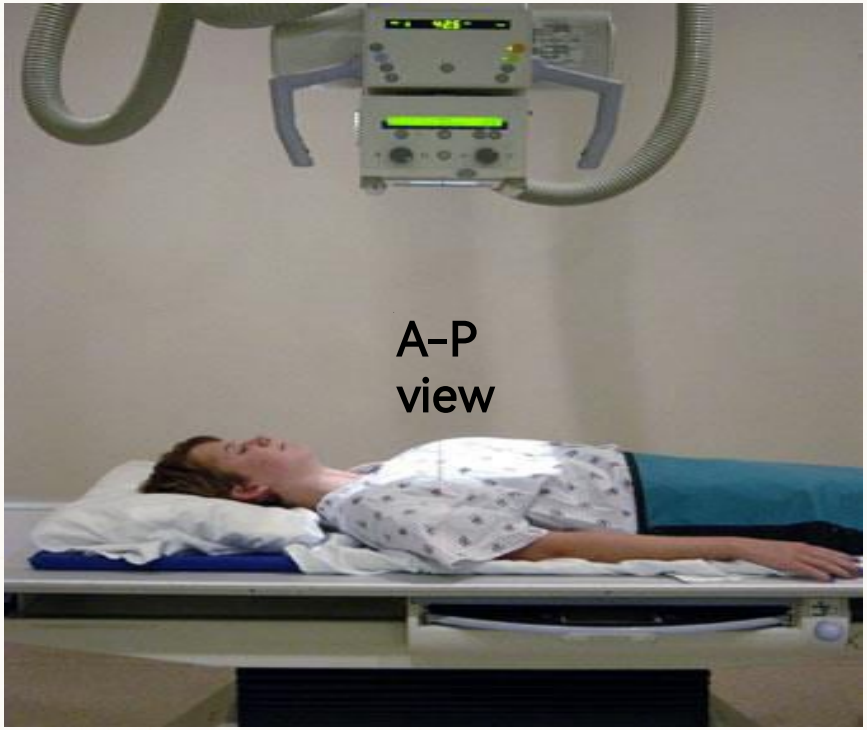
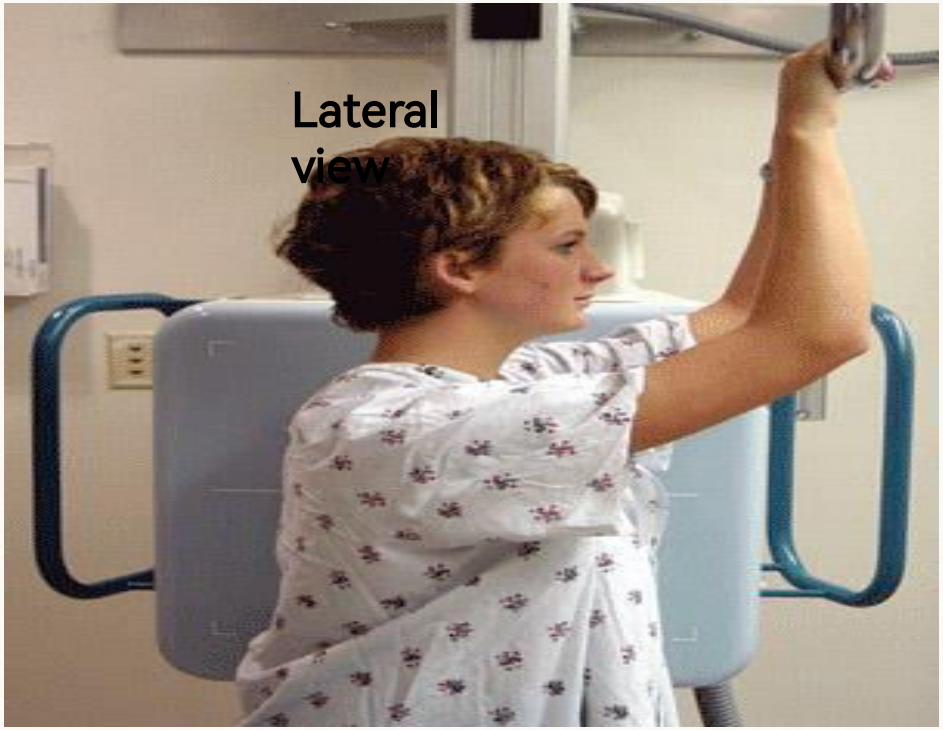
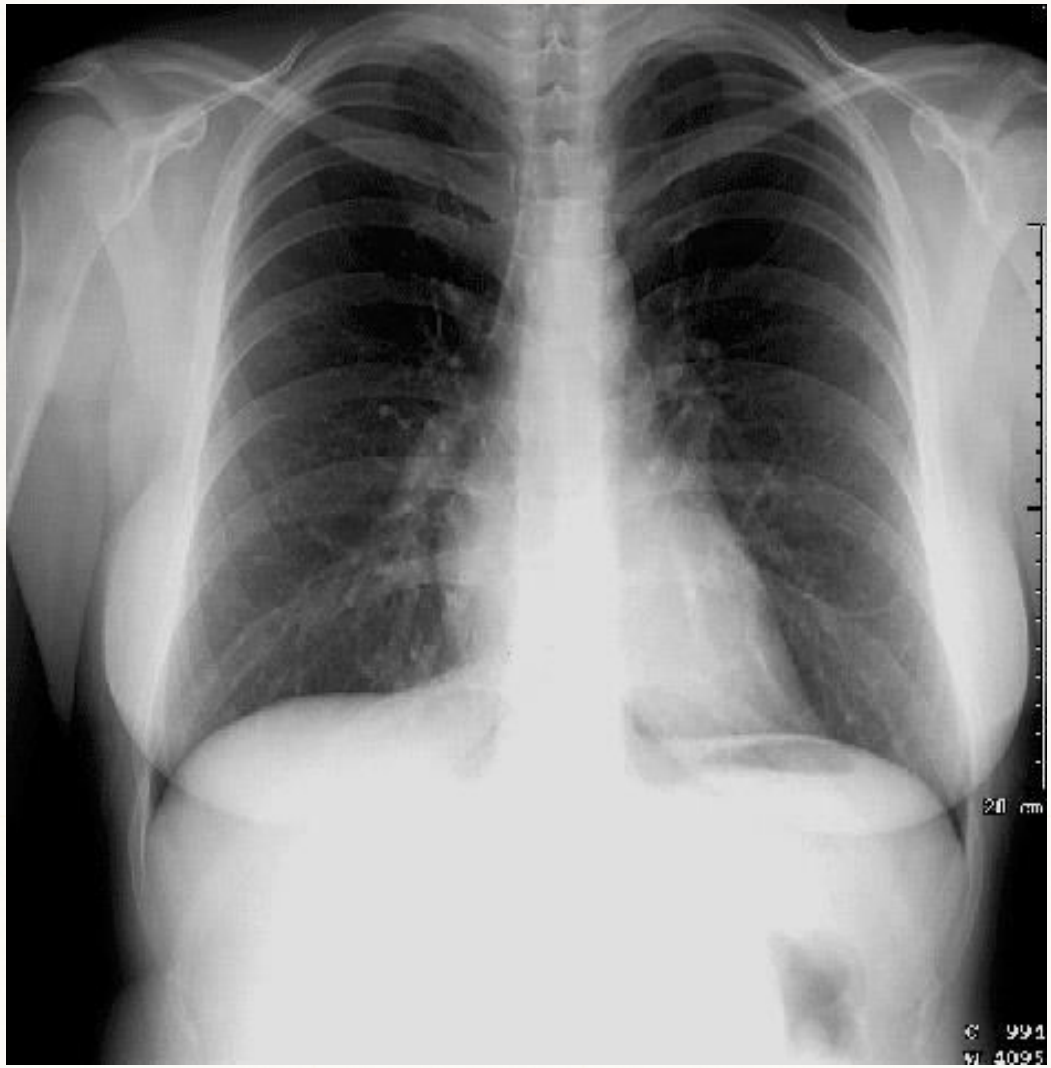




Quality Control

5. Penetration (dose of X-Ray)



Ideal chest x-ray f lm:

- Shouldn‘t see ribs through the hear t
- Barely see the spine through the hear t
- Shouldn‘t see pulmonar y vessels nearly to the edges of the lungs

sof
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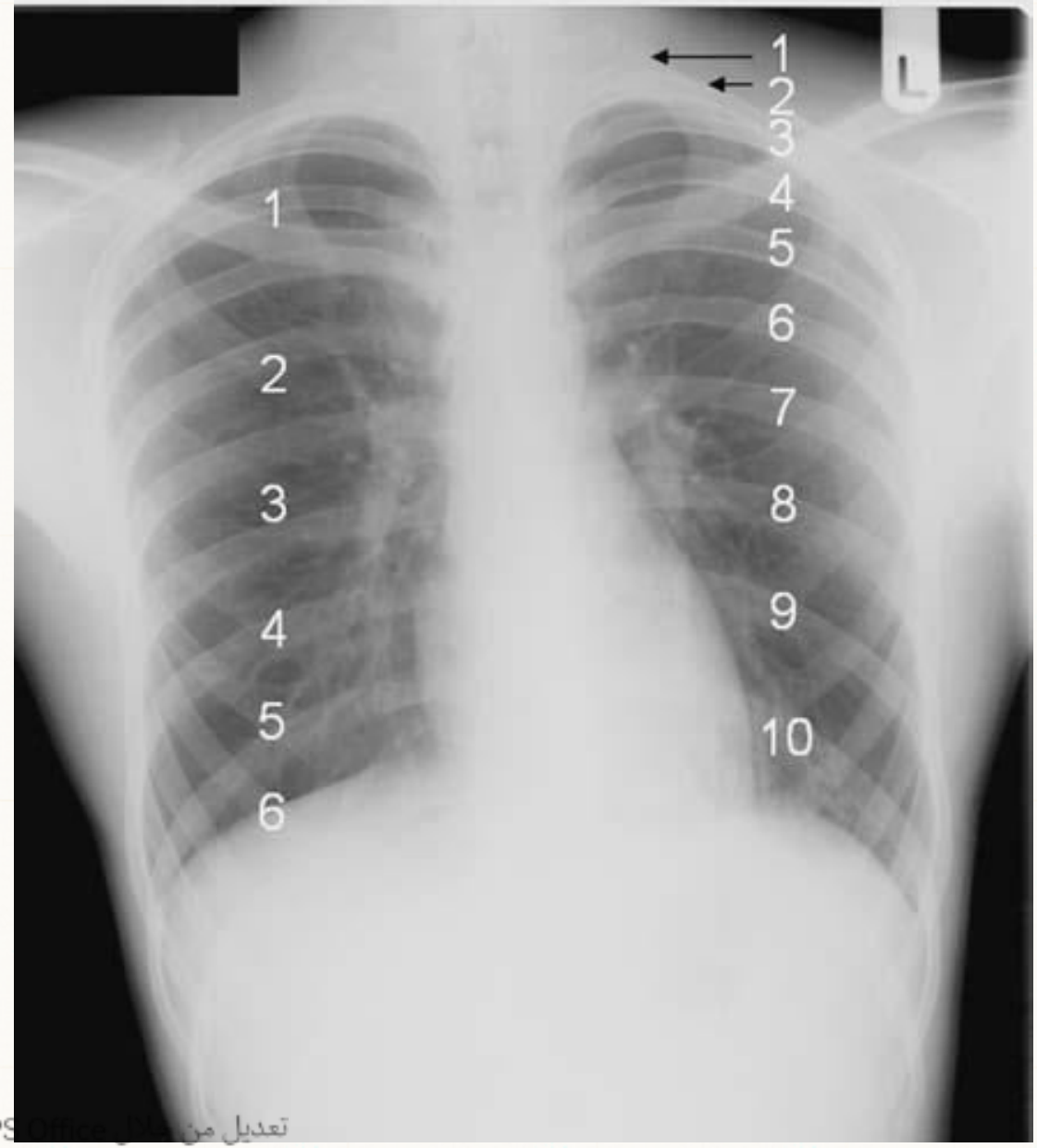
d

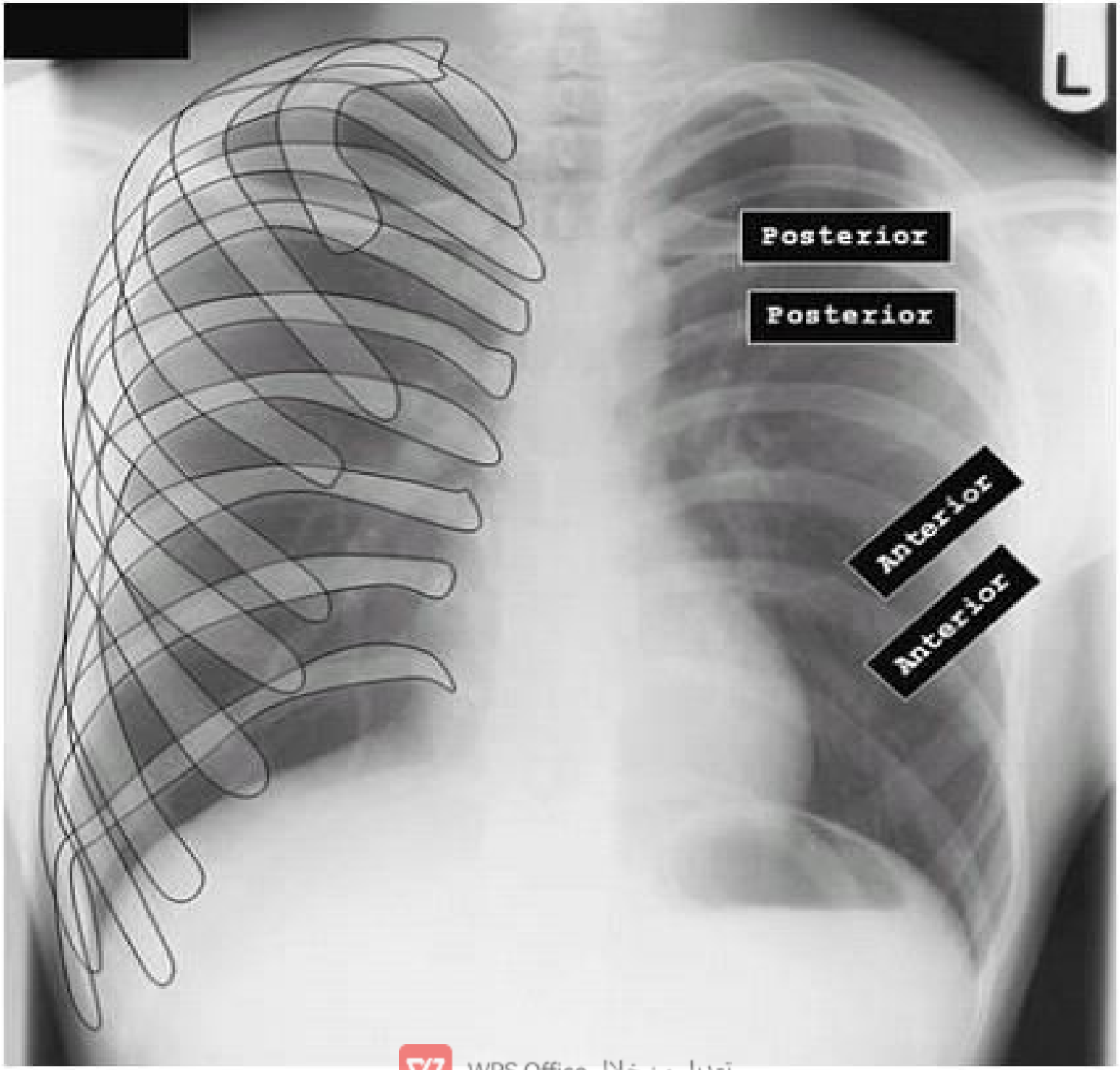
Quality Control

6. Inspiration

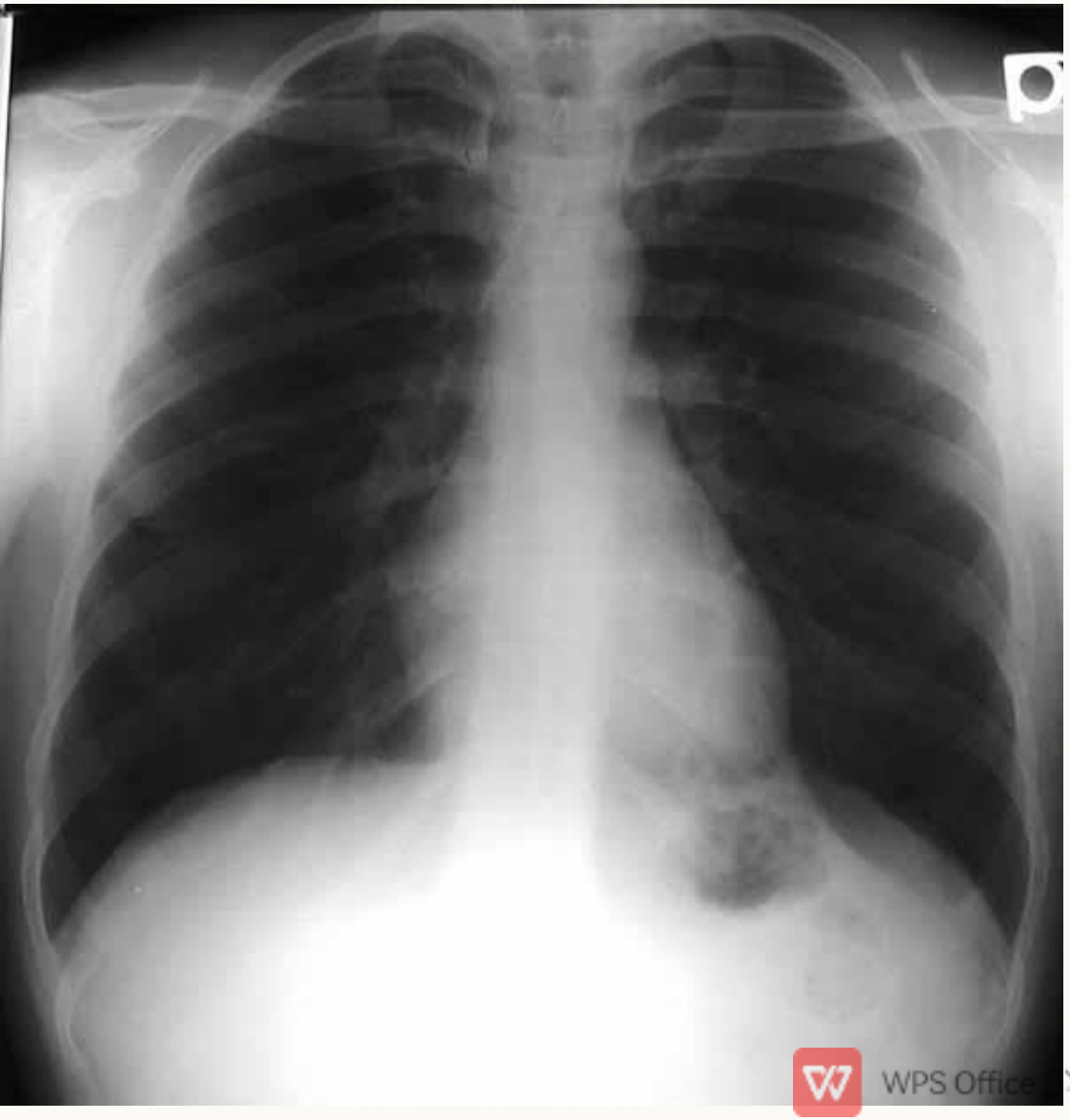
- Should be able to count **10th** ribs posteriorly **OR** **6th** rib anteriorly.

- Heart shadow should not be hidden by the diaphragm

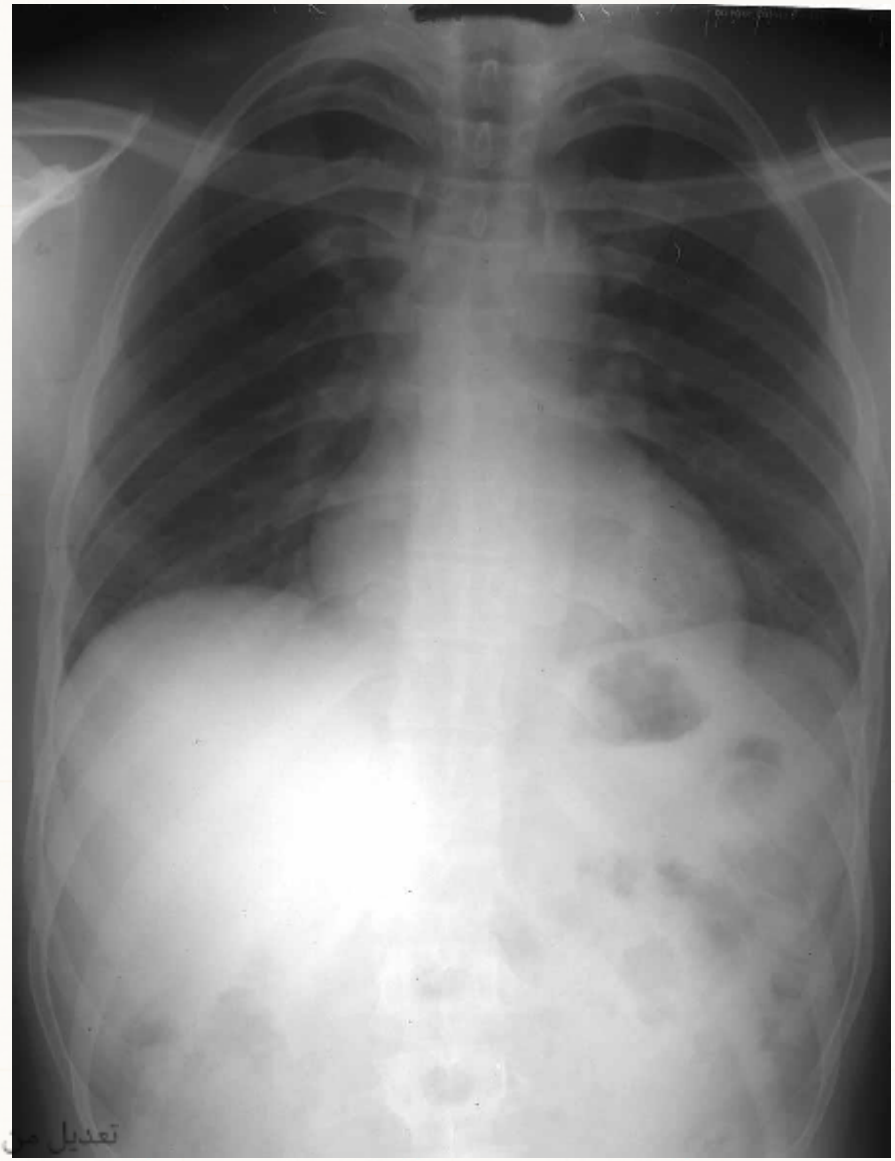




Inspiratio

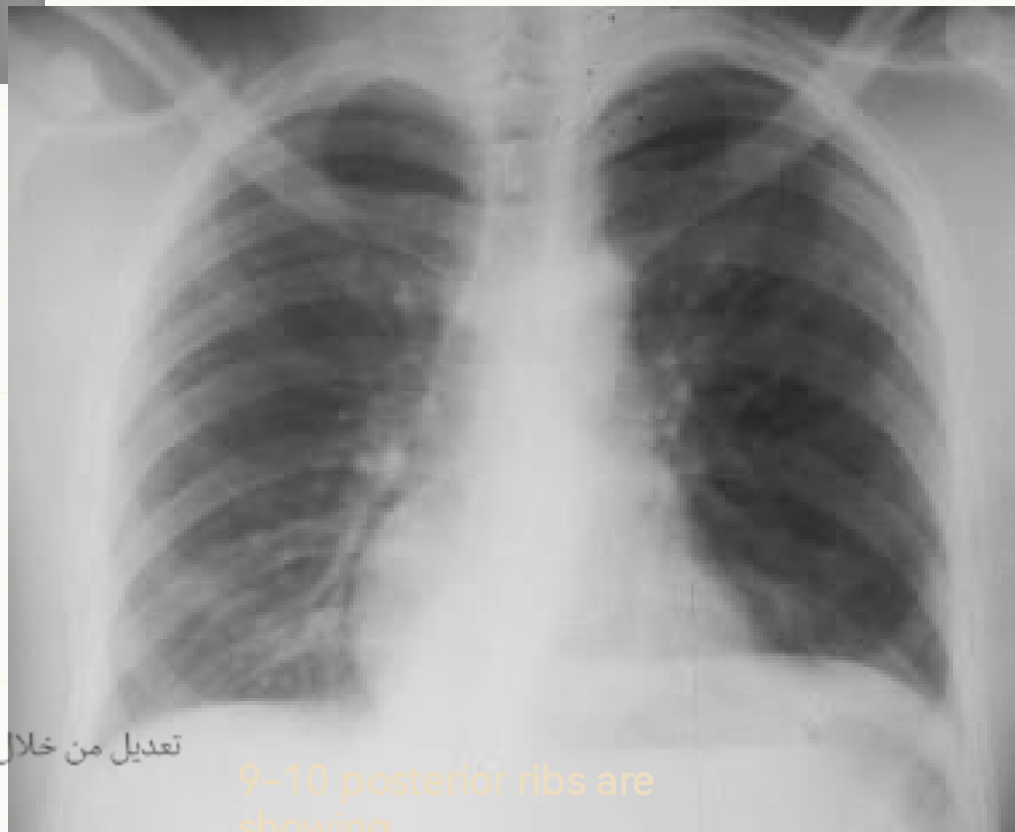


Expiratio



Poor inspiration can crowd lung markings producing pseudo-airspace disease

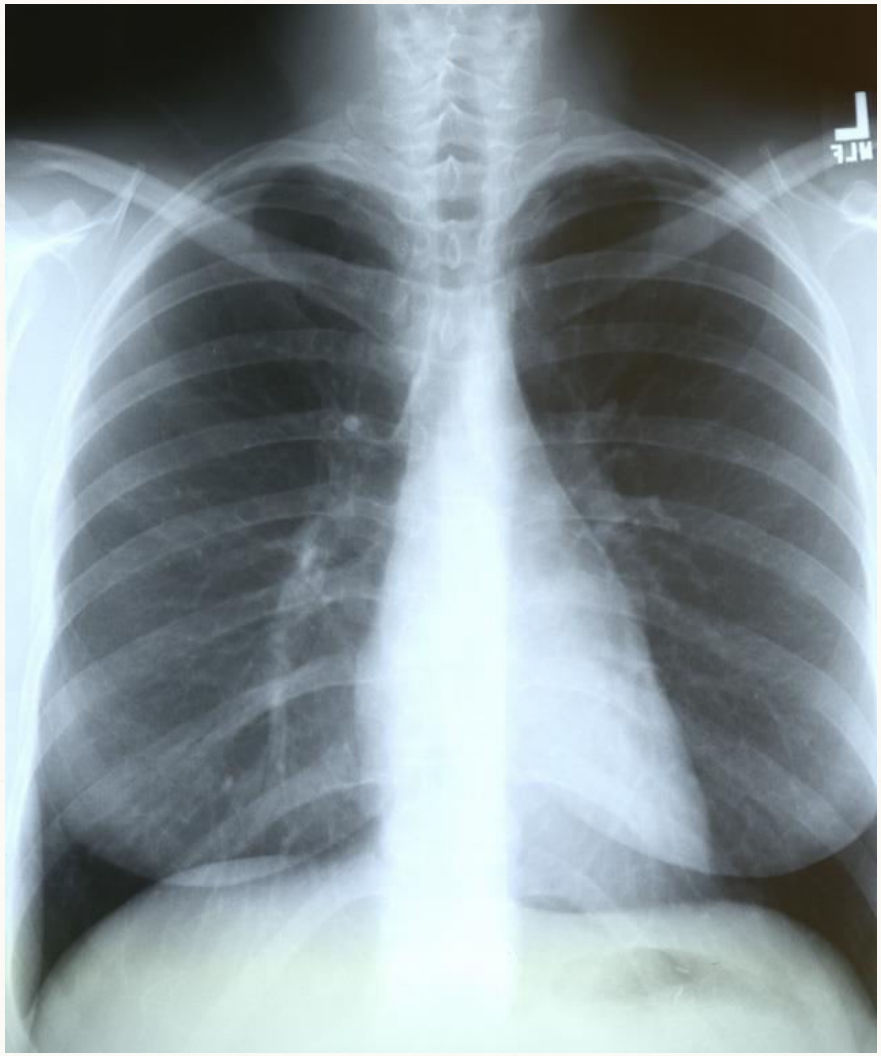
With better inspiration, the “disease process” at the lung bases has cleared

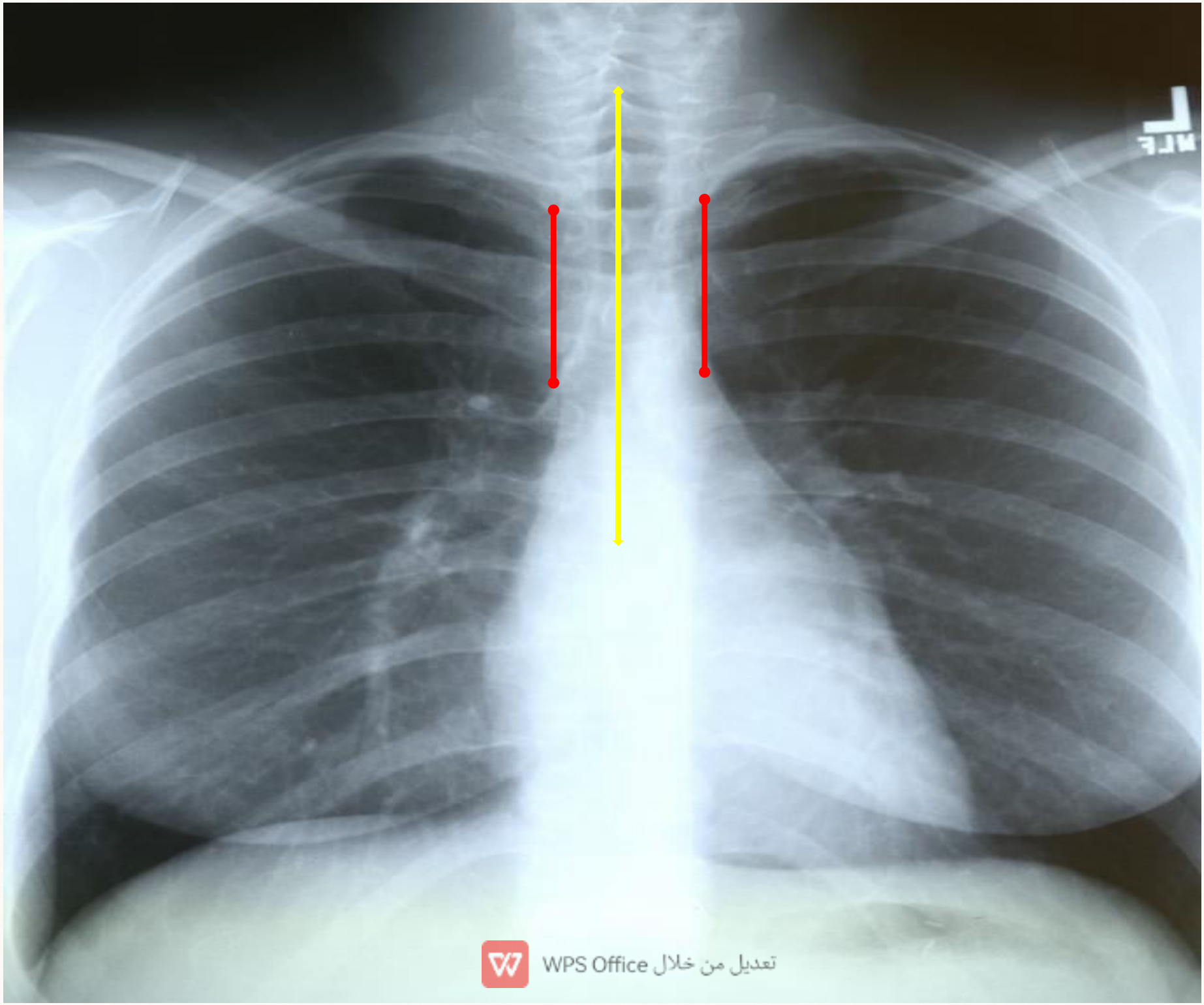


Quality Control

7. Rotation

- Medial ends of bilateral clavicles are equidistant from the midline or vertebral spines

