Basic chest X-ray interpretation

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Part 4

Content

- §11. Pericardium
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- §13. Emphysema
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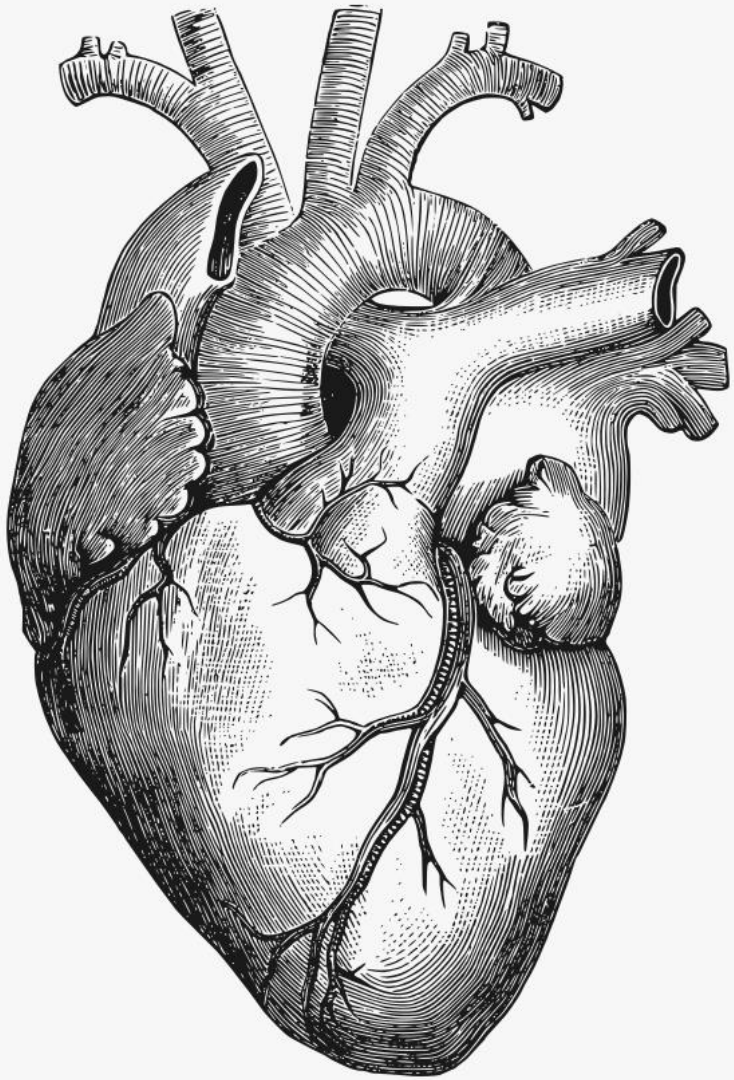
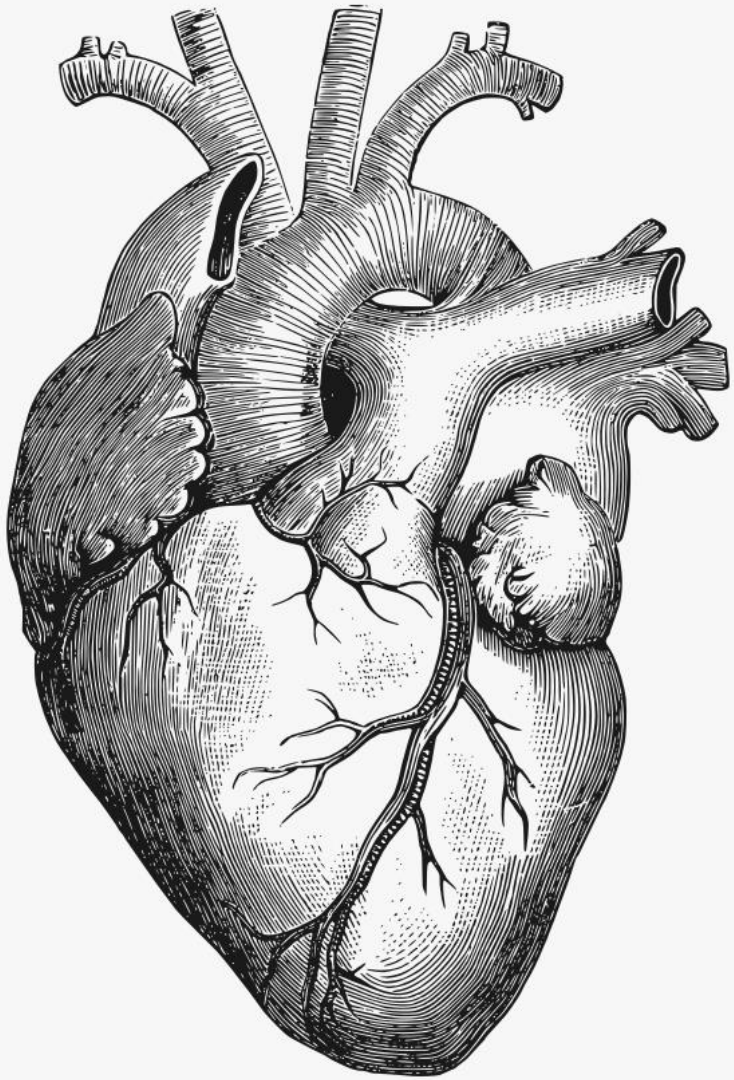


§11. Pericardium

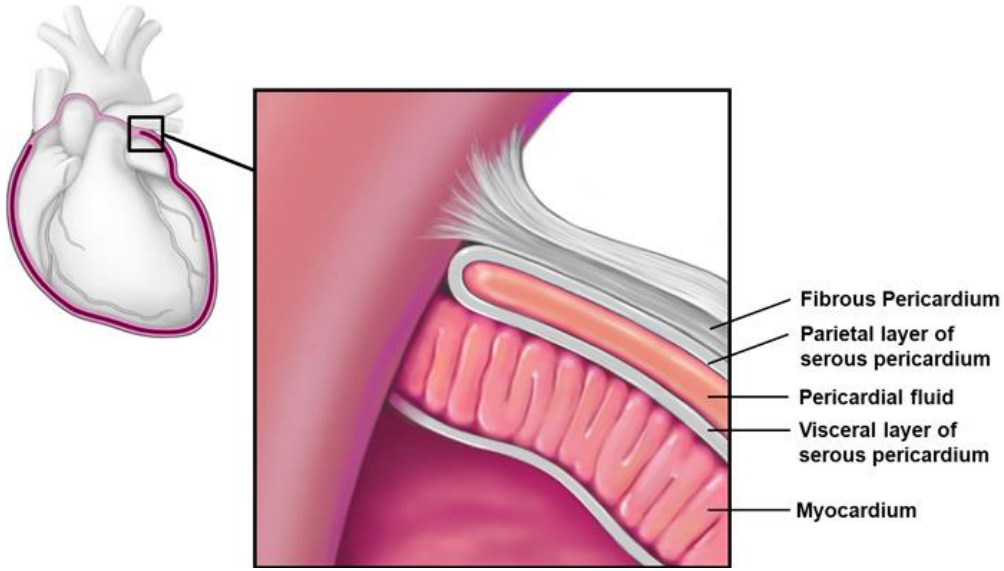
- **Pericardium:**
  - **Pericardial effusion**
  - **Pericardial calcification**



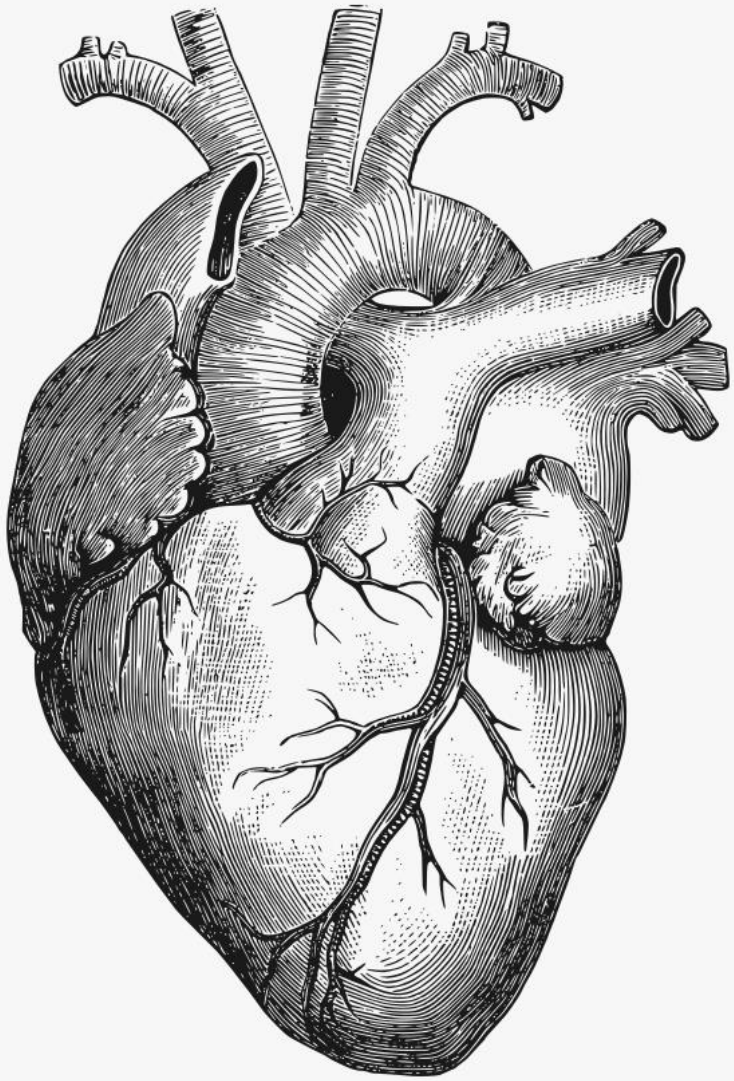
Pericardium

- **Pericardium** is a double-walled sac containing the heart and the roots of the great vessels; has two layers (serous and fibrous); encloses the pericardial cavity which contains pericardial fluid and defines middle mediastinum.

- **Valuable pathological conditions, visible on CXR**
  - Pericardial effusion;
  - Pericardial calcification.



- **Pericardial effusion**



Pericardial effusion

- **Pericardial effusion** is an abnormal accumulation of fluid in the pericardial cavity.
- Etiology is various, but generally it has **infectious, viral, autoimmune or traumatic origin.**
- A pericardial effusion big enough to **lead to hemodynamic impairments and cardiac failure is called cardiac tamponade**.

Pericardial effusion

- **Pericardial effusion** that is greater than **200 mL** is radiographically visible.
  Radiographic signs include:
  - **Increased CTR**
  - **Water bottle configuration**
  - **Oreo cookie sign** (lateral view)
  - **Pulmonary edema***

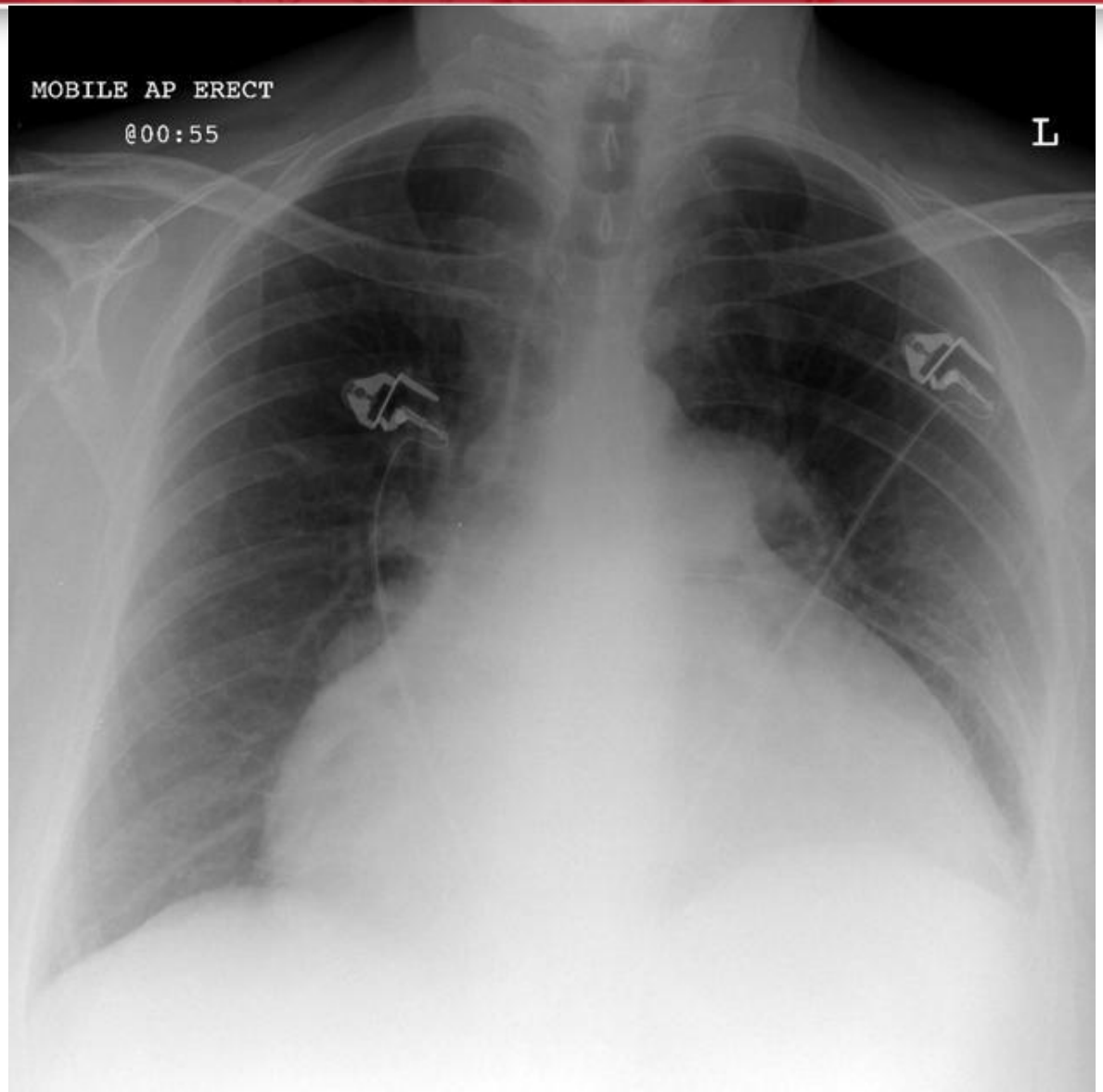
**Pulmonary edema is explained in Part 1 and Part 2 of the current lecture.*

Water bottle configuration

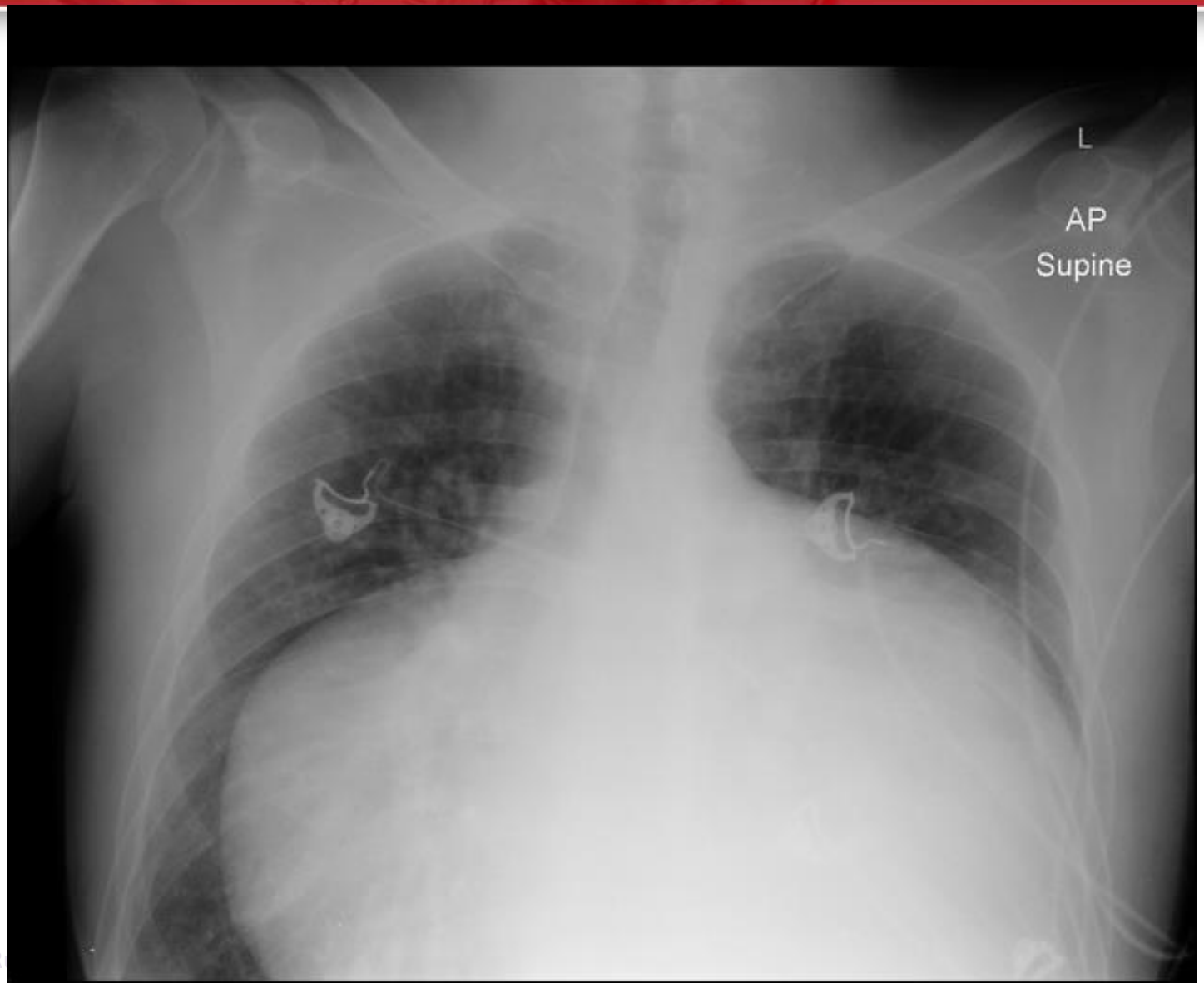
- **Water bottle sign**
  refers to the shape of the cardiac silhouette on erect frontal CXR in patients with a very large pericardial effusion (or cardiac tamponade), that is compared to an old-fashioned water bottle.

