Pneumomediastinum on Chest X Ray

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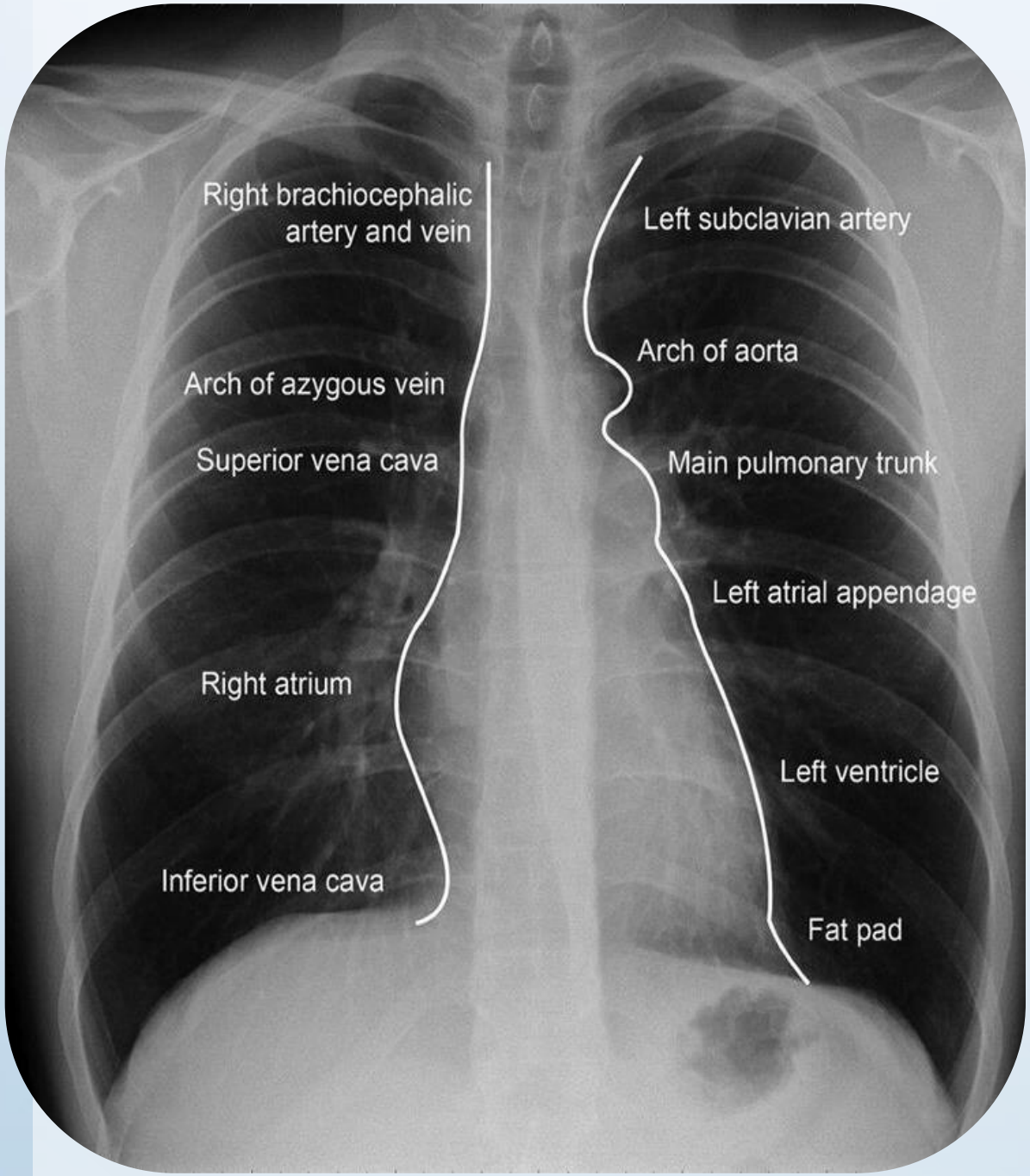
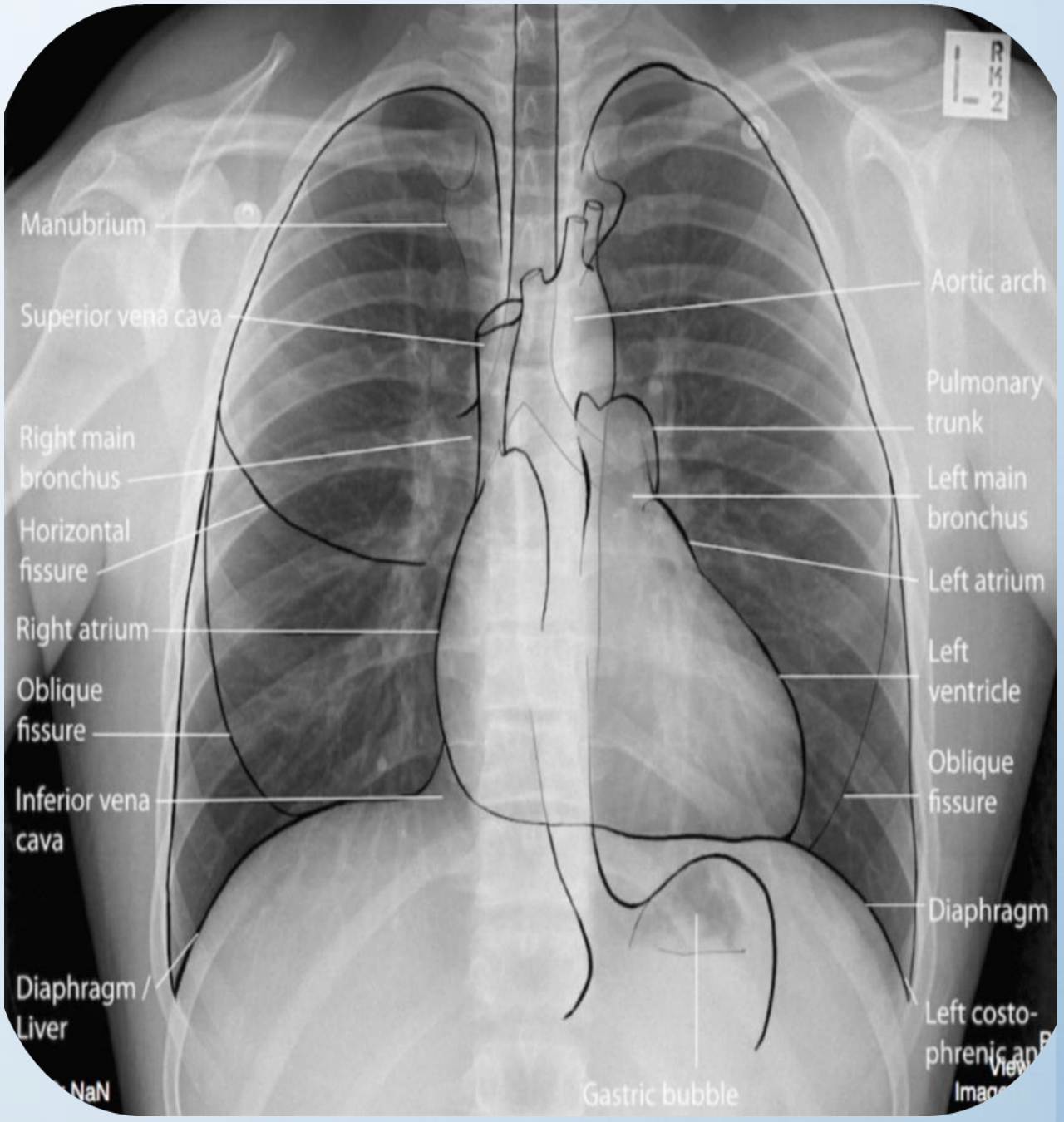
Pneumomediastinum

Free air or gas contained within the mediastinum

It may result from a variety of causes that may be either intrathoracic (eg, narrowed or plugged airway, straining against a closed glottis, blunt chest trauma, alveolar rupture) or extrathoracic (eg, sinus fracture, iatrogenic manipulation in dental extraction, perforation of a hollow viscus)

Normal Chest X Ray


Right brachiocephalic artery and vein
Arch of azygous vein
Superior vena cava
Right atrium
Inferior vena cava
Left subclavian artery
Arch of aorta
Main pulmonary trunk
Left atrial appendage
Left ventricle
Fat pad


Manubrium
Superior vena cava
Right main bronchus
Horizontal fissure
Right atrium
Oblique fissure
Inferior vena cava
Diaphragm / Liver
Aortic arch
Pulmonary trunk
Left main bronchus
Left atrium
Left ventricle
Oblique fissure
Diaphragm
Left costo-phrenic an
Gastric bubble

