Radiological Anatomy of Thorax

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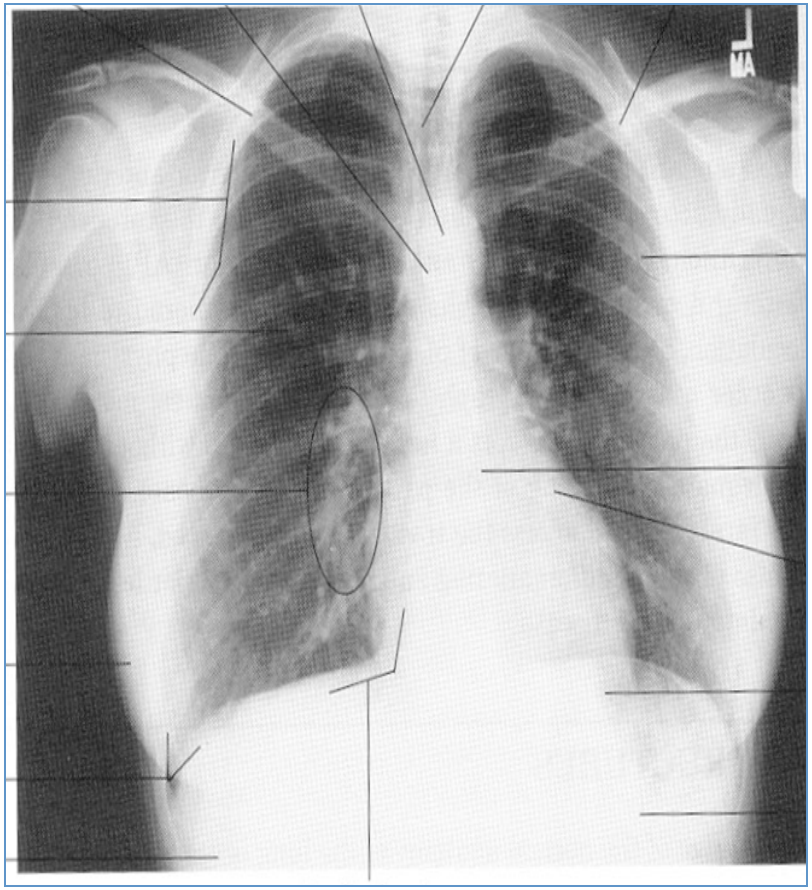


Indications for Chest x - Ray

- A chest x-ray may be used to diagnose and plan treatment for various conditions, including:
  - **Diseases/Fractures of the bones of the chest (**ribs, sternum, clavicle and the vertebrae)
  - **Lung disorders**
  - **Heart disorders**

Chest radiographs are also used to screen for **job-related lung disease** in industries such as mining where workers are exposed to dust.

- Different views of the chest can be obtained by changing the relative position of the body and the direction of the x-ray beams.
- The most common views are ***Posteroanterior (PA), Anteroposterior (AP), lateral (L) & Decubitus***.

Posteroanterior (PA) view:

- The x-rays enter through the posterior aspect of the chest, and exit out of the anterior aspect where they are detected by an x-ray film.
- PA view gives a good assessment of the ***Cardiac Size*****.**
- It avoids magnification of the heart as the film is close to the anterior chest wall.
- **It is identified** by the presence of the ***fundal gas bubble*** and the ***absence of the scapulae in the lung fields.***

Anteroposterior (AP) view:

- The x-rays enter through the anterior aspect and exit through the posterior aspect of the chest.
- AP chest x-rays are done where it is difficult for the patient to obtain a normal chest x-ray, such as when the patient **cannot get out of bed.**
- ***Lateral view***
- Indicated only **for further interpretation**
- **Decubitus: lying at the side**

Posteroanterior
radiograph the following structures must be examined:

- ***Superficial soft tissues***:
- ***Nipples*** in both sexes and the **Breast** in (females) are seen superimposed on the lung fields.
- ***Bones of thoracic cage.***
- ***Diaphragm .***
- ***Lungs and Bronchi.***
- ***Heart & Great Vessels.***

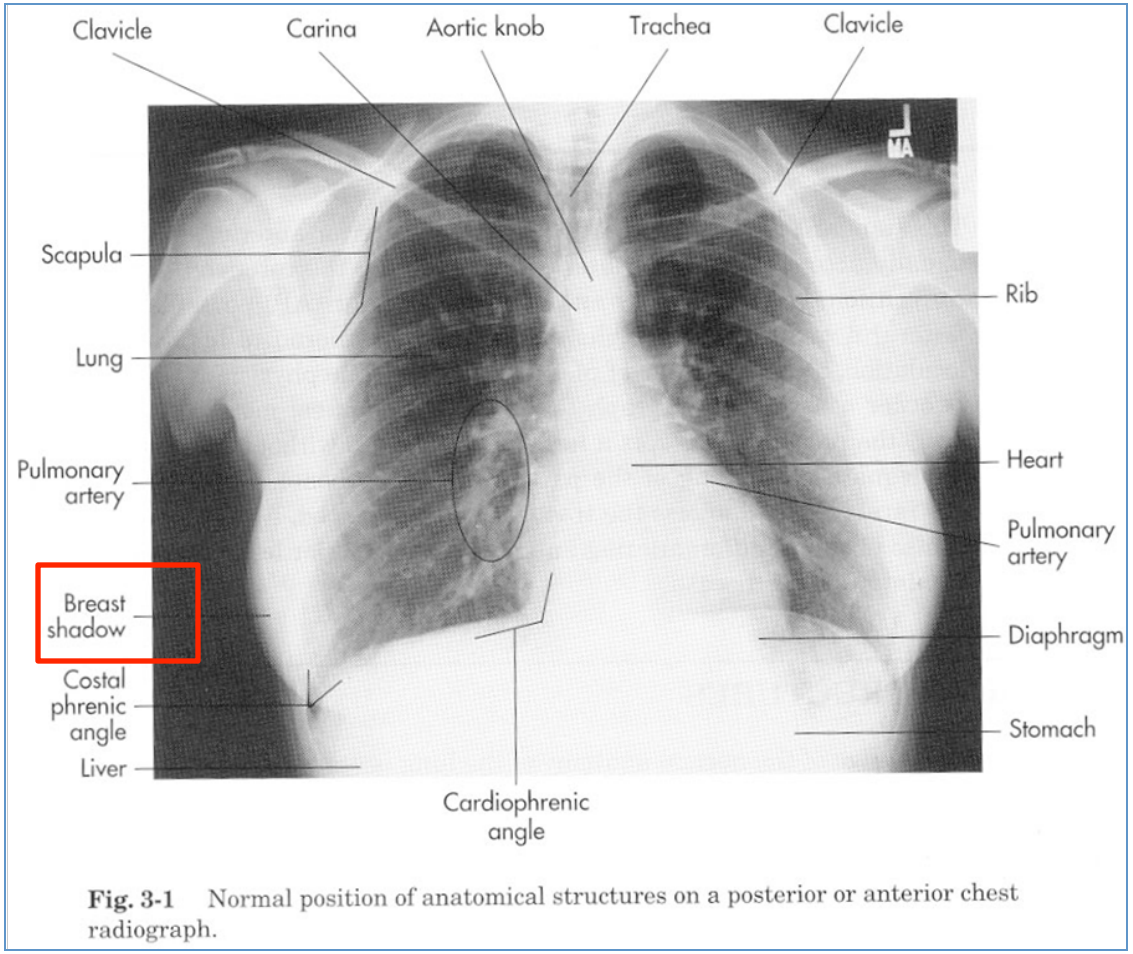
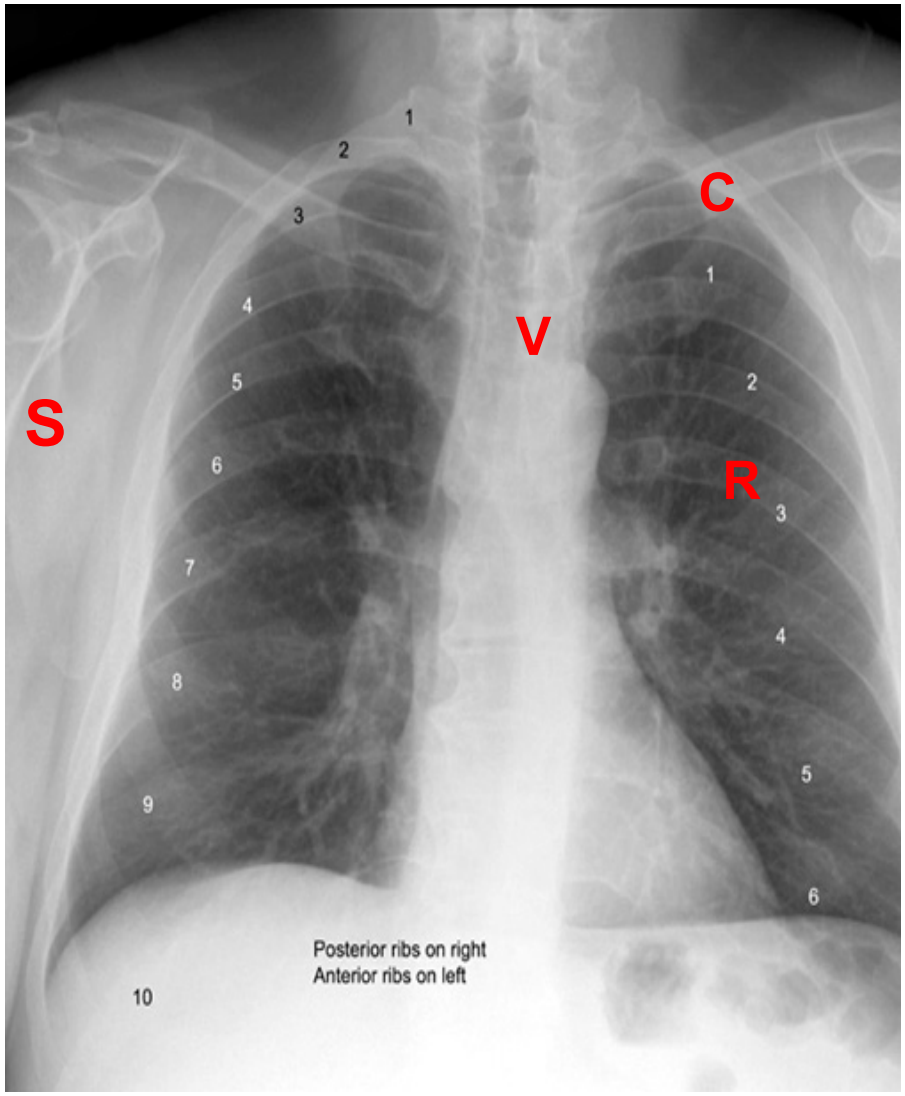


