

The pleura

*It is a *closed serous sac one on each side* in the thoracic cavity and *invaginated* from its medial aspect by the lungs.

***Parts:** it is formed of two layers:

a. Visceral layer (pulmonary pleura): covers and adherent to the lobes of the lung and lining the fissures.

b. Parietal layer: line the corresponding 1/2 of the thoracic wall and is subdivided into :

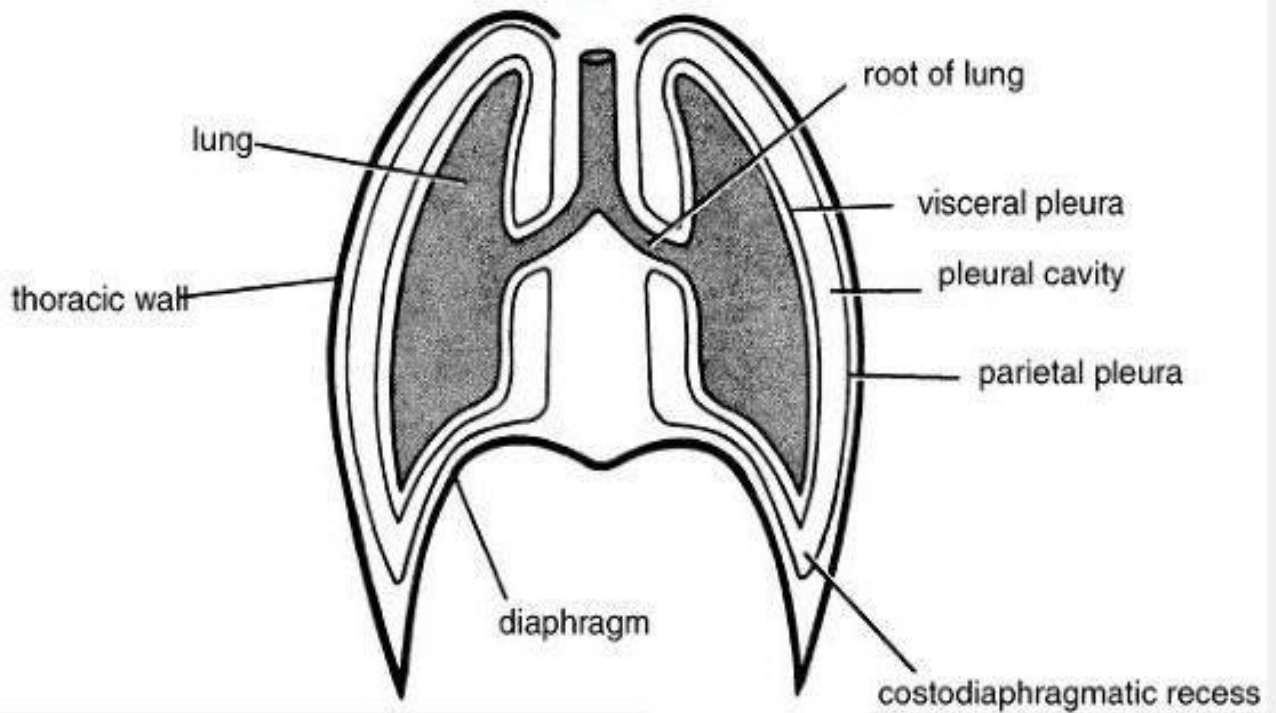
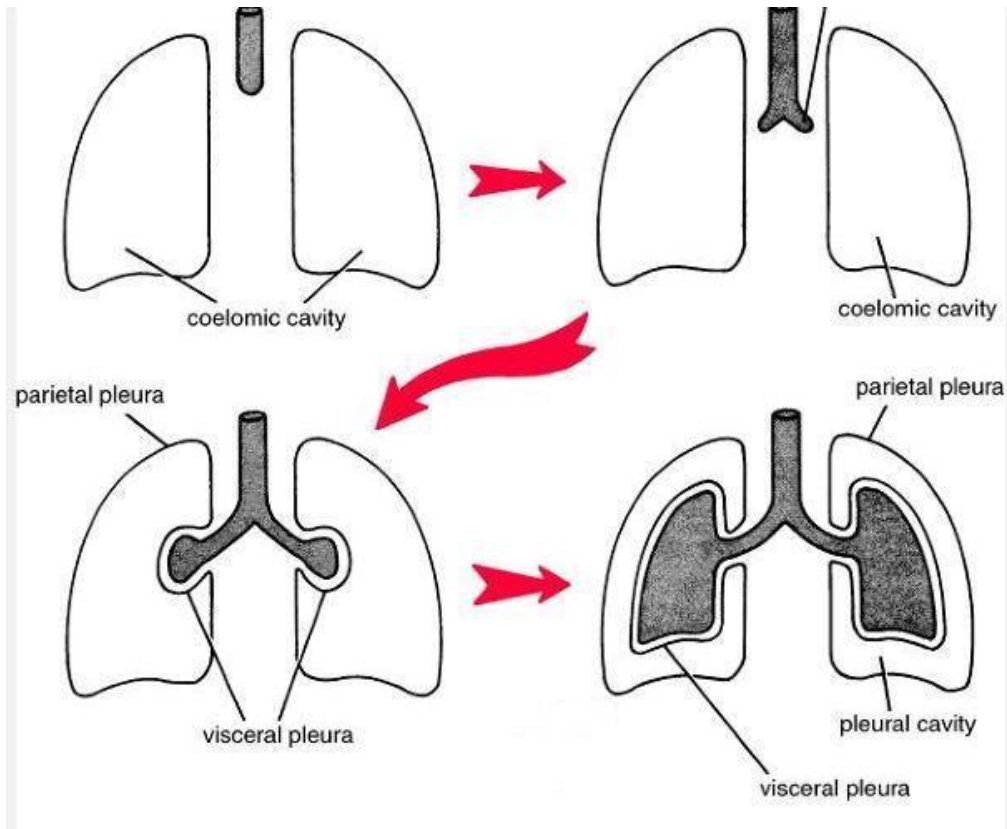
1. Costal pleura: lines the inner surface of ribs, costal cartilage and intercostal space.

