**ANATOMY II**

**CHEST**

**Learning objectives**

1. Define thoracic cage
2. List components of thoracic cage
3. Describe all parts of the thoracic cage
4. Explain function of thoracic cage
5. List all organs enclosed in the thoracic cage
6. List blood supply to chest/thorax
7. List blood supply to lungs and heart
8. Define superior thoracic inlet
9. List structures which pass through the superior thoracic in-let (aperture/opening).
10. Explain boundaries of superior thoracic opening
11. Define inferior thoracic opening (aperture).
12. Explain boundaries of inferior thoracic opening
13. Describe all joints of thoracic cage in the following manner

* Name of joint
* Areas of contact
* Type of joint

**Definition of thoracic cage**

This refers to the chest and the upper parts of the trunk.

It can also be defined as the superior part of the trunk between the neck and the abdomen.

**Components of thoracic cage**

This is a bony cage formed by;

* The sternum (breast bone)
* Costal cartilages
* The 12 parts of ribs
* Bodies of the12 thoracic vertebrae and their intervertebral discs.
* These bony and cartilaginous structures form the thoracic cage (rib cage) which surround the thoracic cavity and supports the shoulder girdle.
* The thorax moves up and down to allow breathing so it is one of the most dynamic regions of the body.

**Shape of thoracic cage**

The thorax is cone shaped with a narrow portion being superior and a broader portion being inferior. It is flat from the front to back.

**Assignment: Draw well labelled diagram of thoracic cage.**

1. **The sternum (breast bone)**

The sternum is a flat narrow bone measuring about 16cm (6 inch) in length.

**Location:** It is located on the anterior thoracic wall in the median line.

**Composition of sternum:**

It has 3 parts

* The manubrium
* The body
* The Xiphoid process.

1. **The manubrium:**

This is triangular in shape and is the superior portion

Jugular notch: Is the most superior aspect of the manubrium that you can feel at the back of your thorax.

Clavicular notch: The left and right notches that articulates with sternal end of the clavicle (collar bone). These two bones i.e. sternum and clavicle form the articulation called the sterno clavicular joint. There is a right and left sterno clavicular joint.

Costal notches: Small notches at the lower end of the manubrium that are attachments for the first ribs on the right and the left.

1. **The body**

This is the middle narrow portion of the sternum and the longest of the three parts. The body is sometimes called the breast bone and is the hard structure you can feel in the middle of your chest. It holds the costal notches for articulation with ribs 2-7.

1. **Xiphoid process**

This is the most inferior and smallest portion of the sternum. It is a small cartilaginous structure (not fully hardened to a bone) that varies in shape from pointed to blunt and ossifies by age 40. (hardens by age 40).

**Assignment: Draw a well labelled diagram of the sternum.**

1. **The thoracic vertebrae**

These includes the 12 thoracic vertebrae (to be discussed under vertebral column)

1. **The ribs (costae)**

The ribs are elongated, flattened and twisted bones. They are very light in weight. These are twelve pairs of ribs.

**Types of bonds**

There are 3 types of ribs

**True ribs –** ribs 1-7 attach directly to the sternum through their own costal cartilages.

**False ribs**- Ribs 8-10 attachment to sternum is in direct. Their costal cartilages joined to rib just above them.

**Floating ribs-** ribs 11-12 attach to vertebrae but not no sternum so they float on one end.

**Structure of a typical rib**

A typical rib consists of three parts;

1. The head
2. The neck
3. Shaft/body

**The head.** This is projection at the posterior end of the ribs. It consists of one or two facets that articulates with facets of the bodies of a single or two adjacent thoracic vertebral.

**The neck.** This is a constricted portion just lateral to the head. A notch like structure on the posterior surface where the neck joins the body is called a tubercle.

**Shaft/body:** This is the main part of the rib. Its anterior end attaches to the costal cartilage which then attaches it to the sternum.

NB 1st and 2nd ribs are referred to as a typical ribs because they posses the three parts mentioned above.

**Functions of the thoracic cage**

* It encloses the internal organs.
* It protects the internal organs.
* It provides support for the bones of the shoulder girdle and upper extremity.
* It provides attachment for muscles of the neck, thorax, upper limbs, abdomen and back.

**Main organs enclosed in the thoracic cage**

* Heart
* Lungs
* Some abdominal organs pass there e.g. Oesophagus
* Great veins (arteries e.g. pulmonary, aorta; veins e.g. venacava)

NB: i) For the diagrams of heart and lungs which you drew, make sure you understand them well.

ii)Ribs commonly affected in traumatic chest injuries are 5th to 12th ribs.

**Blood supply to chest**

**Main artery-** Thoracic aorta

**Main vein** – superior venacava

**Blood supply to the lungs**

**Arteries** – Brachial artery

* Pulmonary artery

**Veins** – Brachial vein

* Pulmonary vein

**Blood supply to the heart**

**Arteries** – Coronary artery (Right & left)

**Veins** – Great cardiac vein

-Middle cardiac vein

-Small cardiac veins (all draining into right atrium)

**Thoracic inlet/superior thoracic aperture/opening**

* This is the opening at the top of the thoracic cavity.
* It is essentially a hole surrounded by bony ring through which several vital structures pass.

**Boundaries of thoracic inlet**

**Posteriorly** – The first thoracic vertebra (TI)

**Laterally** – The first pair of ribs forming lateral C shaped curves from posterior to anterior

-Costal cartilages of the 1st ribs.

**Anteriorly**- Superior border of the manubrium

**Structures passing through thoracic inlet**

* Nerves e.g. phrenic nerve (supply diaphragm) and vagus nerve (supply the heart)
* Blood vessels e.g. Right and left common carotid arteries

Left Sub-Clevian arteries

* Lymph nodes and lymphatic vessels.
* Trachea
* Oesophagus
* Thymus duct
* Apices of the lungs (Apex)

**Inferior thoracic outlet/opening/ aperture**

This is the lower larger opening of thoracic cavity whose edges are the lowest ribs.

**Boundaries of inferior thoracic opening**

**Posteriorly** – Bodies and transverse process of 12th thoracic vertebra.

**Postero-laterally-** 11th and 12th ribs.

**Antero posteriorly**- Coe joint costal cartilages of 7th to 10th ribs.

**Anterially-** Xiphi sternal joint

**Joints of thoracic cage**

|  |  |  |
| --- | --- | --- |
| **Name of Joint** | **Areas of contact** | **Type of joint** |
| 1. Sterno costal joint 2. Xiphi sternal joint 3. Costo chondral joint 4. Costo vertebral joint 5. Sterno clevicular joint 6. Inter condral joint 7. Intervertebral joint 8. Manubrio-sternal joint | Sternum/costal cartilages  Xiphoid process/body of sternum  Ribs /costal cartilages  Ribs/vertebral bodies  Manubrium/clavicle  Costal cartilages  Between vertebral bones  Manubrium and body of sternum | Synovial joint  Sychondrosis  Hyaline cartilage joint  Synovid joint  Saddle joint (type of synovid joint)  Synoviac (plane joint)  Symphysis joint  Cartilaginous joint |