Fig. 3-1 Normal position of anatomical structures on a posterior or anterior chest radiograph.

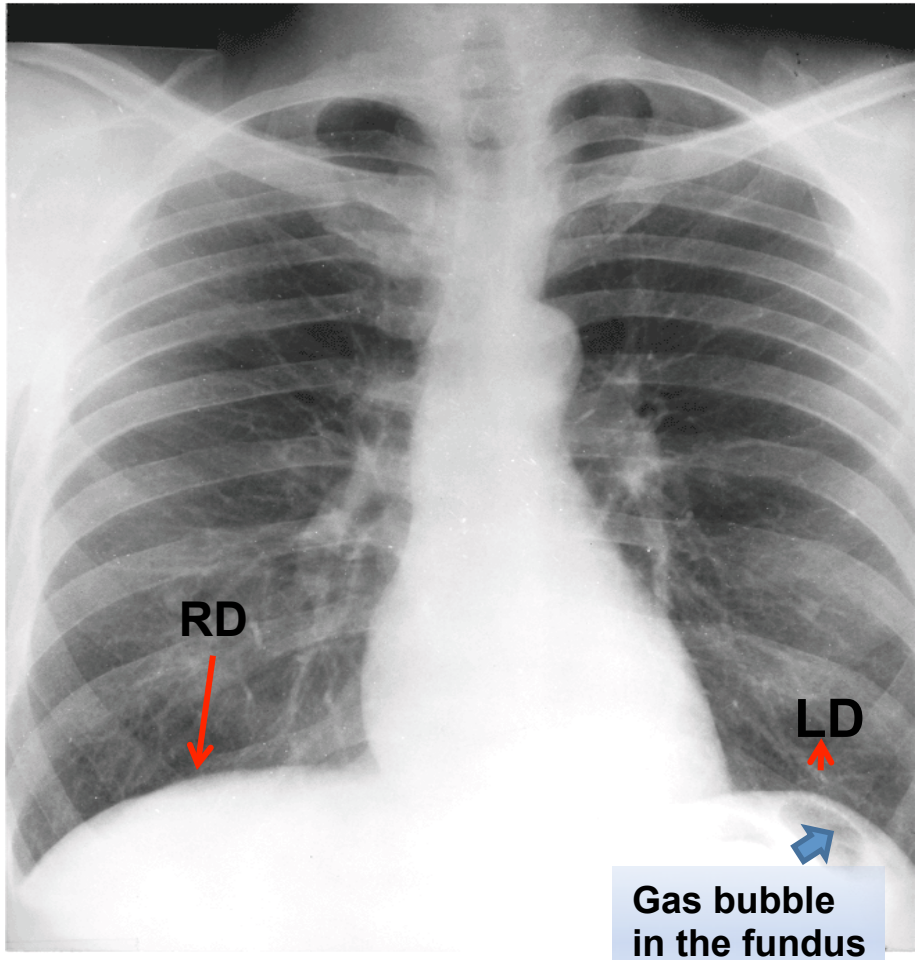
Bones

- The **Thoracic Vertebrae** are imperfectly seen.
- The **Costotransverse joints** and each ***Rib*** should be examined in order from above downward and compared to their fellows of the opposite side .
- The **Costal Cartilages** are not usually seen, but if **calcified**, they will be visible.
- The ***Clavicles*** are seen clearly crossing the upper part of each lung field.
- The medial borders of the ***Scapulae*** may overlap the periphery of each lung field.



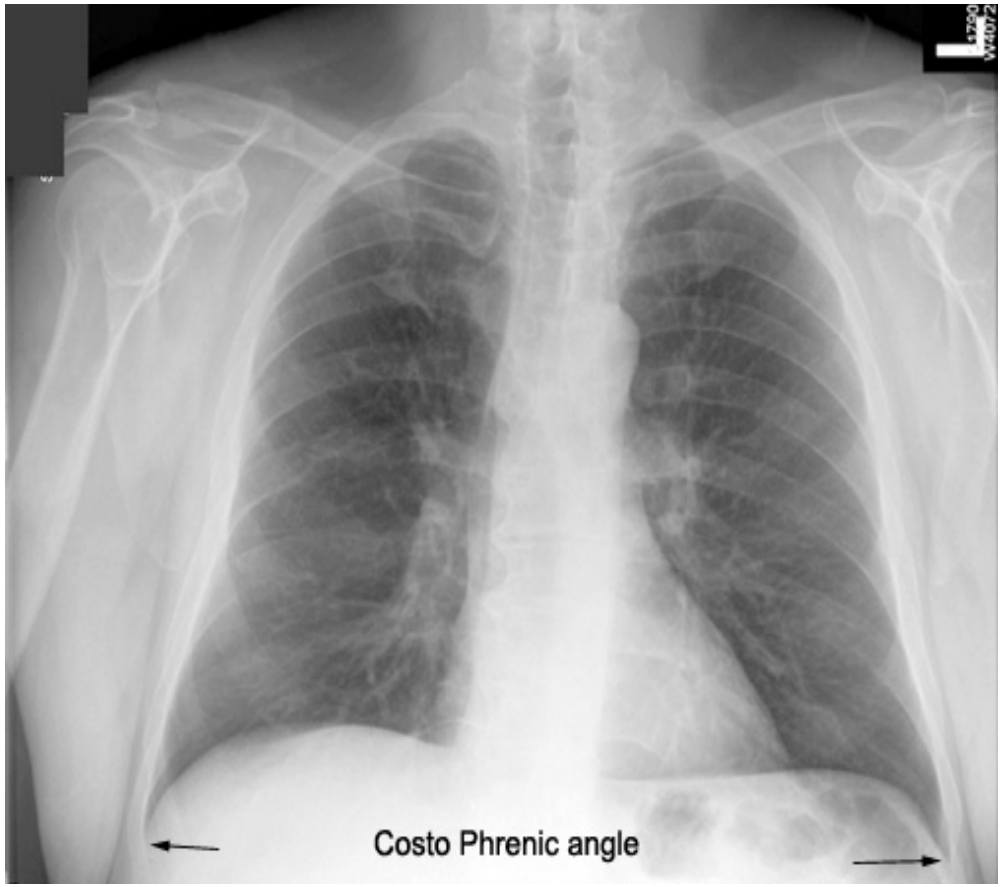
Diaphragm

- The diaphragm shows Dome-shaped shadows on each side.
- ***The right dome*** is slightly higher than the left dome.
- Beneath the right dome is the homogeneous, dense shadow of the ***liver.***
- Beneath the ***left dome*** a gas bubble may be seen in the ***fundus of the stomach.***



