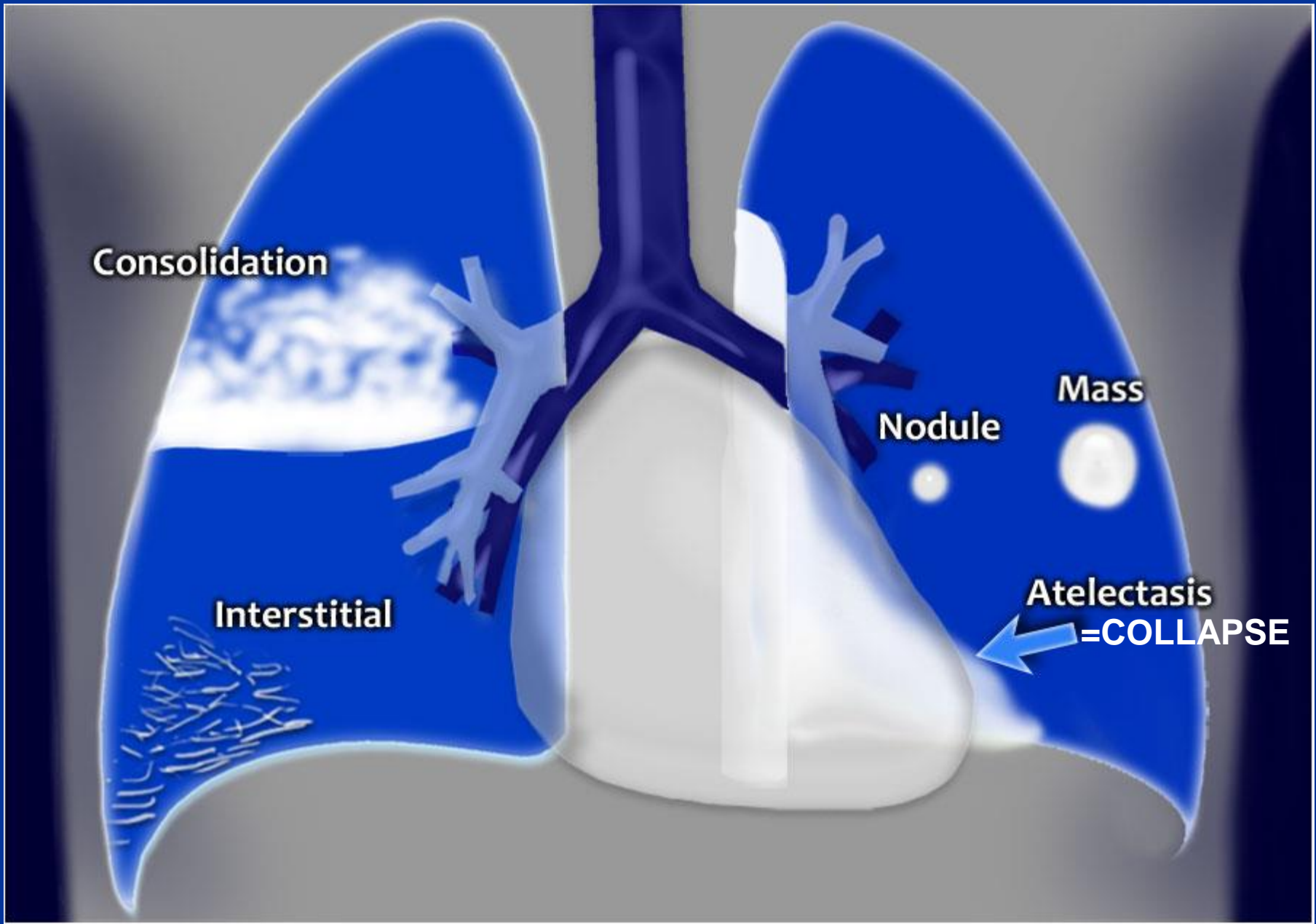


LUNG DISEASES

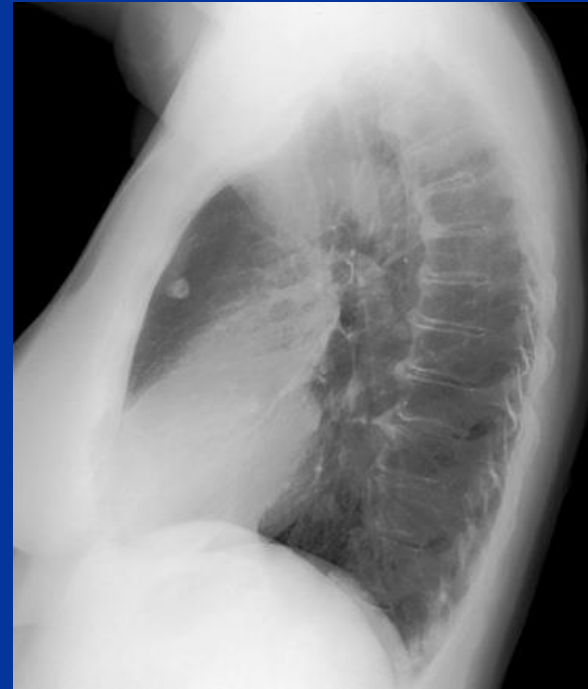


MASS Vs DIFFUSE INFILTRATION

- The basic diagnostic instance is to detect an abnormality.
- In both of the cases, there is an **abnormal opacity** left upper zone.
- In the case ABOVE , the opacity would best be described as a **mass** because it HAS EDGES **well-defined** 3-D STRUCTURE
- The case BELOW has an opacity that is **poorly defined**. This is airspace disease such as **pneumonia**.

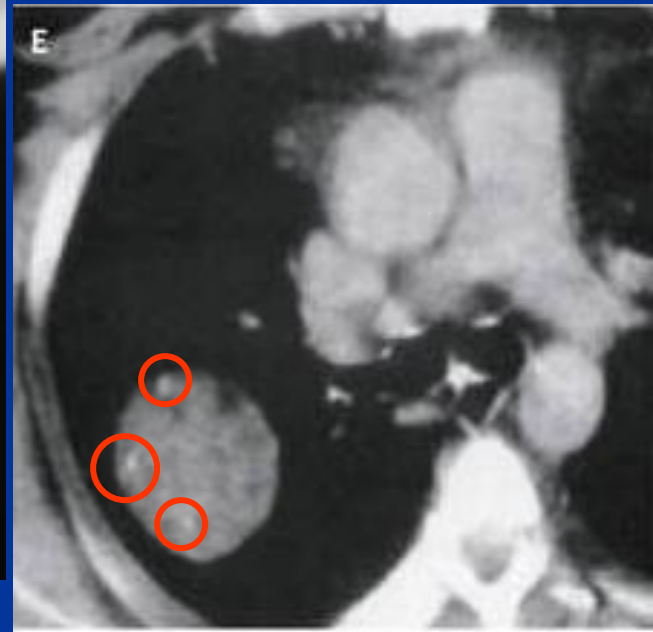
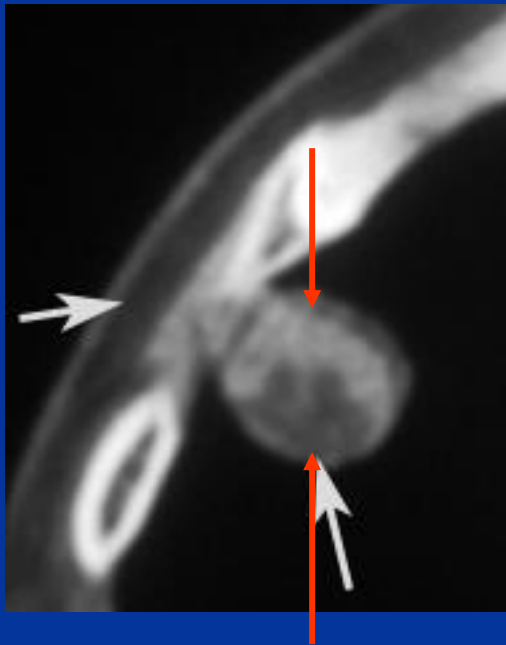
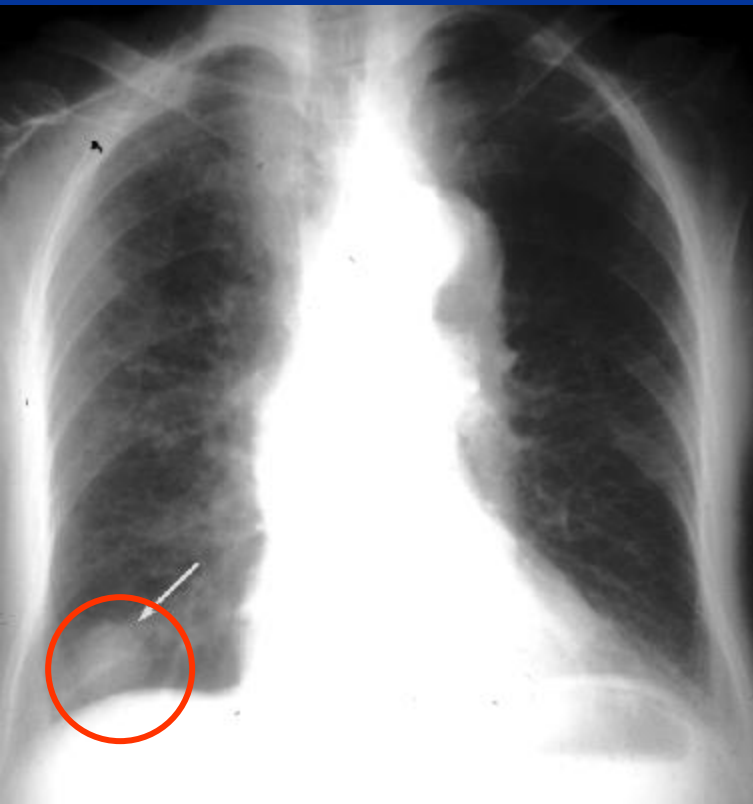


solitary nodule in the lung

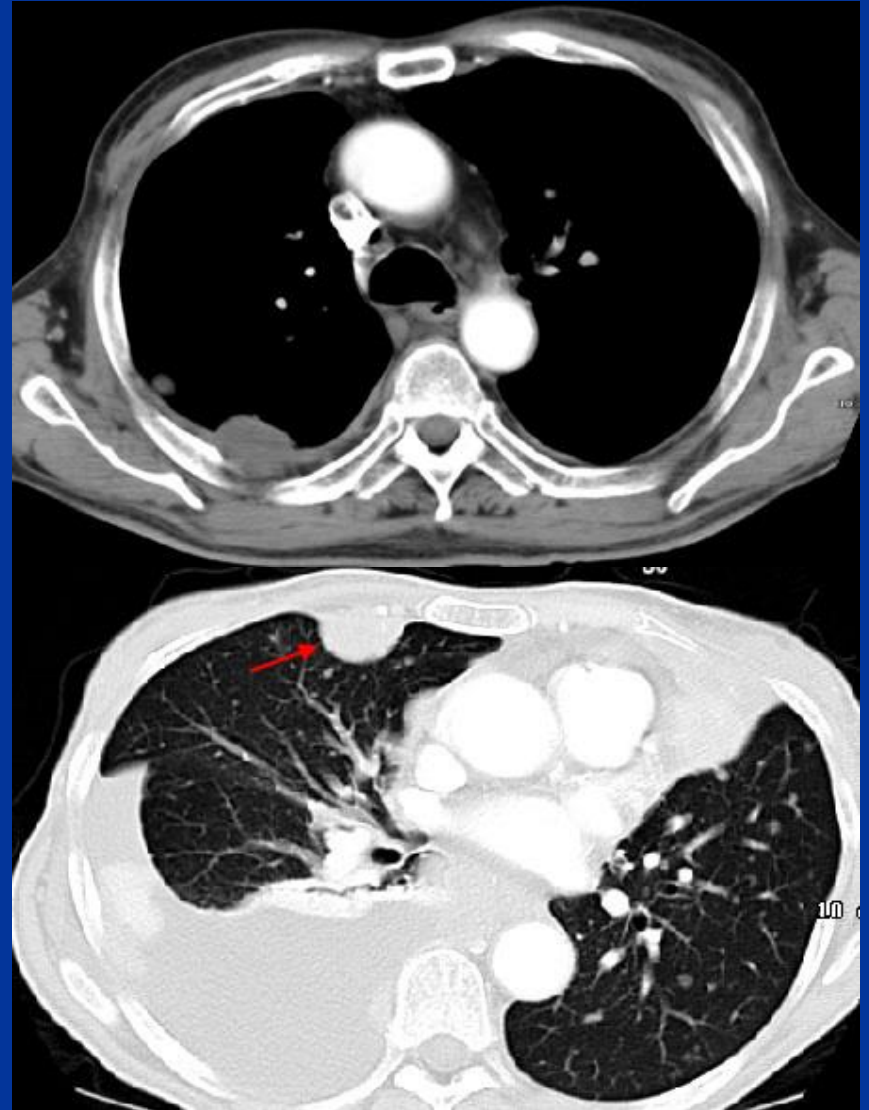
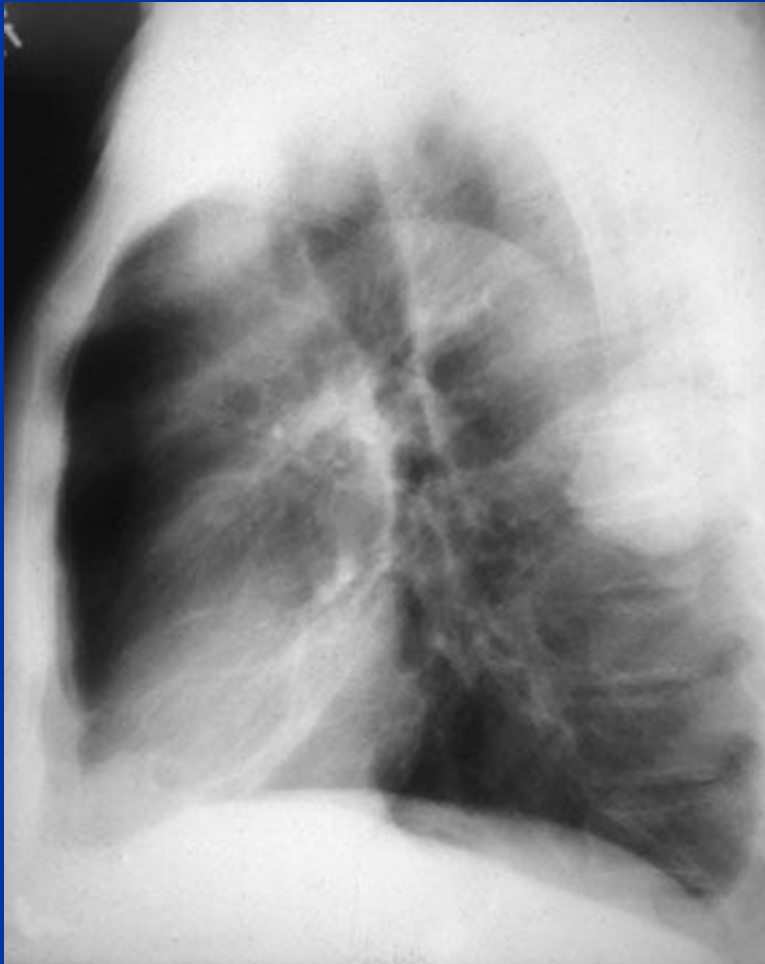


- A solitary nodule in the lung can be totally innocuous or potentially a fatal lung cancer. After detection the initial step in analysis is to compare the film with prior films if available. A nodule that is unchanged for two years is almost certainly benign. Be sure to evaluate for the presence of **multiple nodules** as this finding would change the differential entirely.
- If the nodule is indeterminate after considering old films and calcification, subsequent steps in the work-up include ordering a CT and a tissue biopsy.

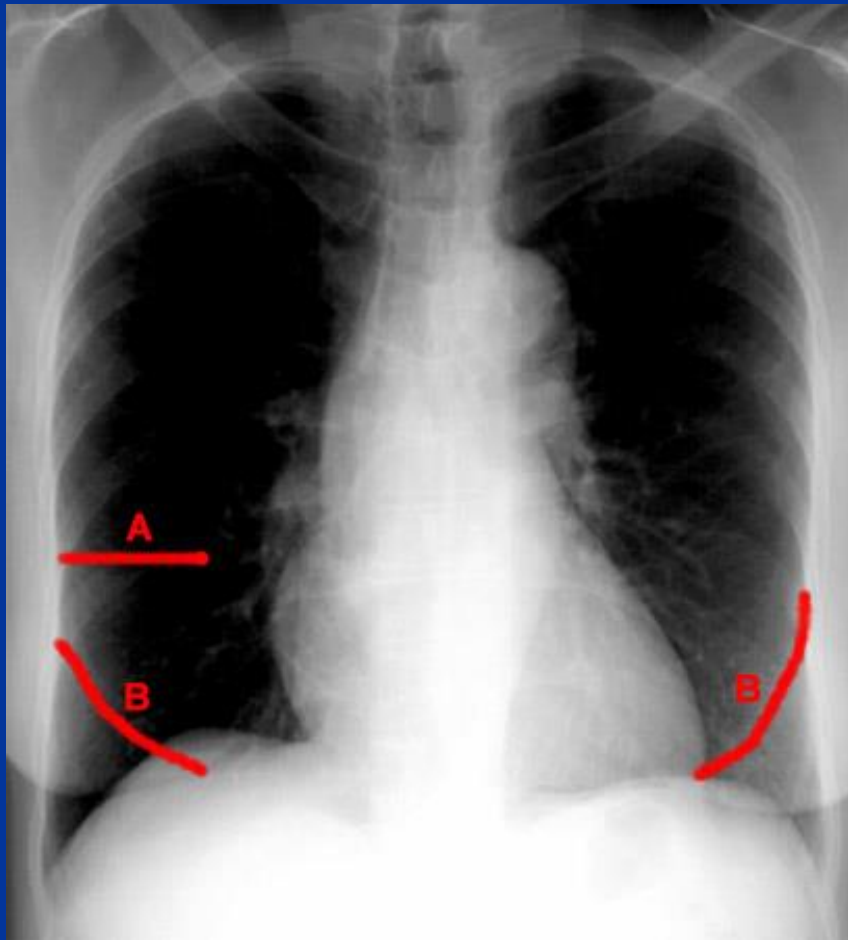
MASS HAMARTOMA



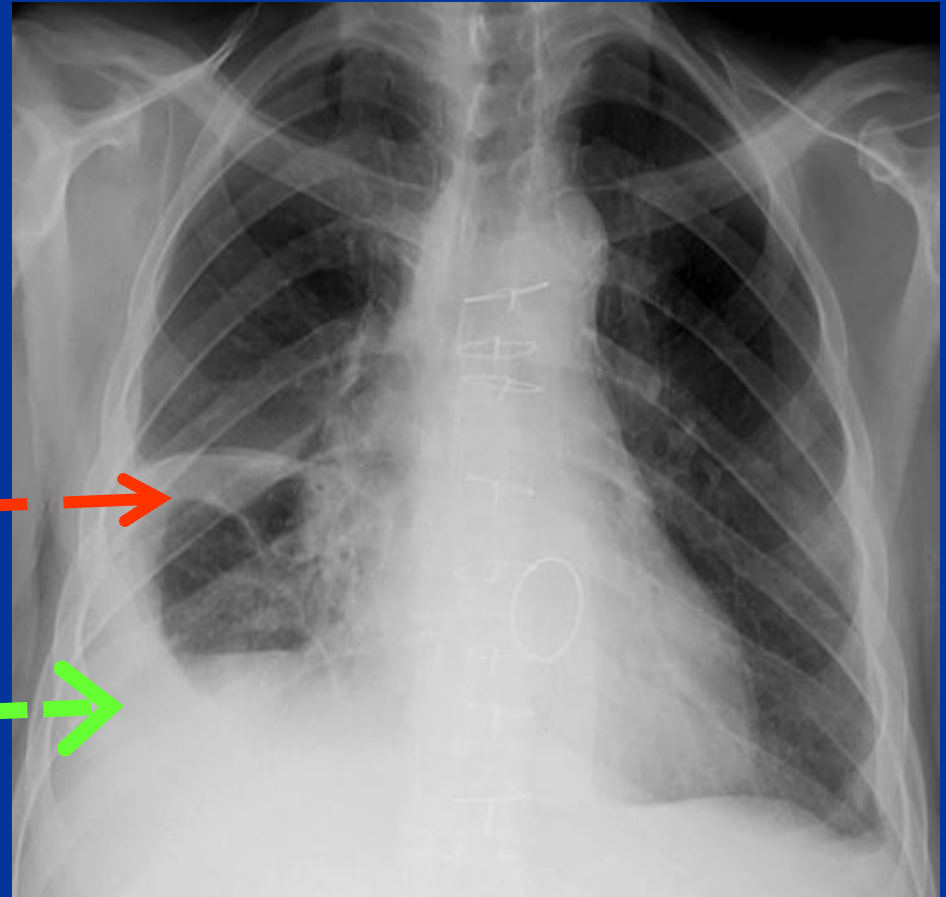
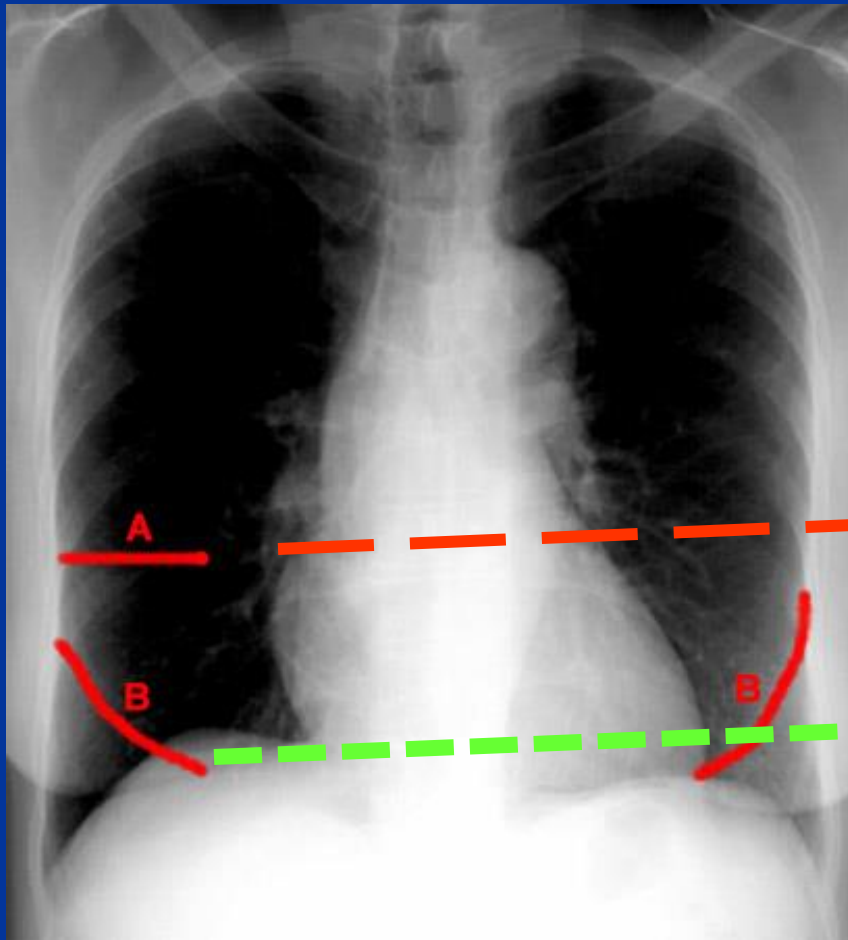
PLEURAL BASED LESION METASTASIS



FISSURES



FISSURES



DEFINITIONS

- **ATELECTASIS**

Loss of volume of lobe, segment or sub segment of the lung.