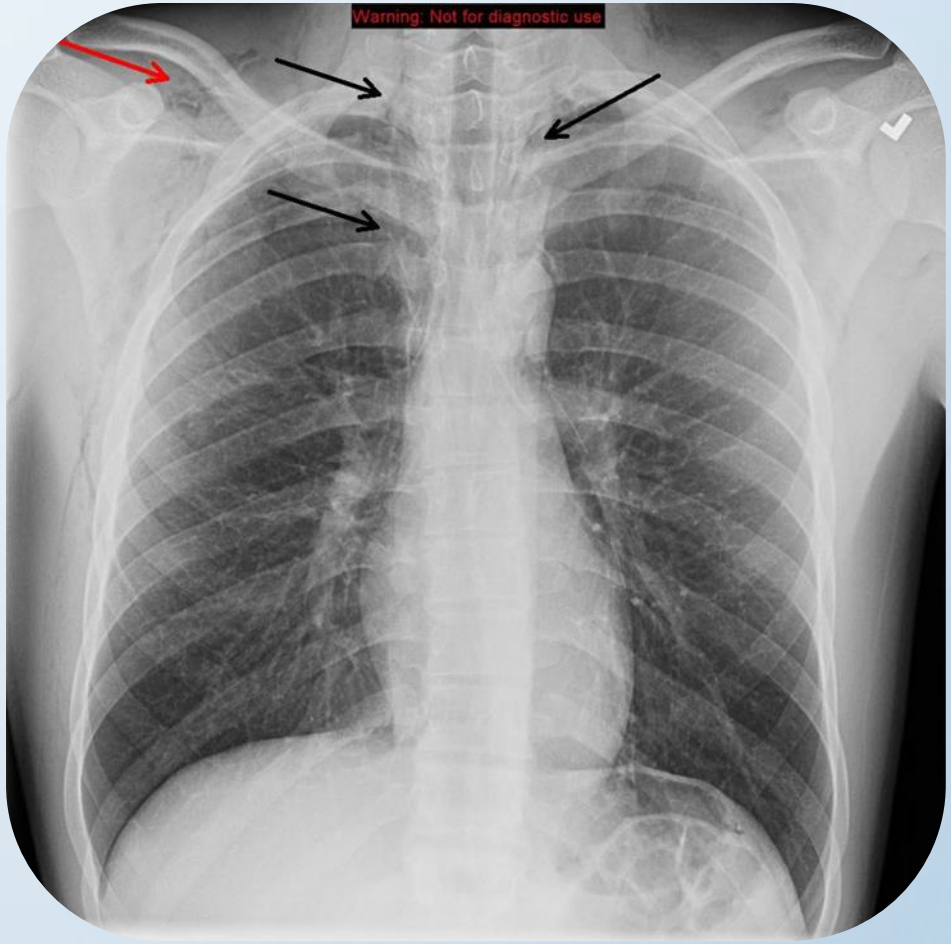
Radiological signs of pneumomediastinum

Radiological signs of pneumomediastinum

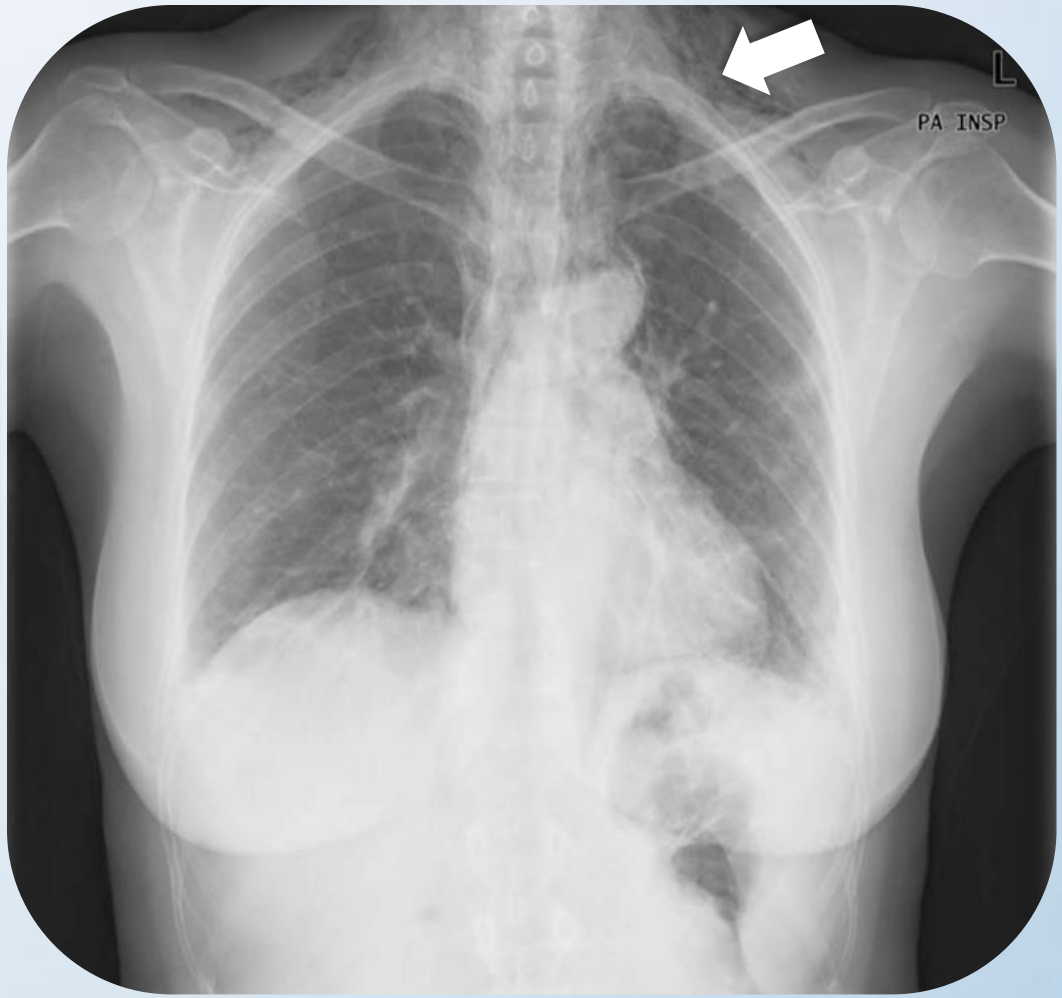
1. Subcutaneous emphysema
2. Pneumopericardium
3. Ring around the pulmonary artery
4. Double bronchial wall sign
5. Continuous diaphragm sign
6. Thymic sail sign
7. Tubular artery sign