Water bottle configuration

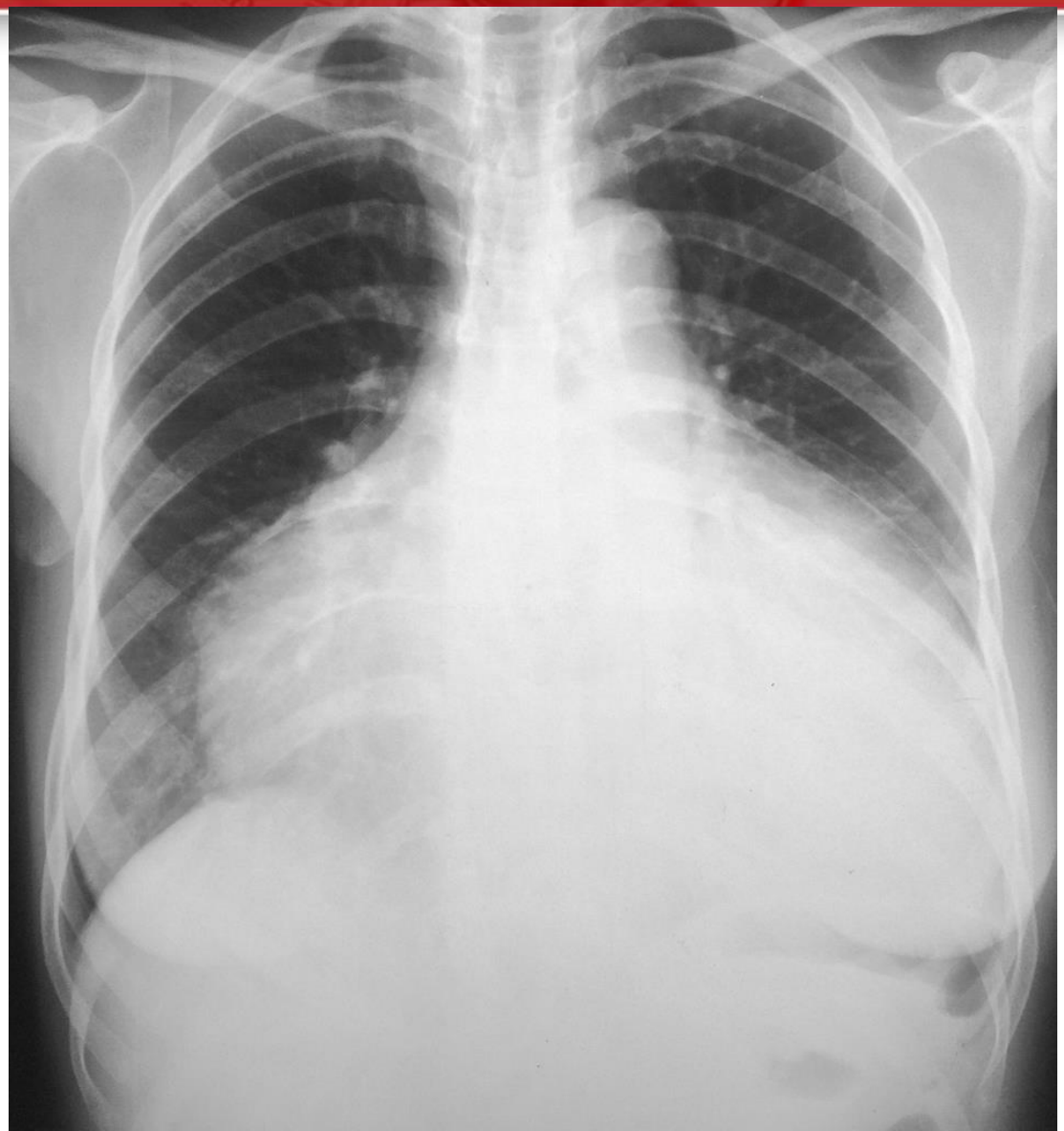
Water bottle configuration



Water bottle configuration



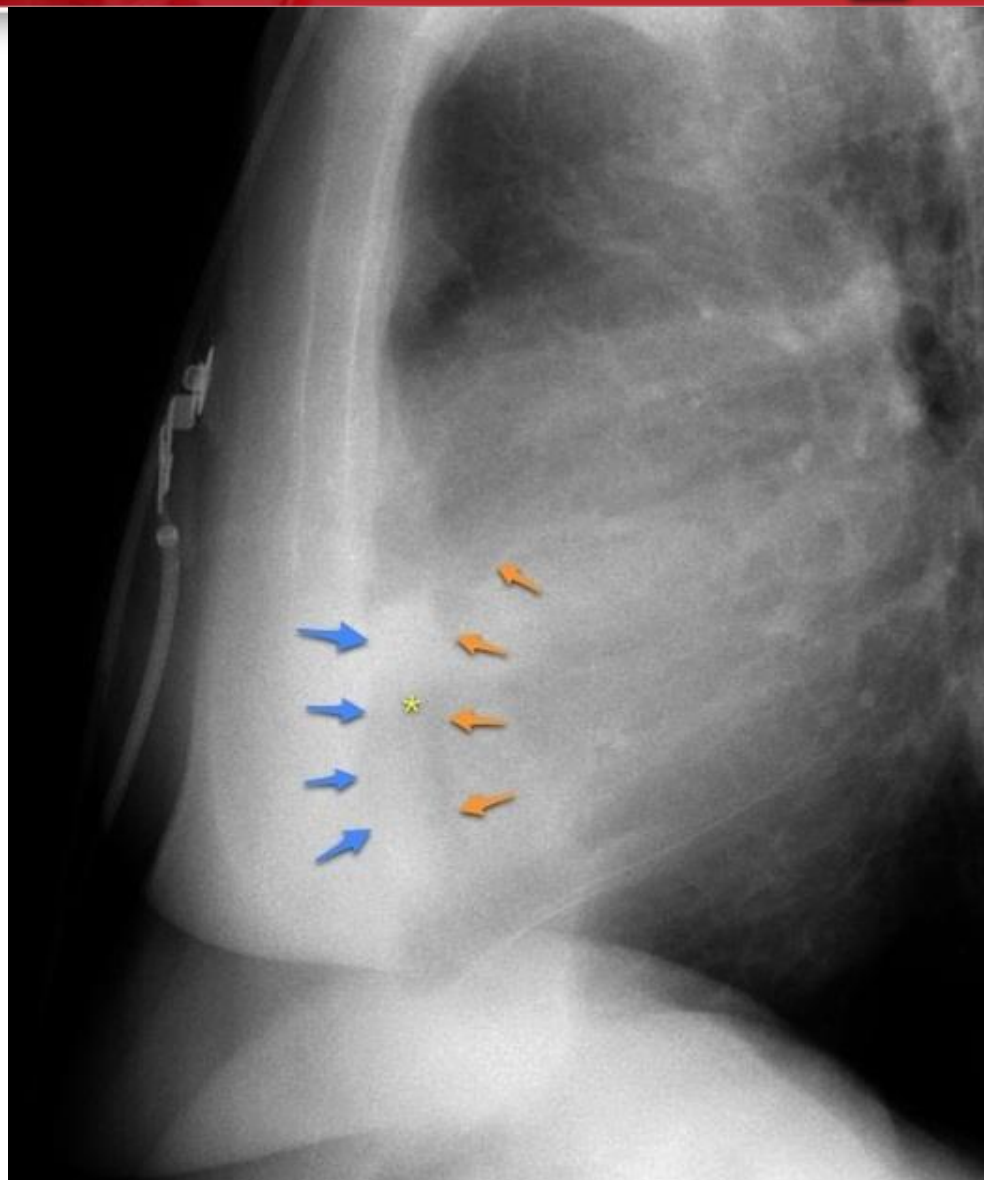
Water bottle configuration



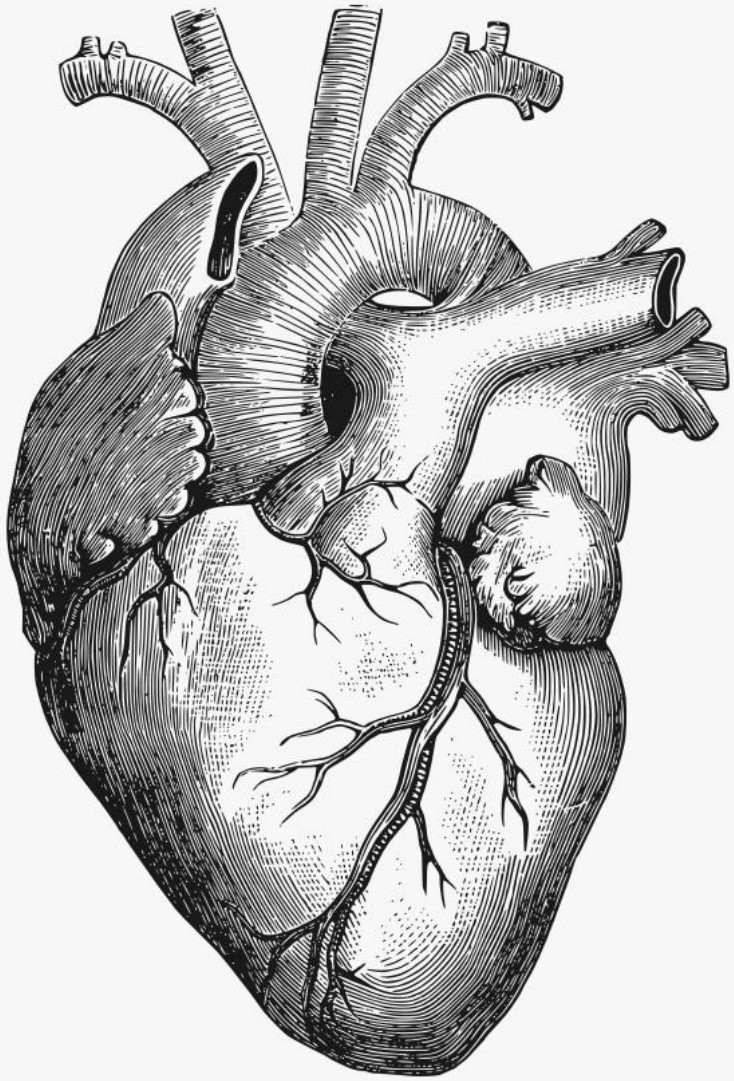
Oreo cookie sign

- **Oreo cookie sign** refers to the appearance of a pericardial effusion on lateral CXR.

- **Three layers**:
  - **1** - lucent epicardial fat (**blue arrows**);
  - **2** - opaque pericardial liquid (**yellow star**);
  - **3** - lucent pericardial fat (**orange arrows**).



- **Pericardial calcification**

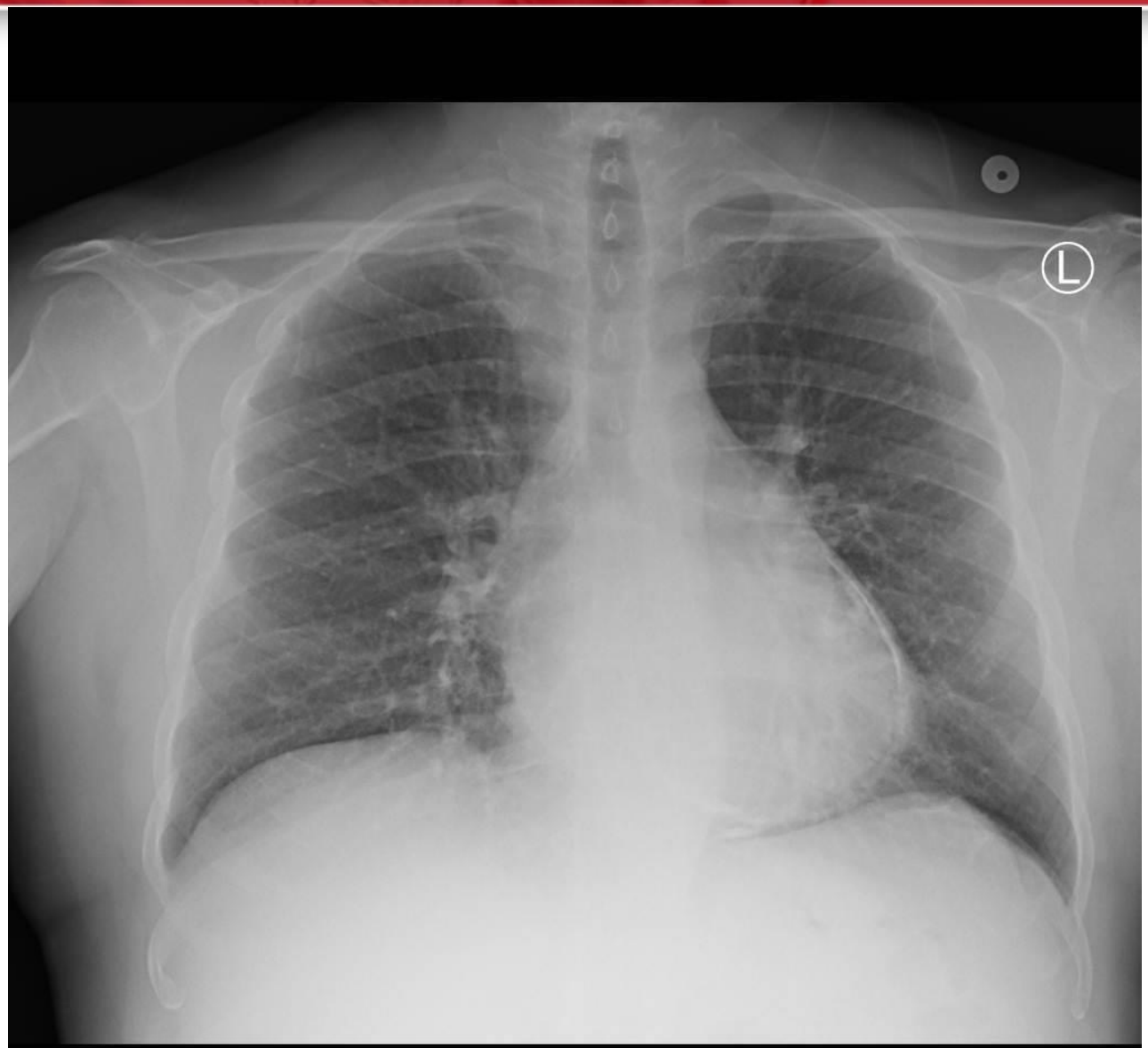


Pericardial calcification

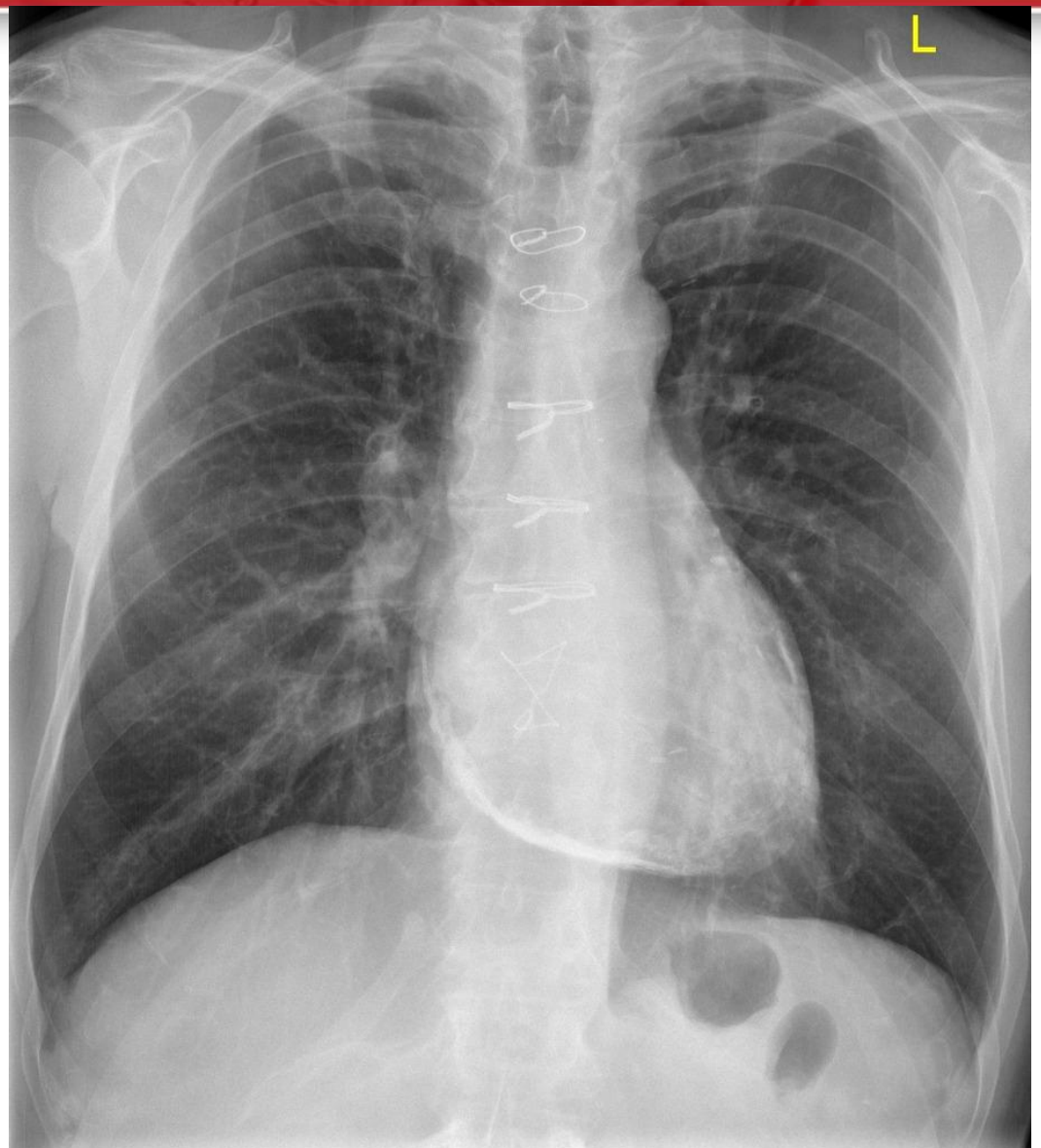
- **Pericardial calcification** is a common outcome of ***constrictive pericarditis***, that has various etiology (*idiopathic, TB, post-MI, post-surgical, infectious, etc.*).

