CARDIOVASCULAR SYSTEM

MEDIASTINUM & PERCARDIUM

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Sunday 3 November 2024

Mediastinum

** It is the space between the two pleural cavities.

** Boundaries of the mediastinum:

- ✓ **Anteriorly:** Sternum.
- ✓ **Posteriorly:** All thoracic vertebrae.
- ✓ **Superiorly:** Thoracic inlet.
- ✓ **Inferiorly:** Diaphragm.

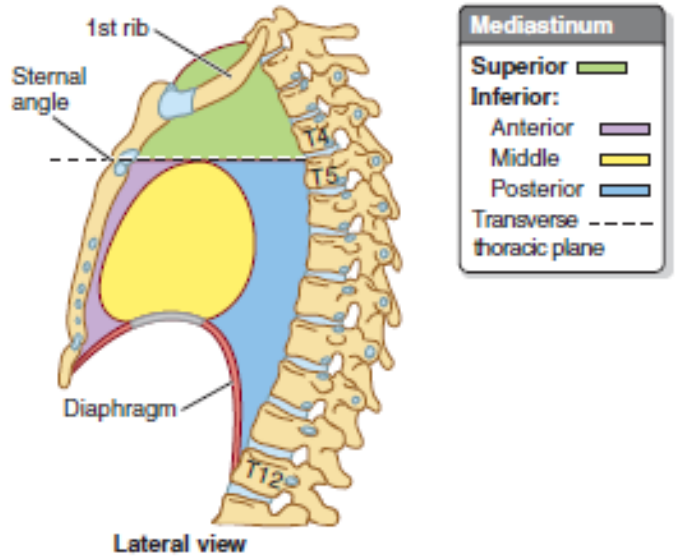
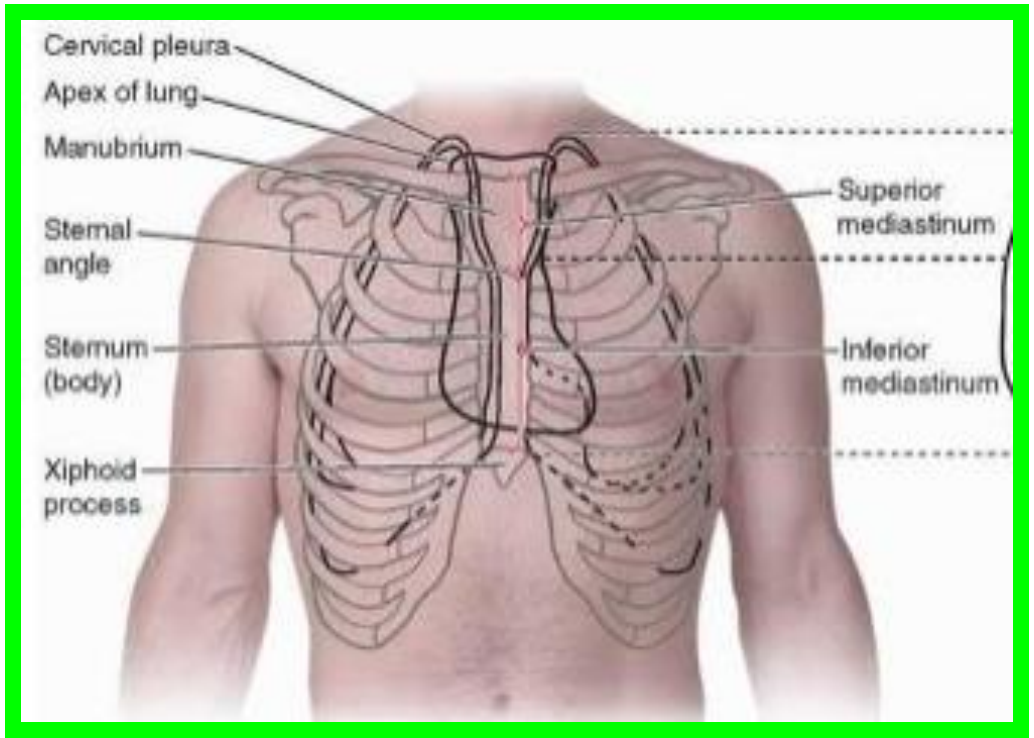
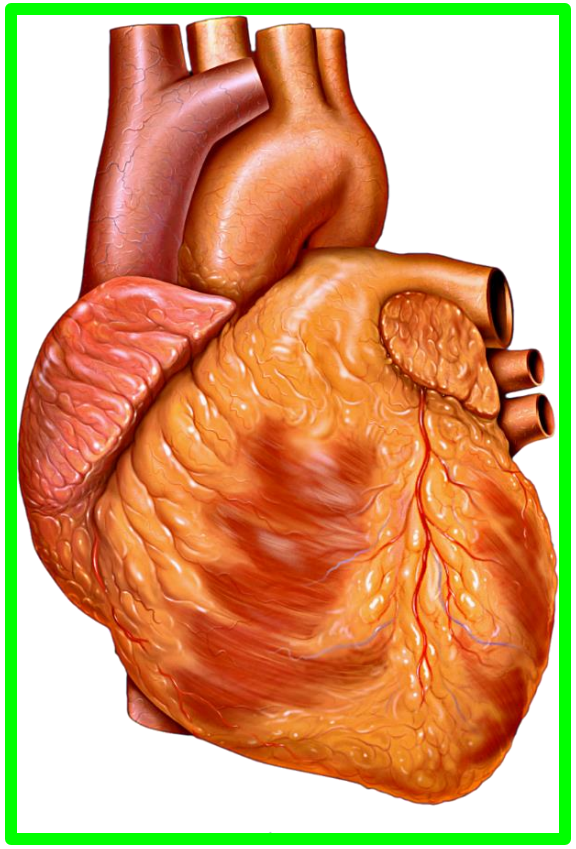


FIGURE 1.23. Subdivisions of mediastinum.