Example collapse (lung)

- **Consolidation**

Loss of air in lobe, segment or sub segment of the lung.

Example= pneumonia (lobe)

Major differentiating factors between atelectasis and pneumonia

Atelectasis

Volume **Loss**

Associated Ipsilateral Shift

Linear, Wedge-Shaped

Apex at Hilum

Pneumonia

Normal or Increased Volume

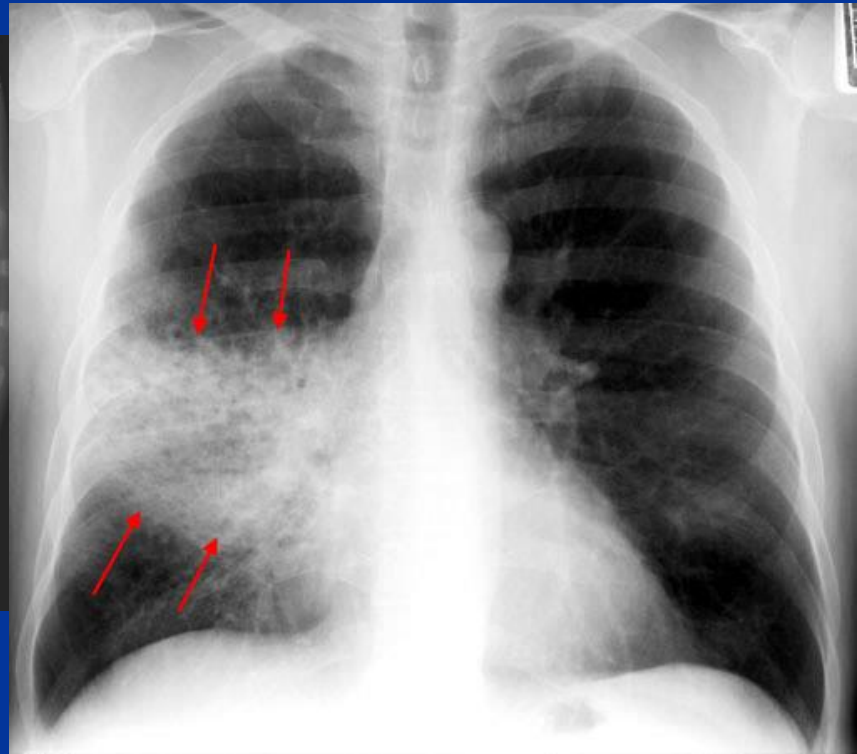
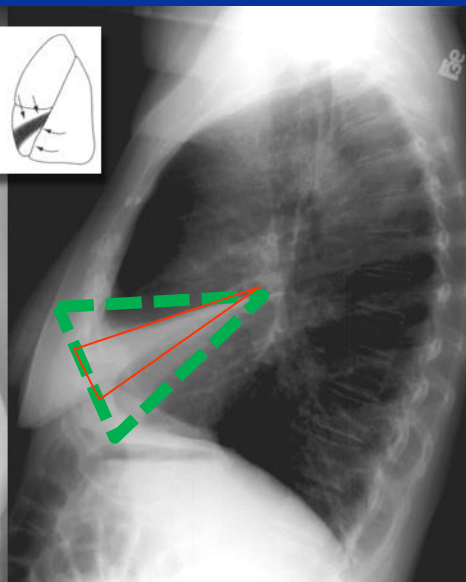
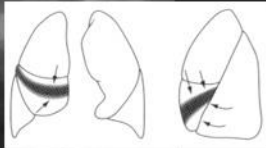
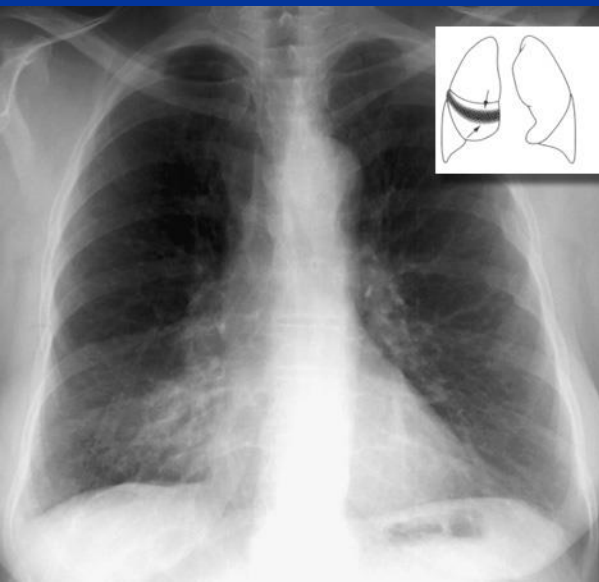
No Shift, or if Present Then Contralateral

Consolidation, Air Space Process

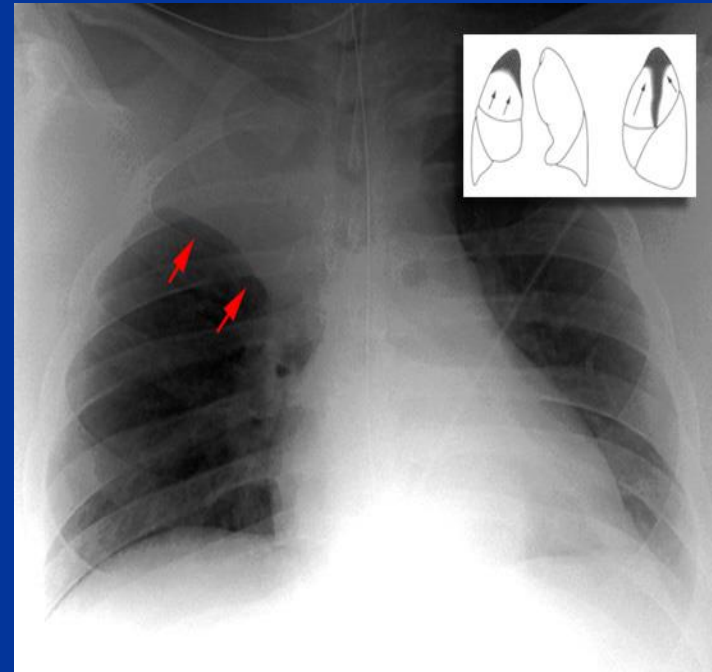
Not Centered at Hilum

Air bronchograms can occur in both.

ATELECTASIS VS PNEUMONIA



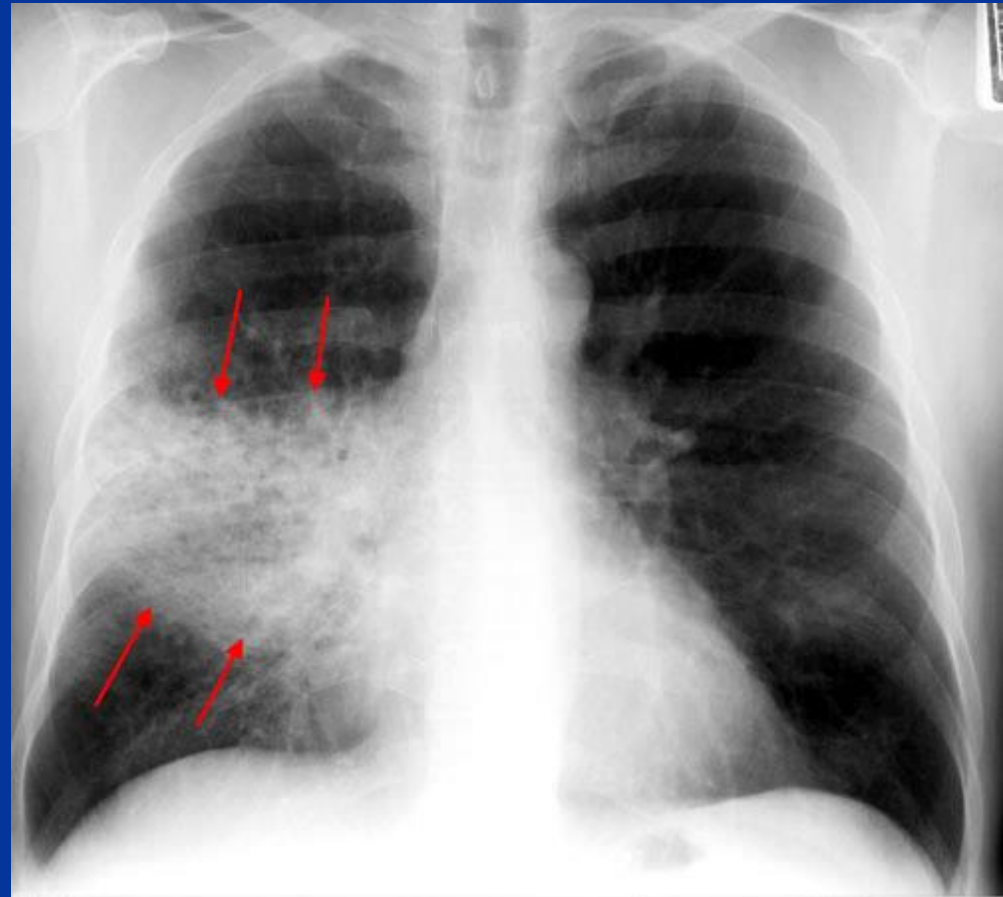
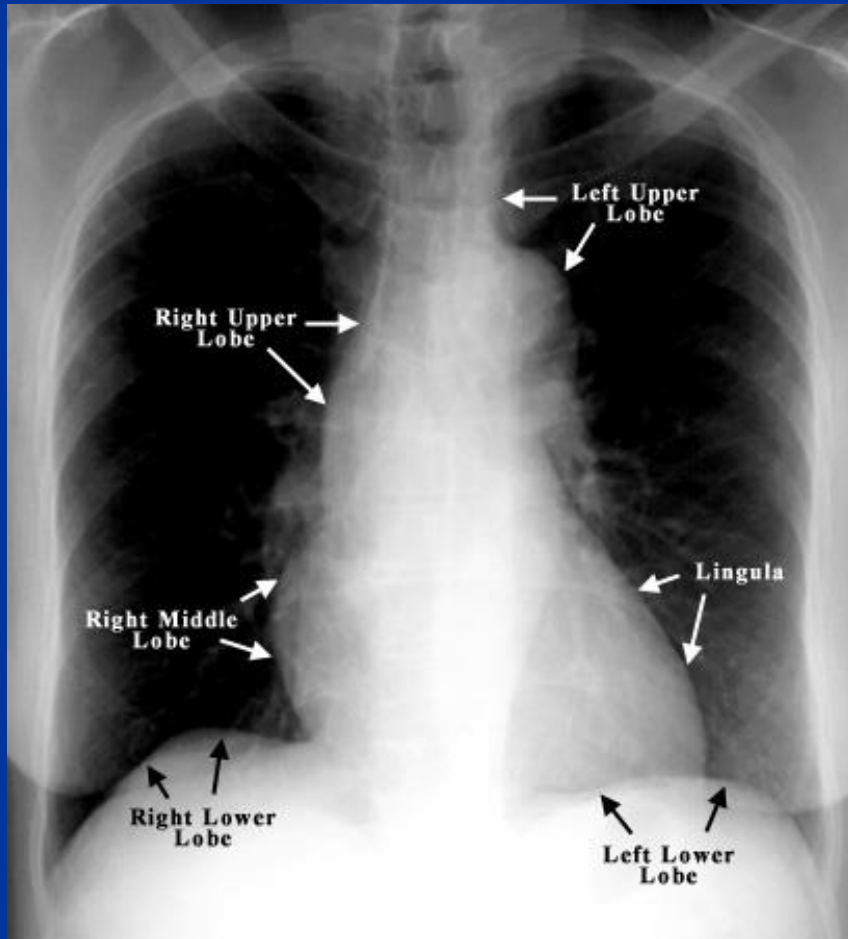
PNEUMONIA VS ATELECTASIS



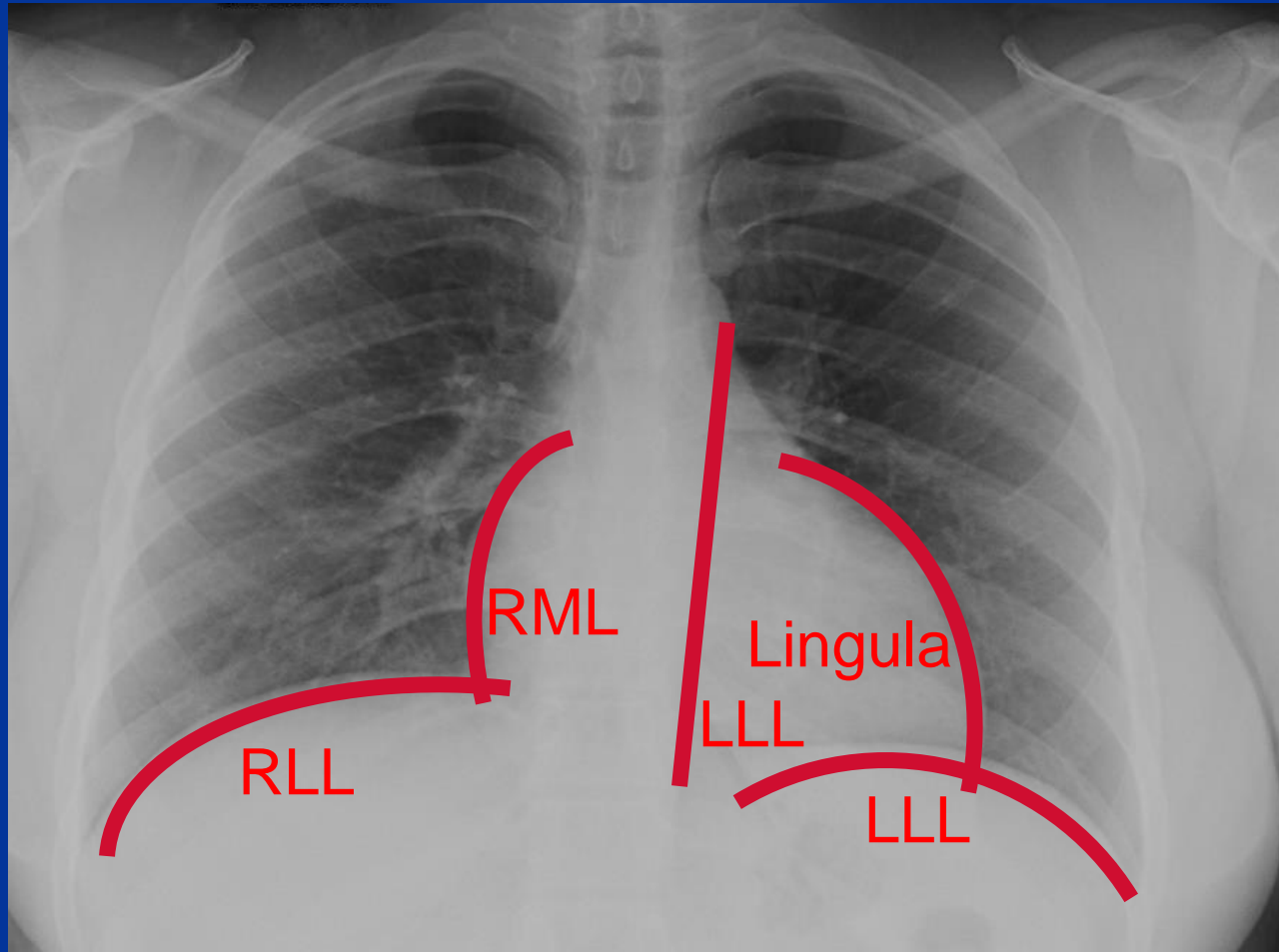
Recognizing air space disease

- Alveolar spaces filled with...something.
- Radiologist's report:
 - “consolidation”
 - “air space opacity”
 - “fluffy density”
 - “infiltrate”
- Nonspecific:
 - Pneumonia, bleeding, edema, tumor, atelectasis

SILHOUETTE SIGN



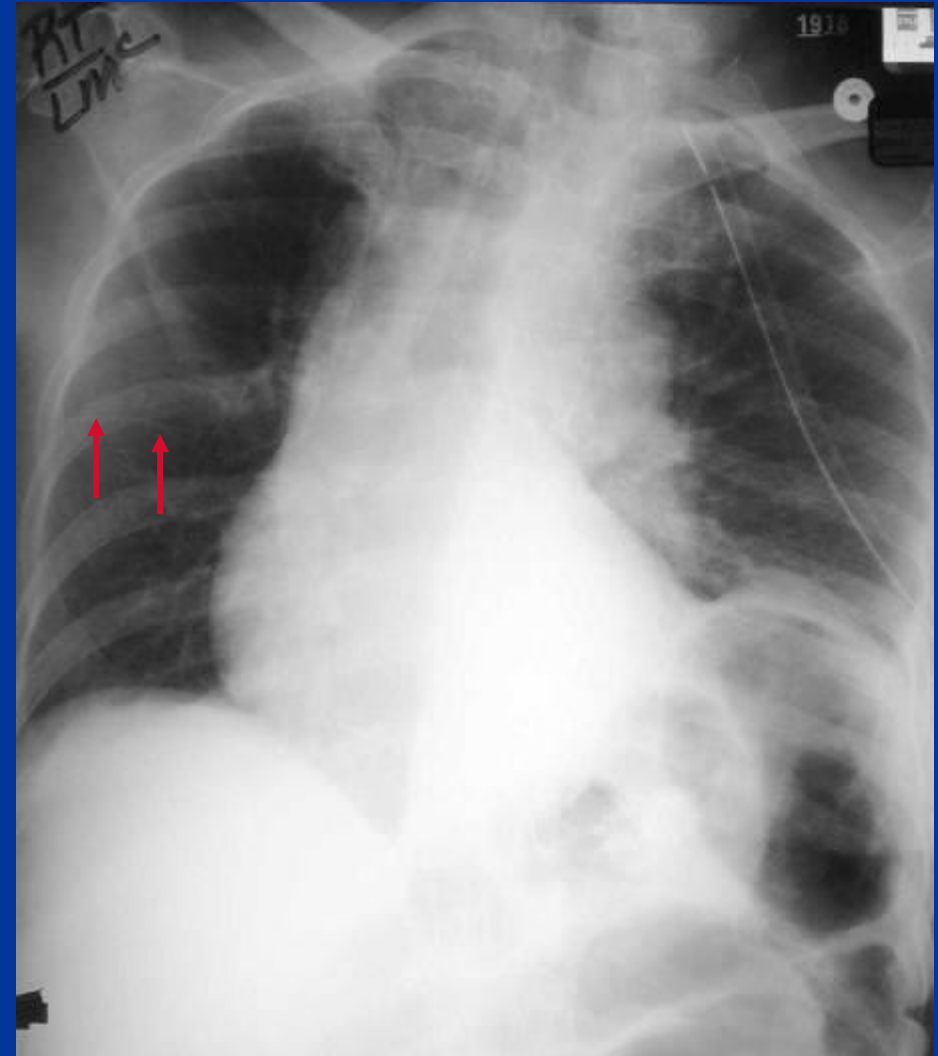
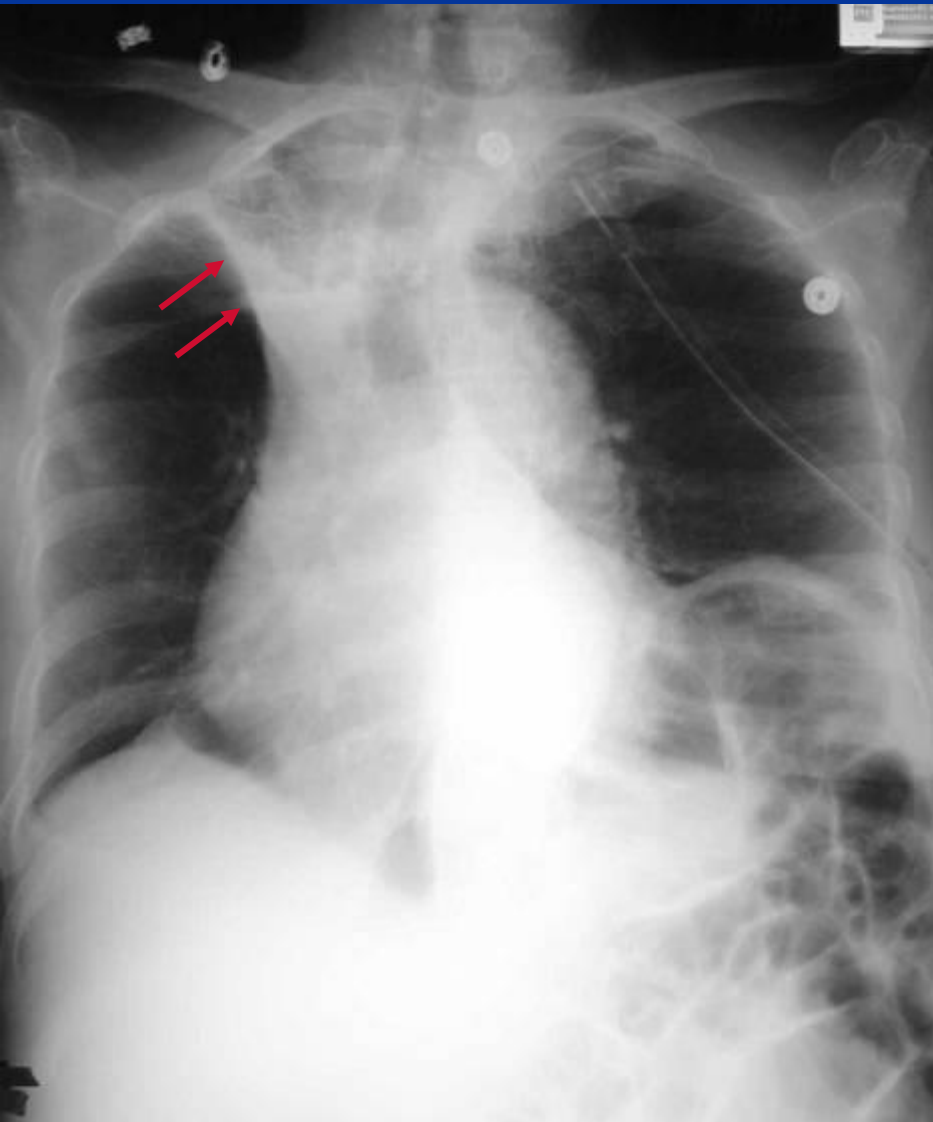
Localizing disease from the silhouette sign