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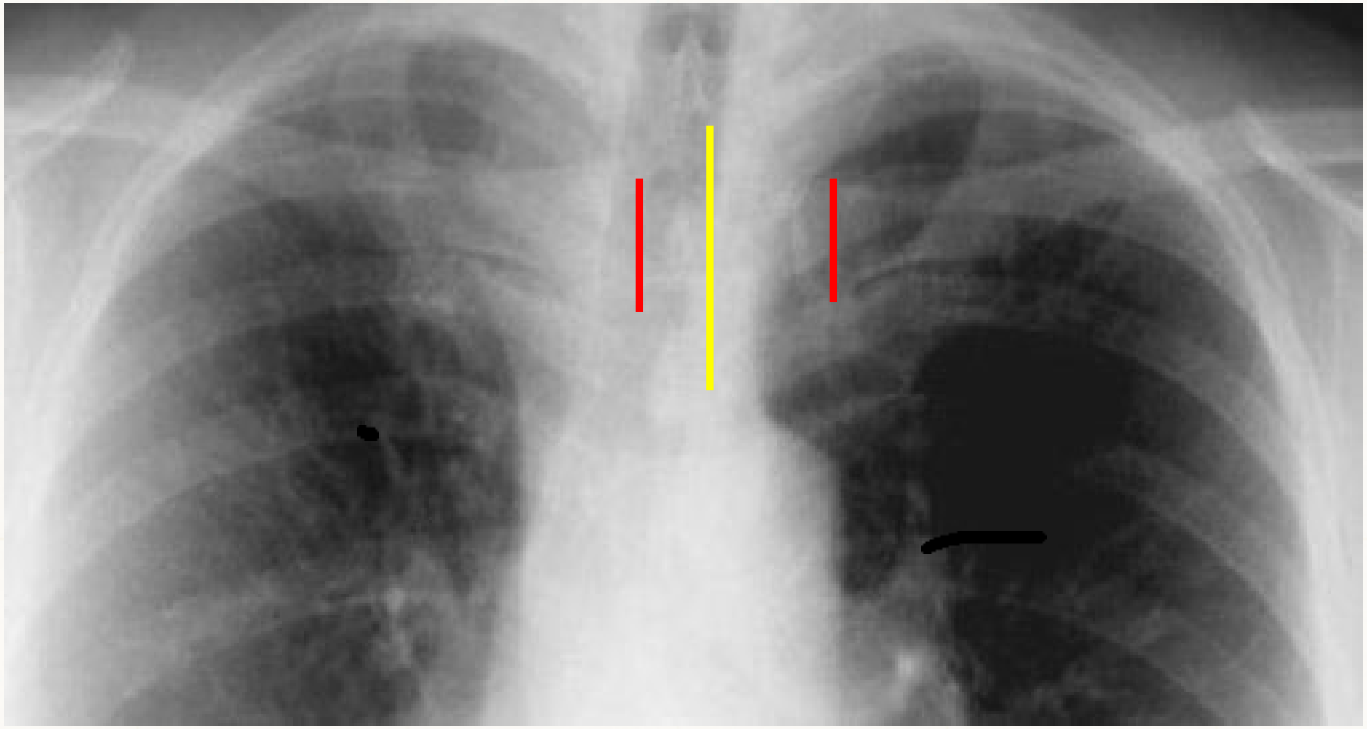
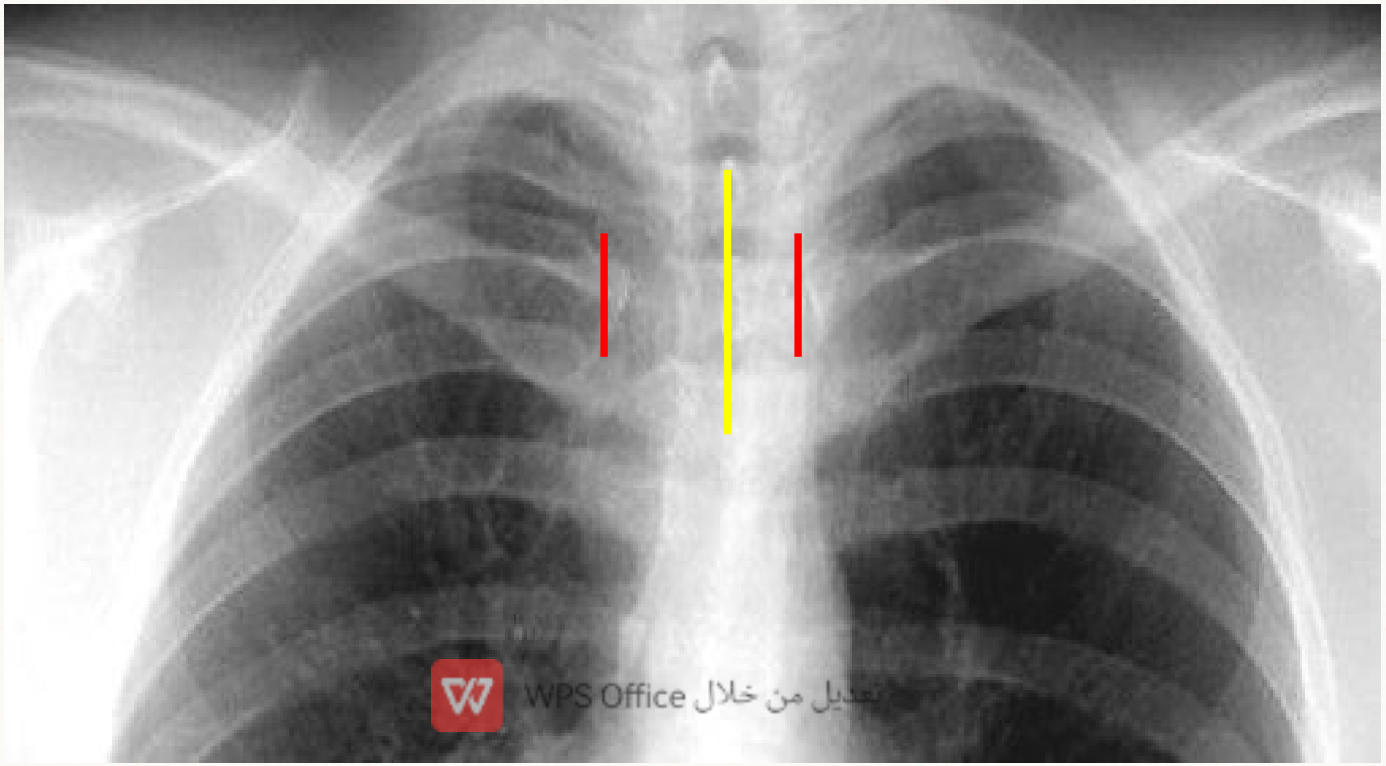
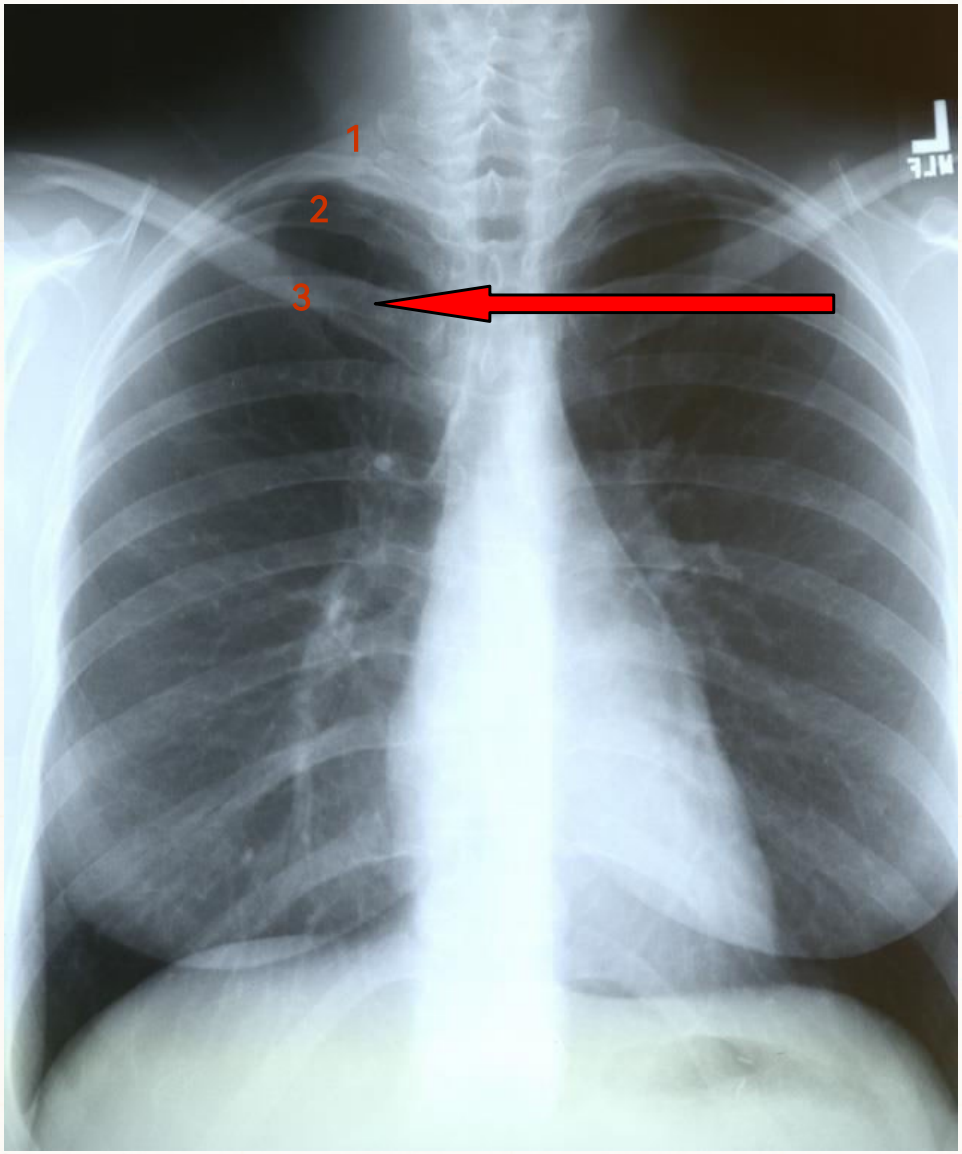




Quality Control

8. Angulation

- Clavicle should lay over 3rd rib or 4th posteriorly.



Findings

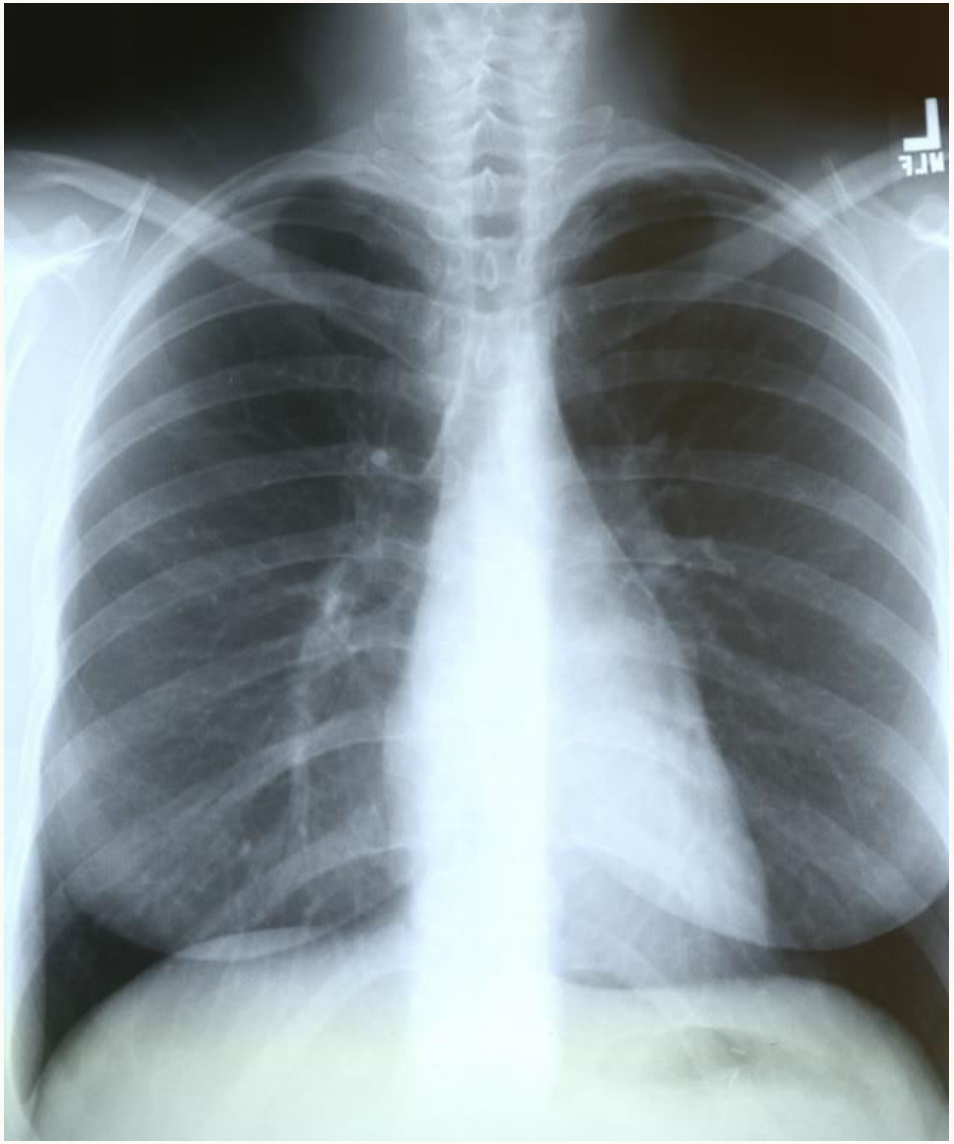
9. **Soft tissue** (Breast shadows, Supraclavicular areas, Axilla) **and bony structures**

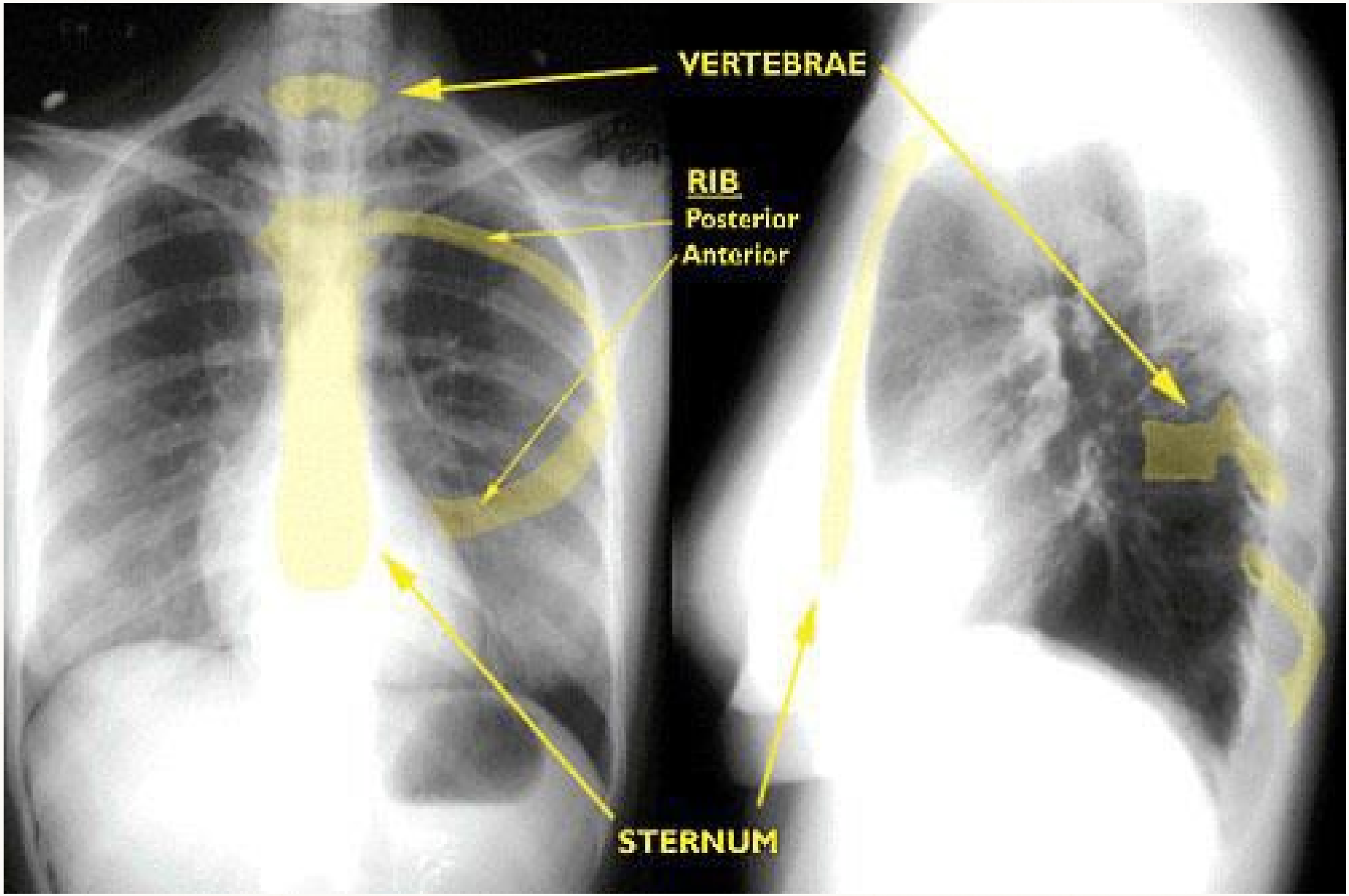
Bony structures:

- Ribs
- Sternum
- Spine
- Shoulder girdle

Check for

- Symmetry
- Deformities
- Fractures
- Masses
- Calcifications
- Lytic lesions



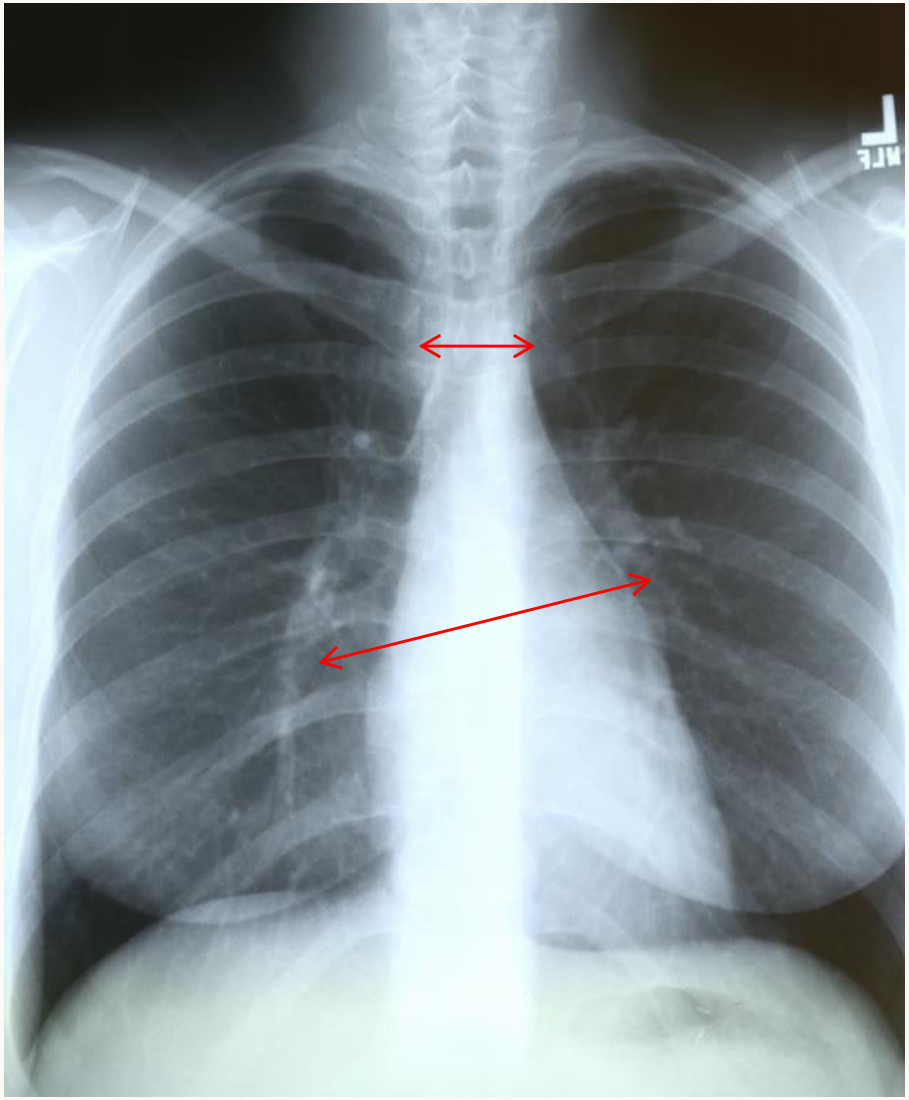


Findings

10.Mediastinum

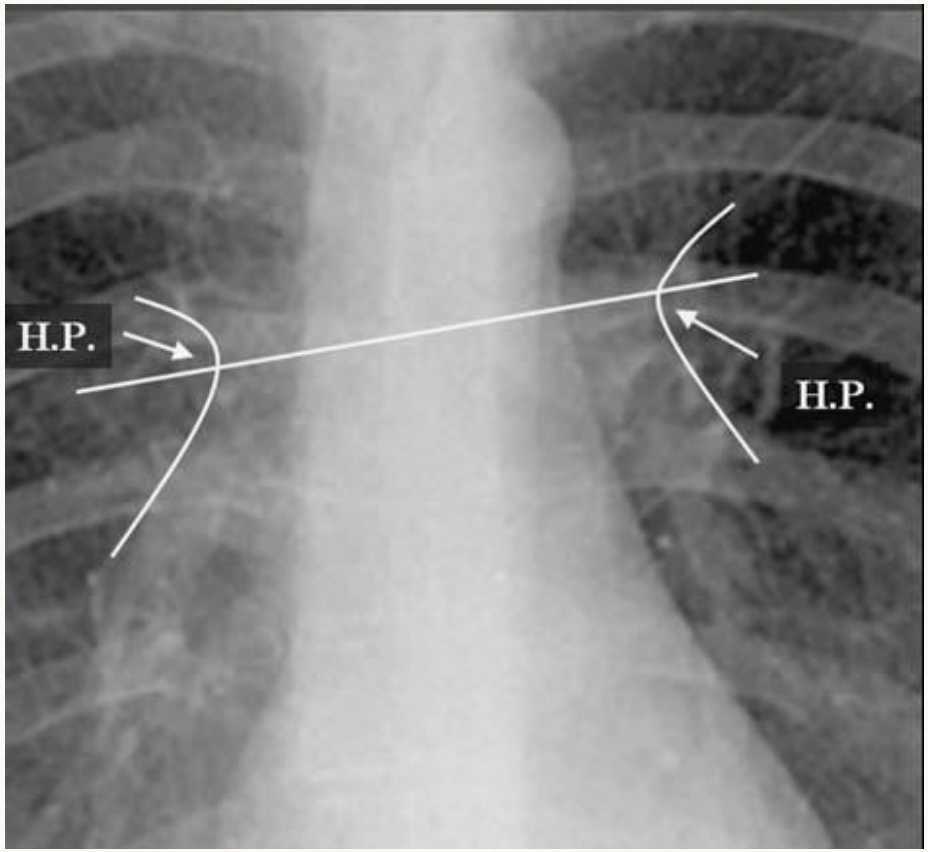
Check for

- Upper mediastinum
- Hilar contours for increase densities or deformities
- Lower Mediastinum



Hilar region:

- Both hila should be concave.
- Both hila should be of similar density.
- The left hilum is usually superior to the right by **up to 1 cm**.



