



Radiological anatomy of the chest

Respiratory Block - Lecture 6

Color index:

Important


In male's slides only

In female's slides only

Extra information, explanation

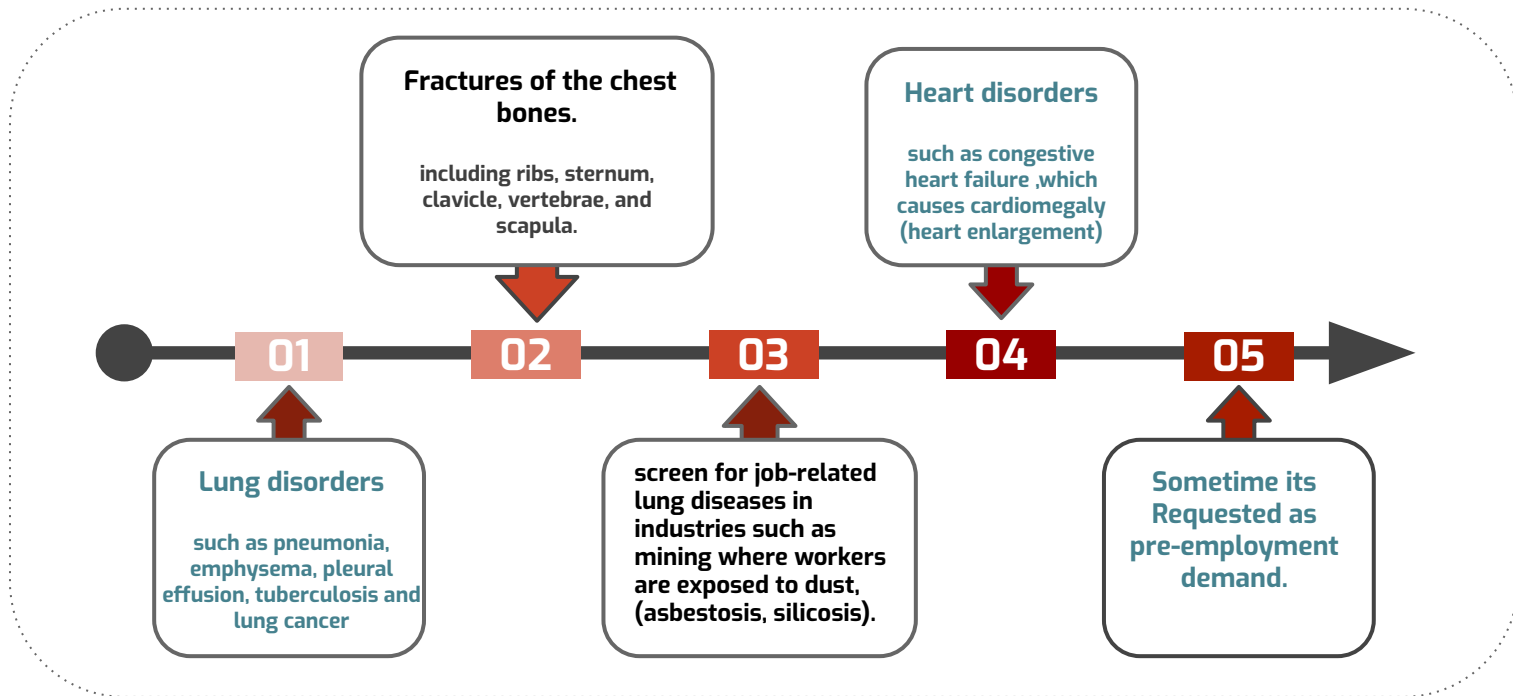
Doctors notes

Objectives:

- Identify the bones of the thoracic cage in X-ray film.
 - Identify superficial soft tissue in X-ray film.
 - Identify the trachea and lung fields in X-ray film.
 - Describe the mediastinum and the cardiac shadows in X-ray film.
 - Describe brief knowledge about Bronchography.
 - Describe brief knowledge about Coronary Angiography.
- 

Radiography

A chest x-ray may be used to diagnose and to plan the treatment and follow up for various conditions, including:



Radiography

Different views of the chest can be obtained by changing the orientation (the relative position) of the body and the direction of the x-ray beams.