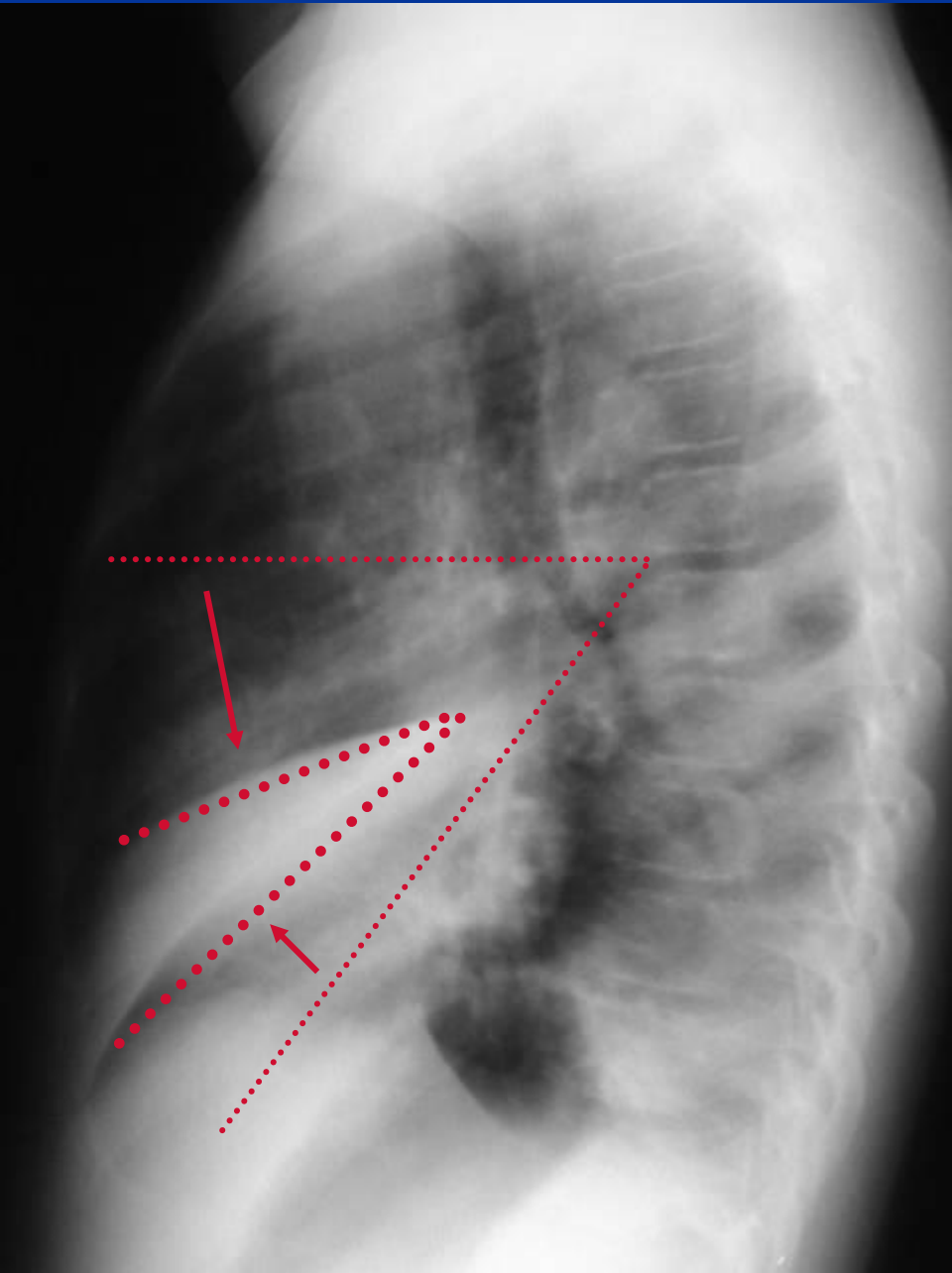
Lobar Atelectasis

- Best sign – **shift of a fissure**
- Rapid development and clearance
- **Air bronchograms** if non-obstructive
- Secondary signs:
 - Mediastinal shift
 - Elevated diaphragm
 - Ribs closer together
 - Vague increased density

RUL Atx



RML Atx



LLL COLLAPSE

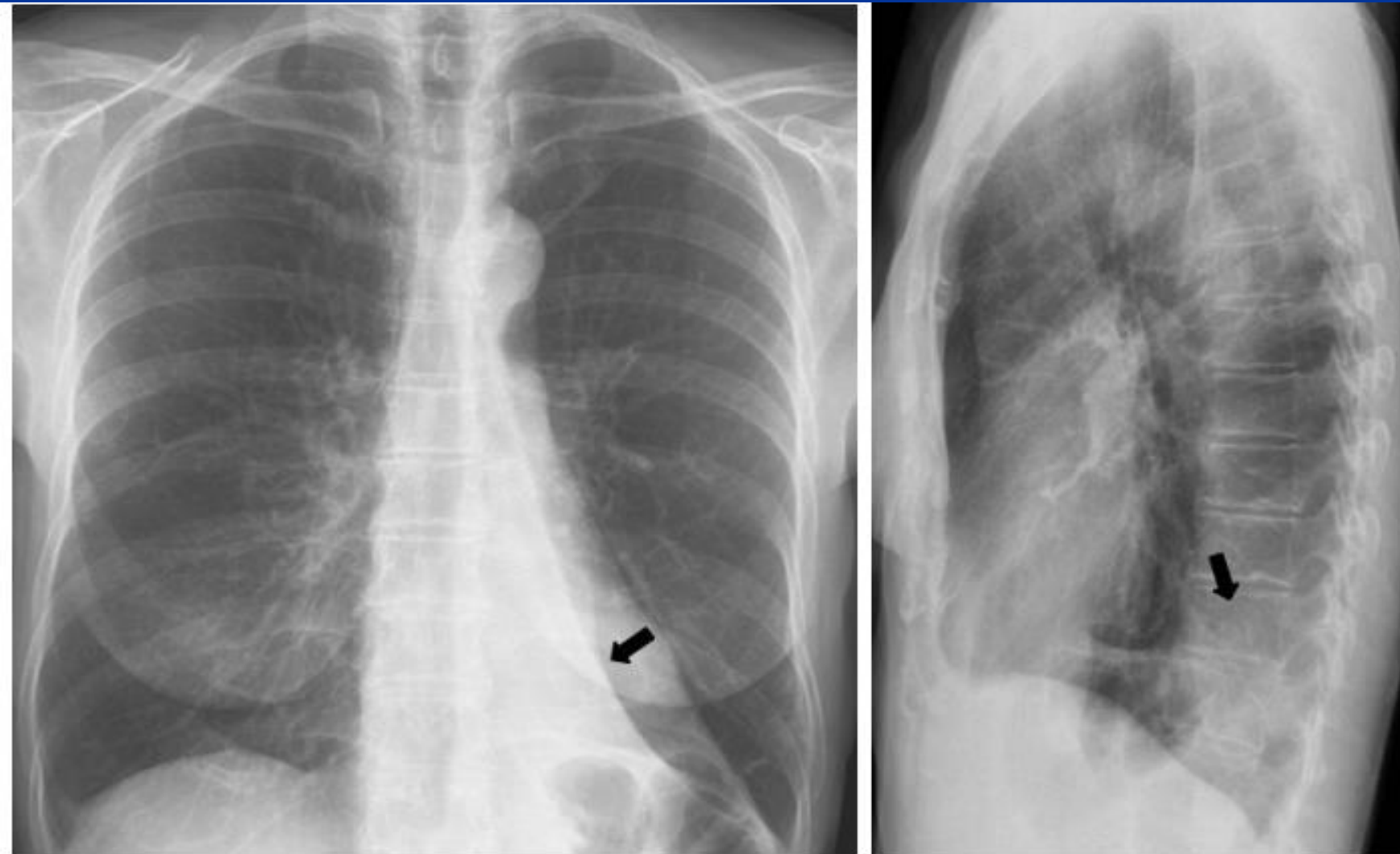
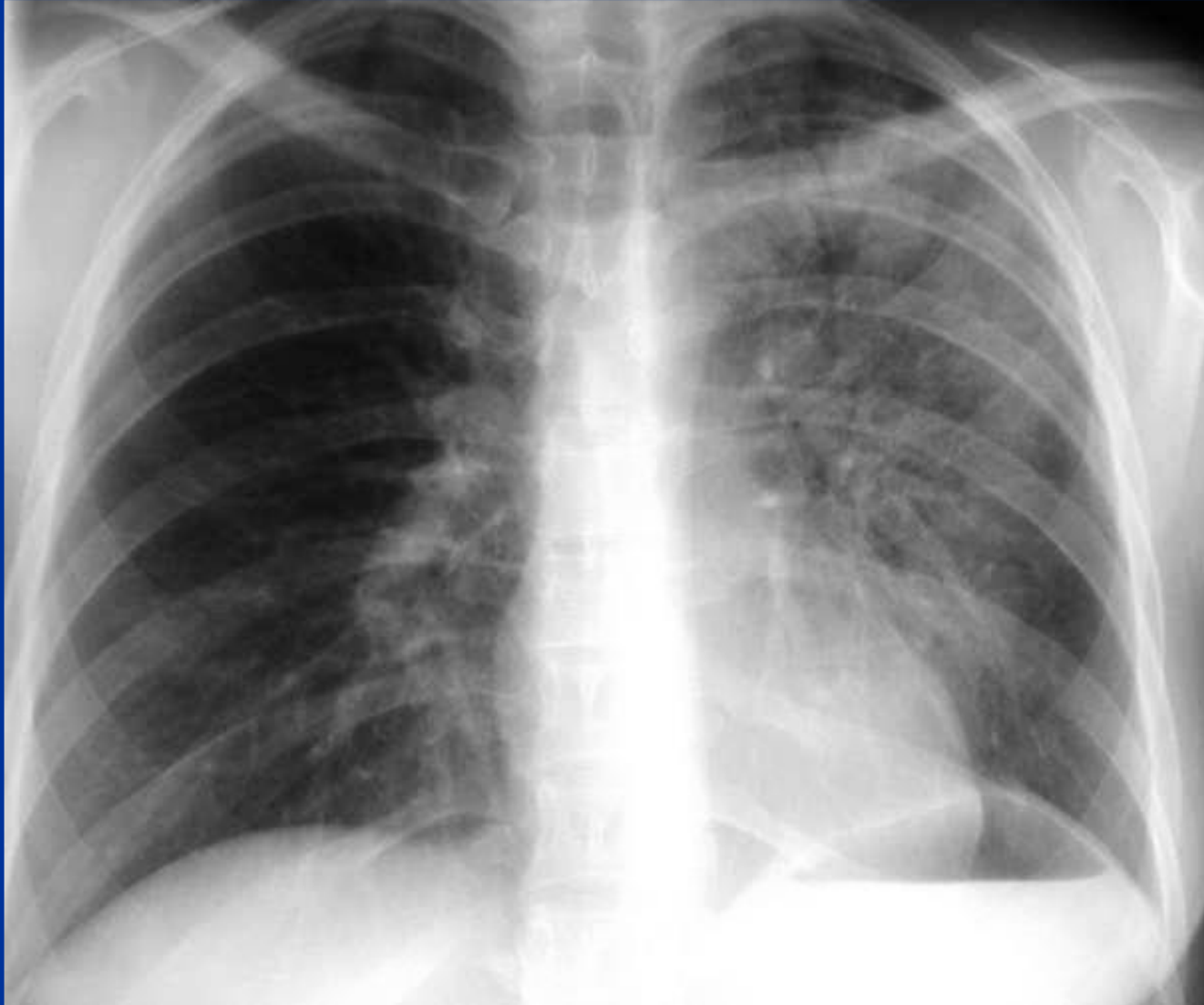


Fig. 9 PA (right) and lateral (left) chest radiographs in a patient with tight left

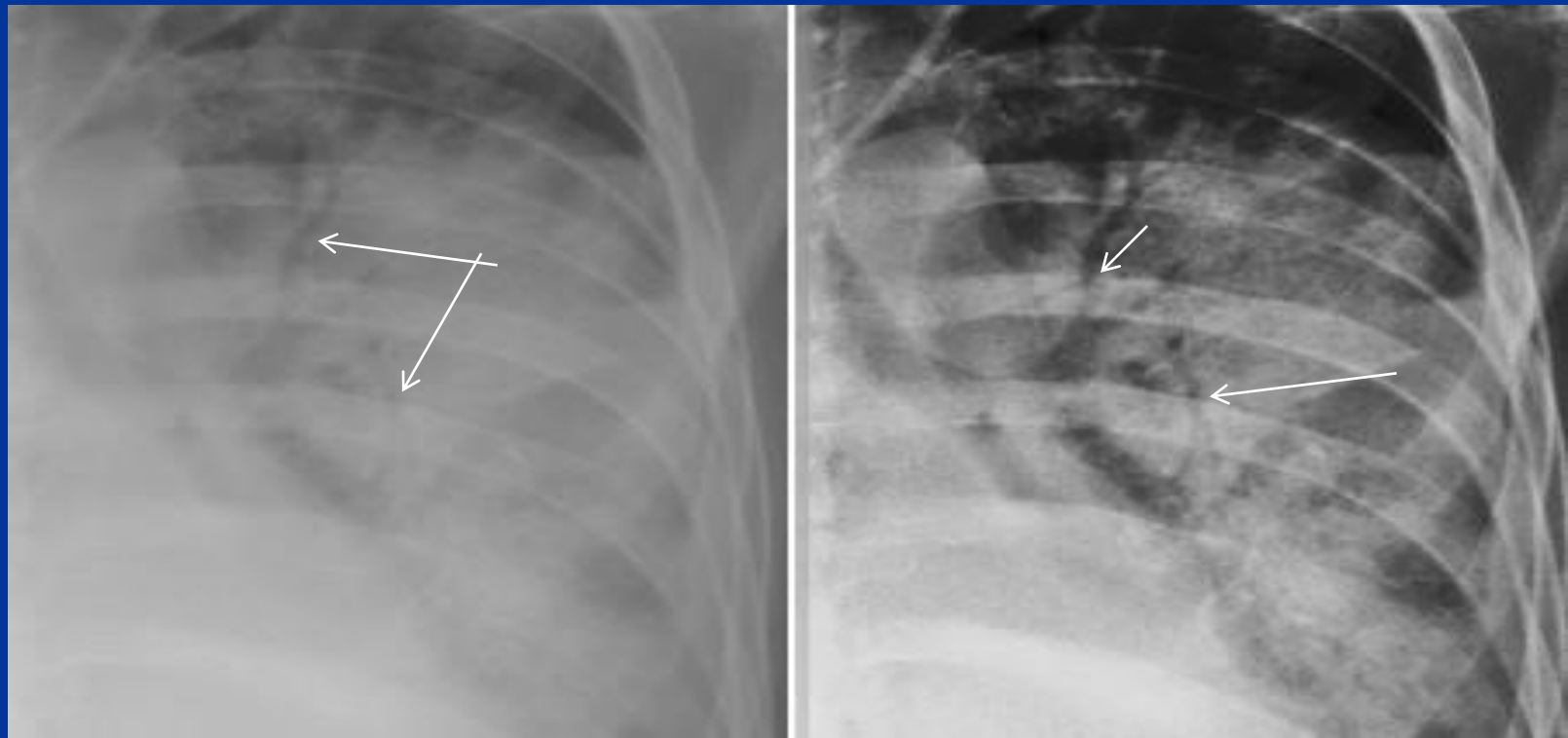
Pneumonia

- Signs:
 - Air bronchogram
 - Silhouette - “positive” or “negative”
 - Dense hilum
 - “Spine” sign (On lateral film)
- All are signs of any air space process
- Dx of pneumonia depends on appropriate clinical scenario.