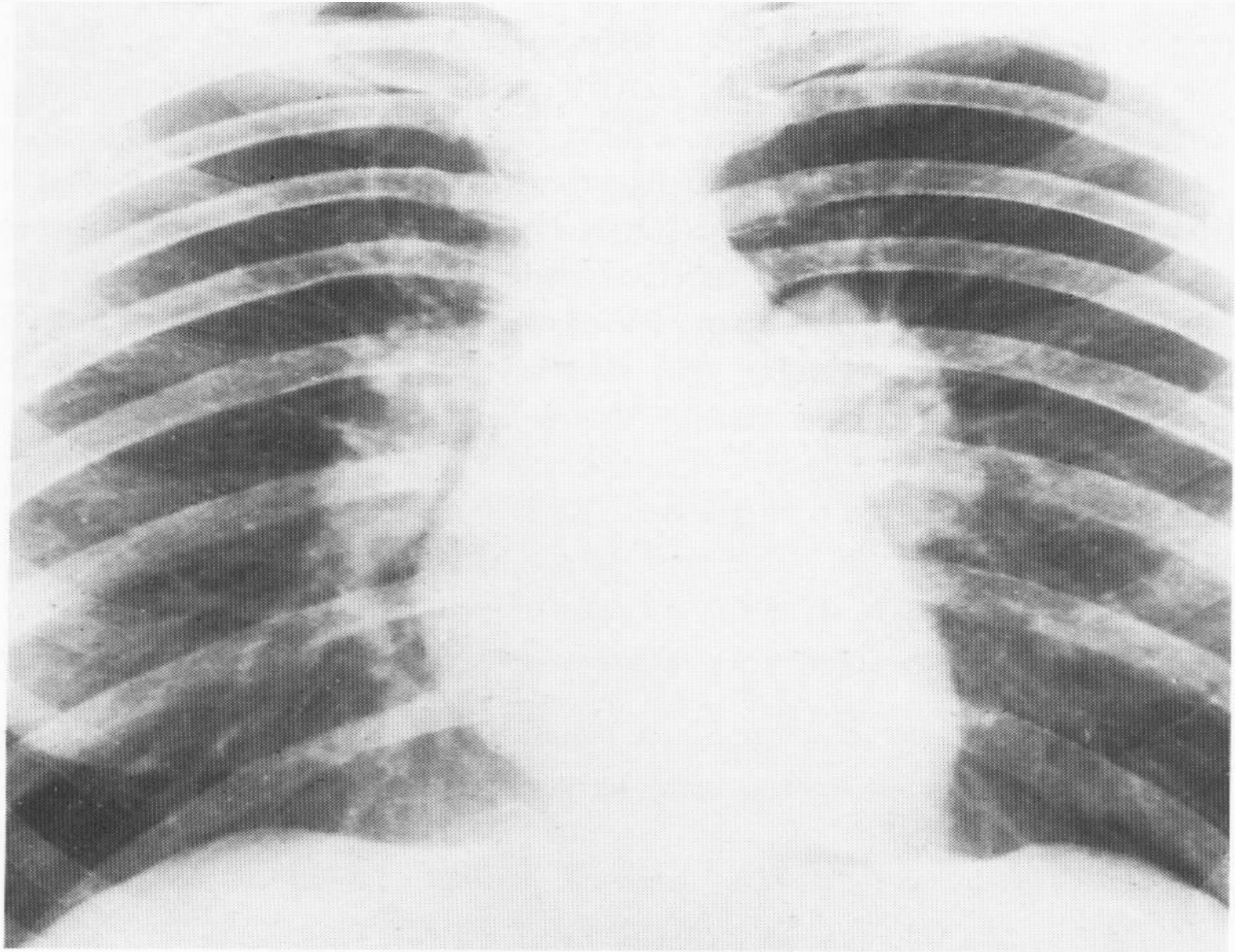
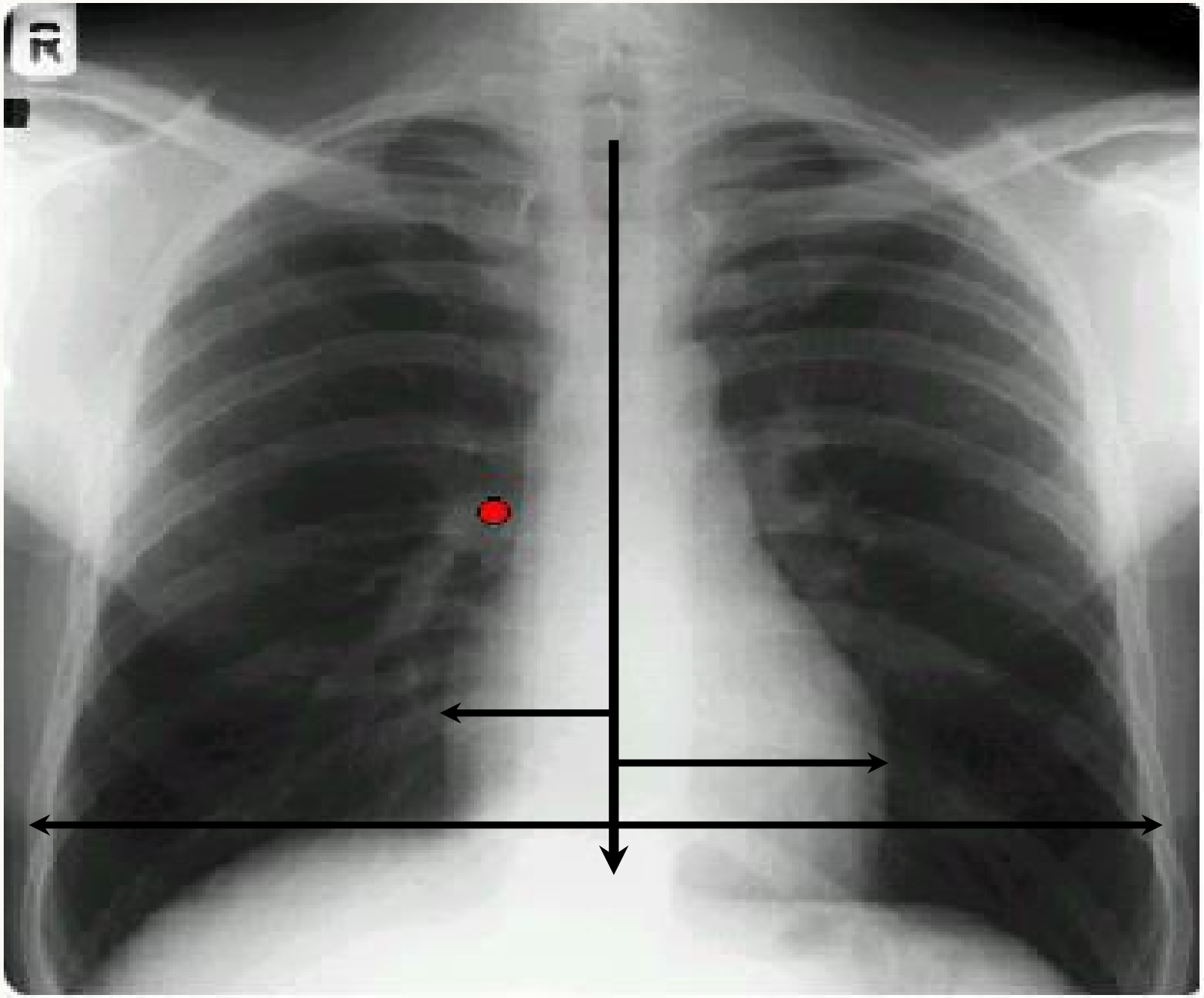
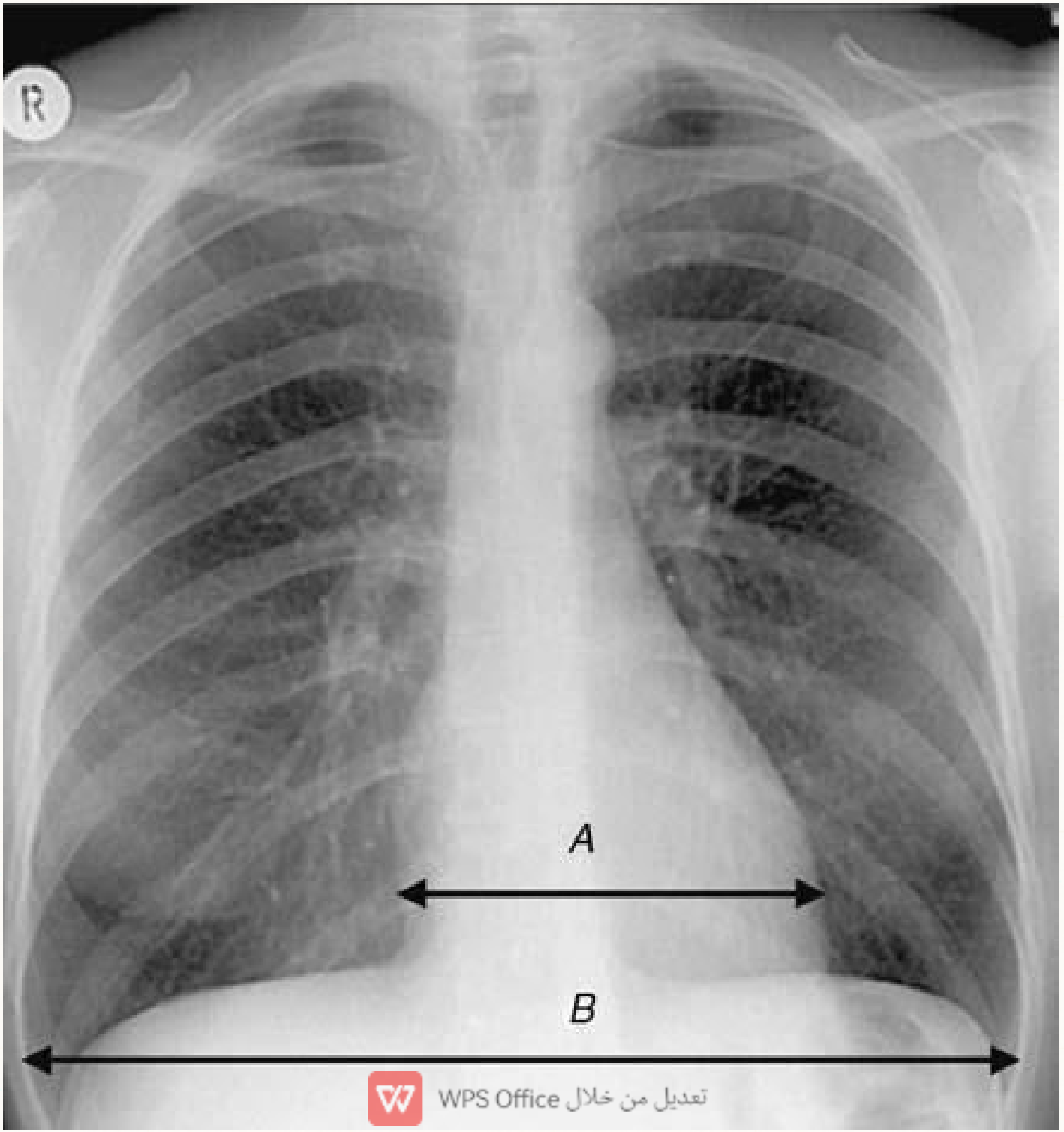
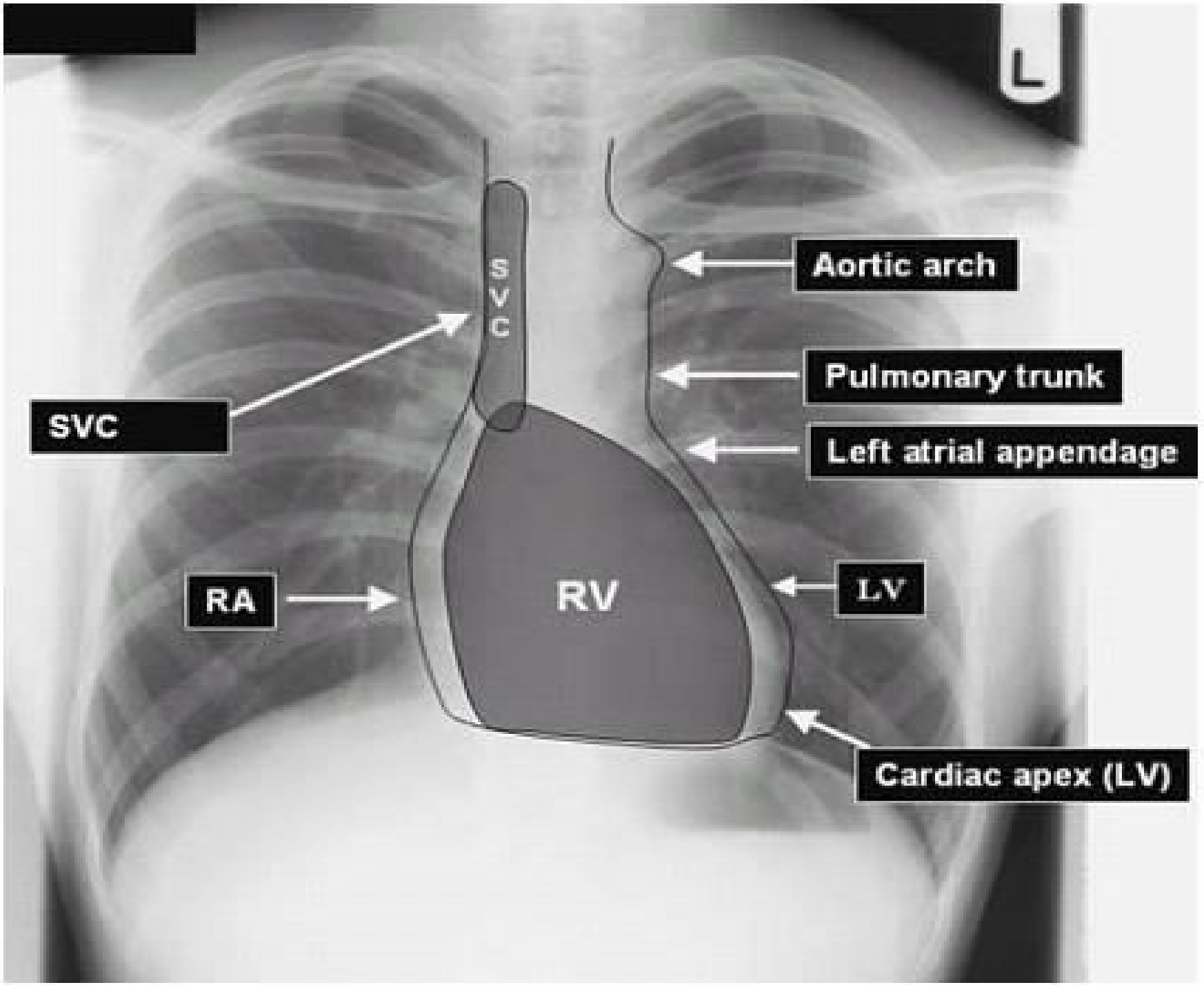
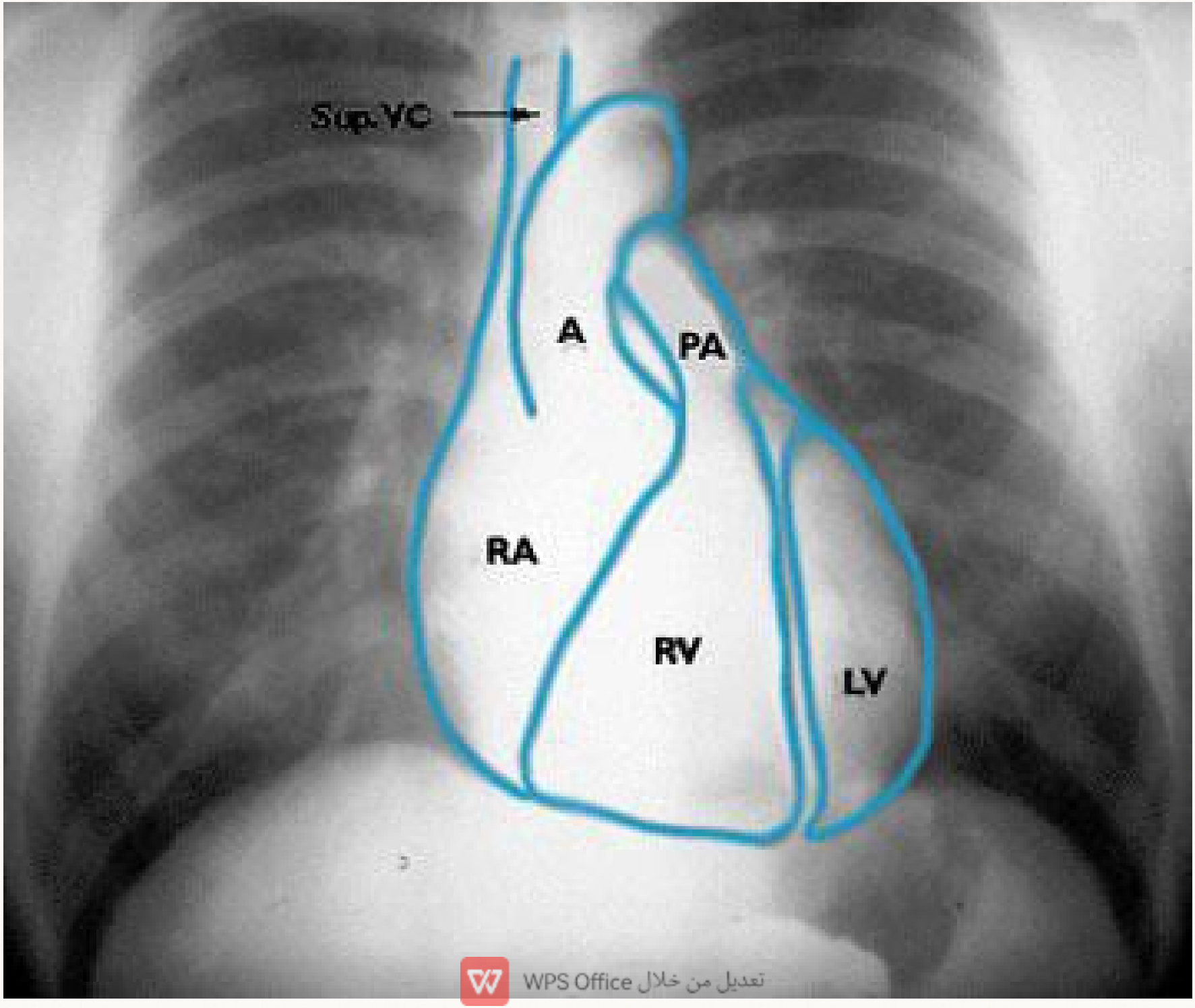


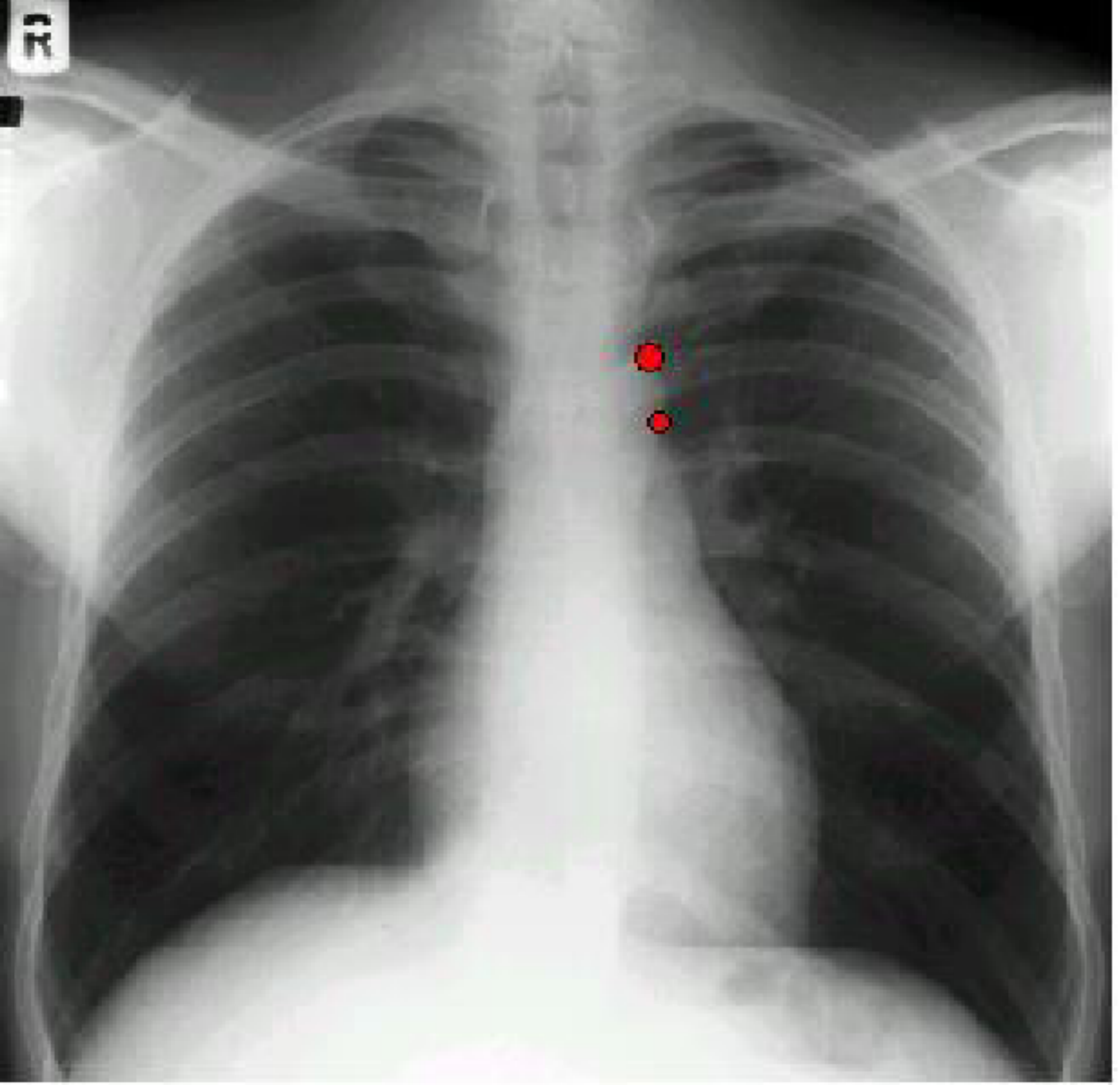
Fig. 7.1 Sarcoidosis. Bilateral hilar node enlargement.







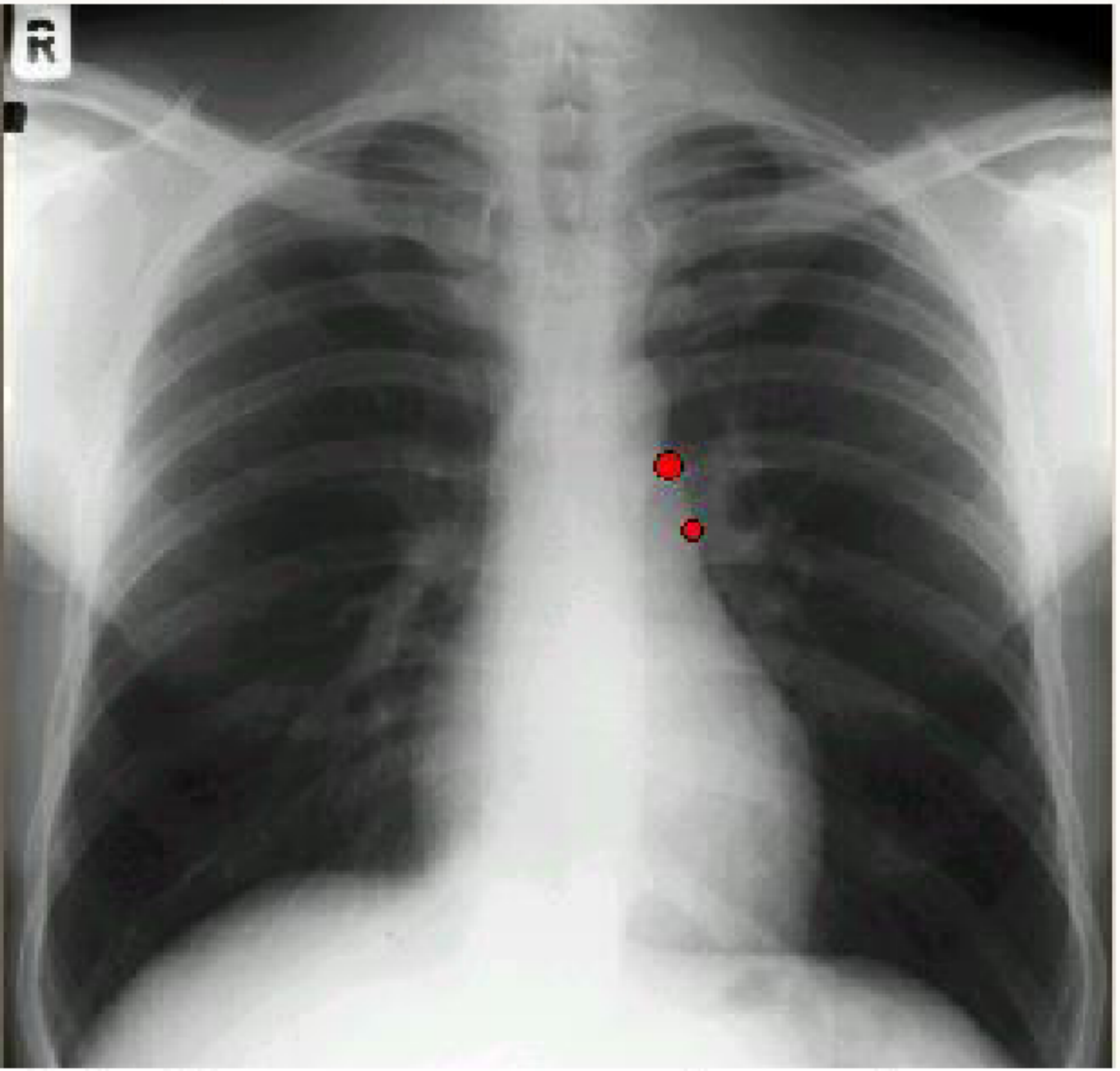




Heart & Vessels

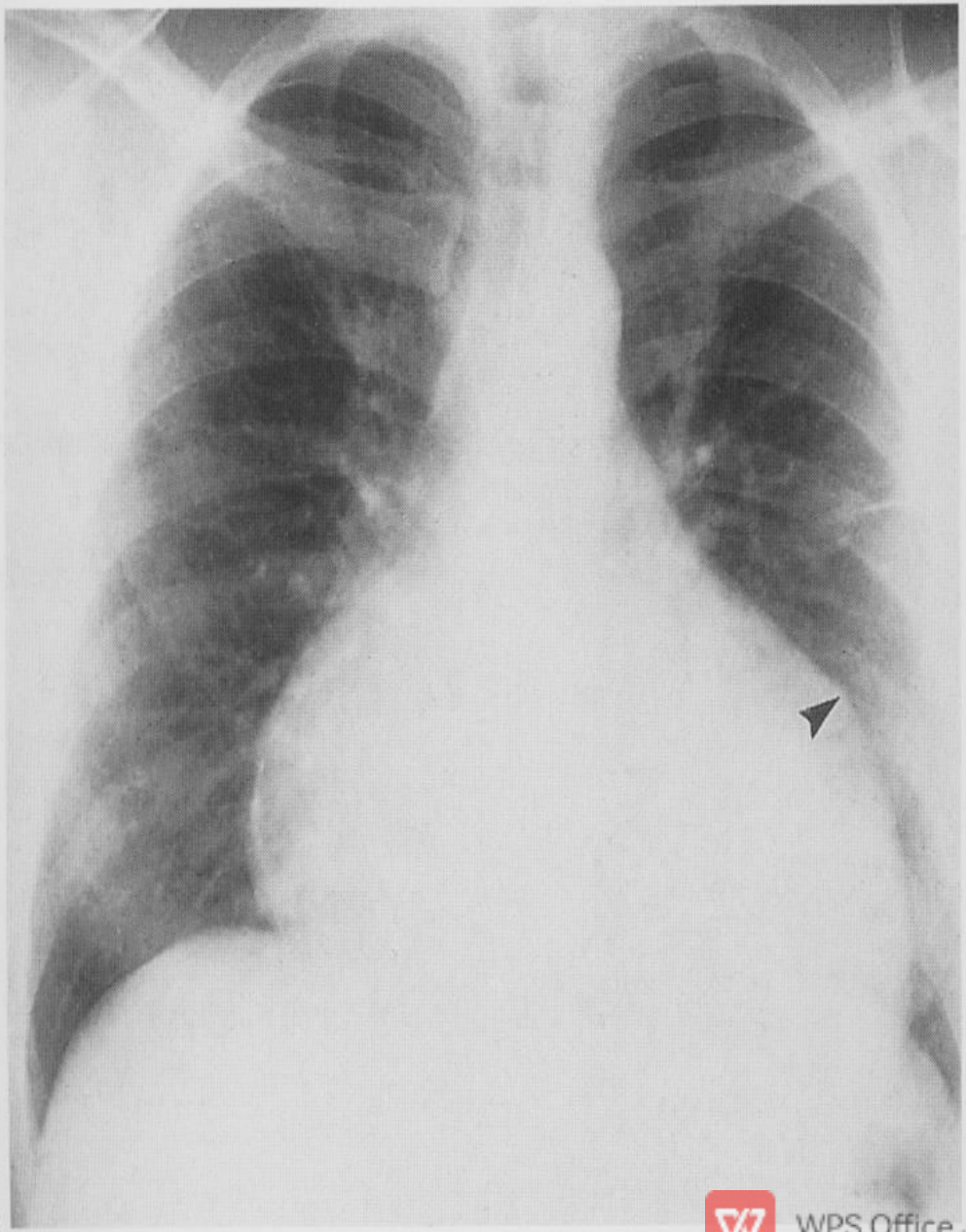
Prominent Knuckle Indicate systemic hypertension mostly

Arch of Aorta (Aortic knuckle)



Heart & Vessels

Pulmonary Trunk



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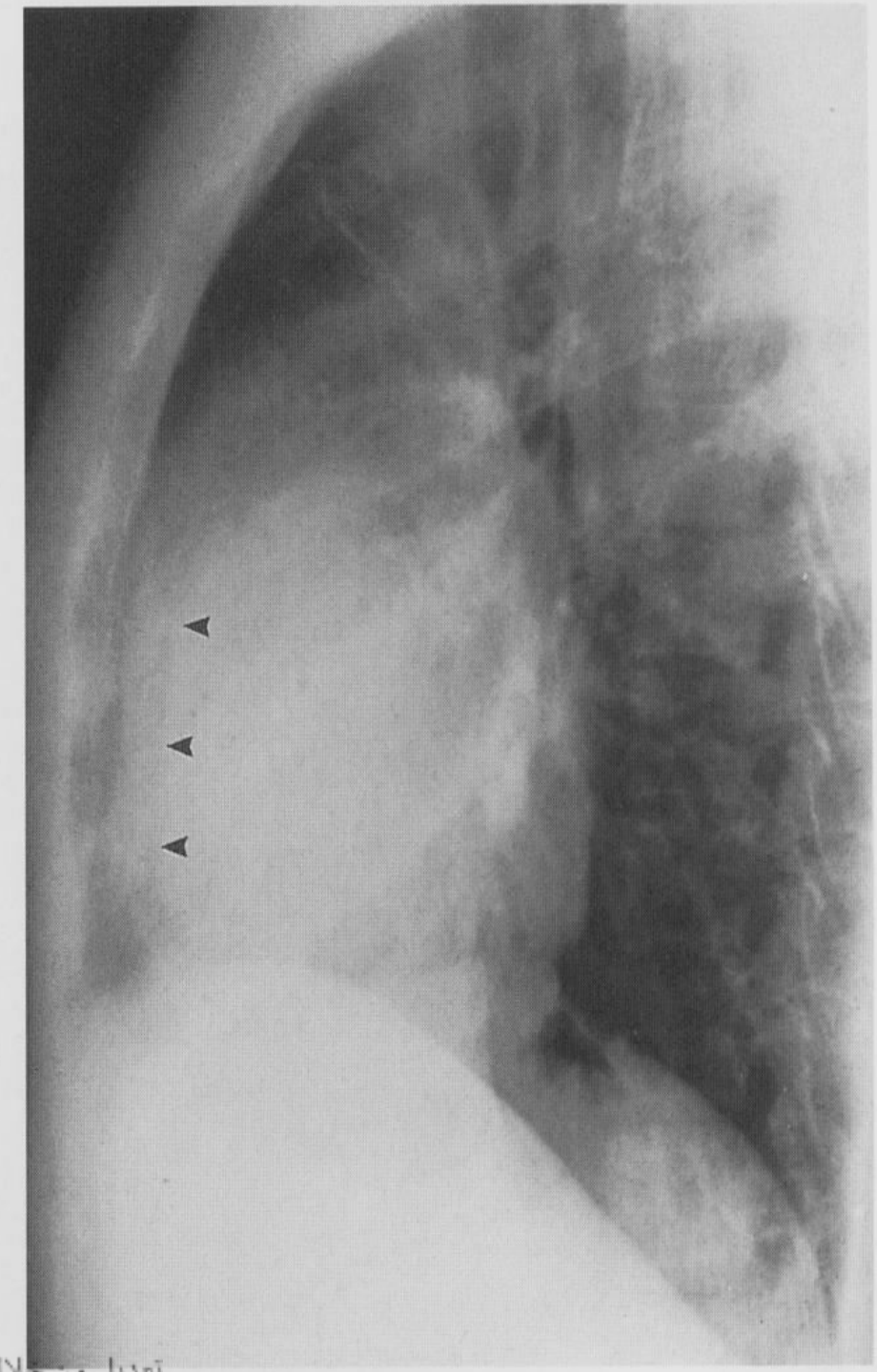
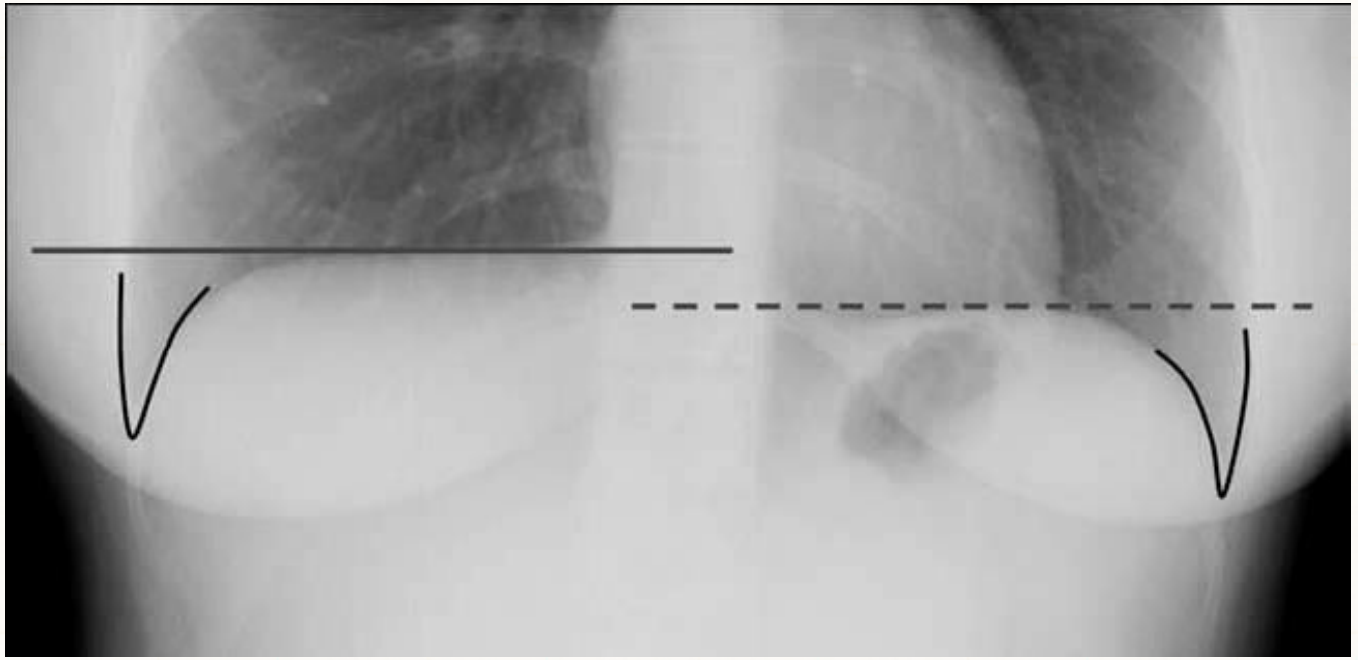


B

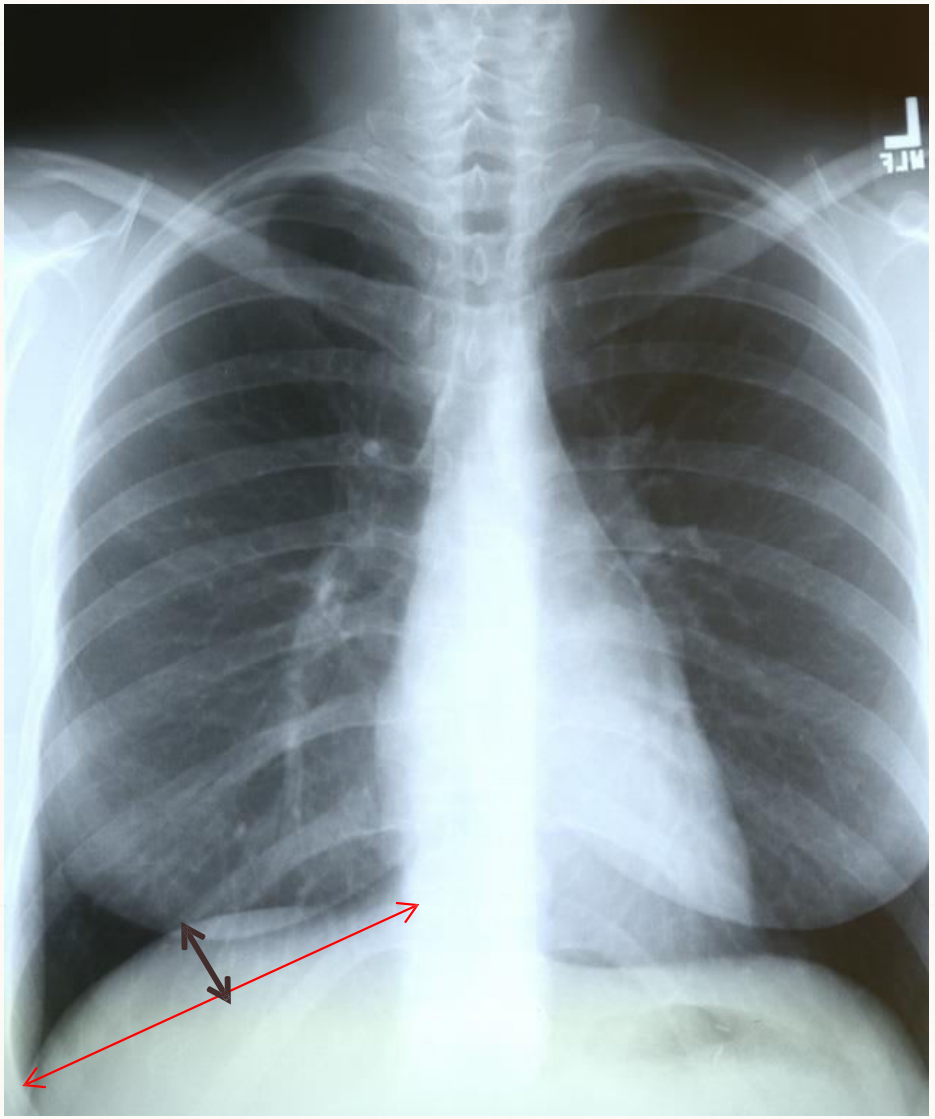
Findings

11. Diaphragm:

- The highest point of the right diaphragm is usually 1–1.5 cm higher than that of the left.
- Each costophrenic angle should be sharply outlined.