- Pericardial calcification is generally **asymptomatic**.
- **Distinctly visible** on CXR and other imaging methods.

Pericardial calcification



Pericardial calcification

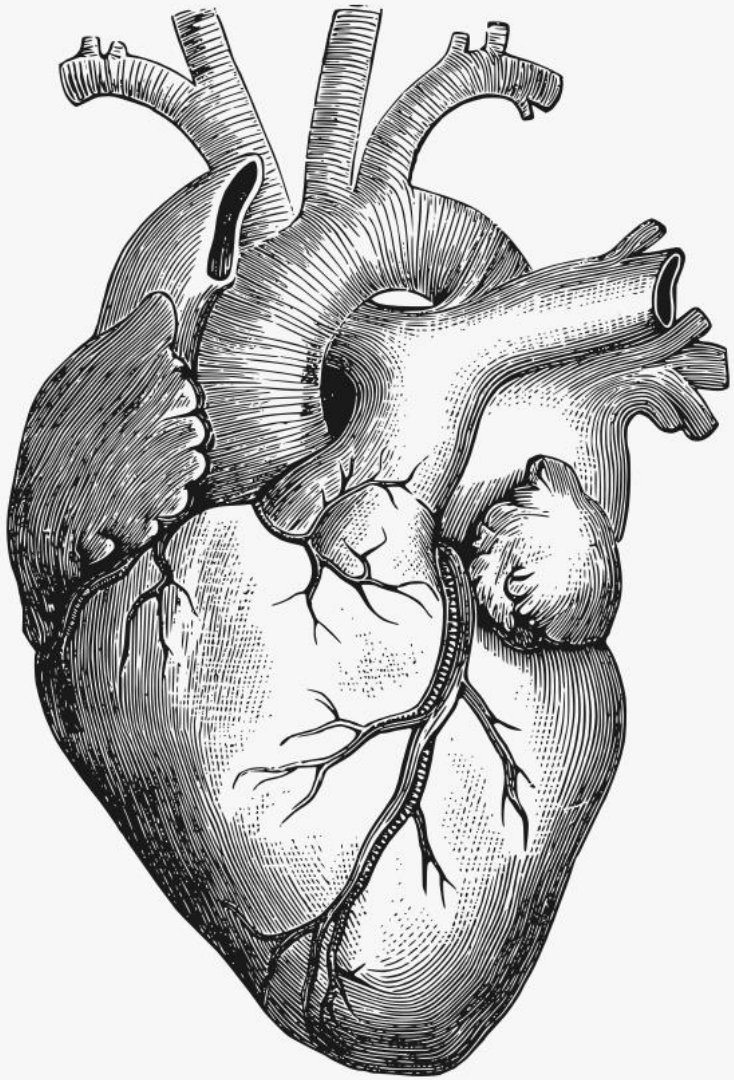


Pericardial calcification

…and bilateral pleural effusion

§12. Aortic knob

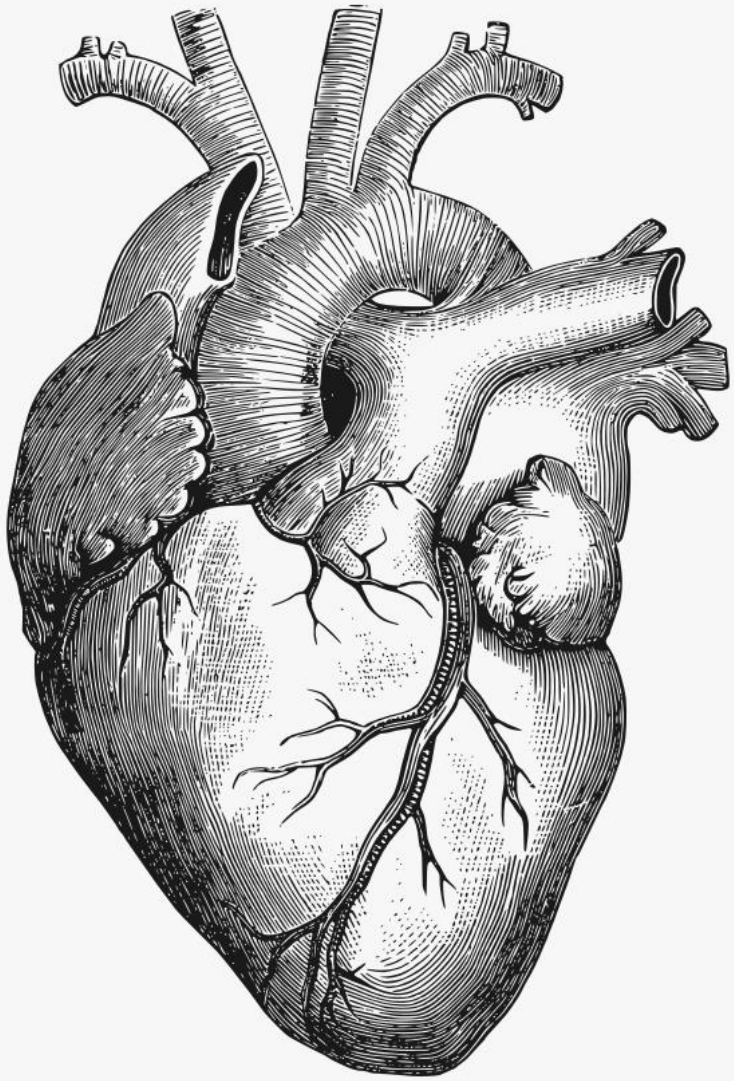
- **Aortic knob:**
  - **Thoracic aortic aneurysm**
  - **Aortic dissection**
  - **Coarctation of the aorta**
  - **Aortic knuckle calcification**



Aortic knob

- **Aortic knob** or **knuckle** refers to the frontal CXR appearance of the distal aortic arch; ***1st mogul of the heart***; forms the superior border of the left cardiomediastinal contour.
- Most common pathologies include:
  - **Thoracic aortic aneurysm;**
  - **Aortic dissection;**
  - **Coarctation of the aorta;**
  - **Aortic knuckle calcification.**

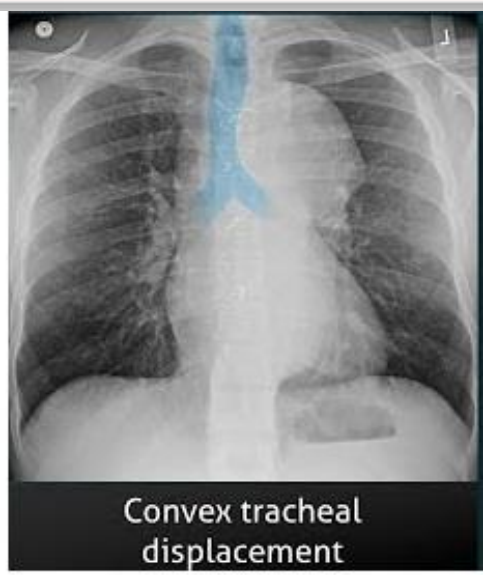
- **Thoracic aortic aneurysm**

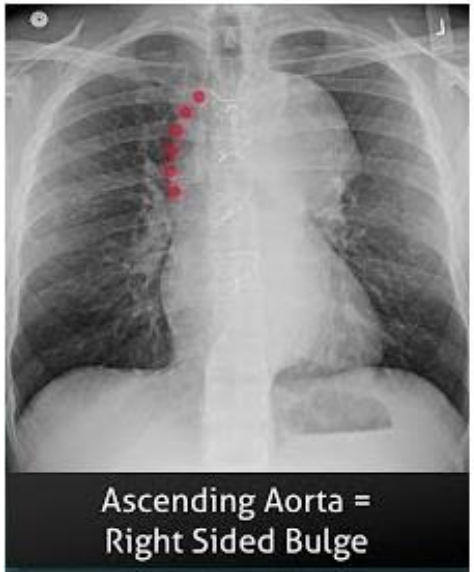


Thoracic aortic aneurysm

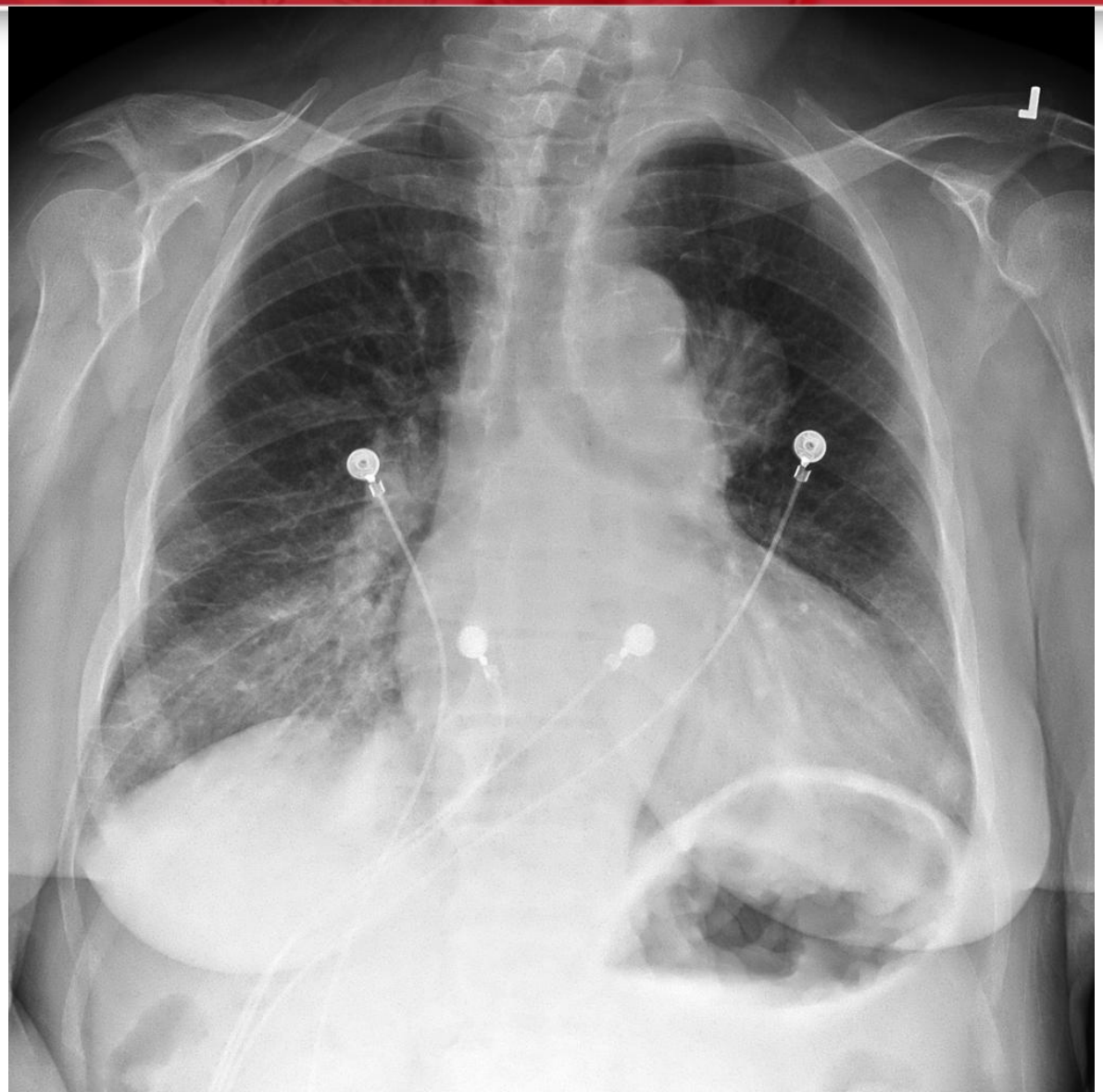
- **Aortic aneurysm** is an enlargement (dilatation) of the aorta to greater than 1.5 times normal size. Commonly located in the abdominal aorta, but can also be located in the thoracic aorta. Causes weakness in the wall of the aorta and increase the risk of aortic rupture.
- CXR signs include:
  - **Widening of the mediastinal silhouette**;
  - **Enlargement of the aortic knob**;
  - **Displacement of the trachea** from the midline.