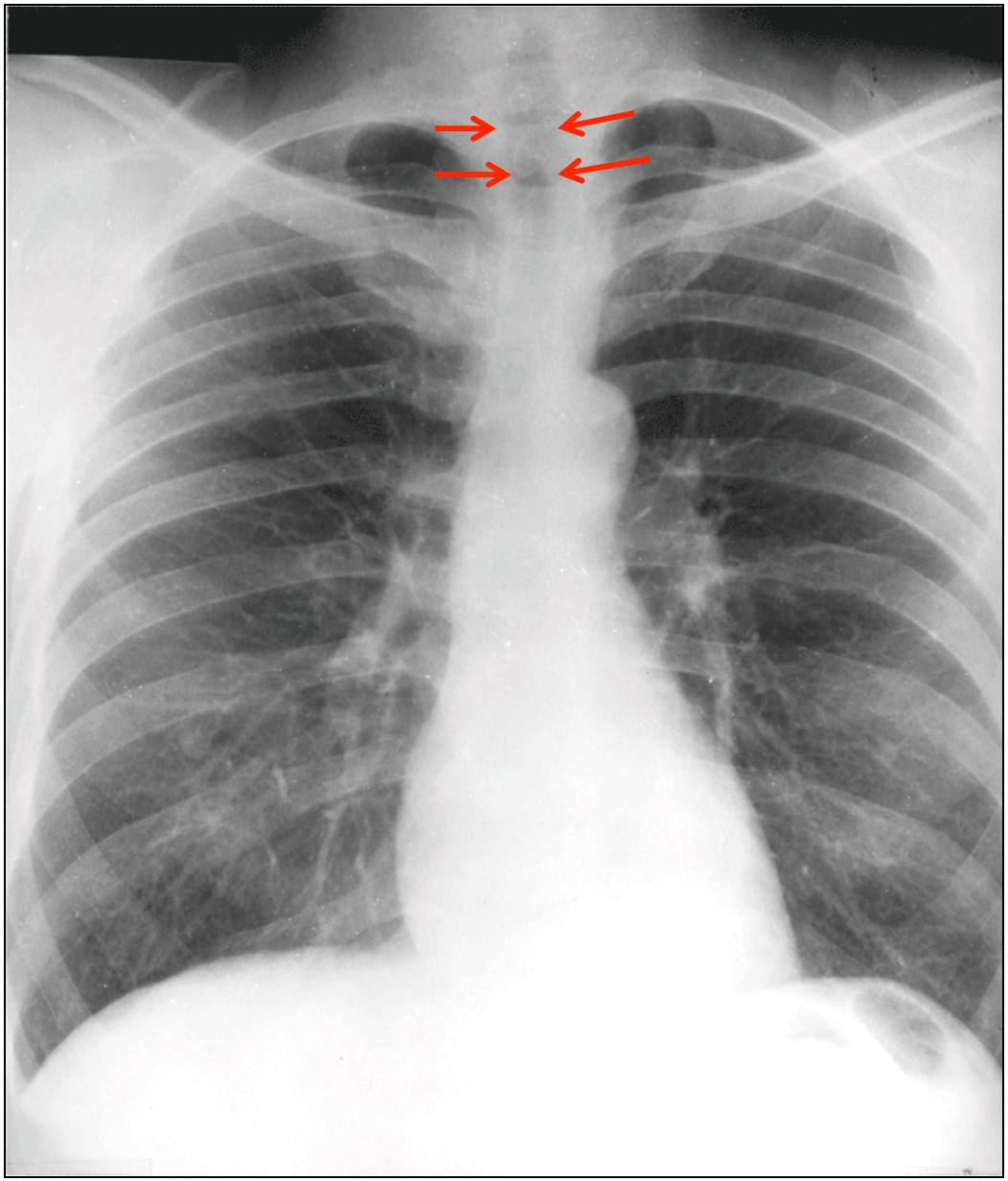
Costo-diaphragmatic (costo-phrenic) Angles

- They are at the sites where the diaphragm meets the thoracic wall.
- The angles become blunt or obscured in case of presence of ***pleural fluid or fibrosis***



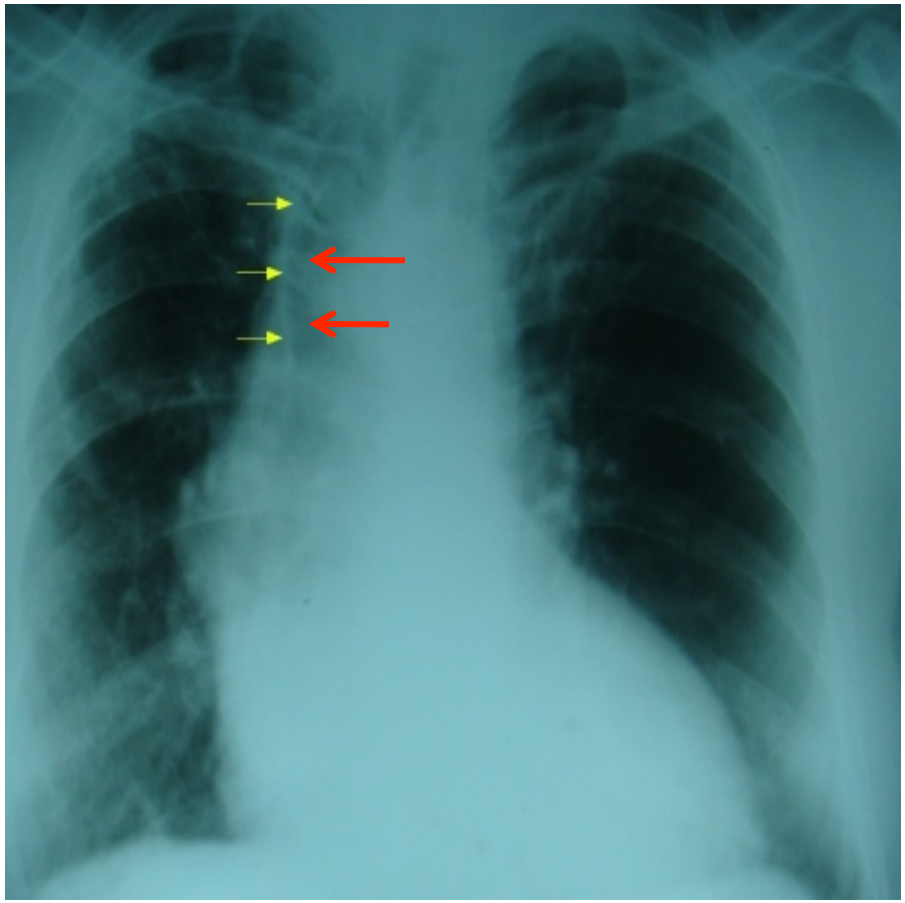
Trachea

- The radiotranslucent, air-filled shadow of the trachea is seen in the ***midline of the neck as a dark area.***
- It is superimposed on the lower cervical and upper thoracic vertebrae.