1.Subcutaneous emphysema

Subcutaneous emphysema occurs when air gets into tissues under the skin

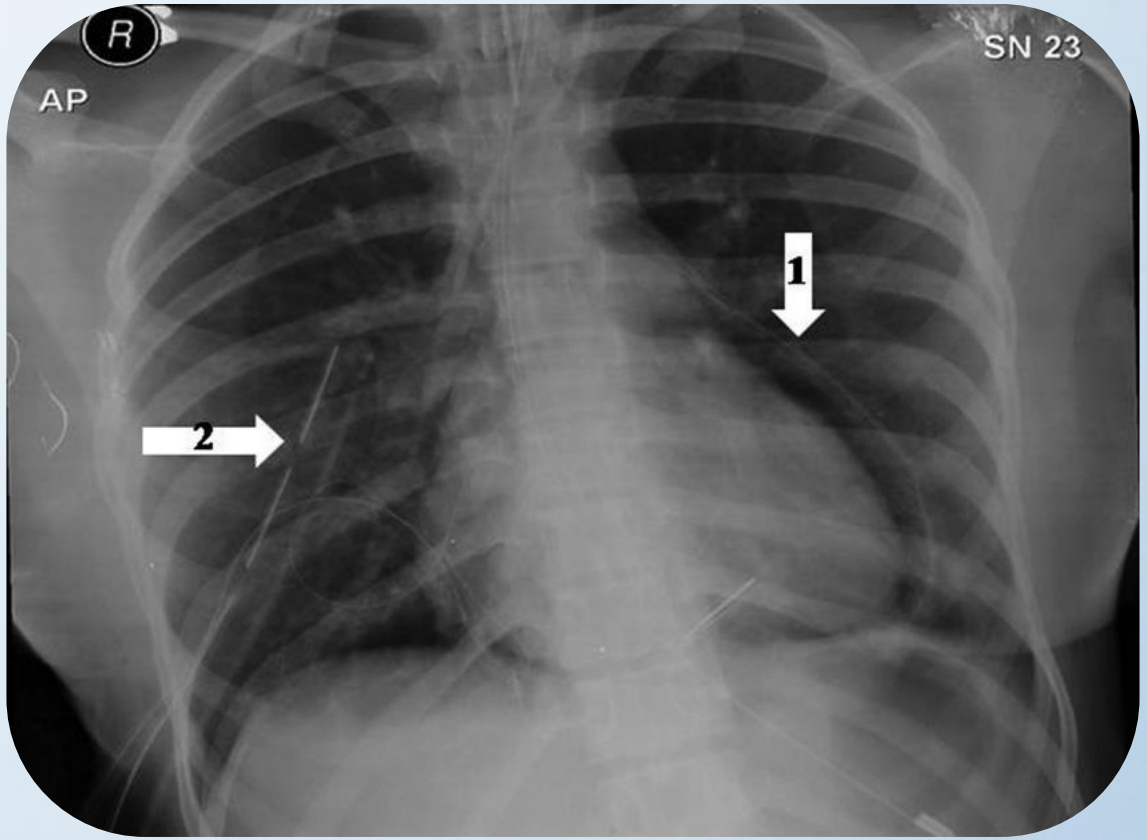


Subcutaneous emphysema
associated
to pneumomediastinum

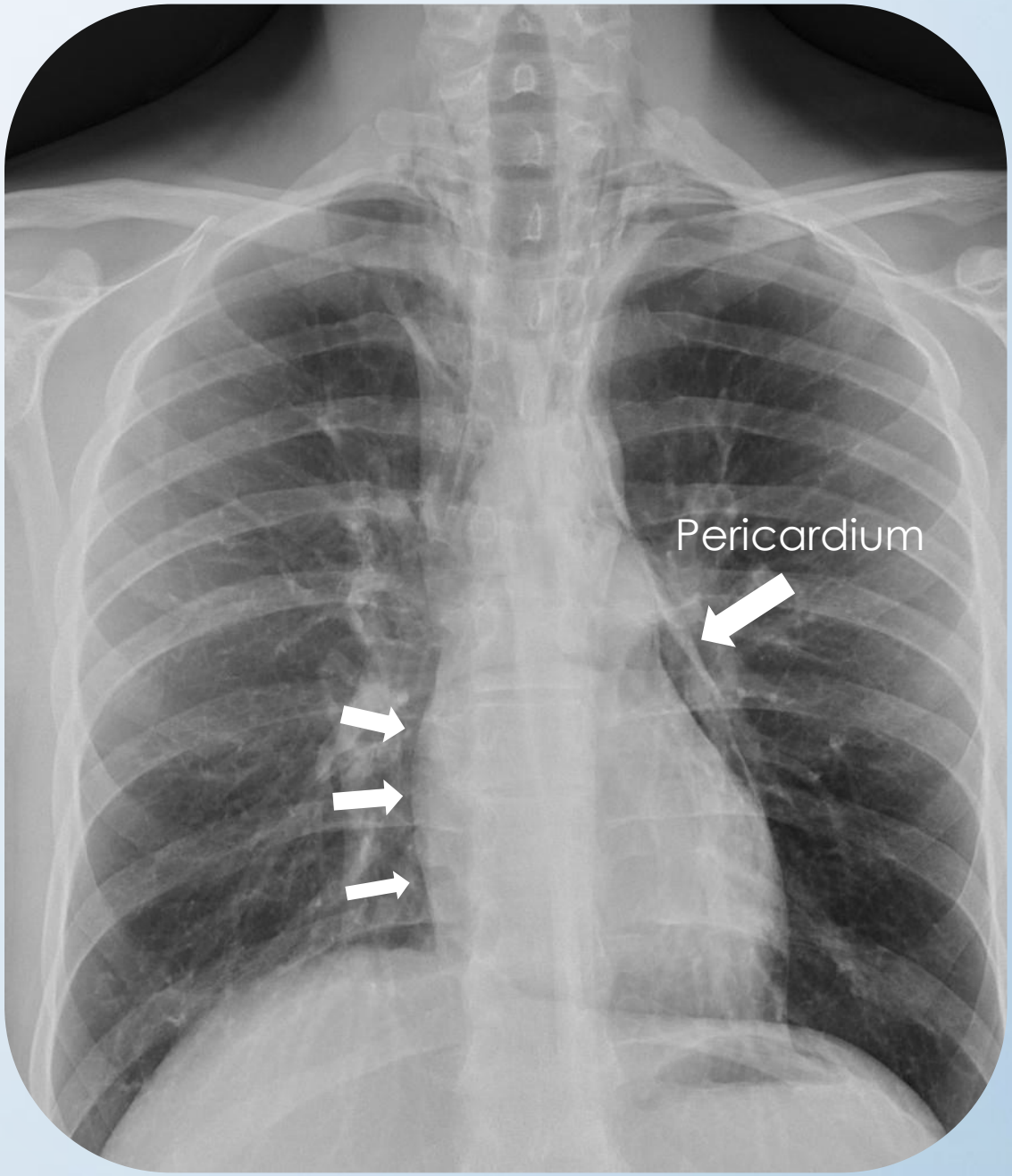


2.Pneumopericardium

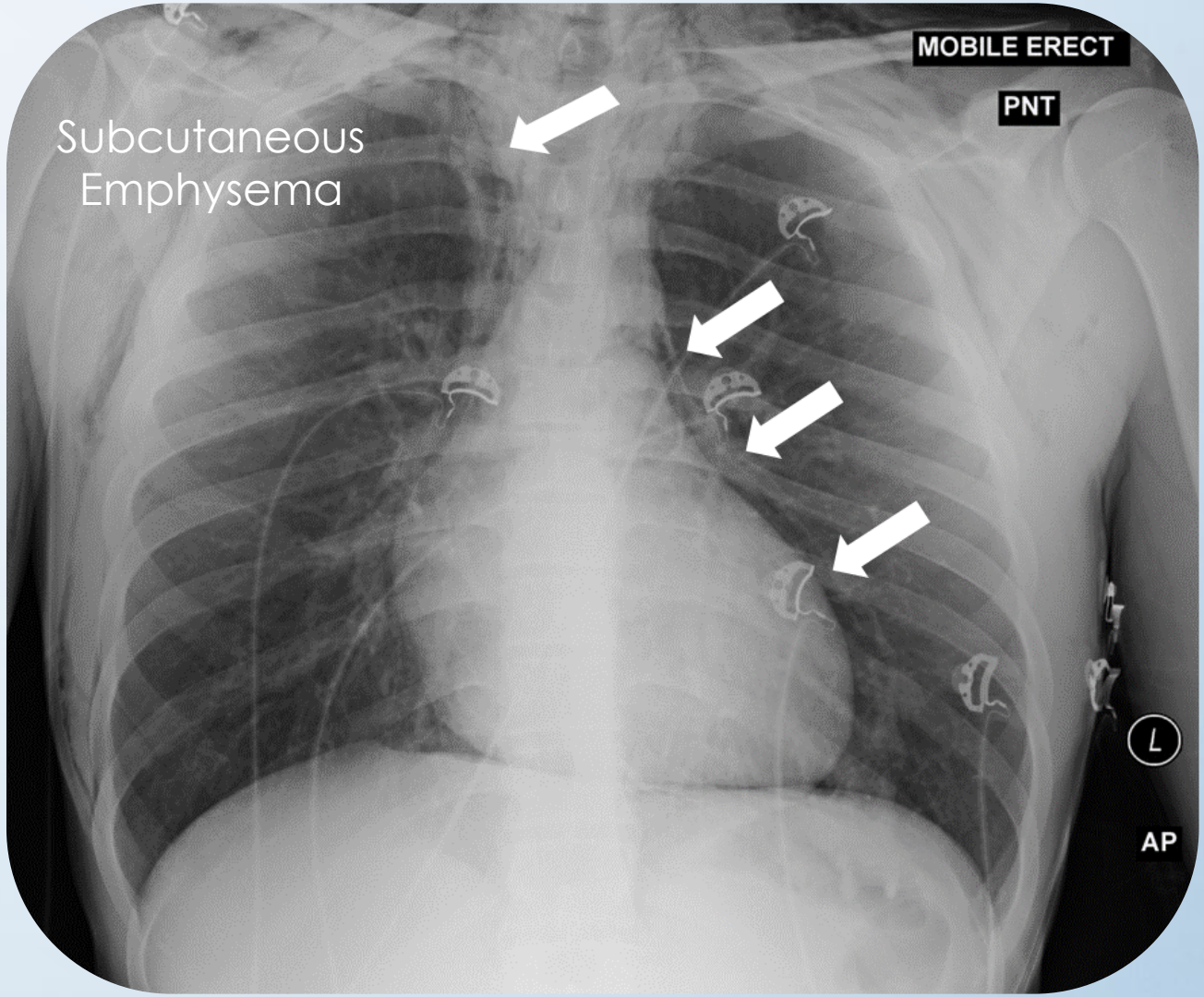
Air enters the pericardial cavity



Pneumopericardium



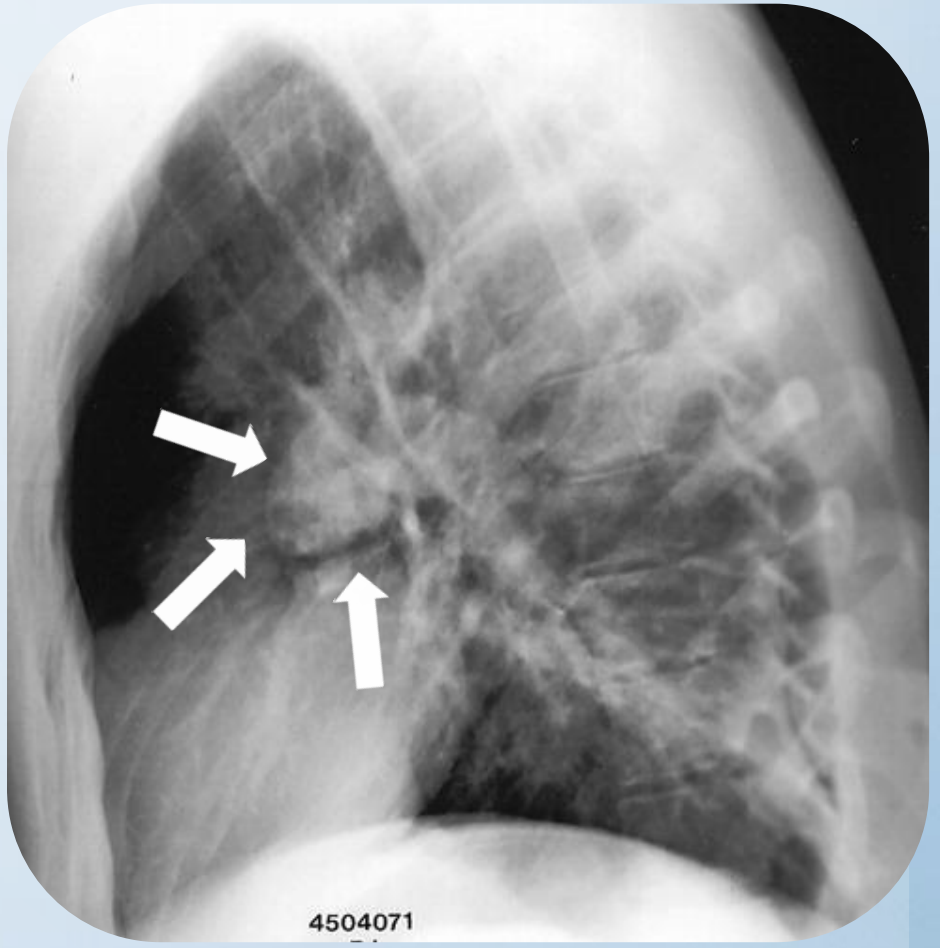
Pneumopericardium
Subcutaneous Emphysema