- Check convexity and domes.
- Check for low flat diaphragm with indentations.
- Check for free air, or f luid.

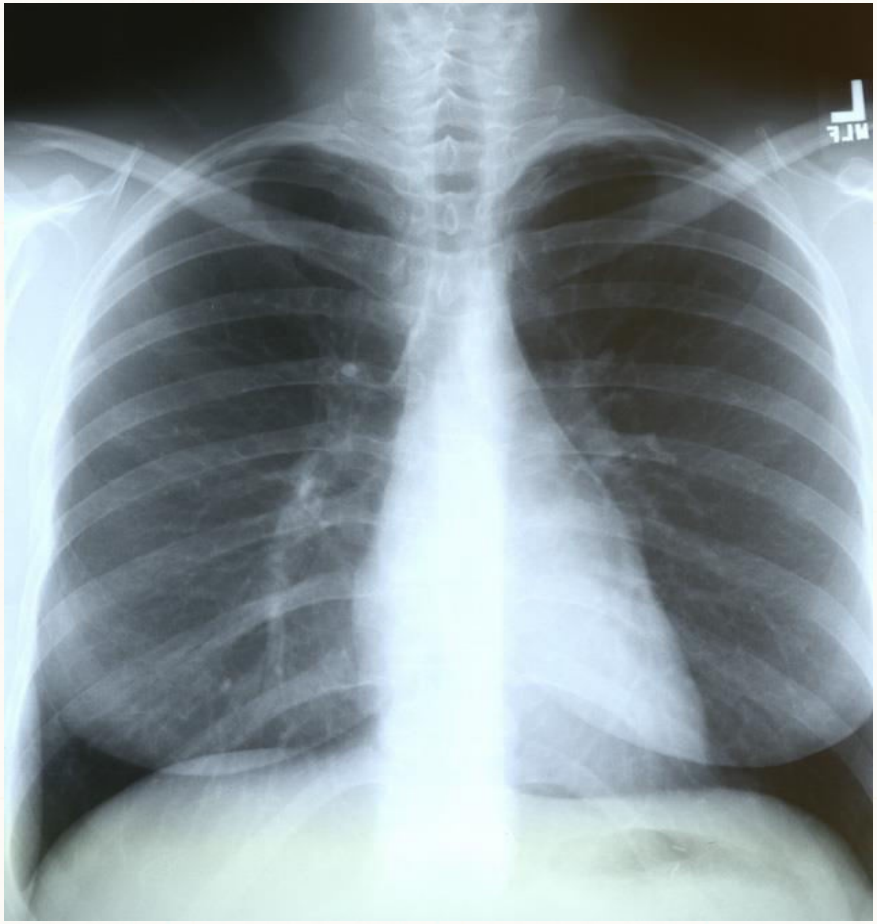


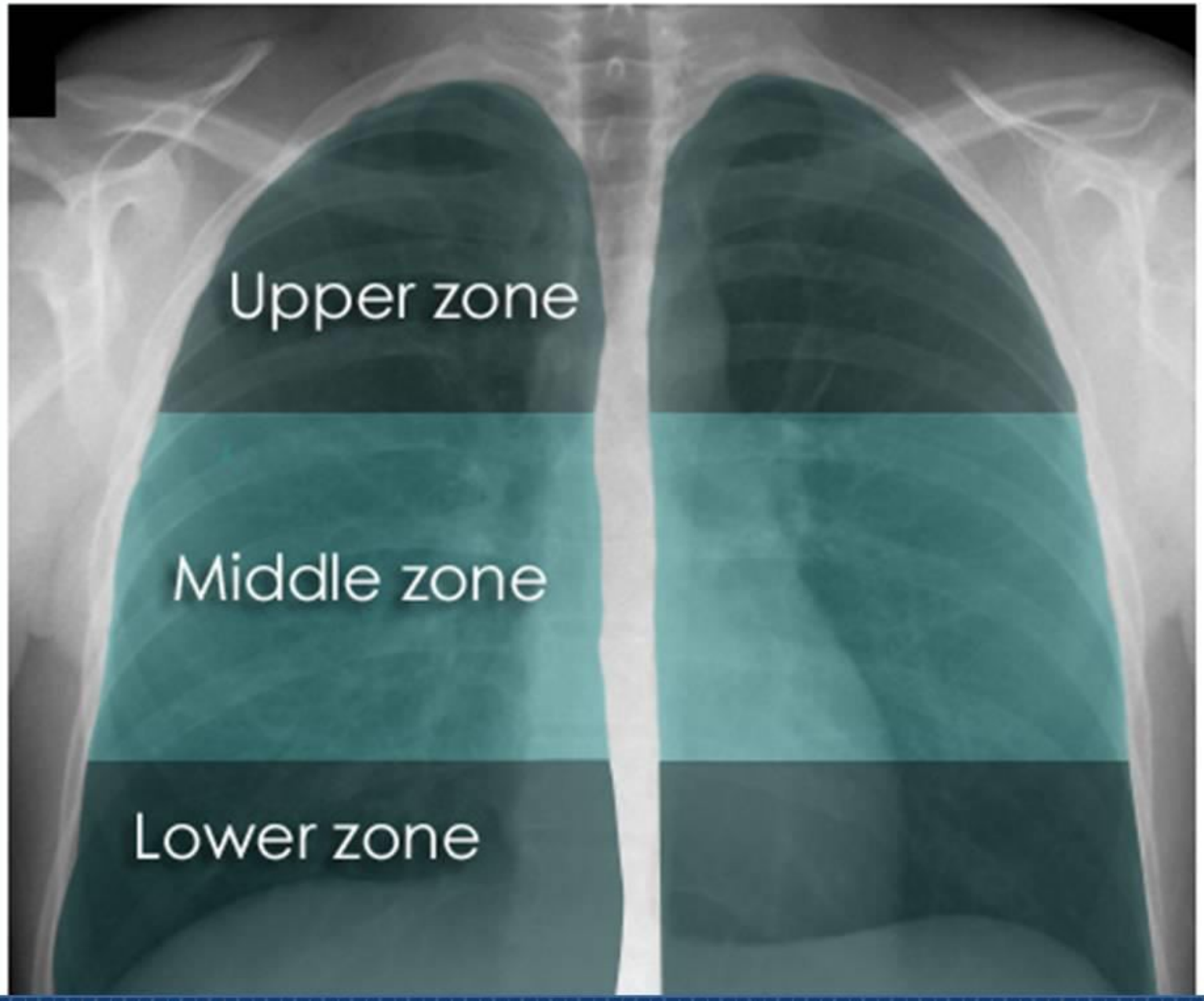
Unilateral Left Diaphragmatic Paralysis

Findings

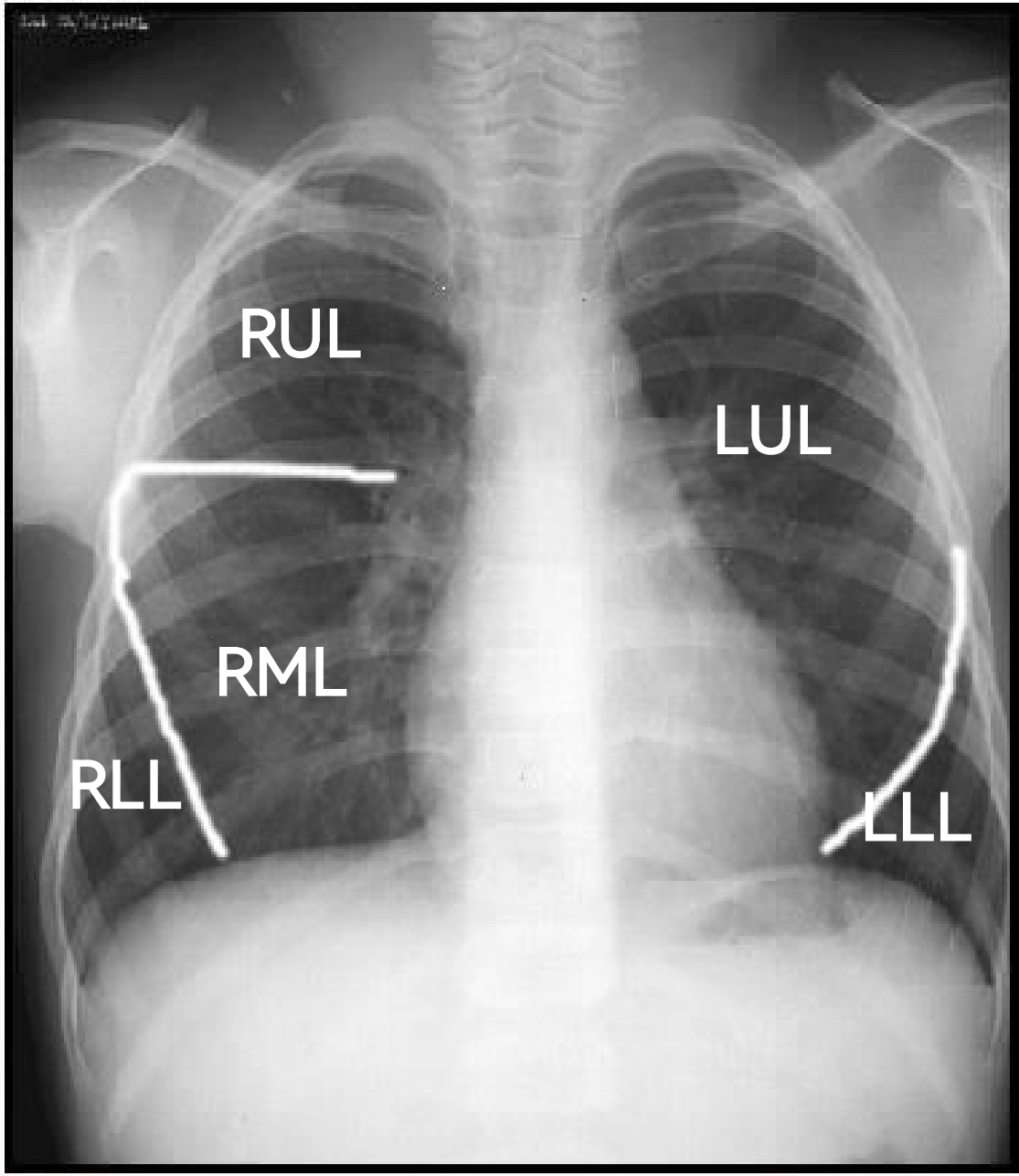
12. Lung Fields:

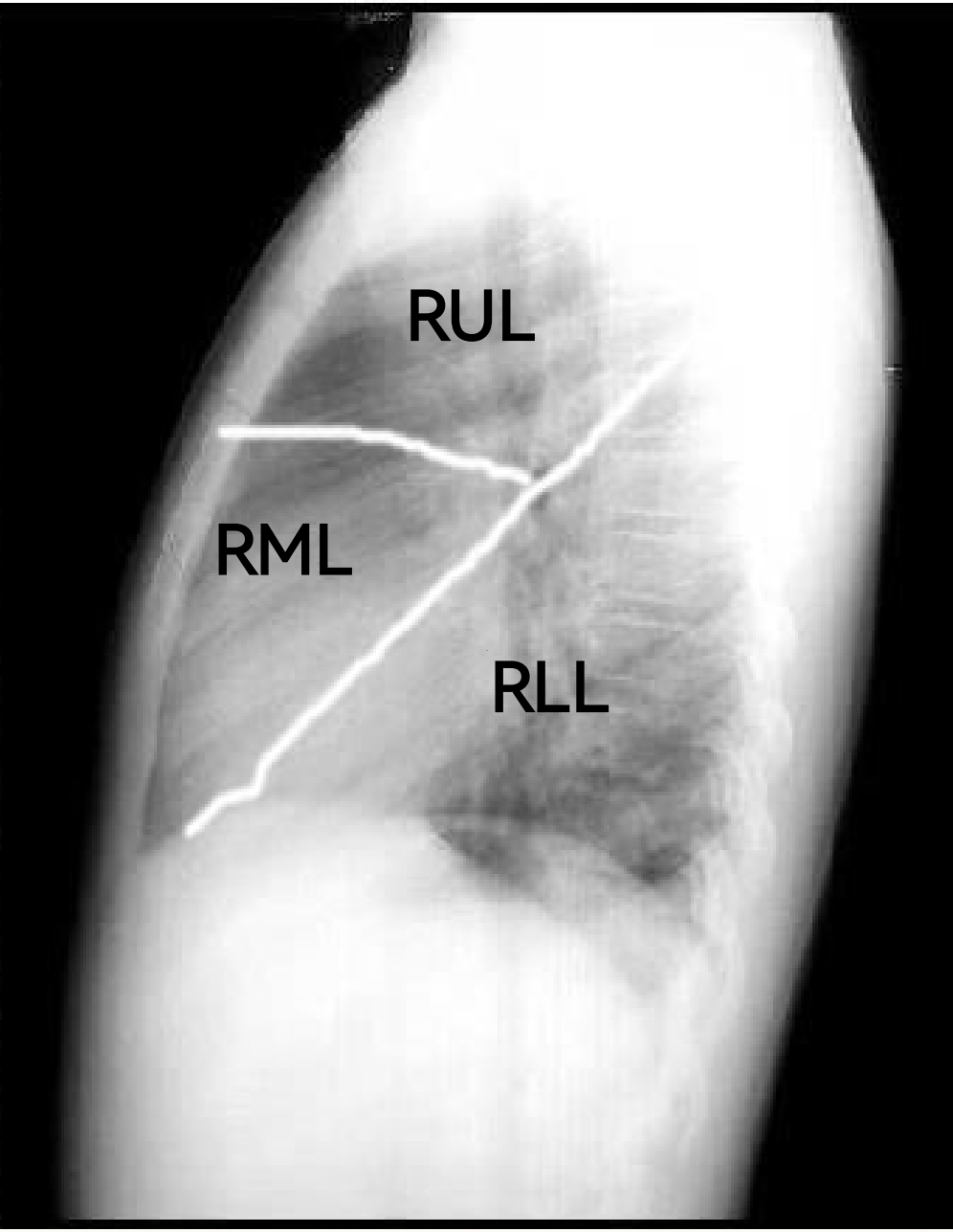
- Pulmonar vascular markings (BVM)
- Opacities, localized or diffuse.
- To determine location of any abnormalities …
  - Use radiologic lung zones.
  - Use fissures to define lung lobes

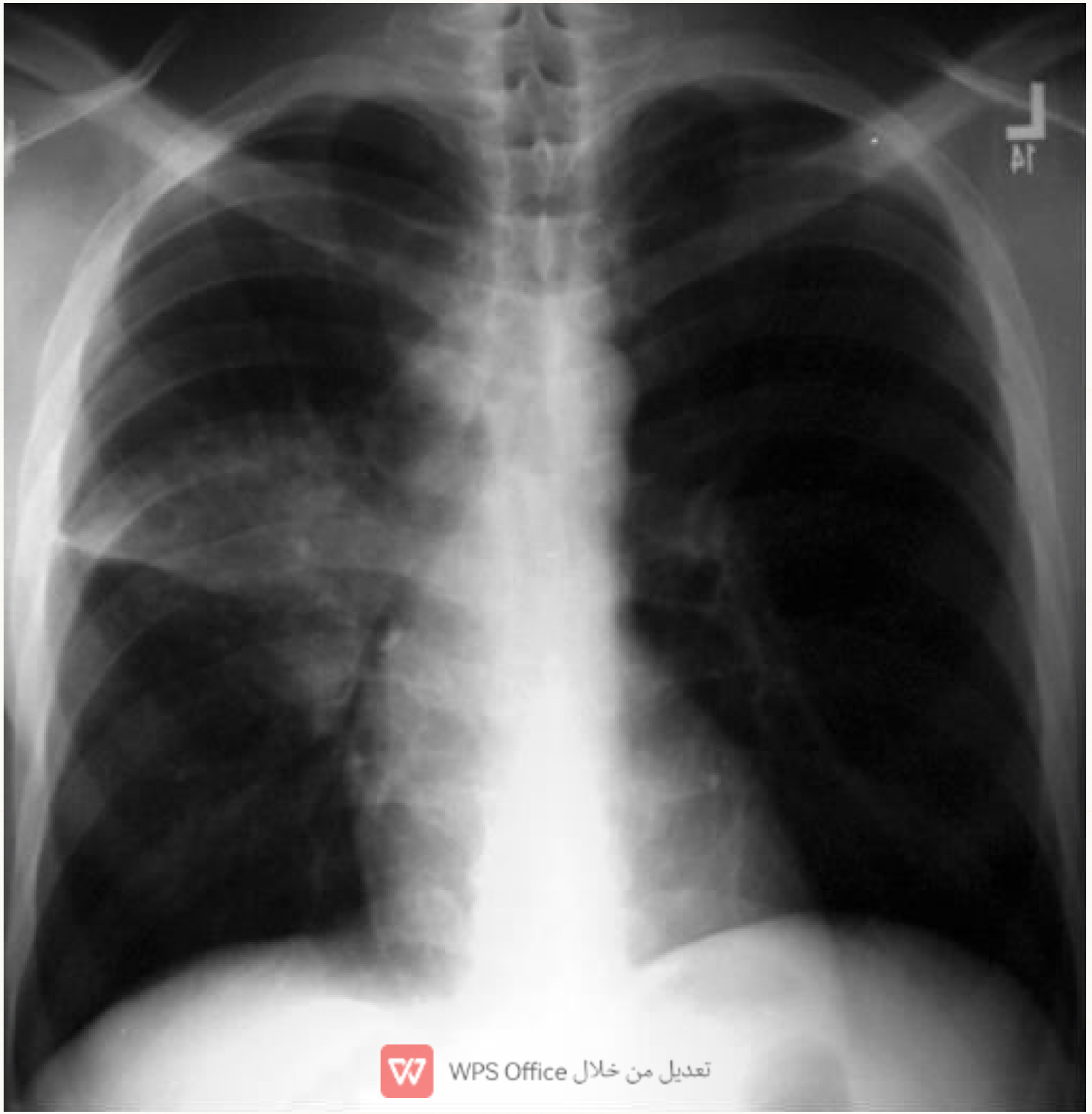


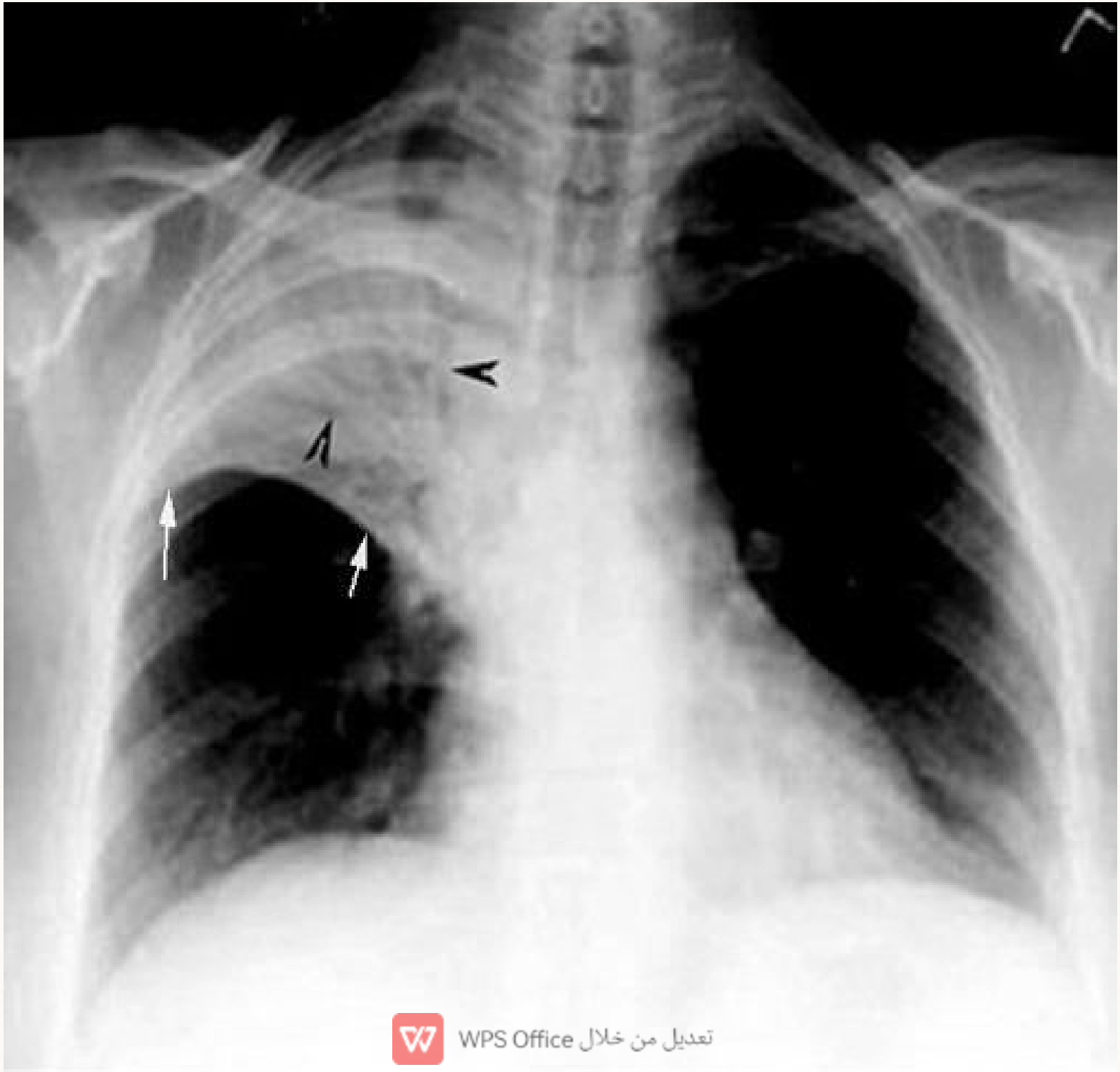


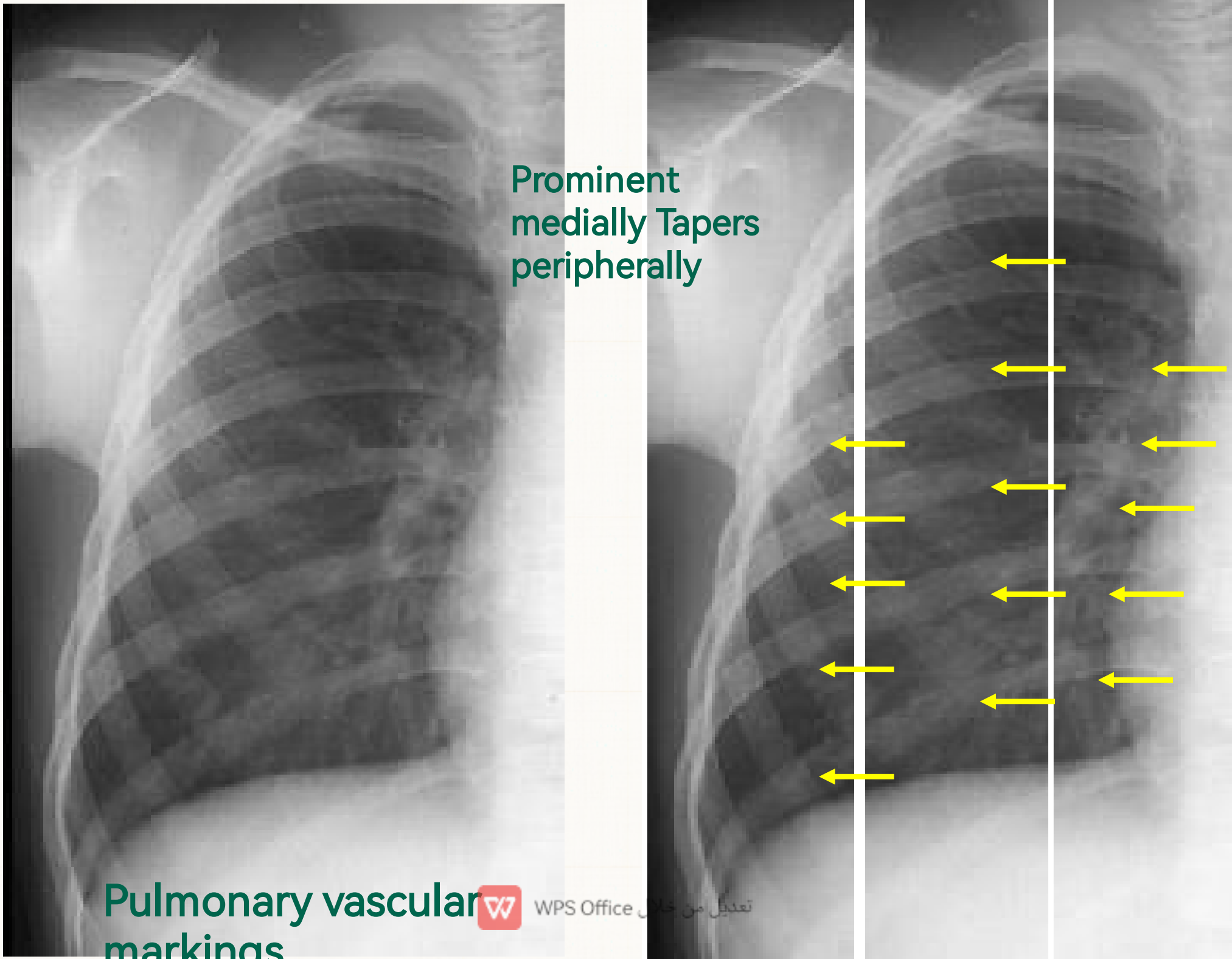
Each of these zones occupies approximately one third of the height of the lungs.

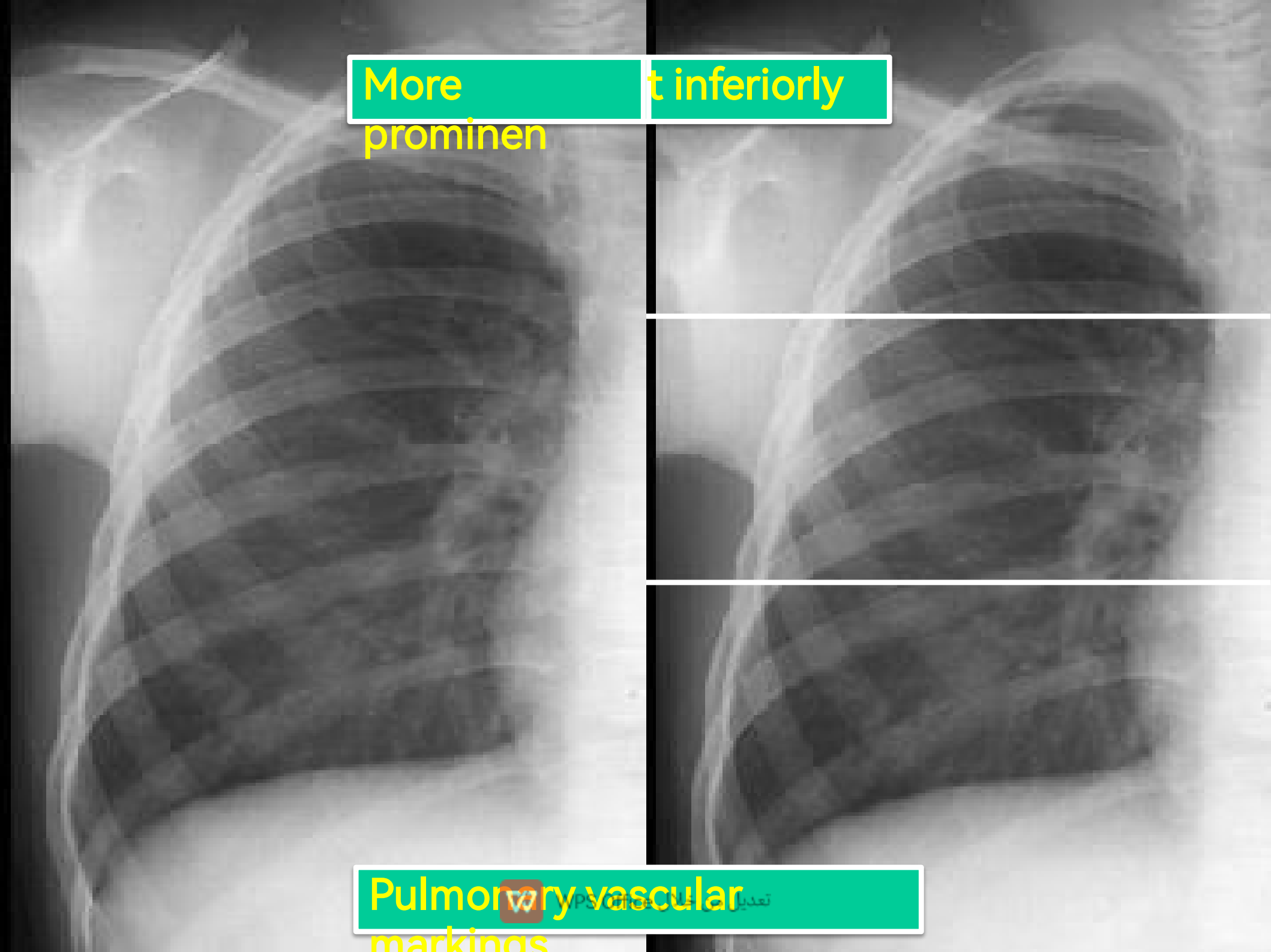









Prominent
medially Tapers
peripherally
Pulmonary vascular
markings


More
t inferiorly
prominen
Pulmonary vascular
markings

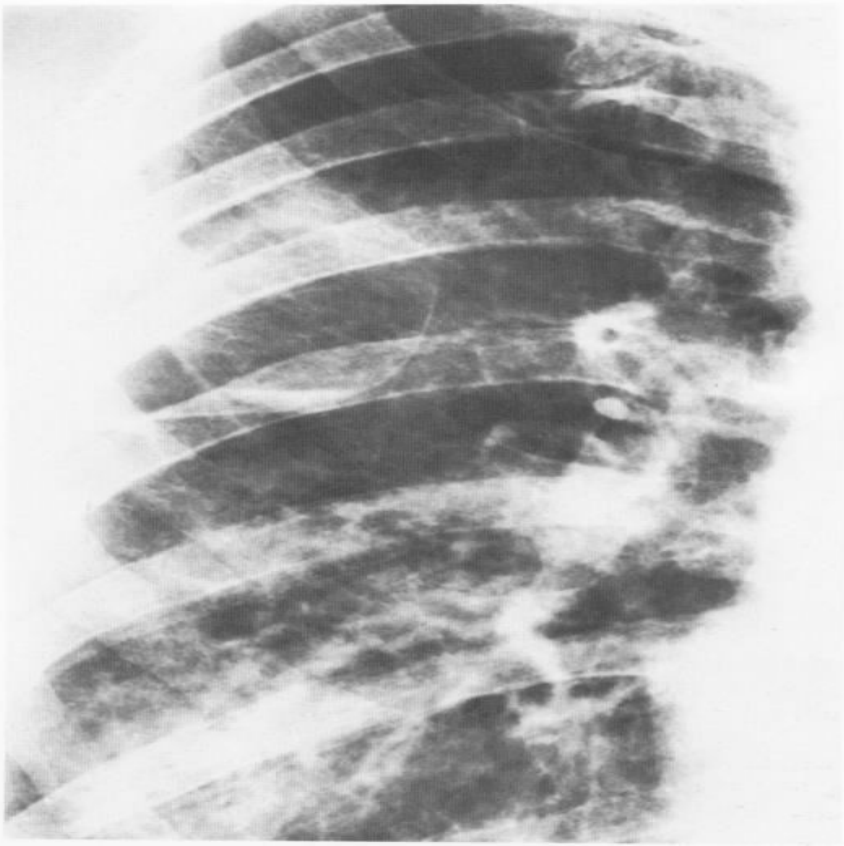
How to comment???????