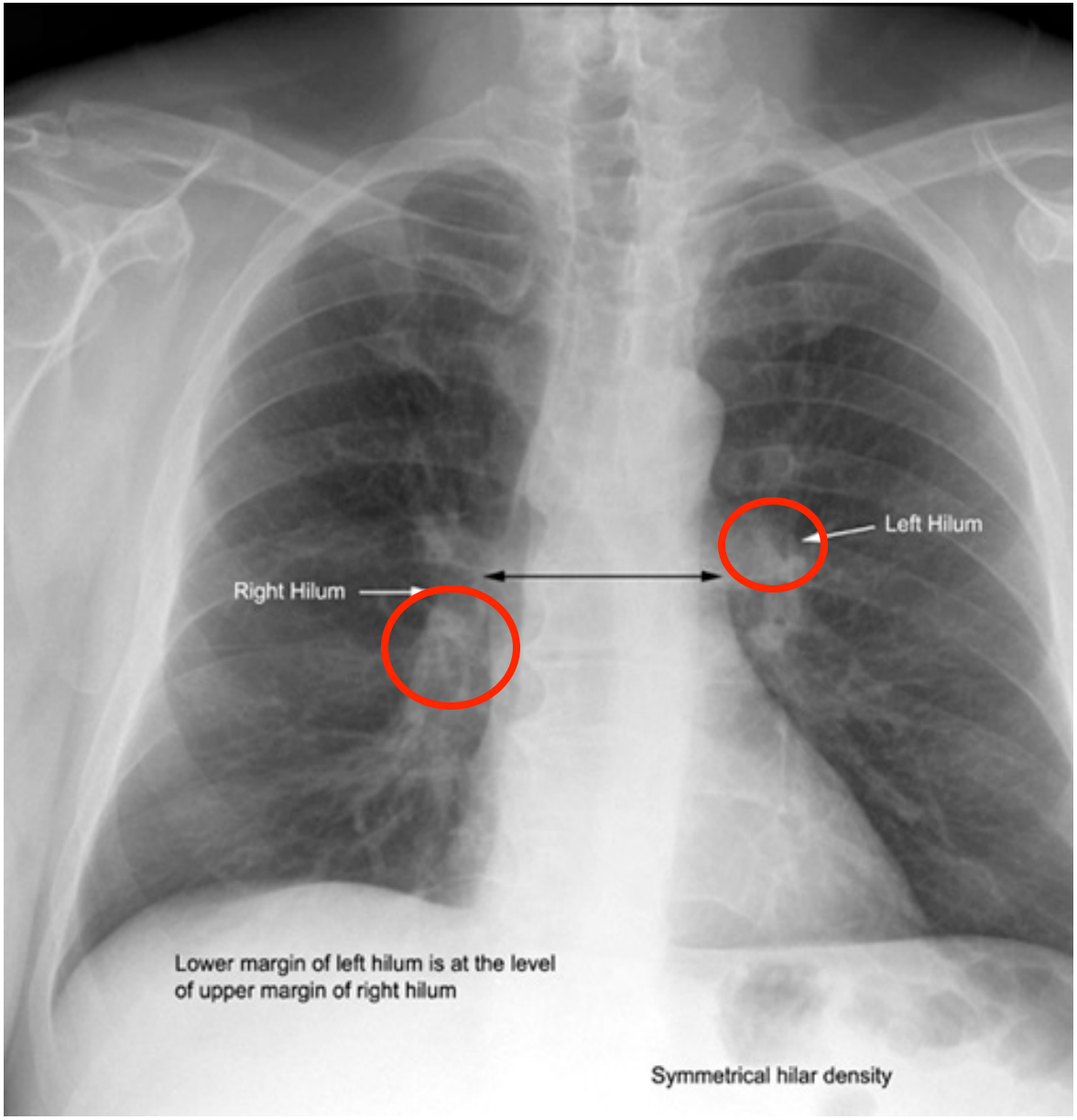
Tracheal shift

- Tracheal air column is seen shifted to right on X-ray chest **PA view**.
- ***It indicates:***
  - A loss of volume of the right upper lobe of the lung, either due to collapse or fibrosis.
  - ***OR***
  - A massive pleural effusion on the left side. (But in this x ray, no pleural effusion is seen on the left)

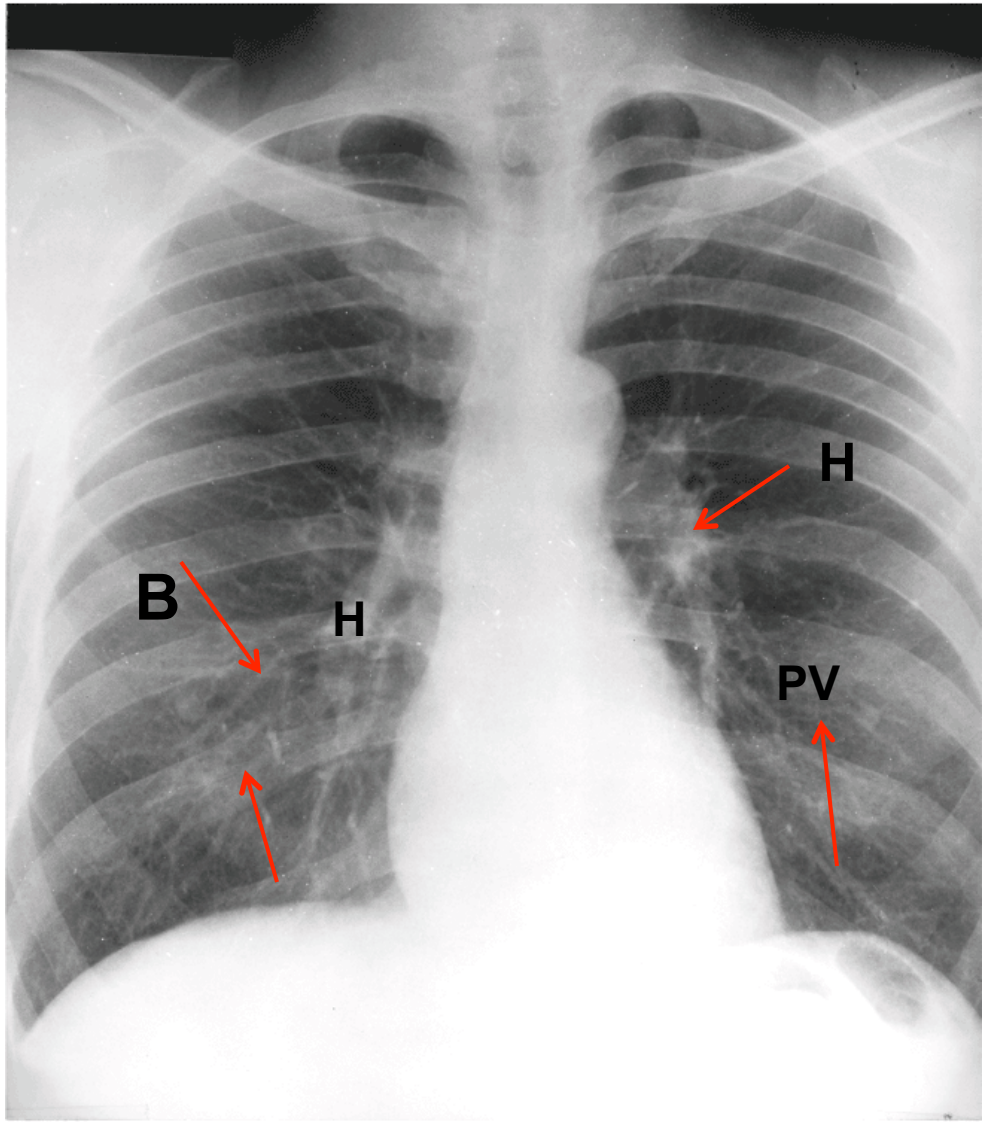


Lungs

- ***Lung Roots:*** Relatively dense shadows caused by the presence of the blood-filled pulmonary and bronchial vessels, the large bronchi, and the lymph nodes.

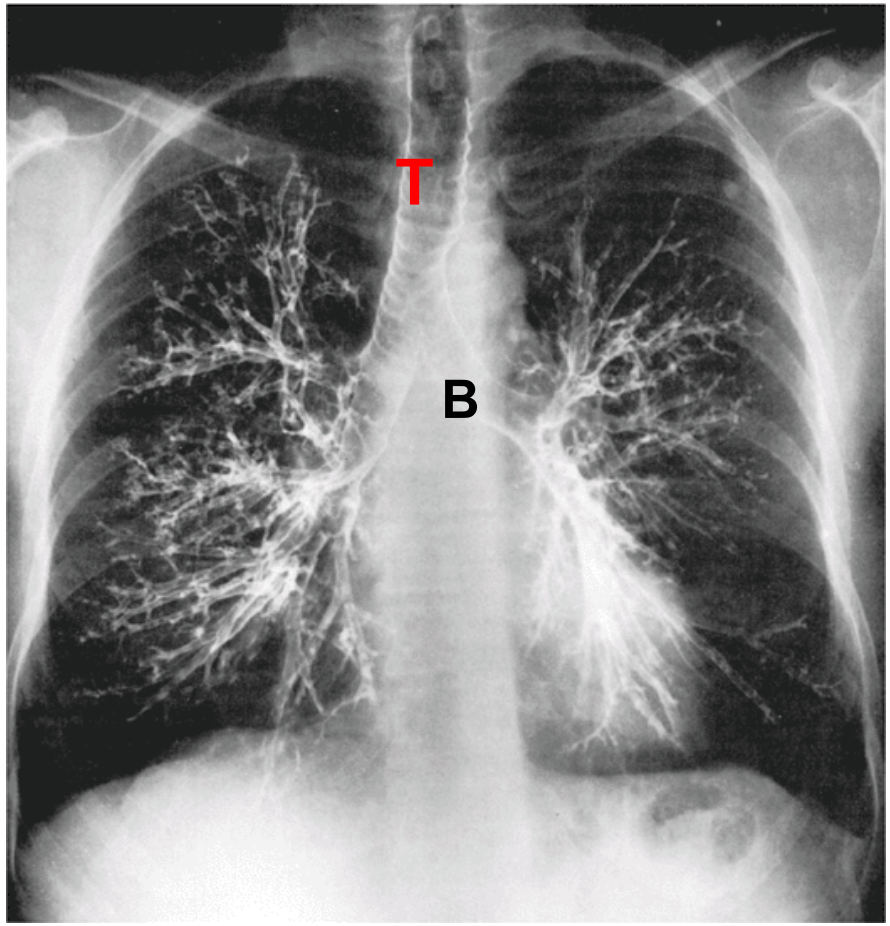


- **The lung fields**, by virtue of the air they contain, readily permit the passage of x-rays. For this reason, ***the lungs are more translucent on full inspiration than on expiration.***
- The ***pulmonary blood vessels*** are seen as a series of small, round, white shadows radiating from the lung root.
- The ***large bronchi***, also cast similar round shadows. The smaller bronchi are not seen