2. Mediastinal pleura: covers the mediastinum. It is continuous with the visceral pleura at the hilum of the lung to form a tube of pleura enclosing the pulmonary vessels and the bronchus. Below the root of the lung the reflection of pleura is prolonged down to form pulmonary *ligament*.

3. Diaphragmatic pleura: covers the thoracic surface of diaphragm.

4. Cervical pleura: covers the apex of the lung. It projects into the root of the neck and covered by the suprapleural membrane.

- The parietal and visceral layers of pleura are in contact with each other. The space between the two layers is a *potential space* known as "**pleural cavity**" which contain capillary fluid.
- **The pulmonary ligament:** as the tube of pleura encloses the structures found in the root of the lung, its two layers come in apposition to each other below the root of the lung and form loose fold of pleura known as the pulmonary ligament. It acts as a *dead space* allowing distention of pulmonary veins when venous return increases from the lungs.



Parts of the pleura

***Pleural recesses:** they are parts of the pleural cavity which *don't contain lung in expiration*, they become filled by lung in deep inspiration. Each pleural sac has two recesses:

- a. **Costo-diaphragmatic recess:** along the *inferior border* of the pleura, between costal and diaphragmatic pleurae .It is the most dependent part of the pleural cavity in the upright position .
- b. **Costo-mediastinal recess:** along the *anterior border* of the pleura, between costal and mediastinal pleurae.

