Joints of Thorax ,Respiratory Movements,Clinical Anatomy

Joints of Thorax

1. Manubriosternal Joint

- Type – Secondary cartilaginous (symphysis).
- Permits slight gliding movement of the body of sternum on the manubrium during respiration.
- Forms the **sternal angle (Angle of Louis)**, a major surface landmark at the level of the **second costal cartilage** and **T4 vertebra**.

2. Costovertebral Joints

- Each head of a typical rib articulates with the **demifacets** on its own vertebral body and that of the vertebra above.
- Type – Plane synovial joint with two cavities separated by an **intra-articular ligament**.
- Ligaments – Radiate and intra-articular ligaments.
- Movements – Rotation of rib necks during breathing.

3. Costotransverse Joints

- Between the **tubercle of the rib** and **transverse process of the corresponding vertebra**.

- Type – Plane synovial.
- Ligaments – Superior, lateral, and proper costotransverse ligaments.
- Movements – Gliding and rotation around the transverse axis.

4. Sternocostal Joints

- First ? Primary cartilaginous (synchondrosis).
- 2nd to 7th ? Plane synovial.
- Permit elevation and depression of the ribs during breathing.

5. Costochondral Joints

- Between ribs and their cartilages – Primary cartilaginous.

6. Interchondral Joints

- Between the cartilages of 6th–9th ribs – Small plane synovial joints; allow slight gliding.

7. Xiphisternal Joint

- Primary cartilaginous between the xiphoid process and the body of the sternum.

Respiratory Movements

Mechanism of Breathing

- **Inspiration:** Increase in thoracic cavity volume ? negative pressure ? air enters lungs.
- **Expiration:** Elastic recoil of lungs and chest wall ? air expelled.

- Movements occur mainly at **costovertebral** and **manubriosternal** joints.

Types of Rib Movements

1. **Pump-handle Movement:**
   - Occurs in upper ribs (2nd–6th).
   - Axis passes through **costovertebral** and **costotransverse** joints.
   - Increases **anteroposterior diameter** of thorax.

2. **Bucket-handle Movement:**
   - Occurs in lower ribs (7th–10th).
   - Axis more oblique; increases **transverse diameter**.

3. **Piston Movement of Diaphragm:**
   - Descent of diaphragm increases **vertical diameter**.

Summary of Movements

TYPE OF MOVEMENT	RIBS INVOLVED	DIAMETER INCREASED
Pump-handle	2nd – 6th	Anteroposterior
Bucket-handle	7th – 10th	Transverse
Piston	All	Vertical

Clinical Anatomy

- **Fracture dislocation of ribs** ? Pain and restricted chest expansion.

- **Costochondritis** ? Inflammation of costal cartilage causing localized tenderness (often mistaken for cardiac pain).

- **Flail chest** ? Multiple rib fractures producing paradoxical chest movement.
- **Sternal angle palpation** ? Used to locate 2nd rib for counting intercostal spaces.
- **Thoracic outlet syndrome** ? Compression of subclavian vessels and brachial plexus by a **cervical rib**.
- **Arthritis of costovertebral joints** ? Pain on deep breathing.

These points integrate all core anatomy, mechanisms, and applied correlations of thoracic joints and breathing movements—concise enough for **exam and viva preparation**