Mediastinum and pericardium

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The mediastinum: is the central compartment of the thoracic cavity surrounded by loose connective tissue. The mediastinum contains the heart and its vessels, the esophagus, trachea, phrenic and vagus nerves, the thoracic duct, thymus and lymph nodes of the central chest. The mediastinum lies within the thorax and is enclosed on the right and left by pleurae. It is surrounded by the sternum and chest wall in front, the lungs to the sides and the spine at the back. It contains all the organs of the thorax except the lungs. It is continuous with the loose connective tissue of the neck.

The mediastinum can be divided into an upper (superior) and lower (inferior) part:

The superior mediastinum starts at the superior thoracic aperture and ends at the thoracic plane. (thoracic plane: is a plane at the level of the sternal angle, and the intervertebral disc of T4–T5).

The inferior mediastinum extends from thoracic plane to the diaphragm. It is subdivided into three regions, all relative to the pericardium – the anterior mediastinum being in front of the pericardium, the middle mediastinum contains the pericardium, and the posterior mediastinum behind pericardium
Mediastinum
Sternal angle represents several important anatomical features:

1- Beginning and end of the aortic arch
2- Bifurcation of the trachea
3- Bifurcation of the pulmonary trunk
4- Left recurrent laryngeal nerve loops under arch of aorta
5- Ligamentum arteriosum lies at this level
6- Azygos vein drains into superior vena cava
7- Cardiac plexus
8- Thoracic duct empties into left subclavian vein
Superior mediastinum

Boundaries
• superiorly by the thoracic inlet;
• inferiorly by the thoracic plane
• laterally by the pleurae
• anteriorly by the manubrium of the sternum
• posteriorly by the first four thoracic vertebral bodies
Contents of the superior mediastinum

**muscles**
Origins of the Sternohyoid, Sternothyroid and lower ends of the Longus colli

**arteries**
Aortic arch, brachiocephalic artery, thoracic portions of the left common carotid and the left subclavian

**Veins**
brachiocephalic veins, upper half of the superior vena cava and left highest intercostal vein

**Nerves**
Vagus nerve, superficial and deep cardiac plexuses, phrenic nerve and left recurrent laryngeal nerve

**Organs**
Trachea with paratracheal and tracheobronchial lymph nodes, esophagus, thoracic duct, thymus gland and some lymph glands
Lt. Phrenic N.
Lt. Vagus N.
Brachiocephalic trunk
Rt. Brachiocephalic V.
Sup. Vena cava
T4/T5 level
Ligamentum Art.

1. Right recurrent laryngeal nerve (2)
2. Left common carotid artery
3. Right phrenic nerve
4. Left recurrent laryngeal nerve
5. Left internal jugular vein
6. Lt. Brachiocephalic V
7. Left subclavian vein
8. Lt. Phrenic N.
9. Lt. Vagus N.
10. Left pulmonary artery (7)
11. Thoracic aorta (8)
12. Pulmonary trunk (3)
Inferior mediastinum

Inferior mediastinum is divided into

1. Anterior mediastinum

Relations

- laterally is the pleura
- posteriorly is the pericardium
- anteriorly is the sternum.

Contents

- A quantity of loose areolar tissue
- Some lymphatic vessels which ascend from the convex surface of the liver
- Two or three anterior mediastinal lymph nodes
- The small mediastinal branches of the internal thoracic artery
- Thymus (disappears in adults)
Middle mediastinum

It bounds the pericardial sac

Pericardium contains the vital organs and is classified into the serous and fibrous pericardium

Contents

- the heart enclosed in the pericardium
- the ascending aorta
- the lower half of the superior vena cava with the azygos vein opening into it
- the bifurcation of the trachea and the two bronchi
- the pulmonary trunk dividing into its two branches
- the right and left pulmonary veins
- the phrenic and vagus nerves
- some bronchial lymphatic glands
- Pericardial and phrenic vessels
Middle Mediastinum

Contents:

Heart enclosed in pericardium

Arteries: Ascending Aorta, Pulmonary trunk with its Lt & Rt branches

Veins: SVC, Pulmonary veins

Nerves: Phrenic, vagus nerve

Bifurcation of Trachea with two principal bronchi

Tracheobronchial lymph nodes

Pericardial and phrenic vessels
Posterior mediastinum

Is bounded:
• Anteriorly by (from above downwards); bifurcation of trachea; pulmonary vessels; fibrous pericardium
• Inferiorly by the thoracic surface of the diaphragm
• Superiorly by the thoracic plane
• Posteriorly by the bodies of the vertebral column from the fifth to the twelfth thoracic vertebra
• Laterally by the mediastinal pleura