- **Surfaces anatomy of pleura**

a. **Cervical pleura:** is represented by a convex line drawn from a point at junction of medial 1/3 and lateral 2/3 of clavicle and a point at sternoclavicular joint with its highest point reaching **2.5** cm above medial 1/3 of clavicle.

b. **Anterior border:** is different in the 2 pleural sacs

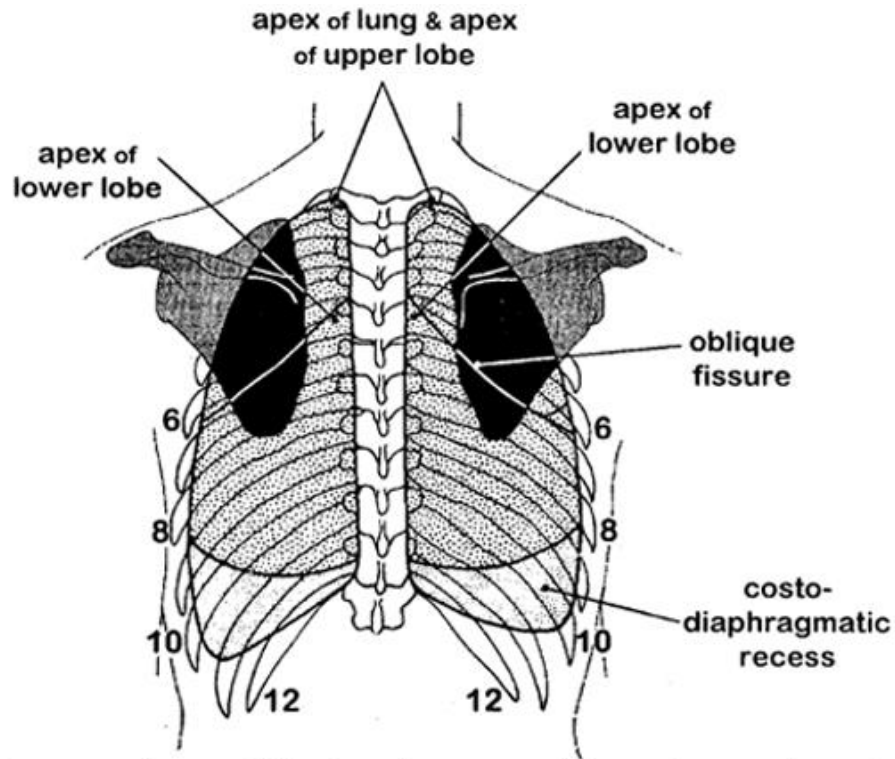
Right pleura: represented by a line passes downwards and medially behind the sternoclavicular joint to the angle of Louis in midline, then vertically down to the right 6th costal cartilage

Left pleura: is the same as that of right pleura till angle of Louis then it descends vertically down till level of left 4th costal cartilage then curves to the left to reach left border of sternum and runs downwards along the left border of sternum to the left 6th costal cartilage to form the cardiac notch .

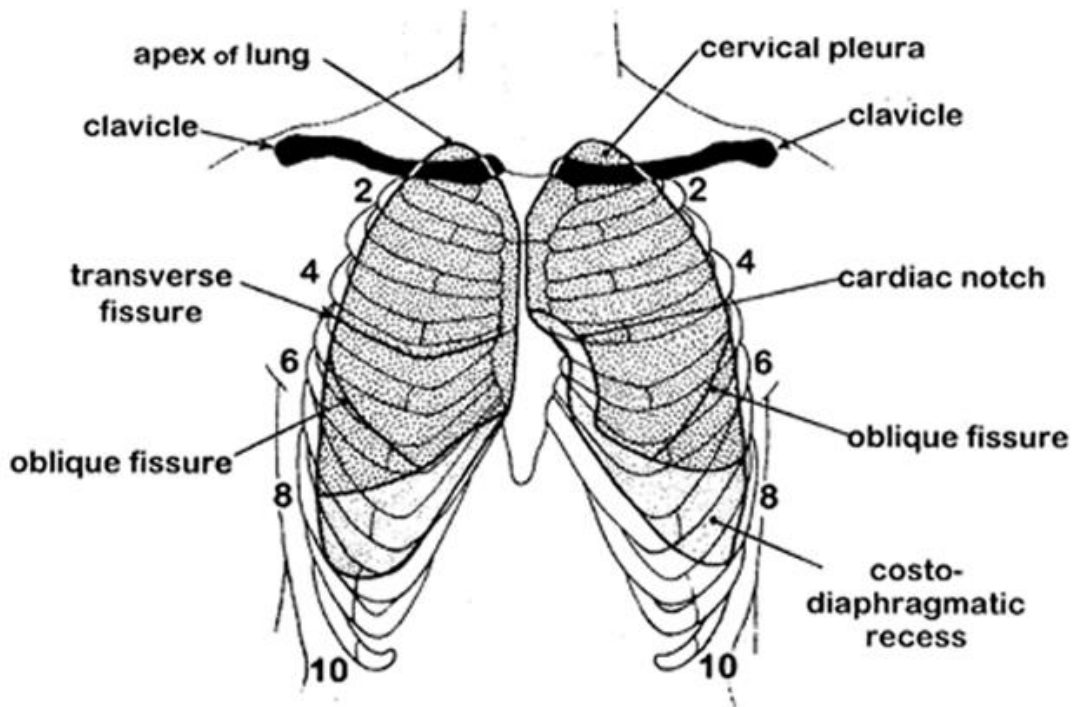
c. **Inferior border:** is represented by a line crossing the following points:

- 6th costal cartilage
- The 8th rib in midclavicular line.
- The 10th rib in the midaxillary line.
- It ends at 12th thoracic spine.

d. **Posterior border:** represented by a vertical line between 12th thoracic spine and sternoclavicular joint.



Surface anatomy of the two lungs and two pleurae from behind



The surface anatomy of the two lungs and two pleurae from front

- **Nerves supply of pleura:(Pleural pain)**

b. Visceral layer: only autonomic nerve supply from the pulmonary plexuses (**insensitive** for pain because it receives no nerves of general sensation) .

c. Parietal layer: rich in sensory nerve supply (sensitive for pain) :

***Costal & peripheral part of diaphragmatic pleurae:** from intercostal nerves T₁₋₁₁ (irritation leading to local pain & referred pain to the dermatomes of the thoracic and abdominal walls) .

* **Central part of diaphragmatic and mediastinal pleurae:** phrenic nerve C₃₋₅. (irritation leading to local pain & referred pain to the root of the neck and over the shoulder) .

- **Applied anatomy:**

1. **Pleurisy** is inflammation in the pleura .

2. At the vertebral end of the pleura, the pleura descends below the 12th rib; during kidney operations the surgeon must avoid injury the pleura.

3. **pleural effusion** : is collection of clear serous fluid in the pleural cavity .

4.**Pneumothorax:** the presence of air in pleural cavity.

5.**Haemothorax:** the presence of blood in pleural cavity.

