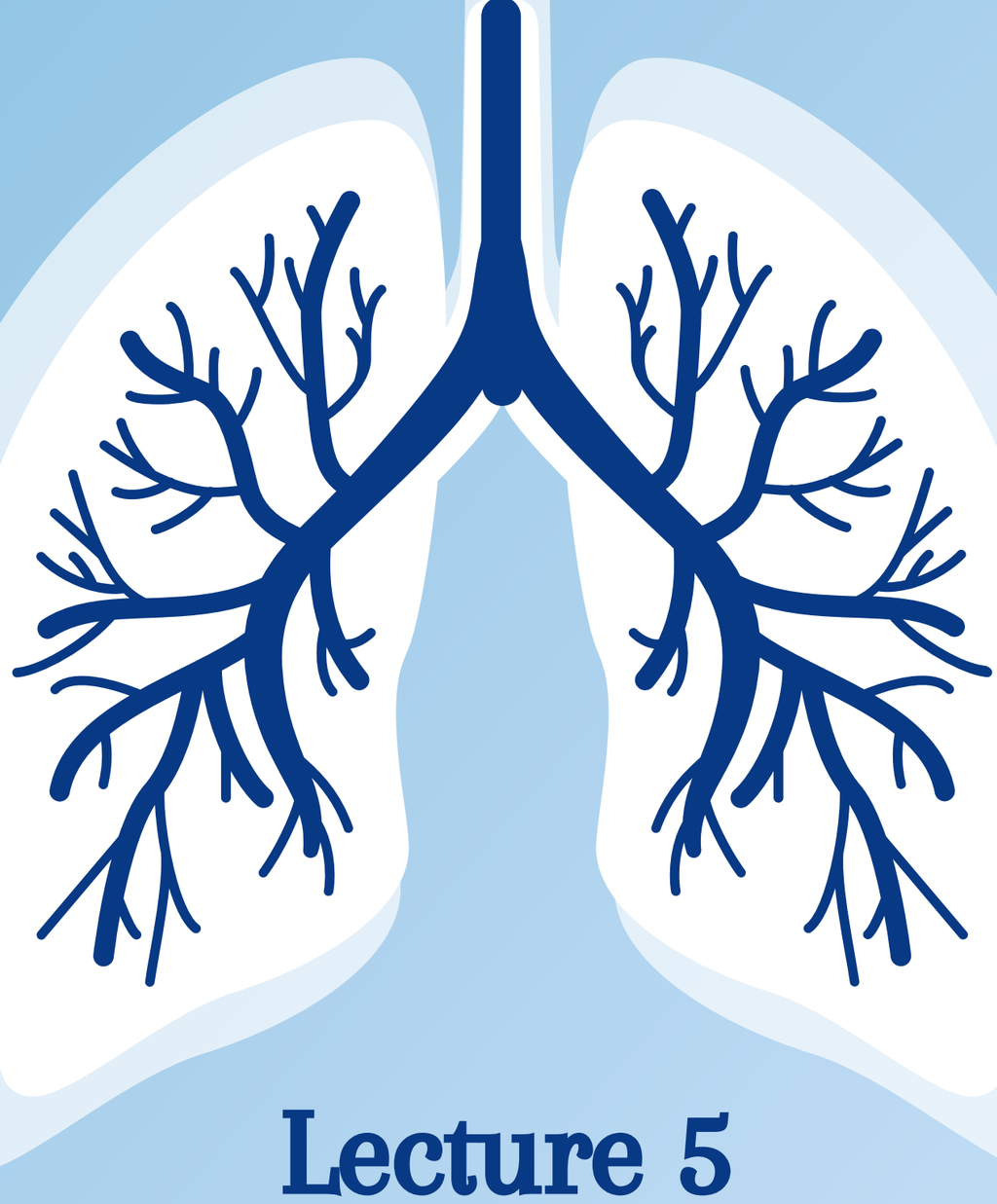


Color Index:

- Main text
- Boys' Slides
- Girls' Slides
- Important
- Dr's Notes
- Extra

Editing File

Lecture 5

RADIOLOGIC ANATOMY OF THE CHEST

OBJECTIVES

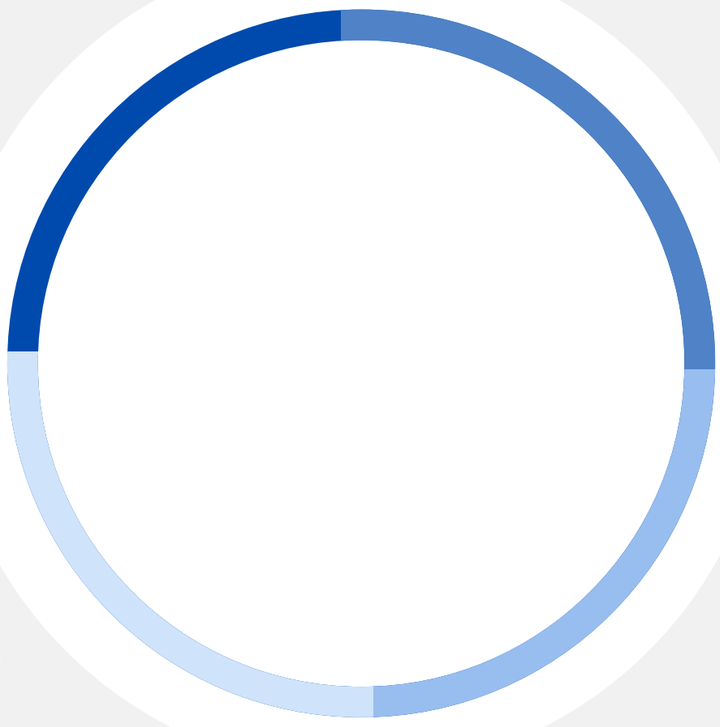
- Recognize the indications for X-ray.
- Differentiate between chest X-ray views.
- identify different structures in a PA chest X-ray .
- Recognise some imaging techniques such as bronchography, coronary angiography and barium contrast imaging techniques.

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, Scapula and the vertebrae)

Lung Disorders



Chest radiographs

Heart disorders

Chest radiographs are also used to screen for job-related lung diseases in industries such as mining, where workers are exposed to dust, asbestos-exposed workers (carcinogenic agent), silica exposed workers (silicosis causing lung fibrosis).

Chest x-ray viewes

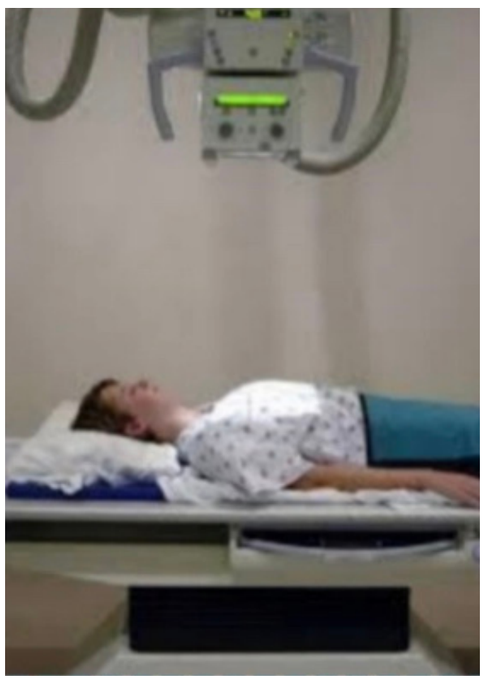
- Different views of the chest can be obtained by changing the relative position of the body and the direction of the x-ray beams:
- The most common views are Posteroanterior (PA), Anteroposterior (AP), lateral (L) & Decubitus.