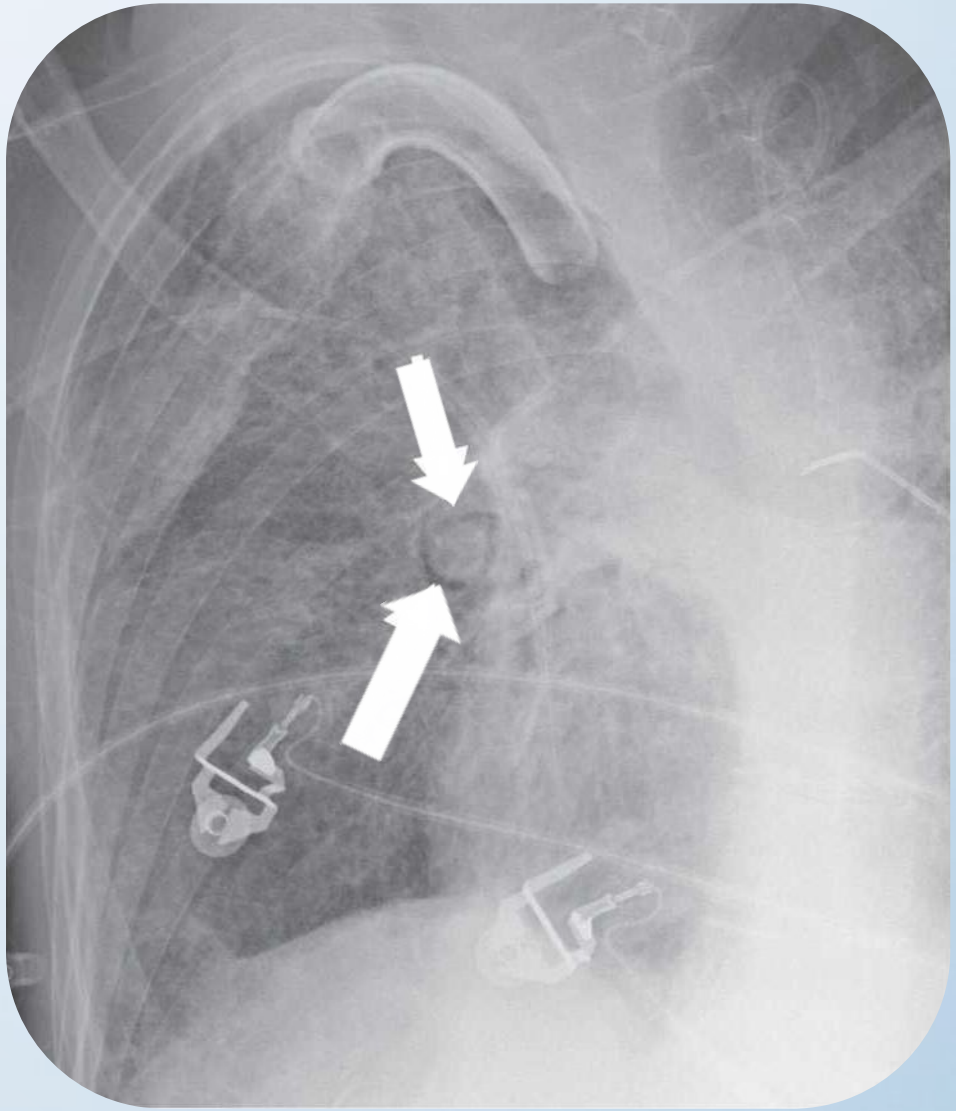
3.Ring around the pulmonary artery

A lucent ring around the extra pericardial segment of the **pulmonary artery**

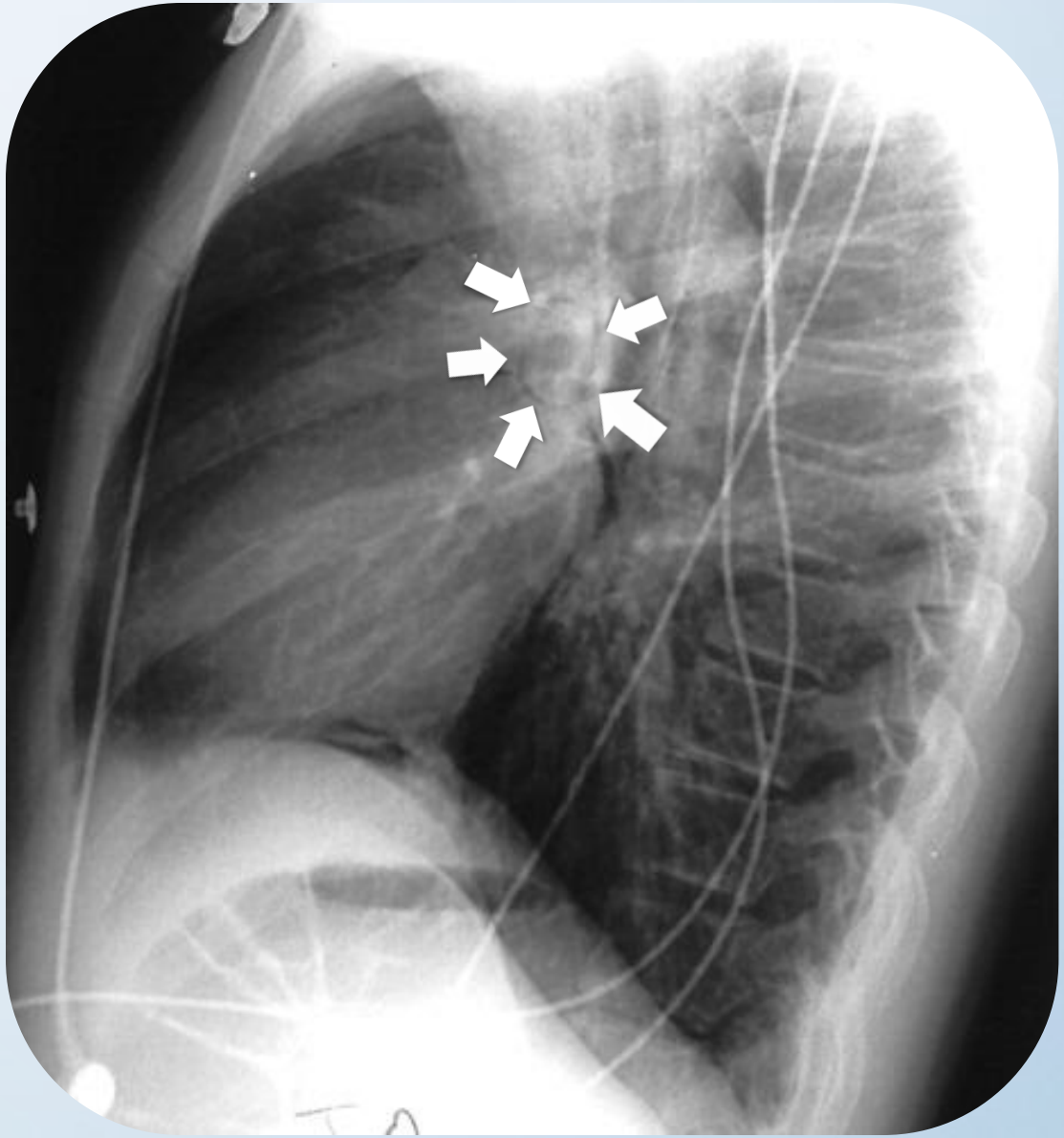
Generally seen in lateral radiographs



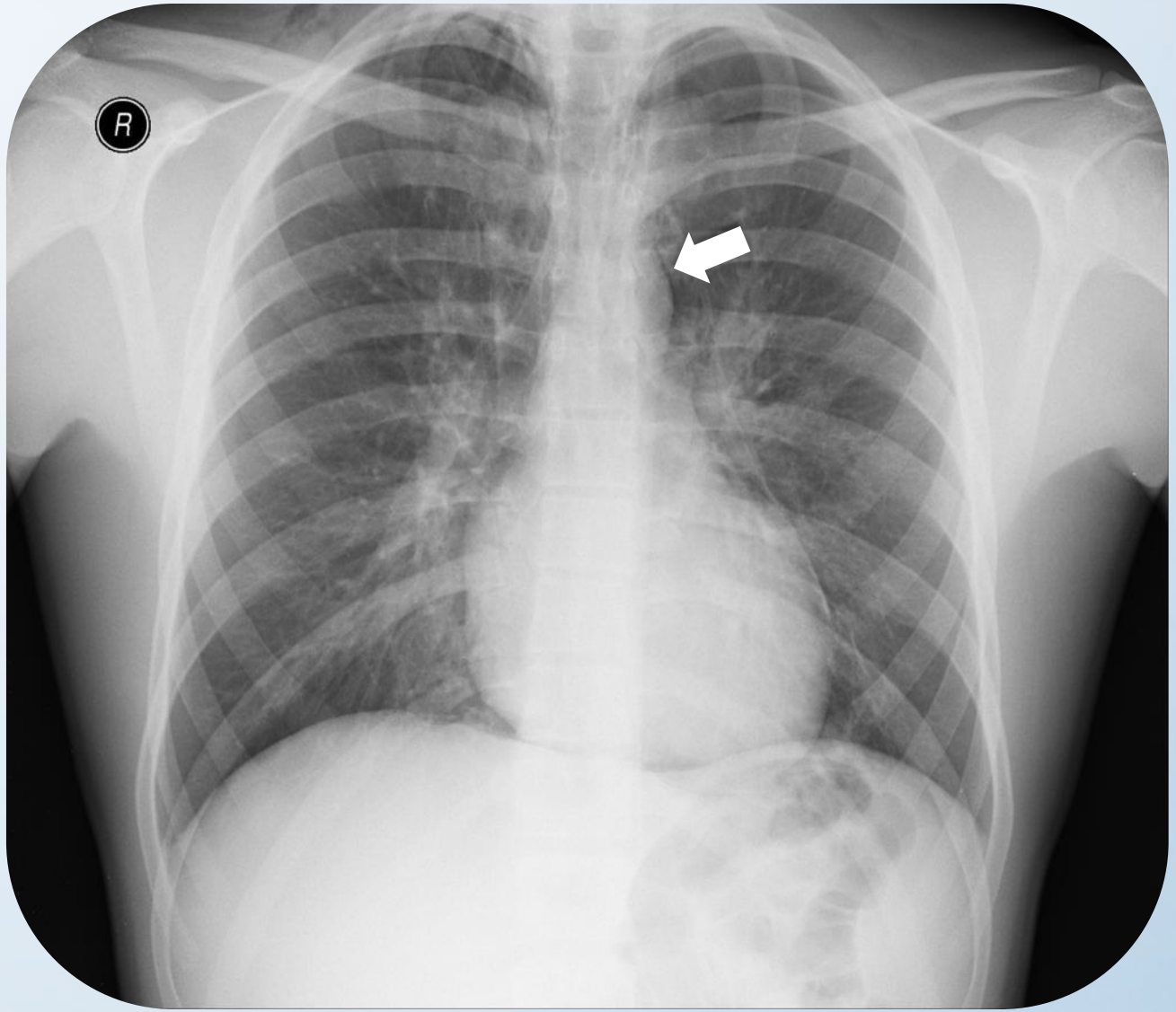
Ring around the pulmonary artery



Ring around the pulmonary artery

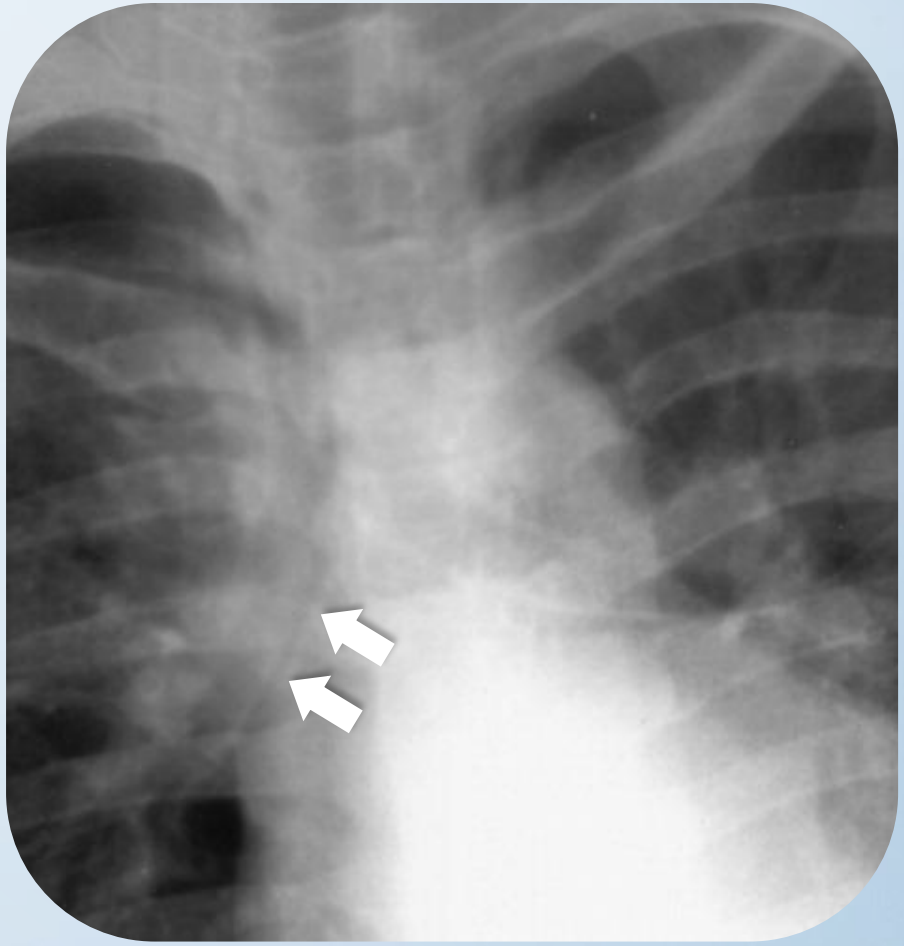


Air around
Pulmonary trunk



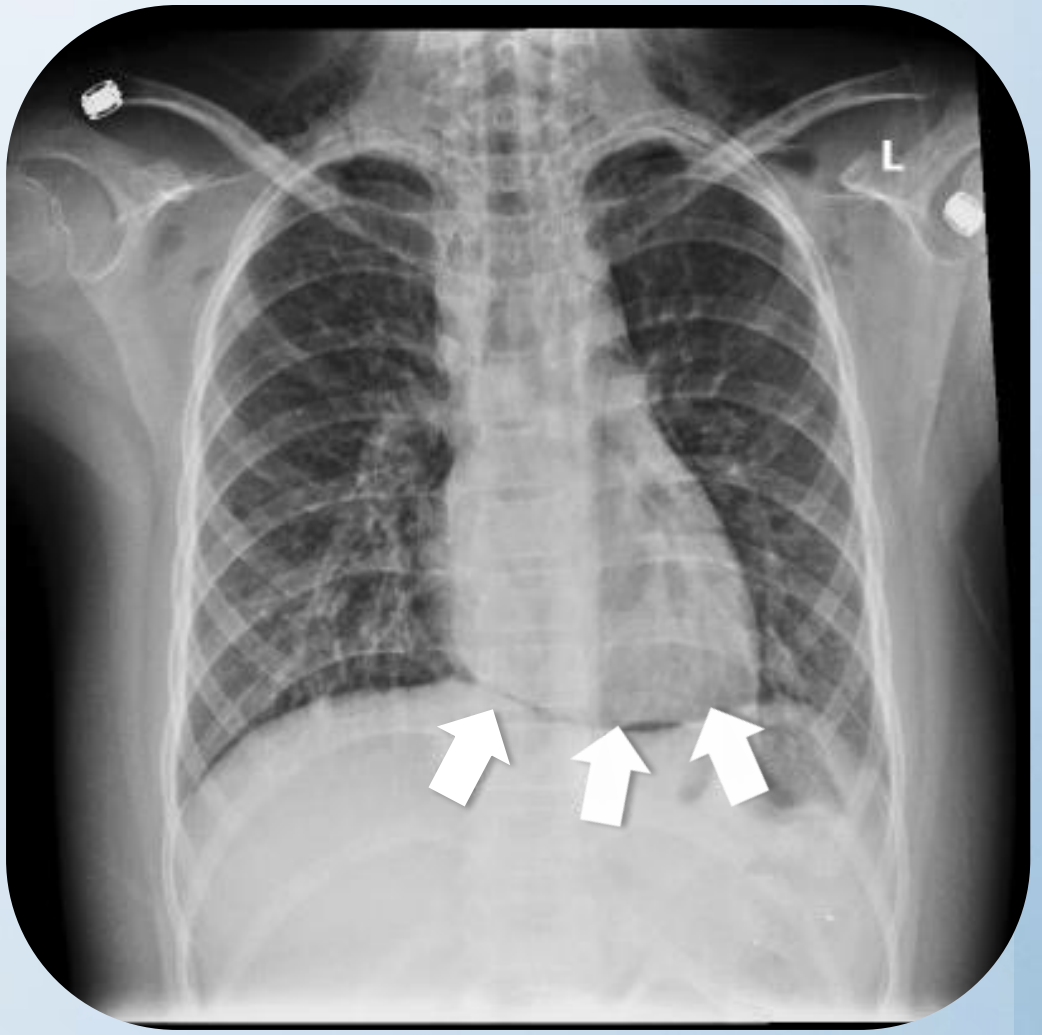
4.Double bronchial wall sign

Air in the mediastinum which allows visualization of **both sides of the bronchial wall**