Mediastinum

- In living persons is a highly mobile region because it consists primarily of hollow (liquid- or air-filled) visceral structures



Dr. Aiman Qais Afar

Sunday 3 November 2024

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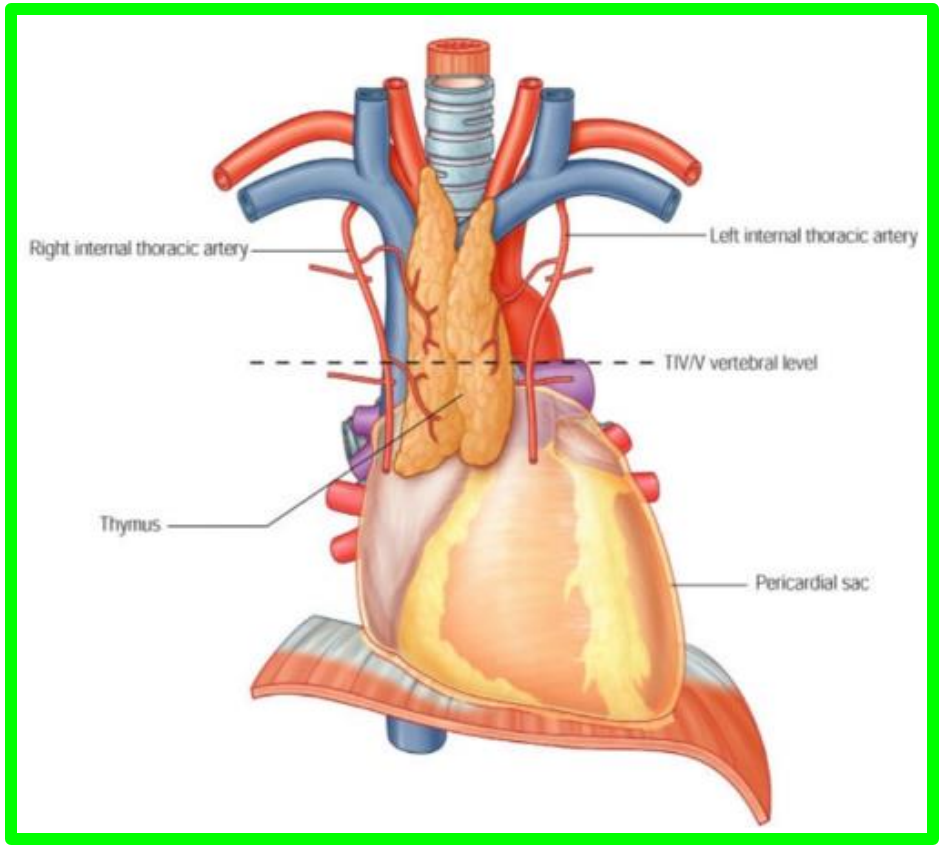


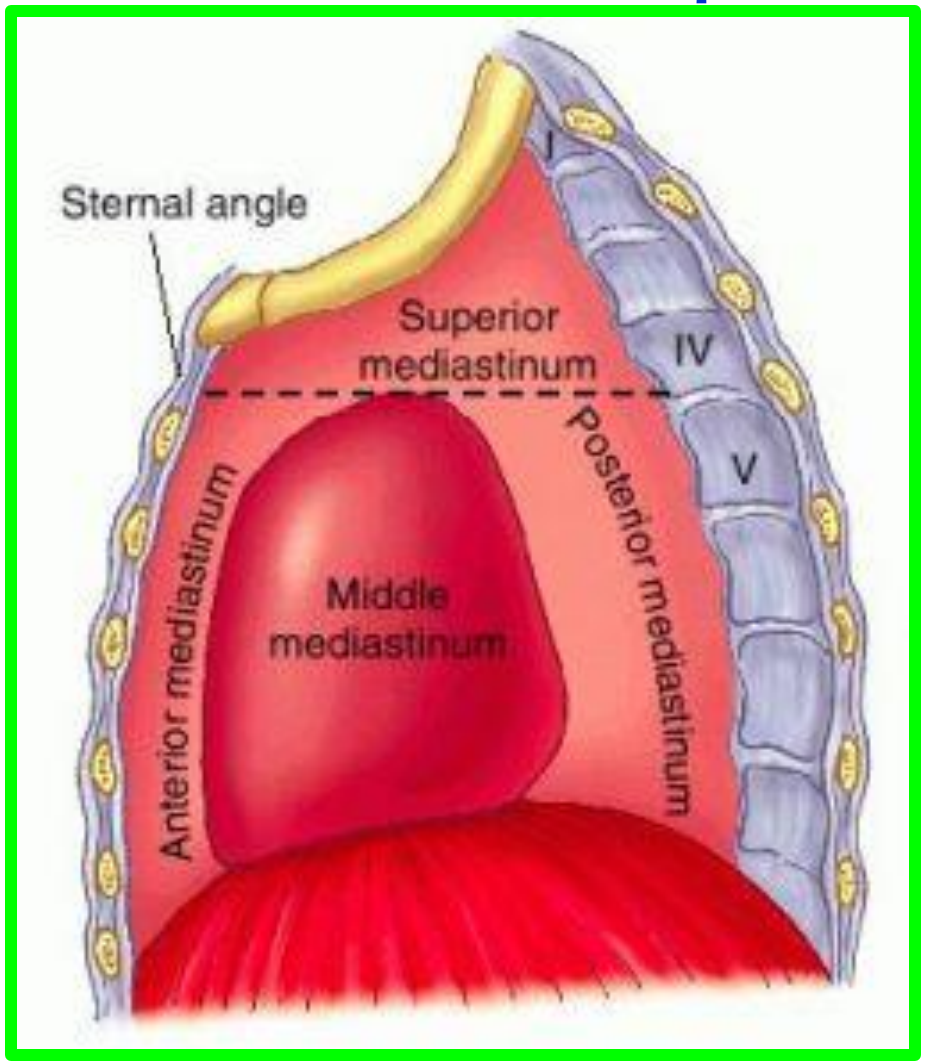
The connective tissue here becomes more fibrous and rigid with age; hence, the mediastinal structures become less mobile

Mediastinum

** The mediastinum is divided by a horizontal imagery line extends from the sternal angle (angle of Louis) to the inter-vertebral disc of T4/T5 into superior and inferior mediastinum.