1 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.
- It is the most frequently requested imaging test.
- 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

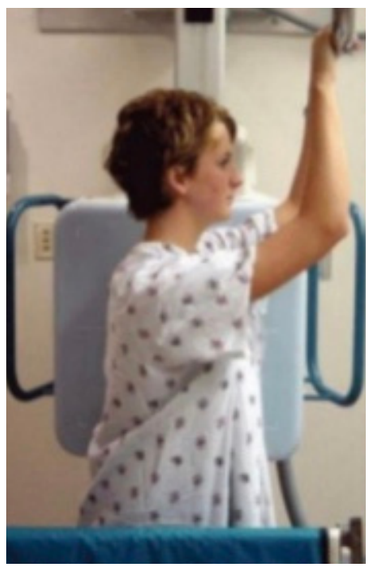
2 Anteroposterior (AP) view:

- 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's difficult for the patient to obtain a normal chest x-ray, such as when the patient can't get out of bed.
- It is often used frequently to aid diagnosis of acute and chronic conditions in intensive care units and wards.
- The heart appears larger compared to PA view.



3 Lateral view:

- Obtained with the left chest against the cassette to diminish the effect of magnification of the heart.
- Indicated only for further interpretation of certain lung and heart conditions.



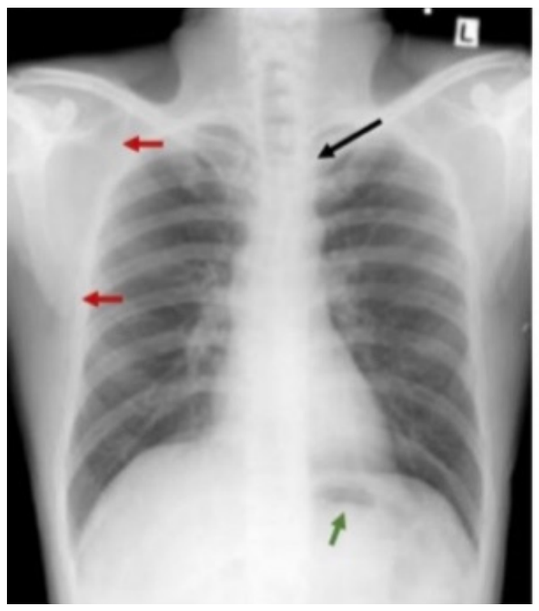
4 Decubitus:

- Lying at the side
- Helps in assessment of volume of pleural fluid.

Boys' Slides

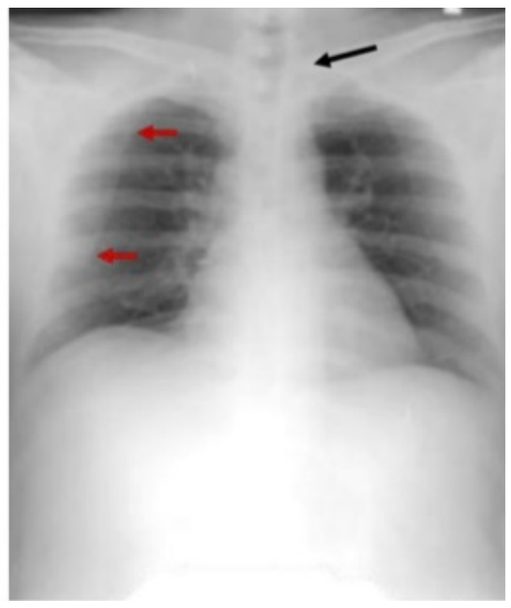
PA

- Scapulae lie in the periphery (red arrow)
- Clavicles are projecting over lung fields (black arrow)
- Fundal gas bubbles are seen (green arrow)



AP

- Scapulae are projecting over lung fields (red arrows)
- Clavicles are above the apex of lung fields (black arrow)
- Heart shadow is apparently enlarged



Posteroanterior Radiograph

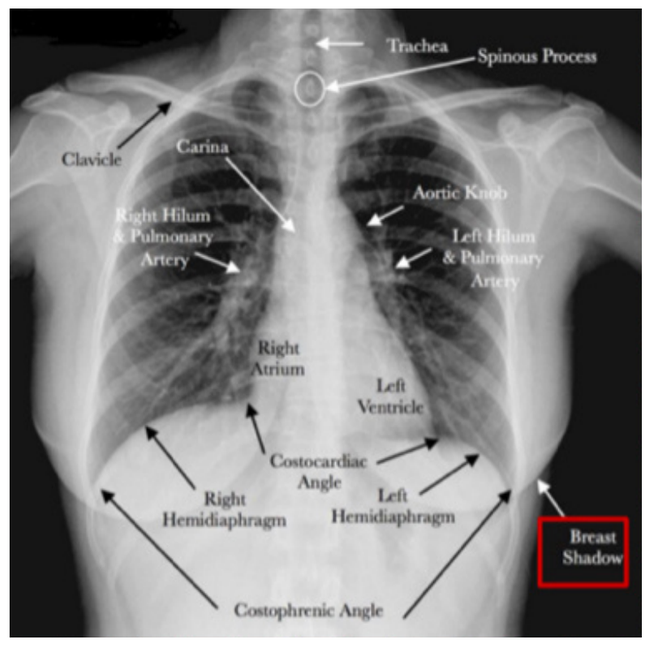
- For Posteroanterior radiographs (PA), the following structures must be examined:

Posteroanterior

- superficial soft tissue
- bones of thoracic cage
- Diaphragm
- Trachea
- lungs and bronchi
- Heart and great vessels

Superficial soft tissue

- Nipples in both sexes
- Breast shadows (in females) are seen superimposed on the lung fields.