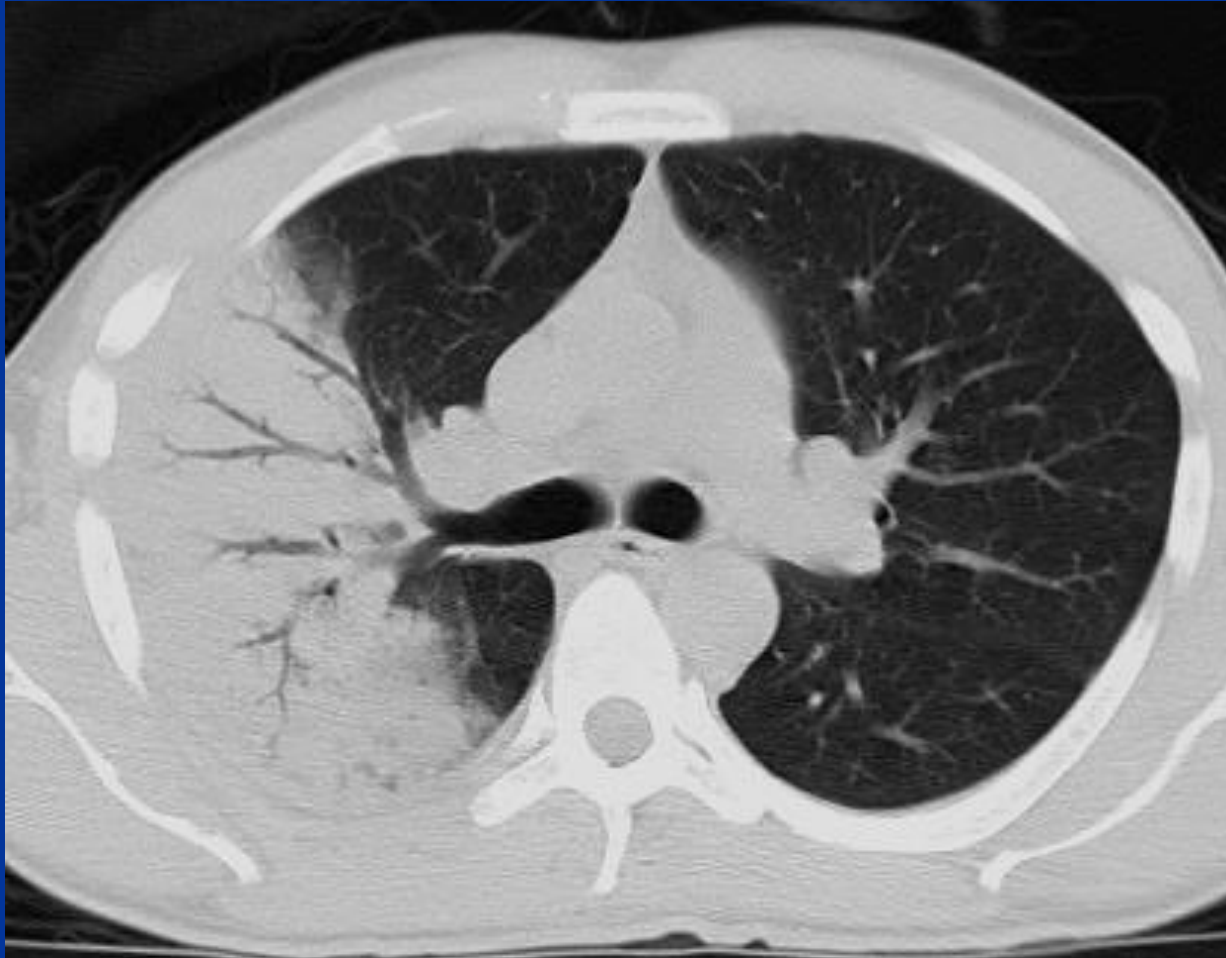
AIR-BRONCHOGRAM



Air bronchogram sign

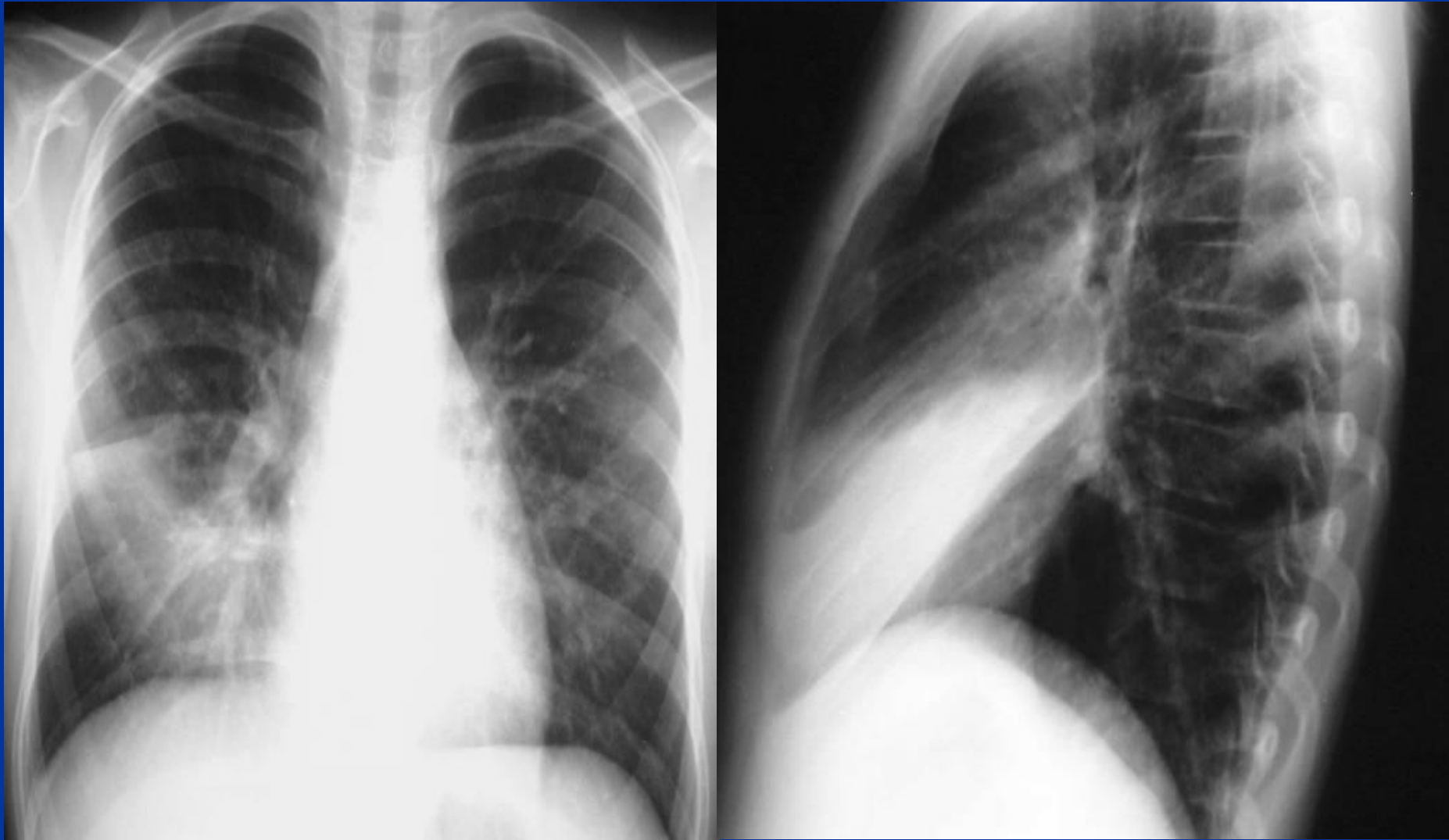


Air bronchograms — CT

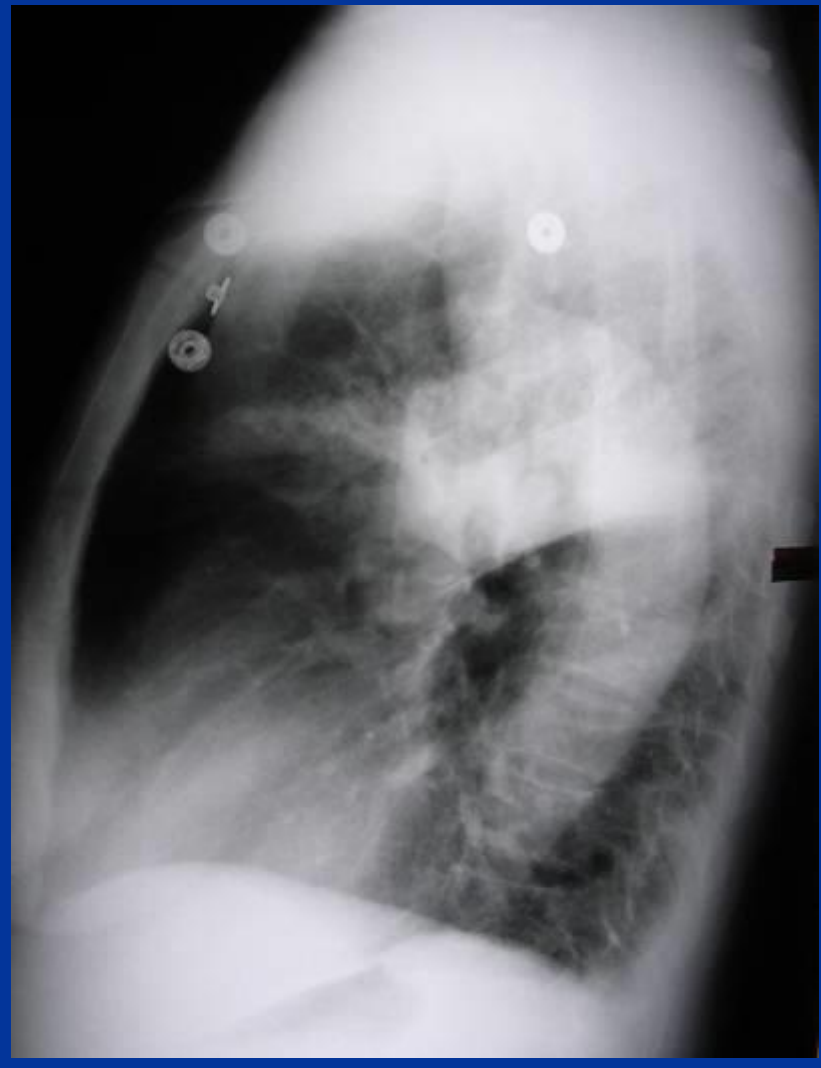


Pneumonia

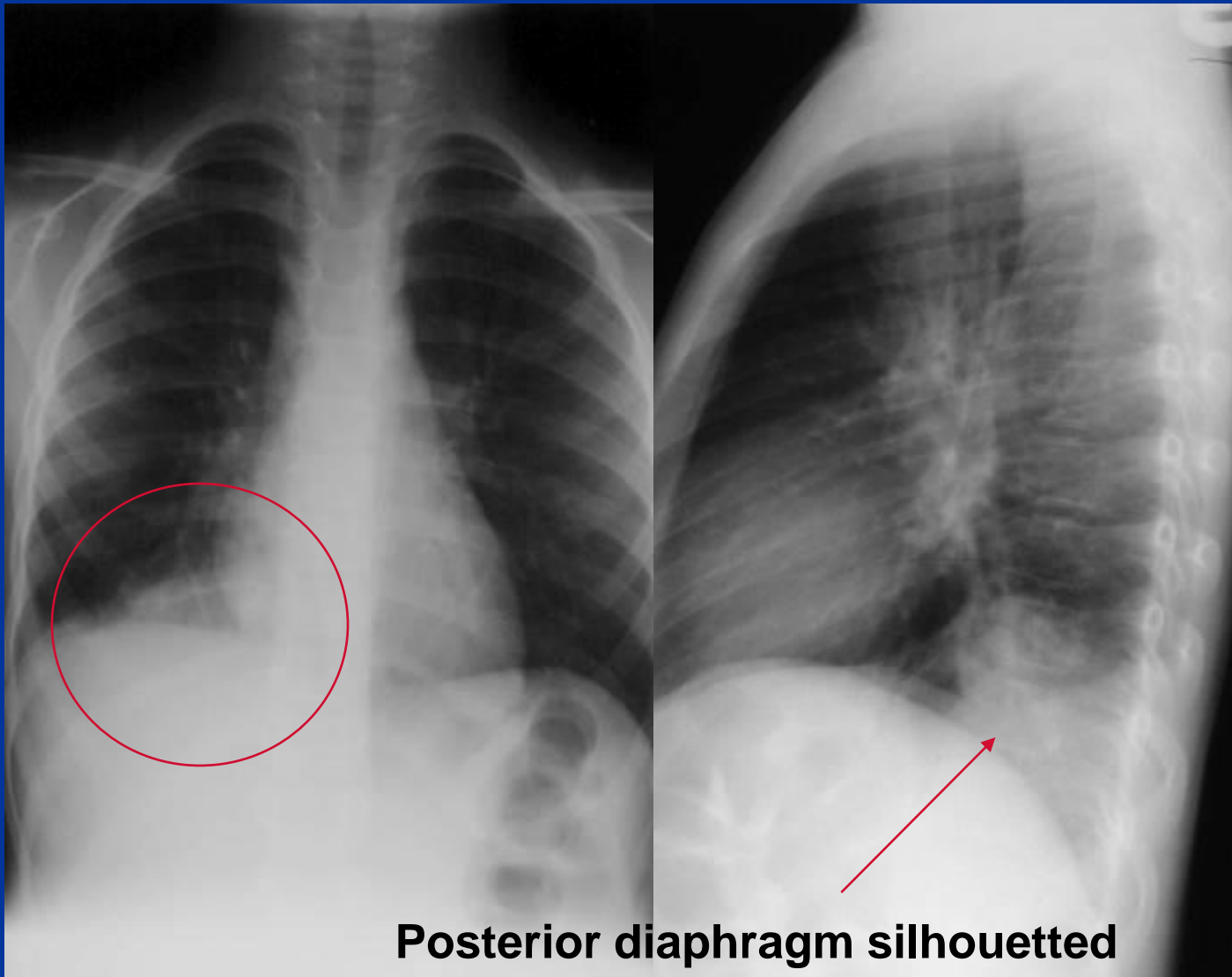
Right middle lobe



Right upper lobe

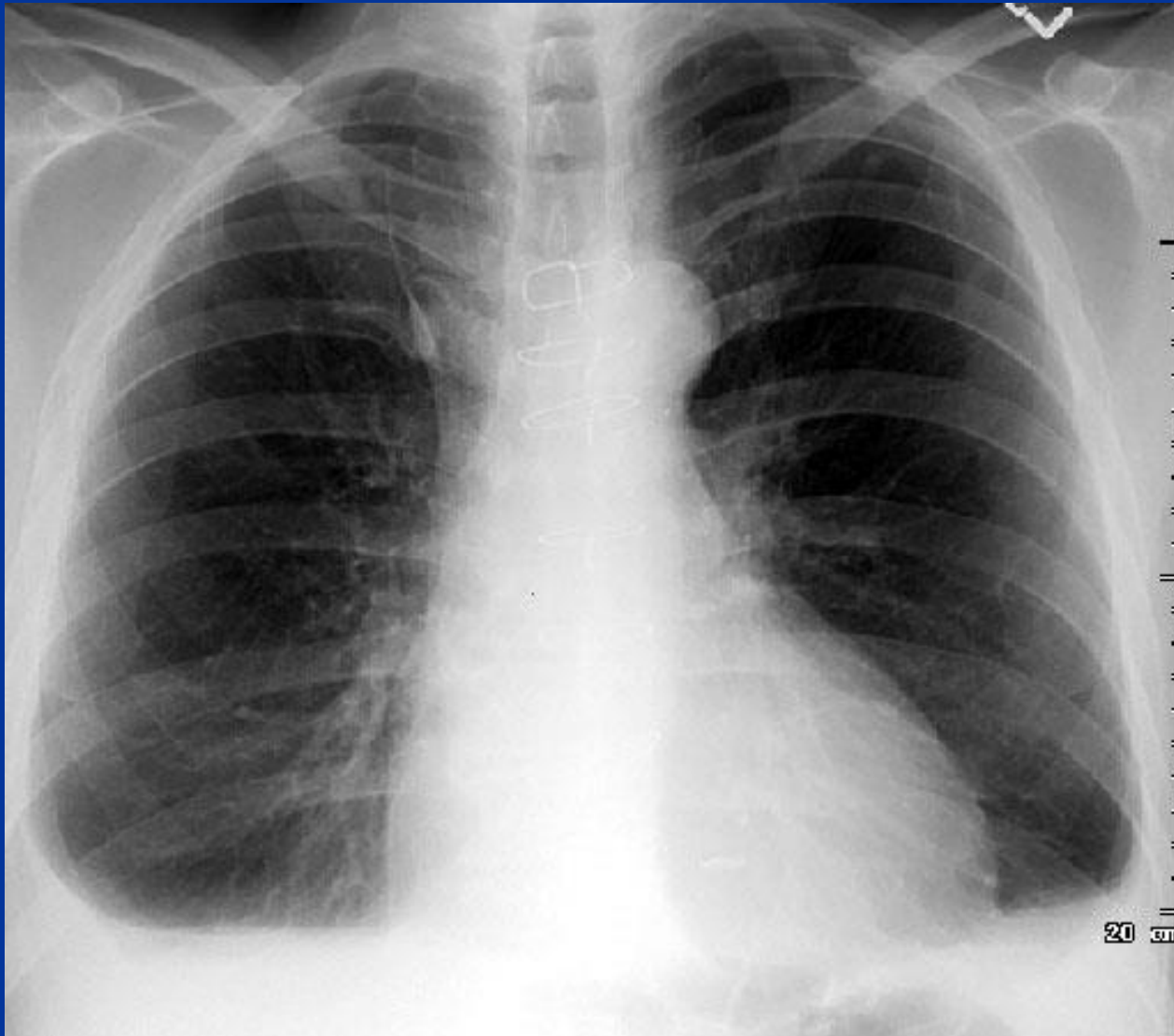


Right lower lobe

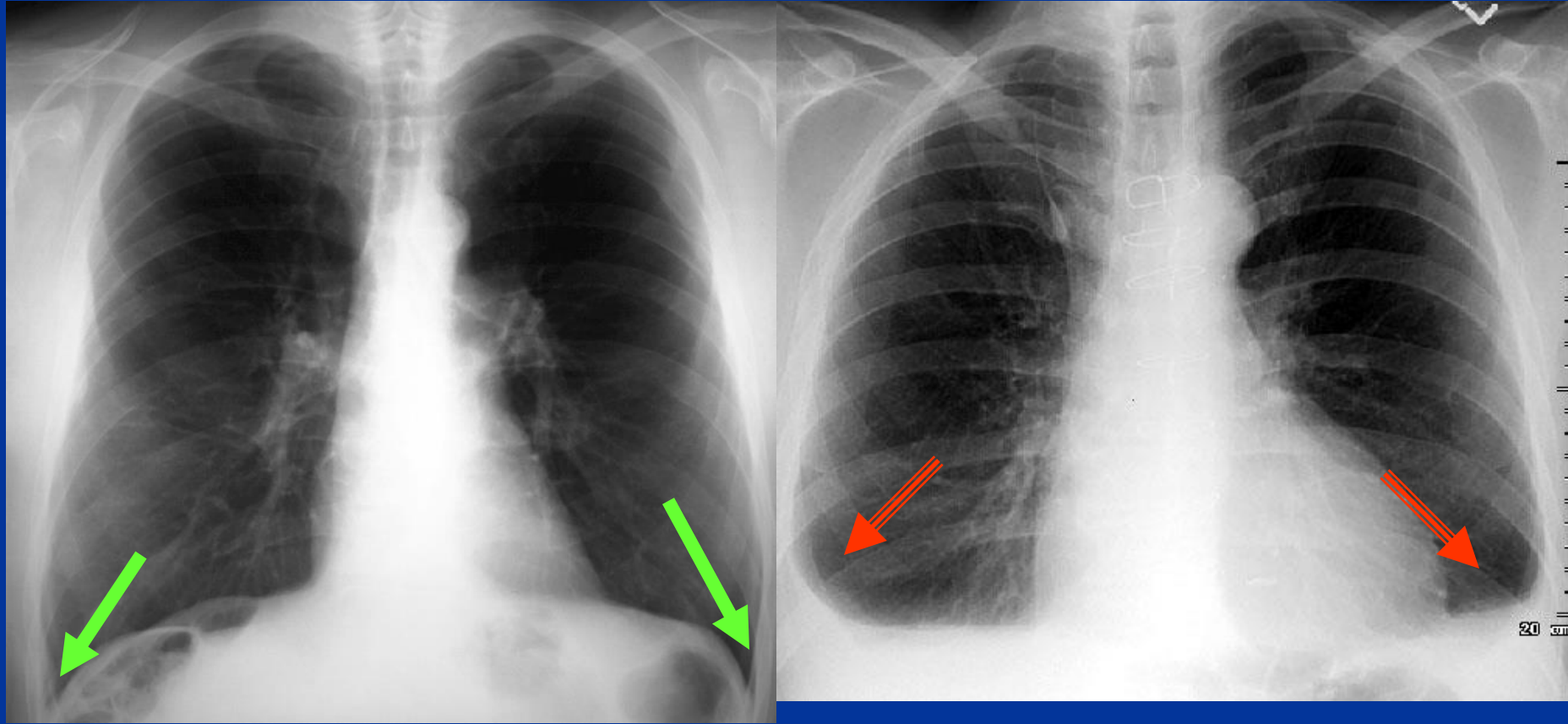


Posterior diaphragm silhouetted

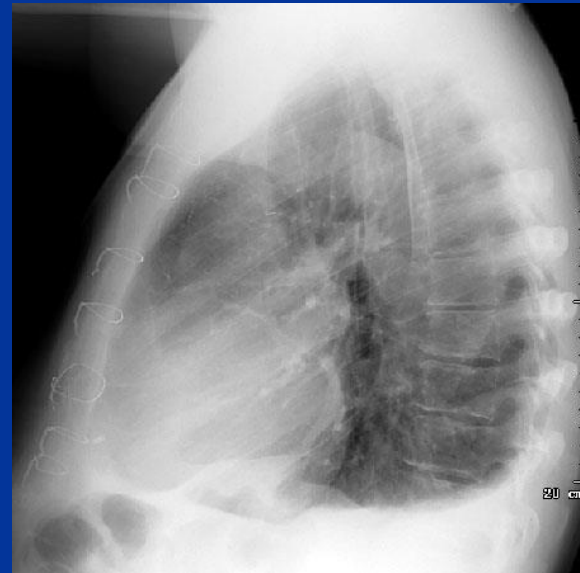
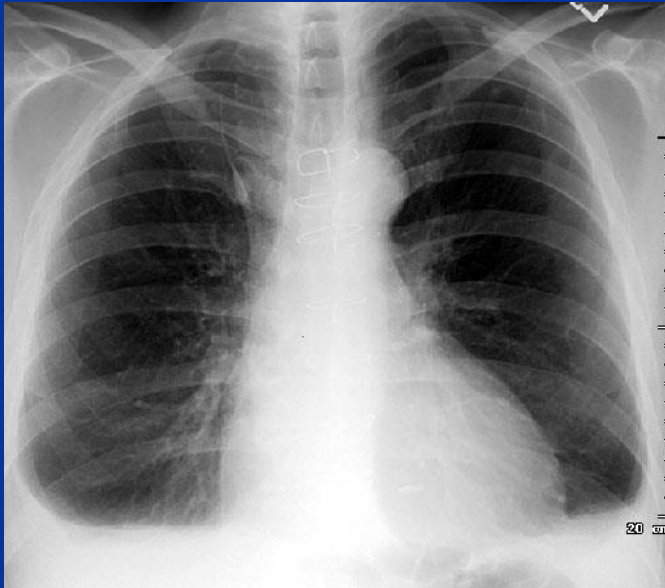
PLEURAL EFFUSION



COMPARE COSTO-PHRENIC ANGLES

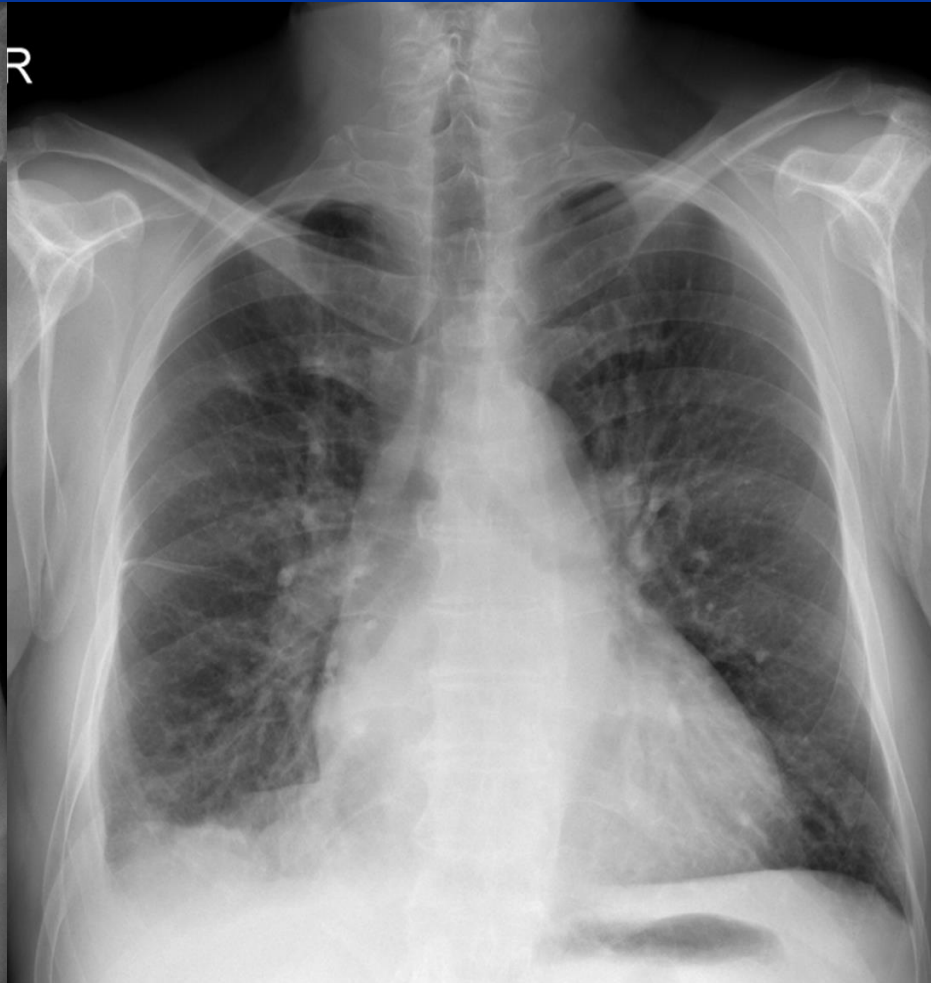
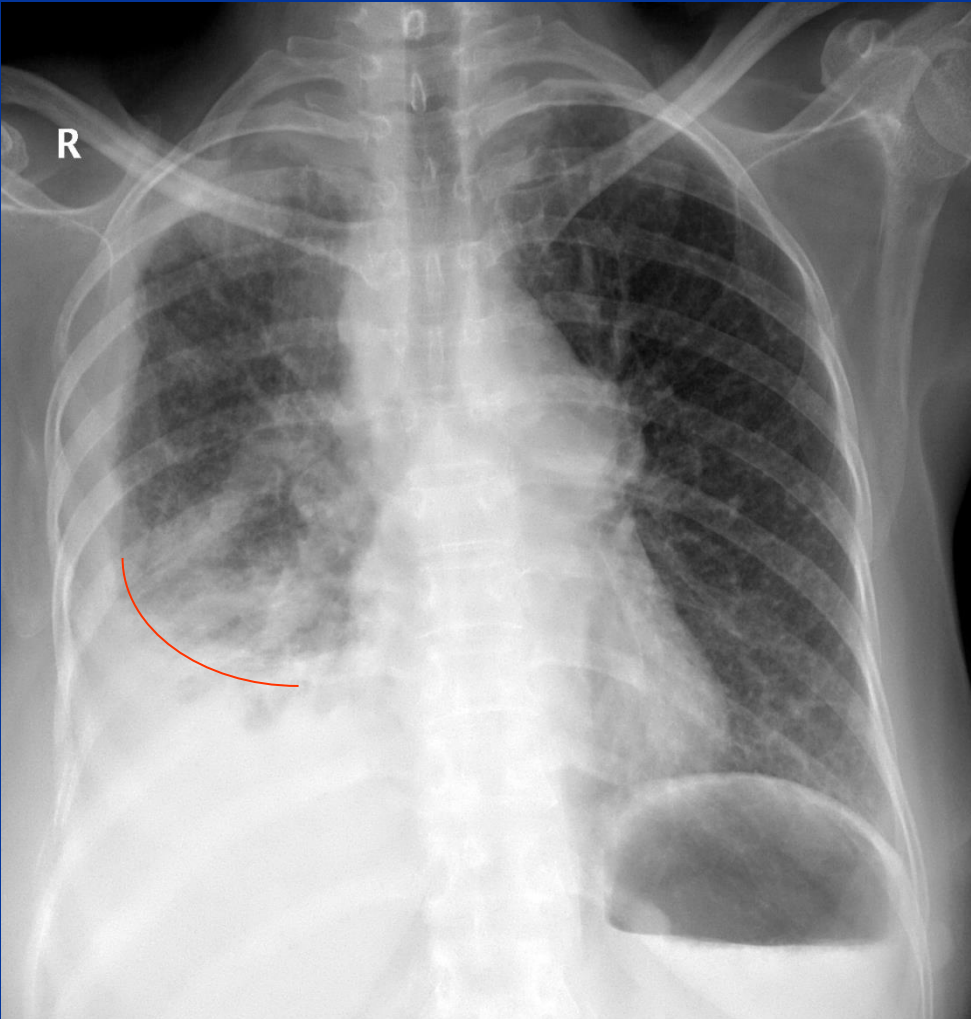