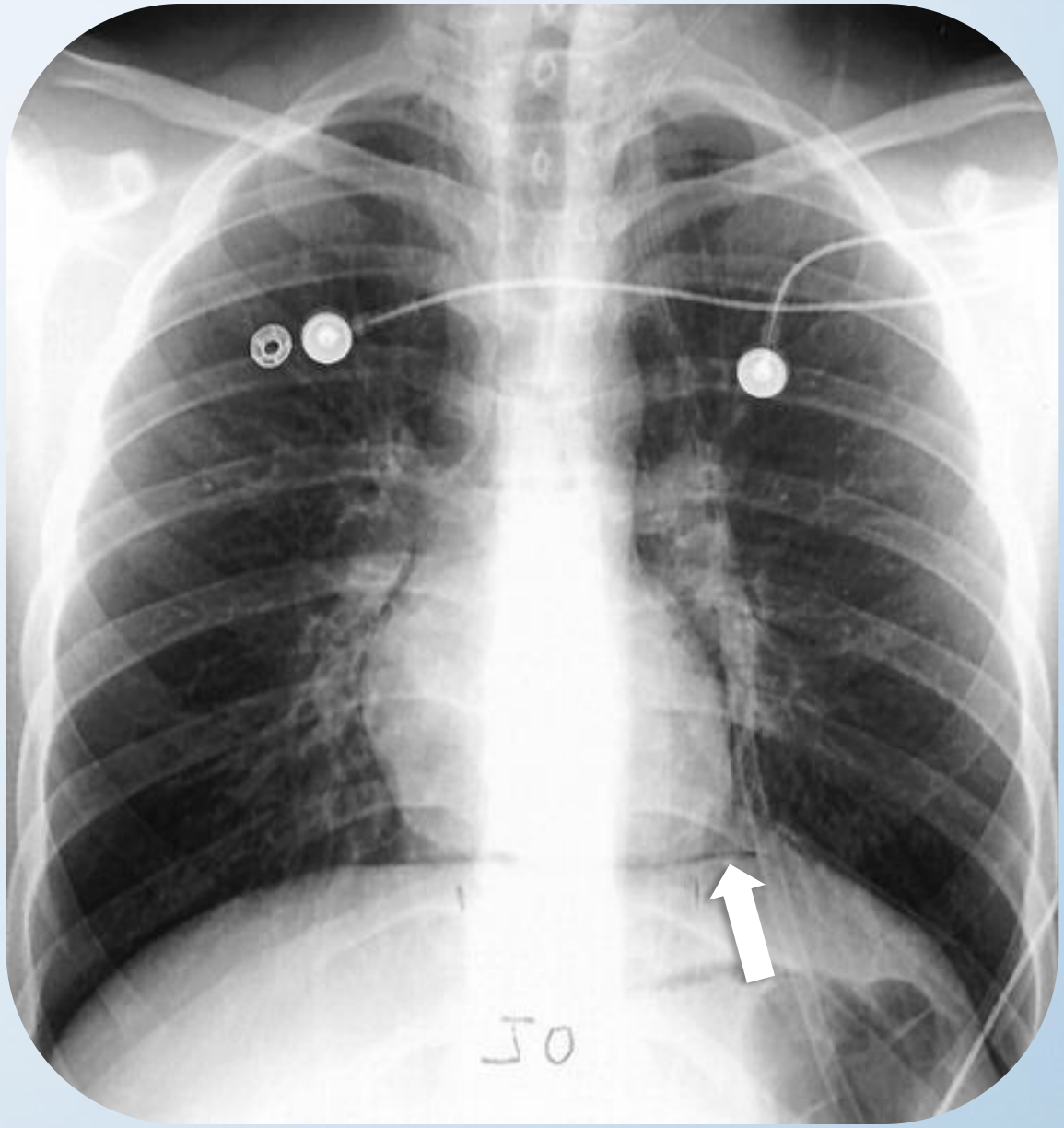


5.Continuous diaphragm sign

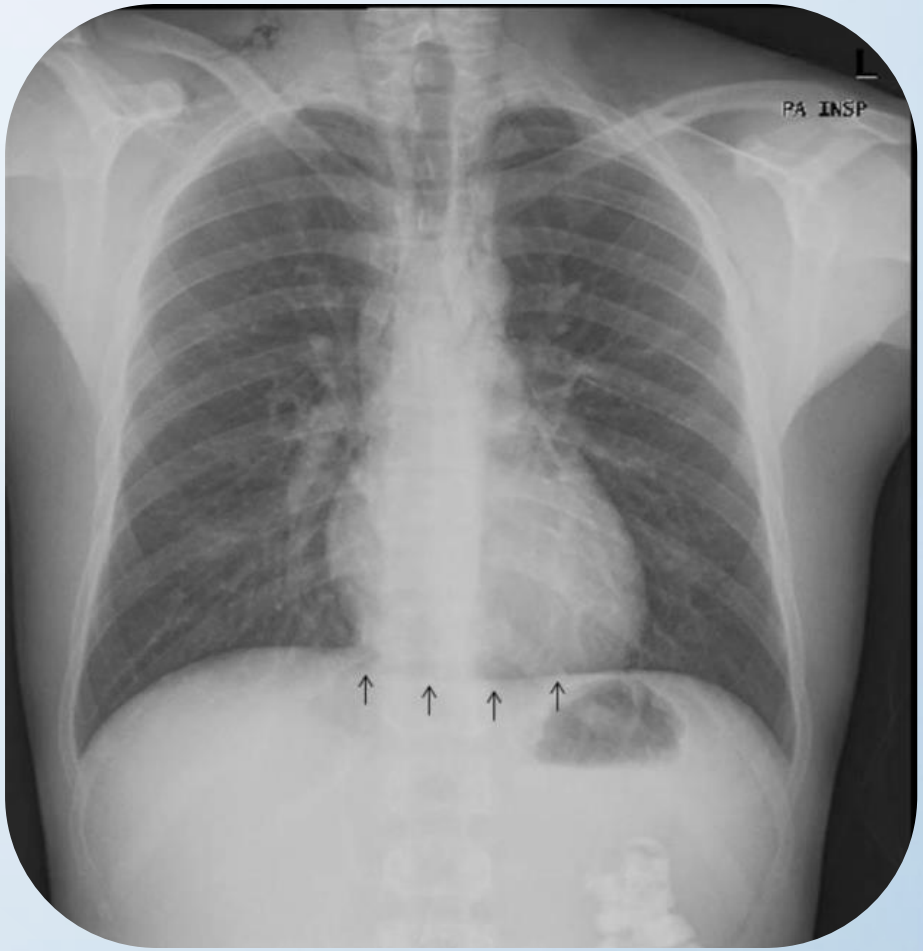
It is seen on a frontal radiograph when **gas in the mediastinum separates the heart and the superior surface of the diaphragm**, and it can be seen on either upright or supine views