- Plain x-Ray P-A view
- Site of the lesion
- Description
- Diagnosis or DD

Opacity (Liquid or soft tissue density)		Hypertranslucency (Increased air density)
Diffuse	**Localized**	
• Diffuse alveolar • Diffuse interstitial • Mixed • Vascular	• Consolidation • Cavitation • Mass • Fibrosis • Atelectasis	• Bulla • Localized airway obstruction • Diffuse airway obstruction e.g. Emphysema

Radiological description:

Heterogenous opacity.

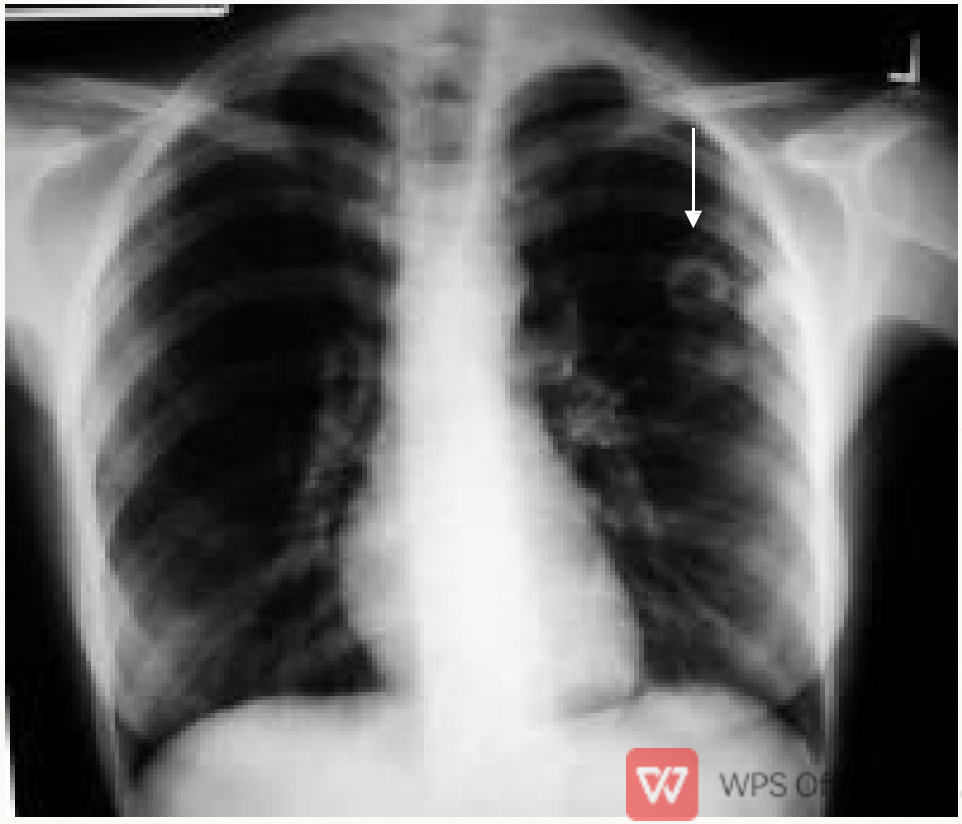


Homogenous opacity.

Radiological description:

- **Nodule:**

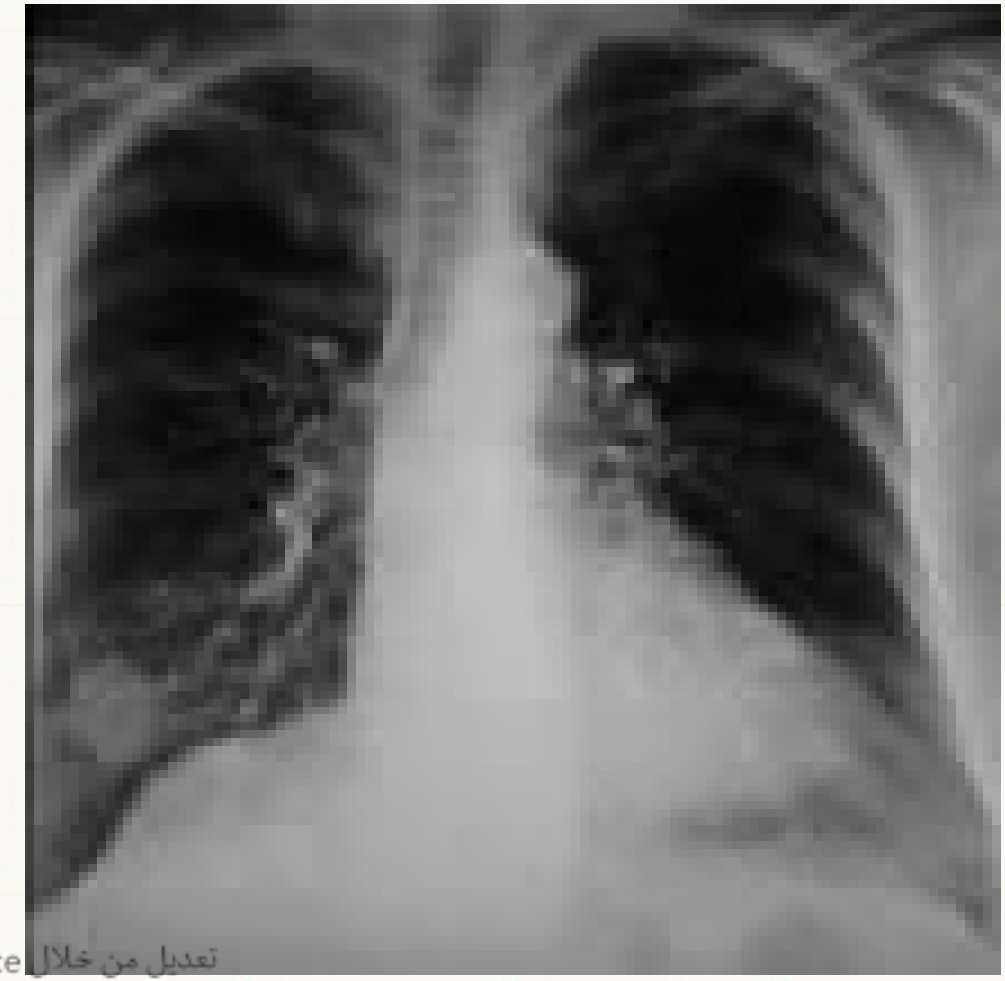
  Well circumscribed pulmonary opacity (5 mm – 3 cm in diameter) and surrounded by normal lung.



Radiological description:

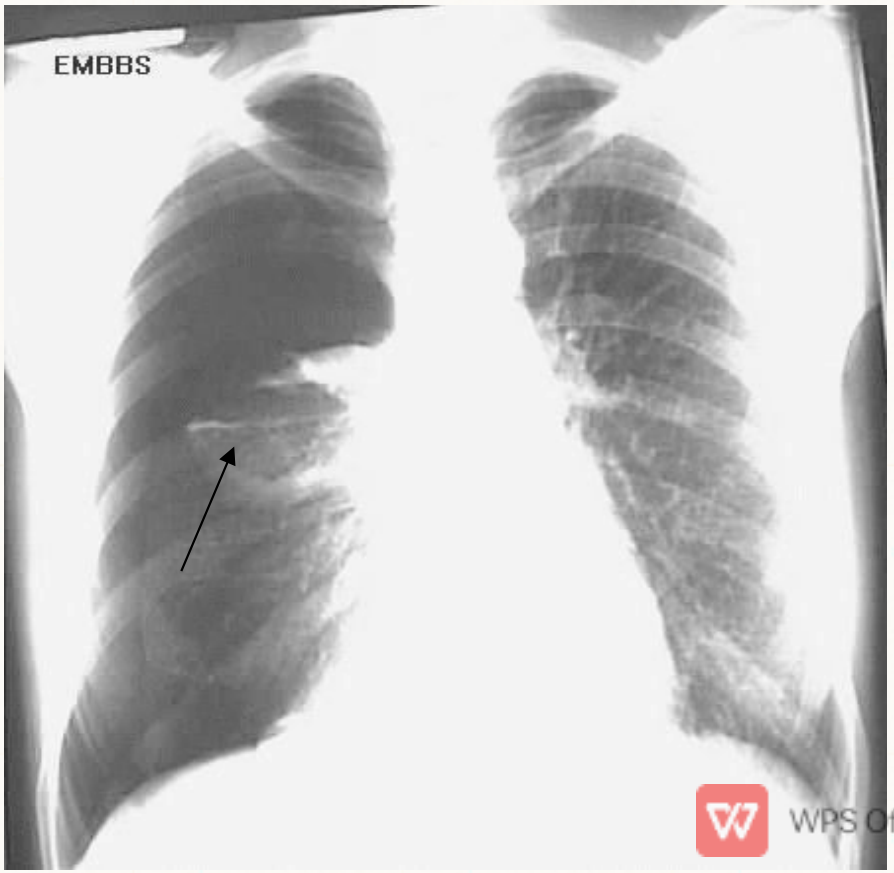
Mass:

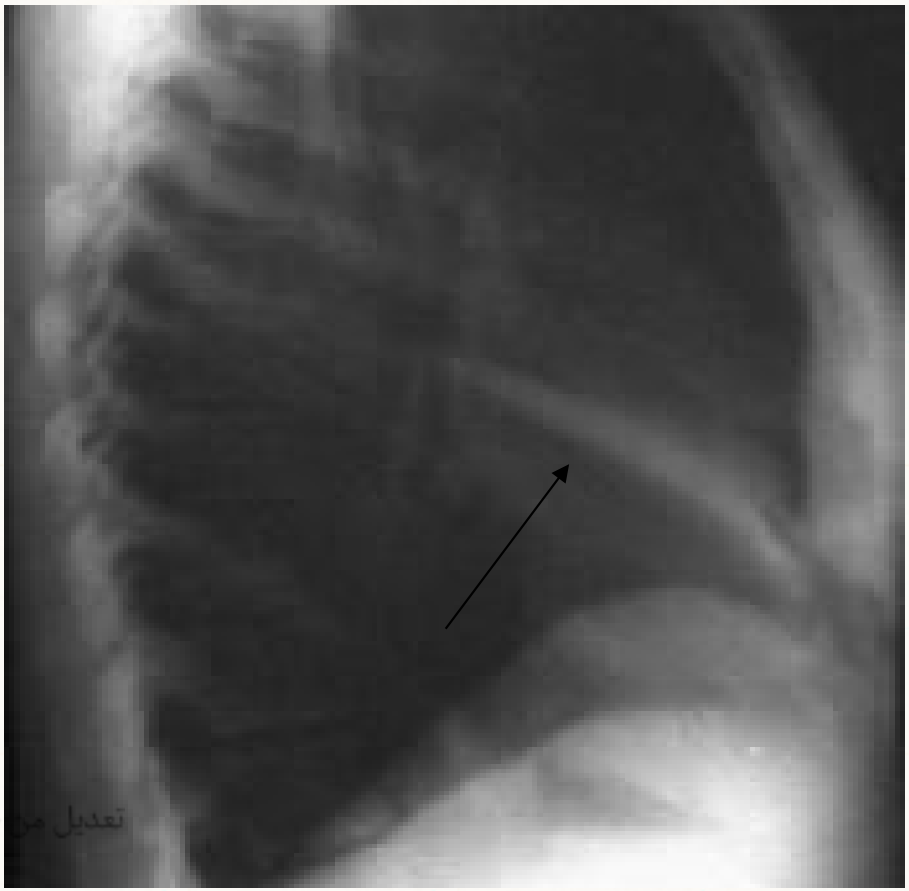
Pulmonary opacity 3 cm or more in diameter.



Radiological description:

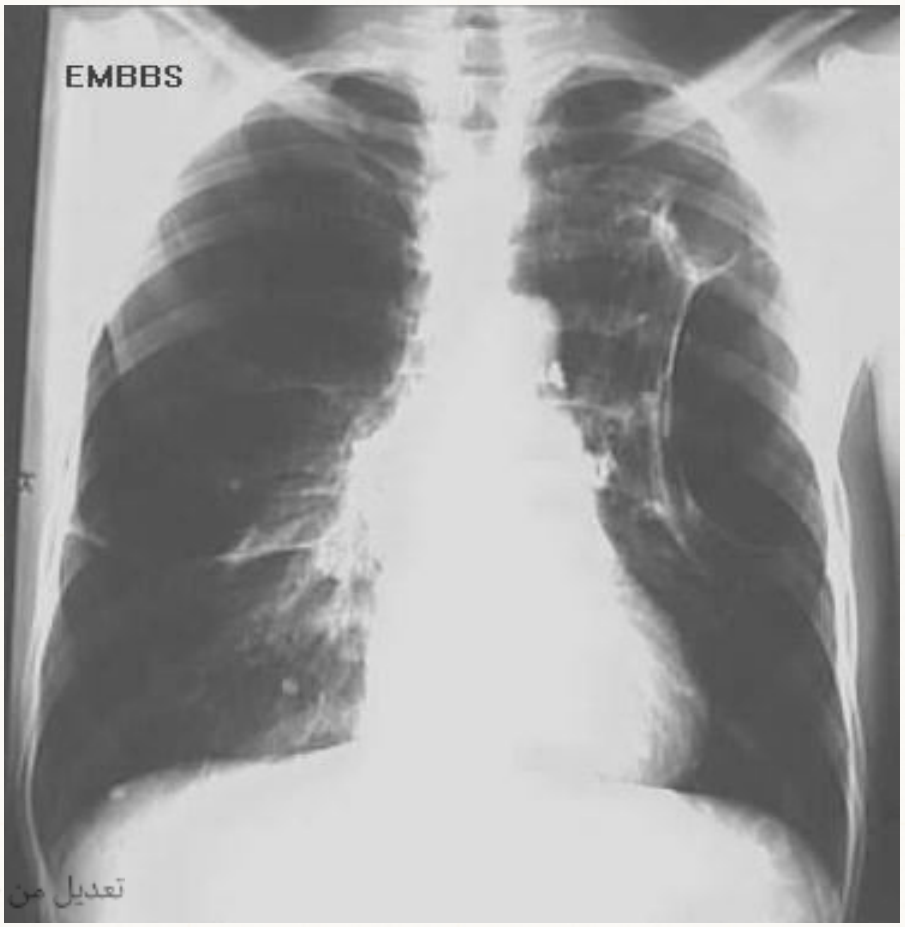
- **Linear shadows:** 1-3 mm in thickness and 1 - 10 cm or more in length
- **Band like shadows:** 3-10 mm in width.





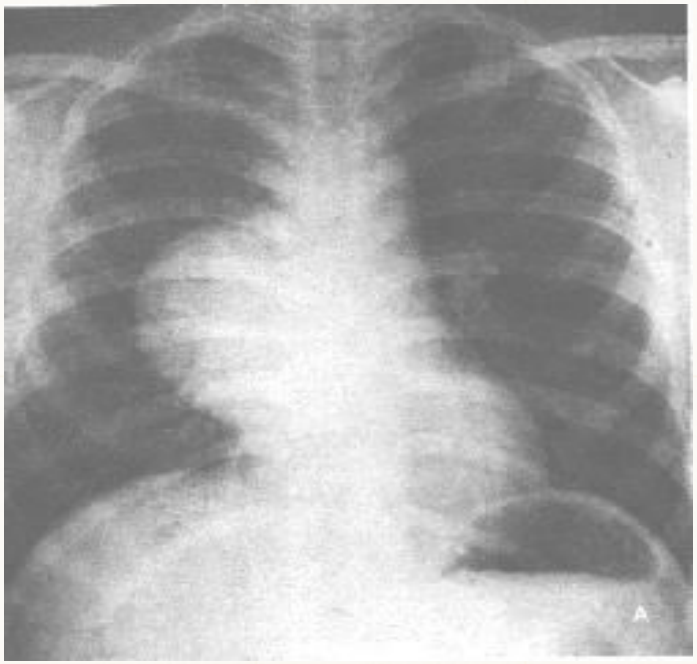
Radiological description:

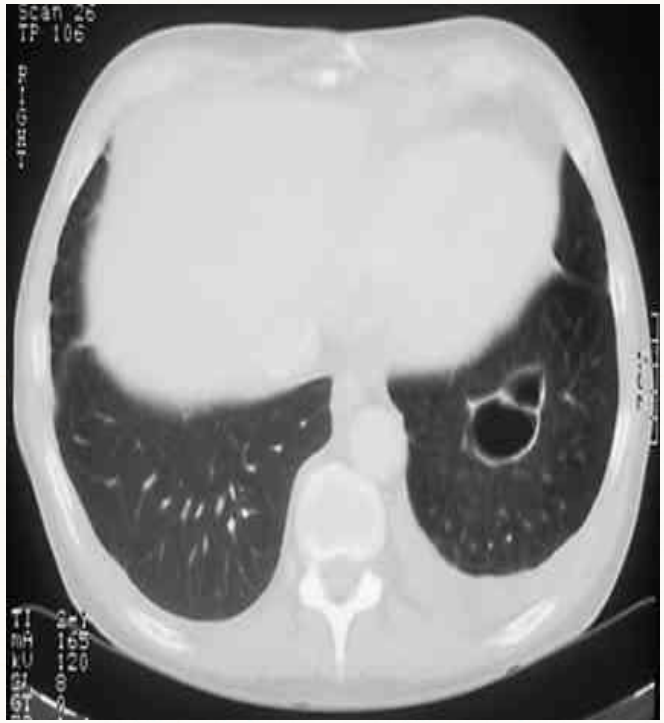
Bulla: Air filled space at least 1 cm in diameter and wall is hairline (<1 mm in thickness).



Radiological description:

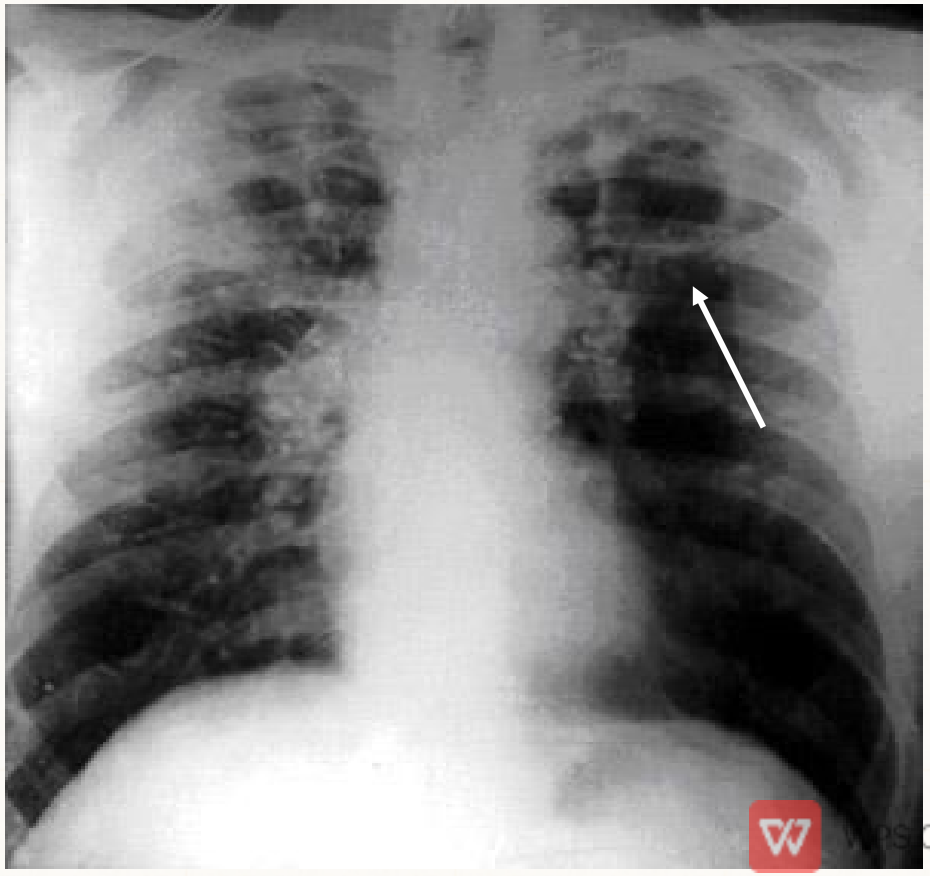
- **Cyst:** Air filled or fluid filled space at least 1 cm in diameter and wall is 1 - 3 mm in thickness.

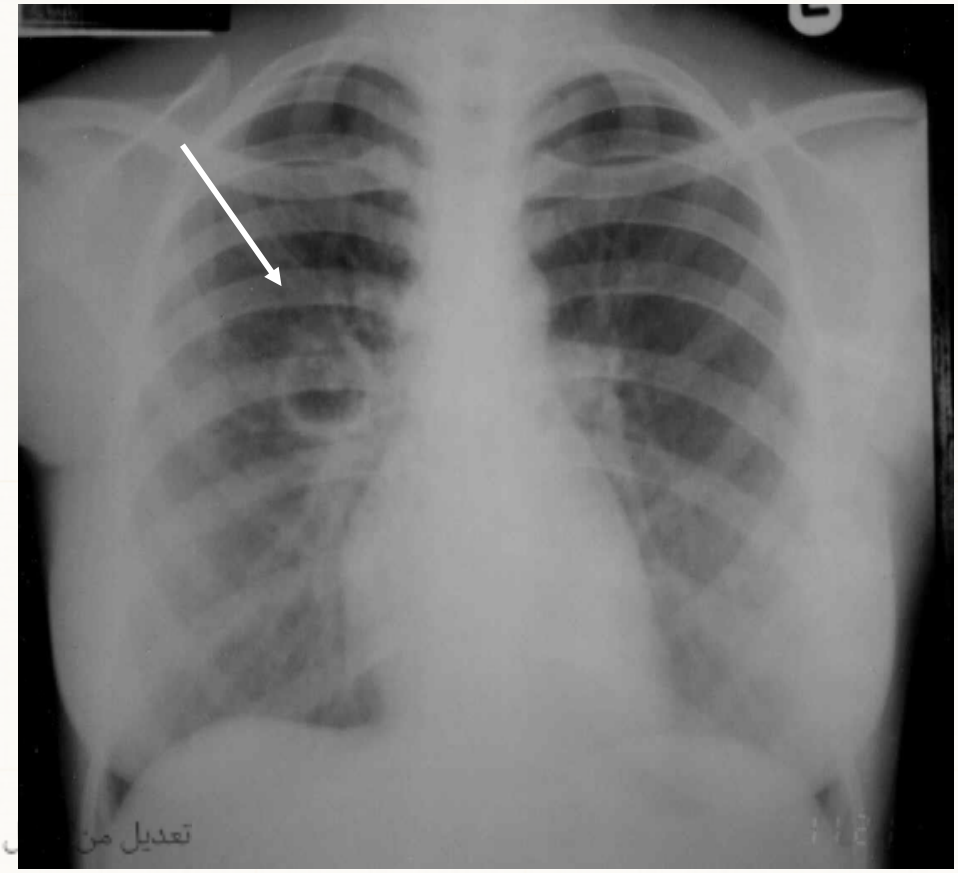




Radiological description:

- **Cavity:** Air f illed space at least 1 cm in diameter with complete wall and wall thickness is >3 mm.

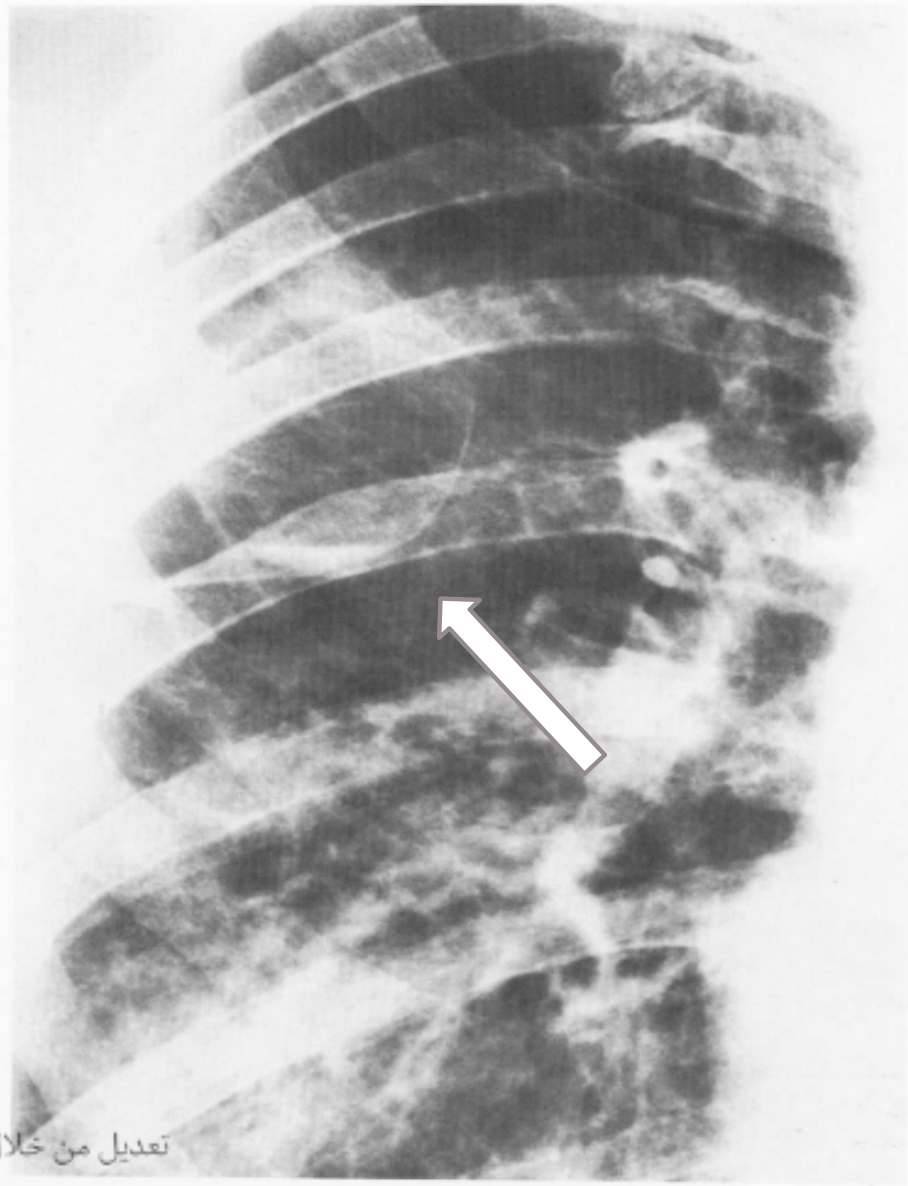




Radiological description:

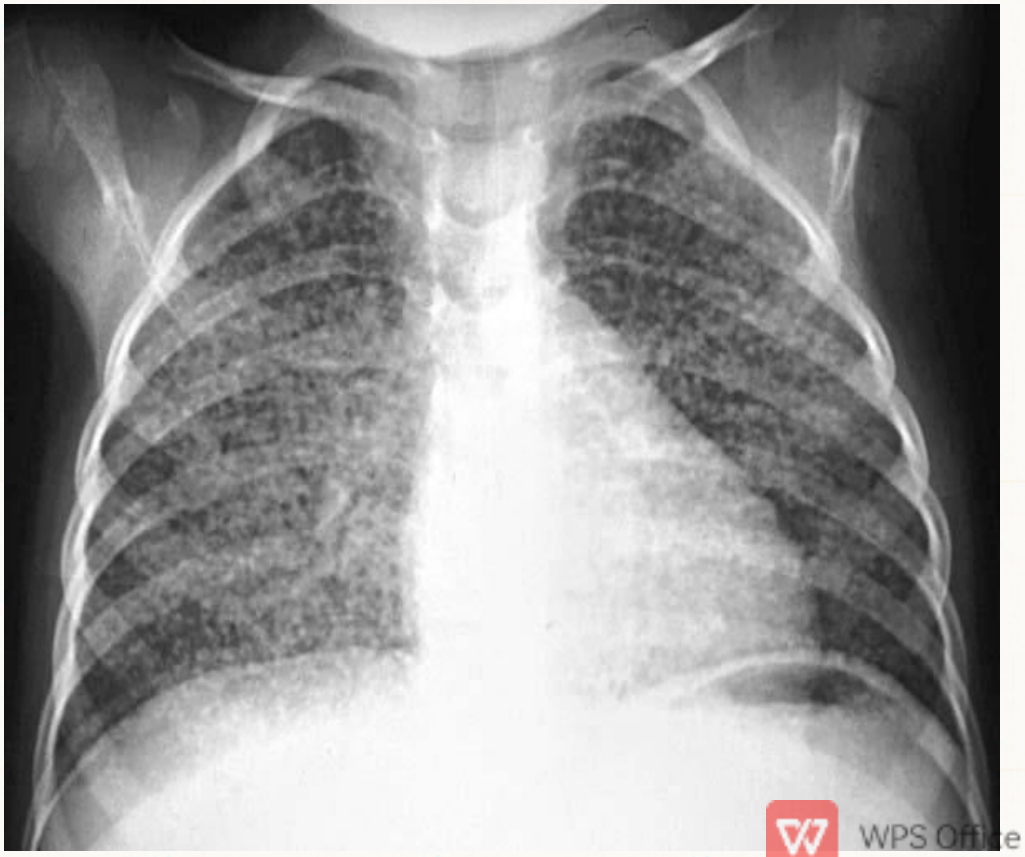
- **Pneumatocele:**

  Bulla resulting from pneumonic check-valve obstruction that rapidly ↑ in size.



Radiological description:

Miliar yshadows:
small discrete opacities of similar size 2-5 mm in diameter.



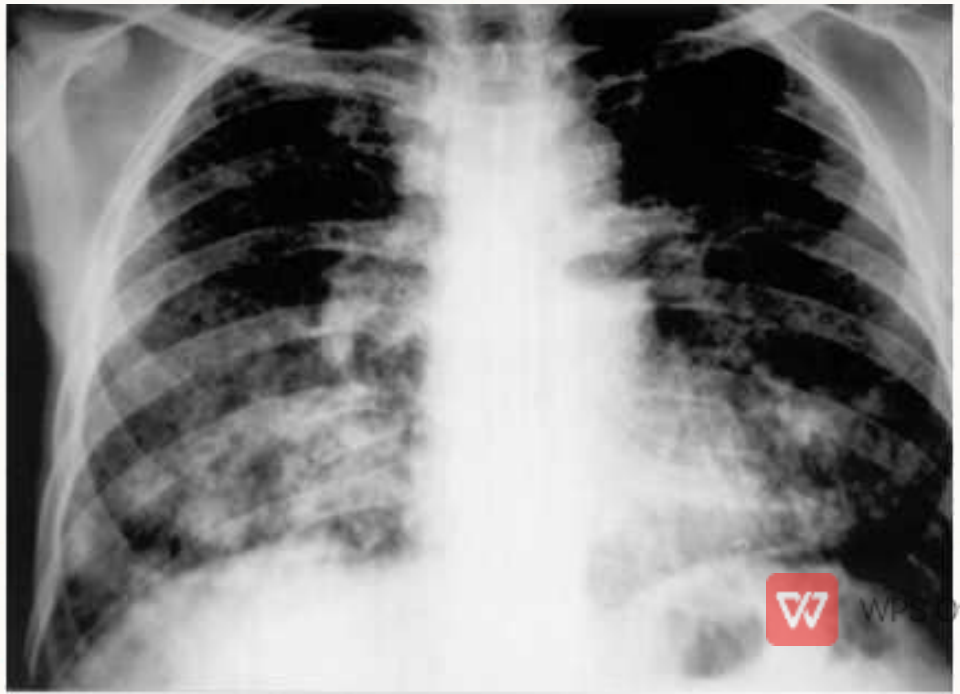
Radiological description:

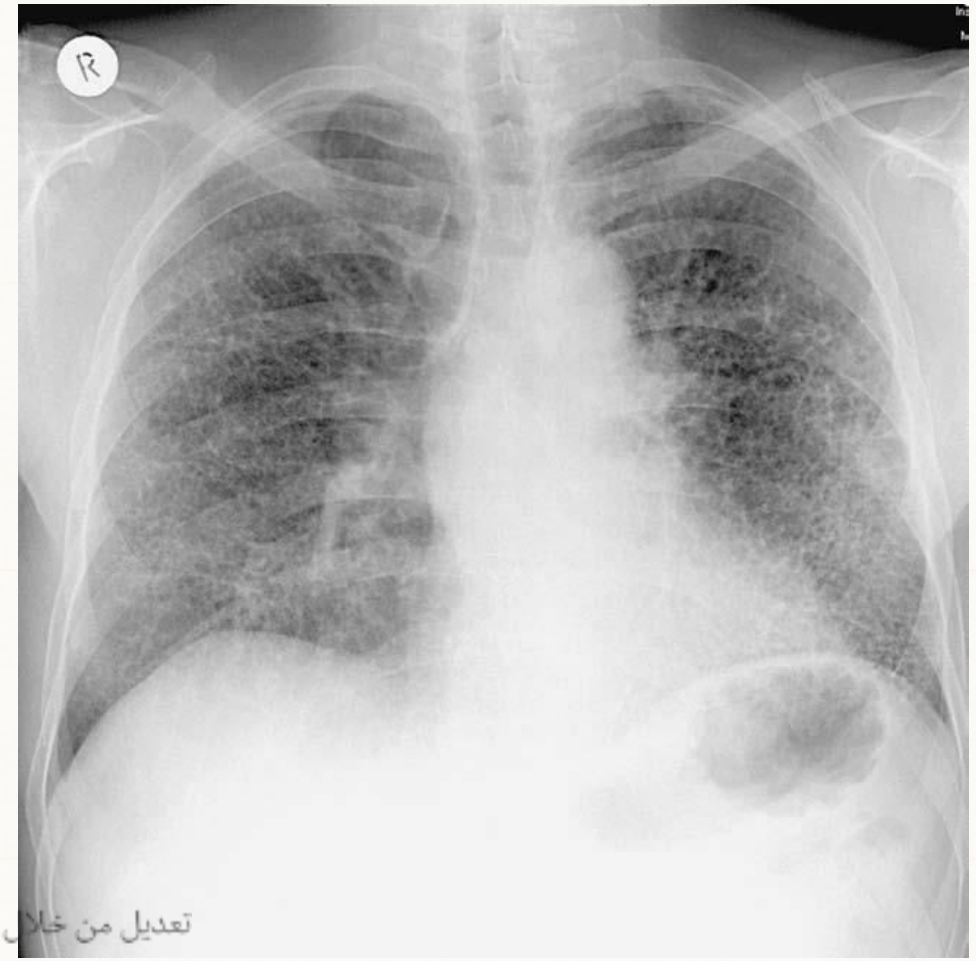
- **Reticular:**

  Linear streaks with mosaic appearance (1.5 – 10 mm thickness).