PLEURAL EFFUSION

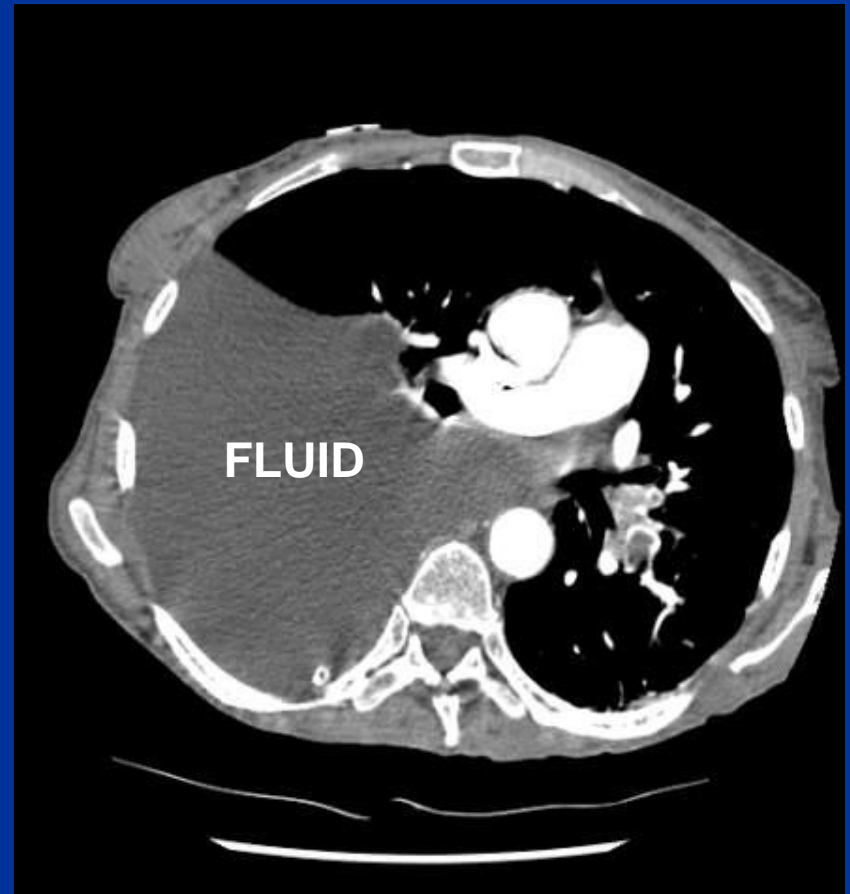
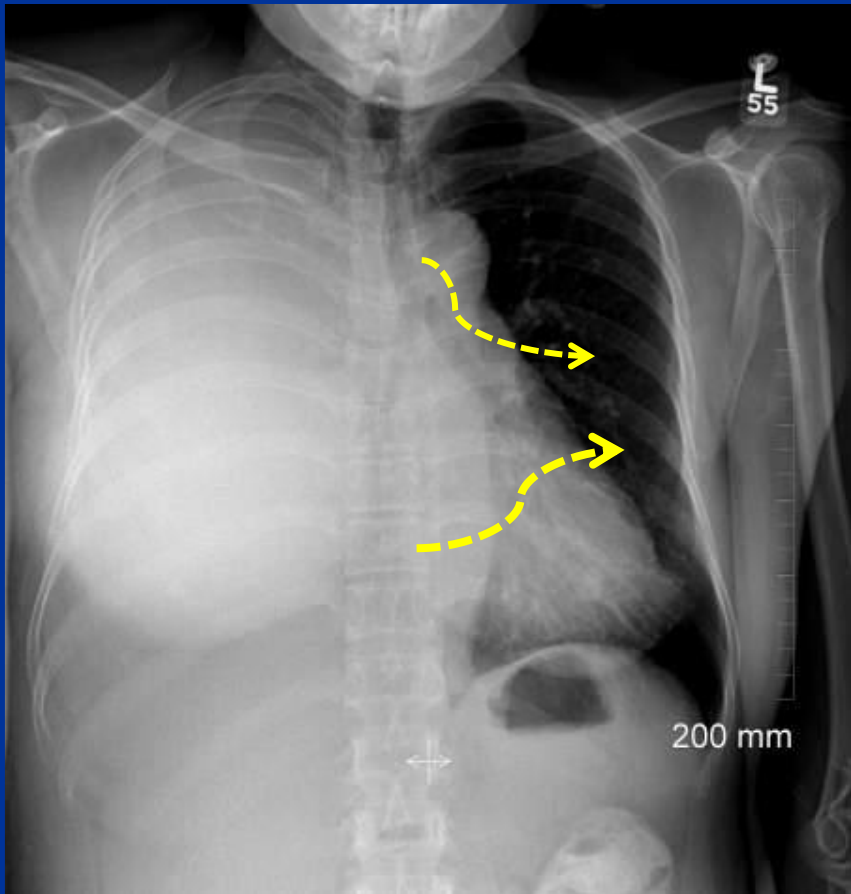


- On an upright film, an effusion will cause blunting on the lateral and if large enough, the posterior costophrenic sulci. Sometimes a depression of the involved diaphragm will occur. A large effusion can lead to a mediastinal shift away from the effusion and opacity the hemithorax. Approximately **200 ml** of fluid are needed to detect an effusion in the **frontal film** vs. approximately **75ml** for the **lateral**. Larger effusions, especially if unilateral, are more likely to be caused by malignancy than smaller ones.

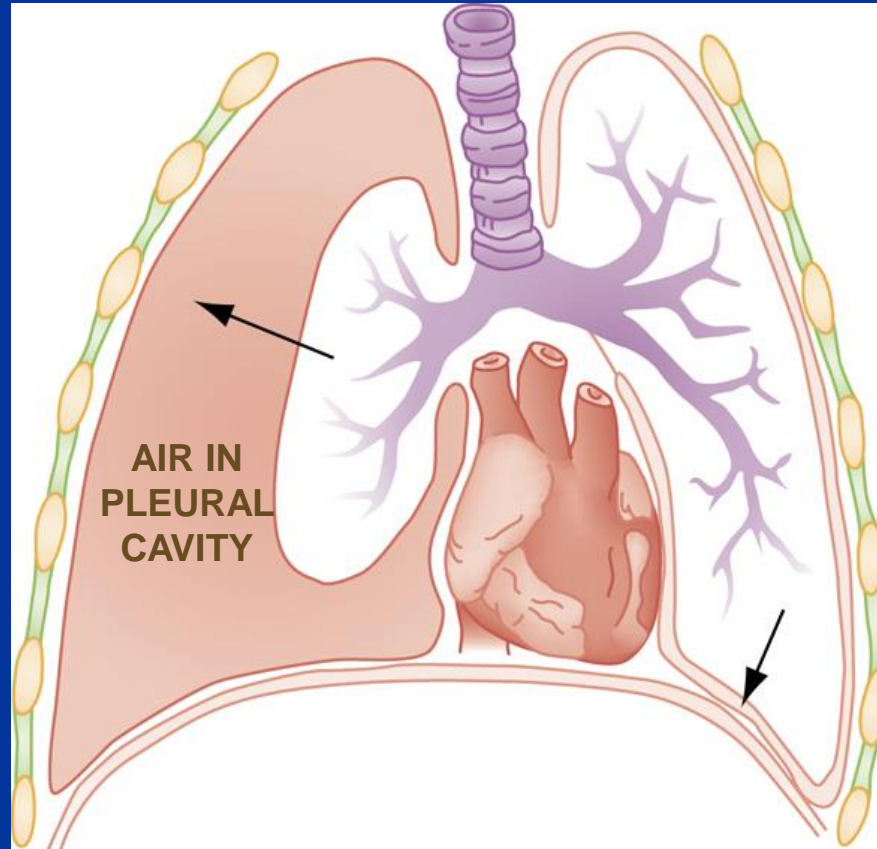
PLEURAL EFFUSION



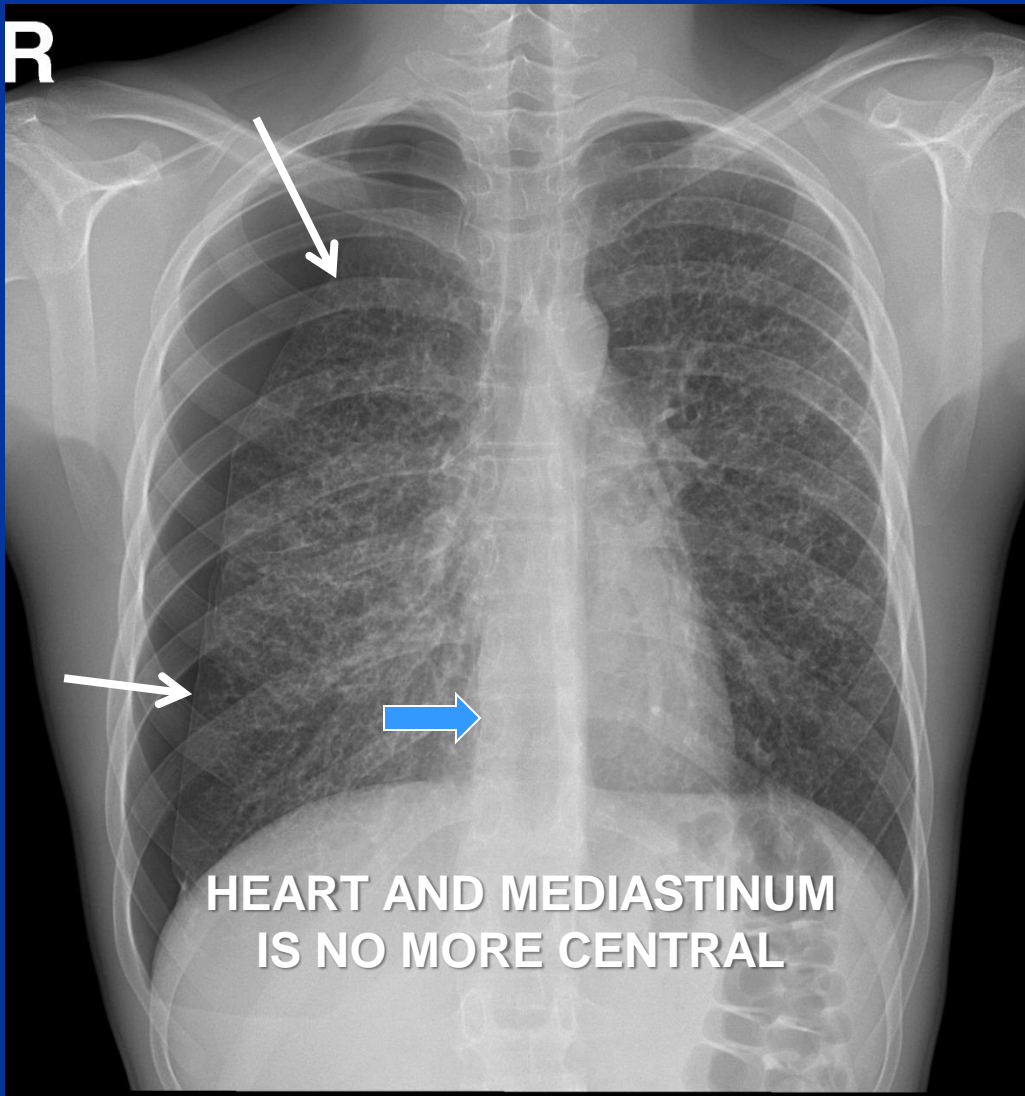
SEVER PLEURAL EFFUSION



PNEUMOTHORAX



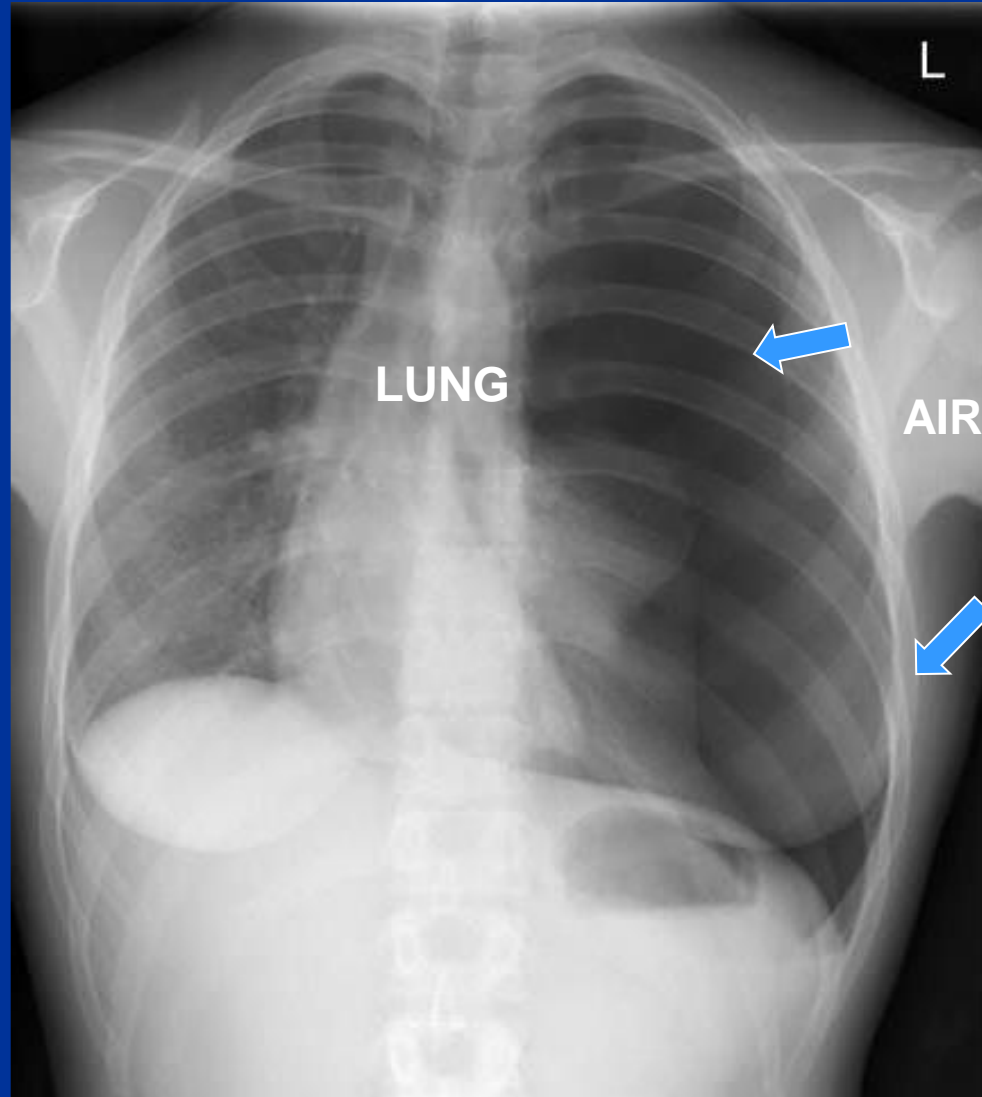
PNEUMOTHORAX



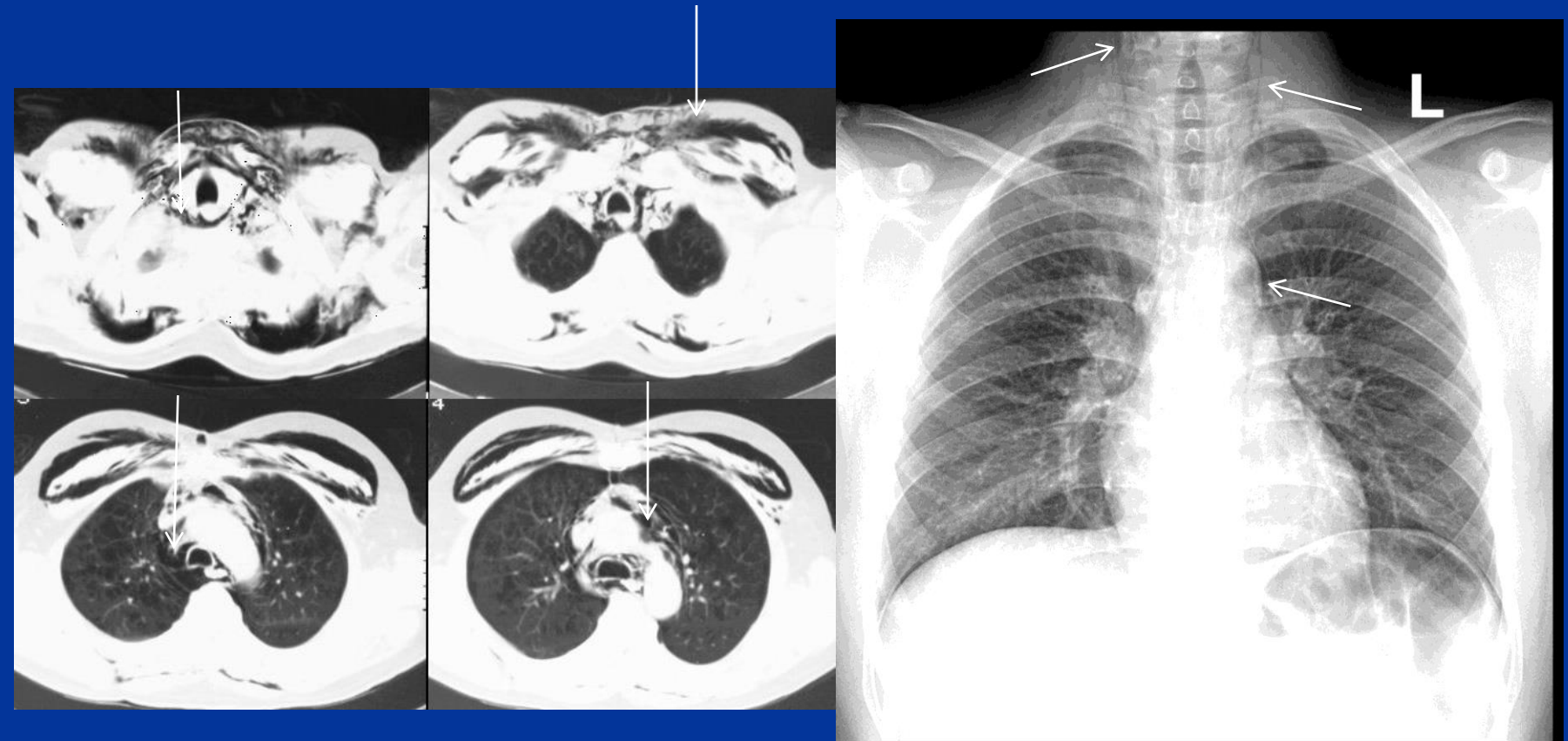
A pneumothorax is defined as air inside the thoracic cavity but outside the lung. A spontaneous pneumothorax is one that occurs without an obvious inciting incident.