Continuous diaphragm sign

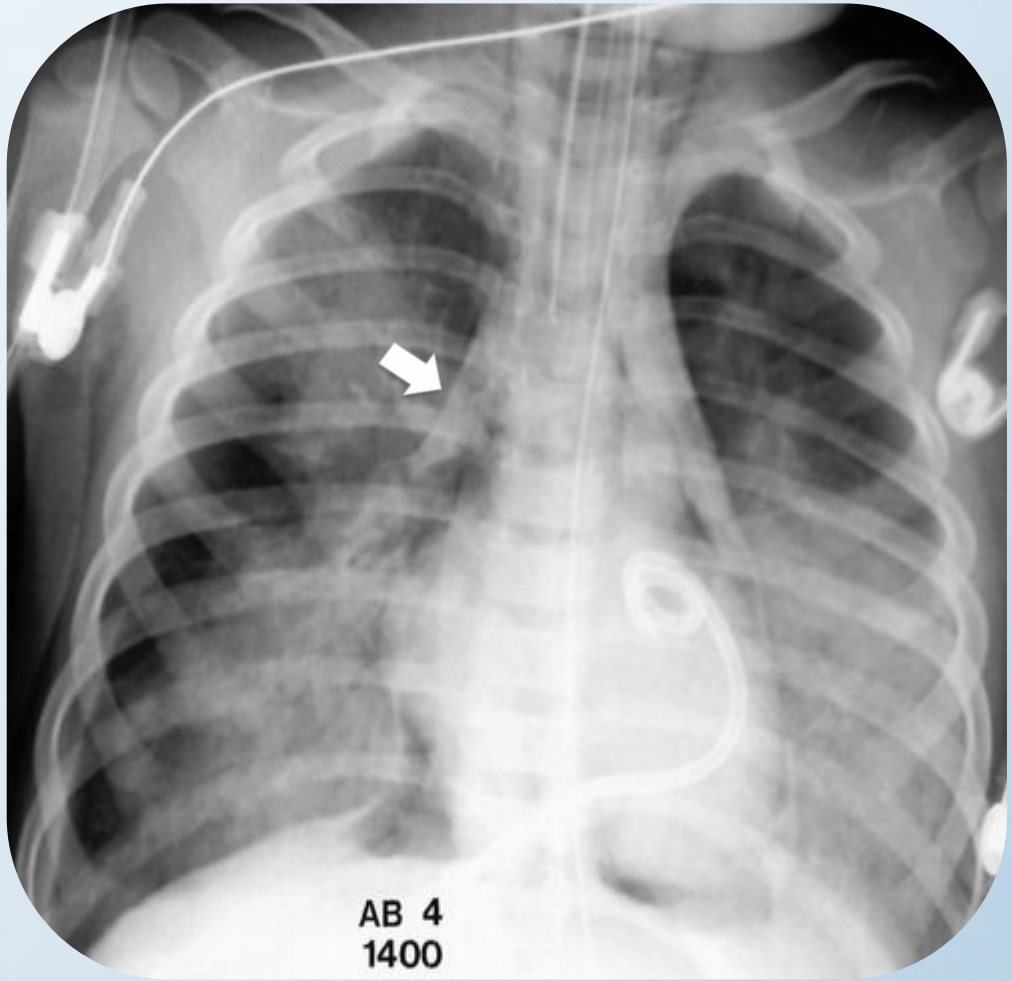


Continuous diaphragm sign

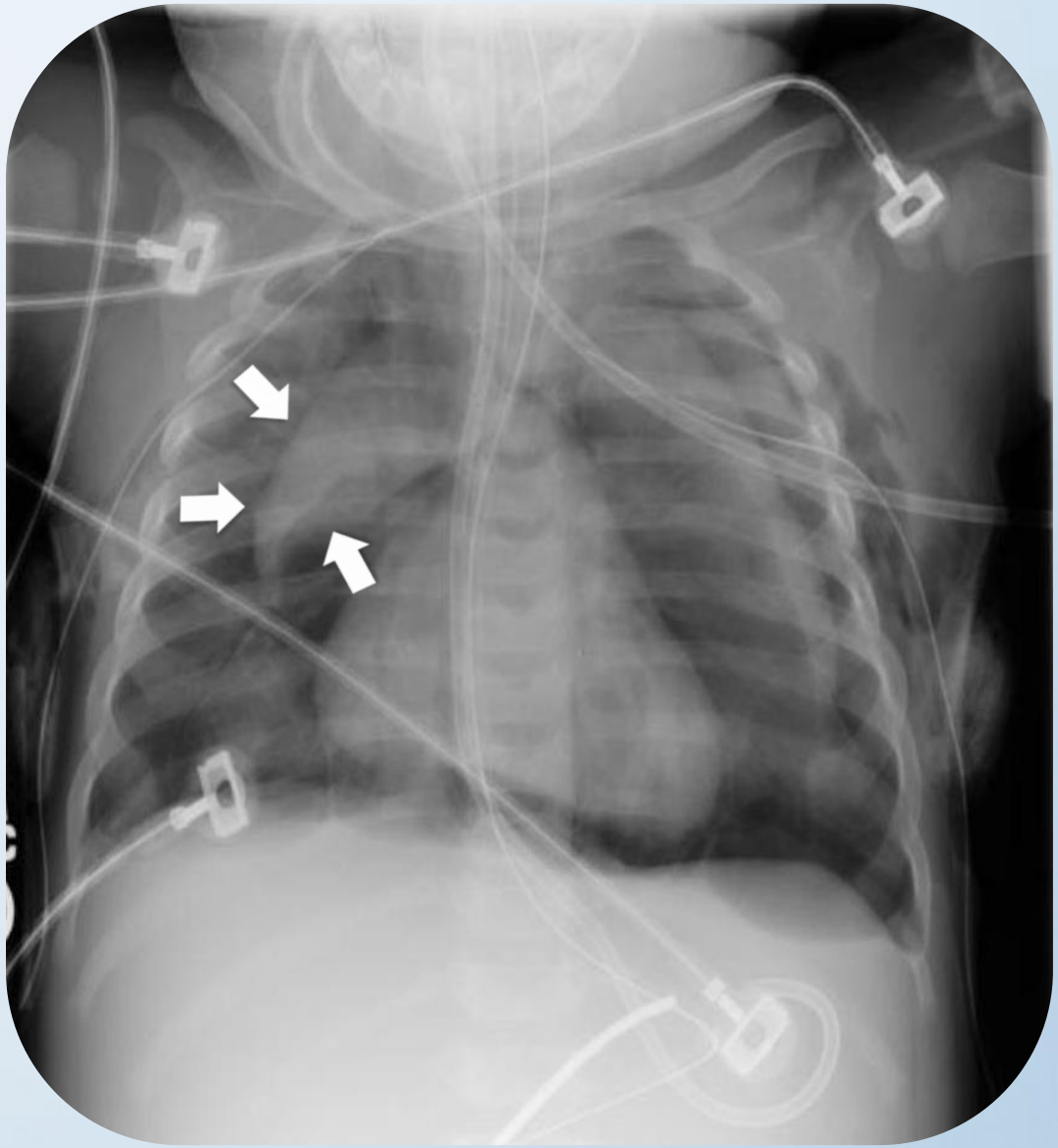


6.Thymic spinnaker sail sign

The thymus is outlined by air due to presence of air in mediastinum

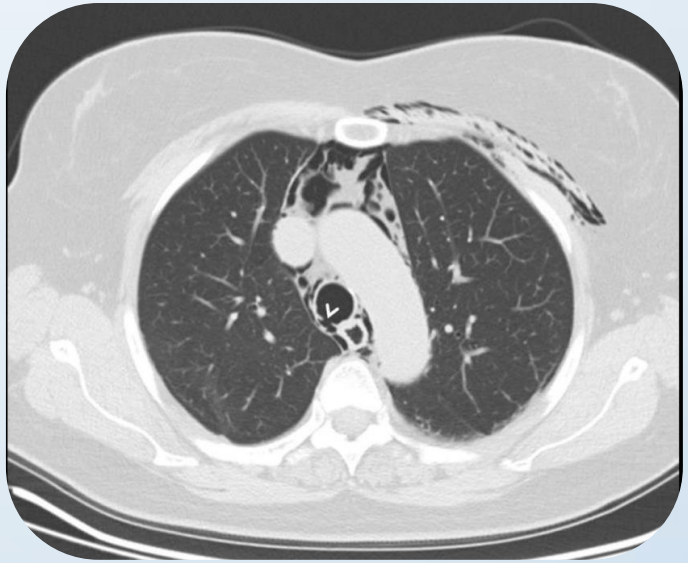


Spinnaker sign
thymus is prominent and outlined by air.



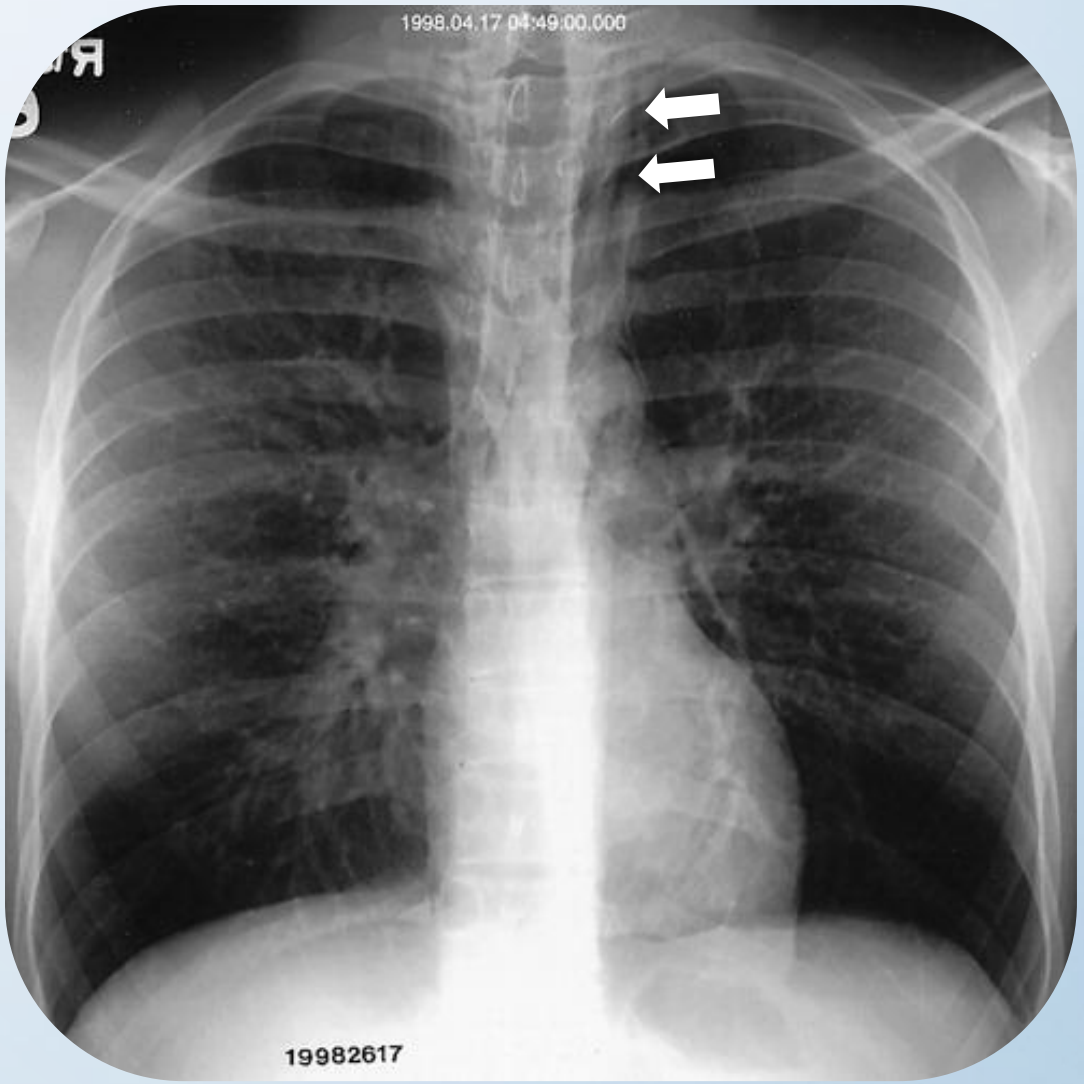
7. Tubular artery sign

Tubular Artery Sign is the outline by air of aortic arch branches seen on postero-anterior chest radiography, that happens when air dissects from mediastinum through fascial planes to the neck



Tubular artery sign

Pneumomediastinum outlining the **left subclavian** artery

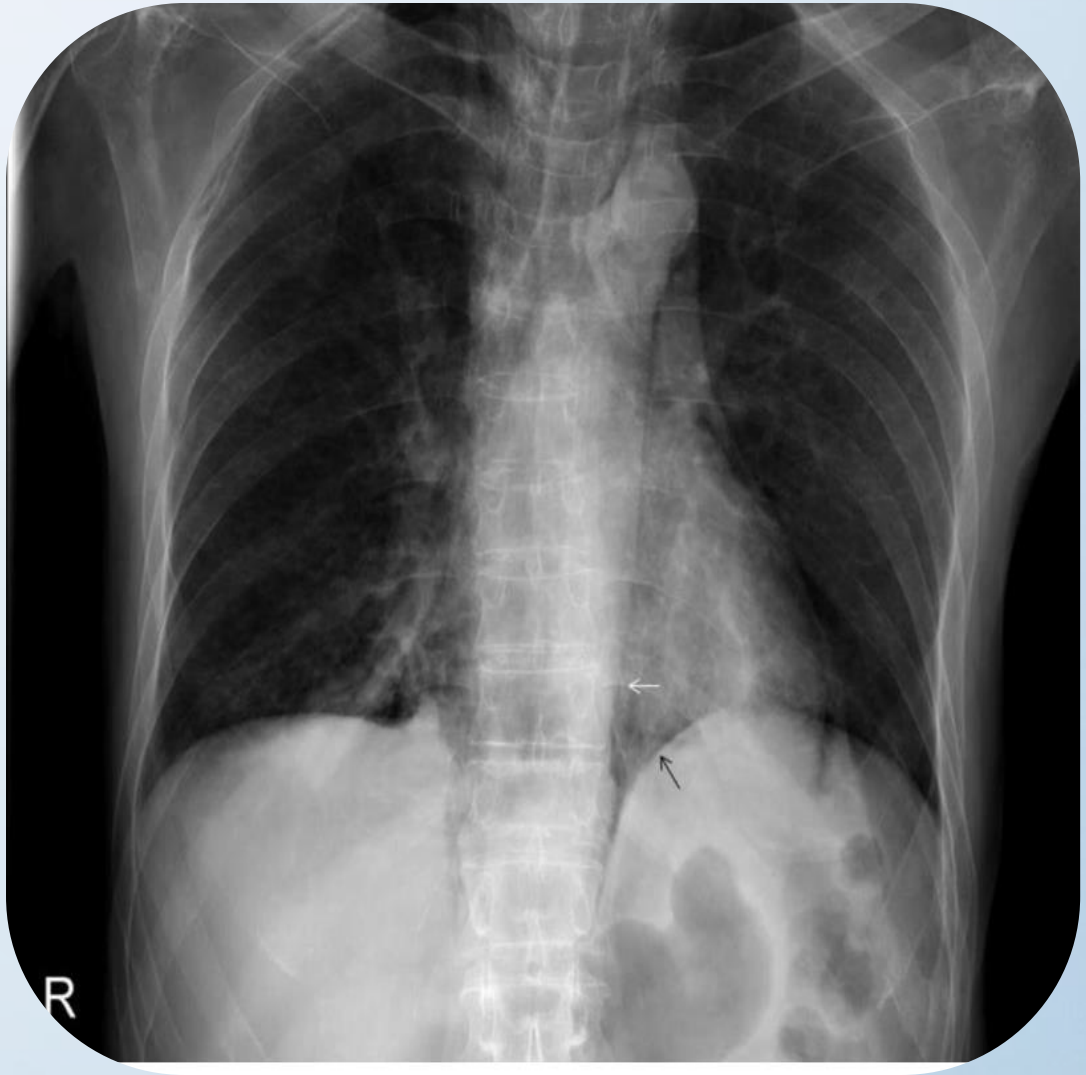


Tubular Artery Sign (white arrows)

dissection of the border of the descending aorta (black arrows); dissection of mediastinal pleura around aortic arch (white arrowhead) and around heart (black arrowhead).