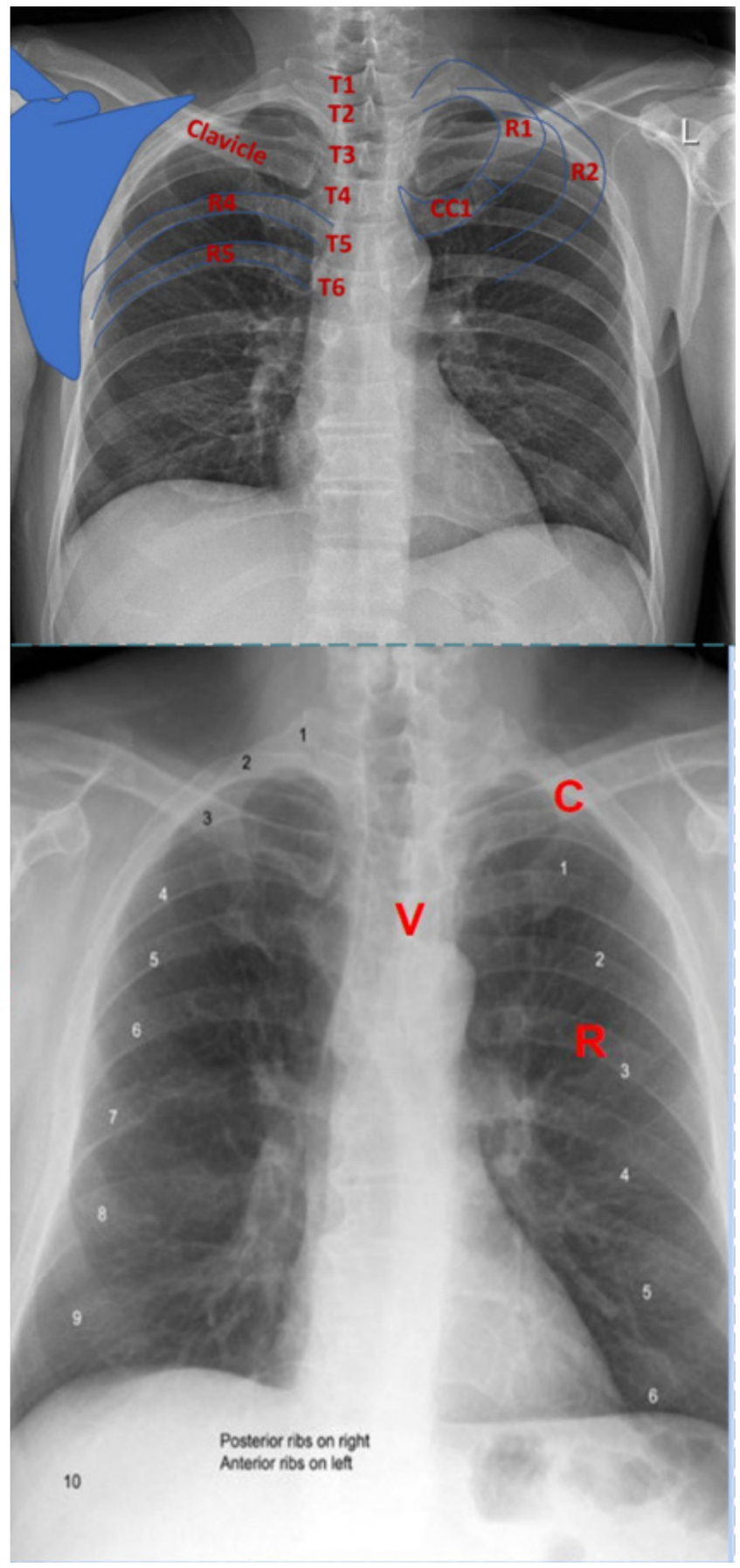


Bones of Thoracic cage

- The thoracic vertebrae are usually 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 it's calcified as the first costal cartilage, 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. It is seen in the periphery of each lung field. **
- Anterior and posterior parts of the ribs are superimposed.
- The humerus is occasionally seen.

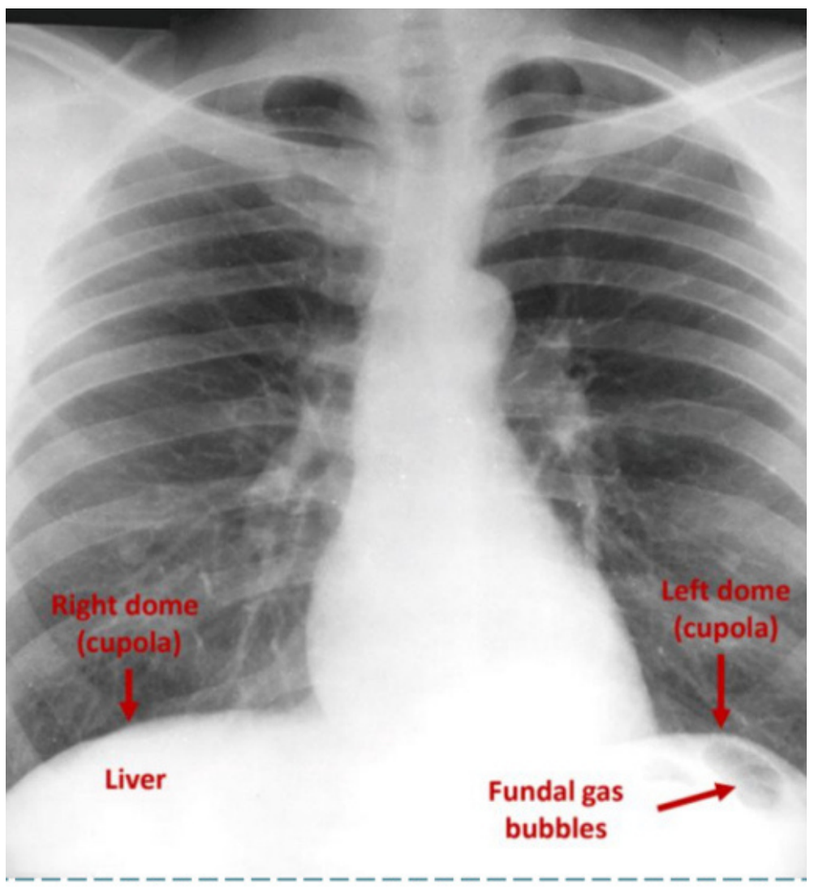
*: (The comparison is based on quantity and shape).

**: (If there is any problem in the scapulae it won't be seen in the Posteroanterior)



Diaphragm

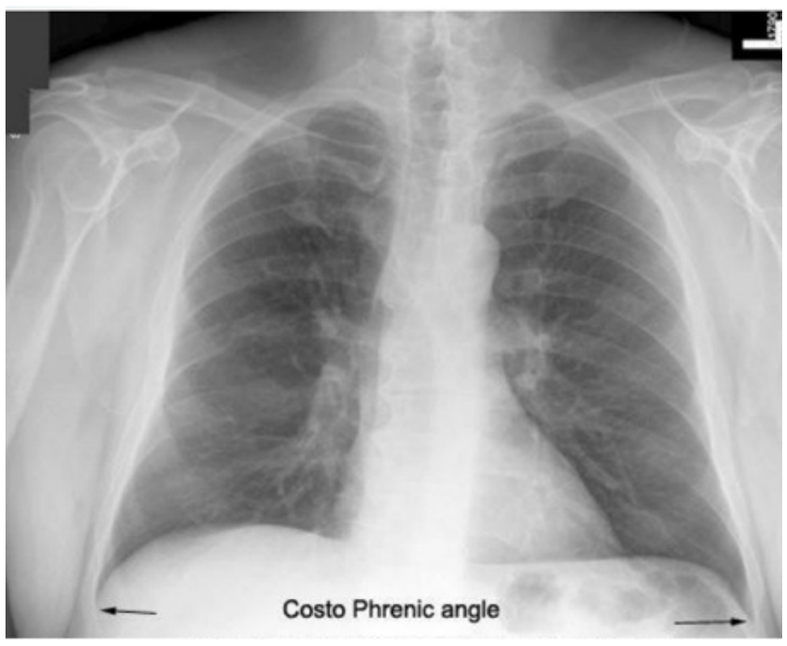
- The Diaphragm shows Dome-shaped shadow on each side.
- The right dome (cupola) is slightly higher than the left dome (cupola).
- Beneath the right dome is the homogenous, dense shadow of the liver
- Beneath the left dome the gas bubbles in the fundus of the stomach may be seen.



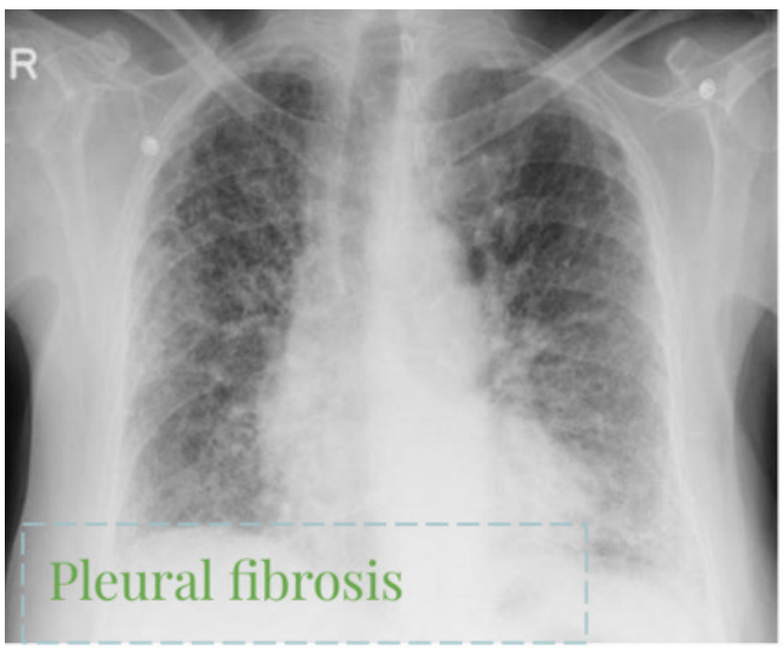
Dr: "That's why we see the right side higher than the left side."