** The inferior mediastinum is divided by the heart and pericardium into:

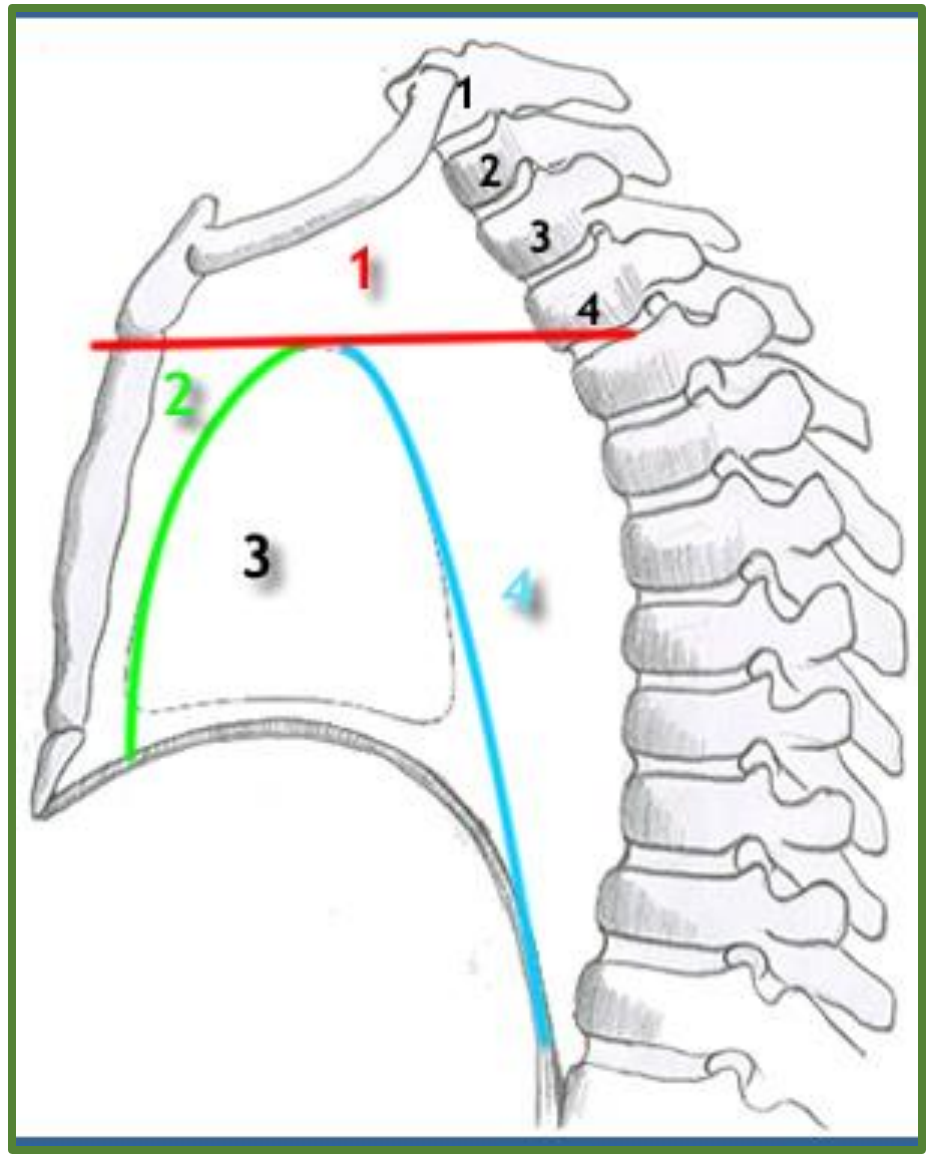
- Anterior mediastinum
- Middle mediastinum
- Posterior mediastinum



Superior mediastinum

** Boundaries:

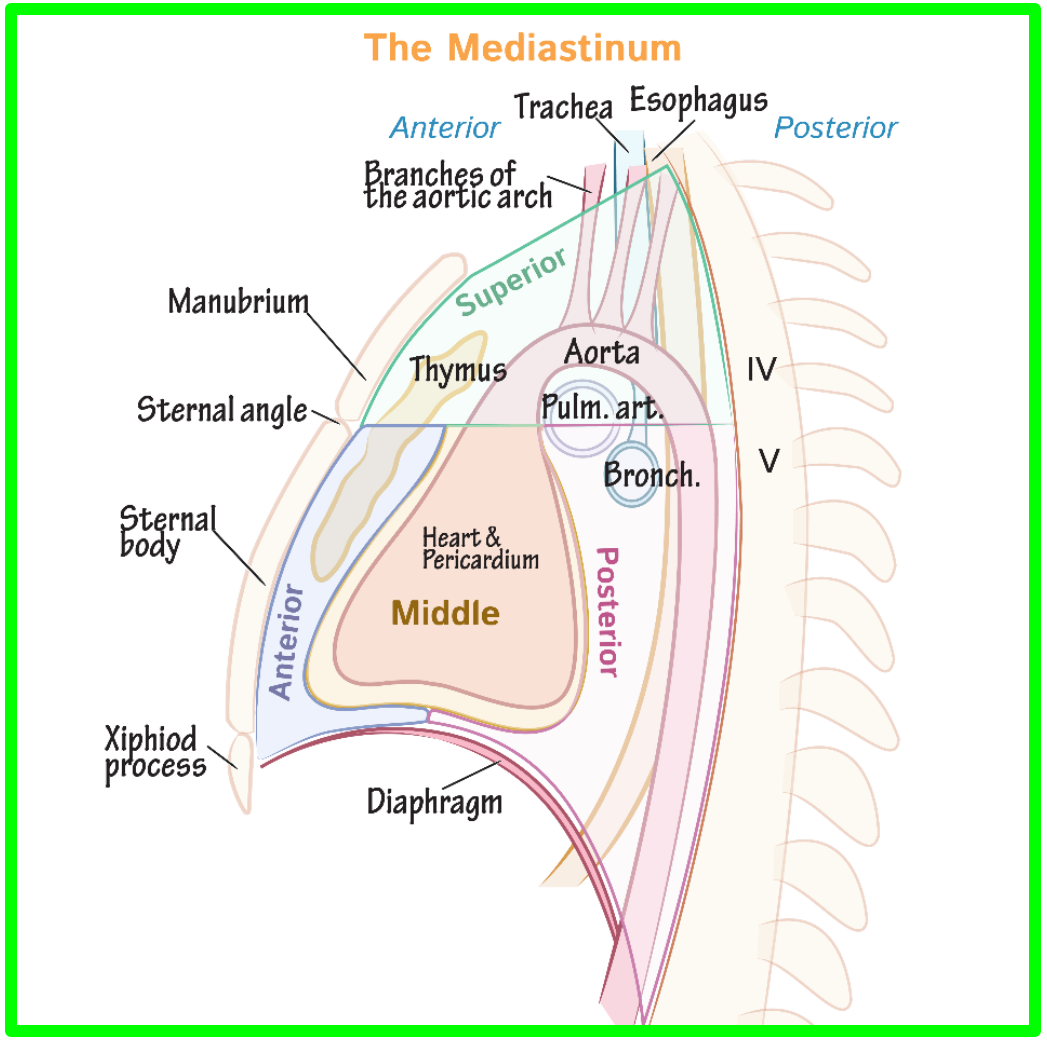
- ✓ **Anteriorly:** manubrium sterni.
- ✓ **Posteriorly:** upper 4 thoracic vertebrae.
- ✓ **Superiorly:** inlet of the thoracic cavity.
- ✓ **Inferiorly:** the imaginary plane from the sternal angle to the lower border of T4.