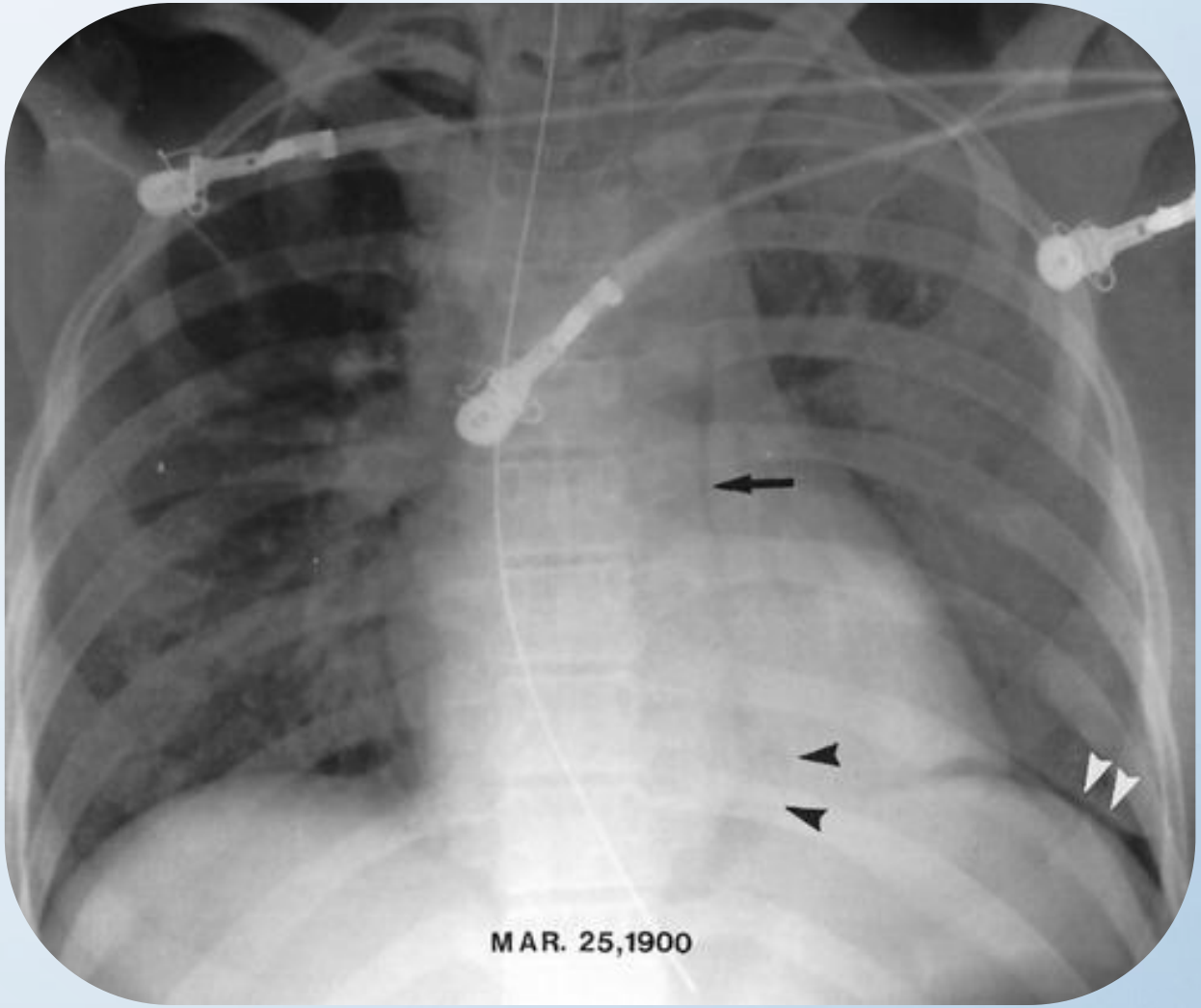
Naclerio's V sign:

This sign consists in the lucent line of the air dissection of the descending aorta, forming one limb of the V (white arrow), which together the lucent line of air above the left diaphragm dome, forming the second V limb (black arrow), resemble a V

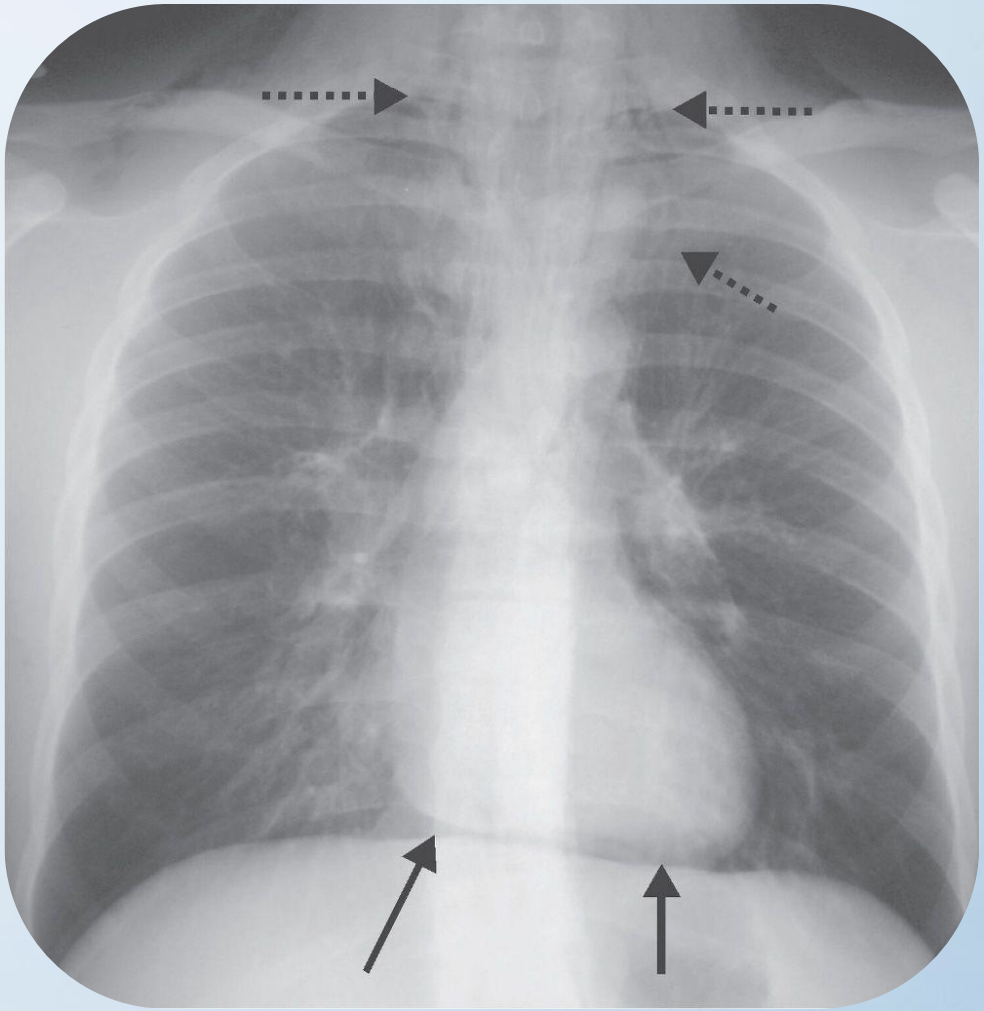


Review of some Cases

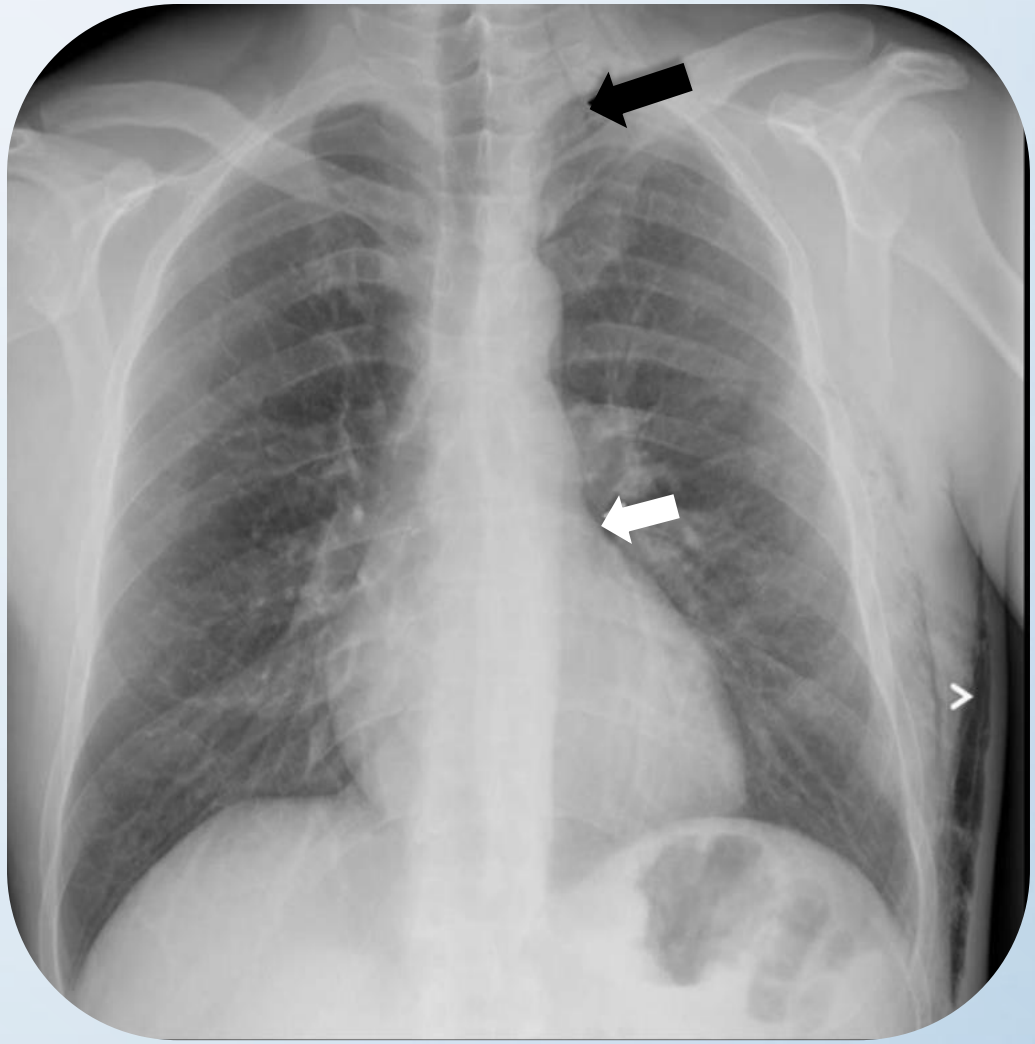
Extrapleural sign in a 26-year-old woman with esophageal rupture
AP radiograph demonstrates a **linear area of lucency paralleling the descending aorta (arrow**)
A collection of air is seen just lateral to the **lower descending aorta (black arrowheads**). This air presumably resides within the **pulmonary ligament**.
Note also the small collection of air in the left pleural space (white arrowheads).