Costo-diaphragmatic (costo-phrenic) angles

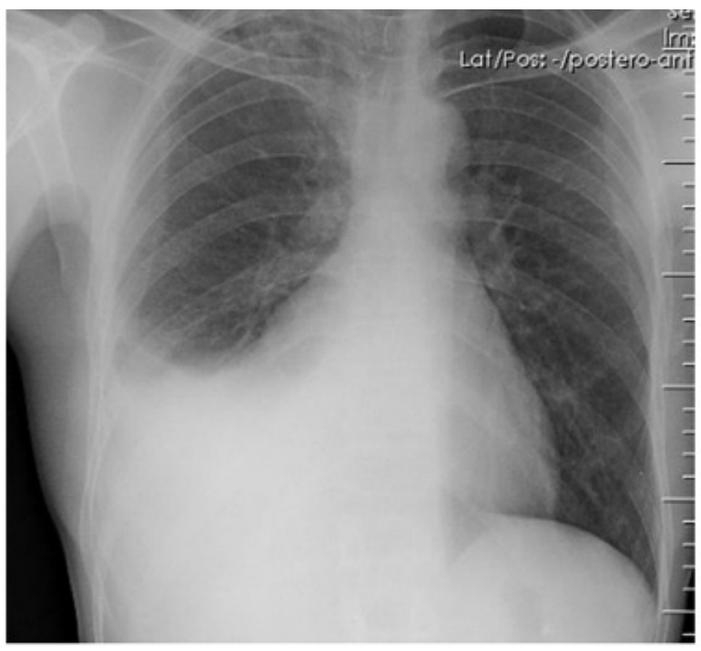
- They are at the sites where the diaphragm meets the thoracic wall.
- The angles become blunt or obscured in case of presence of pleural fluid (effusion) or fibrosis.

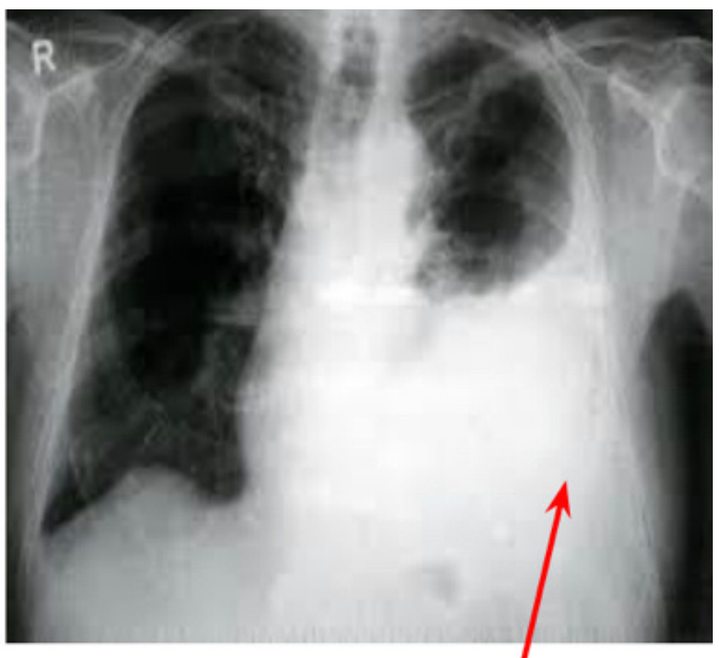


Dr: Abnormal cases pictures are just for your knowledge.



