

Introduction, Thoracic Wall Proper, Intercostal Muscles

Introduction

- The **thorax** is covered externally by the **muscles of the pectoral region** and internally by **intercostal muscles** and **membranes** that fill the gaps between adjacent ribs and cartilages.
- These muscles give **rigidity and protection** to the thoracic wall.
- Each intercostal space has **one right and one left thoracic nerve**—together they form true **dermatomes** of the thoracic region.
- The **posterior intercostal vein, artery, and nerve (V-A-N)** lie in the **costal groove**, arranged from above downward.
- The **sympathetic trunk** originates from the **lateral horns of the T1–T12 spinal cord segments** and continues down to the **L2 level**.

Coverings of the Thoracic Wall (superficial to deep):

1. Skin
2. Superficial fascia
3. Deep fascia
4. Extrinsic muscles (derived from upper limb, back, and abdomen)

Extrinsic muscles covering the thorax include:

- *Upper limb group:* Pectoralis major, pectoralis minor, serratus anterior, trapezius, latissimus dorsi, levator scapulae, rhomboid major, rhomboid minor, serratus posterior superior, serratus posterior inferior.
- *Abdominal group:* Rectus abdominis, external oblique.
- *Back group:* Erector spinae (sacrospinalis).
- Additional muscles from the **head, neck, and abdomen** attach to the margins of the thoracic apertures.

Thoracic Wall Proper

- The **thoracic cage** forms the **skeletal framework** of the thoracic wall.
- The **spaces between ribs** are called **intercostal spaces**—filled by **intercostal muscles, vessels, nerves, and lymphatics**.
- There are **11 intercostal spaces posteriorly** and **9 anteriorly** (the lower two ribs—11th and 12th—are floating).
- The **upper ten spaces** correspond to **true and false ribs**, forming the muscular part of the wall.

Intercostal Muscles

Each intercostal space contains **three layers of muscles**:

1. **External intercostal muscles**
 - **Direction:** Downward and forward (“hands-in-pockets” direction).

- **Extent:** From the rib tubercle posteriorly to the costochondral junction anteriorly, where replaced by **external intercostal membrane**.
- **Function:** Elevate ribs ? aid **inspiration**.

2. Internal intercostal muscles

- **Direction:** Downward and backward, opposite to external intercostals.
- **Extent:** From sternum anteriorly to angle of rib posteriorly, replaced by **posterior intercostal membrane**.
- **Function:** Depress ribs ? aid **expiration**.

3. Innermost intercostal muscles (deep layer)

- Incomplete and best seen in lower intercostal spaces.
- Includes:
 - **Innermost intercostal** (lateral portion)
 - **Subcostal muscles** (posteriorly, crossing more than one space)
 - **Transversus thoracis** (anteriorly, on deep surface of sternum and costal cartilages).
- **Function:** Assist internal intercostals in expiration.

Nerve Supply:

- All intercostal muscles are supplied by **intercostal nerves (T1–T11)**.

Blood Supply:

- From **posterior and anterior intercostal arteries**.

Actions Summary:

- **External intercostals:** Inspiration (raise ribs).
- **Internal and innermost intercostals:** Expiration (depress ribs).