Contents of Superior Mediastinum

1) Sternohyoid and sternothyroid muscles.
2) Thymus gland.
3) Large veins;
   a. left brachiocephalic vein.
   b. Right brachiocephalic vein.
   c. Upper half of superior vena cava.

4) Large arteries;
   A. Arch of the aorta:
   B. Brachiocephalic artery.
   C. Left common carotid artery.
   D. Left subclavian artery.



Contents of Superior Mediastinum

5) Trachea.

6) Esophagus

7) Right and left vagus nerves.

8) Right and left phrenic nerves

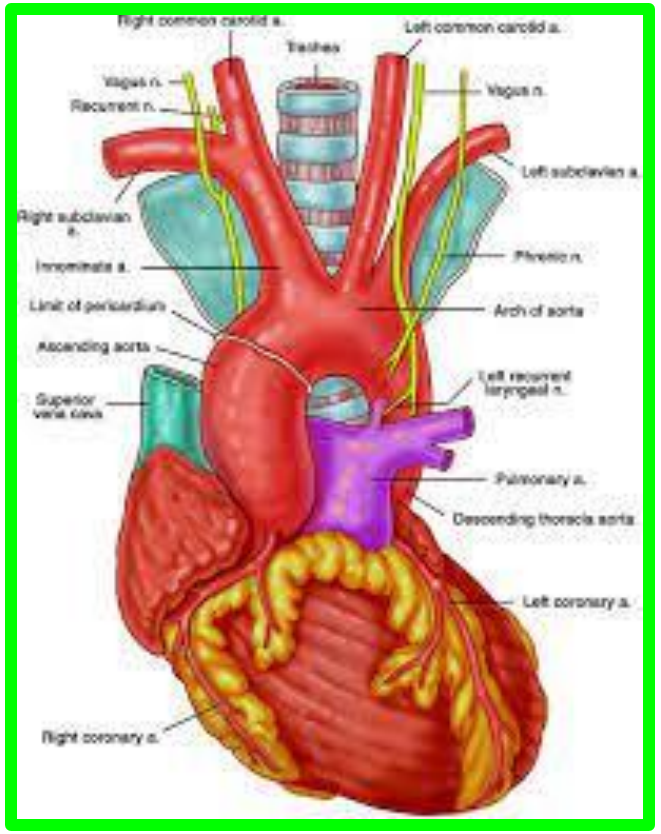
9) Thoracic duct.

10) Lymph nodes.

11) Left recurrent laryngeal nerve.

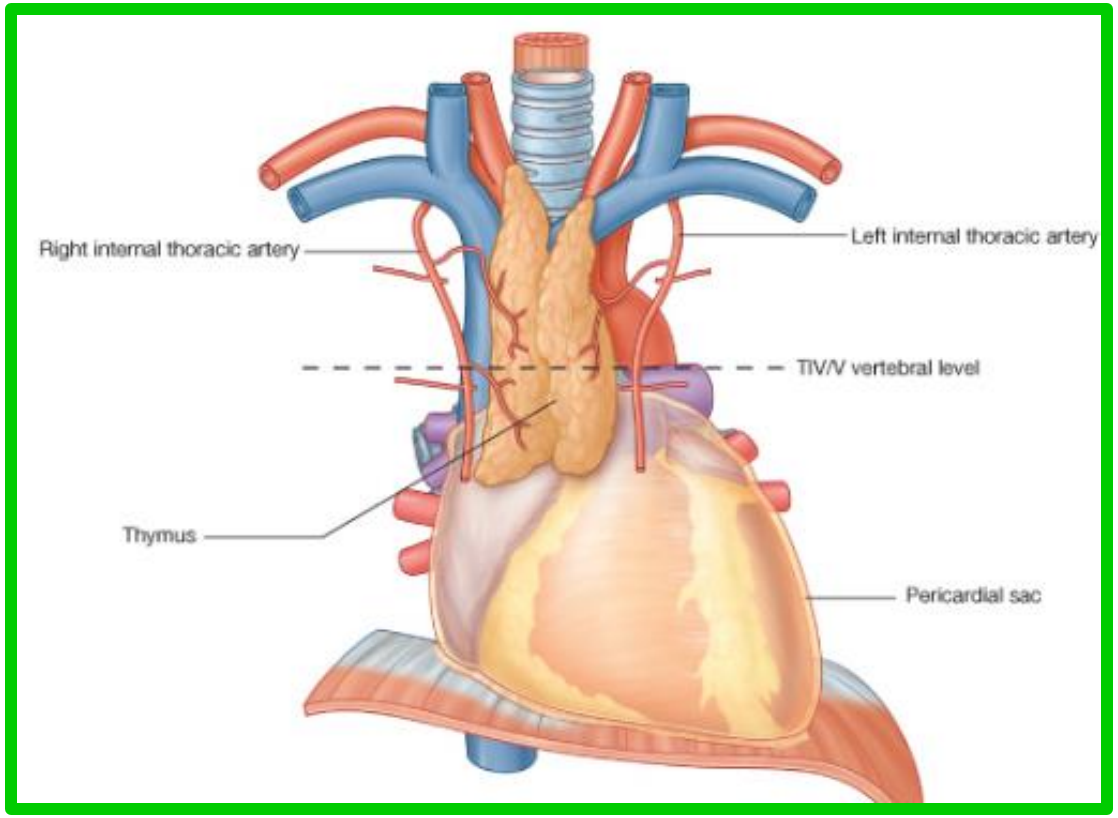
12) Left superior intercostals vein.

13) Cardiac plexus.



