MEDICAL EDUCATION RESOURCE

Thoracic Cavity and Pleura

Thoracic Cavity and Pleurae — Thoracic Cavity and Dissection

Thoracic Cavity

- The **thoracic cavity** is the upper part of the ventral body cavity, enclosed by the **thoracic wall**, **diaphragm**, and **superior thoracic aperture**.
- It is divided into **three compartments**:
    1. **Two pleural cavities** (right and left) containing the lungs.
    2. **One mediastinum**, situated between the pleural sacs, containing the heart, great vessels, trachea, oesophagus, and thymus.
- The **walls** of the cavity are formed by:
    - **Anteriorly:** Sternum and costal cartilages.
    - **Posteriorly:** Thoracic vertebrae.
    - **Laterally:** Ribs and intercostal spaces.
    - **Inferiorly:** Diaphragm (separating thorax from abdomen).
    - **Superiorly:** Thoracic inlet (communication with neck).
- The **mediastinum** acts as the **central partition** between the two lungs. It is divided into:

- **Superior mediastinum** (above the level of sternal angle).
- **Inferior mediastinum**, further subdivided into **anterior, middle, and posterior** parts.

- The **pleural cavities** are lined by **pleurae**, which are serous membranes enclosing each lung.

Dissection of Thoracic Cavity

1. **Position:** Place the cadaver supine with the thorax elevated slightly.
2. **Skin incision:**
   - A midline incision from the **suprasternal notch to the xiphoid process**, extended laterally along the costal margins and upwards along midaxillary lines.
3. **Reflection:**
   - Reflect the skin and superficial fascia to expose **pectoralis major and minor**.
   - Cut through the intercostal muscles along selected intercostal spaces to open the thoracic cage.
4. **Exposure:**
   - Remove anterior thoracic wall by cutting costal cartilages close to their junction with ribs.
   - Detach diaphragm along the costal margins to view the **thoracic viscera**.
5. **Observation:**

- Note the **two pleural sacs**, each containing a lung, and the **mediastinum** between them.

- Identify **heart within pericardium**, **thymus (in children)**, and **great vessels** emerging from the heart.

6. **Further dissection:**

   - The pleural reflections and recesses (costodiaphragmatic and costomediastinal) can be traced by following the **parietal pleura** over the inner thoracic wall and diaphragm.

   - The **mediastinal pleura** can be gently separated to expose the **pericardium** and related structures.

The thoracic cavity thus serves as a **protective chamber** for vital organs of respiration and circulation and provides **mechanical support** for lung expansion during breathing

Pleura

- The **pleura** is a **serous membrane** similar to the peritoneum, composed of **mesothelium (flattened epithelium)**.

- Each lung is enclosed within a **pleural sac** consisting of two continuous layers:

  - **Parietal pleura** ? lines thoracic wall, mediastinum, diaphragm.

  - **Visceral (pulmonary) pleura** ? covers the lung surface and fissures, inseparable from the lung tissue.

- Both layers enclose a potential space — the **pleural cavity** — containing a thin film of **serous fluid** that allows frictionless movement during respiration.

Parts of the Parietal Pleura

1. **Costal pleura** – lines inner surface of ribs and intercostal spaces.
2. **Diaphragmatic pleura** – covers the diaphragm's upper surface.
3. **Mediastinal pleura** – forms the lateral wall of the mediastinum.
4. **Cervical pleura (cupula)** – extends into the root of the neck above the first rib.

Pulmonary Ligament

- A double fold of pleura extending down from the lung root.
- Allows **movement of pulmonary vessels** and **descent of lung roots** during inspiration

  bd-chaurasias-human-anatomy-vol…

  .

Pleural Recesses

- **Costomediastinal recess** ? between costal and mediastinal pleura; more prominent on the **left** near the cardiac notch.
- **Costodiaphragmatic recess** ? between costal and diaphragmatic pleura; deepest at the **midaxillary line**, between the **8th and 10th ribs**.
    - These act as **reserve spaces** into which the lungs expand during deep inspiration

      bd-chaurasias-human-anatomy-vol…

.

Nerve Supply of the Pleura

- **Parietal Pleura:**
  - Derived from **somatopleuric mesoderm**, hence supplied by **somatic nerves**.
  - **Costal and peripheral diaphragmatic pleurae:** Intercostal nerves ? pain referred to thoracic wall.
  - **Mediastinal and central diaphragmatic pleurae:** Phrenic nerve (C4) ? pain referred to **shoulder tip** via **supraclavicular nerves**

    bd-chaurasias-human-anatomy-vol…

    .
- **Visceral Pleura:**
  - Derived from **splanchnopleuric mesoderm**, supplied by **autonomic nerves** accompanying **bronchial vessels**.
  - Sympathetic: from **T2–T5 ganglia** ? bronchodilation.
  - Parasympathetic: from **vagus nerve** ? bronchoconstriction and glandular secretion.
  - **Insensitive to pain**

    bd-chaurasias-human-anatomy-vol…

    .
- **Blood Supply:**
  - Parietal pleura: **Intercostal, internal thoracic, musculophrenic arteries**.

- Venous drainage: **Azygos and internal thoracic veins**.
- Lymphatics: **Intercostal, internal mammary, posterior mediastinal, and diaphragmatic nodes**

bd-chaurasias-human-anatomy-vol…

.

Clinical Anatomy

- **Pleurisy (Pleuritis):** Inflammation of pleura; may be **dry** (painful) or **wet** with **pleural effusion**. Pain arises from parietal pleura friction.
- **Pleural Effusion:** Collection of fluid in pleural cavity; obliterates **costodiaphragmatic recess**.
- **Pneumothorax:** Air in pleural cavity causing **lung collapse**.
- **Haemothorax:** Blood in pleural cavity.
- **Hydropneumothorax:** Air and fluid together.
- **Empyema:** Pus in pleural cavity

bd-chaurasias-human-anatomy-vol…

.

Referred Pain:

- Irritation of **costal pleura** ? pain along intercostal nerves (chest/abdominal wall).
- Irritation of **mediastinal or central diaphragmatic pleura** ? pain at **shoulder tip** (C4 dermatome).

- **Right shoulder pain:** Gallbladder inflammation.
- **Left shoulder pain:** Splenic rupture.

Important Procedures:

- **Paracentesis thoracis:** Needle inserted in **lower part of intercostal space** to avoid main vessels and nerve

  bd-chaurasias-human-anatomy-vol…

  .

- **Pleural effusion** is a frequent feature in **pulmonary tuberculosis**

  bd-chaurasias-human-anatomy-vol…

  .

In summary, the pleura serves as a **protective and lubricating membrane** for the lungs. Its **dual nerve supply** explains the **distinct patterns of referred pain**, and its recesses and folds (like the **pulmonary ligament**) are essential for lung mechanics during respiration.