Pleural fibrosis

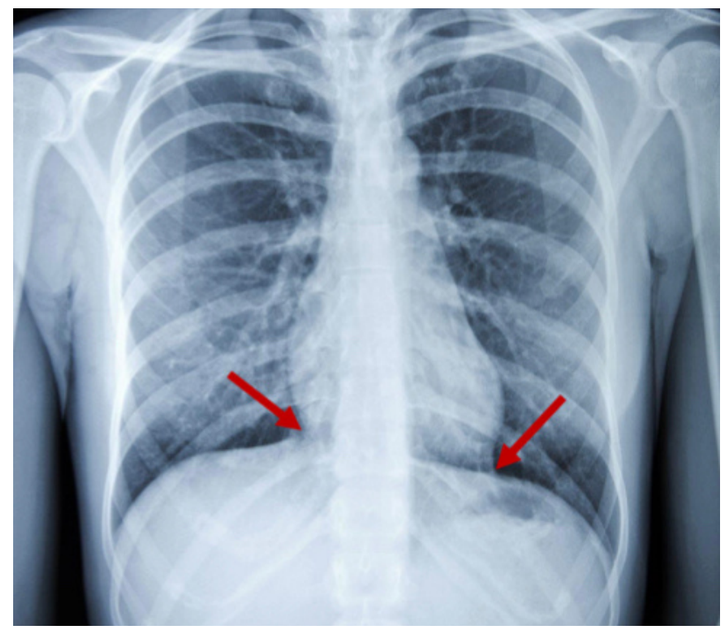




Left lung is blunt

Cardiophrenic Angle

Boys' Slides

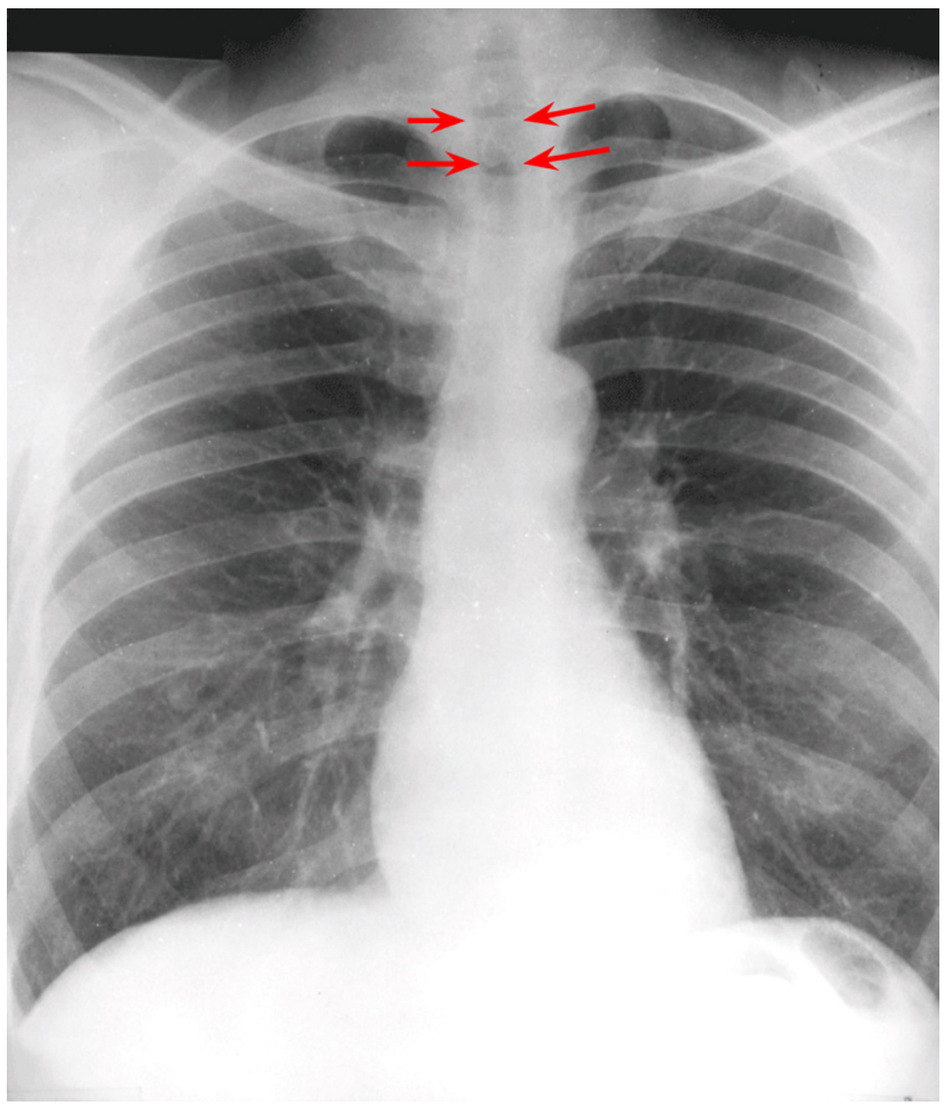


- The angle between the diaphragm and heart.
- The angle becomes blunt in certain diseases (e.g. pericardial cyst).

Dr: we can use it for diagnosis

Trachea

- The radio-translucent, 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.



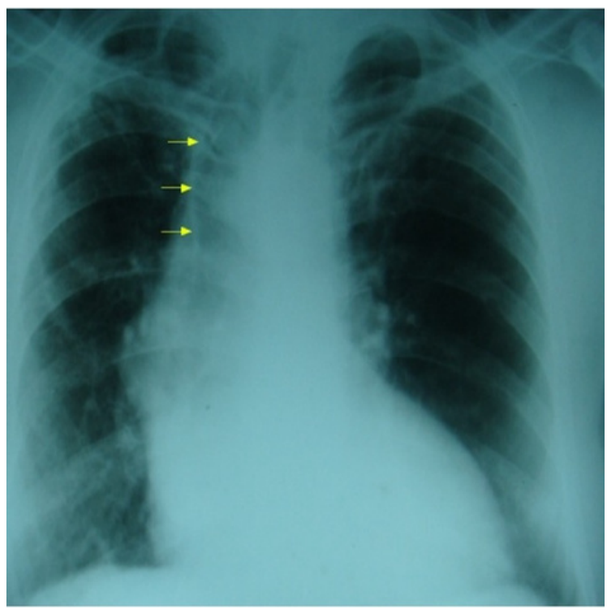
Tracheal shift

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.

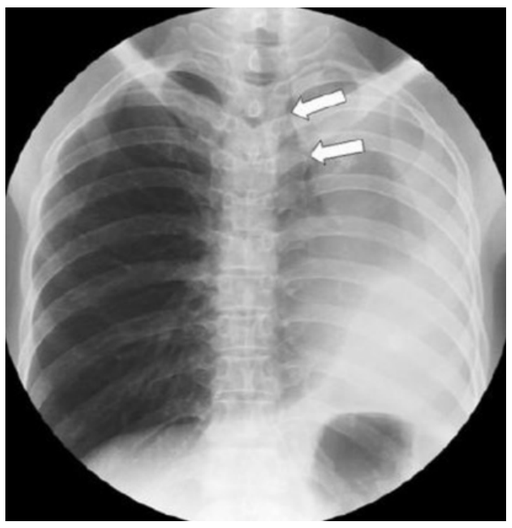
or:

- A massive pleural effusion on the left side. (But in this x ray, no pleural effusion is seen on the left)



To the opposite side of the lesion (as in massive pleural effusion)

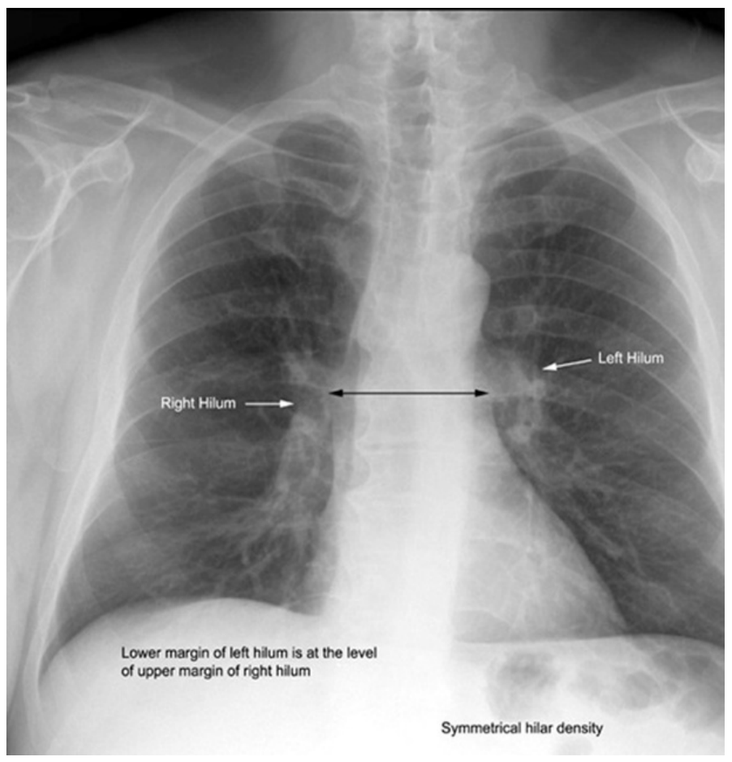
To the same side of the lesion (as in lung collapse)