Dr. Aiman Qais Afar

Sunday 3 November 2024

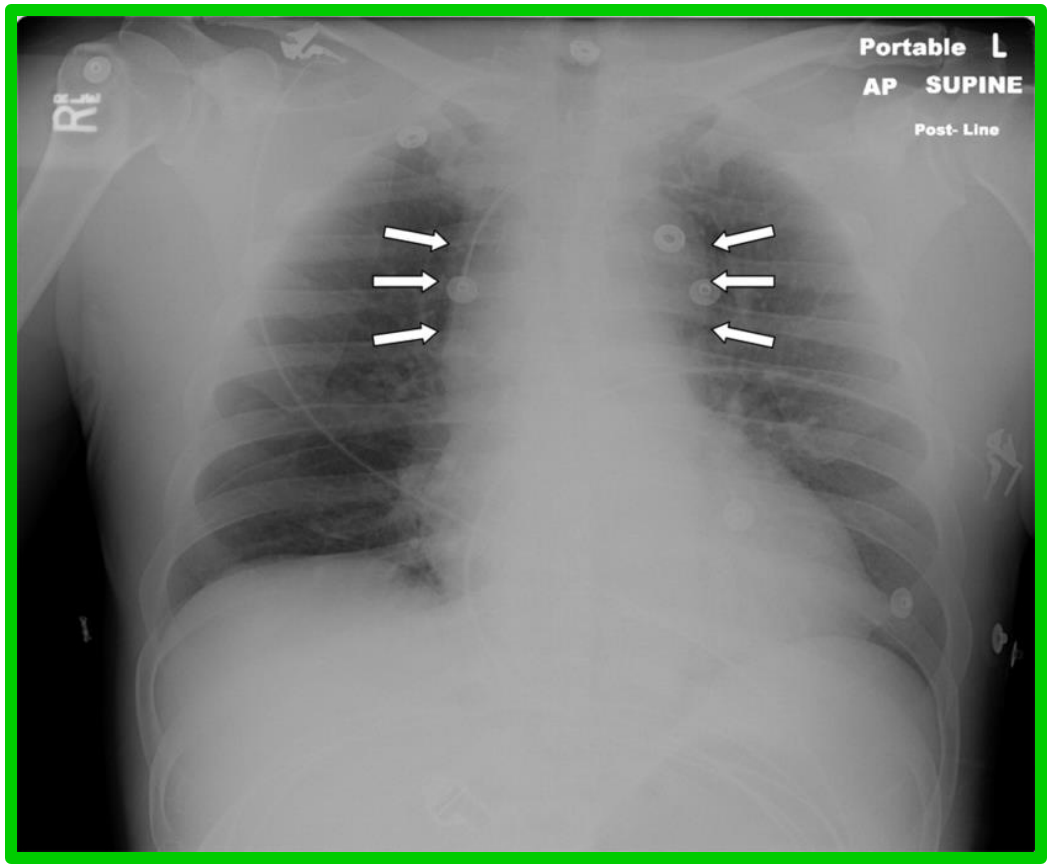


Widening of Mediastinum

✓It is often observed after trauma which produces hemorrhage into the mediastinum from lacerated great vessels such as the aorta or SVC.

✓ Malignant lymphoma (cancer of lymphatic tissue)

✓Hypertrophy (enlargement) of the heart (often occurring due to congestive heart failure)



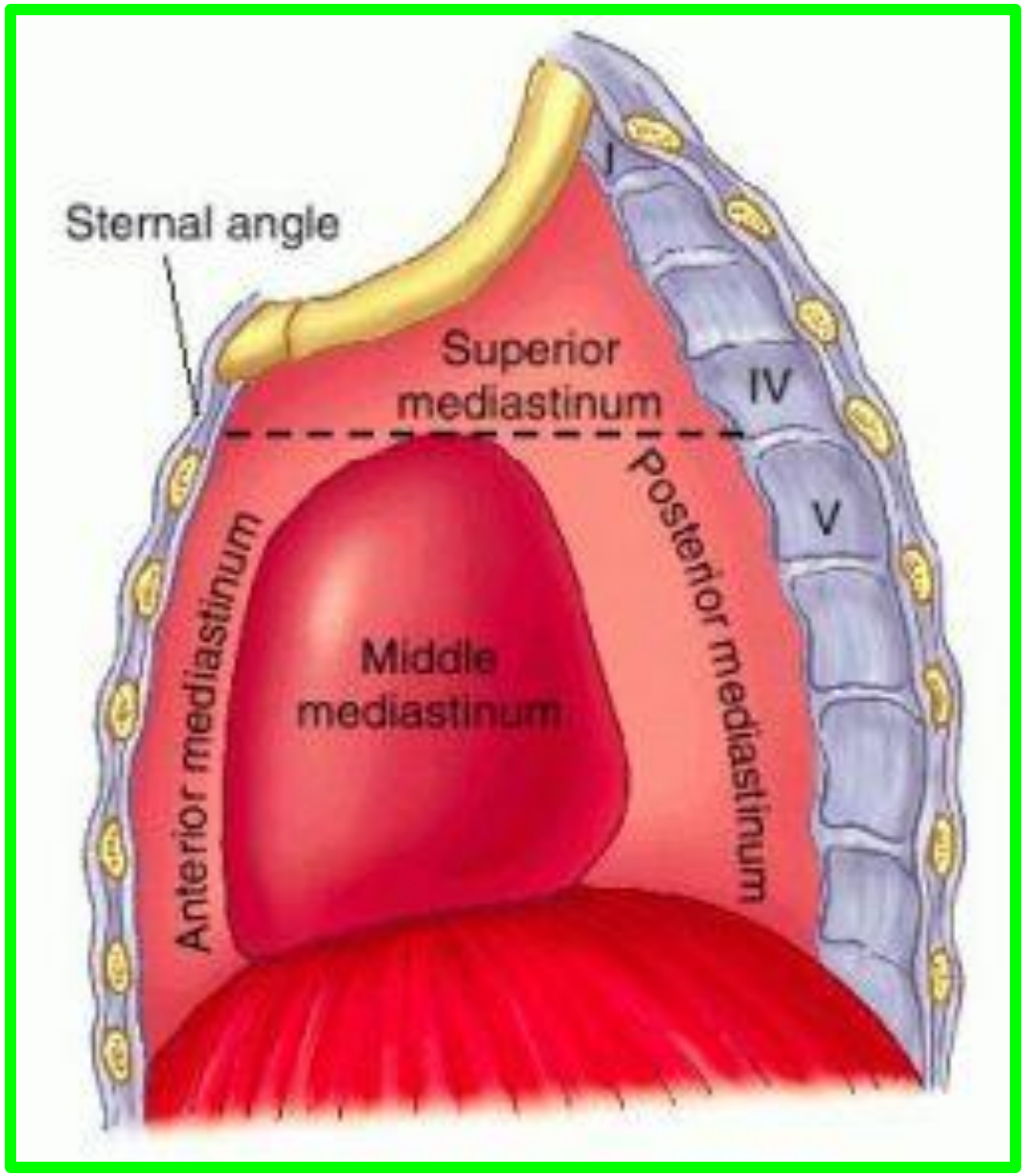
1- Compression of veins leading to venous congestion of upper limb, head and Neck
2- Compression of the arteries leading to ischemia of upper limb, head & neck.
3- Compression of the trachea leading to dyspnea (difficult of respiration).
4- Compression of the oesophagus leading to dysphagia (difficult in swallowing).