Thoracic aortic aneurysm

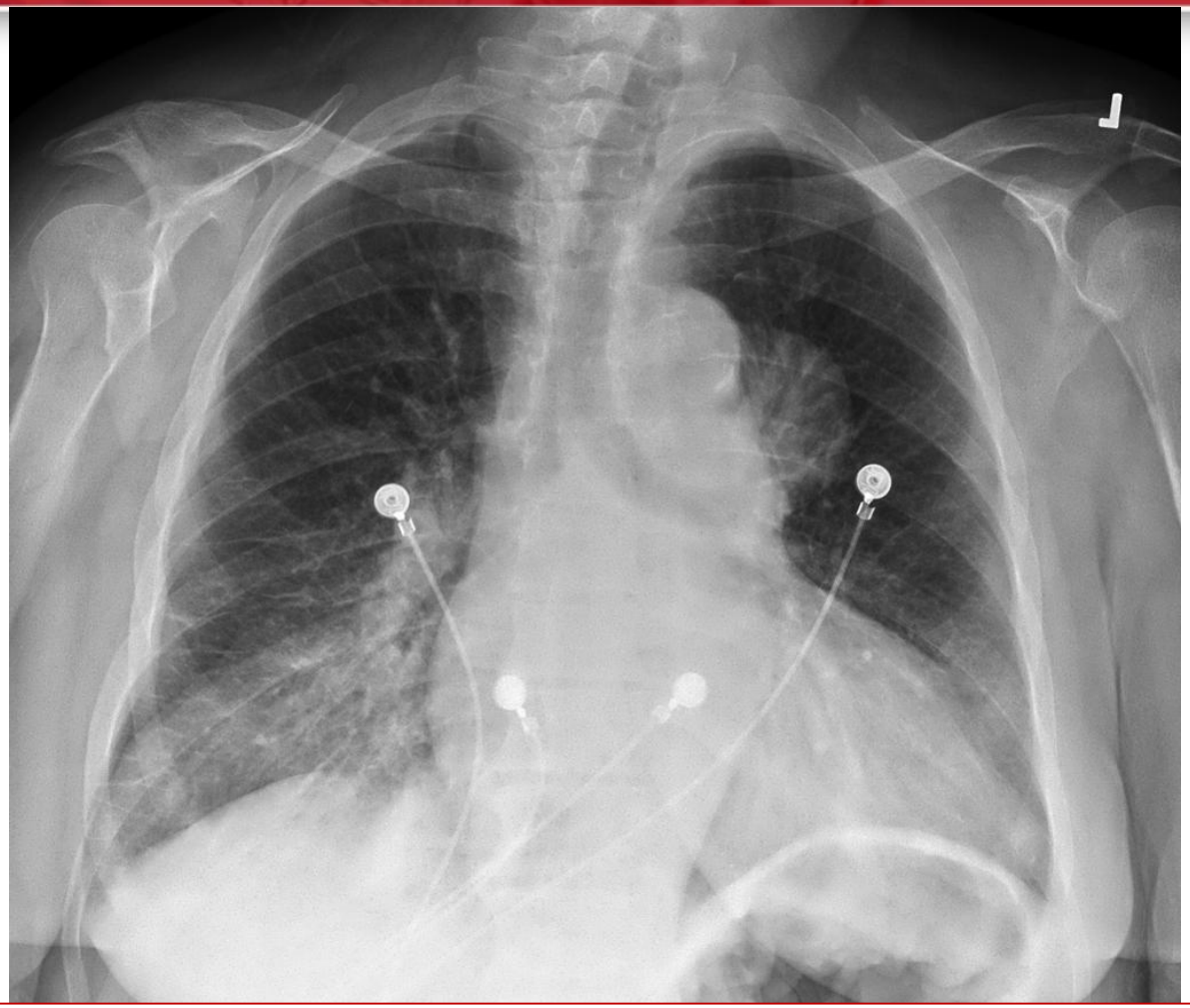




Thoracic aortic aneurysm

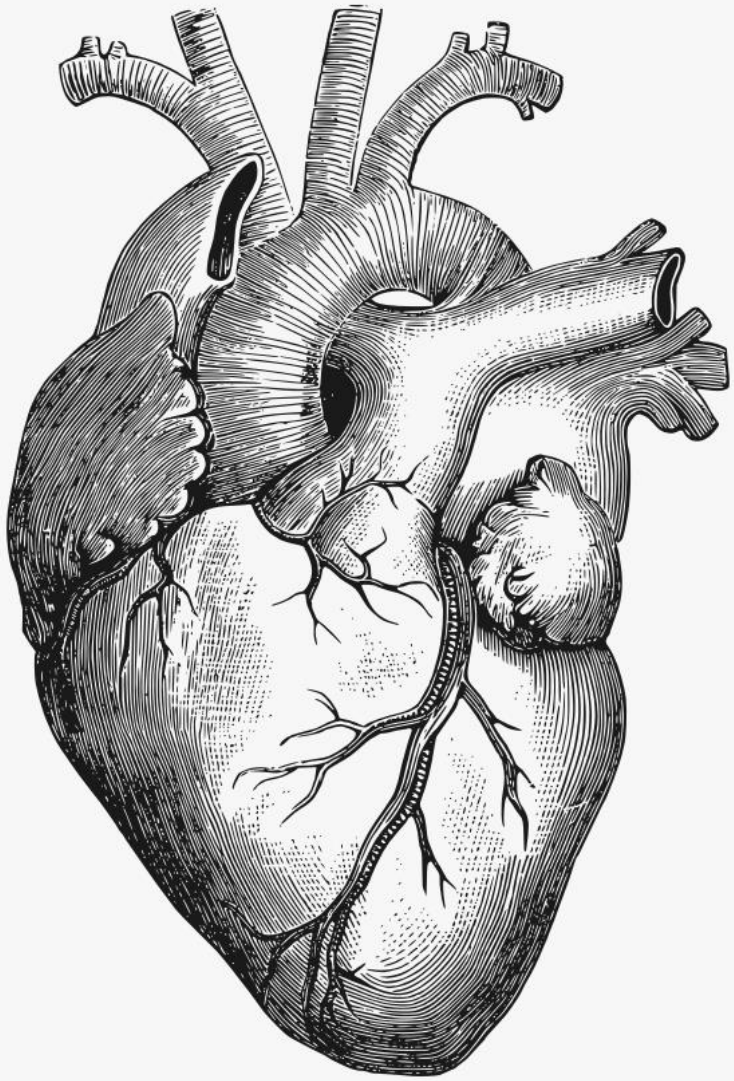


Thoracic aortic aneurysm



Ds: Large rounded opacity projecting from the mediastinum laterally on the left. Cardiomegaly. Calcification of the arch of the aorta.

- **Aortic dissection**



Aortic dissection

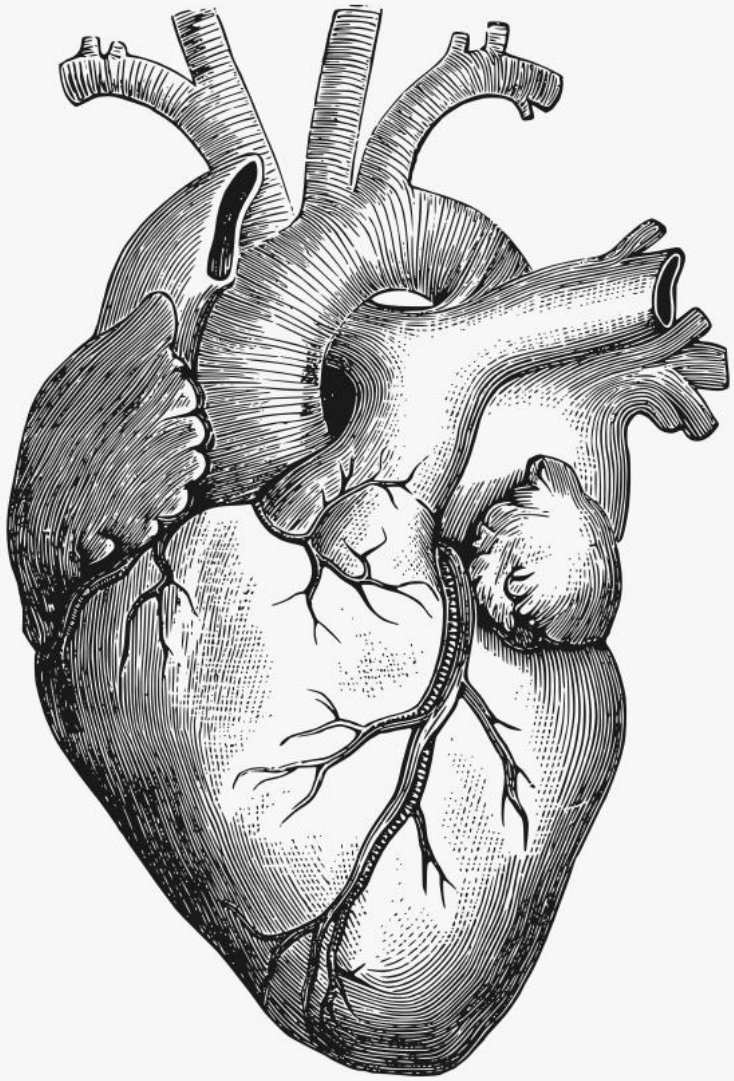
- **Aortic dissection** is the form of the acute aortic syndromes; occurs when blood enters the medial layer of the aortic wall through a tear or penetrating ulcer in the intima and tracks along the media, forming a second blood-filled channel within the wall.
- Chest radiography may demonstrate a number of suggestive findings, including:
  - Widened mediastinum at the level of the aortic knob;
  - Double and/or irregular aortic contour;
  - Deviation of mediastinal structures.

Aortic dissection

*stabbing injury to chest

Aortic dissection

- **Coarctation of the aorta**



Coarctation of the aorta

- **Coarctation of the aorta** refers to a narrowing of the aortic lumen, most common in the aortic arch.

- It has the next radiographic signs:
  - Figure 3 sign;
  - Inferior rib notching (Rösler sign).

Figure 3 sign

- **Figure 3 sign** is a contour abnormality of the aorta.

  Formed by:
  - prestenotic **dilatation of the aortic arch** and left subclavian artery;
  - indentation at the **coarctation** site ("tuck");
  - post-stenotic **dilatation of the descending aorta**.

Figure 3 sign

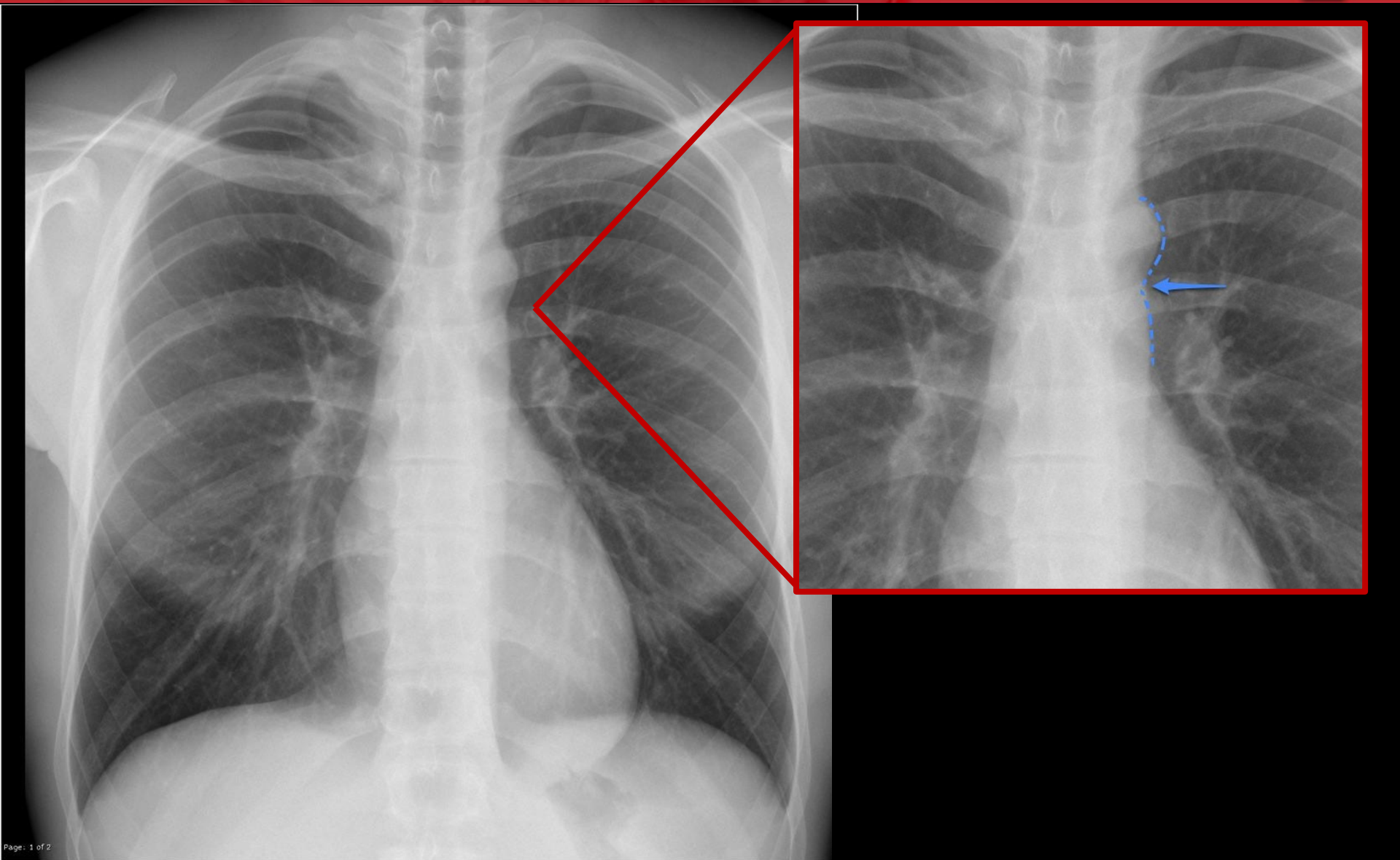
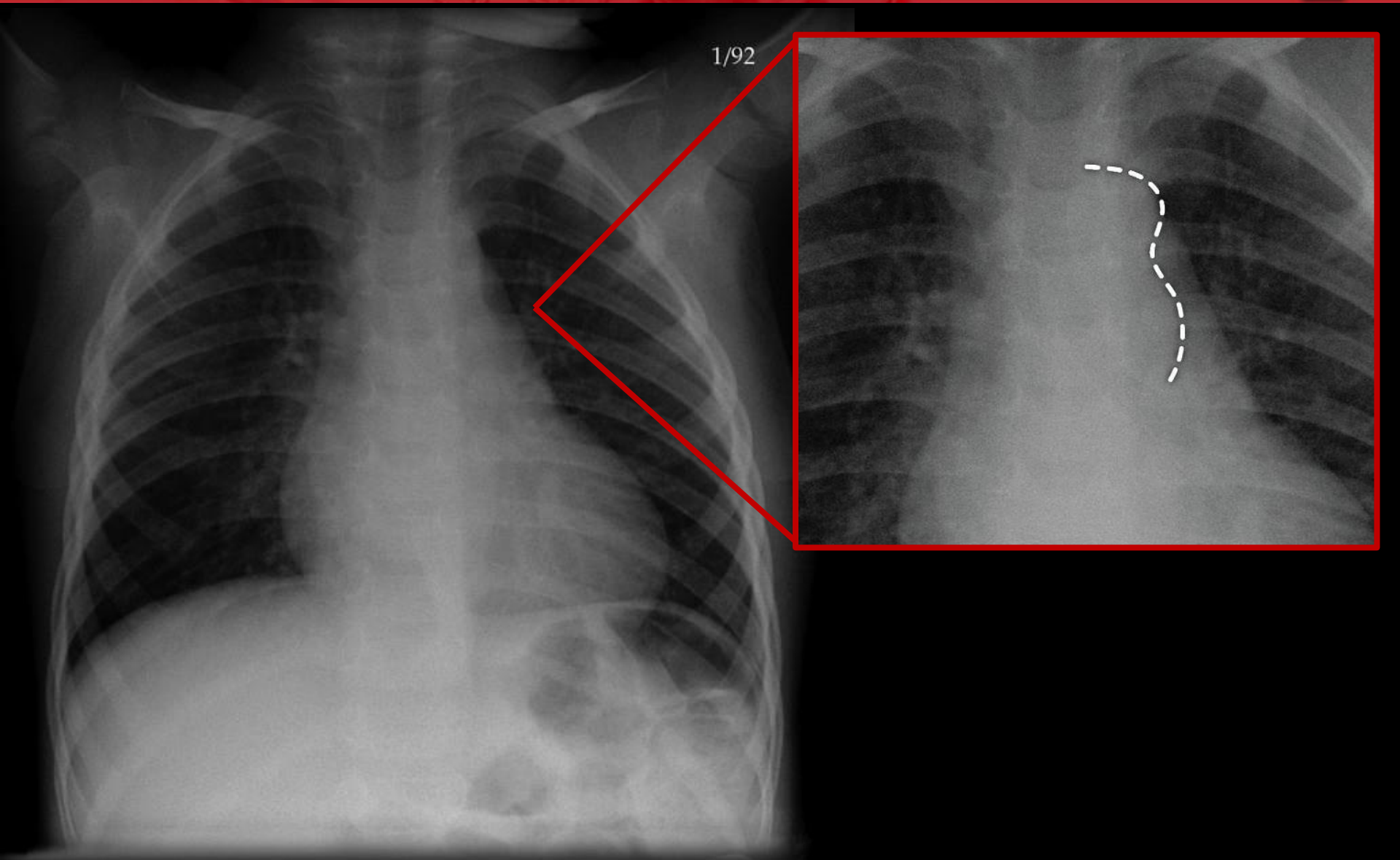
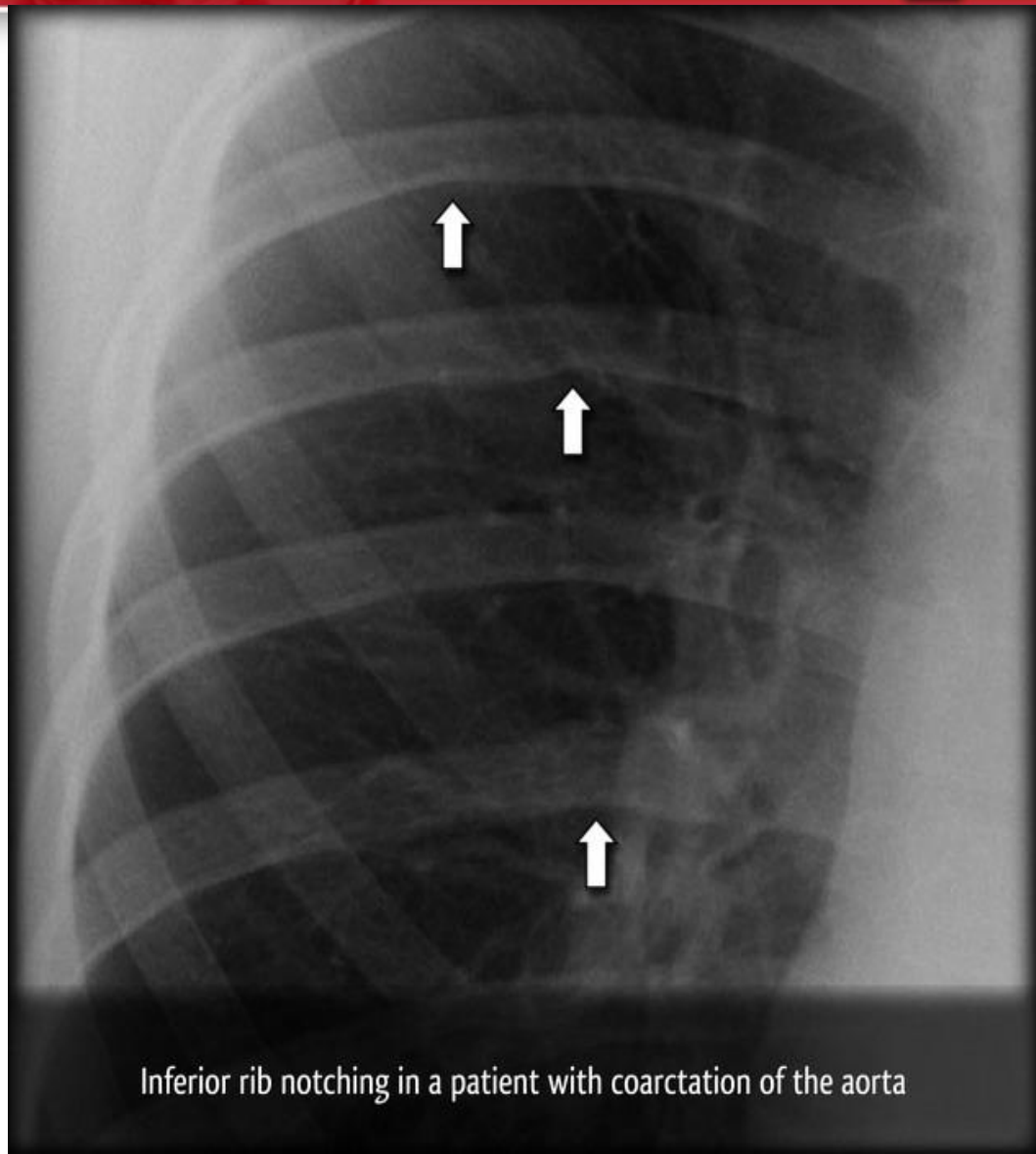