Lungs

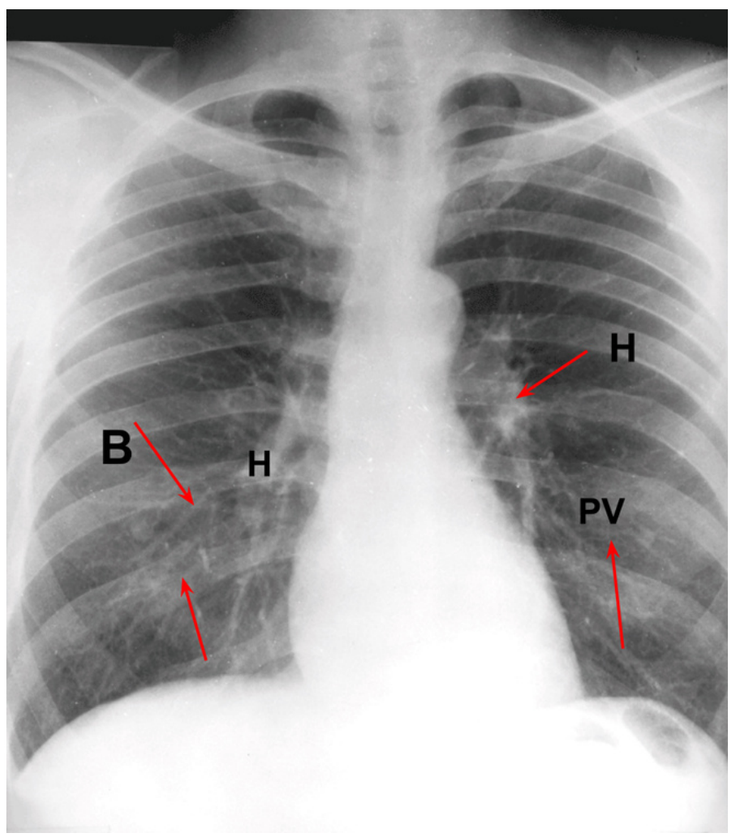
Girls' Slides

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



Lung Fields

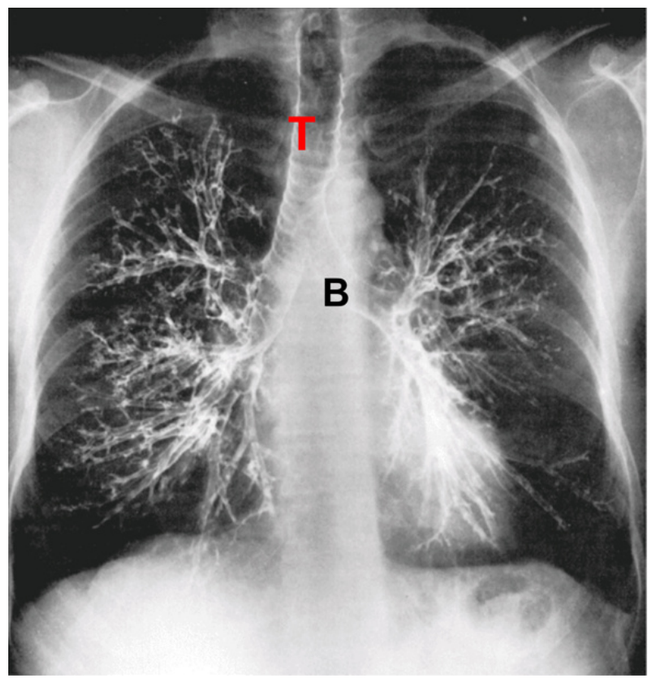
- Lungs are translucent (especially on full inspiration) due to the air they contain which readily permit passage of X-rays.
- The lung fields, by virtue of the air they contain, readily permit the passage of x-rays. For this reason, the lungs are more translucent on full inspiration than on expiration.
- Blood-filled pulmonary vessels (PV) are seen as a series of small, round, dense white shadows radiating from the hilum of the lung. (from the lung root)
- The large bronchi, also cast similar round shadows. The smaller bronchi are not seen
- The large airways are visible on most good quality chest X-rays. They contain air and so are of lower density (more black) than the surrounding soft tissues. The trachea branches into the left and right main bronchi, which can be followed as they branch beyond the hila



B = Bronchi
H = Hilum
PV = Pulmonary Vessels

Bronchography

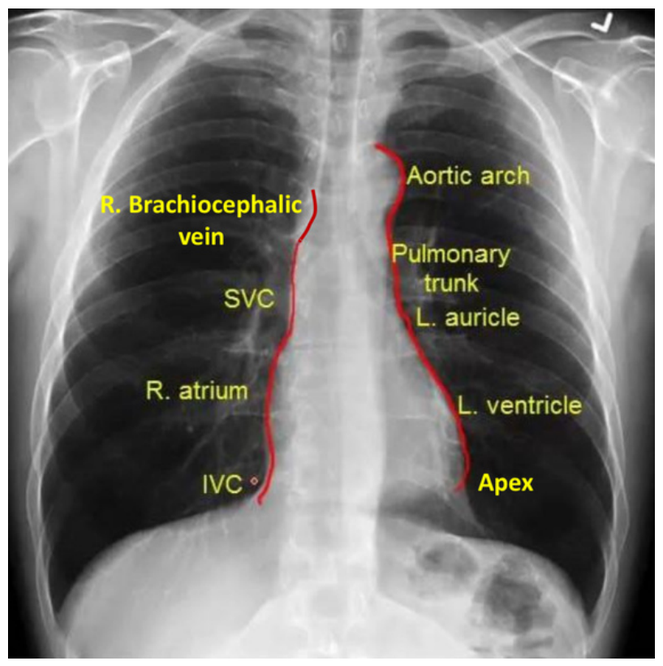
- Bronchography is a special study of the bronchial tree by means of the introduction of contrast medium (material) into a particular bronchus or bronchi, and performing plain radiographic imaging, usually under fluoroscopic control. The contrast media are nonirritating and sufficiently radiopaque to 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.



Dr. Said very important

Mediastinum borders

The **Right Border** from above downward consists of:

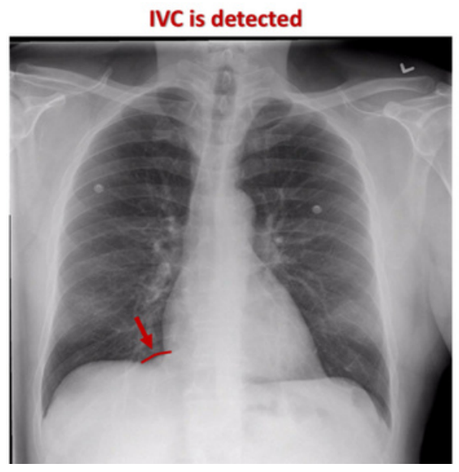
- Right brachiocephalic vein
- Superior vena cava,
- Right atrium
- Inferior vena cava (sometimes detected)

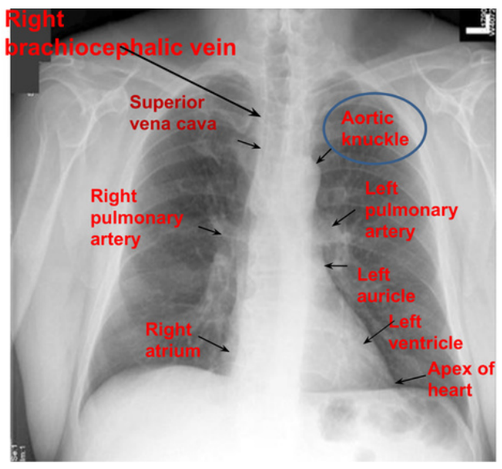
The **Left Border** consists of:

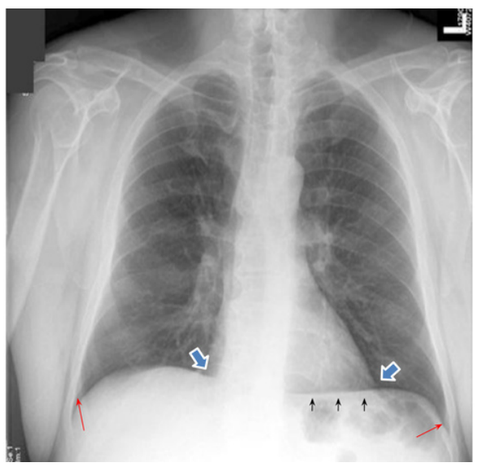
- A prominence, the Aortic knuckle (knob), caused by the aortic arch;
- Left margin of the Pulmonary Trunk,
- the Left Auricle,
- Left Ventricle
- apex of heart.

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

Note the cardiophrenic angles.