Tracheal tag: The trachea ends at the level of T4/T5. This level descends during inspiration to the level of T6.

Anterior mediastinum

** Boundaries;

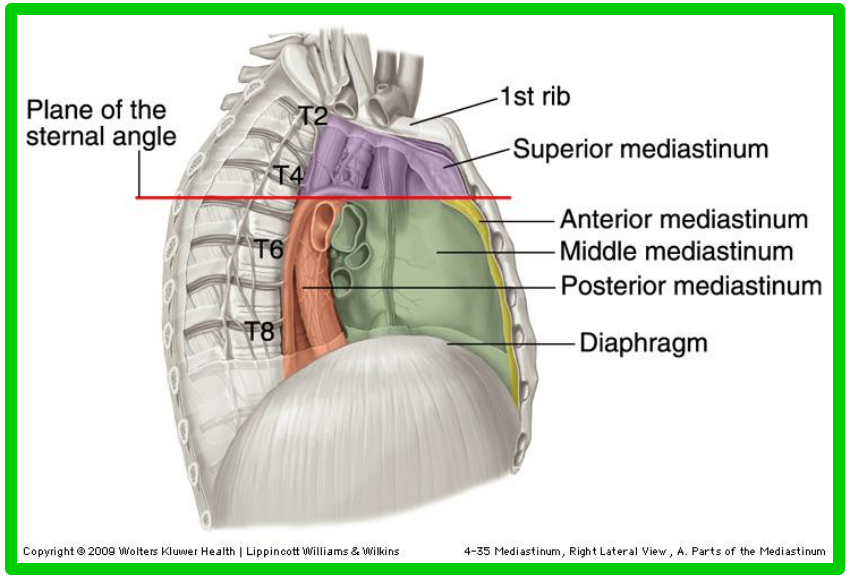
- **Anteriorly;** The body of the sternum.
- **Posteriorly;** the pericardium and the heart.
- **Superiorly;** the horizontal transverse thoracic plane
- **Inferiorly;** the diaphragm.
- **On each side;** the pleura and lung.

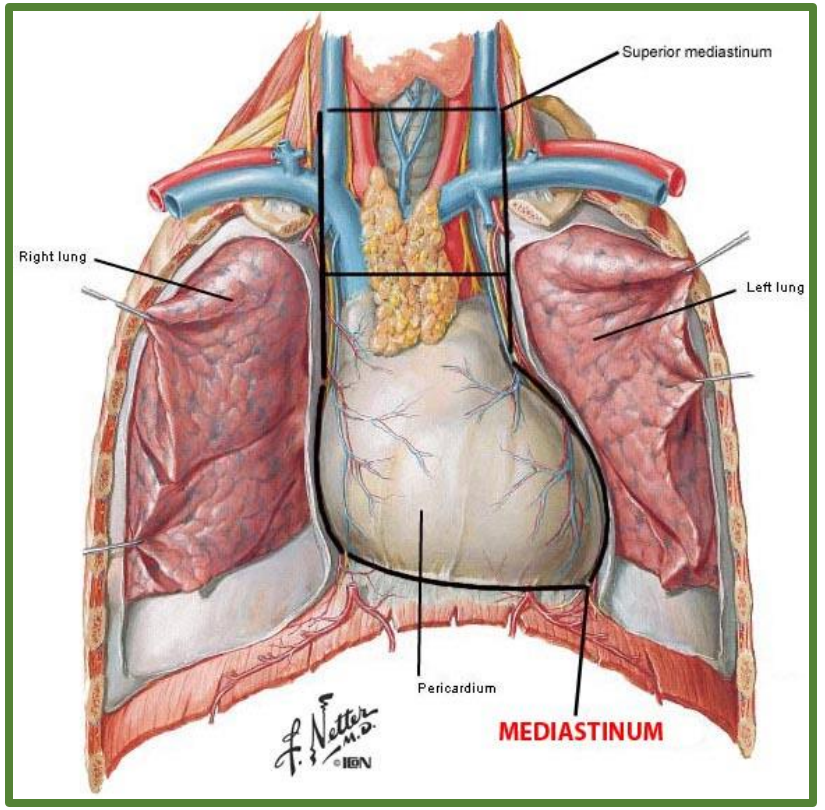


Anterior mediastinum

** Contents

1) Thymus gland.
2) Superior and inferior of sterno-pericardial ligaments. They connect the fibrous pericardium to the back of the body of the sternum.
3) Sternocostalis muscle.
4) Few lymph nodes.
5) Loss areolar connective tissue.
6) Mediastinal branches of internal thoracic artery.