Bronchography

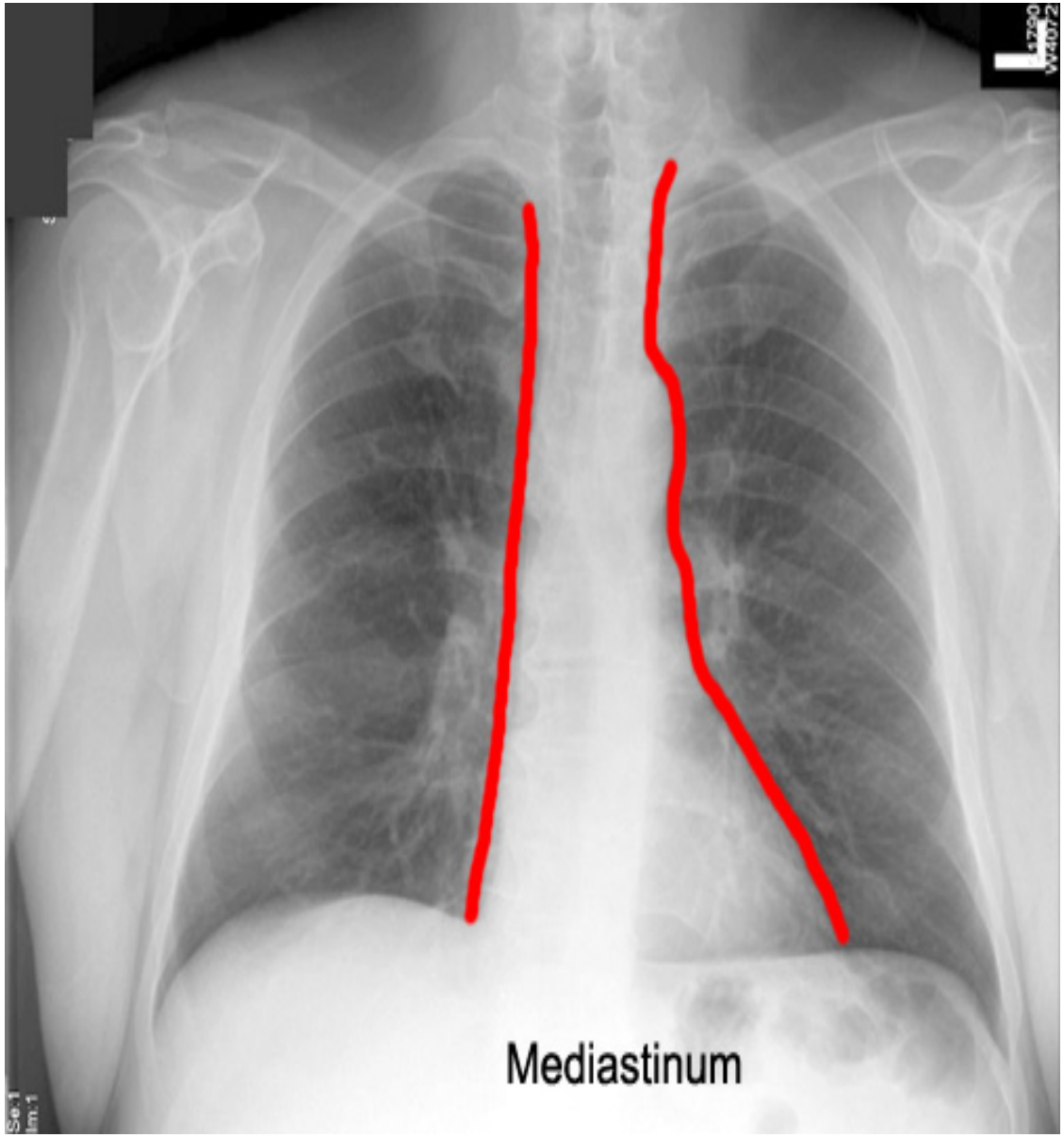
- Bronchography is a special study of the bronchial tree by means of the introduction of contrast medium into a particular bronchus or bronchi, usually under fluoroscopic control. The contrast media are nonirritating and sufficiently radiopaque to allow good visualization of the bronchi. After the radiographic examination is completed, the patient is asked to cough and expectorate the contrast medium.