Contents

Artery: thoracic part of the descending aorta
Veins: azygos vein, the hemiazygos vein and the accessory hemiazygos vein
Nerves: vagus nerve, splanchnic nerves, sympathetic chain
Other structures: Esophagus, thoracic duct, some lymph glands
Contents of the posterior mediastinum
The Pericardium

• **Pericardium**: Is a membranous flask shaped sac that surrounds and protects the heart.

• It is formed by two principal portions:
  • **An outer fibrous pericardium**: Is tough, inelastic, dense irregular connective tissue. It blends inferiorly with the central tendon of the diaphragm and superiorly with the adventitia of the great vessels.
  
  • **An inner serous pericardium**: is a thin, more delicate membrane that forms a double layer around the heart.

• The **outer parietal layer** of the serous pericardium is fused with the fibrous pericardium.

• The **inner visceral layer** of the serous pericardium, called the *epicardium*. It is combined with the underlying delicate areolar tissue and adipose tissue and adheres tightly to the surface of the heart.
• Between the parietal and visceral layers of the serous pericardium is a thin film of lubricating fluid known as **pericardial fluid**.

• The space that contains the few milliliters of pericardial fluid is called the **pericardial cavity**.

• **The heart is suspended freely** inside the pericardial cavity. It is only fixed by the junction between fibrous pericardium and the adventitia of the aorta, pulmonary trunk and superior vena cava superiorly and adventitia of pulmonary veins posteriorly.
Junction between fibrous pericardium and adventitia of great vessels

Visceral layer of serous pericardium (epicardium)

Pericardial cavity

Parietal layer of serous pericardium

Fibrous pericardium

Mediastinum
Layers of the Heart Wall

- The wall of the heart consists of three layers: **epicardium**, the **myocardium**, and the **endocardium**.

- **Epicardium (external layer):** is composed of two tissue layers. The outermost is the visceral layer of the serous pericardium (**mesothelium**). Beneath the mesothelium is a variable amount of delicate areolar tissue and adipose tissue. It contains blood vessels, lymphatics, and nerves that supply the myocardium.

- **The middle myocardium** (muscle 95% of the heart) is responsible for the pumping action of the heart and is composed of cardiac muscle tissue.

- **Endocardium (innermost layer):** is a thin layer of **endothelium** overlying a thin layer of connective tissue. Provides a smooth lining for the chambers of the heart and covers the valves of the heart. The smooth endothelial lining minimizes the surface friction.
A section of the heart showing its three layers: epicardium, myocardium, and endocardium.

**Epicardium**
Covers the outer surface of the heart; also called the visceral pericardium.
- Mesothelium
- Areolar tissue

**Myocardium**
Muscular wall of the heart consisting primarily of cardiac muscle cells.

**Endocardium**
Covers the inner surfaces of the heart.
- Endothelium
- Areolar tissue

**Pericardial cavity**
(contains serous fluid)

**Parietal Pericardium**
The serous membrane that forms the outer wall of the pericardial cavity; it and a dense fibrous layer form the pericardial sac surrounding the heart.
- Dense fibrous layer
- Areolar tissue
- Mesothelium
Pericardial sinuses
There are two pericardial sinuses: **Transverse sinus** and **oblique Sinus**

**Transverse sinus**: located between the aorta and pulmonary artery anteriorly and the superior vena cava posteriorly

**Oblique sinus**: is a cul-de-sac sinus, enclosed between the limbs of an inverted U shaped pericardial reflection; it lies posterior to the left atrium. Pericardial reflection is a double layer of visceral mesoderm supporting the heart in the pericardial cavity.
Boundaries of the oblique sinus

right (in ascending order): *inferior vena cava*, *right inferior pulmonary vein* and *right superior pulmonary vein*

Superior: it is separated from the transverse pericardial sinus above by a **double** reflection of serous pericardium that extends transversely between the left and right superior pulmonary veins

Left (in ascending order): *left inferior pulmonary vein* and *left superior pulmonary vein*
Lateral folding apposes paired **heart tube primordia** and brings **dorsal aortae** to midline. Heart primordia fuse to form **tubular heart**.
Thank You