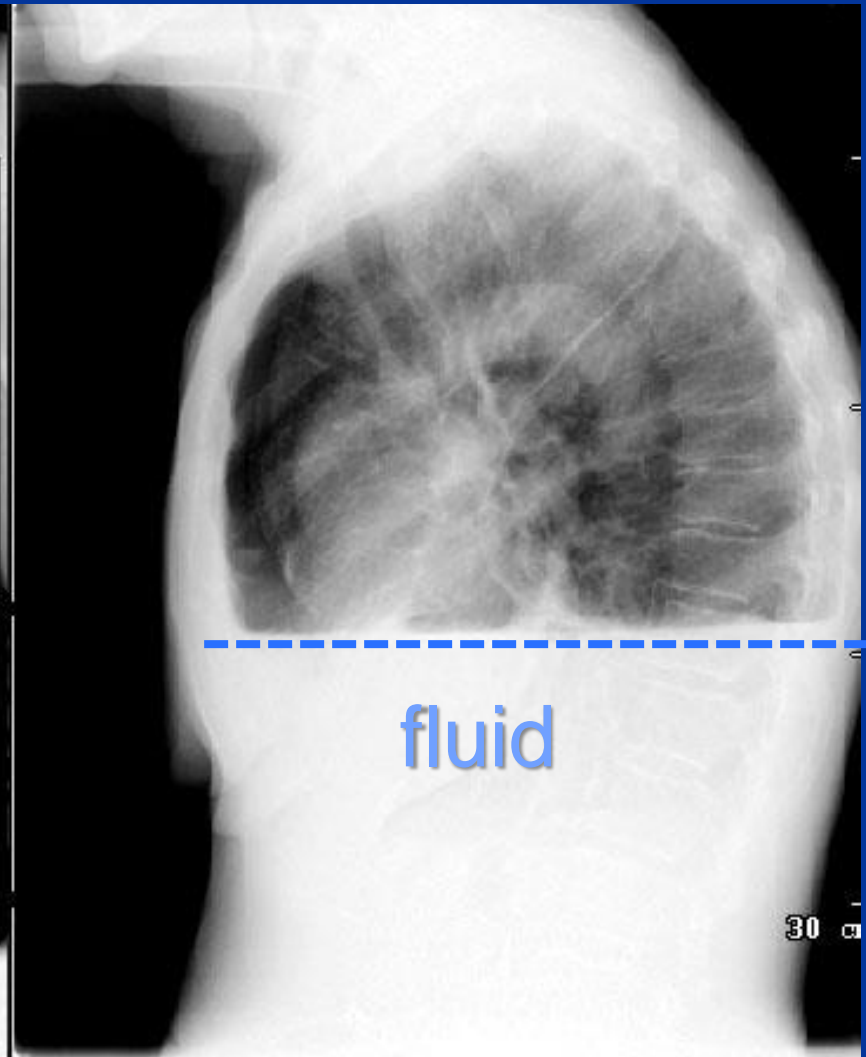
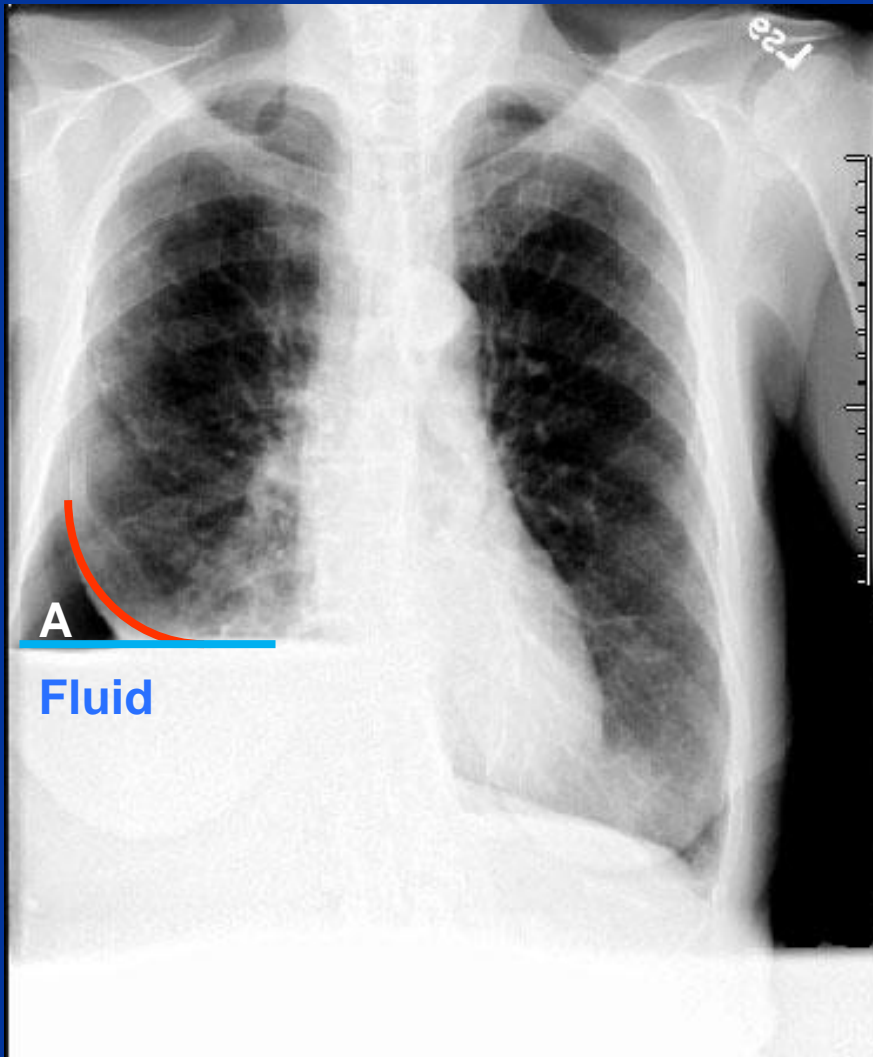
TENSION PNEUMOTHORAX



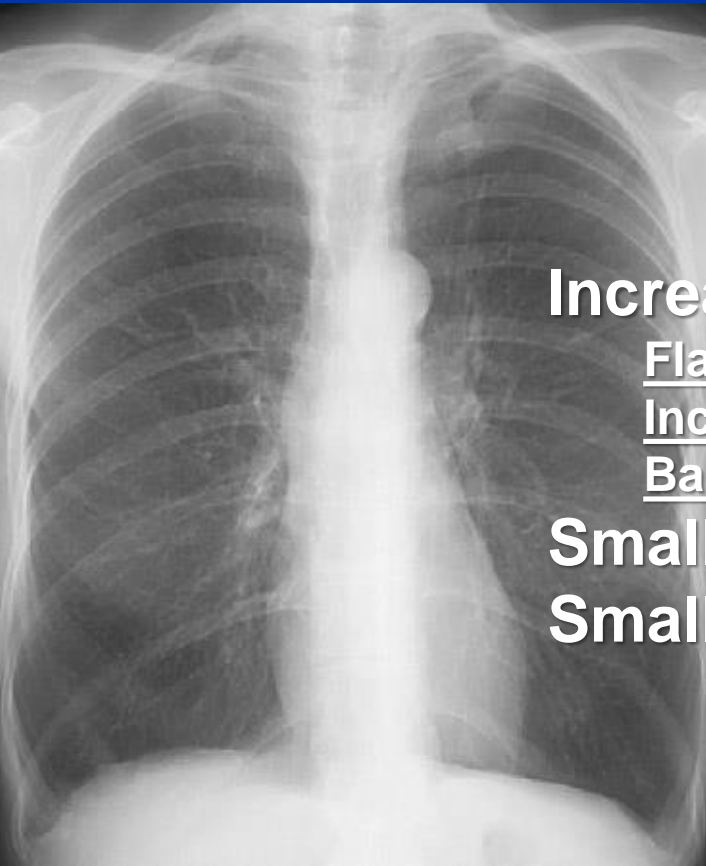
PNEUMOMEDIASTINUM



Hydro-pneumo-thorax



EMPHYSEMA



Increased Lung Volume

Flattened Diaphragms

Increase in Retrosternal Airspace

Barrel chest

Small Vessels

Small, narrow cardiac SHADOW



- Emphysema is **loss of elastic recoil of the lung** with destruction of pulmonary capillary bed and alveolar septa. It is caused most often by cigarette smoking and less commonly by alpha-1 antitrypsin deficiency.



EMPHYSEMA

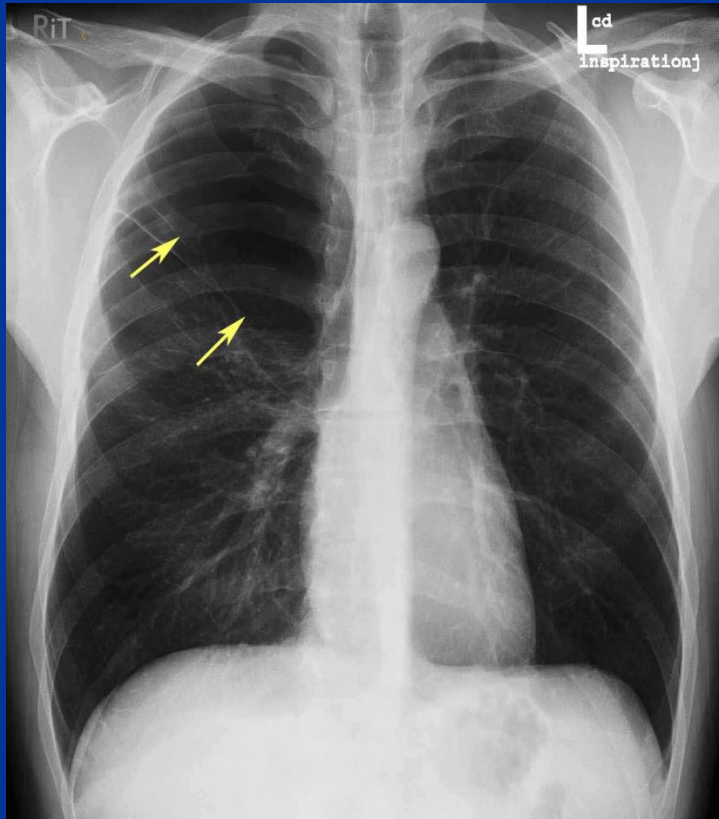


Normal

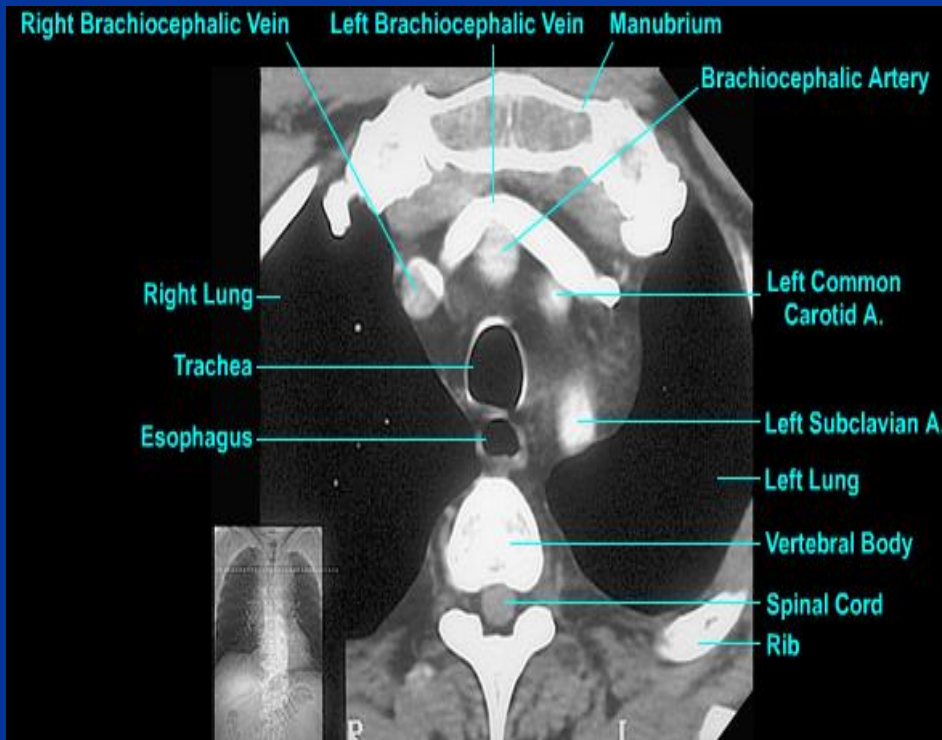
- Emphysema is commonly seen on CXR as diffuse hyperinflation with flattening of diaphragms, increased retrosternal space, bullae (lucent, air-containing spaces that have no vessels that are not perfused)



Giant Bulla

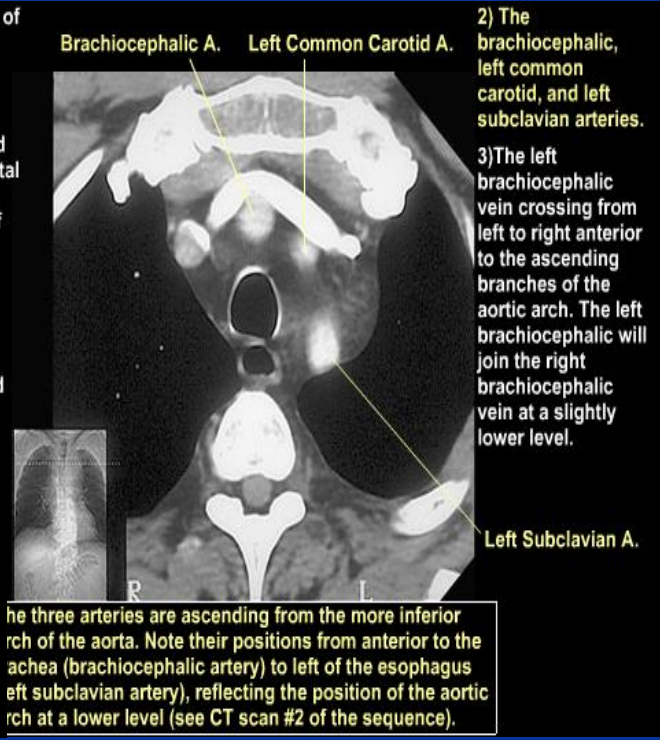


CT anatomy



Thoracic CT scan #1 of 7 in series from the same patient (radiographs #12 - #18). Intravascular contrast was injected into the left antecubital vein of the arm. This CT lies at the level of the superior mediastinum. Note:

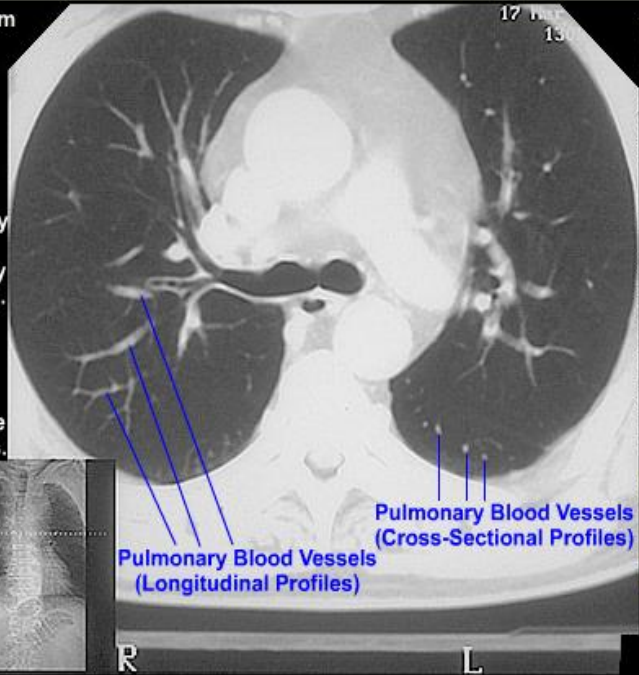
1) The esophagus positioned directly anterior to the vertebral column and the trachea directly in front of the esophagus.



CT

CT scan #1 of 2 from the same patient; level of the bifurcation of the trachea. The radiographic technique emphasizes pulmonary anatomy at the expense of soft tissue anatomy in the mediastinum. Bronchi are identified by their air-filled lumens, pulmonary blood vessels have dense blood-filled lumens.

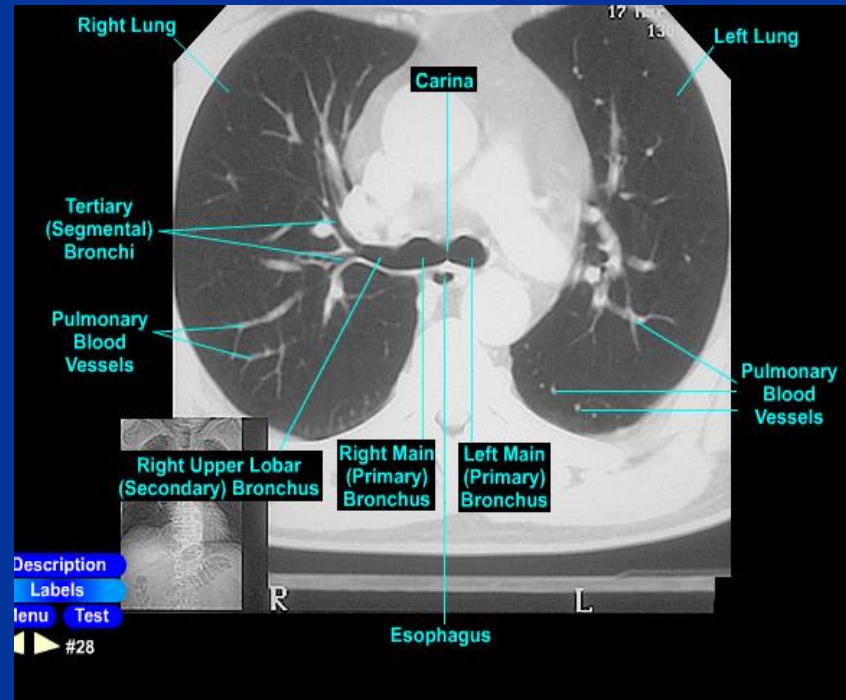
Note:



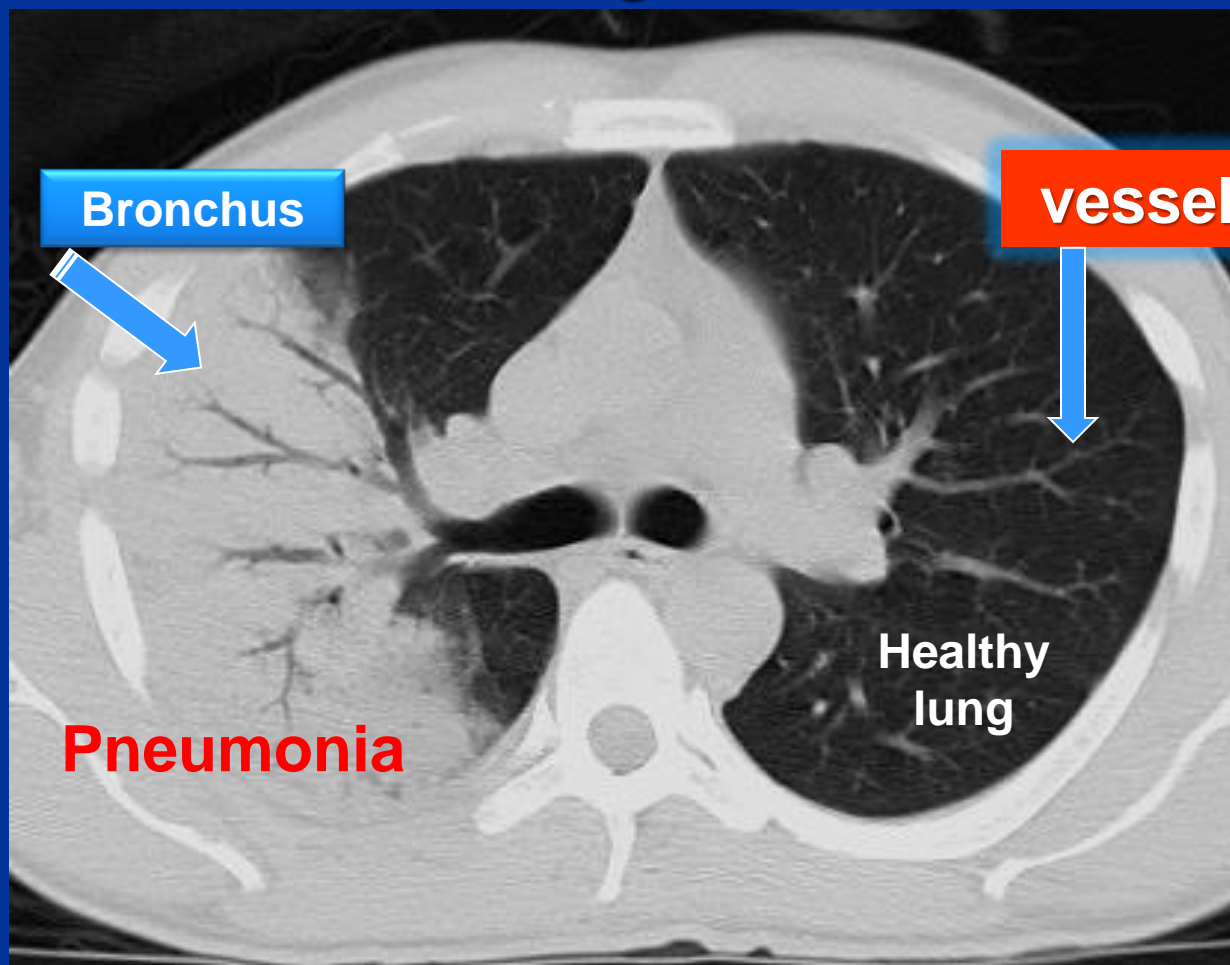
1) The carina (a tracheal cartilage) at the bifurcation of the trachea into left and right main (primary) bronchi.

2) The right upper lobar (secondary) bronchus and its subsequent branching into tertiary bronchi.

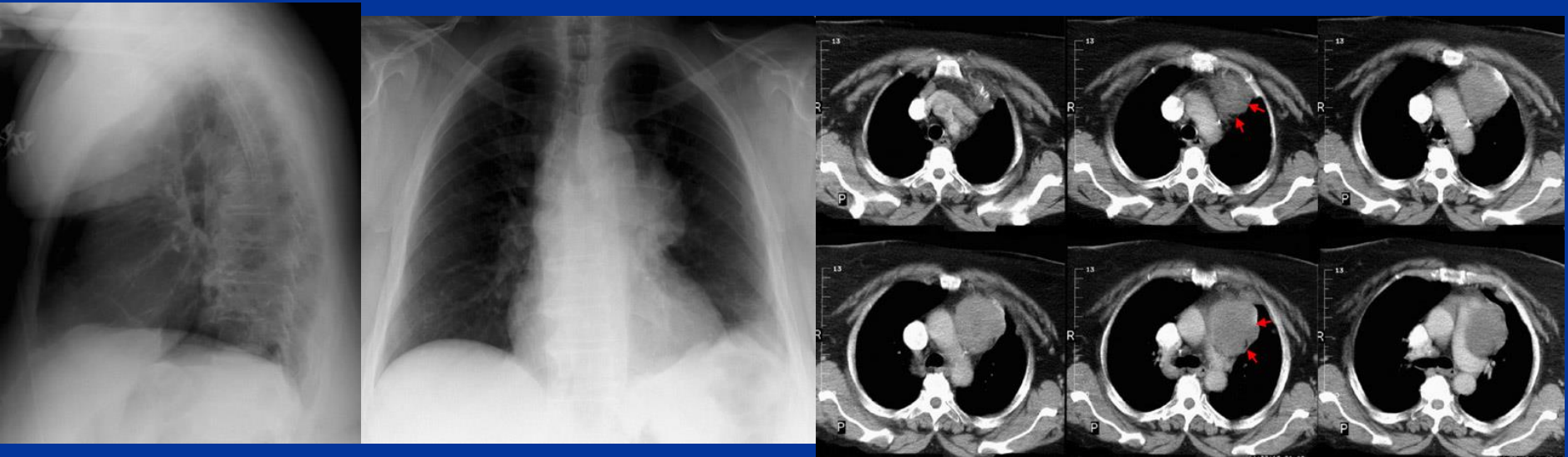
3) Various profiles of pulmonary blood vessels.



