MEDICAL EDUCATION RESOURCE

Facts to Remember, Clinicoanatomical Problem, Frequently Asked Questions & Multiple Choice Questions

Facts to Remember

- The **thoracic cage** is a **bony and cartilaginous elastic framework** that protects vital organs and assists in respiration.
- The **sternum**, **ribs**, and **thoracic vertebrae** form its main structural components.
- The **thorax** is shaped like a **truncated cone** — narrow at the top and broad at the base.
- **True ribs (1–7)** attach directly to the sternum; **false ribs (8–10)** attach indirectly; **floating ribs (11–12)** are free anteriorly.
- The **sternal angle (Angle of Louis)** is a key surface landmark — lies at the level of the **2nd costal cartilage** and between **T4 and T5 vertebrae**.
- The **inlet of thorax** is **kidney-shaped**, bounded by **T1 vertebra**, **first ribs**, and the **upper border of manubrium sterni**.
- It is closed by **Sibson's fascia (suprapleural membrane)** that protects the apex of the lung.
- The **outlet of thorax** is closed by the **diaphragm**, which separates the thoracic and abdominal cavities.
- Three major **openings of diaphragm** and their vertebral levels:

    - **Vena caval opening – T8**
    - **Oesophageal opening – T10**
    - **Aortic opening – T12**

- **Cervical rib** (from C7) may cause **thoracic inlet syndrome**, compressing the **subclavian artery** and **lower trunk of brachial plexus**.
- **Rib fractures** commonly occur at the **angle of the rib**; **upper two** and **lower two** ribs are least affected.
- The **diaphragm** descends during inspiration, increasing thoracic volume; **hiccups** are due to its **spasmodic contraction**.
- The **sternum** is an important site for **bone marrow biopsy (sternal puncture)**.

Clinicoanatomical Problem

A young adult suffering from **chronic anaemia** was advised to undergo **sternal puncture** to determine the cause of anaemia.

Questions:

1. What is a **sternal puncture** or **bone marrow biopsy**?
2. How are **bones classified** according to shape?

Answer

Sternal puncture (Bone marrow biopsy):

- The **sternum** is a **single, median flat bone** forming the anterior wall of the thoracic cage.
- The **manubrium** (upper part) is broader and made of **two plates of compact bone** enclosing **cancellous bone**.
- In **sternal puncture**, a **special thick needle** is inserted through the **skin**, **fascia**, and **anterior compact bone plate** until it reaches the **bone marrow** within the cancellous layer.
- About **0.3 mL of marrow** is aspirated, spread on slides, and stained for examination.
- This helps determine if the anaemia is due to a defect in **red blood cell (RBC)** or **white blood cell (WBC)** production.

Classification of Bones (According to Shape):

- **Long bones:** e.g. Humerus, Femur
- **Short bones:** e.g. Tarsal bones
- **Flat bones:** e.g. Sternum
- **Irregular bones:** e.g. Vertebra
- **Sesamoid bones:** e.g. Patella
- **Pneumatic bones:** e.g. Maxilla (contains air sinuses)

Clinical Importance:

Sternal puncture is a **common diagnostic procedure** for evaluating **bone marrow disorders**, **leukaemia**, and **anaemia**. The **manubrium or upper body of the sternum** is preferred due to its safe accessibility and rich marrow content

Frequently Asked Questions

1. Name the bones forming the thoracic cage.
2. What are true, false, and floating ribs?
3. Enumerate the joints taking part in the formation of the thoracic cage.
4. Mention the plane and boundaries of the thoracic inlet.
5. What structures pass through the superior aperture of the thorax?
6. What is Sibson’s fascia? Mention its attachments and function.
7. What are the boundaries of the thoracic outlet?
8. Name the structures passing through the diaphragm and their vertebral levels.
9. Explain the differences between the thorax of an adult and that of an infant.
10. Define the sternal angle and mention its clinical importance.
11. What is the significance of the 2nd costal cartilage in surface anatomy?
12. What are the common sites of rib fracture and their clinical implications?
13. Define thoracic inlet syndrome and mention its cause.
14. Explain why the upper and lower two ribs are least likely to fracture.
15. Describe the importance of the thorax in respiration.

Multiple Choice Questions

1. The true ribs are:
   a) 1–7 b) 8–10 c) 9–12 d) 7–10
   Answer: a) 1–7

2. The first rib articulates posteriorly with:
   a) C7 b) T1 c) T2 d) T3
   Answer: b) T1

3. The thoracic inlet is bounded posteriorly by:
   a) C7 b) T1 c) T2 d) T3
   Answer: b) T1

4. The diaphragm separates:
   a) Thoracic and abdominal cavities b) Thoracic and pelvic cavities c) Pleural sacs d) Mediastina
   Answer: a) Thoracic and abdominal cavities

5. The cervical rib arises from:
   a) C6 b) C7 c) T1 d) T2
   Answer: b) C7

6. The aortic opening of the diaphragm lies at the level of:
   a) T8 b) T9 c) T10 d) T12
   Answer: d) T12

7. The vena caval opening of the diaphragm is at:
   a) T8 b) T9 c) T10 d) T12
   Answer: a) T8

8. The oesophageal opening of the diaphragm is at:
   a) T6 b) T8 c) T10 d) T12
   Answer: c) T10

9. Sibson’s fascia is also called:
   a) Endothoracic fascia b) Suprapleural membrane c) Costal fascia d) Pectoral fascia
   Answer: b) Suprapleural membrane

10. Thoracic inlet syndrome is commonly due to:
    a) Cervical rib b) Fracture of rib c) Pleurisy d) Pneumothorax
    Answer: a) Cervical rib

These **FAQs and MCQs** summarize the key exam topics from the *Thorax* chapter—covering **bony framework, apertures, respiratory mechanics, and clinical aspects** useful for both **theory and viva preparation**