Figure 3 sign

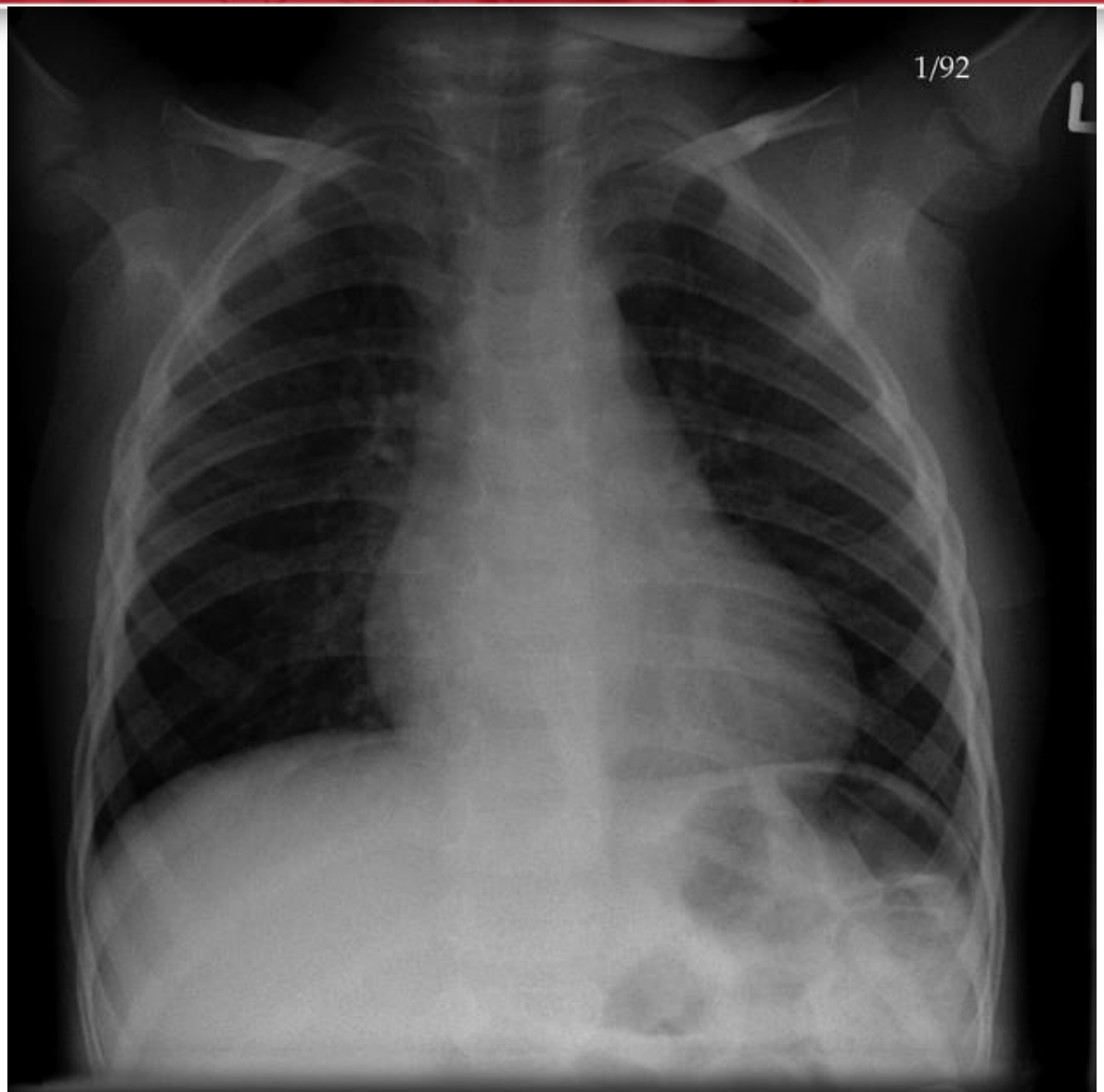


Rösler sign

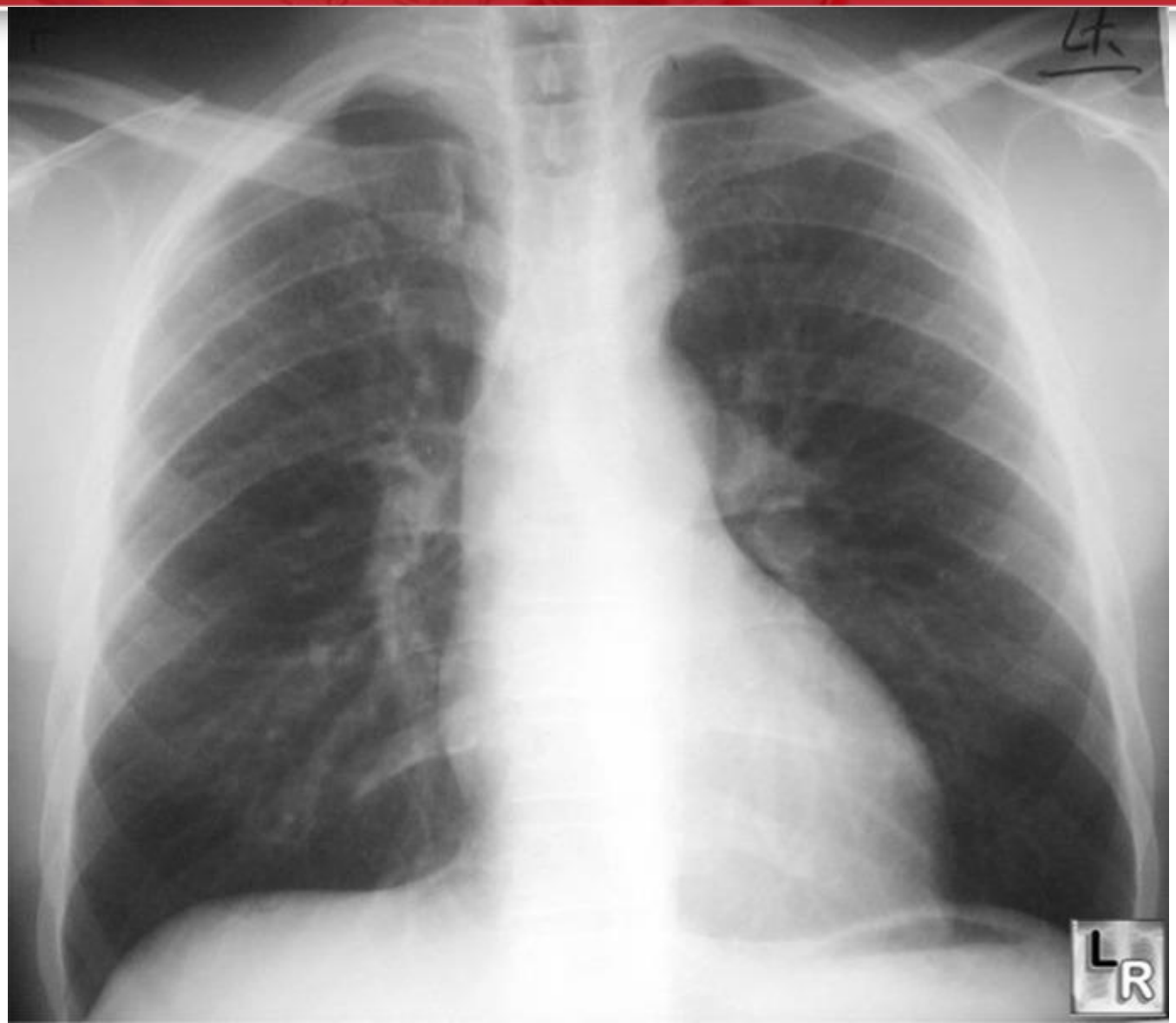
- **Rösler sign = inferior rib notching.**
- **Rib notching** refers to **deformation of the superior or inferior surface of the rib**.
- The dilated intercostal collateral vessels (which form as a way to bypass the coarctation and supply the descending aorta) erode the inferior margins of the ribs, resulting in notching.
- Usually the **4th to 8th ribs** are involved.


Inferior rib notching in a patient with coarctation of the aorta

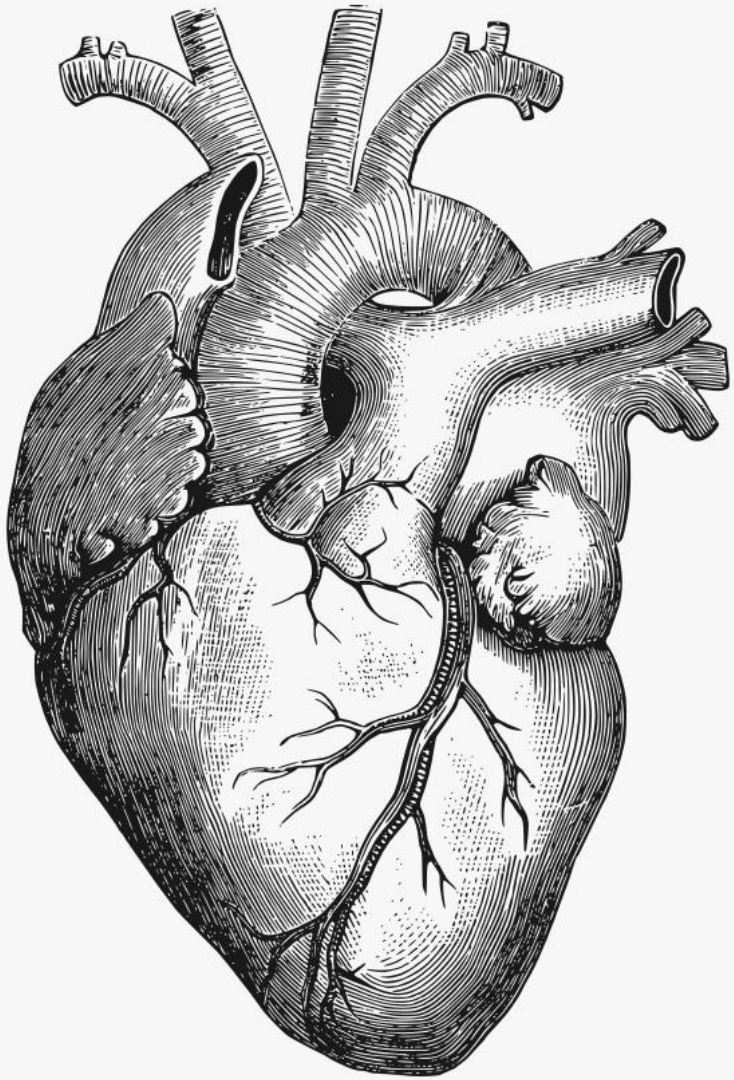
Coarctation of the aorta



Coarctation of the aorta



- **Aortic knuckle calcification**

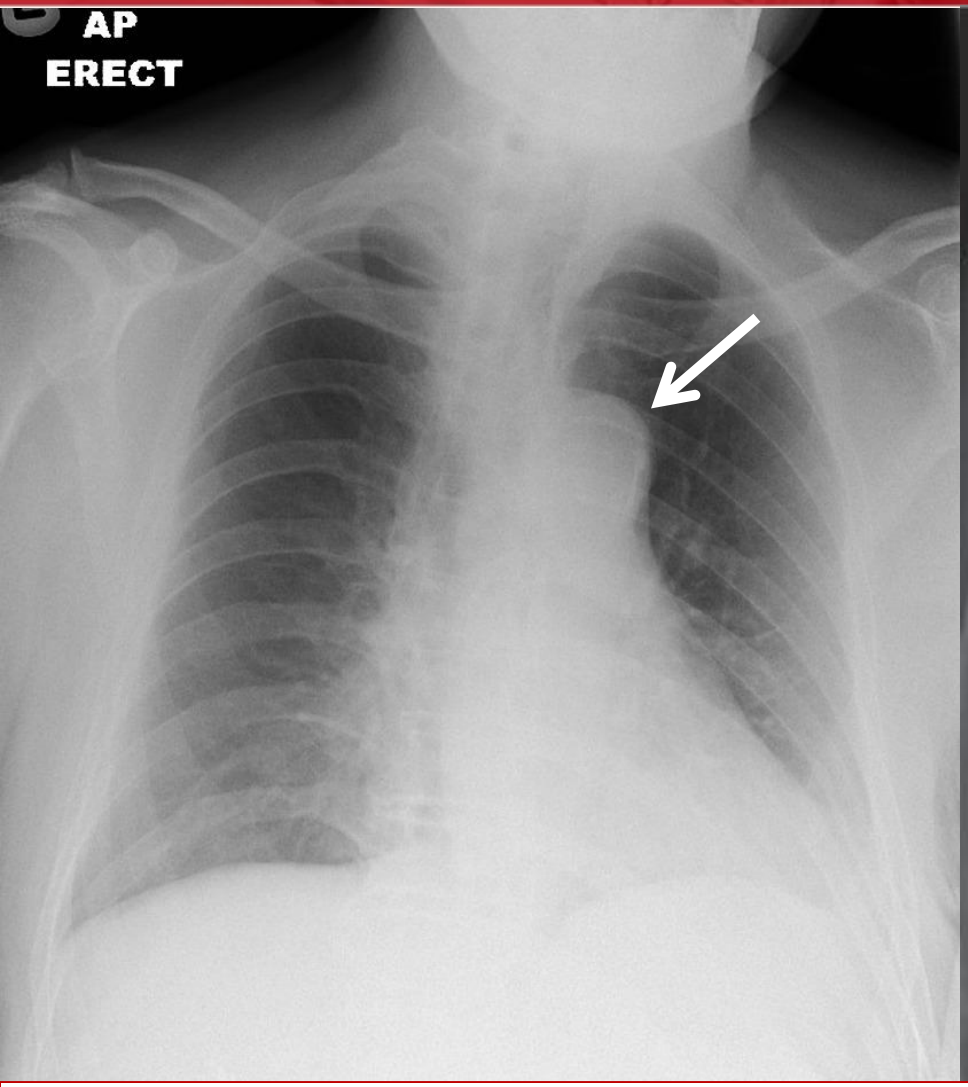


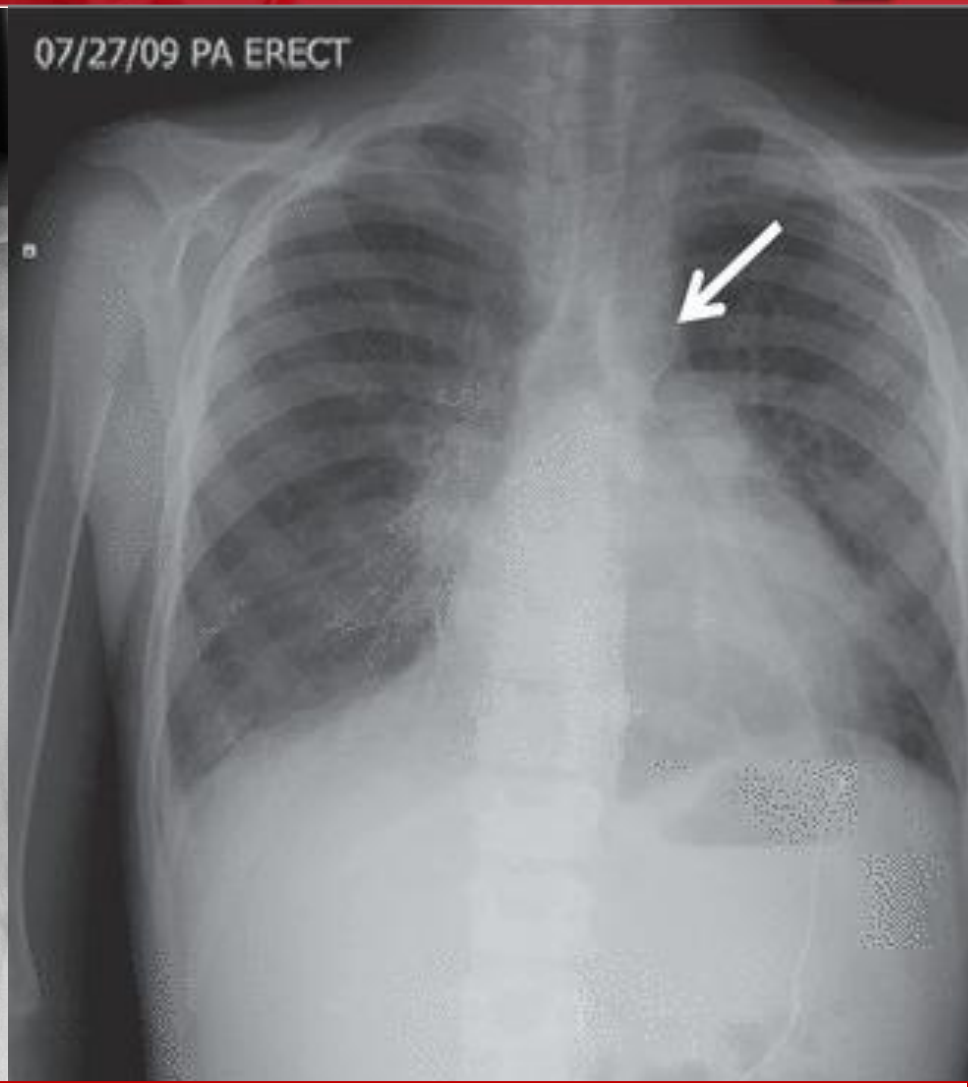
- **Calcification of the aortic knob** is a common finding on chest X-rays of elderly individuals and is probably the result of local stress and strain.