(it is named according to the direction of the entrance of the X-ray beam)

The most common views are:

Posteroanterior



Posteroanterior (PA)

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 avoids magnification of the heart as the film is close to the anterior chest wall. Thus Gives a good assessment of the Cardiac Size*

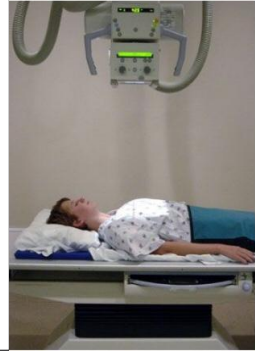
It is identified by the presence of the fundal gas bubble and the absence of the scapula in in the lung fields.

Anteroposterior (AP)

The x-rays enter through the anterior aspect and exit through the posterior aspect of the chest.

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

Anteroposterior



Lateral



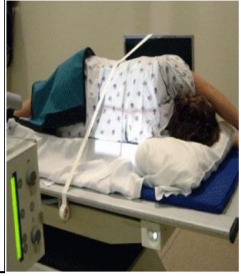
Lateral

Indicated only for further interpretation
(to confirm the diagnosis)

Decubitus

lying at the side

Decubitus



Posteroanterior Radiograph

For Posteroanterior radiograph (PA), the following systems must be examined in order:

V1 • Superficial soft tissues

V2 • Bones

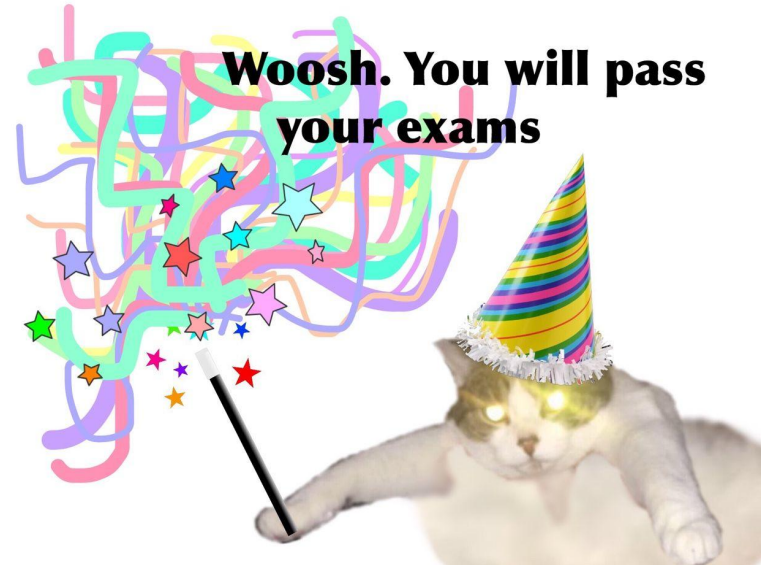
V3 • Diaphragm

V4 • Trachea

V5 • Lungs and bronchi

V6 • Mediastinum

V7 • Heart and greater vessels



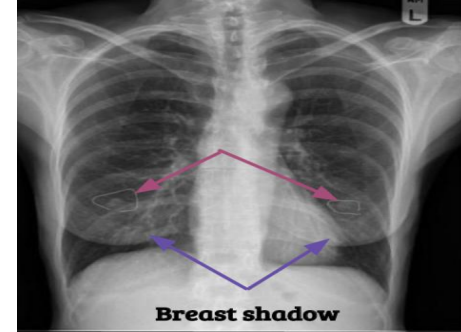
we didn't know what to do with the extra space so we decided to show you the magical cat