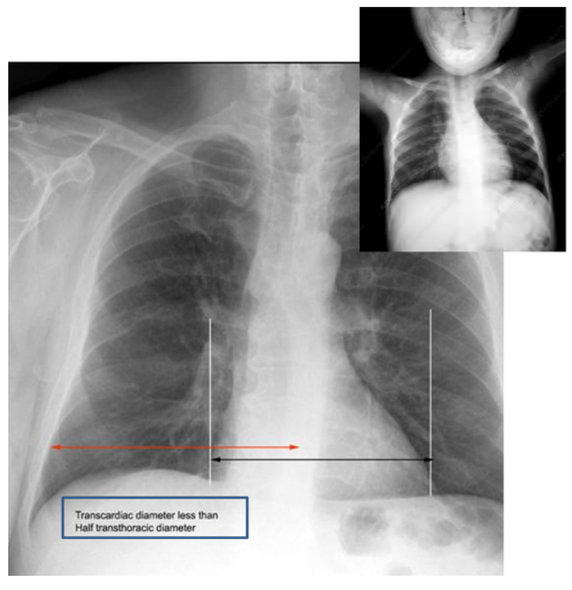


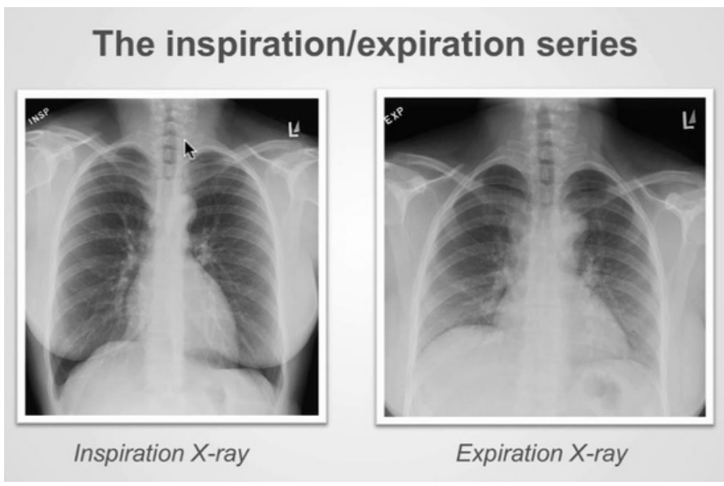


Heart

The Transverse Diameter of the heart should not exceed half the width of the thoracic cage.

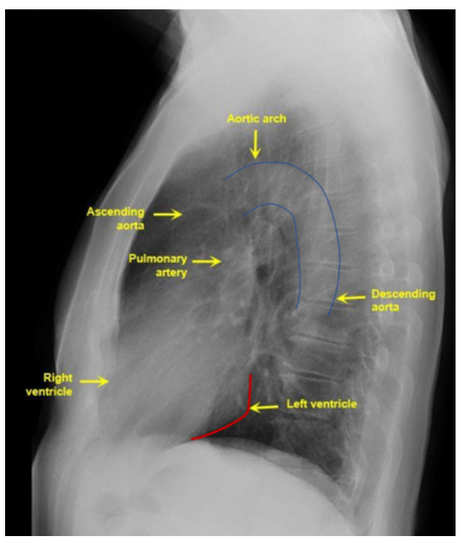
- On deep inspiration, when the diaphragm descends, the vertical length of the heart increases and the transverse diameter is narrowed.
- In infants, the heart is always wider and more globular in shape than in adults.

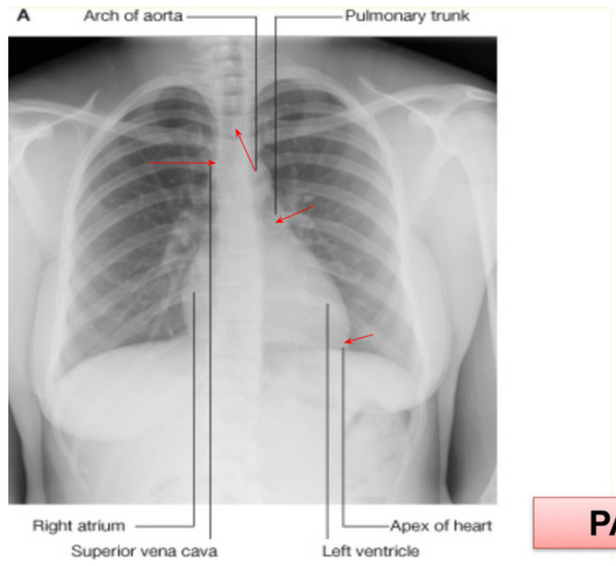




Lateral chest radiograph

Note that the upper vertebrae are indistinct compared to the lower vertebrae because they are superimposed by the shoulder.

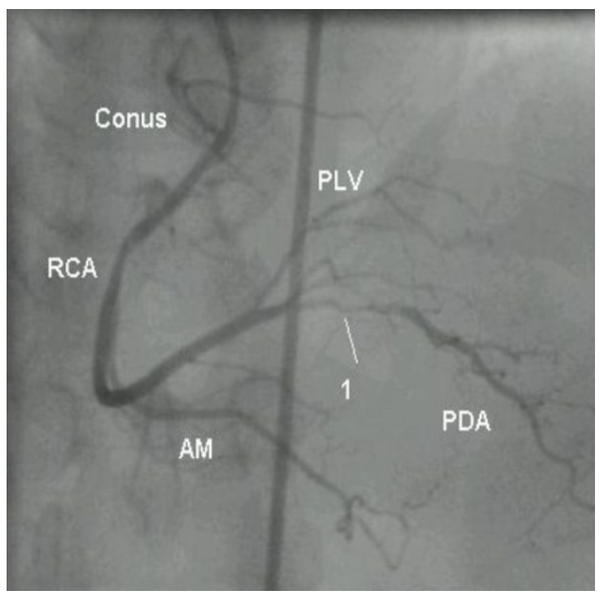




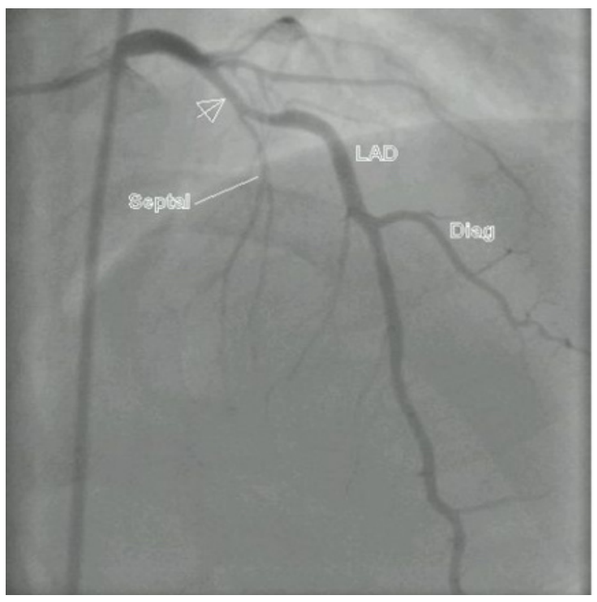
Coronary Angiography

- A procedure that uses a radio-opaque contrast dye and X-ray imaging to detect blockages in the coronary arteries
- an X-ray with radio-opaque contrast in the coronary arteries