- The descending portion of the thoracic aorta is less frequently involved, except in severe atherosclerosis.

- Most common CXR sign is a **“porcelain aorta” sign**.

Aortic knuckle calcification

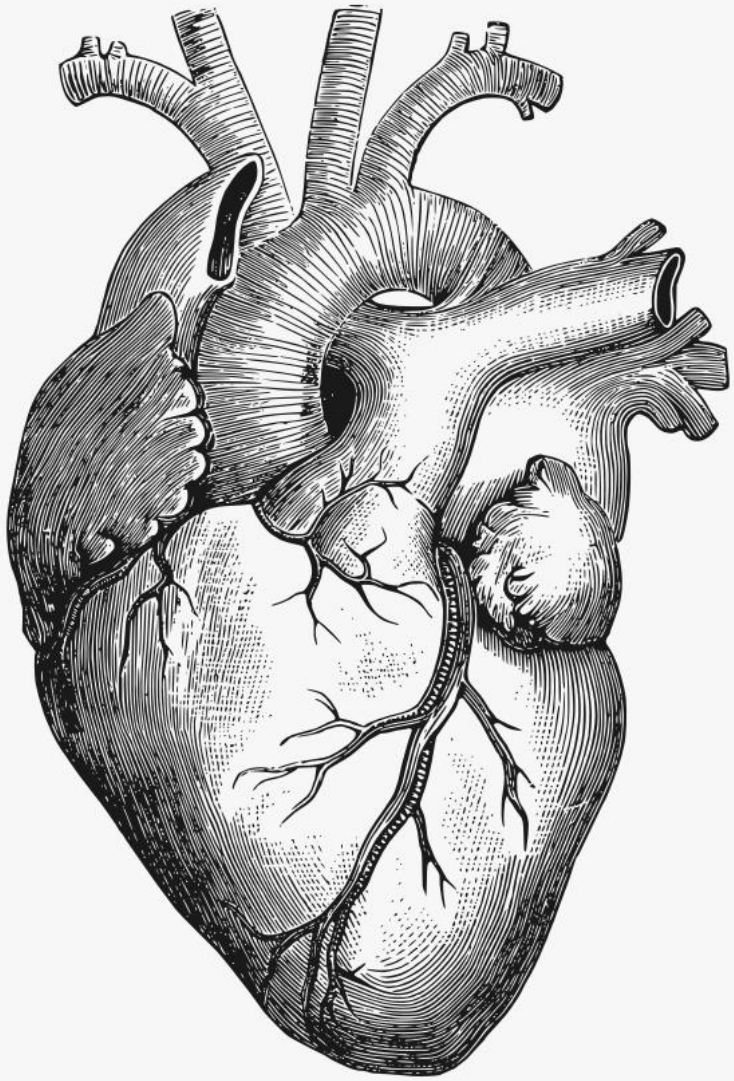




“Porcelain aorta” sign.

§13. Emphysema

- **Emphysema**

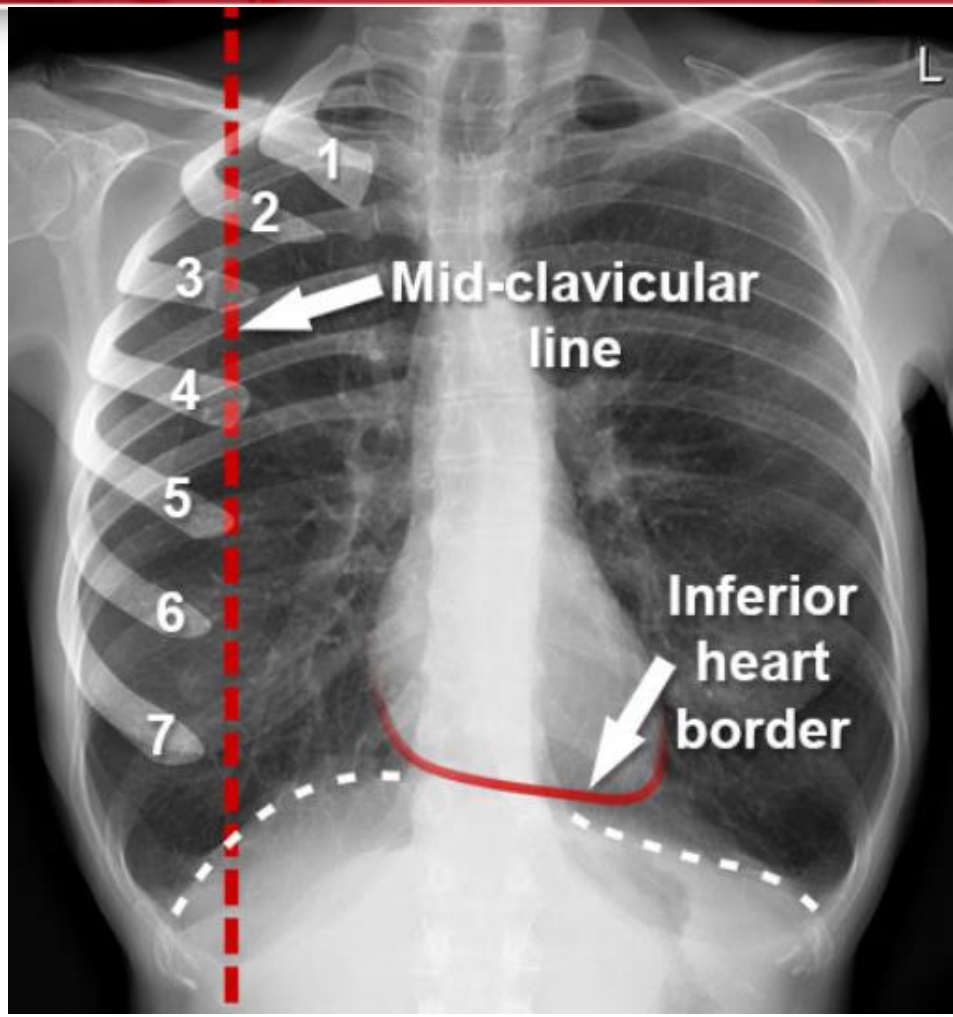


Emphysema

- **Chronic obstructive pulmonary disease** (**COPD**) includes 2 components - **chronic bronchitis** and **emphysema**.
- Characteristic of emphysema on CXR:
  - Hyperexpansion*;
  - Flattened diaphragm*;
  - Floating heart sign;
  - Decreased peripheral bronchovascular markings*;
  - Cardiomegaly.

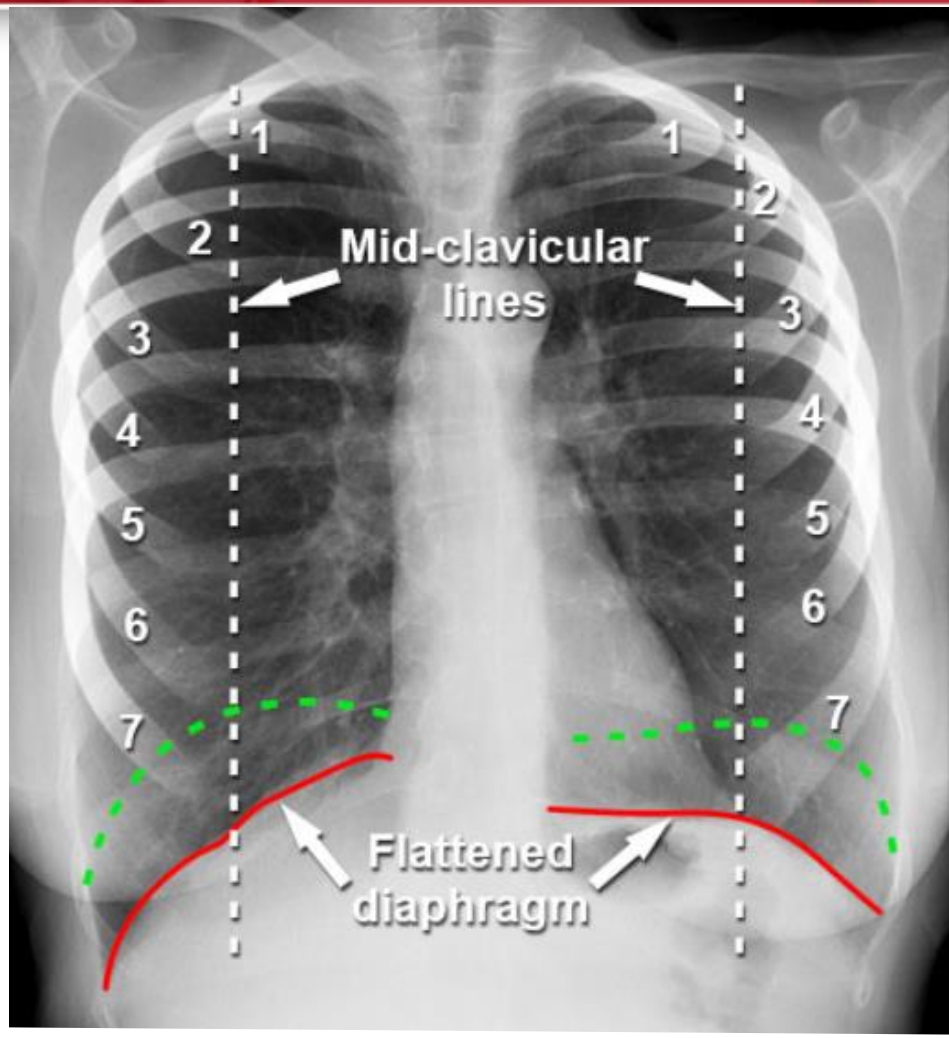
**The rest of CXR signs of emphysema are explained in Part 1 and Part 2 of the current lecture.*

Floating heart sign



- **Floating heart sign** - visibility of the inferior border of the heart (**heart appears to float above the diaphragm**); refers to **hyperexpansion.**

COPD



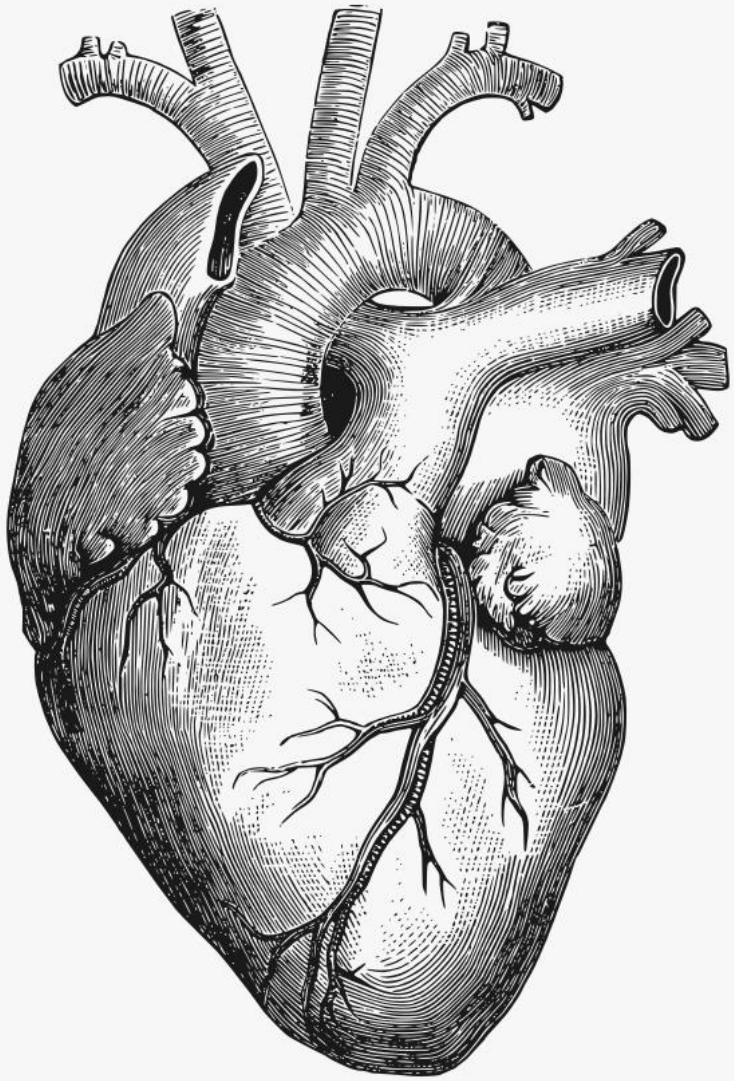
Ds: Emphysema (hyperexpansion, flattened diaphragm, hyperlucency of lung fields)

COPD

Ds: Emphysema (hyperexpansion, flattened diaphragm, hyperlucency of lung fields, floating heart sign), cardiomegaly (CTR>0.5)

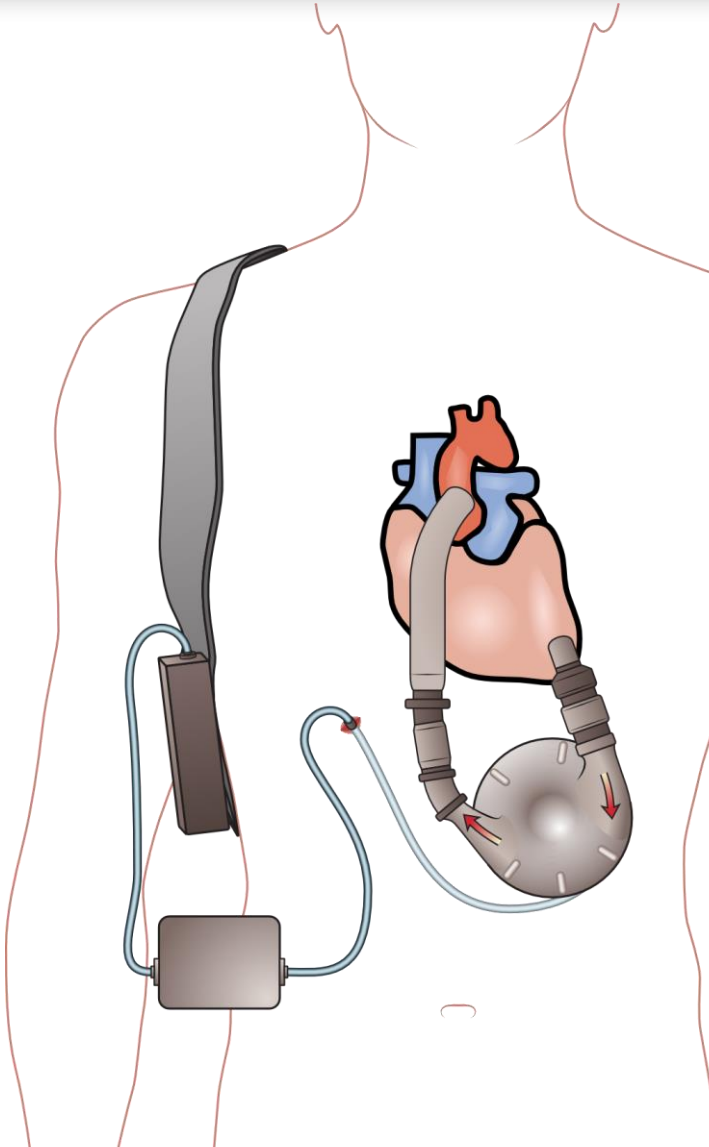
§14. Extras

- **Extras**

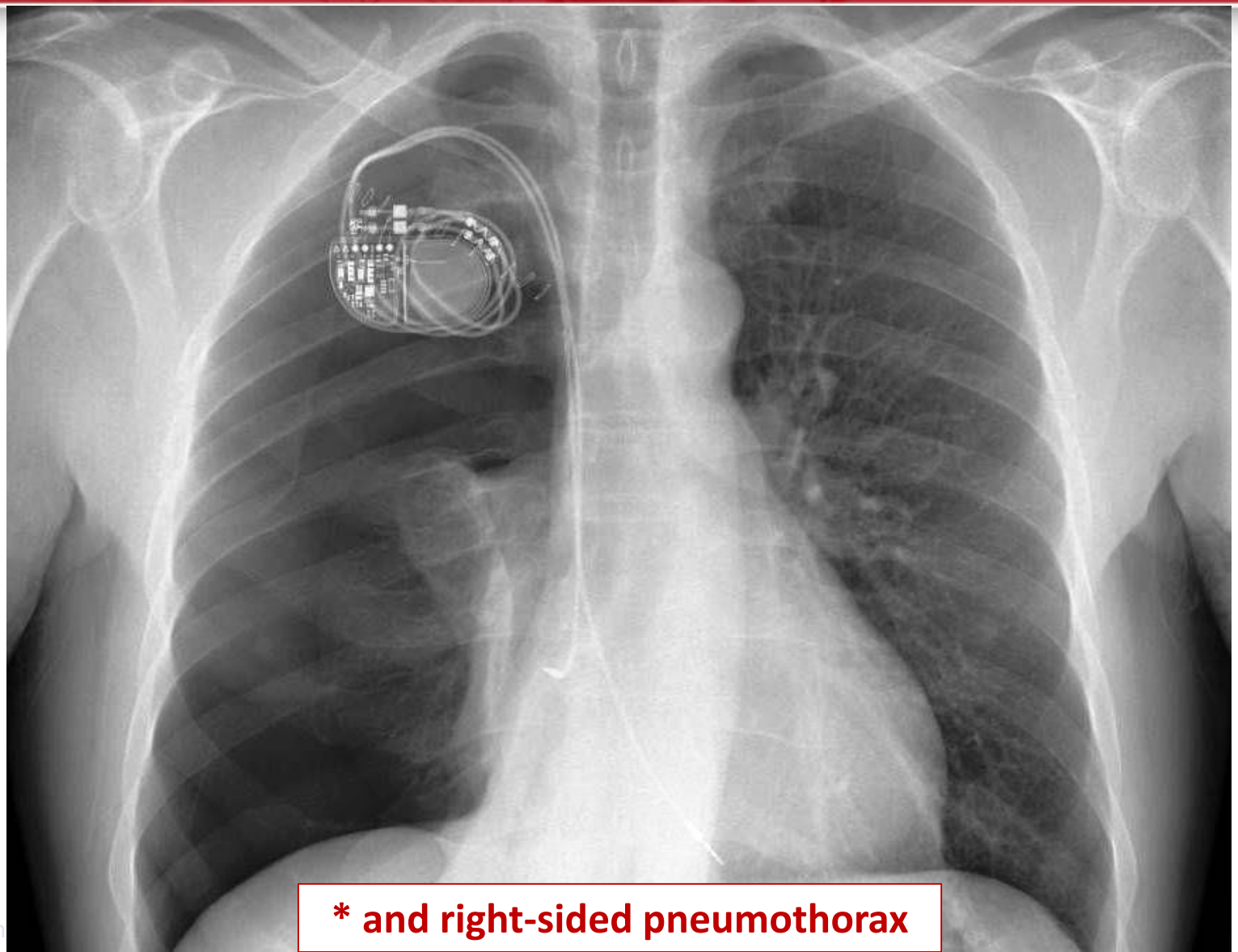


Extras

- In this paragraph the CXR appearances of the following objects will be shown:
  - Pacemaker;
  - Prosthetic valves;
  - Left ventricular assist device