Posteroanterior Radiograph

1 Superficial soft tissues

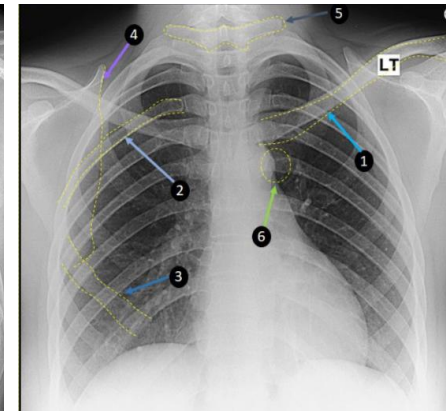
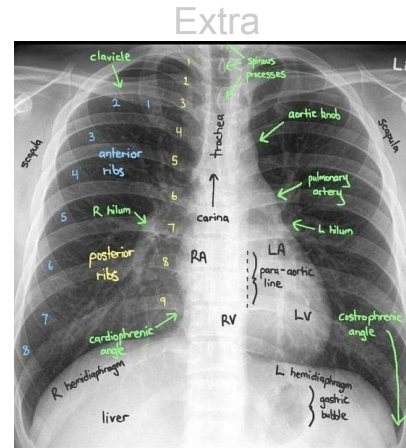
The superficial soft tissues that can be seen are:

- The nipples in both sexes
- The breast in female are seen superimposed on the lung fields.



2 Bones of thoracic cage

- 1- **Clavicle**: are seen clearly crossing the upper part of each lung field.
- 2- **The medial borders of the Scapulae** : may overlap the periphery of each lung field.
- 3- **Thoracic Vertebrae**: are imperfectly seen.
- 4- **The costo-transverse joints** and each rib should be examined in order from above downward and compared to their flow of the opposite side.
- 5- **posterior ribs.**
- 6- **anterior ribs.**
- 7- **The Costal Cartilages**: are not usually seen, but if calcified, they will be visible.

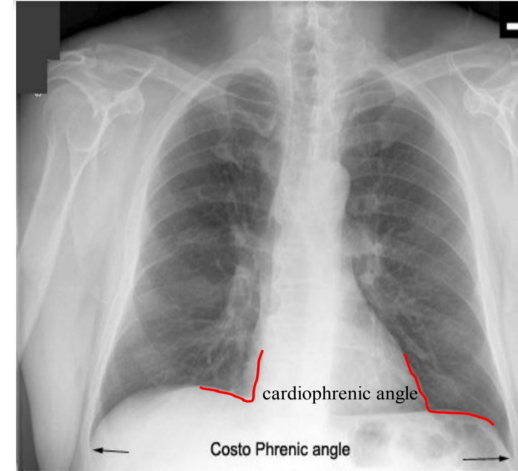


Posteroanterior Radiograph

3

Diaphragm

- The diaphragm appears as a **dome-shaped** shadow on each side.
- The **right side is slightly higher** than the left.
- **Beneath the right dome is the homogeneous, dense shadow of the liver.**
- Beneath the left dome a **gas bubble** mostly seen in the fundus of the **stomach**.
- **The Costophrenic or Costodiaphragmatic angle** is: where the diaphragm meets the thoracic wall. These angles become blunt or obscured due to minimal pleural fluid (effusion) or fibrosis.
- Also note the cardiophrenic angle where the diaphragm meet the heart.



Posteroanterior Radiograph

4

Trachea

- The radio-translucent, air-filled shadow of the trachea is seen in the midline of the neck as a dark area.
- This is superimposed by the lower cervical and upper thoracic vertebrae.

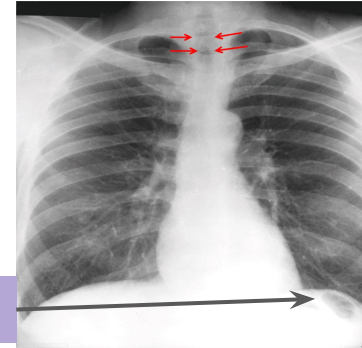
- **Tracheal shift** : Tracheal air column is seen shifted to right on X-ray chest PA view.