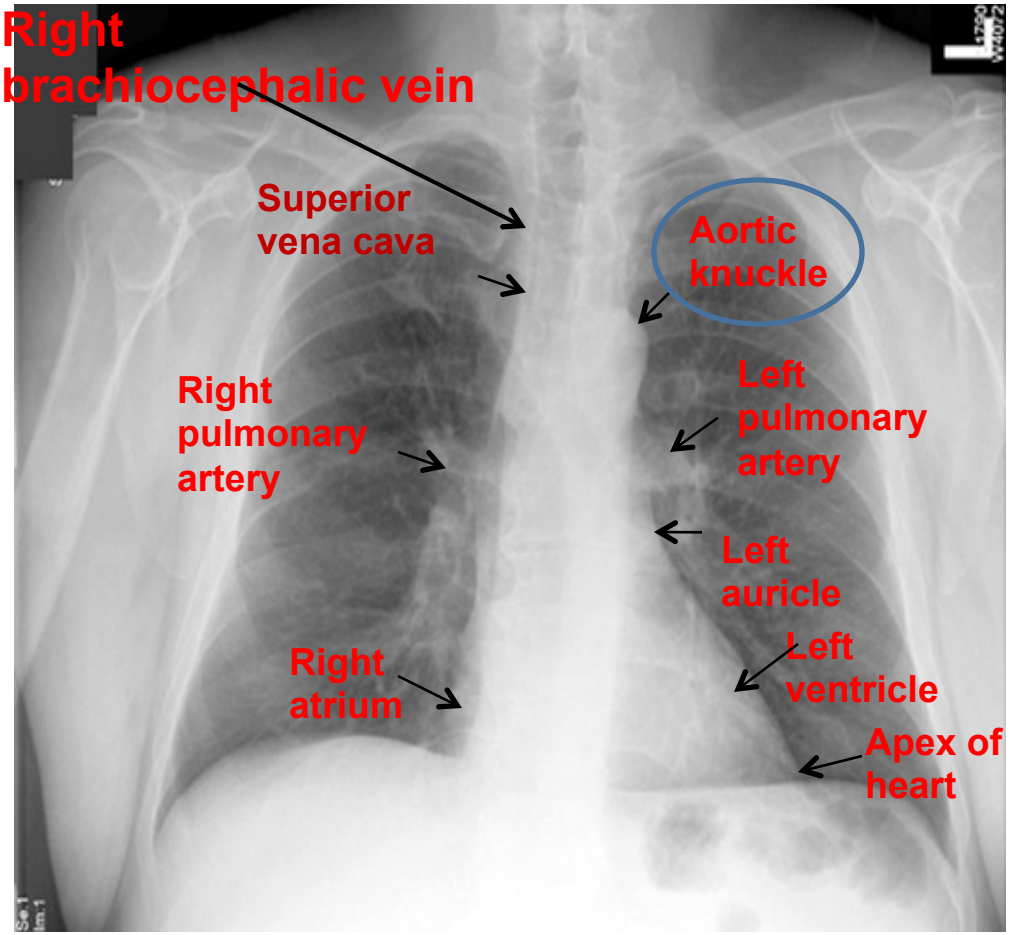
Posteroanterior Bronchogram

Mediastinum

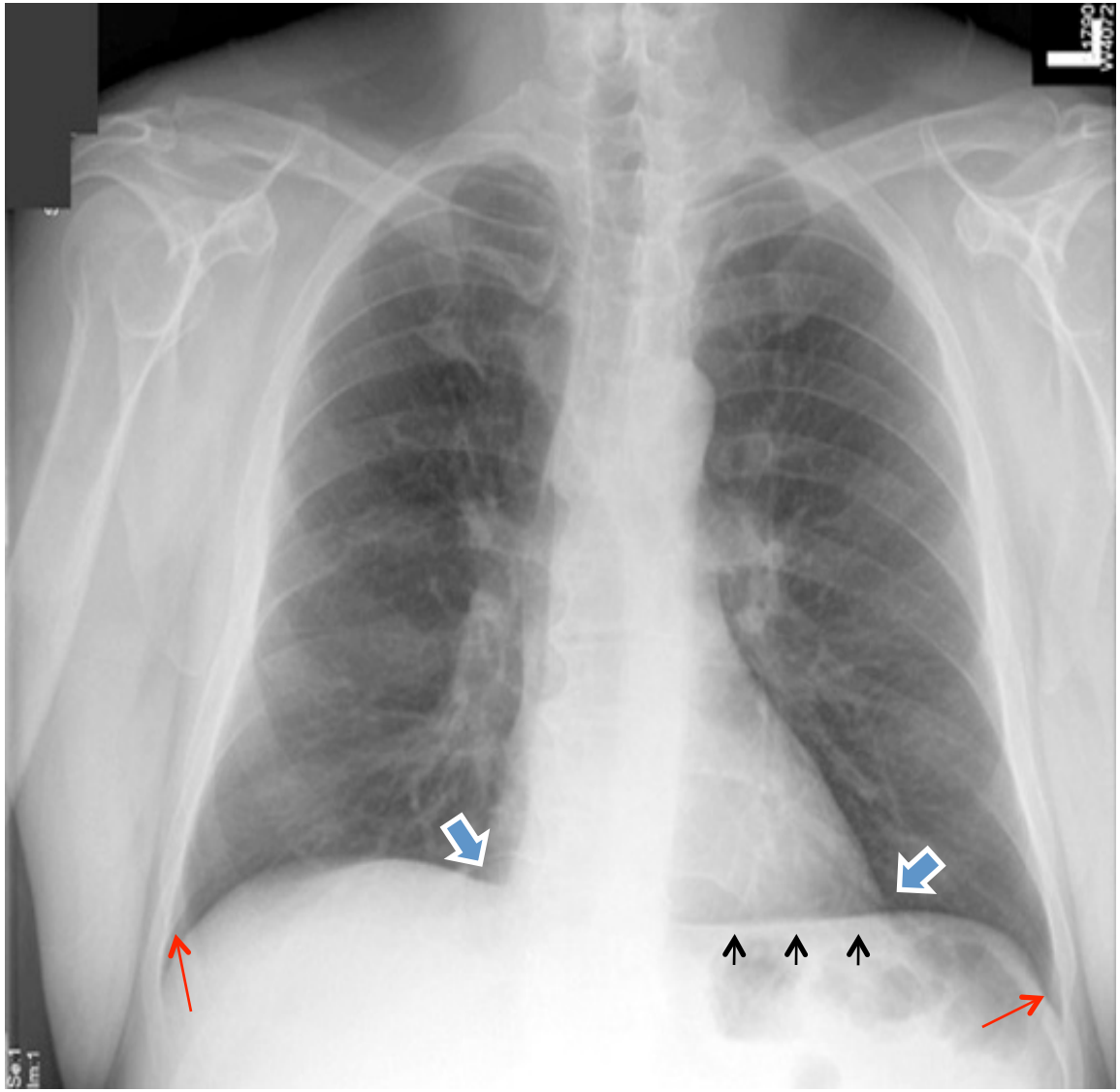
- ***The shadow is produced by the various structures within the mediastinum, superimposed one on the other***
- Note the outline of the heart and great vessels.



- The **Right Border** from above downward consists of:
- ***Right brachiocephalic vein, Superior vena cava, Right atrium***, and sometimes the Inferior vena cava.
- The **Left Border** consists of:
- A prominence, the **Aortic knuckle**, caused by the ***aortic arch***;
- Left margin of the ***Pulmonary Trunk, the Left Auricle, and the Left Ventricle & apex of heart.***

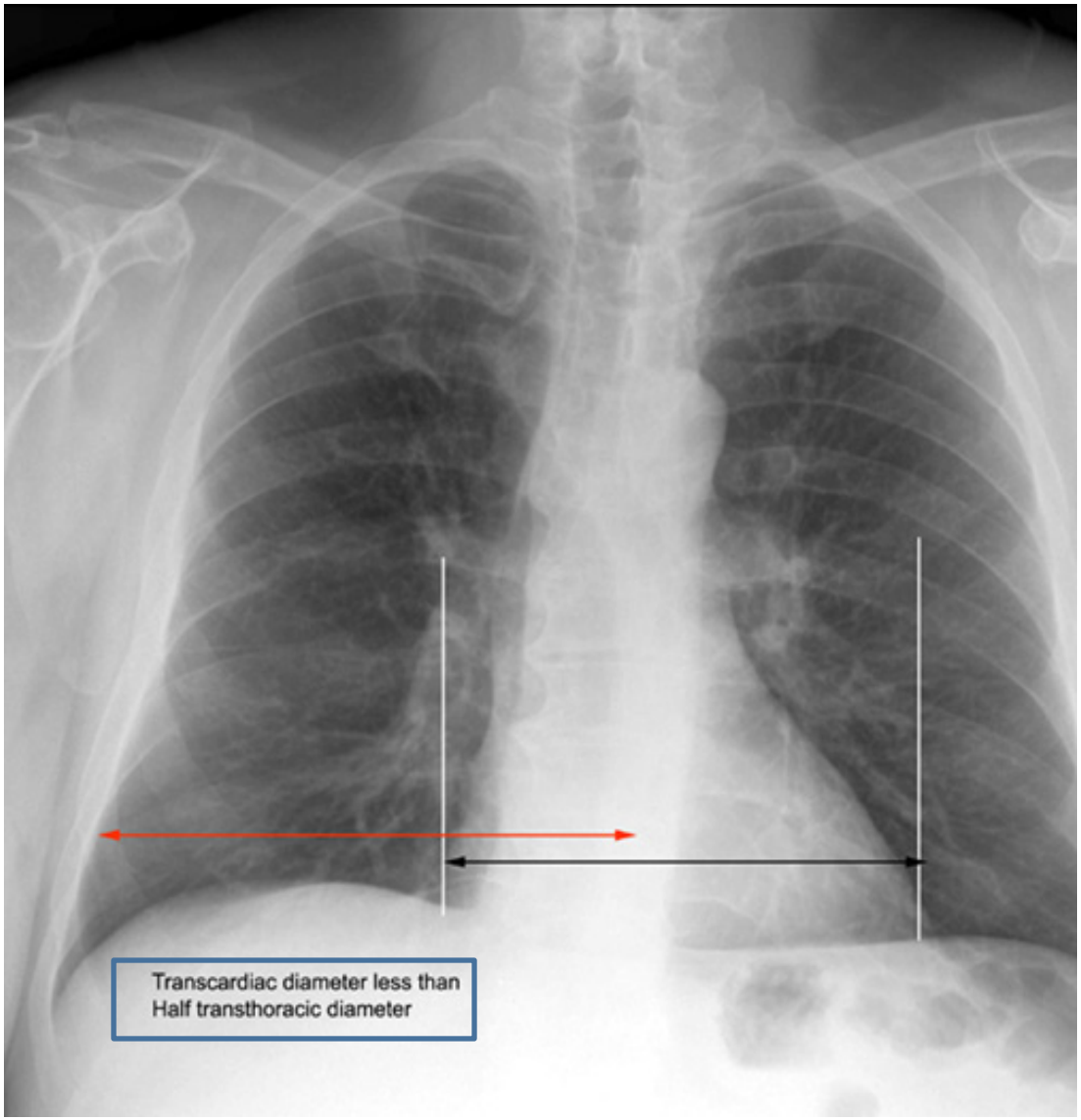


- **The inferior border** (lower border of the heart) blends with the diaphragm and liver shadow.
- Note the cardiophrenic angles.

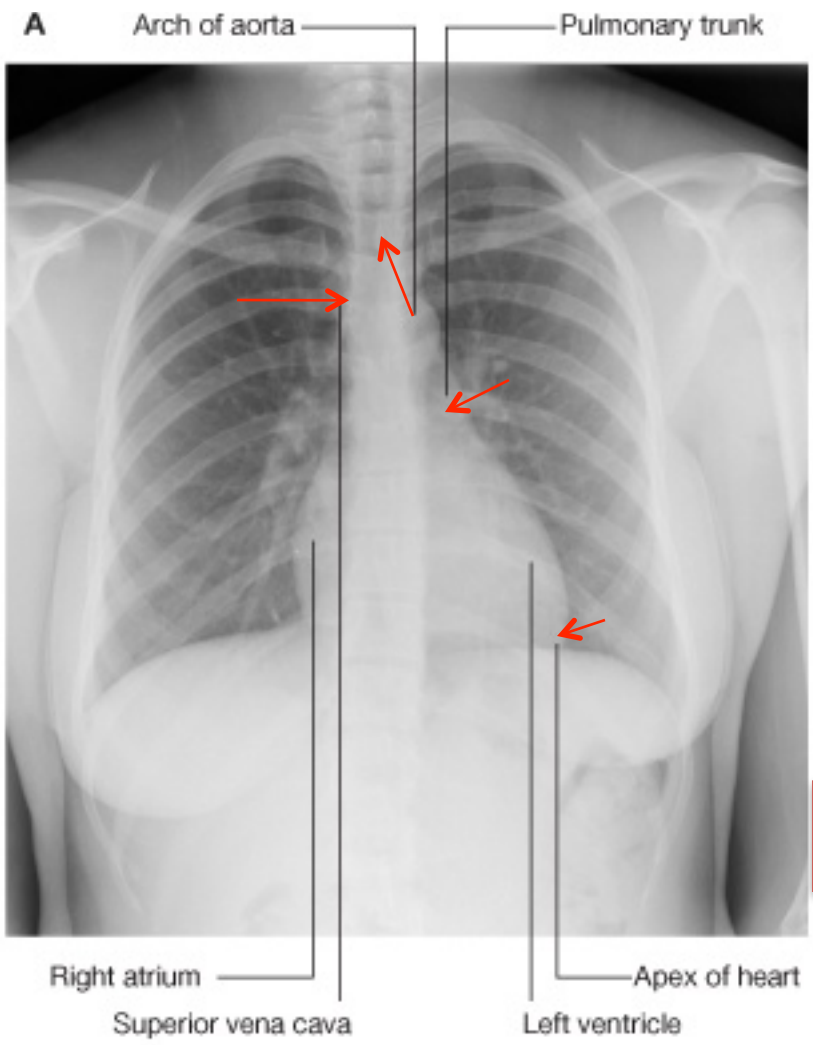


Heart

- The ***Transverse Diameter*** of the heart should not exceed half the width of the thoracic cage.
- On ***deep inspiration***, when the diaphragm descends, ***the vertical length*** of the heart increases and the transverse diameter is narrowed.
- In ***infants***, the heart is always wider and more globular in shape than in adults.