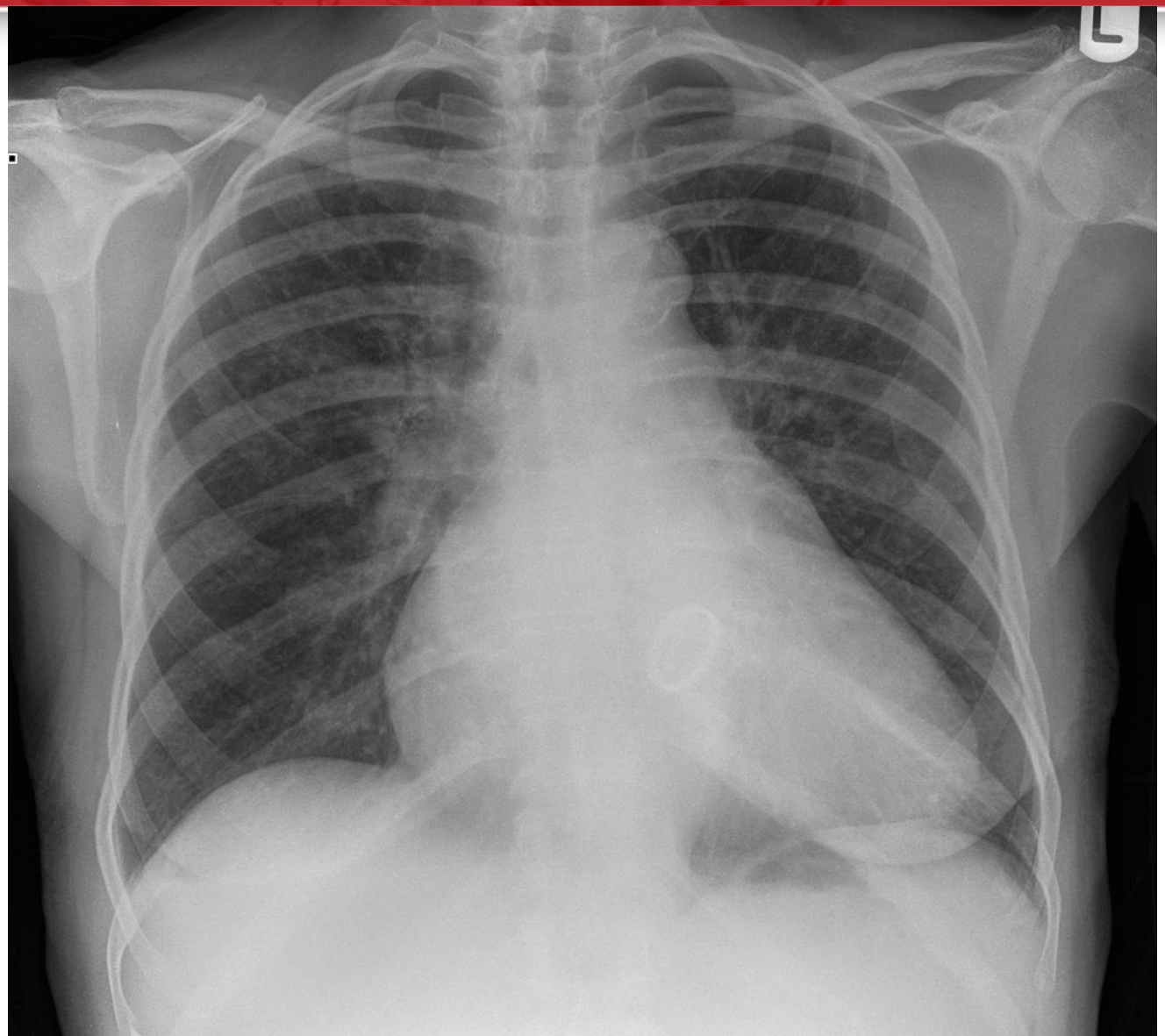


Pacemaker

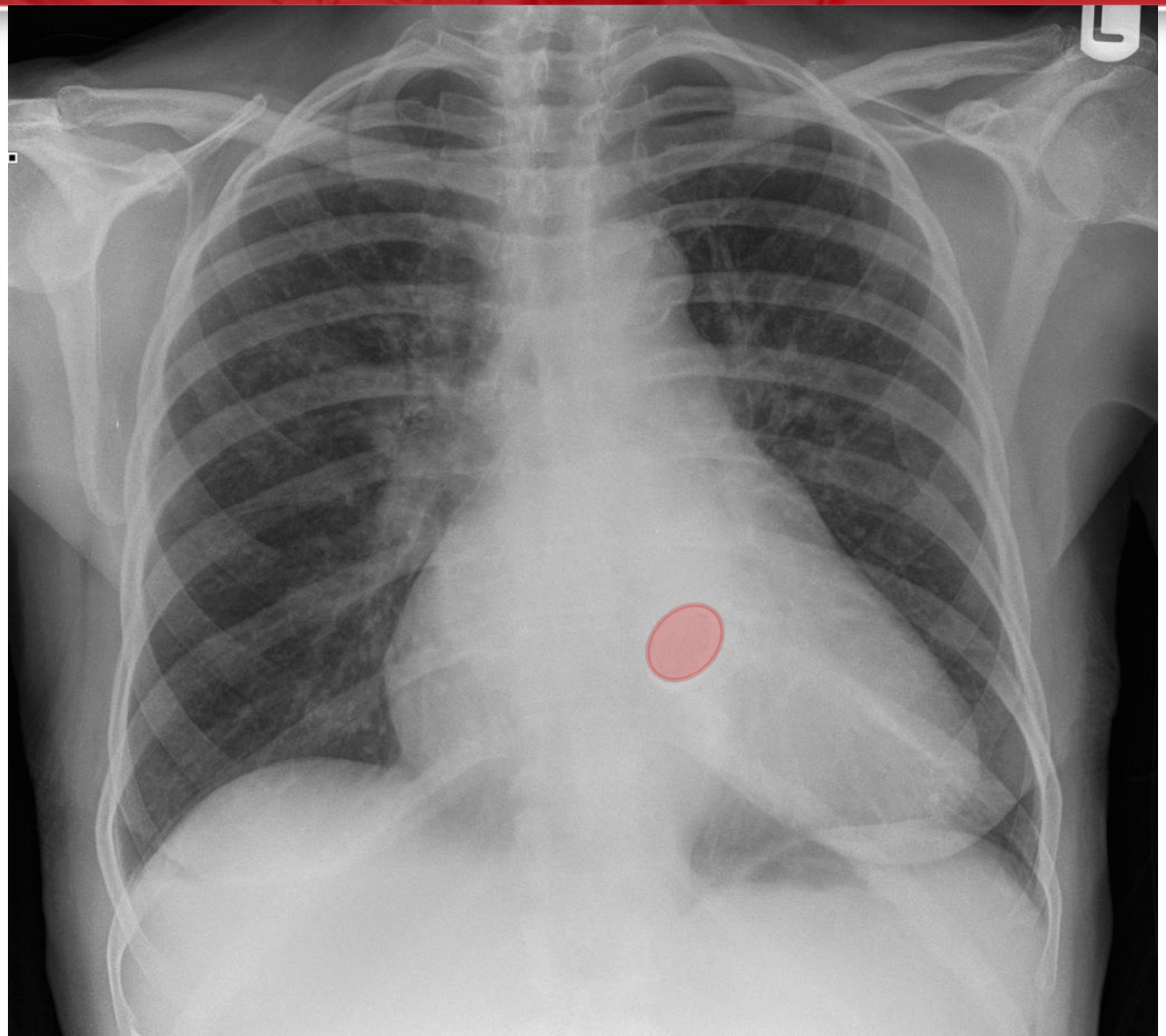


* and right-sided pneumothorax

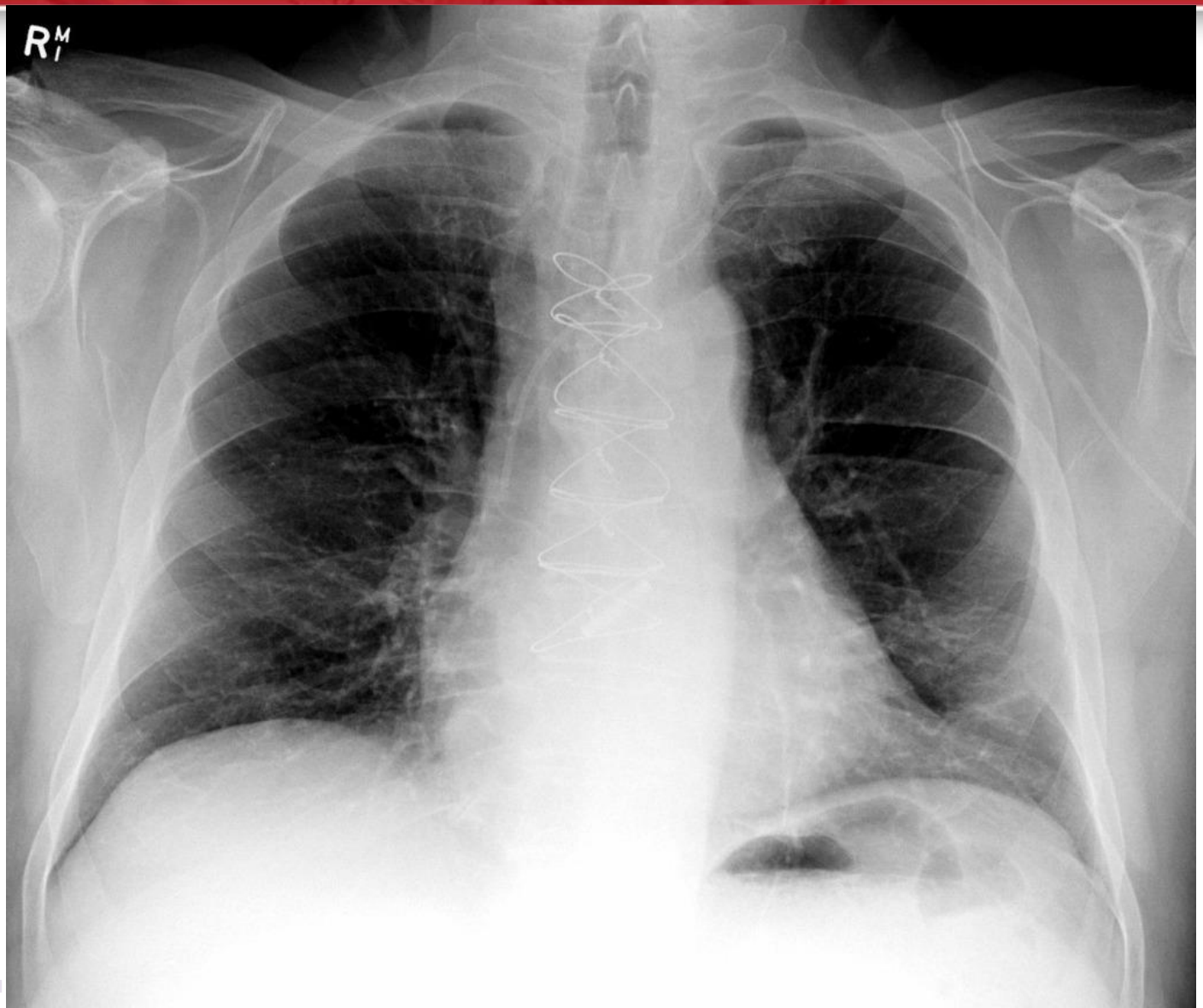
Mitral valve replacement



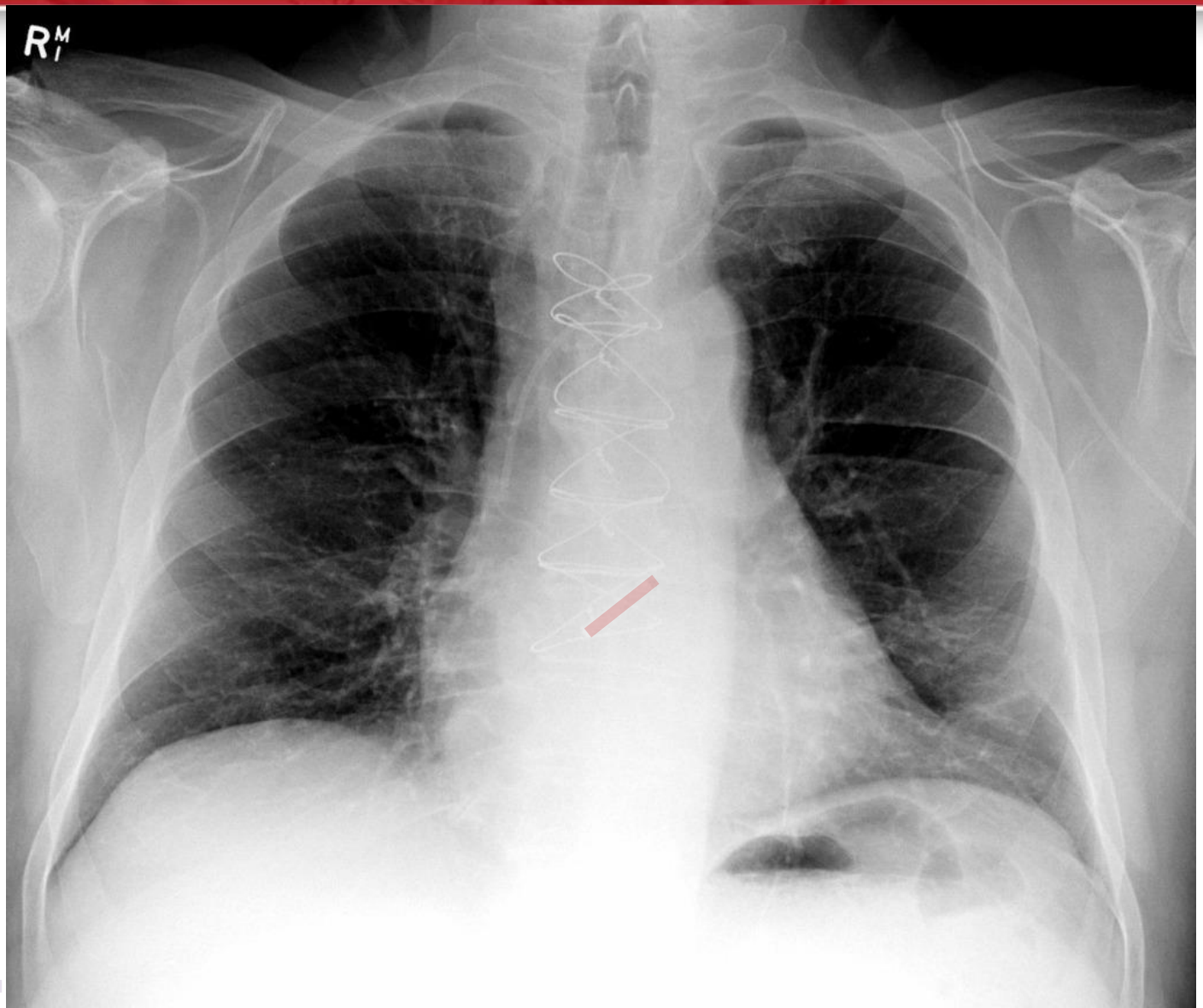
Mitral valve replacement



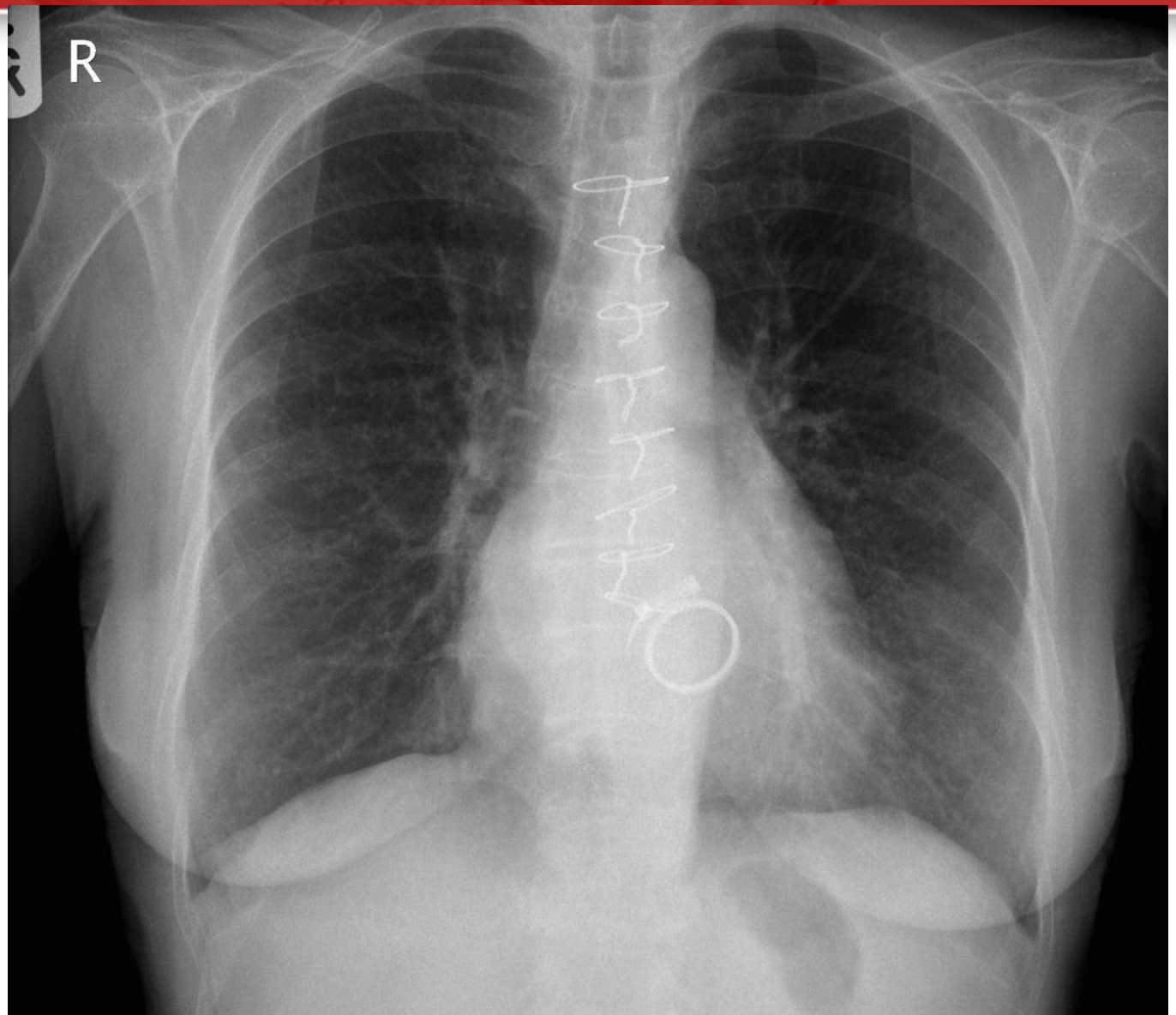
Aortic valve replacement



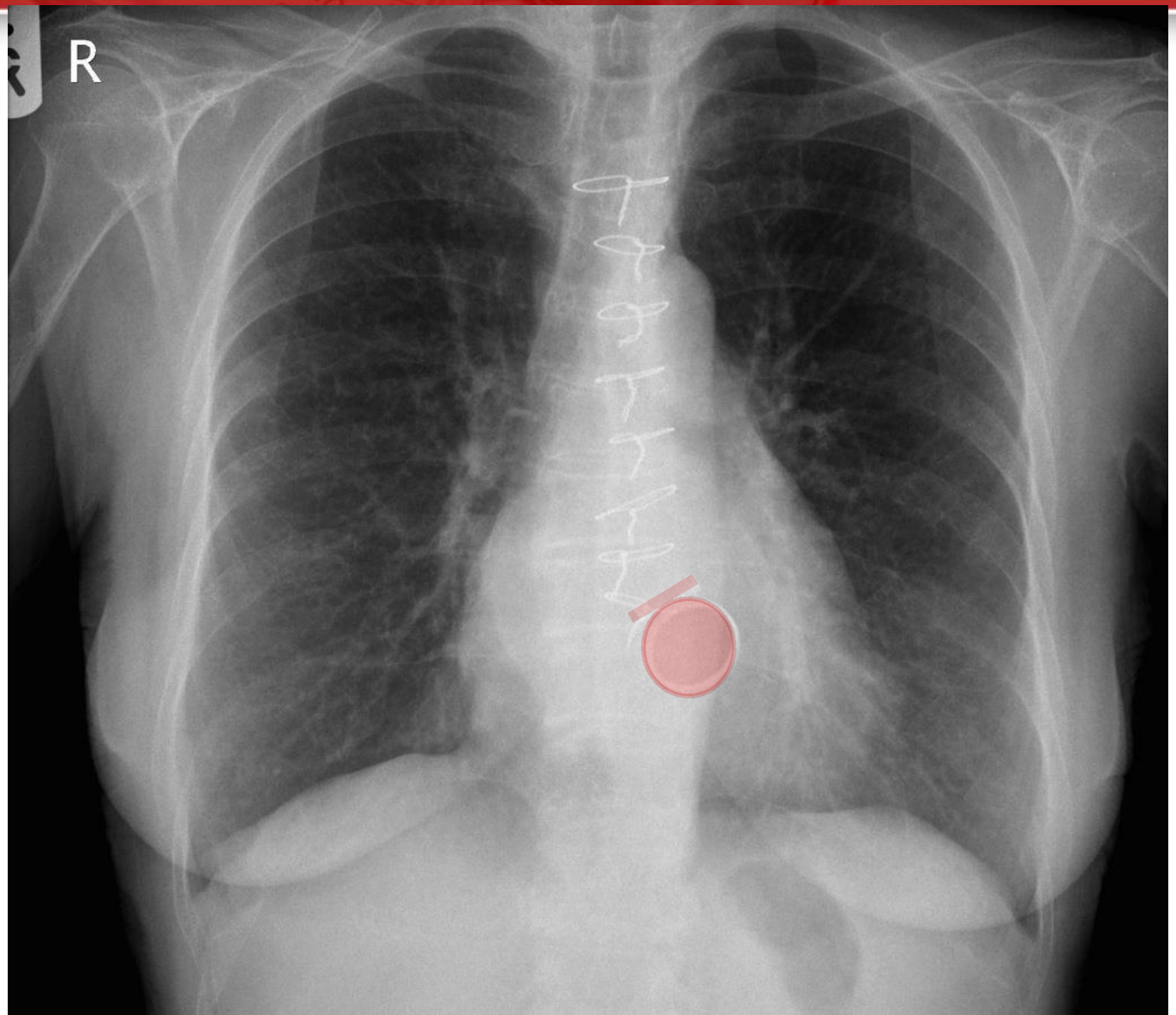
Aortic valve replacement