It indicates:

1- A loss of volume of the right upper lobe of the lung, either due to collapse or fibrosis

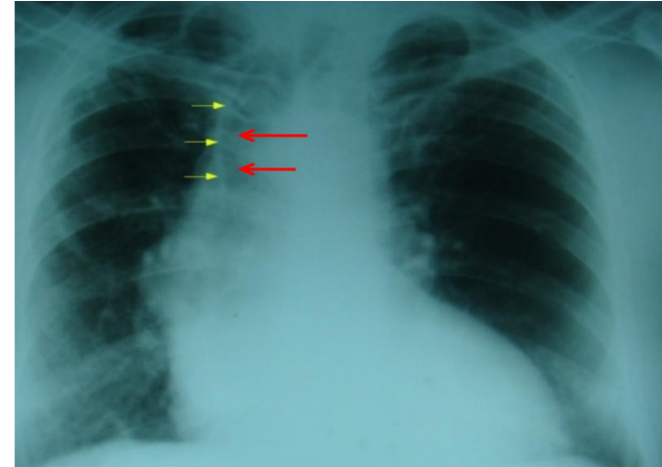
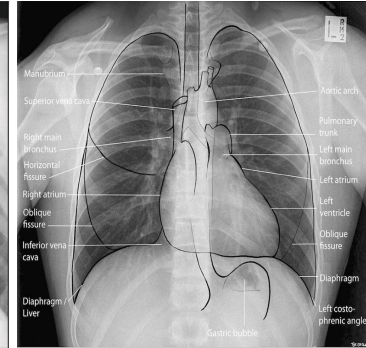
2- A massive pleural effusion on the left side

mentioned by males doctor



gas bubble in fundus of stomach

Extra

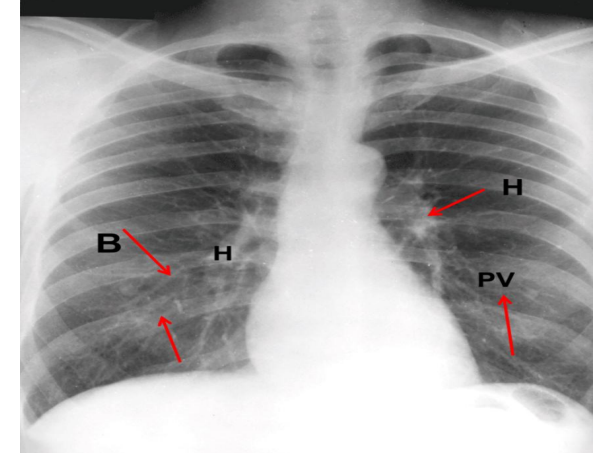
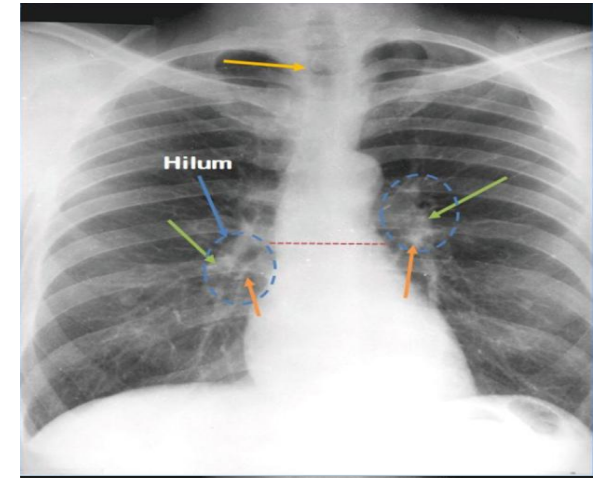