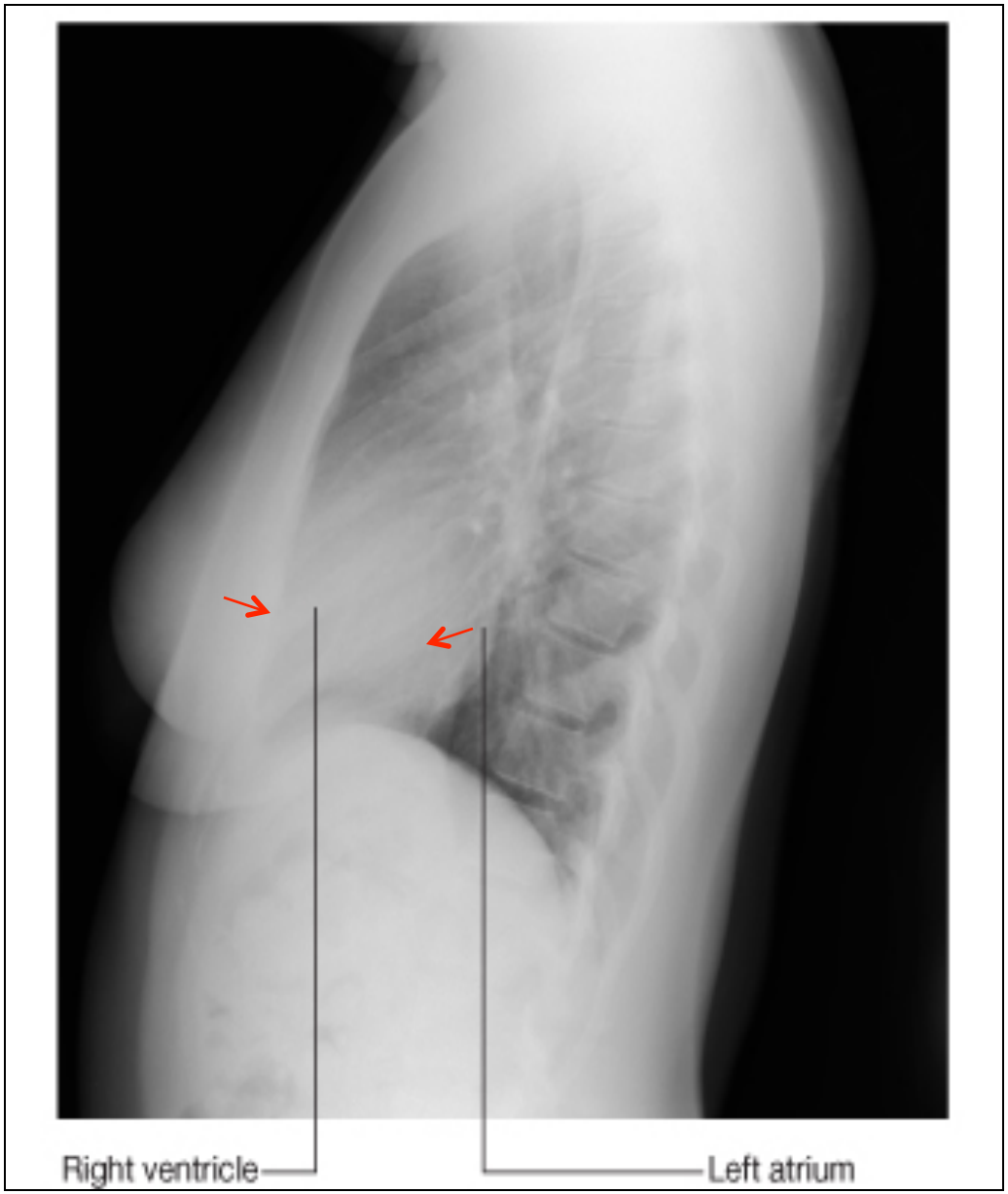


HEART

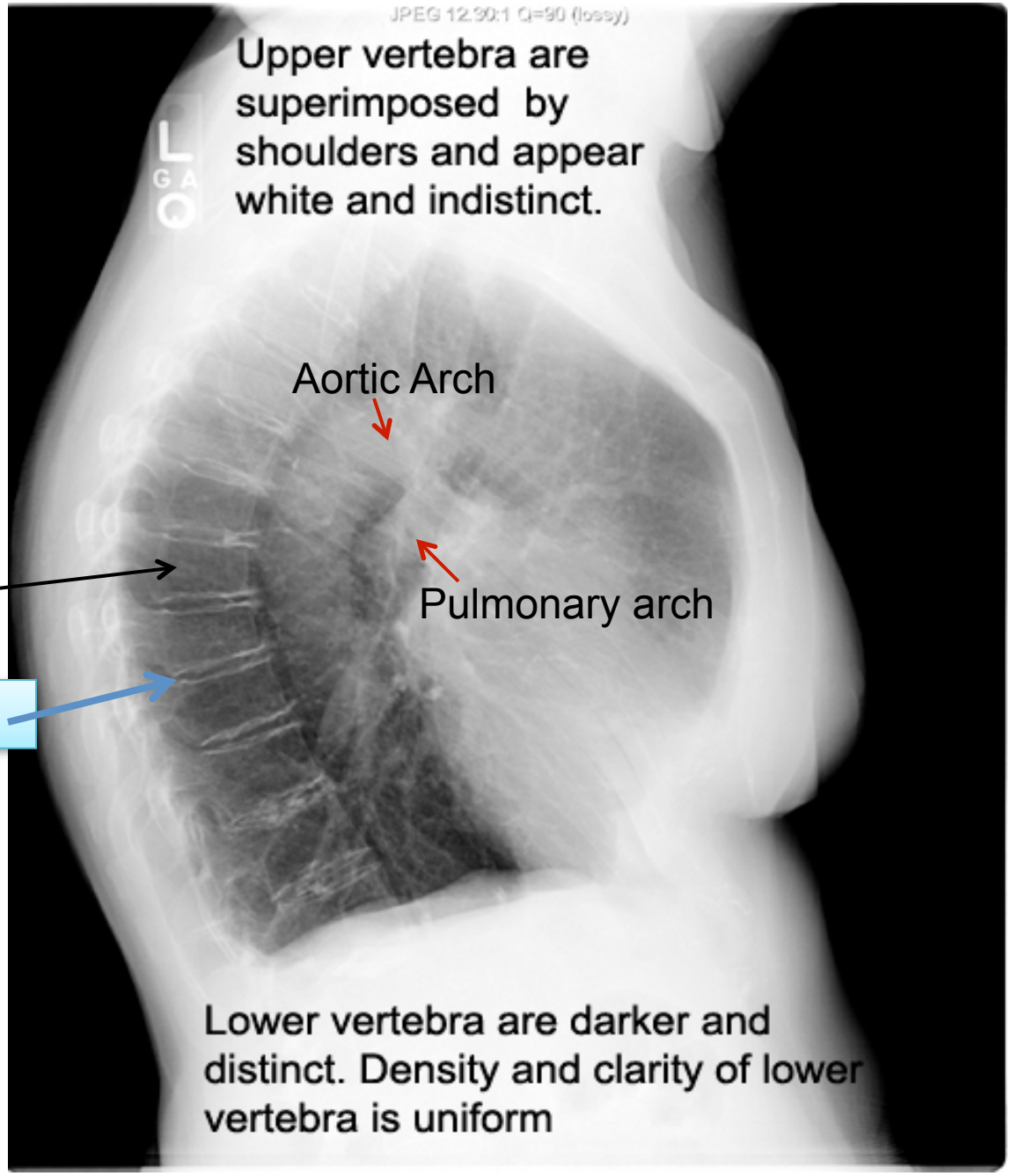

A
Arch of aorta
Pulmonary trunk
Right atrium
Superior vena cava
Left ventricle
Apex of heart