Continuous lucency is seen between the heart and the diaphragm (*solid arrows*)
Air in the mediastinum is also seen tracking into the neck bilaterally (*dashed arrows*)



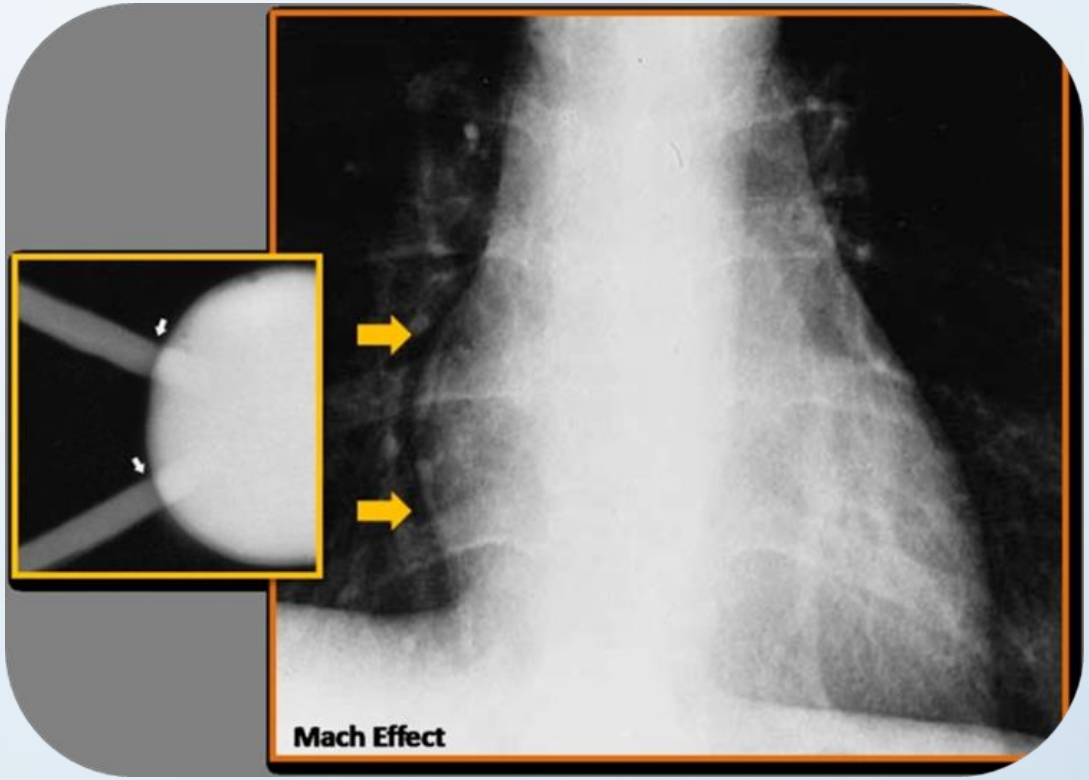
Subcutaneous emphysema (arrowhead), air dissecting neck tissues (black arrow) and a lucent line on the left border of the heart (white arrow)



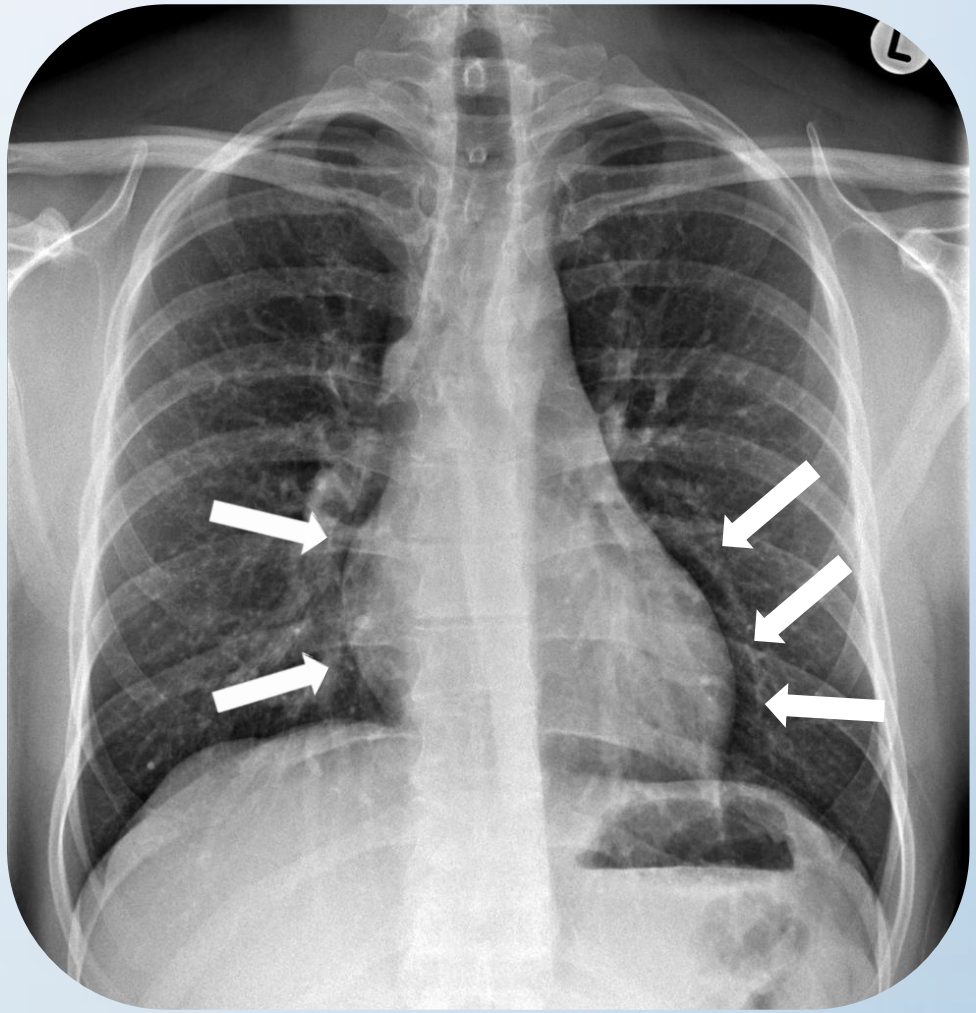
Mach effect

Mach bands or the **Mach effect** refers to an optical phenomenon from edge enhancement due to lateral inhibition of the retina

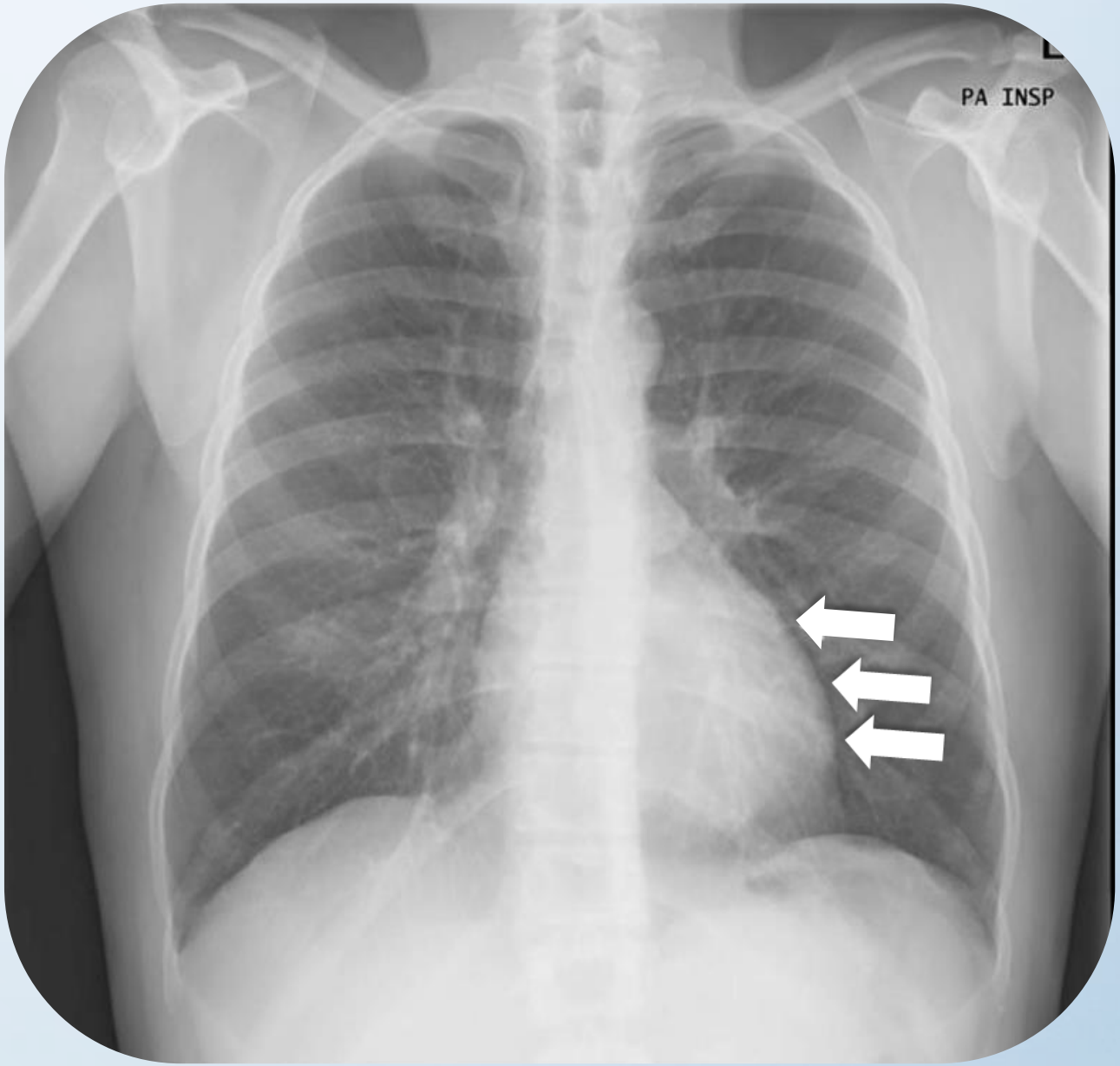
Along the boundary between adjacent shades of grey in the Mach bands illusion, lateral inhibition makes the darker area falsely appear even darker and the lighter area falsely appear even lighter.


Mach Effect

Normal chest x-ray with quite pronounced **Mach effect** creating a perceived lucency outlining the mediastinum and hemidiaphragms



Mach band effect, mimicking a pneumomediastinum



Refences

1.Radiologic features of pneumomediastinum: from classic signs to clinical management. EPOS TM. DOI: 10.1594/ecr2015/C-2405

2. Pneumomediastinum Revisited. Christopher M. Zylak, James R. Standen, George R. Barnes, Carl J. Zylak. Jul 1 2000 https://doi.org/10.1148/radiographics.20.4.g00jl131043

3. Medscape