Posteroanterior Radiograph

5

Lung

- **Lung roots:** relatively dense shadows caused by the presence of:
 - 1- Blood-filled pulmonary and bronchial vessels
 - 2- Large bronchi
 - 3- Lymph node
- Notice that the **lower margin of left hilum lies at the level of the upper margin of right hilum.**
- **the lungs are more translucent on full inspiration than on expiration.** because of the air they contain, readily permit the passage of x-rays.
- The pulmonary blood vessels are seen as a series of small, rounded, white shadows radiating from the lung root.
- The large bronchi, are seen as similar round shadows.
- The smaller bronchi are not seen.



Heart

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

(القلب الطبيعي لا يصل قطرة بالعرض الى نصف قطر القفص الصدري , القلب اقل من نصف القفص)

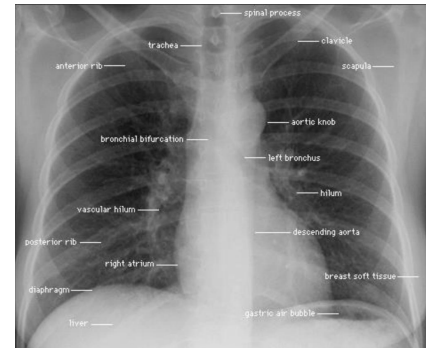
2 On **deep inspiration**, when the **diaphragm descends**, the **vertical length of the heart increases** and the **transverse diameter is narrowed**.

3 The heart in **infant** always **wider and more globular** than in adults.



Mediastinum

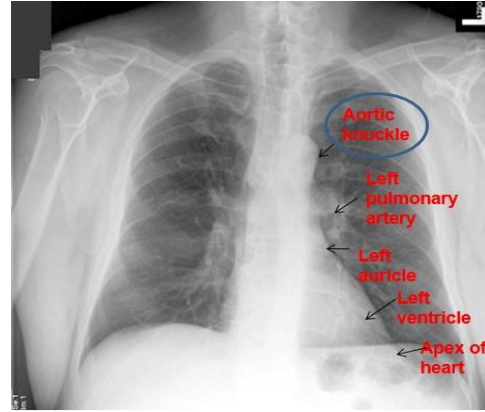
- The shadow is produced by the various structures within the mediastinum, superimposed one on the other.
- Note the **outline of the heart and great vessels**.



Mediastinum

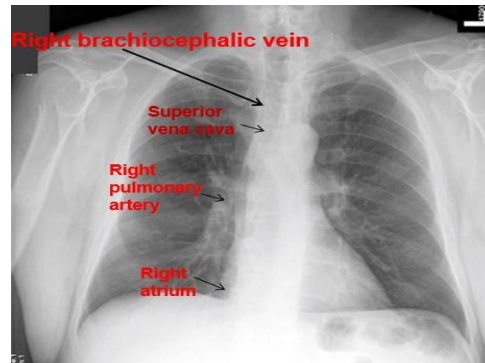
Left Border

1. the **Aortic knuckle (or knob)** caused by the aortic arch.
2. the Pulmonary Trunk.
3. the Left Auricle.
4. the Left Ventricle (apex of heart).



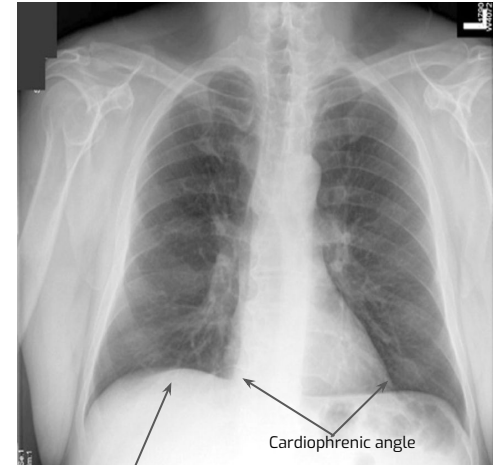
Right Border

1. Right brachiocephalic vein
2. Superior vena cava
3. Right atrium
4. Sometimes the Inferior vena cava.



Inferior Border

1. (lower border of the heart) blends with the diaphragm and liver shadow.
2. Note the cardiophrenic angles.



girls slides only



Bronchography



1 Is special study of the bronchial tree by inhalation of a contrast medium into a particular bronchus or bronchi
usually this study is done under fluoroscopic control.