- **Reticulonodular:**

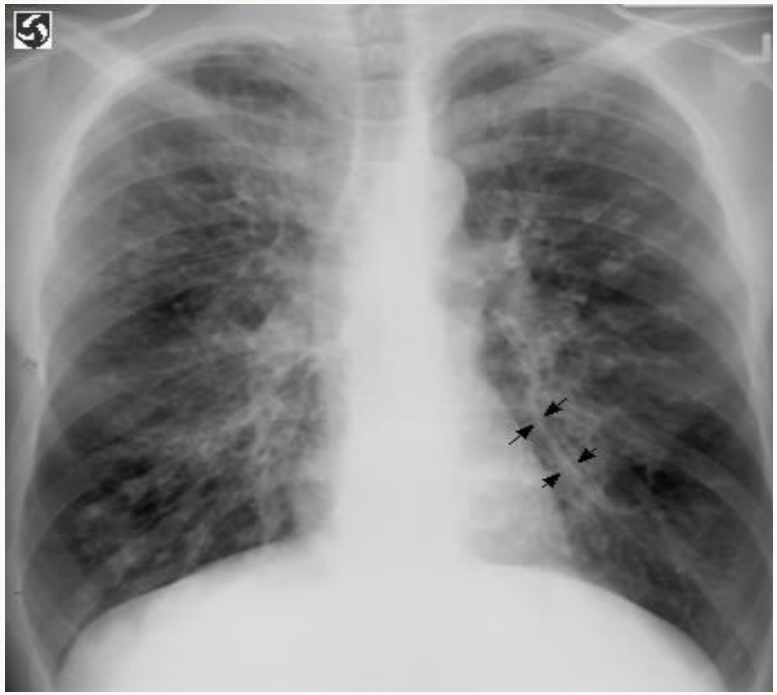
  Mixed reticular and miliary.

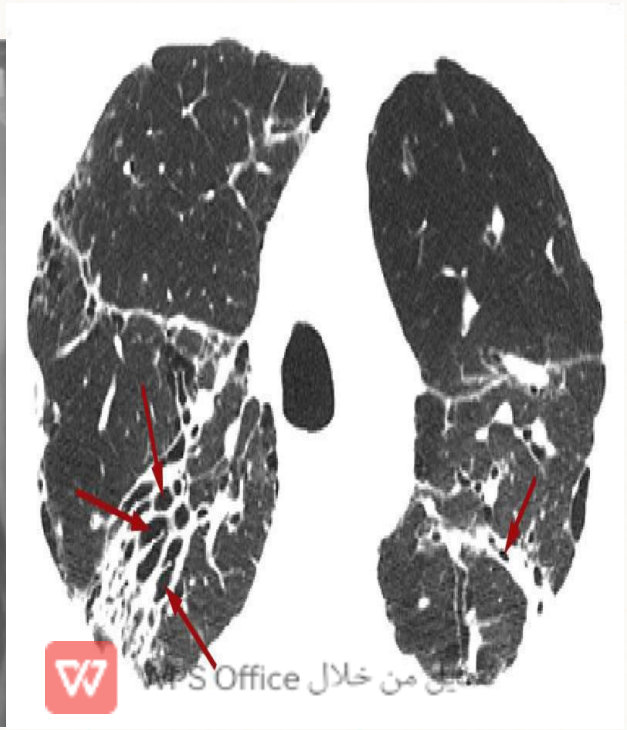


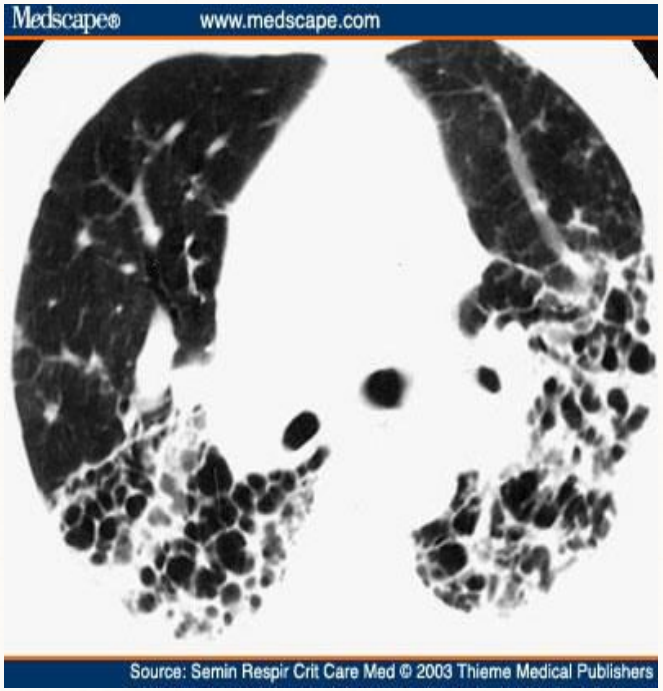


Radiological description:

Honeycomb shadowing:
Multiple Cysts 5-10 mm in size.







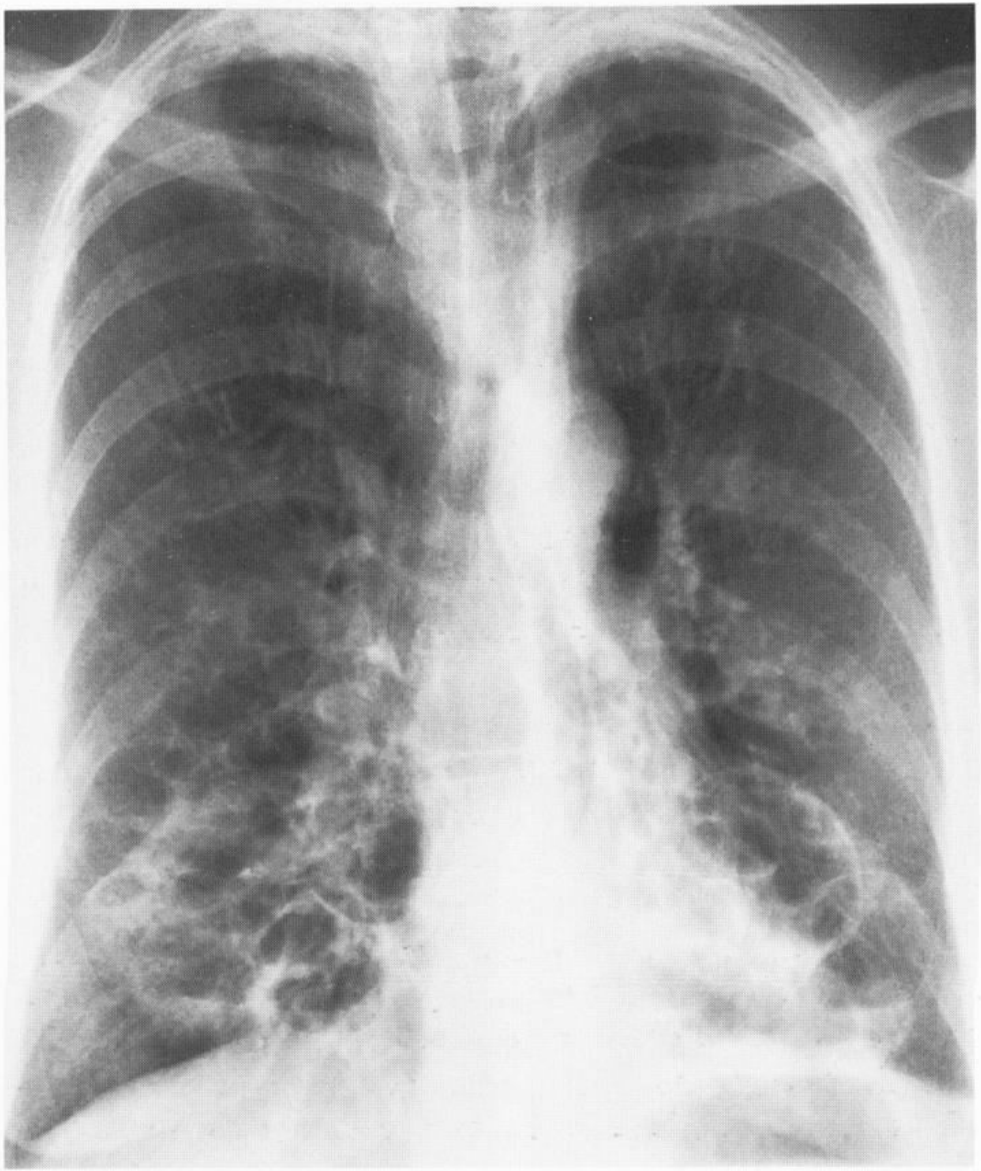
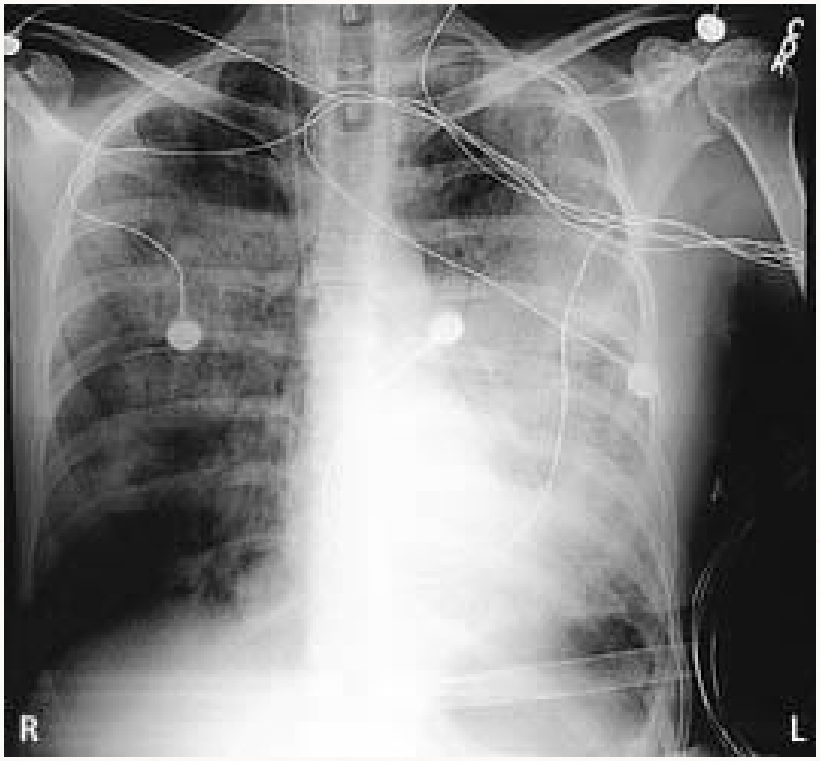


Fig. 6.9 Bronchiectasis. Multiple ring shadows, many containing air–fluid levels, are present throughout the lower zones of this patient with cystic bronchiectasis.

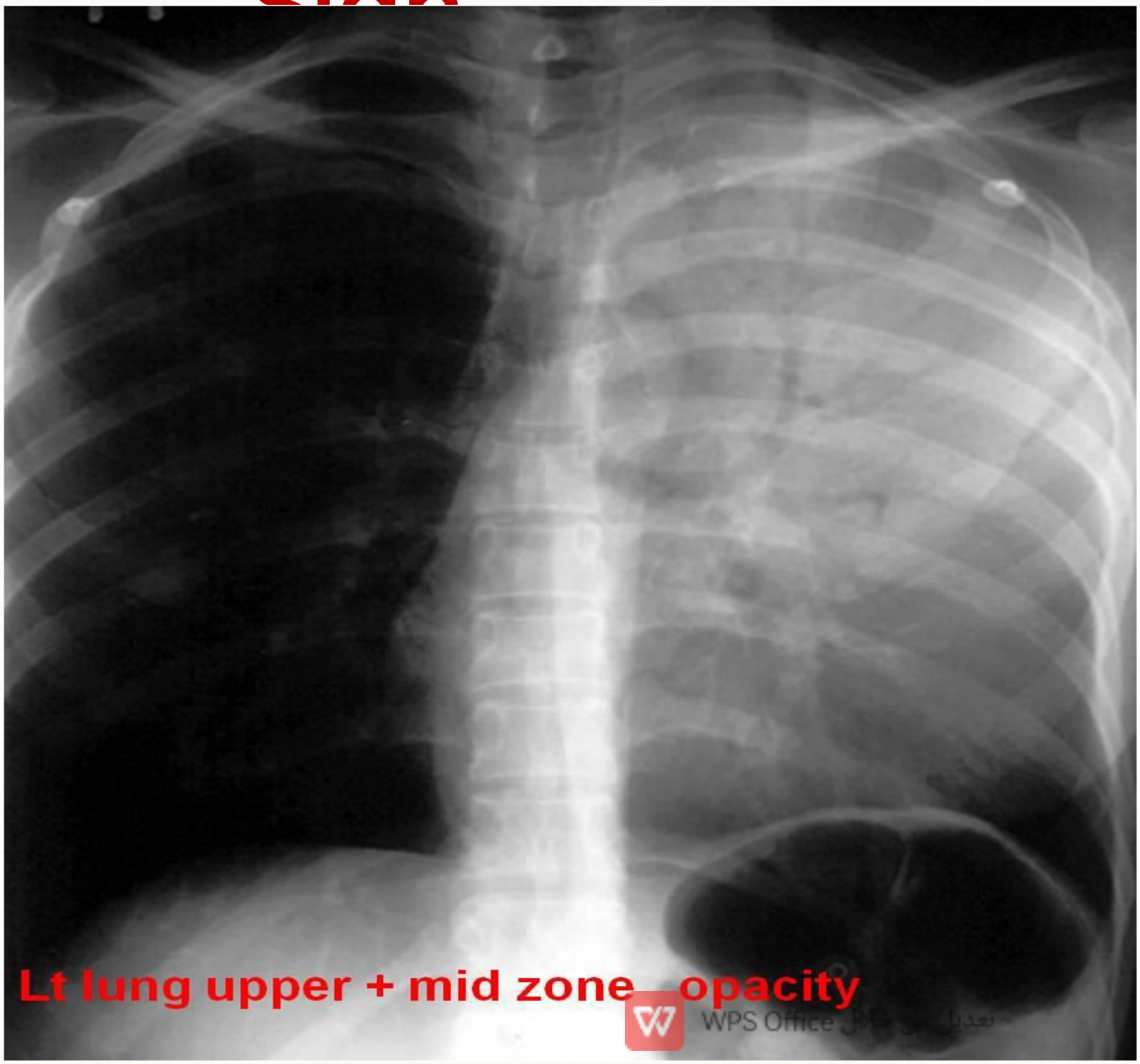
Fig. 6.11 Cystic bronchiectasis. A CT image through the upper lobes demonstrates multiple ring shadows. More caudal images reveal these to be due to irregularly dilated bronchi.

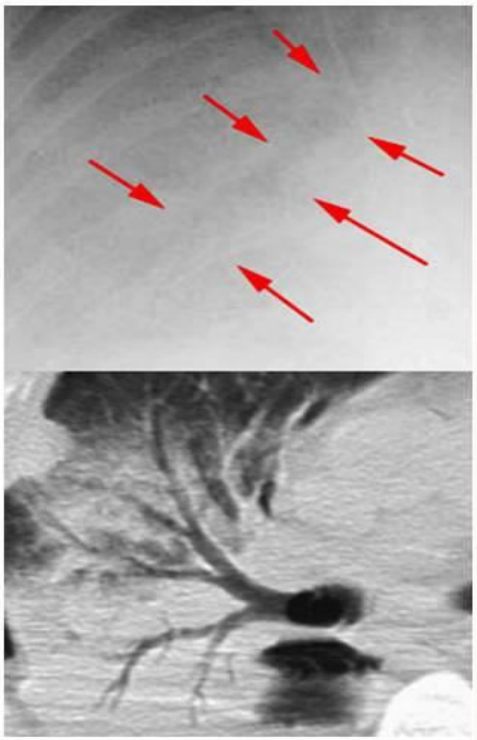
- Ground-Glass Opacity “GGO”:

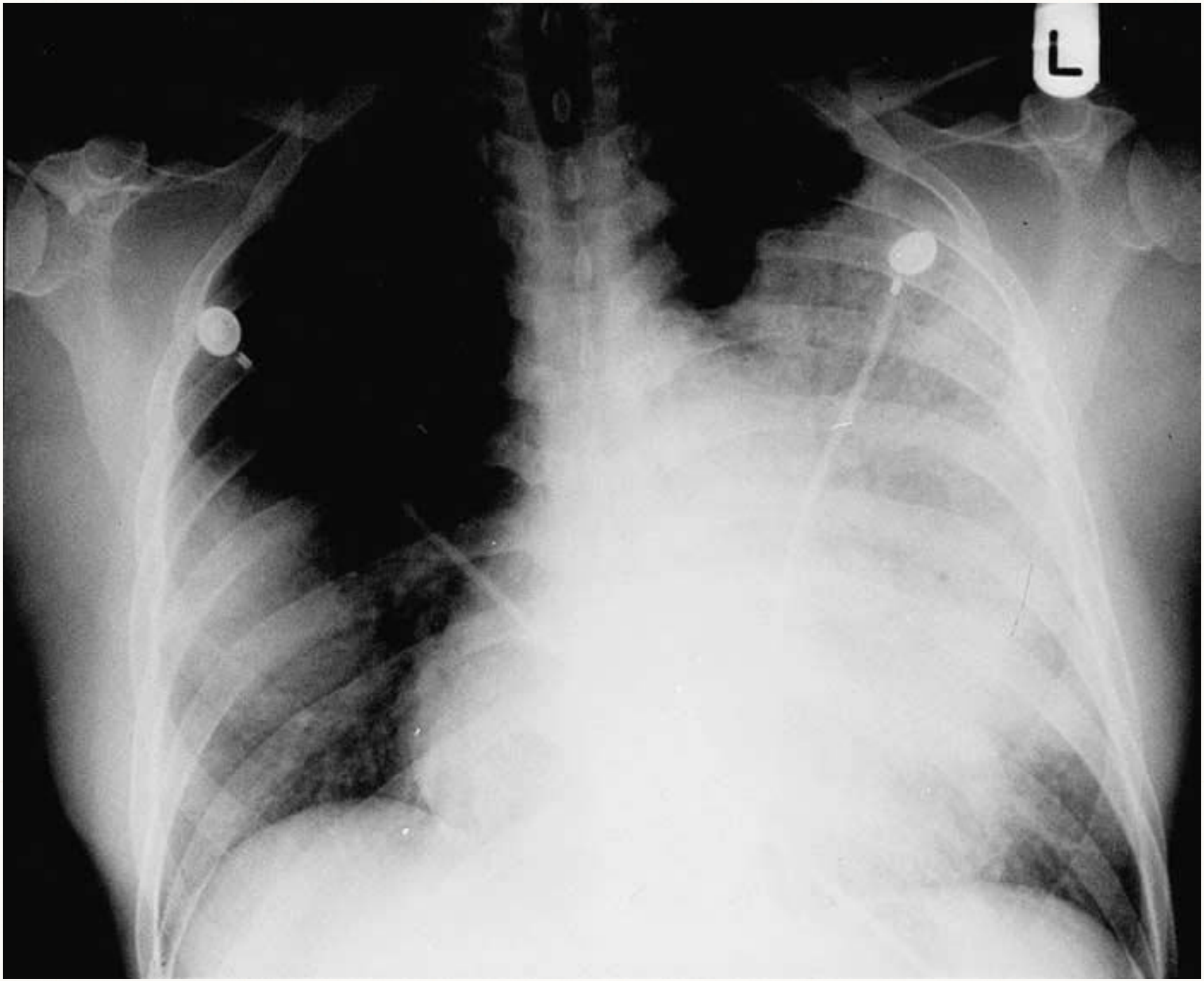
  Fine granular pattern which obscures the normal anatomic detail of the lung with preser ation of BVM.