Air bronchograms — CT



Anterior Mediastinal Mass

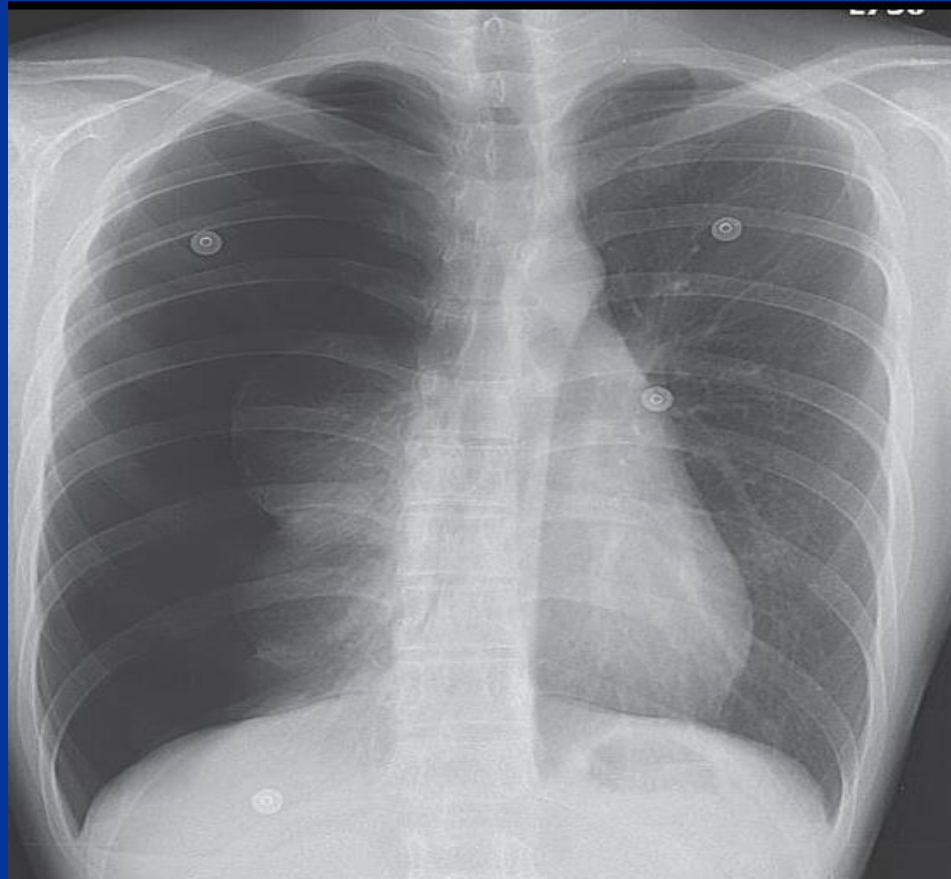


- Anterior mediastinal masses consist of the **4 "T's"** (Terrible lymphadenopathy, Thymic tumors, Teratoma, Thyroid mass). Usually CT or fine needle aspiration is needed to make the definitive diagnosis of an anterior mediastinal mass.

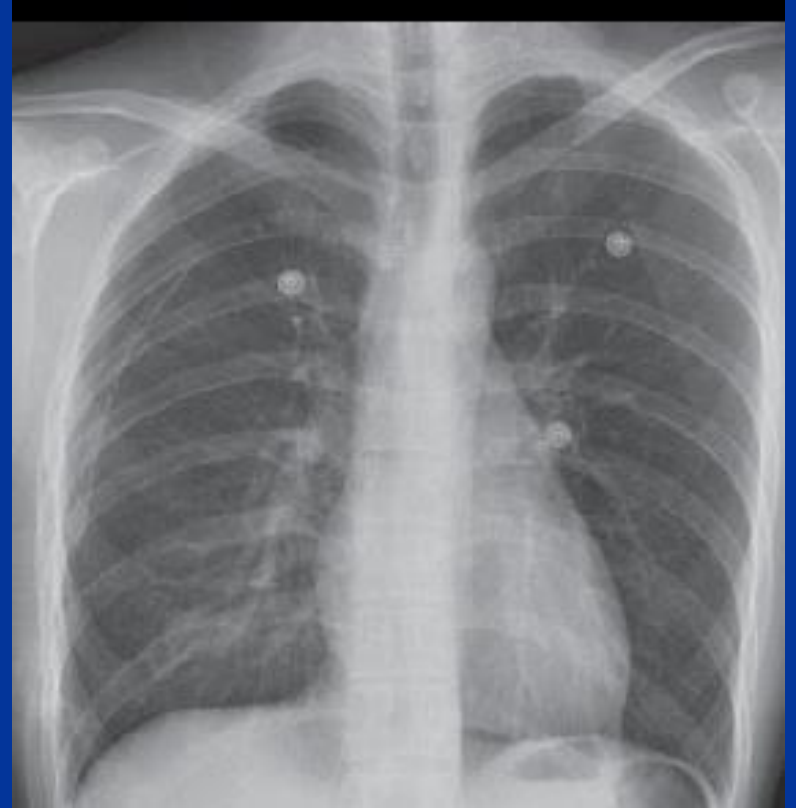
CASES

History

▶ 27-year-old woman with chest tightness and shortness of breath presents to the Emergency Department.



Case 1 Tension Pneumothorax



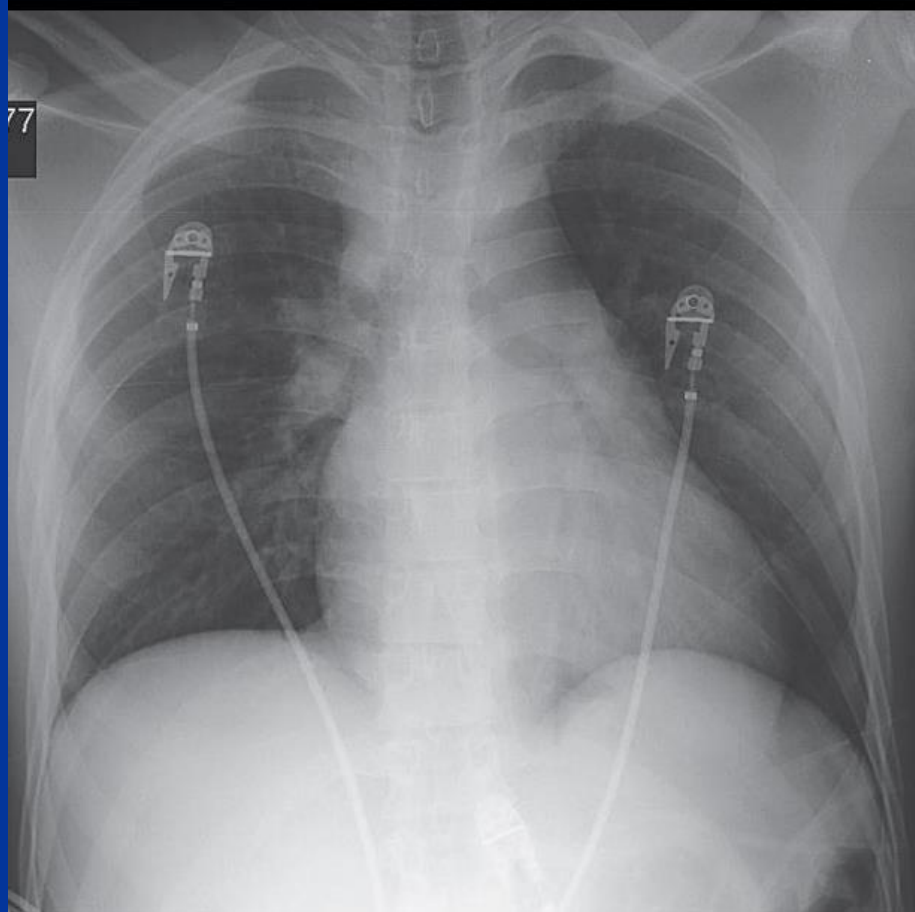
Findings

▶ Initial chest radiograph (Fig. 1.1) clearly demonstrates increased lucency in the right hemothorax with minimal displacement of the right hemidiaphragm inferiorly and shift of the mediastinum left ward. Note the increased distances between the ribs on the right, compared with those on the left . The right lung is partially collapsed.

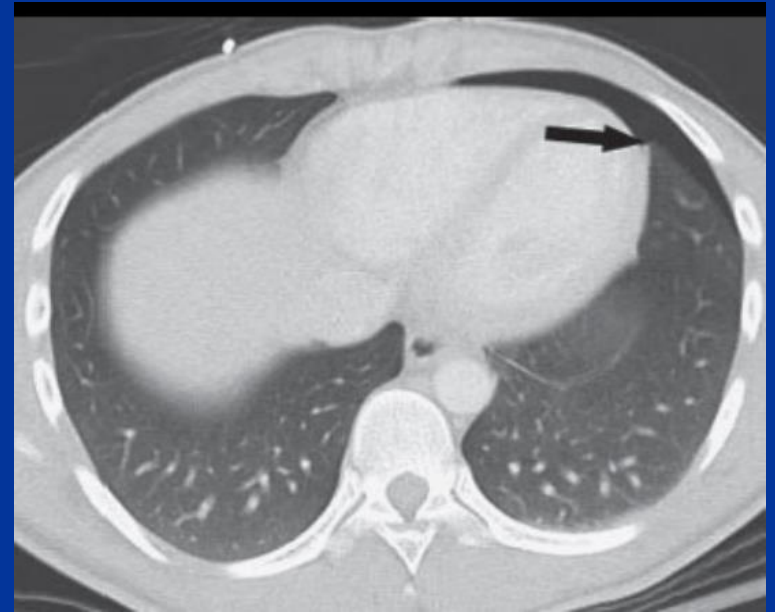
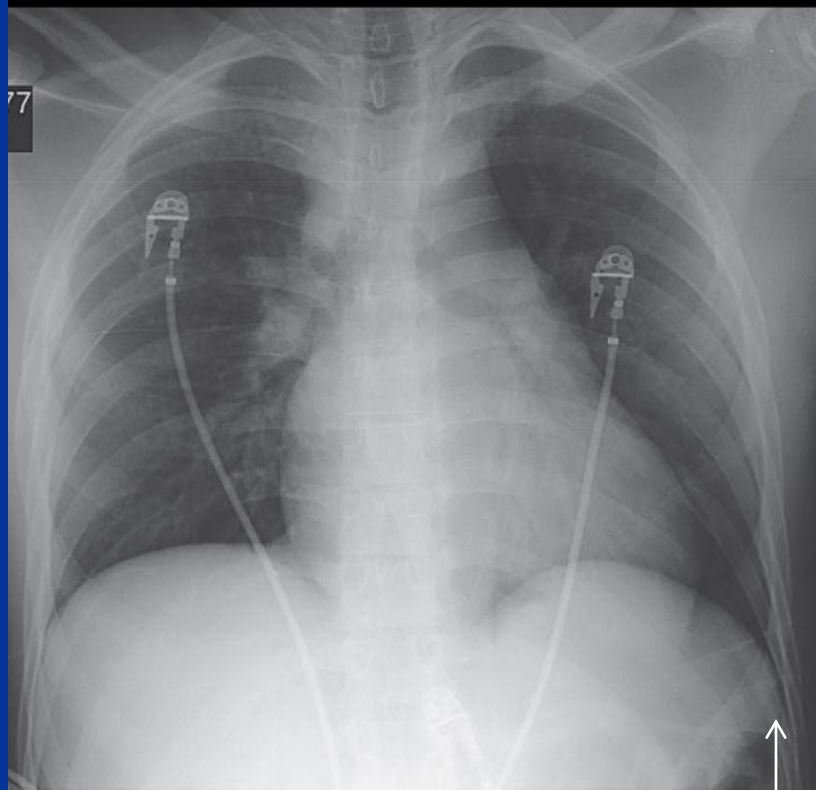
▶ Visceral pleural surface (white arrows in Fig. 1 .2) can be seen as a thin white line, allowing distinction from a skin fold. No pulmonary vessels are seen lateral to the pleural line. The anterior junction line (black arrow in Fig. 1.2) is also displaced left ward.

History

- ▶ 19-year-old man after a motor vehicle collision is imaged in the trauma suite.



Case 2 Pneumothorax with Deep Sulcus Sign



Findings

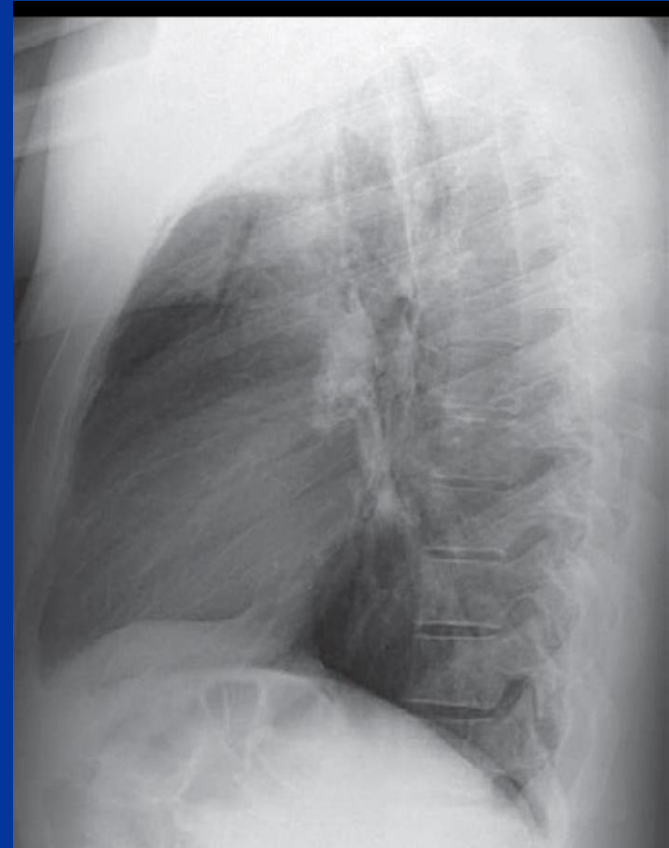
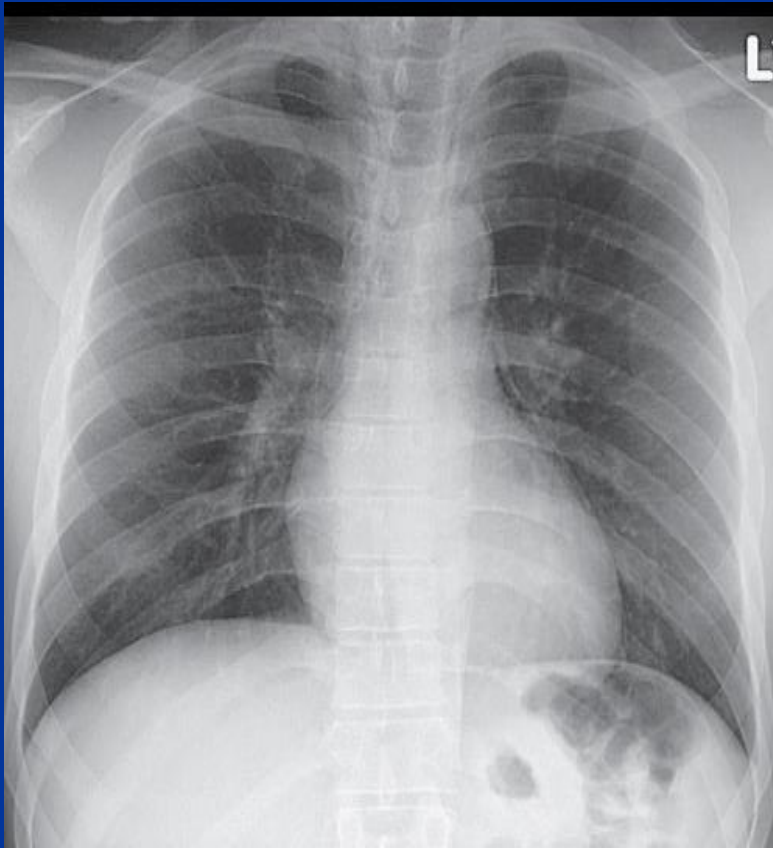
▶ **Supine radiograph (Fig. 2.1) shows increased lucency at the left base, but no pleural line is seen. The left costophrenic sulcus extends more inferiorly than the right.**

Wires represent ECG leads overlying the patient.

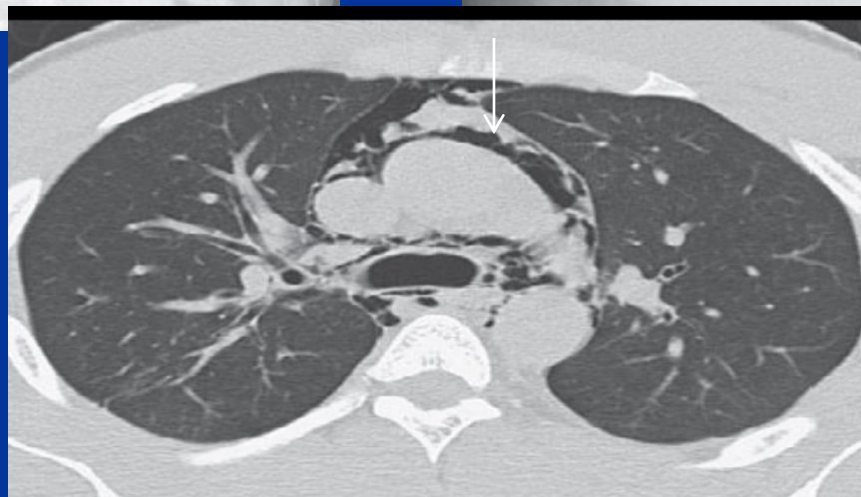
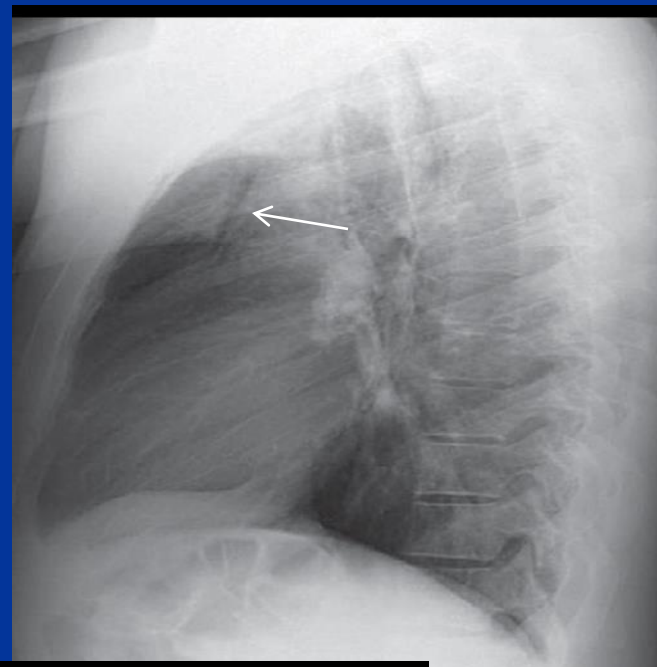
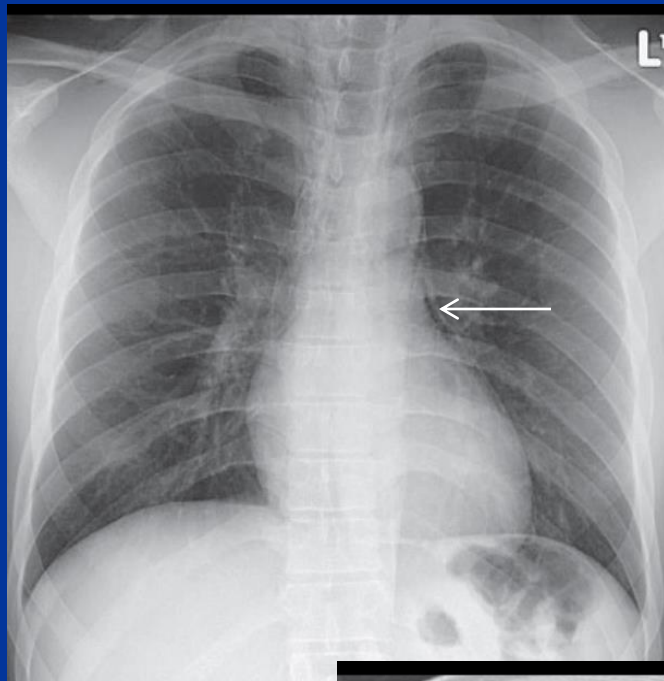
▶ **Follow-up abdominal CT (performed because of the history of trauma) and upright radiograph confirm the small pneumothorax (black arrows in Fig. 2.2 and 2.3).**

History

- ▶ 22-year-old man complains of severe sudden onset of chest pain.



Case 3 Spontaneous Pneumomediastinum



Findings

▶ Chest radiograph shows lucency adjacent to the left heart border (arrow in Fig. 6.3) on the frontal radiograph.

Increased lucency is also seen around the aortic arch and in the right paratracheal region.

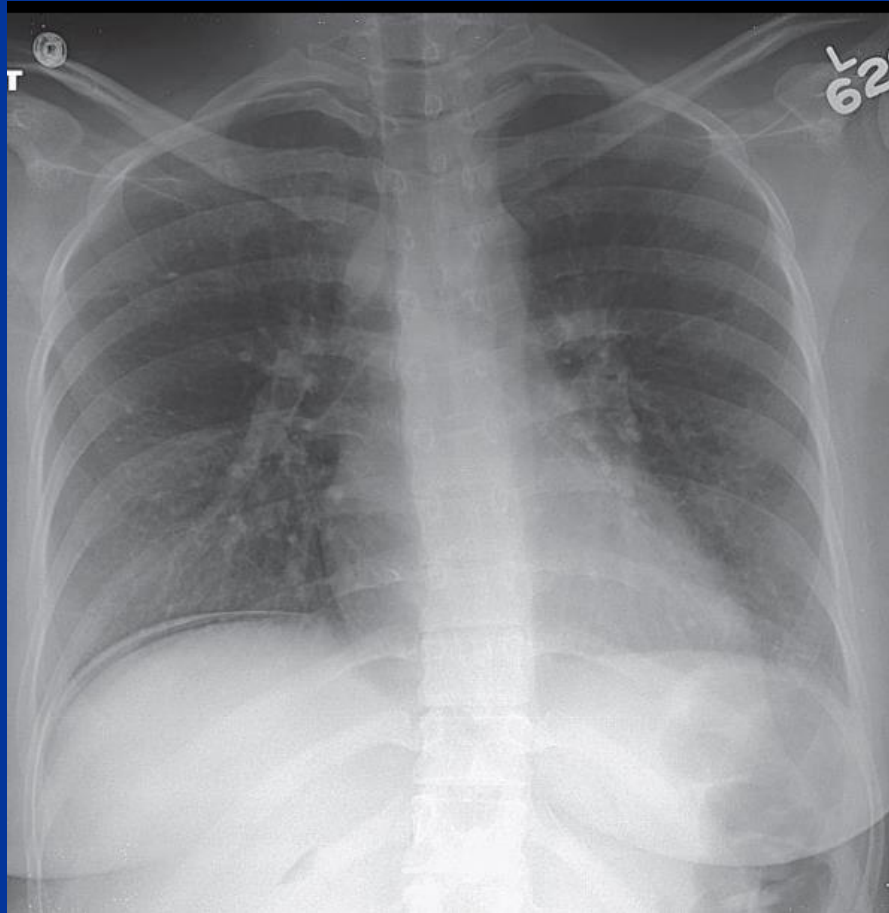
▶ On the lateral radiograph, the anterior wall of the trachea is very well seen (arrow in Fig. 6.4).

Gas is also seen anterior to the ascending aorta.