2 Characteristic of contrast media?

- non irritating (so the patient will not cough it)
- sufficiently radiopaque. (to allow good visualization of the bronchi)

3 After completion of examination, the patient is asked to cough and expectorate the contrast medium

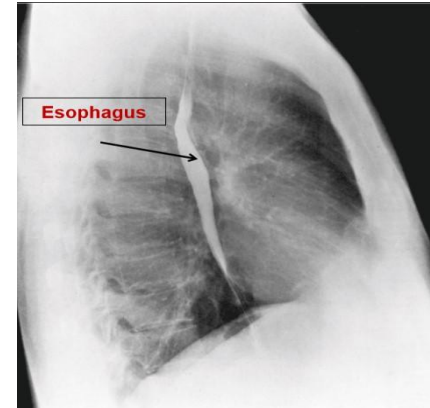
Bronchography and the contrast visualization of the esophagus



- Contrast visualization of the esophagus by swallowing a contrast media (barium swallow)
- Identification of the **aortic arch** and the **left bronchus**.
- Identification of the **enlargement of the atrium**.

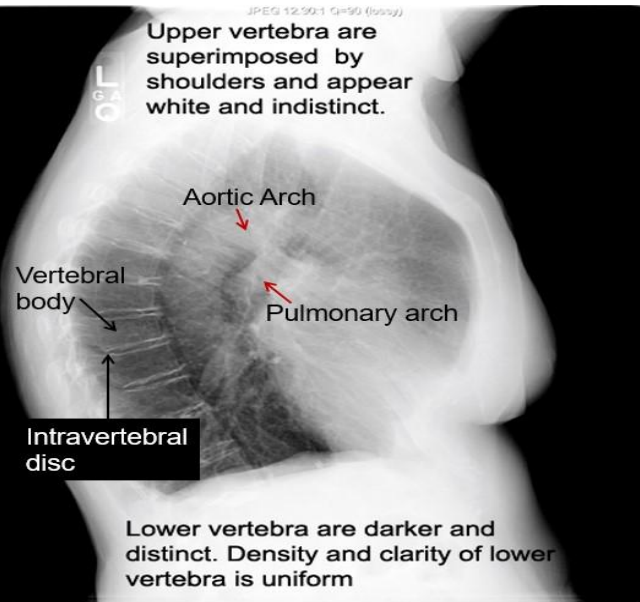
Other barium contrast studies:

1. **Barium meal:** stomach
2. **Barium follow through:** small intestine.
3. **Barium enema:** large intestine.



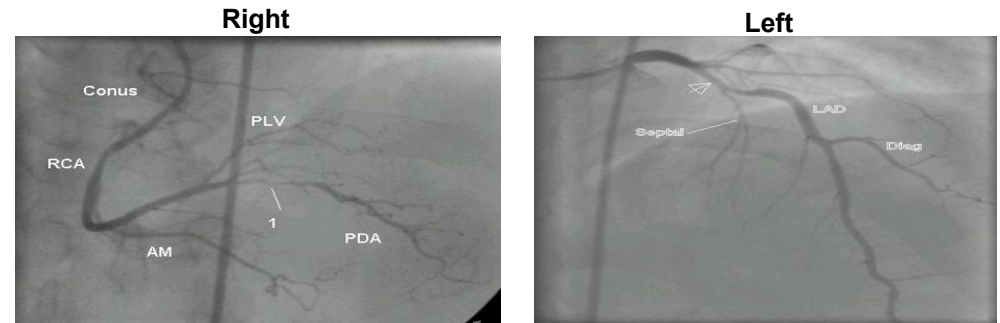
Other Chest X-rays

Lateral radiograph of the chest



girls slides only

Coronary Angiography



- an X-ray with radio opaque contrast in the coronary arteries.
- Pathological narrowing or blockage of coronary artery can be identified.