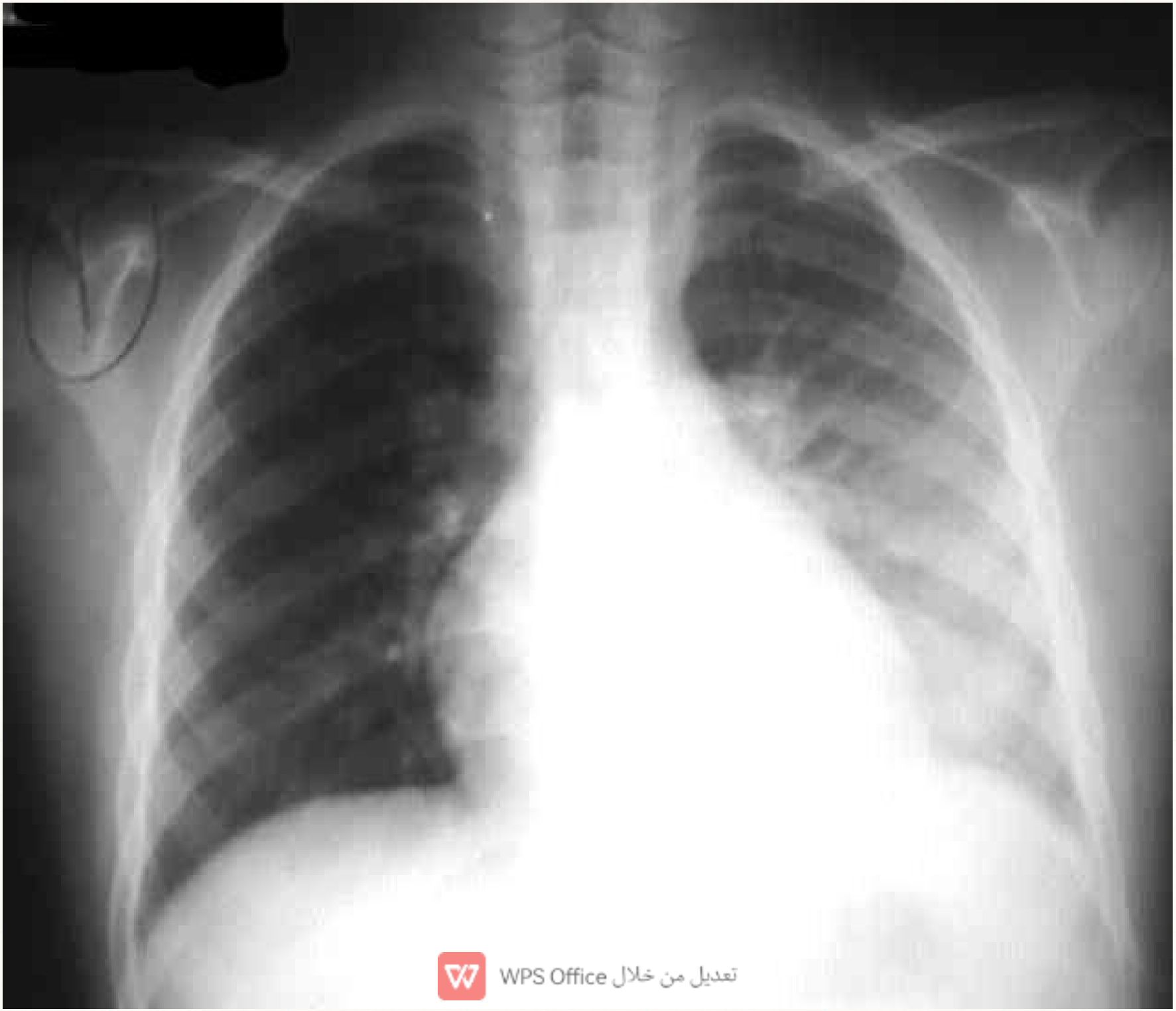
Air-Bronchogram Sign

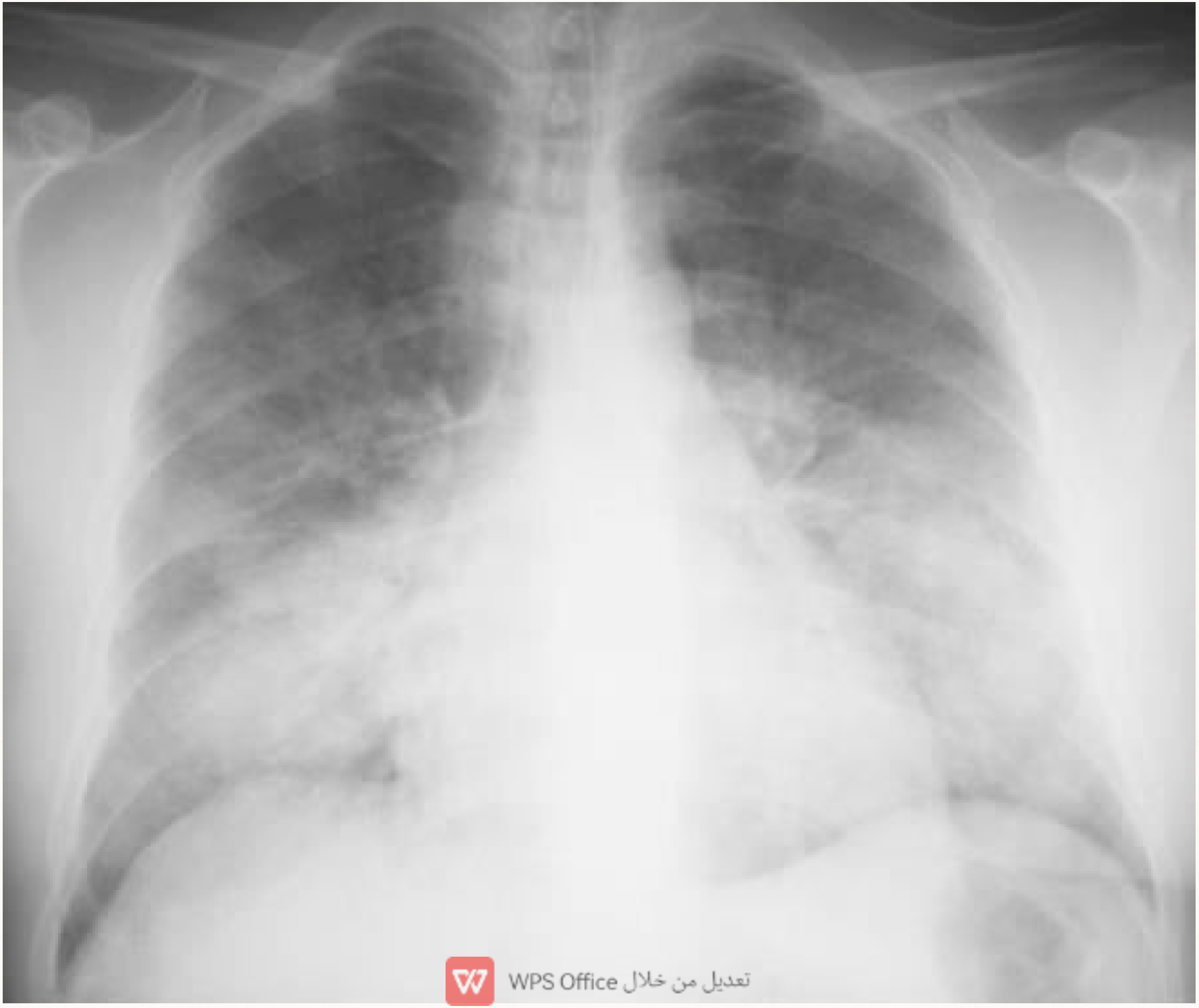


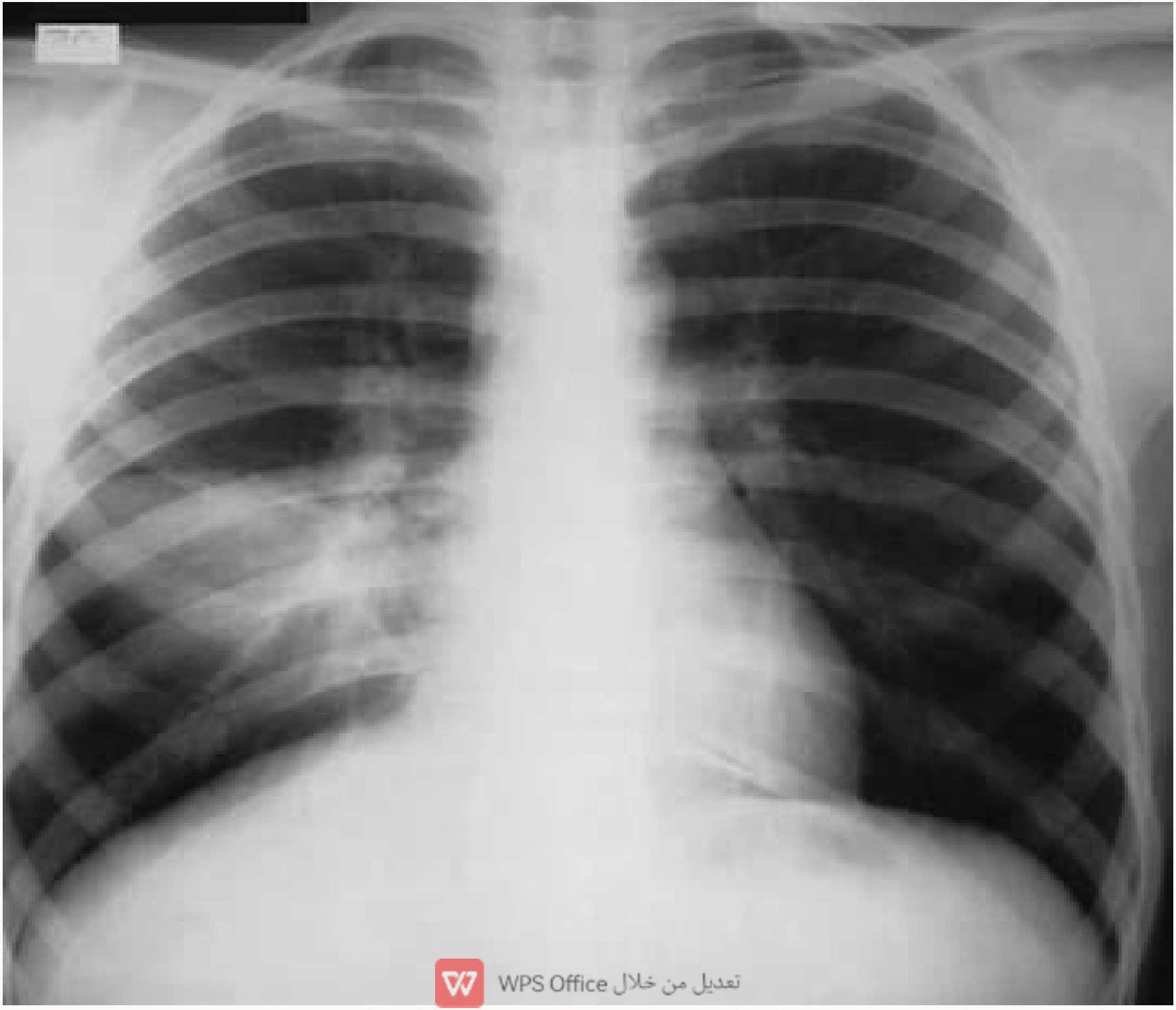


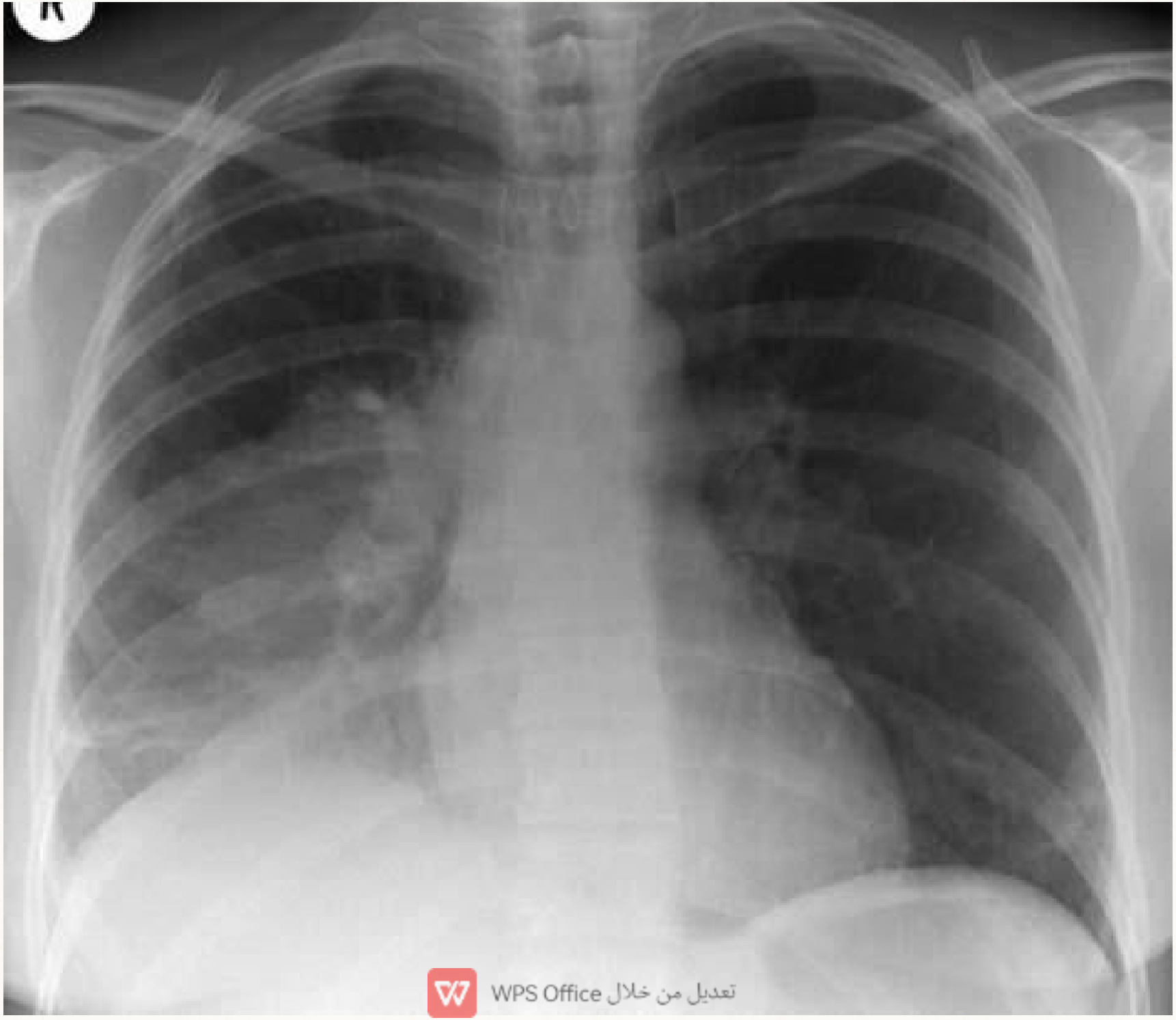


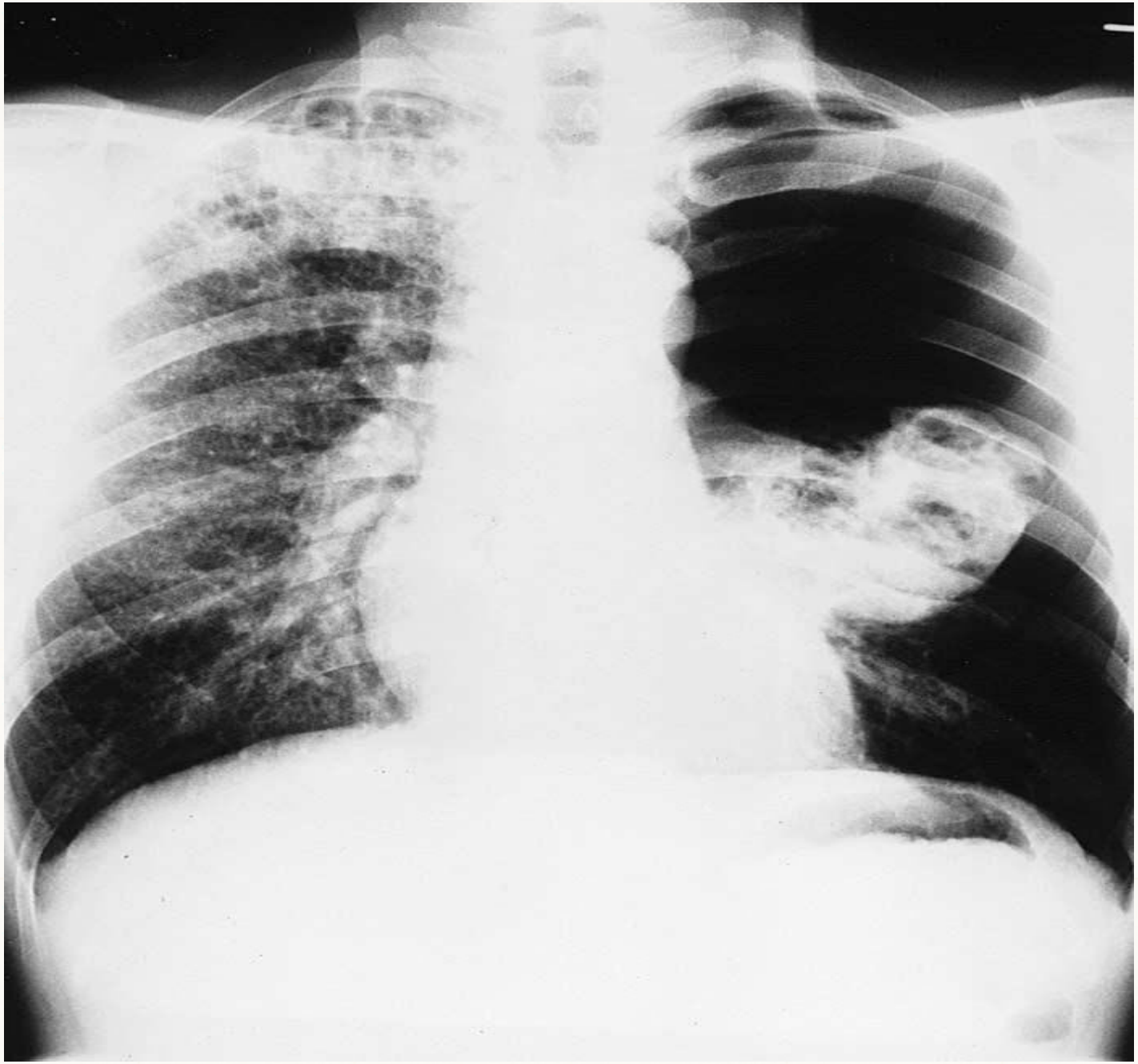
Severe pneumonia Multilobar involvement



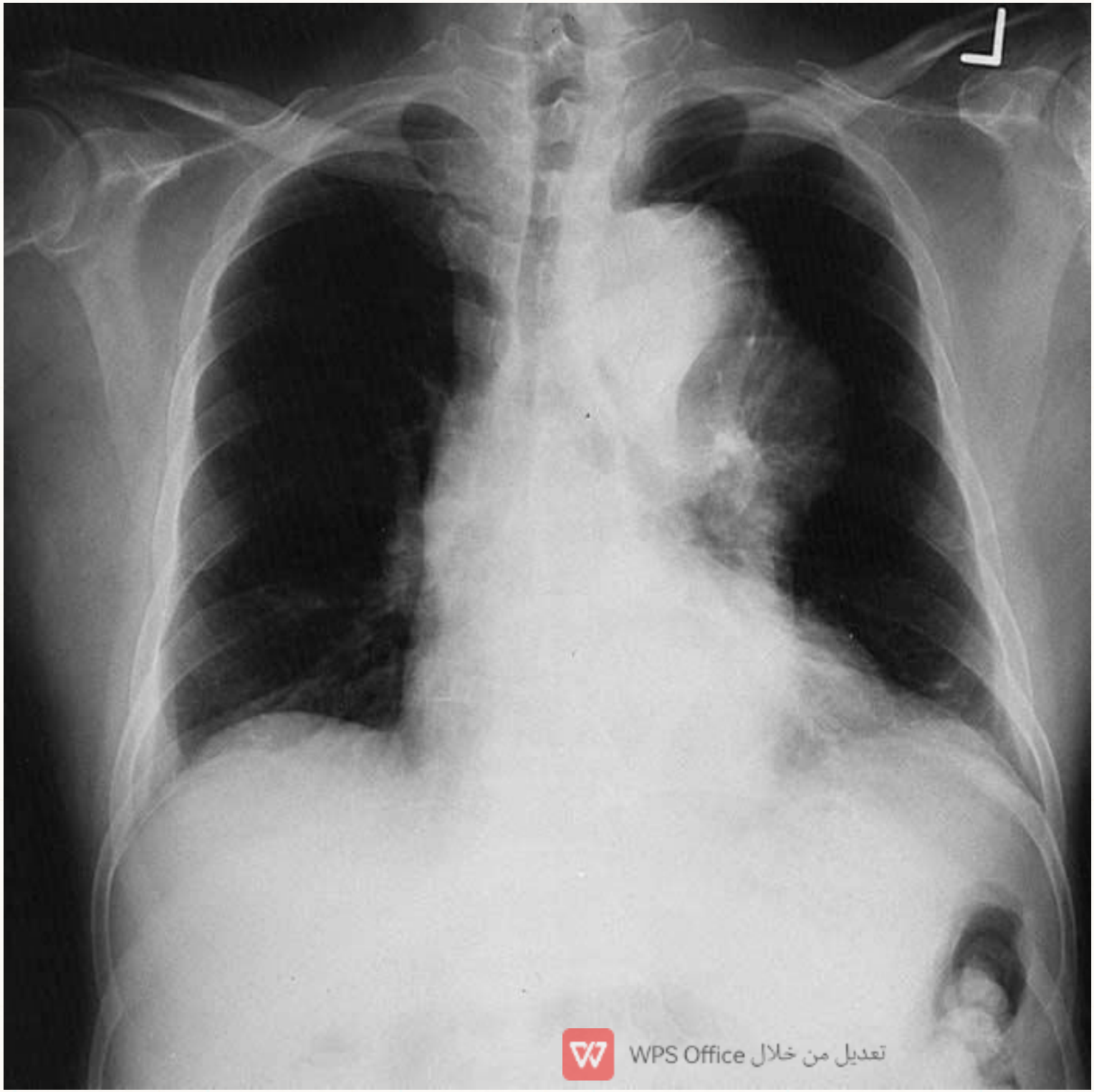




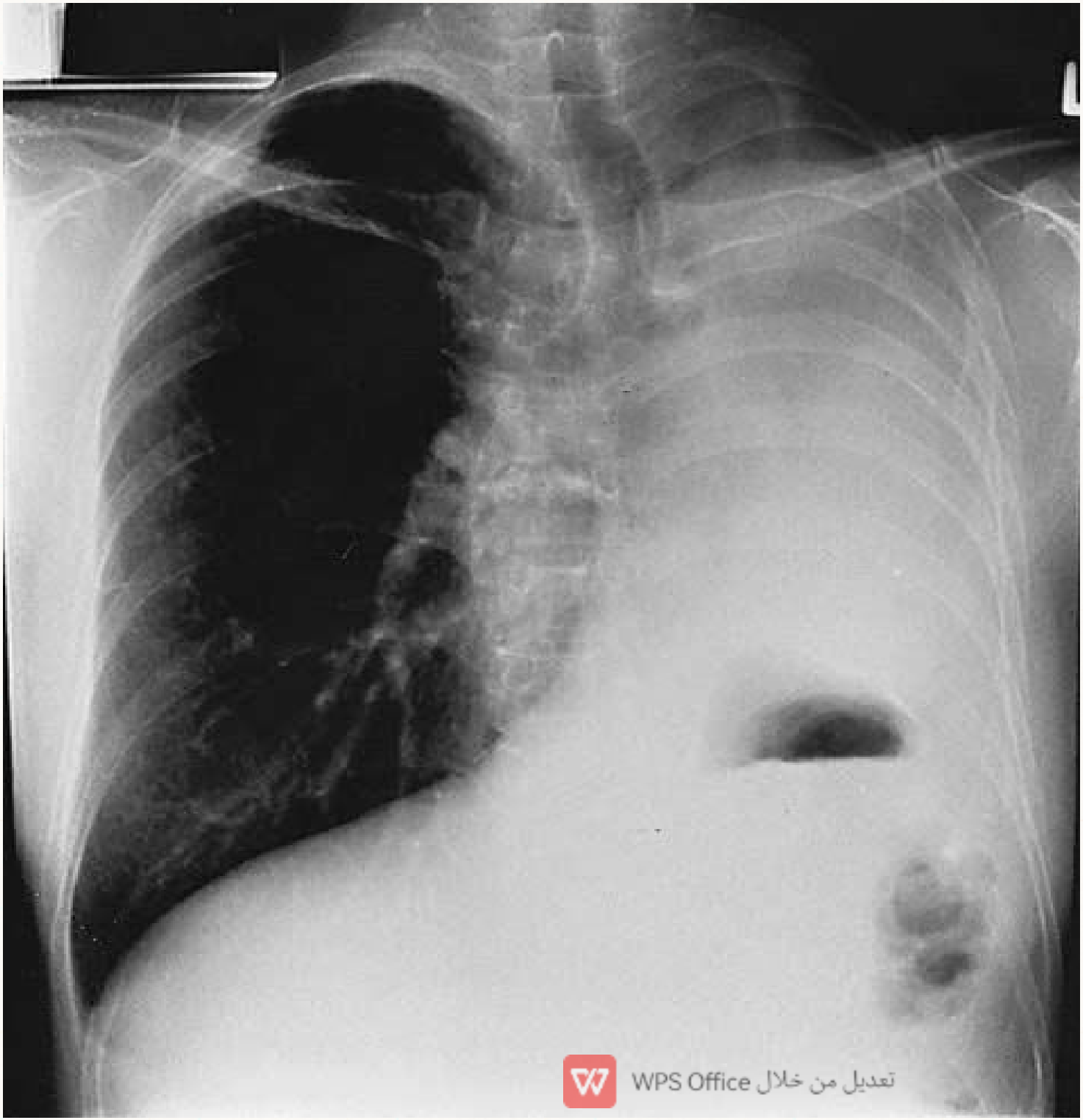




left pneumothorax right lung also shows cystic
changes in the upper lobe



widening of superior mediastinum well-defined mass inferior and contiguous with aorta arch. Dissection of the arch of the aorta has to be excluded.



homogenous opacif ɛation of the left hemithorax.

DD:

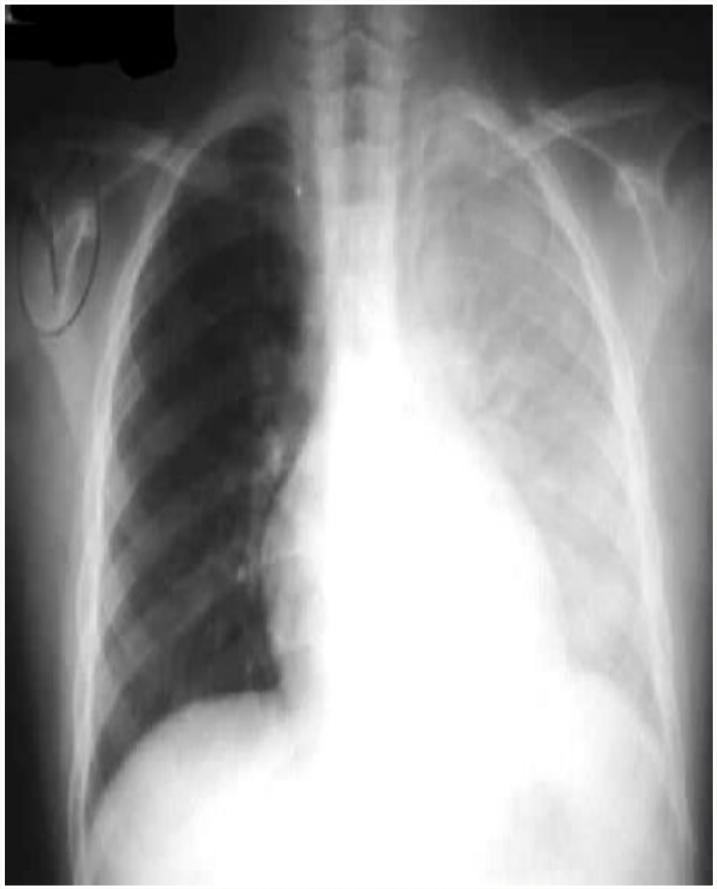
1.Collapse

2. Fibrosis

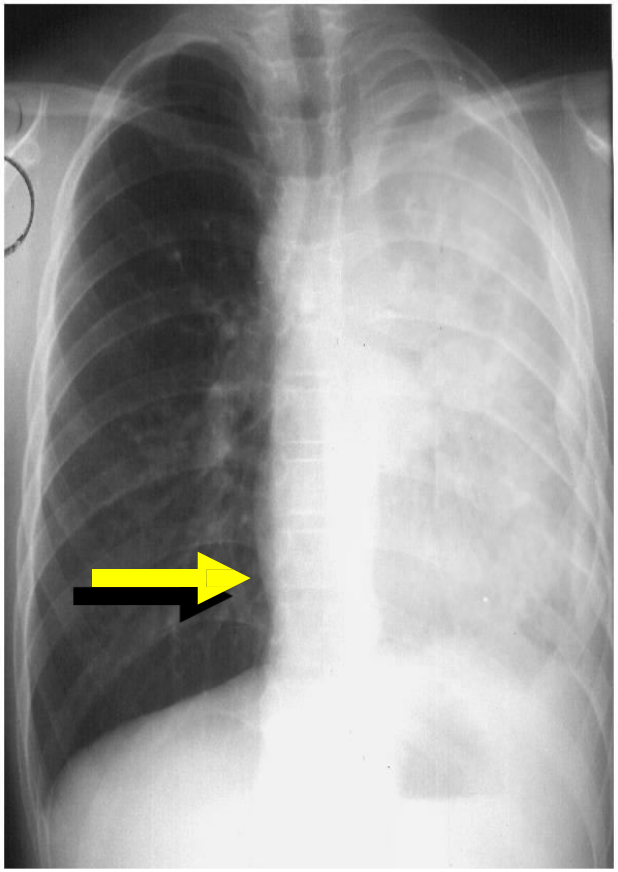
3. Pneumonectom y

3. Consolidation

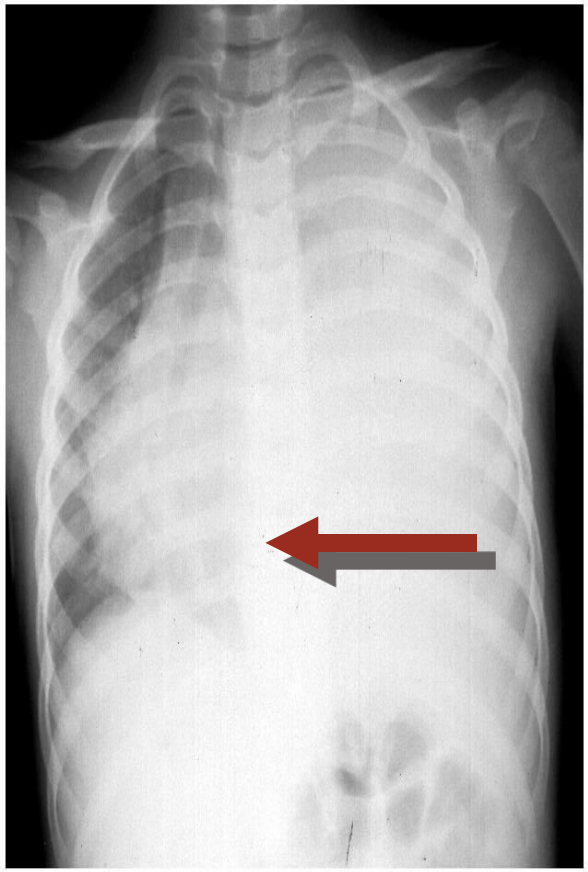
4.Ef ɬsion 5.Mass



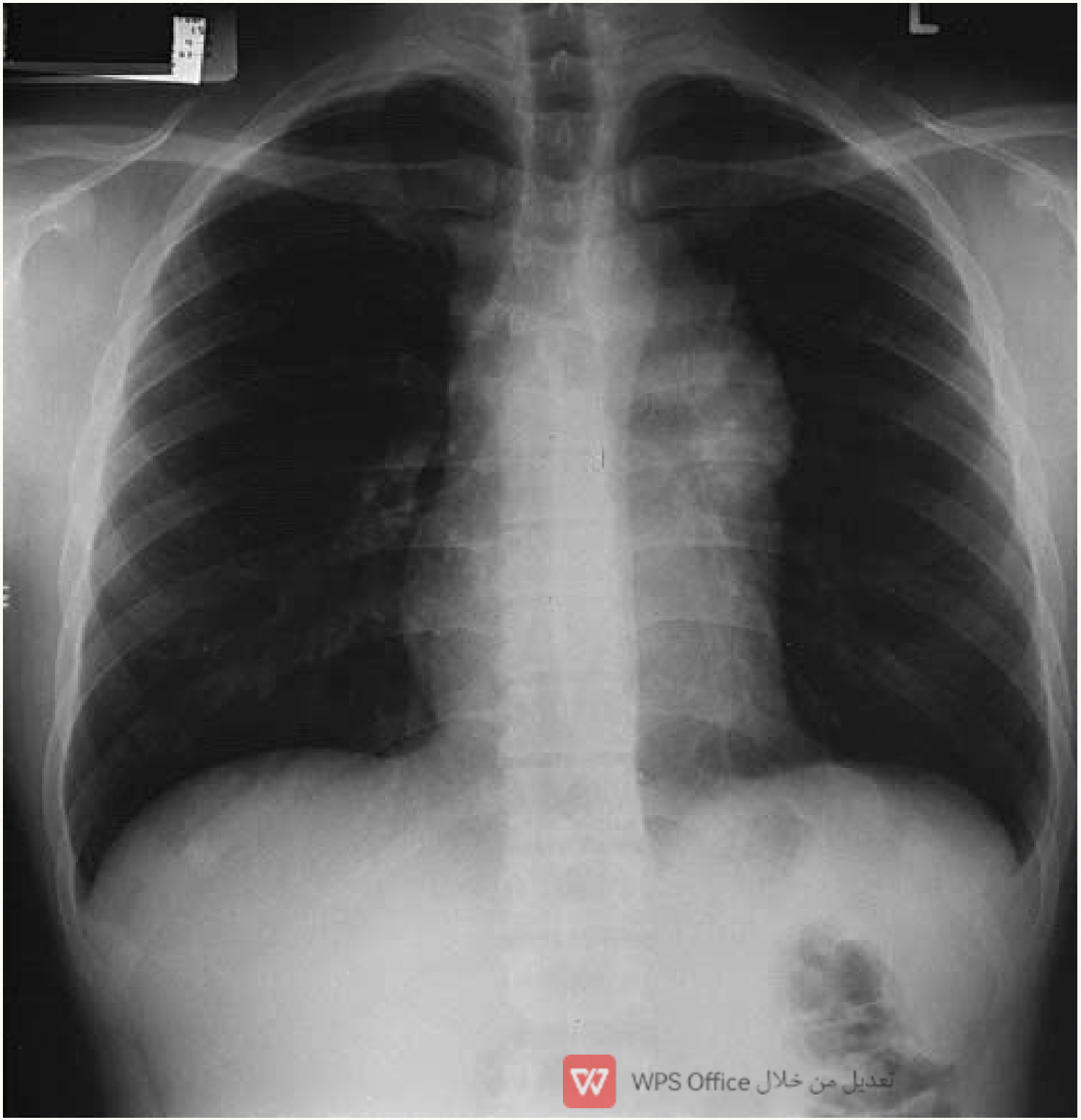
Consolidated Pneumonia



Massive Atelectasis



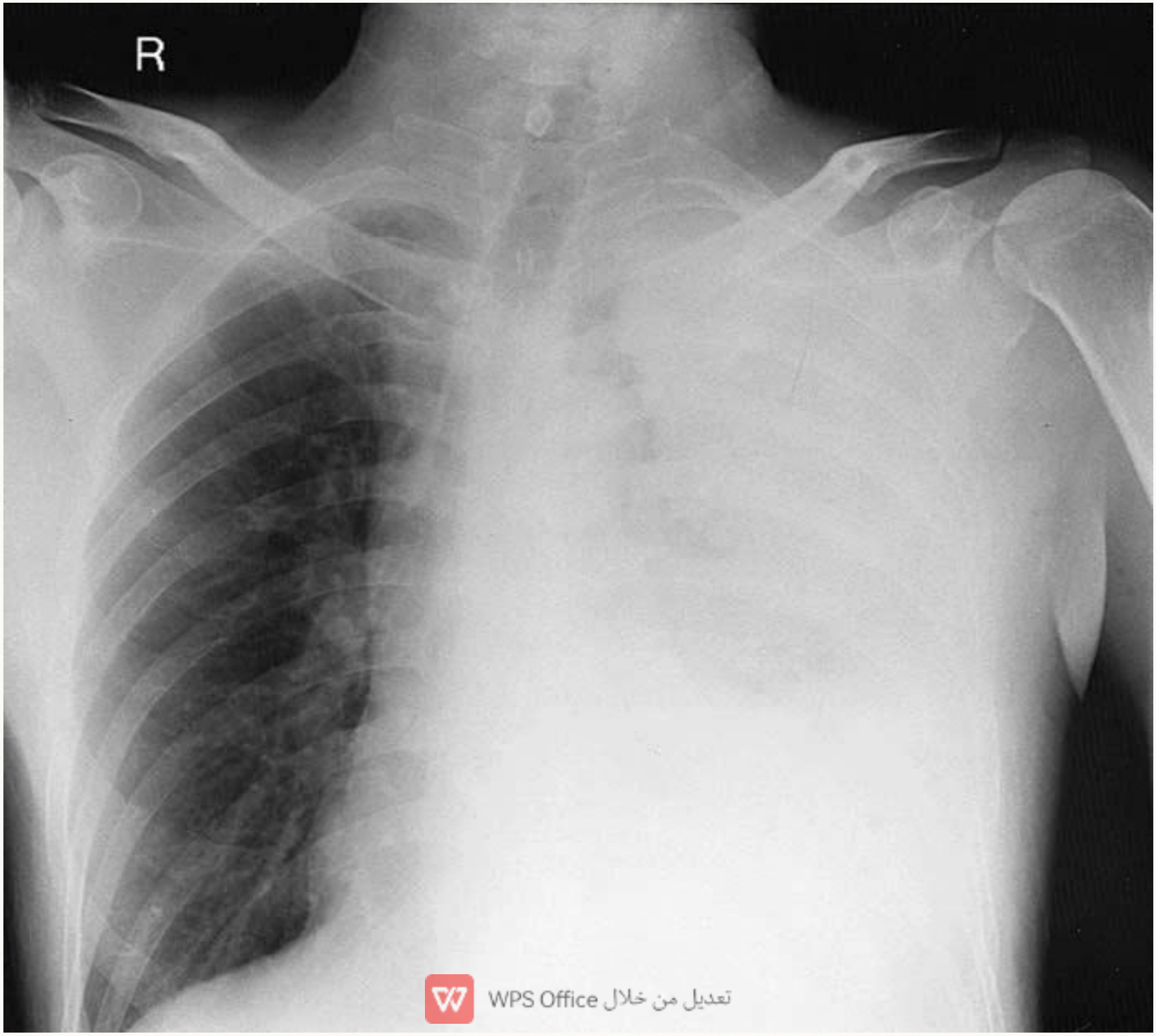
Massive Pleural Effusion

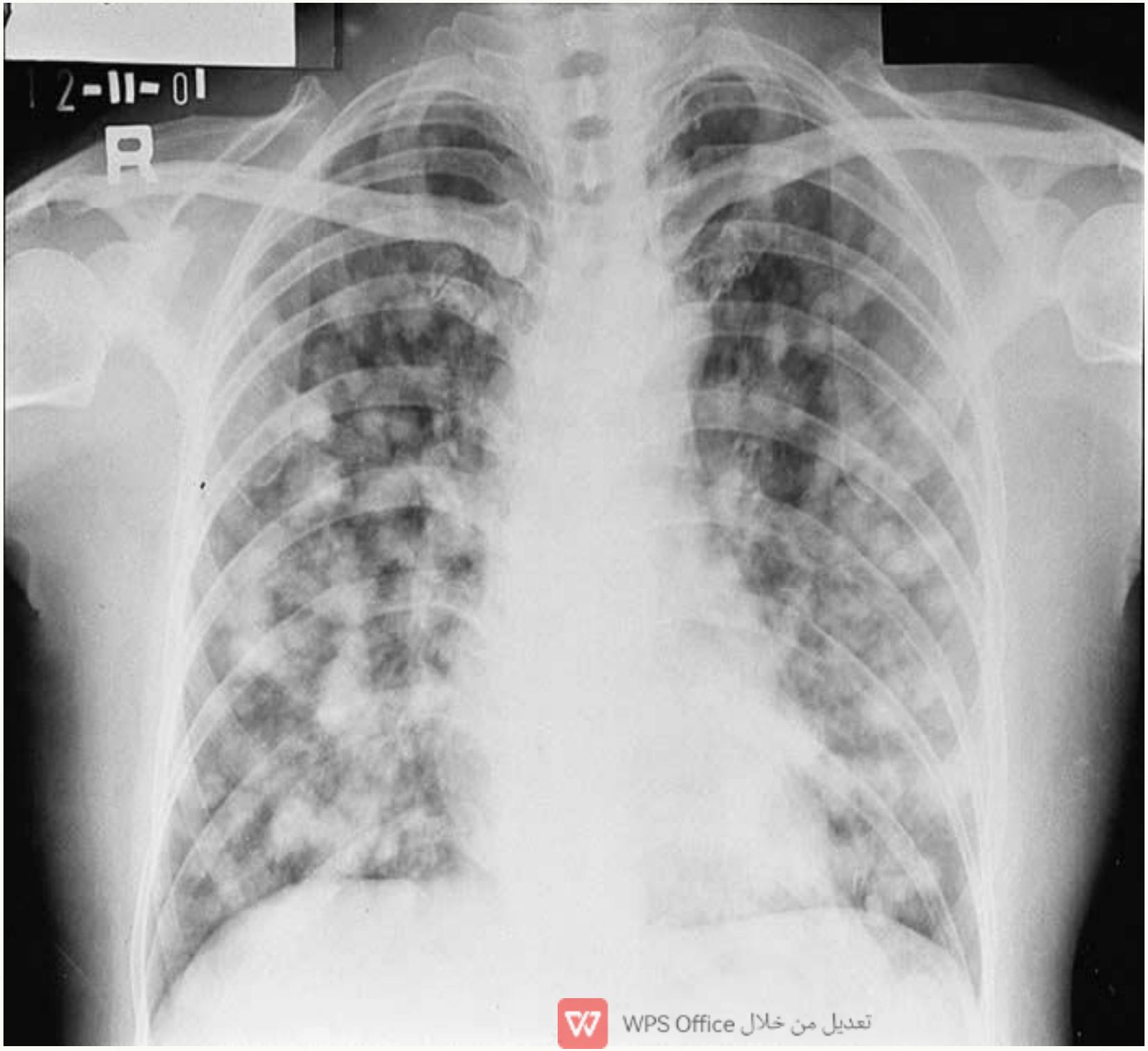


Homogenous opacity , rounded, well def ined border, overlying the left hilum

DD:

- Pulmonar y artery dilatation.
- Lymphoma
- Mediastinal mass
- Sarcoidosis

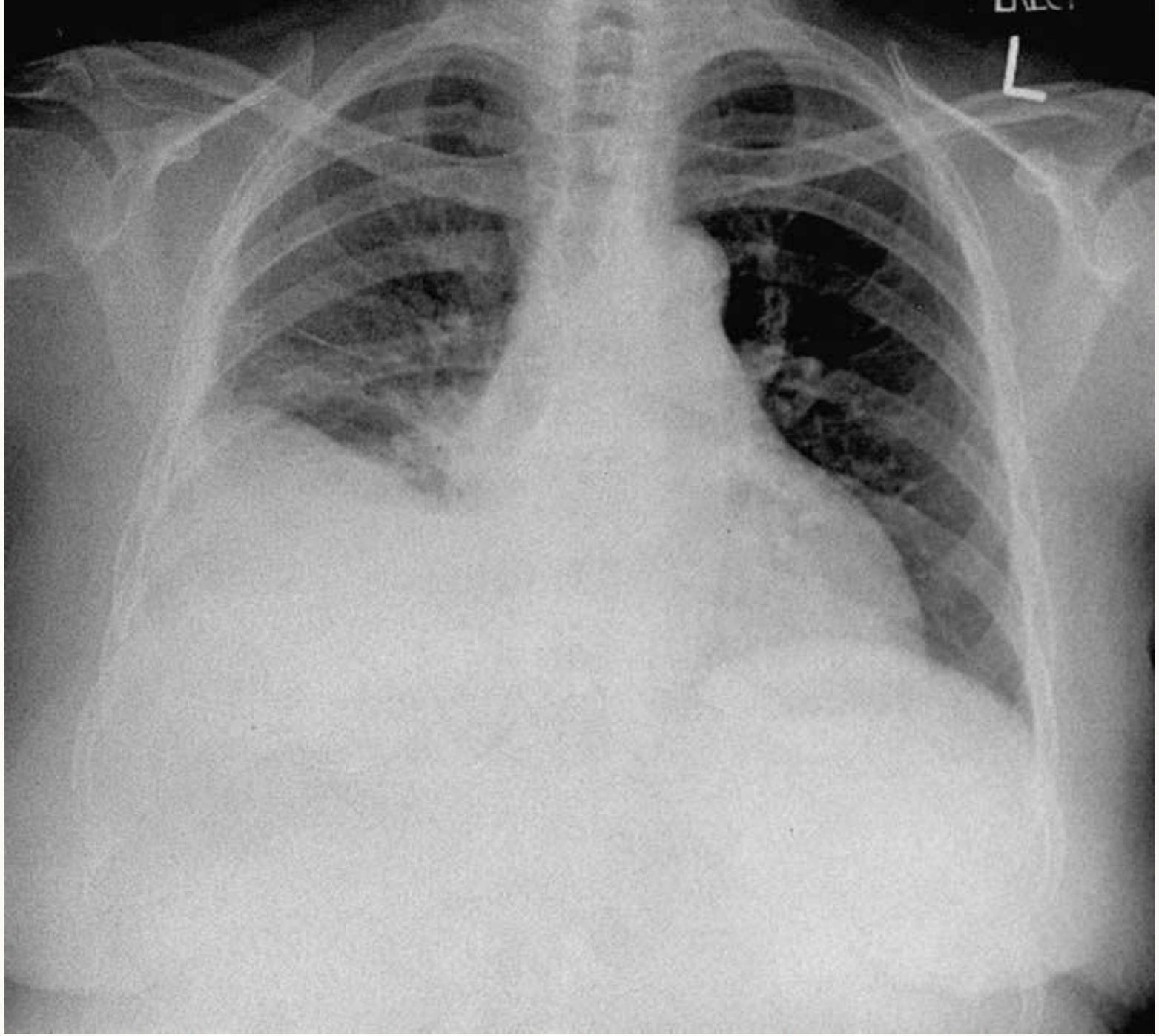




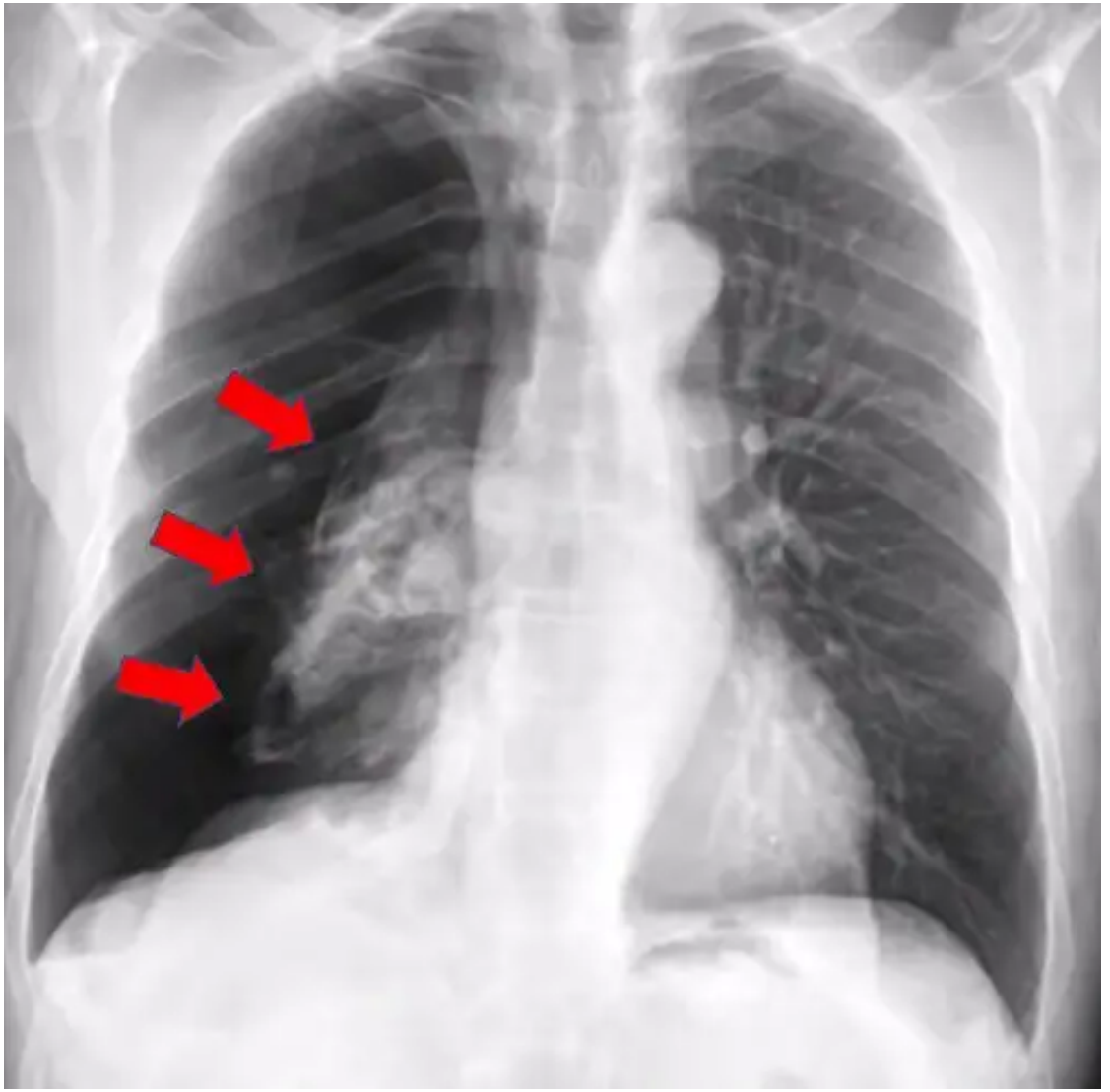
Bilateral lung nodules

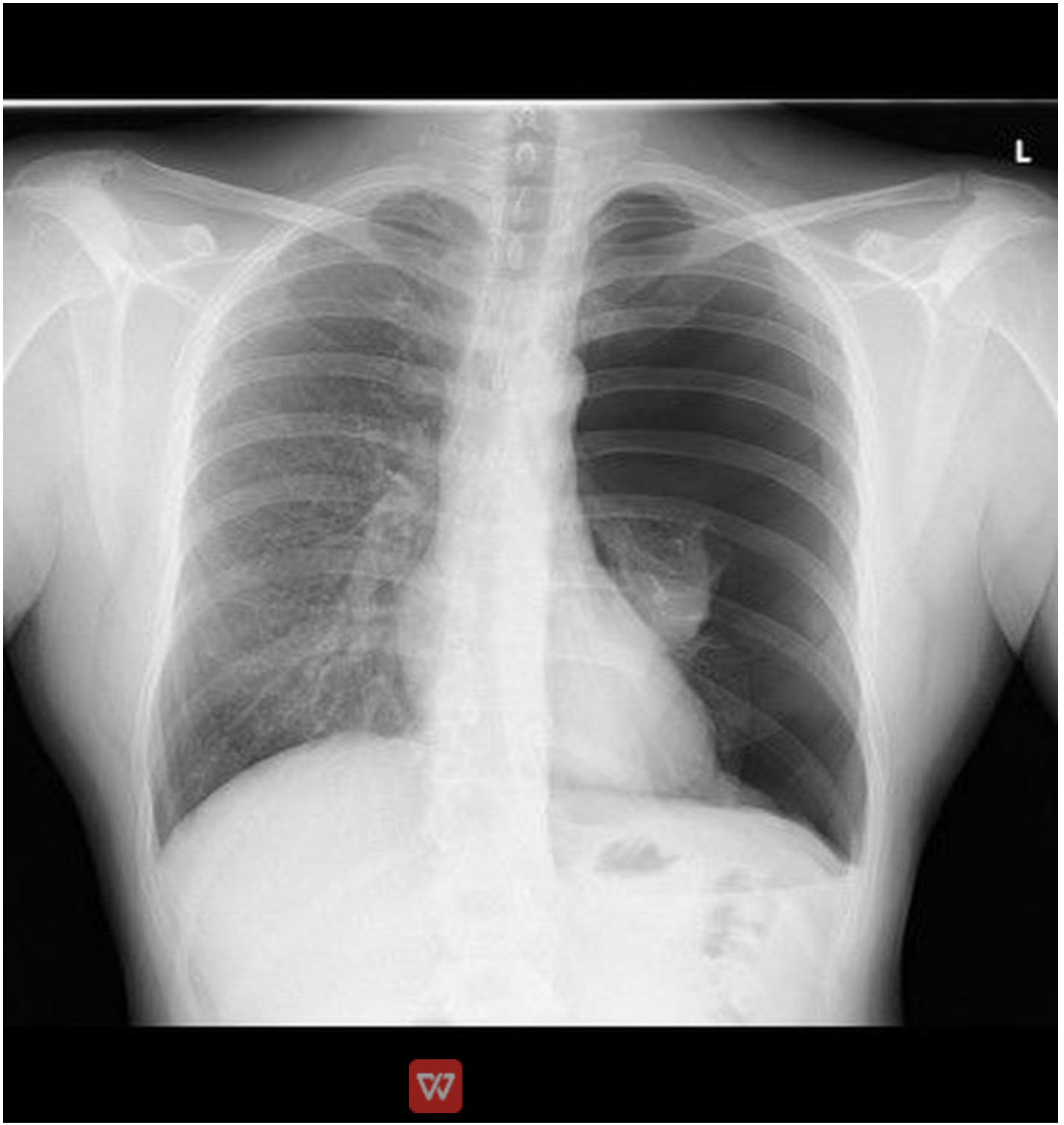
DD

- Metastases from cancers:
  - Breast
  - Colon
  - Rectum
  - Kidney.
- Bronchopneumonia
- TB
- Rheumatoid



This patient gave histor yof liver cirrhosis and ascites. Pleural ef fusion.

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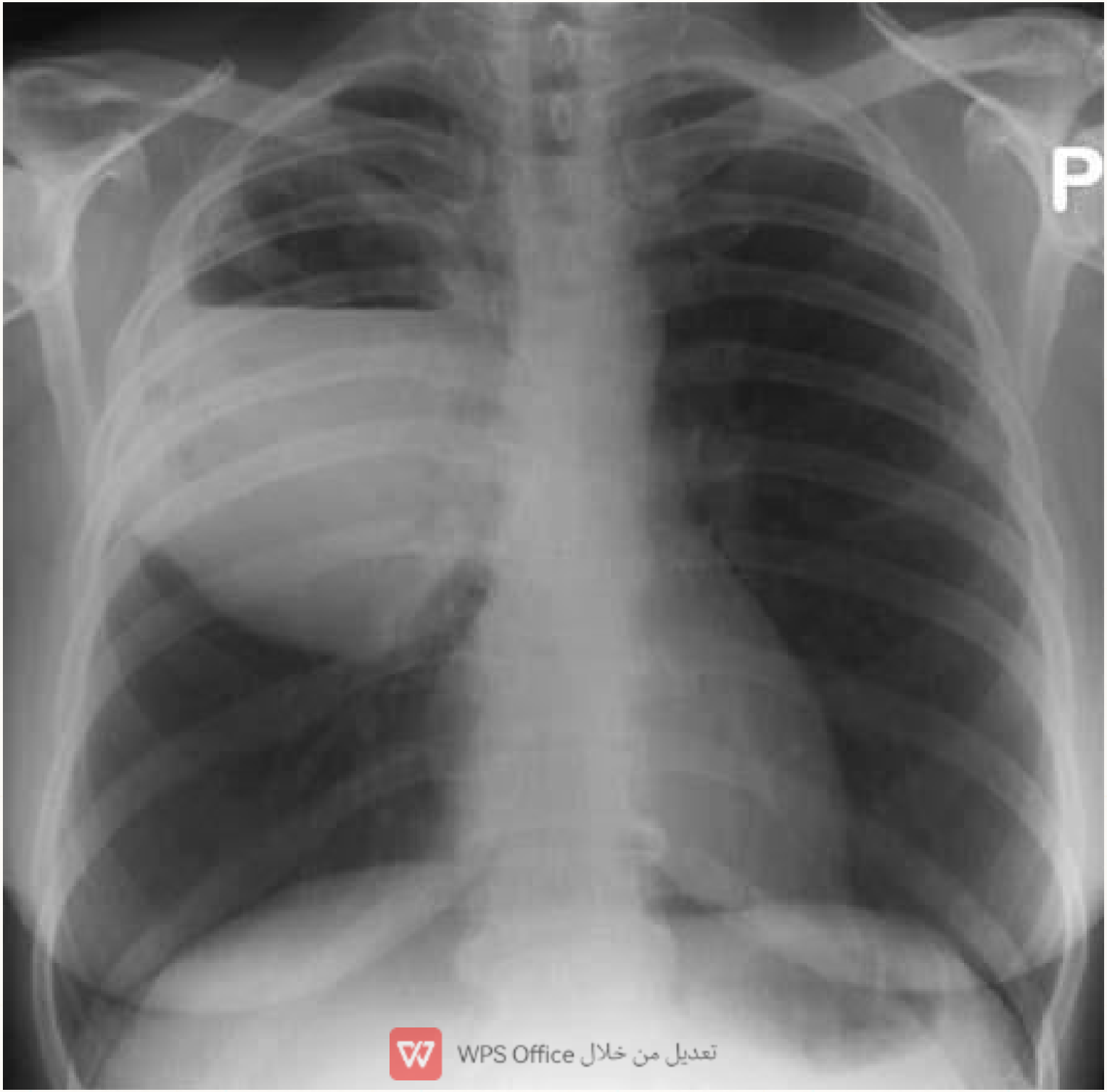

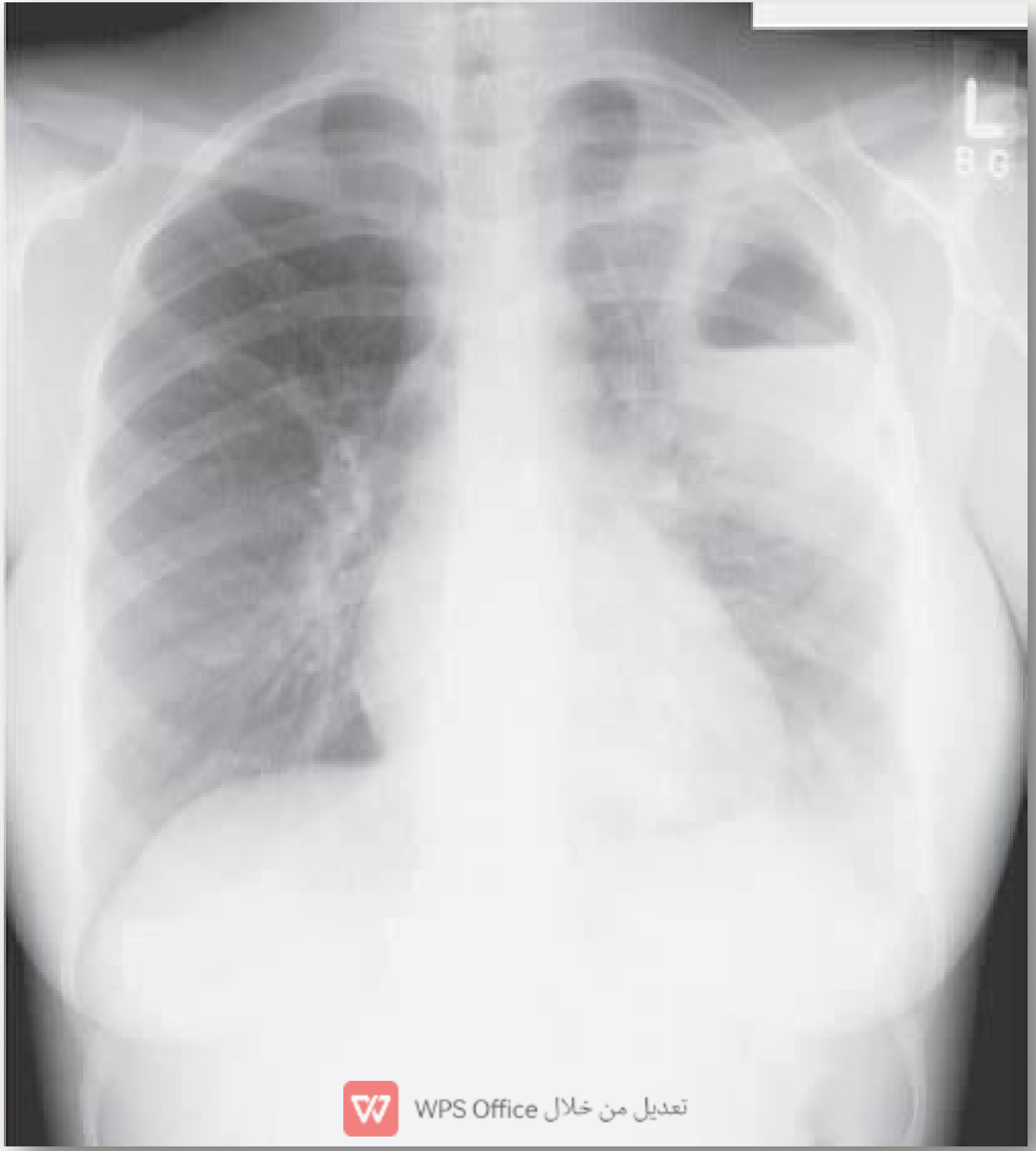

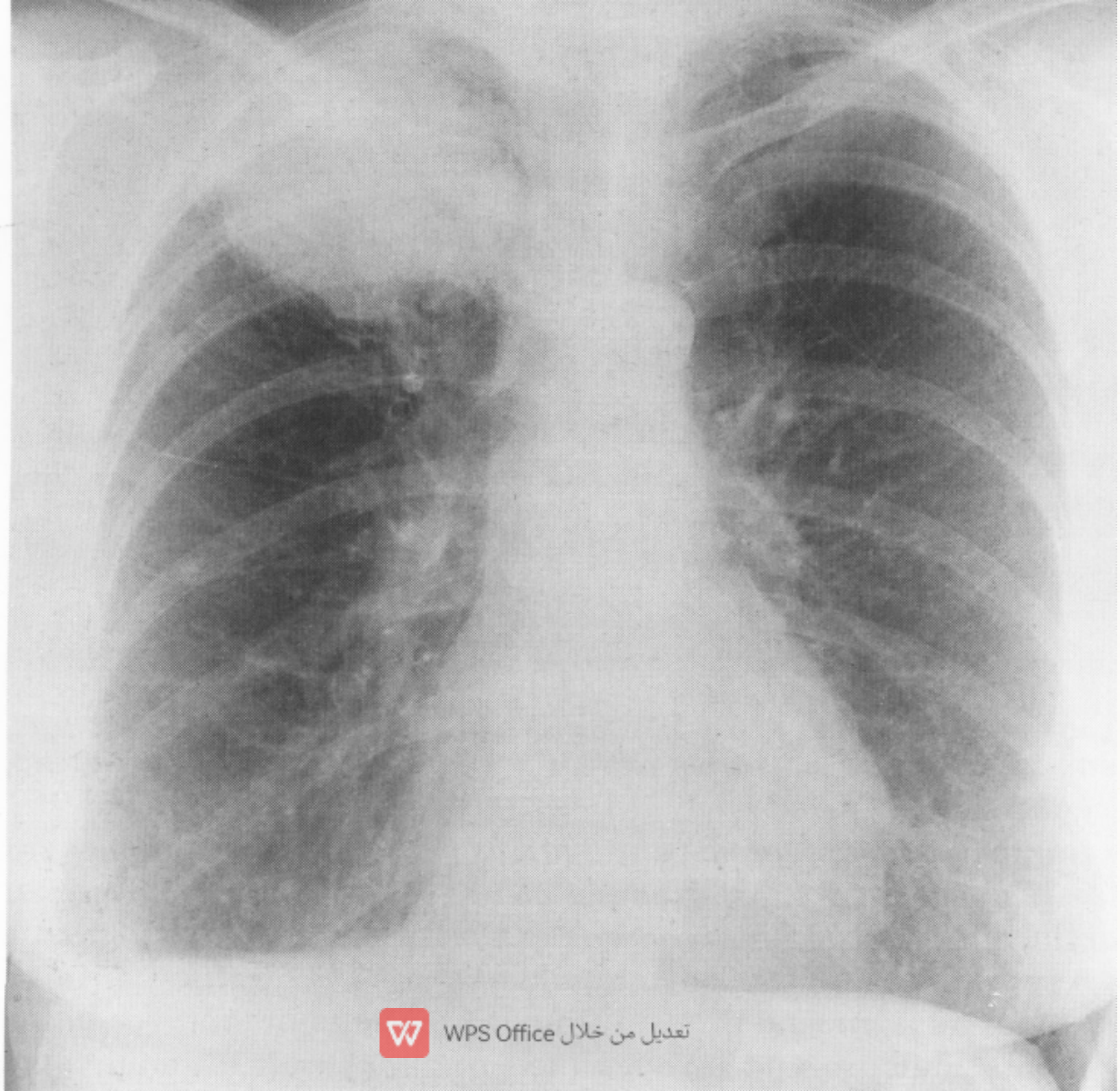

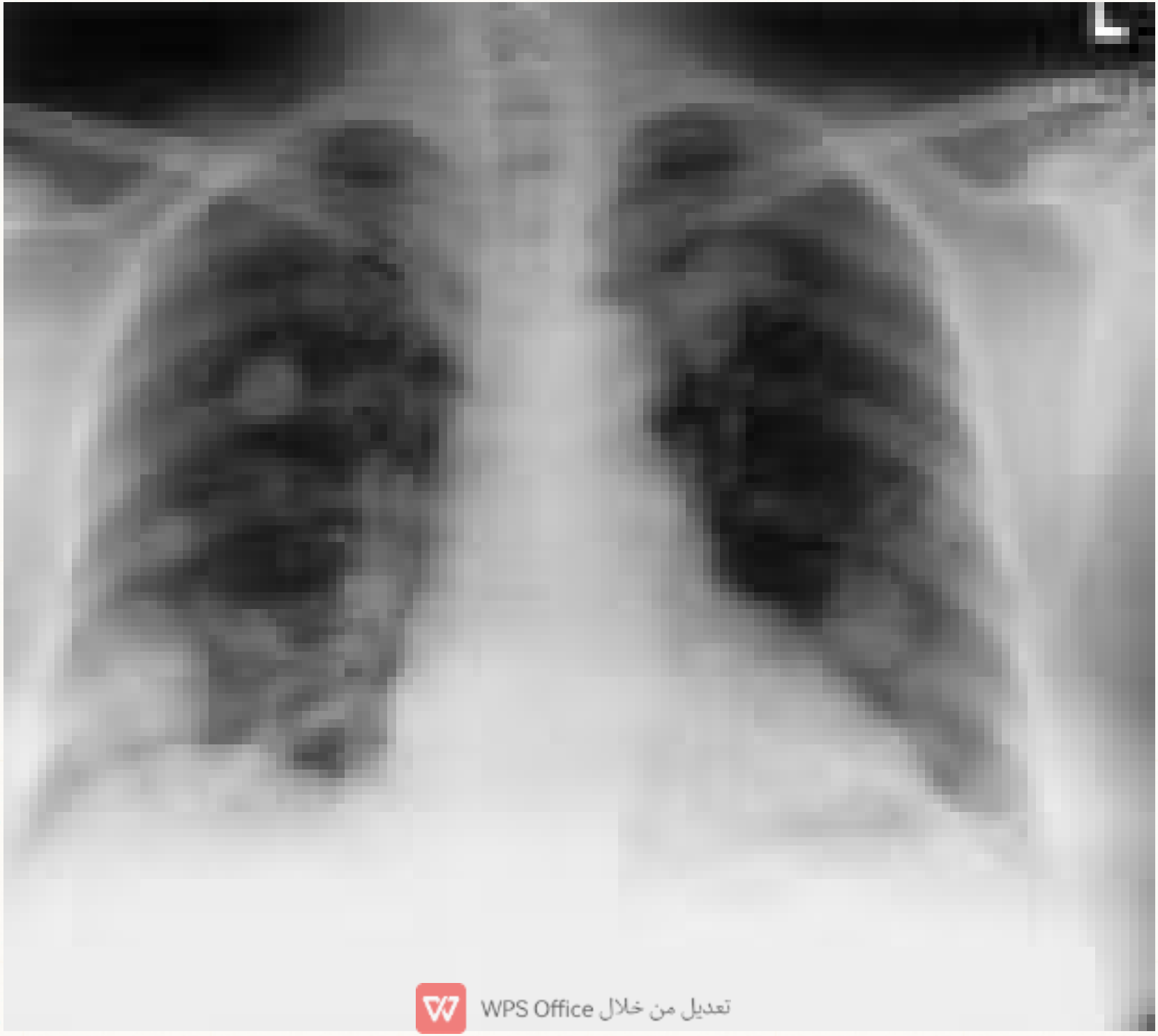

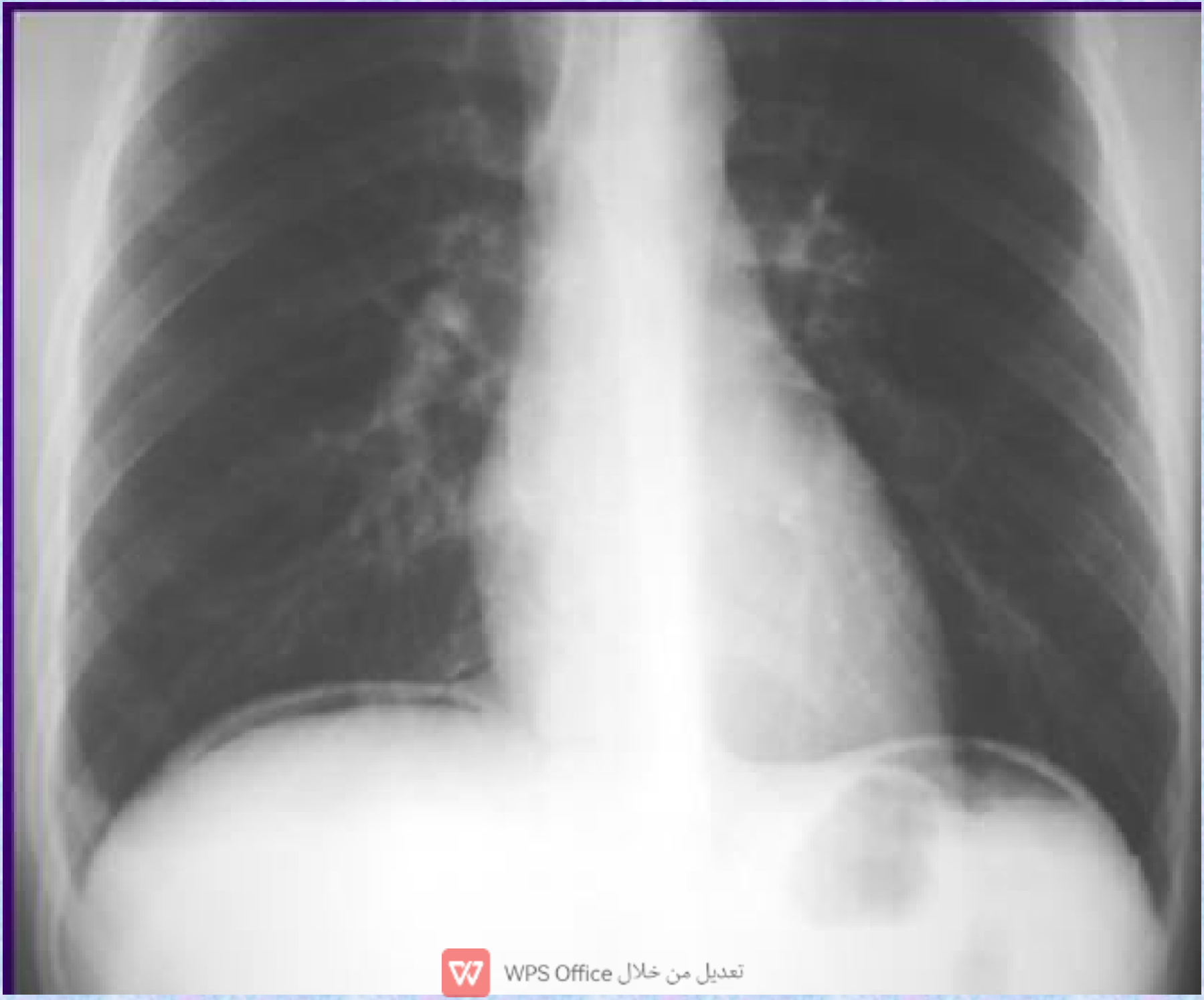

Bilateral Interstitial Infiltrate

There is an interstitial infiltrate throughout both lung fields. Hilar lymphadenopathy is also present. The impression of the radiologist included pneumonia, tuberculosis, or other granulomatous disease.