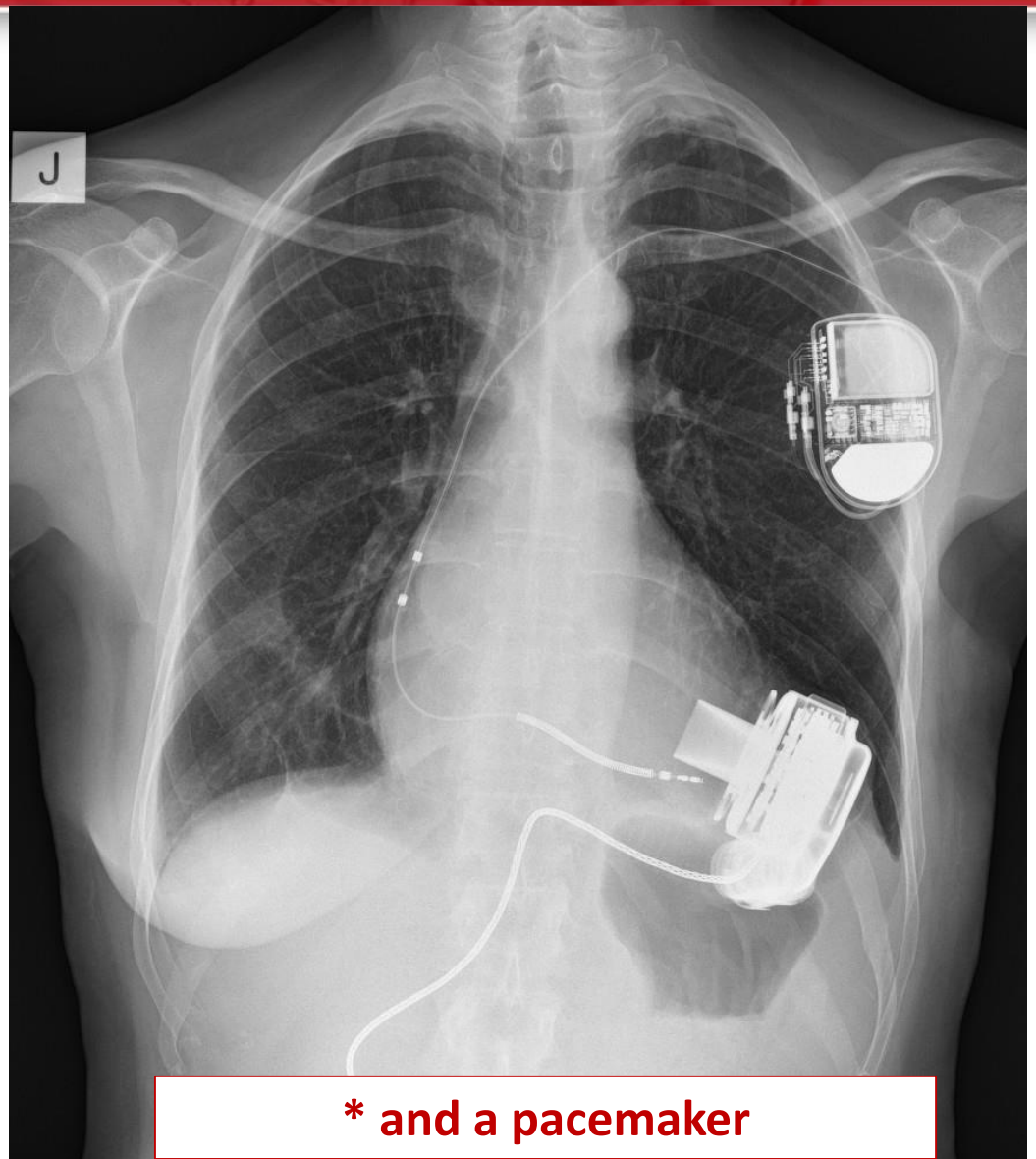
Mitral and aortic valve replacement



Mitral and aortic valve replacement

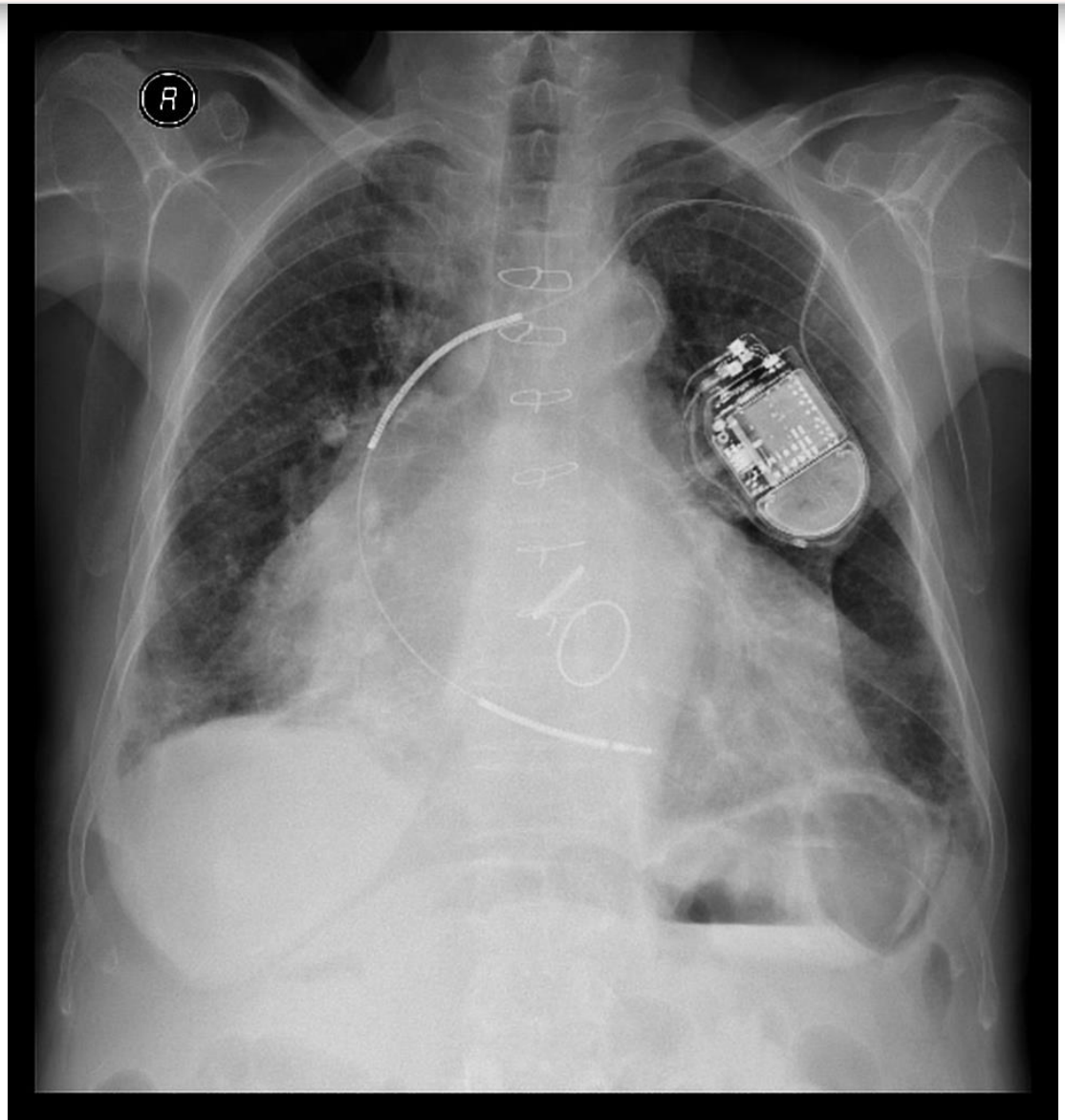


Left ventricular assist device



* and a pacemaker

MVR, AVR, pacemaker



C-C-C-COMBO

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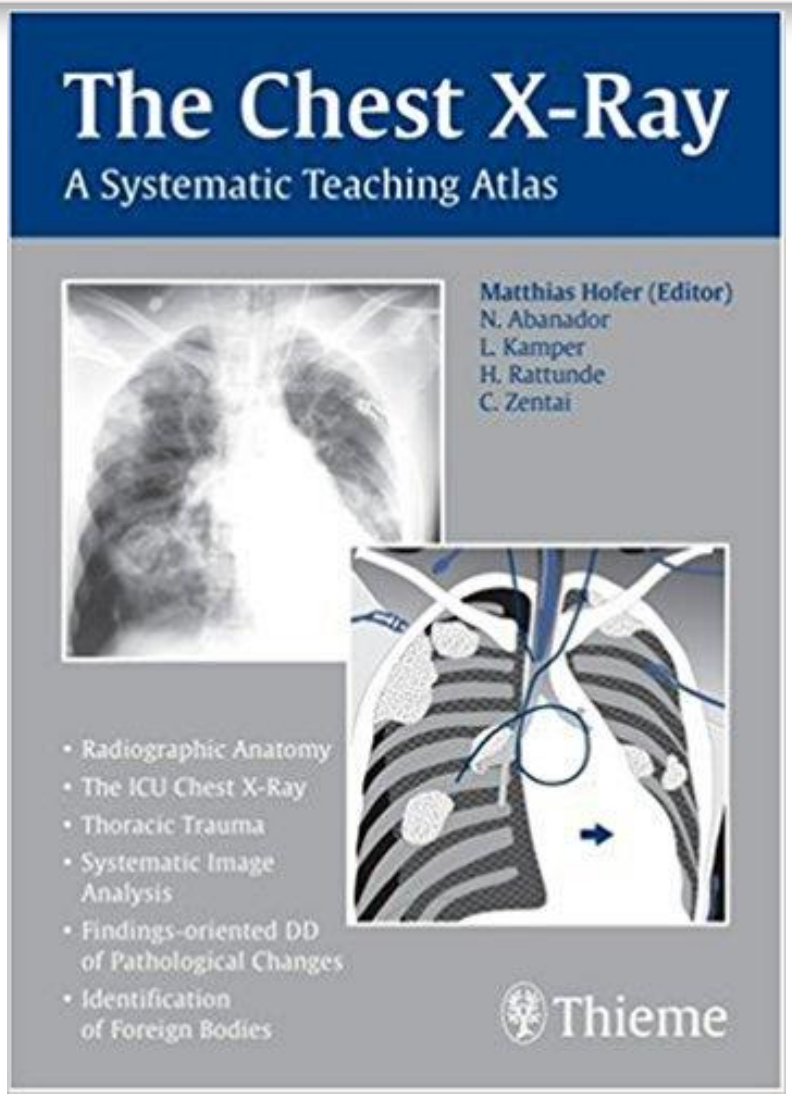

**strongly recommended to medical students and young doctors.*

Thank you!