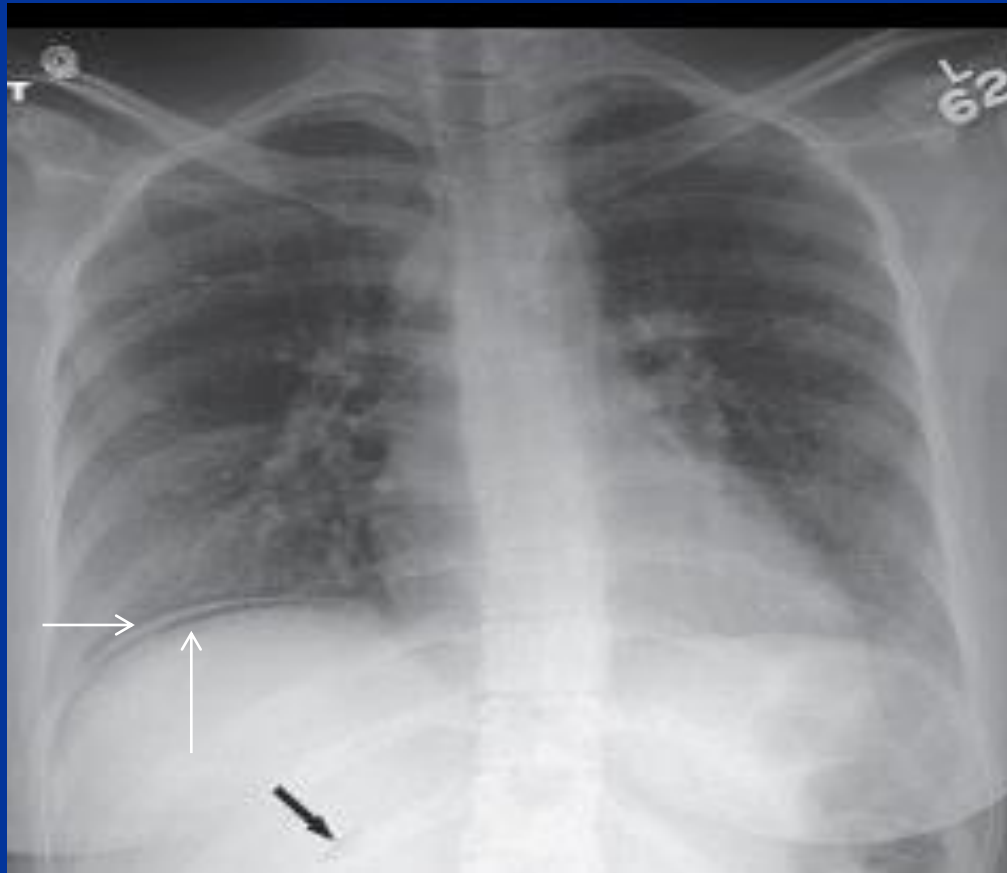
▶ CT (Fig. 6.5) confirms the presence of gas centrally without fluid or evidence of tracheal rupture.

History

- ▶ 26-year-old woman presents with sudden onset of chest and shoulder pain.



Case 4 :Pneumoperitoneum (from a Perforated Ulcer)

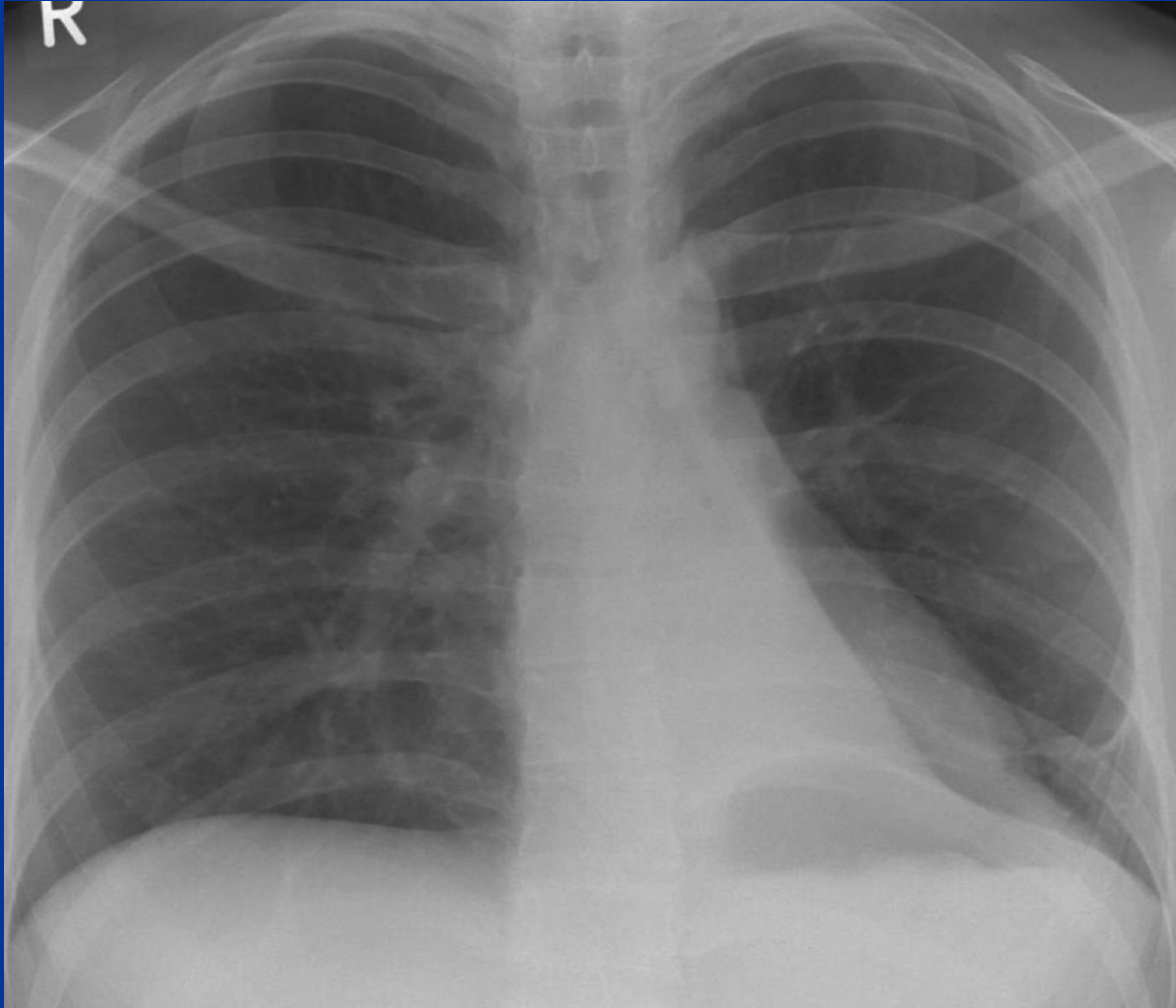


Findings

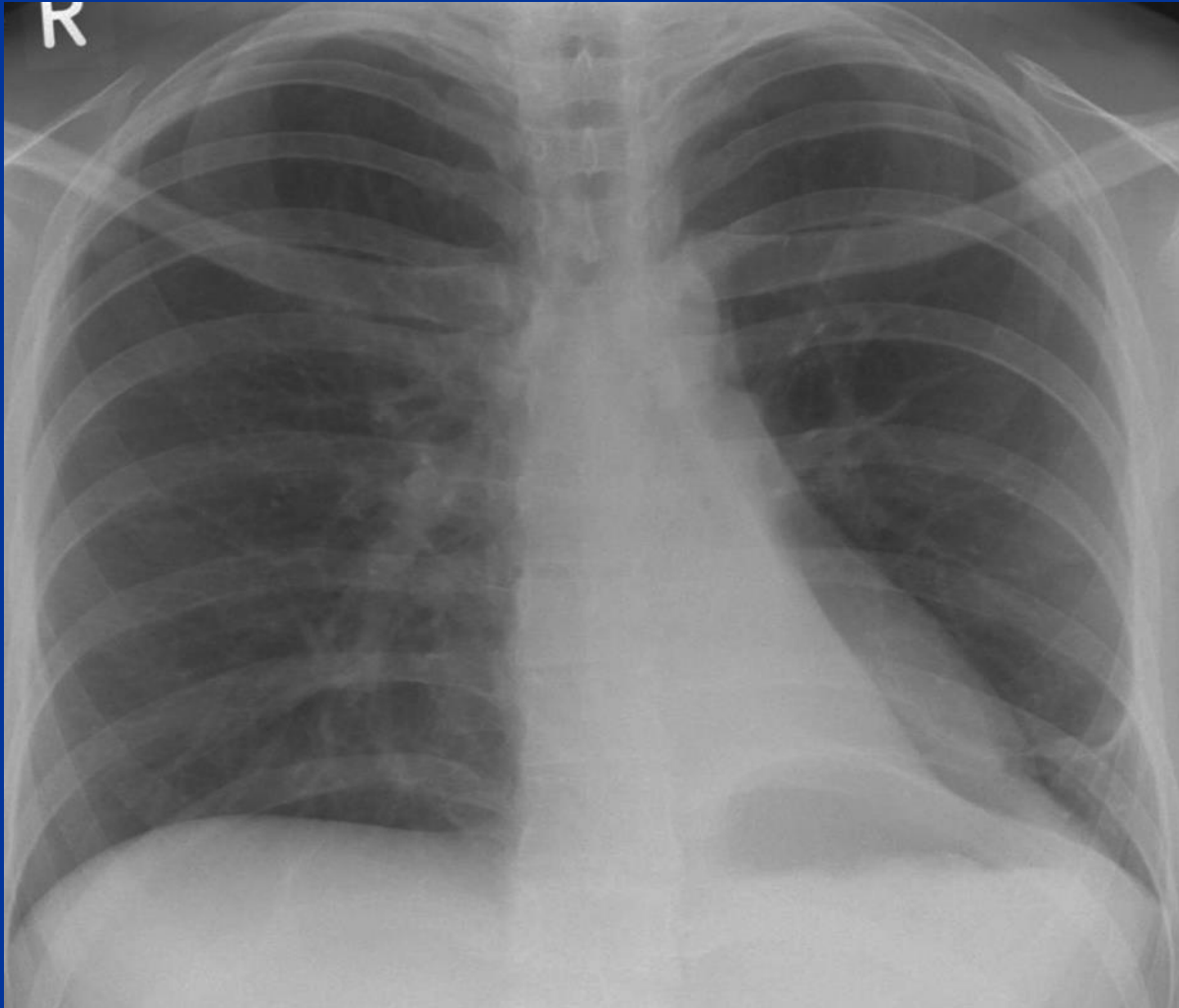
- ▶ Chest radiograph shows a crescentic lucency below the right hemidiaphragm (Fig. 7.1).
- ▶ Another lucency is seen above the right kidney (arrow in Fig. 7.2). This gas within the hepatorenal fossa has been called the “Doge’s cap” sign, as it is said to resemble the headgear of the former leaders of Venice.

History

- ▶ 28-year-old man with a history of myasthenia gravis is noted to be hypoxic.



Case 5 Left Lower Collapse (from a Mucus Plug)



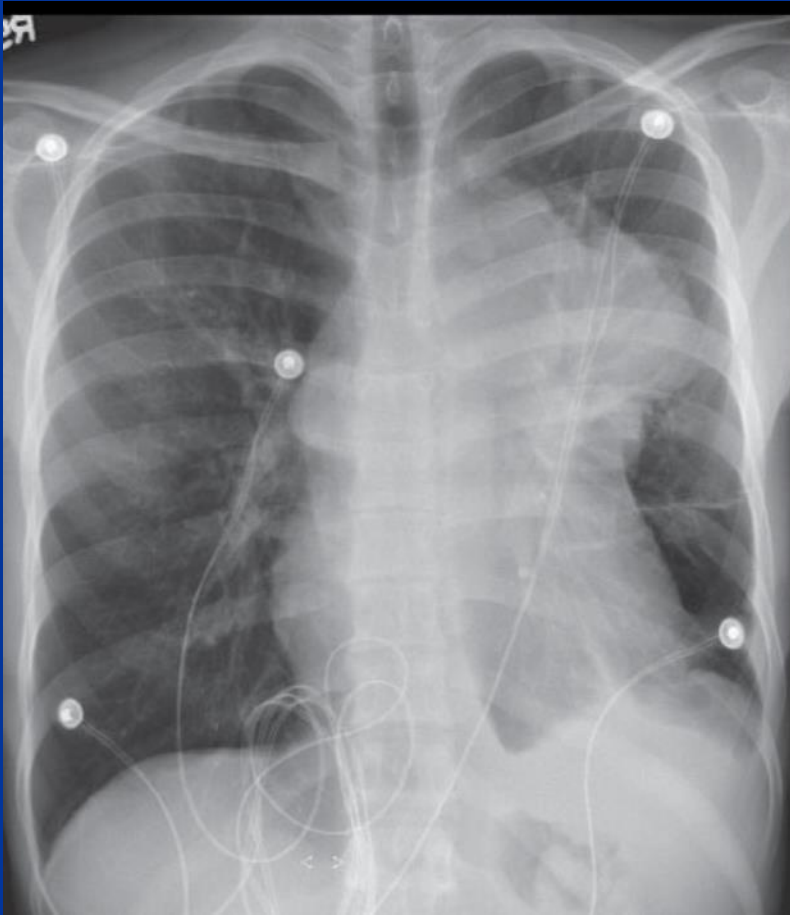
Findings

▶ Initial chest radiograph shows a retrocardiac opacity. The left hemidiaphragm cannot be seen behind the heart and the left heart border appears straightened. Also note the inferior location of the left hilum.

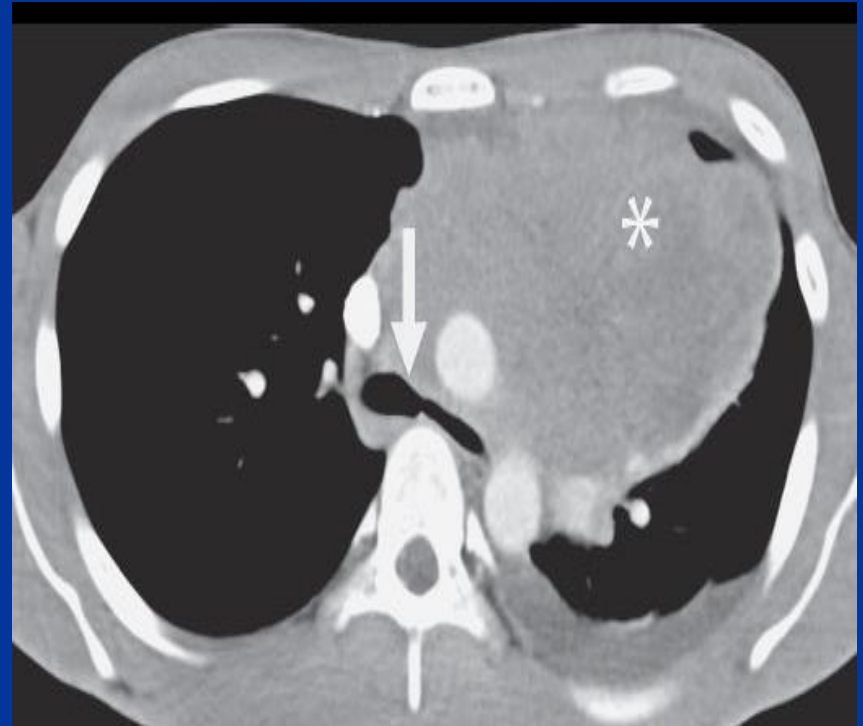
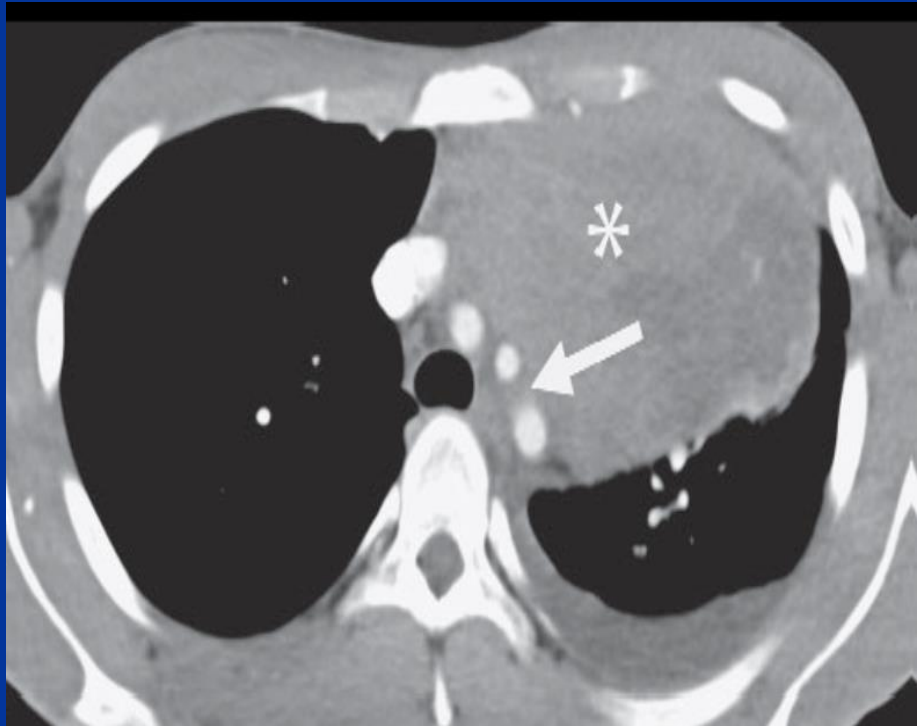


History

- ▶ 21-year-old man with exertional dyspnea is sent for a chest radiograph.



Case 6: Anterior Mediastinal Mass (Diff use Large B-cell Lymphoma)



Findings

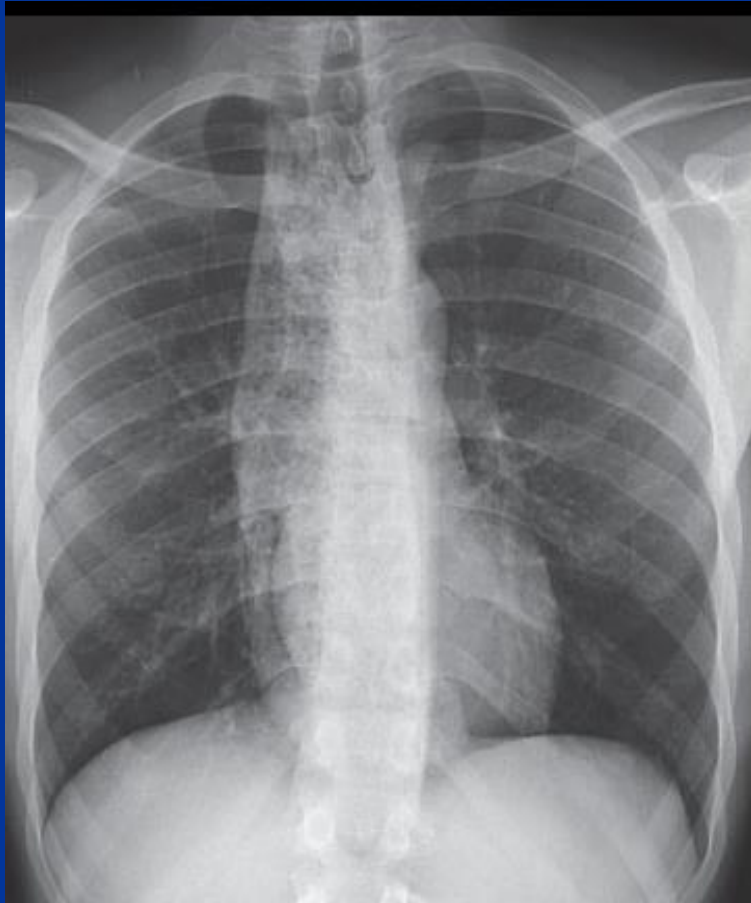
▶ On the frontal radiograph, a soft -tissue-density mass (arrow in Fig. 28.3) silhouettes the aortic arch and aorticopulmonary window. The left hilar vessels (asterisk in Fig. 28.3) can be seen through the mass (hilum overlay sign) and the descending thoracic aortic line is preserved.

▶ On the lateral, the mass fills in the retrosternal clear space. The trachea is also displaced posteriorly and compressed against the spine.

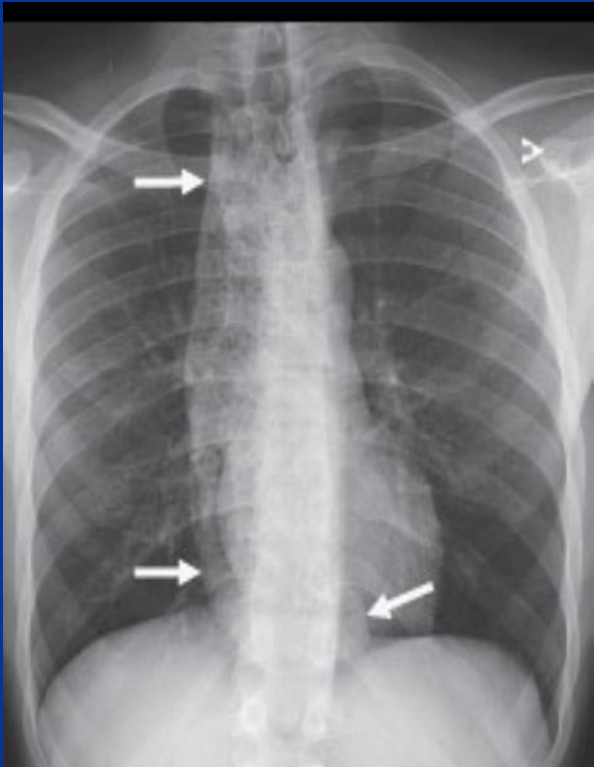
▶ CT images demonstrate a slightly heterogeneous soft tissue mass (asterisk in Figs. 28.4 and 28.5) centered within the anterior mediastinum, encasing the great vessels (arrow in Fig. 28.4) and displacing the trachea and left main stem bronchus posteriorly (arrow in Fig. 28.5).

History

- ▶ 21-year-old man complains of chest pressure after eating.



CASE 7: Achalasia



Findings

▶ Chest radiograph shows a tubular soft tissue density mass (white arrows in Figs. 51.3 and 51.4) with mottled air extending through the middle mediastinum from the thoracic inlet to the diaphragm. The trachea is deviated anteriorly (black arrow in Fig. 51.4).

▶ Upper gastrointestinal study confirms the marked dilatation of a debris-filled esophagus with beak-like tapering (thick white arrow in Fig. 51.5) at the gastroesophageal junction. Intermittent emptying of the esophagus into the stomach was noted at the time of the exam, as well as tertiary contractions.

THANK YOU