MEDICAL EDUCATION RESOURCE

# Formation and Shape of Thorax

### Skeleton of Thorax

- The **skeleton of the thorax**, or **thoracic cage**, is an **osseocartilaginous elastic cage** designed to **alter intrathoracic pressure** during respiration.
- **Function:**
    - During **inspiration**, it expands to allow air entry into the lungs.
    - During **expiration**, it contracts to expel air.
- It provides protection to the **heart, lungs, and great vessels** and supports the **pectoral girdle** and upper limbs.

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### Formation of the Thoracic Cage

- **Anteriorly:** Sternum (composed of manubrium, body, and xiphoid process).
- **Posteriorly:** 12 thoracic vertebrae with their **intervertebral discs**.
- **Laterally:** 12 pairs of ribs with costal cartilages.
    - **True (vertebrosternal) ribs:** 1st–7th ribs—each directly articulates with the sternum.
    - **False (vertebrochondral) ribs:** 8th–10th ribs—join the cartilage of the rib above, forming the **costal margin**.

- **Floating (vertebral) ribs:** 11th and 12th—anterior ends free, not attached to sternum.

- **Joints involved:**
  - Costovertebral, costotransverse, manubriosternal, and chondrosternal joints enable **respiratory movements**.

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**Shape of the Thorax**

- The thorax resembles a **truncated cone** — **narrow above**, **broad below**.
  - **Upper end:** Continuous with the neck, partly separated by the **suprapleural membrane (Sibson's fascia)**.
  - **Lower end:** Separated from the abdomen by the **diaphragm**, concave downward.
- The **thoracic cavity** is smaller than it appears because:
  - The upper part appears wider due to the shoulders.
  - The lower part is encroached upon by the abdomen (due to the diaphragm's dome).
- **Transverse Section:**
  - **Adults:** Oval/reniform (kidney-shaped); transverse diameter > anteroposterior.
  - **Infants:** Circular—ribs horizontal, leading to **abdominal respiration**.
  - **Quadrupeds:** Anteroposterior diameter > transverse.

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**Clinical Anatomy**

- **Respiration:**
  - The diaphragm descends during inspiration, increasing the vertical diameter.
  - In adults, both **thoracic and abdominal respiration** occur; in infants, mainly abdominal.
- **Rib Fractures:**
  - The ribs are weakest at their **angles**, where fractures commonly occur due to indirect trauma.
  - The **upper two ribs** (protected by the clavicle) and **lower two ribs** (floating) are least likely to fracture.
  - In children, rib fractures are rare due to high elasticity of the chest wall.
- **Hiccups:**
  - Caused by **spasmodic contraction of the diaphragm** with sudden closure of the glottis.
  - May result from **gastric irritation**, **phrenic nerve irritation**, **uraemia**, or **hysteria**.

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**Summary Table**

| FEATURE | DESCRIPTION |
|---|---|
| **Thoracic skeleton** | Elastic cage for respiration and protection |
| **True ribs** | 1st–7th (attach to sternum) |
| **False ribs** | 8th–10th (join cartilage above) |

| FEATURE | DESCRIPTION |
| --- | --- |
| **Floating ribs** | 11th–12th (free anteriorly) |
| **Shape** | Truncated cone; narrow above, broad below |
| **Infant thorax** | Circular, abdominal breathing |
| **Adult thorax** | Oval, thoracic + abdominal breathing |
| **Common fracture site** | Rib angle |
| **Diaphragm function** | Expands thorax vertically during inspiration |