PA

LV



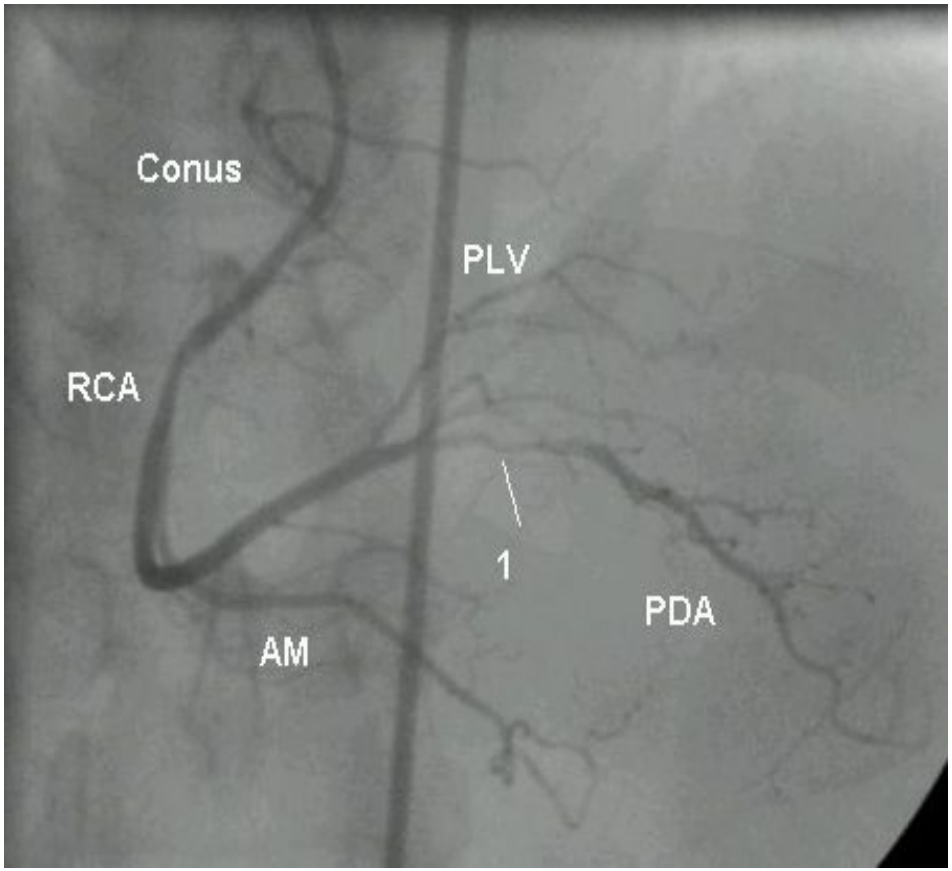
Lateral radiograph of the chest



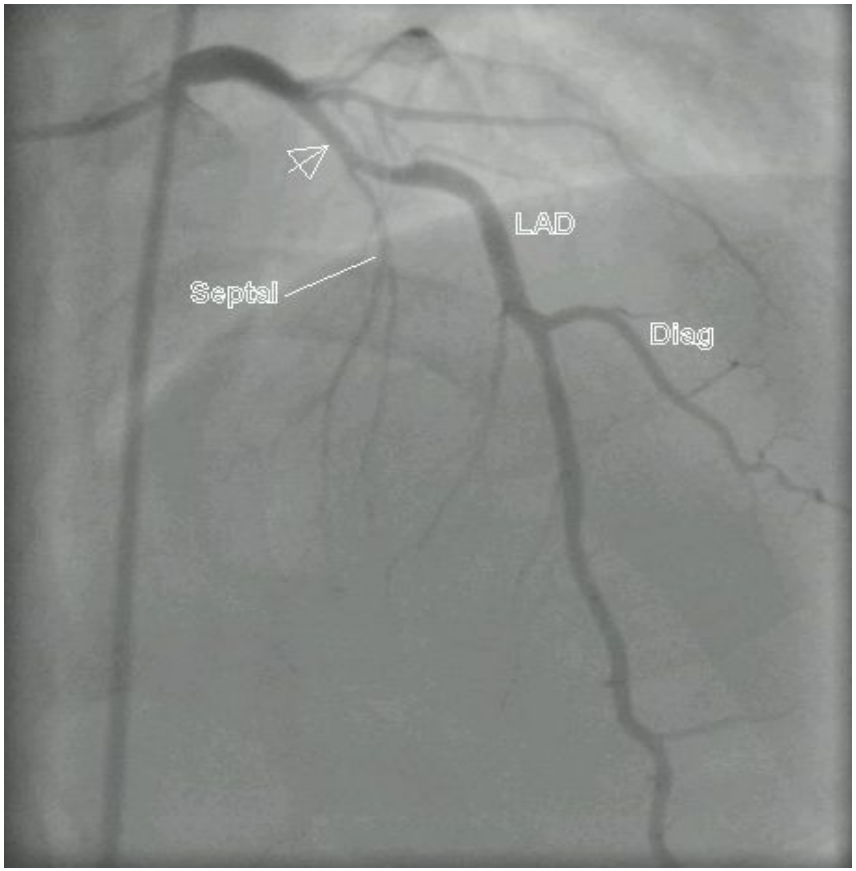
Vertebral body

Intervertebral disc

Coronary Angiogram (an X-ray with radio-opaque contrast in the coronary arteries)

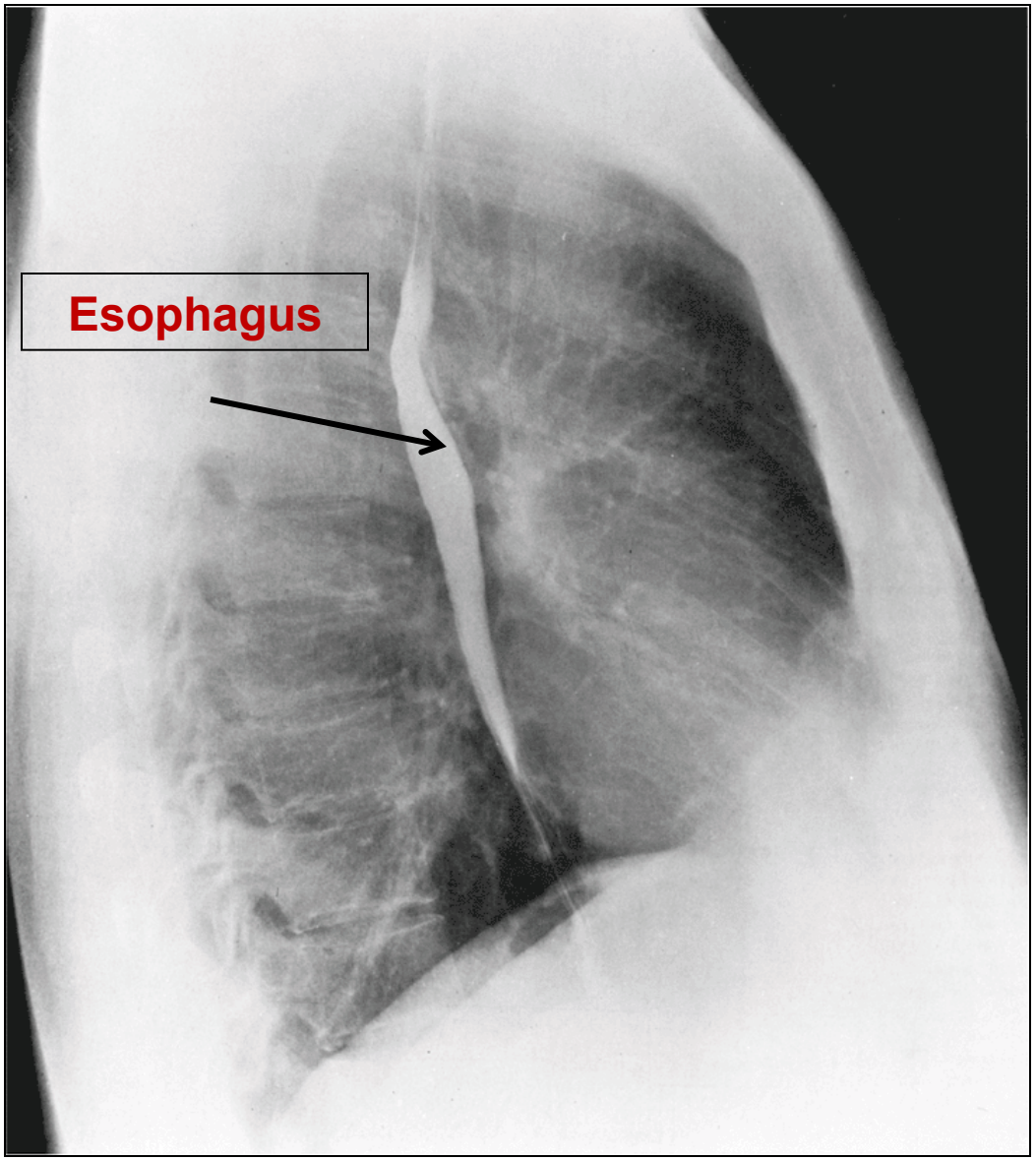


Right coronary



Left coronary

Contrast Visualization of the Esophagus



Left lateral radiograph of the chest of a normal adult man after a barium swallow.

Other barium contrast studies:
Barium meal: stomach
Barium follow through: small intestine
Barium enema: large intestine

THANK YOU