Right coronary artery angiogram

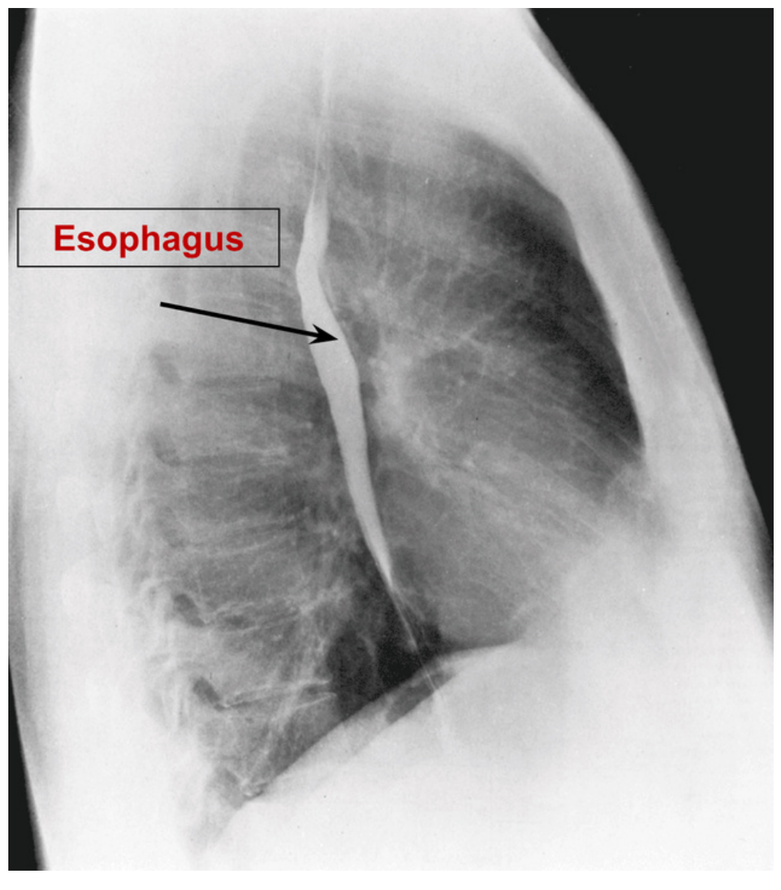


Left coronary artery angiogram



Dr said just know that it's an X-ray for coronary arterey

Contrast visualization of the esophagus using barium swallow



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

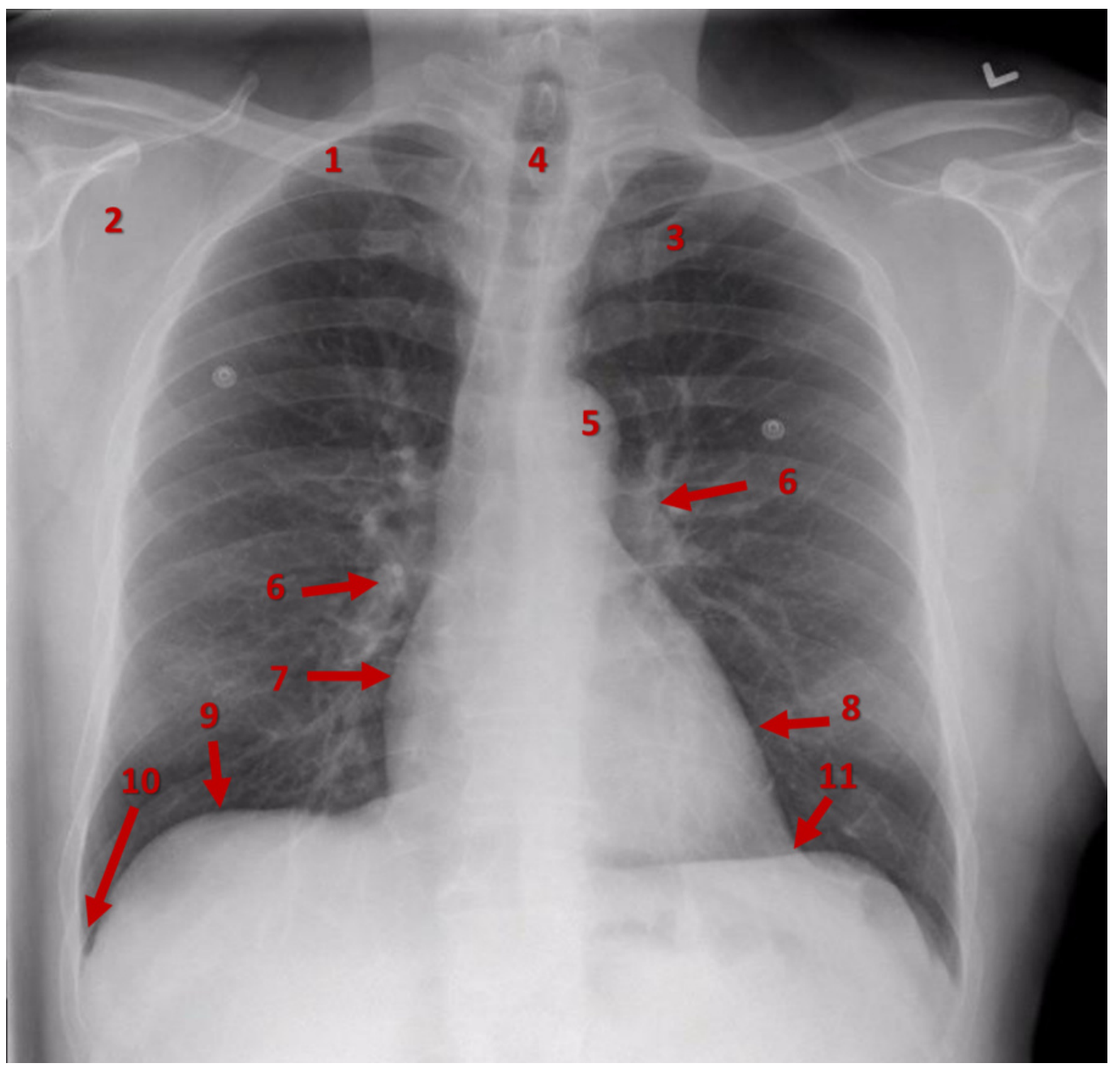
Barium contrast studies also include:

- Barium meal: for stomach
- Barium follow through: for small intestine
- Barium enema: for large intestine

PA chest x-ray

Boys' Slides

1) Clavicle
2) Scapula
3) First rib
4) Trachea
5) Aortic knuckle (knob – arch)
6) Pulmonary vessels
7) Right atrium
8) Left ventricle
9) Right dome (cupola) of diaphragm
10)Right costophrenic angle
11)Left cardiophrenic angle



MCQs

1 which of the following structures are NOT clear in X-ray?

A-Ribs	B-Scapula	C- Clavicle	D- Costal cartilage

2 which view provides a good assessment of cardiac size?

A- PA view	B- AP view	C- lateral view	D- decubitus

3 which of the following is NOT found at the left border of the mediastinum?

A-pulmonary trunk	B-inferior vena cava	C-Aortic knuckle	D-left auricle

4 which view helps in assessment of volume of pleural fluid?

A- PA	B- AP	C- lateral view	D- decubitus

5 Which of the following best describes the shape of the heart in infants when compared to adults?

A- Wider and more globular	B- Wider and less globular	C- Narrower and more globular	D- Narrower and less globular

1-D 2-A 3-B 4-D 5-A

SAQs

1 Enumerate the Mediastinum borders

The Right Border consists of:
Right brachiocephalic vein, Superior vena cava, Right atrium, Inferior vena cava

The Left Border consists of:
A prominence, the Aortic knuckle Left margin of the Pulmonary Trunk, the Left Auricle, Left Ventricle, apex of heart.

2 Mention the two types of the tracheal shift

To the opposite side of the lesion
To the same side of the lesion

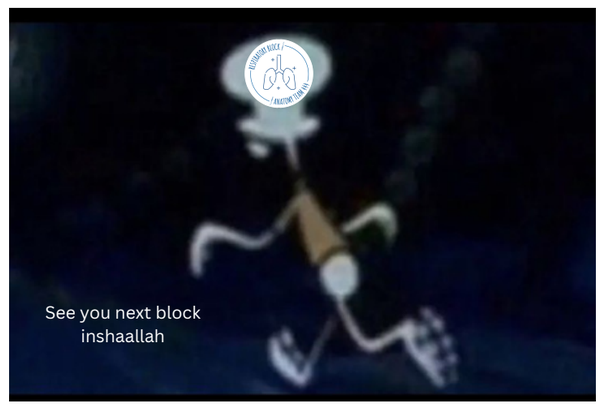
3 Mention three structures that the must be examined by Posteroanterior radiographs

Diaphragm, trachea , lung and bronchi

4 List two of the Barium studies in visualizing the GIT

Barium swallow - esophagus
Barium meal - stomach

More questions? Click here!



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