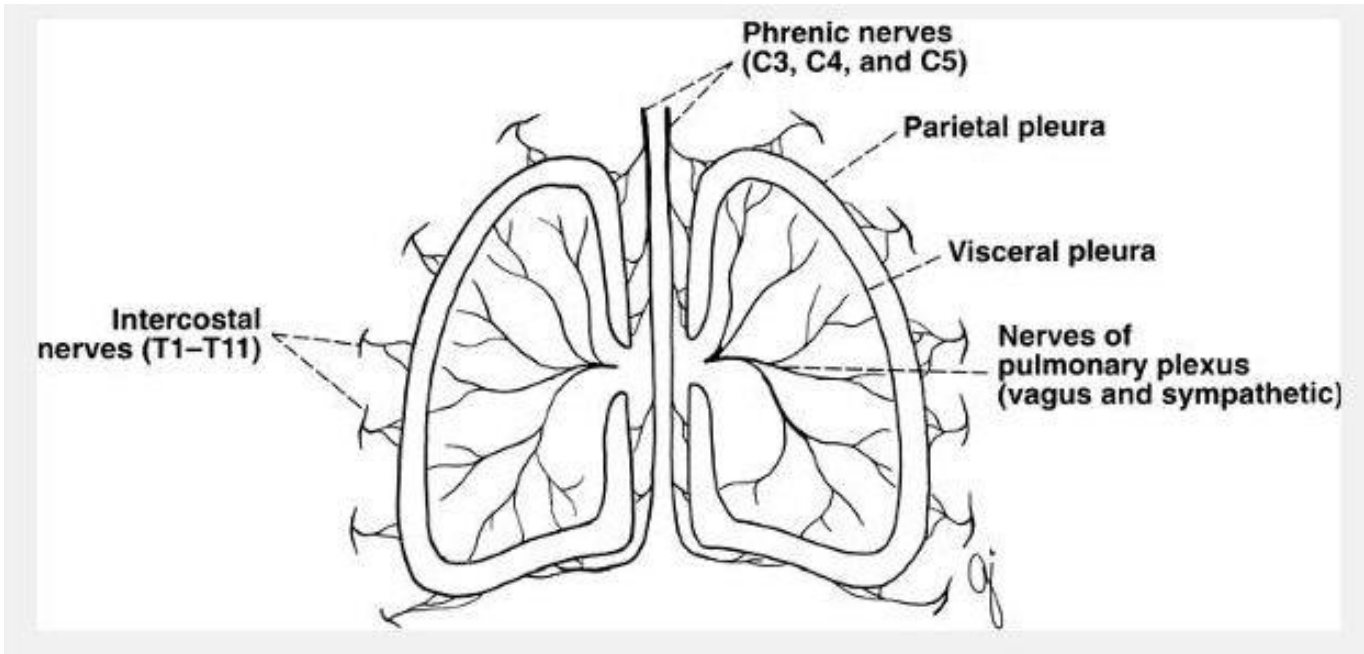
6. **Empyema:** is the presence of pus in pleural cavity.

7. **Thoracocentesis** : Small or moderate fluid can be drained from pleural cavity (in upright position fluid is collected in the costodiaphragmatic recess) by inserting a needle in the **9th intercostal space in the midaxillary line** , during expiration to avoid injury of lung with the needle directed upwards to avoid injury of the diaphragm. To avoid injury of the intercostal vessels in the costal groove , the needle has to be inserted **superior to the rib** , high enough to avoid injury of the collateral branches .

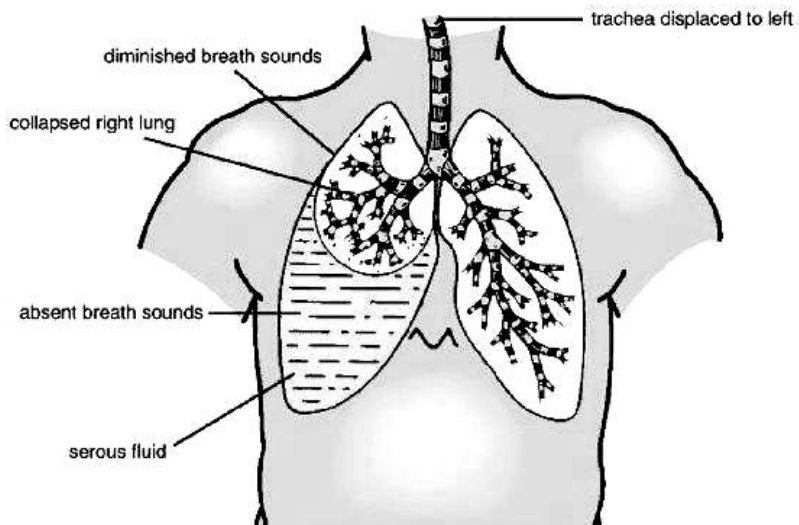
8. **Insertion of chest tube** : Major amount of fluid can be drained from pleural cavity by inserting a tube in the **5th. intercostal space in the midaxillary line** . The extracorporeal end of the tube should be connected to an **under water seal** . The tube can be directed superiorly to drain air or inferiorly (to costodiaphragmatic recess) to drain any fluid .

9. **Artificial pneumothorax:** is introduction of air in the pleural cavity in order to collapse the diseased lung with tuberculosis, so that the lung can rest.

10. **Thoracoscopy** (diagnostic or therapeutic) allows visualization of the pleural cavity .



Nerve supply of the parts of the pelura



Pleural effusion