Good luck and we wish all the best!
see you next block.

- Anatomy team

MCQ

Q1: A chest x-ray may be used to diagnose all the following EXCEPT:

- A. Lung disorder
- B. Fracture of the chest bone
- C. Heart disorder
- D. Myocardial infarction

Q4: The diaphragm on an X-ray film is seen as

- A. Concave shape
- B. Pyramidal shape
- C. Dome shape
- D. Conical shape

Q2: The X-ray enters through the posterior aspect of the chest and leaves through the anterior aspect

- A. Anteroposterior view
- B. Lateral view
- C. Posteroanterior view
- D. Decubitus

Q5: The cardiophrenic angle is caused by the meeting of the diaphragm with the

- A. Ribs
- B. Heart
- C. Liver
- D. Stomach

Q3: All of the following bones can be seen in the posteroanterior view EXCEPT:

- A. Clavicle
- B. Lumbar vertebra
- C. Medial border of Scapula
- D. Anterior ribs

Q6: The radio-translucent, air-filled shadow seen in the midline of the neck as a dark area is

- A. Trachea
- B. Esophagus
- C. Sternum
- D. None of the above

MCQ

Q7: Which of the following structures is NOT visible in the lung

- A.** Pulmonary blood vessels
- B.** Lymph nodes
- C.** Small bronchi
- D.** Large bronchi

Q10: Which structure is NOT found at the right border of the mediastinum

- A.** Aortic knuckle
- B.** Right brachiocephalic vein
- C.** Right atrium
- D.** Superior vena cava

Q8: The Transverse Diameter of the heart should not exceed

- A.** One-third of the width of the thoracic cage
- B.** One fourth of the width of the thoracic cage
- C.** One-fifth of the width of the thoracic cage
- D.** Half the width of the thoracic cage.

Q11: 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

Q9: In deep inspiration the vertical length of the heart and the transverse diameter is.....

- A.** Increases, Expands
- B.** Decreases, Expands
- C.** Increases, Narrowed
- D.** Decreases, Narrowed

Q12: Is a special study of the bronchial tree by inhalation of a contrast medium

- A.** Angiography
- B.** Radiography
- C.** Bronchography
- D.** Mammography

SAQ :

1 : What are the systems that should be examined in the posteroanterior radiograph?

2 : What does a tracheal shift to the right indicate?

3 : In what way would an infants heart differ from an adults heart on a chest X-ray?

SAQ Answers

1:

1. superficial soft tissues
2. bones
3. diaphragm
4. trachea
5. lungs and bronchi
6. mediastinum
7. heart and greater vessels.

2 : 1- A loss of volume of the right upper lobe of the lung, either due to collapse or fibrosis

2- A massive pleural effusion on the left side

3 : The heart of an infant would be wider and more globular than an adult's heart .

Team leaders Abdullah Alsubaihi Abeer Awwad



A special thanks to Abdullah Alsubaihi for his hard work and support.

Team Members :

- Shayma Abdullah
- Sumo Abdulrahman
- Fatimah Saad
- Shaden Alsaiedan
- **Ghada Aljedaie**
- **Alaa Alsulmi**
- Sara alrashidi
- Joud alnujaidi
- Shahad almezel
- Osama Alharbi
- Bassam Alasmari
- Nawaf Al-Shahrani
- Bader Alrayes
- **Nawaf Alsaadi**
- **Mohammed Akresh**
- **Ibrahim Alabdulkarim**

Contact us:
Anatomy439@gmail.com