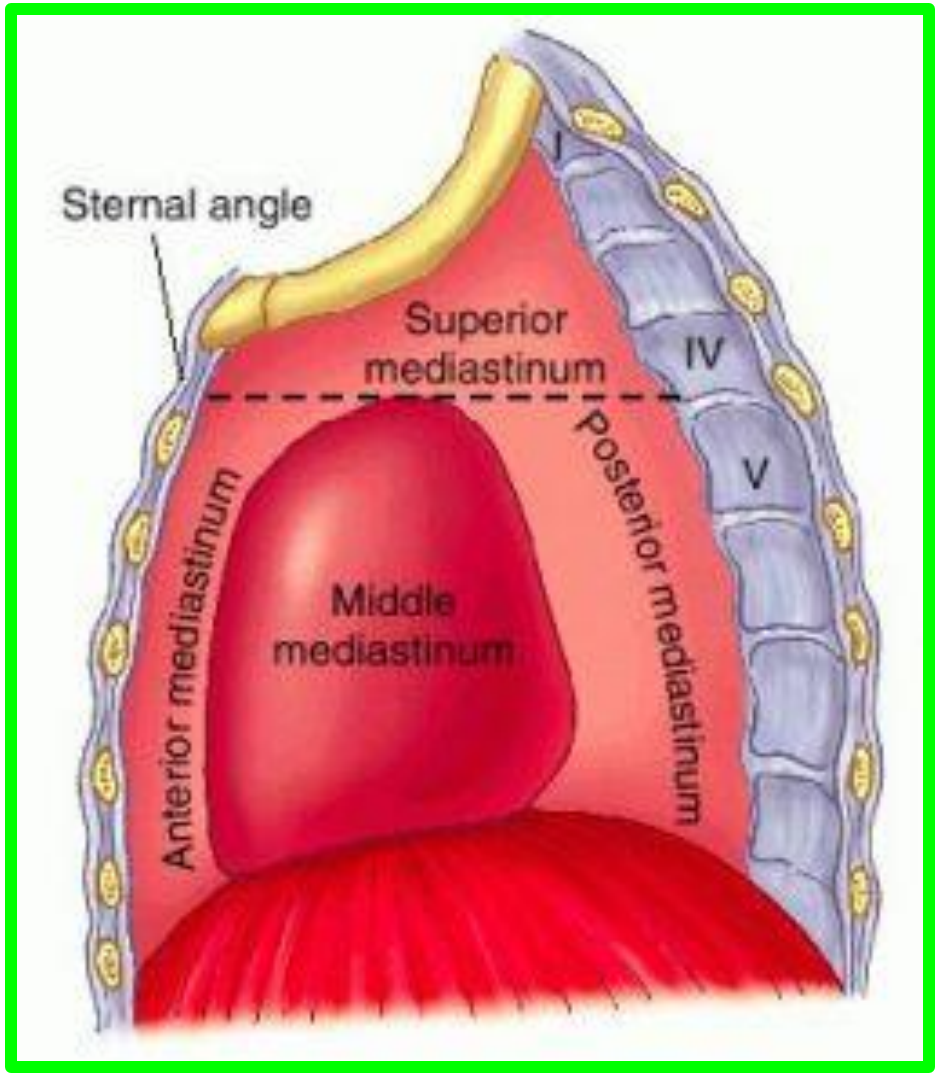




Middle mediastinum

** Boundaries;

- **Anteriorly;** anterior mediastinum.
- **Posteriorly:** posterior mediastinum.
- **Superiorly:** The horizontal transverse thoracic plane
- **Inferiorly:** the diaphragm
- **On each side;** the pleura and lung.

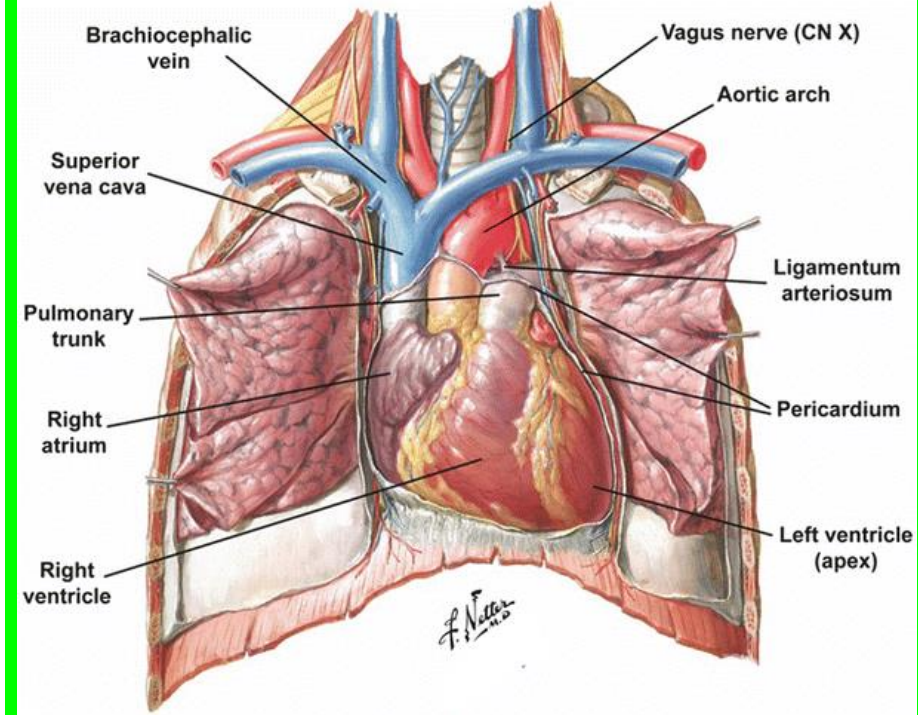


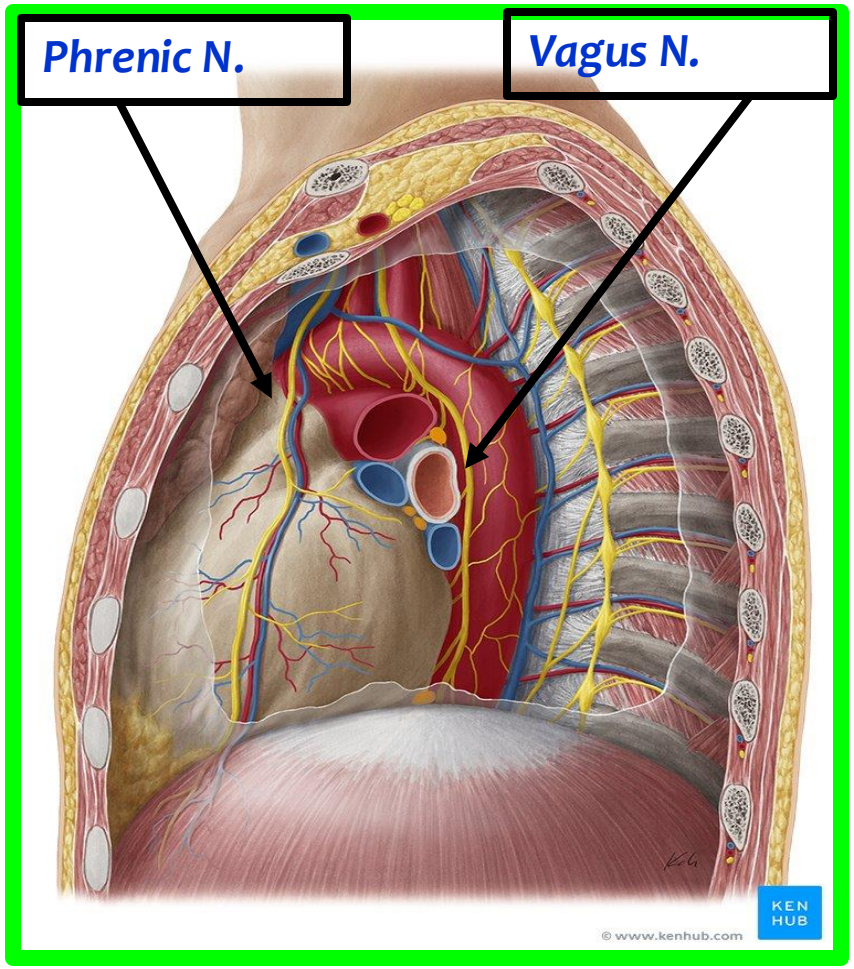
Middle mediastinum

** Contents

1) The heart and pericardium
2) Beginning and termination of:

A. Aorta and pulmonary trunk.
B. SVC and IVC.
C. 4 pulmonary veins.



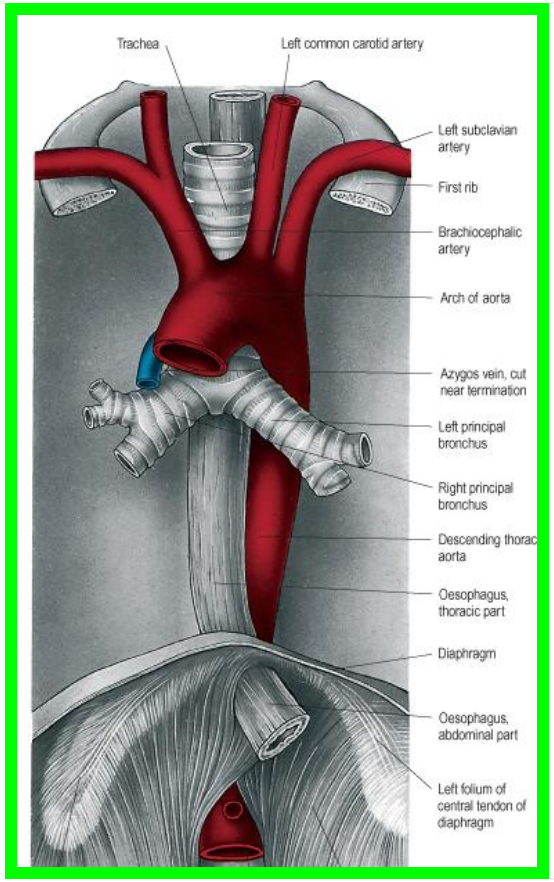


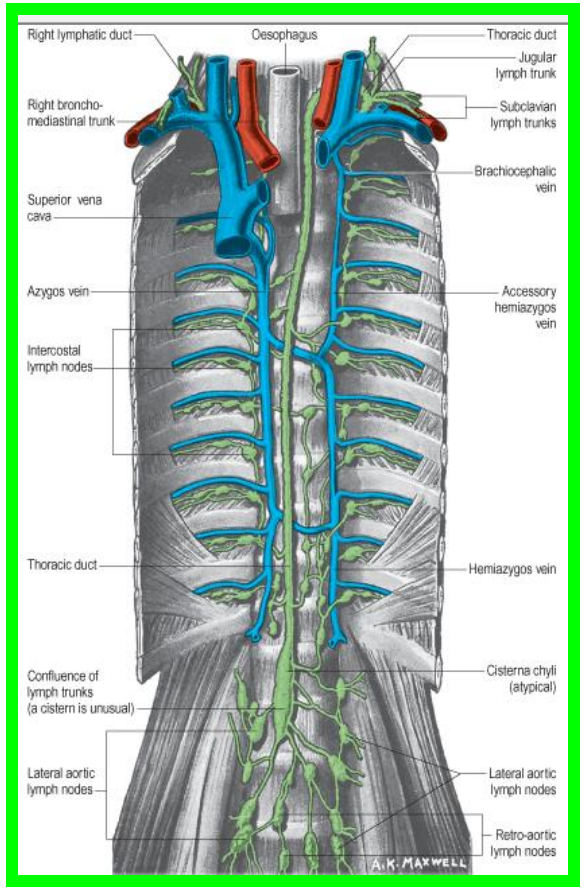
Dr. Aiman Qais Afar
Sunday 3 November 2024

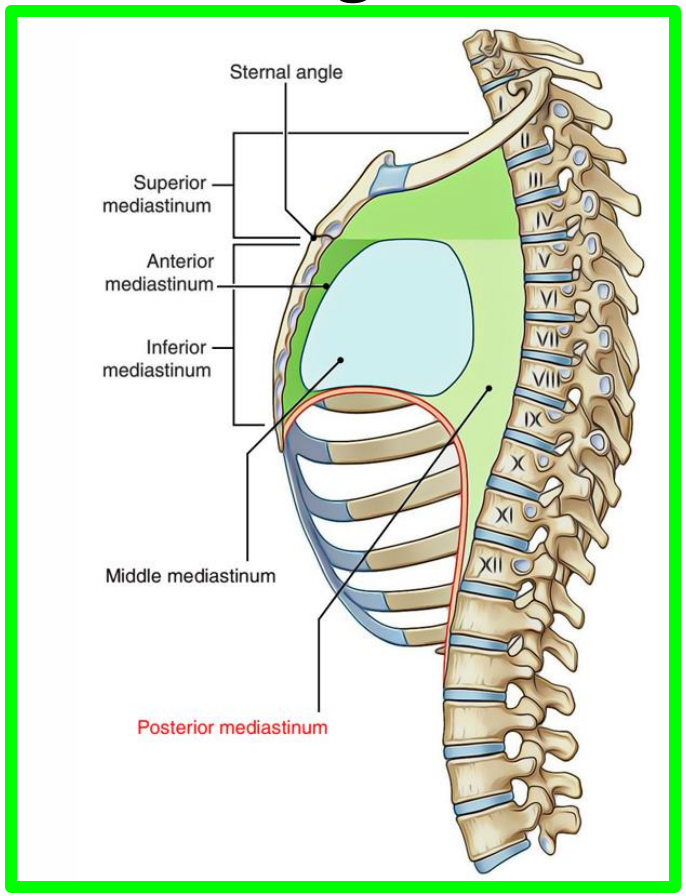
Posterior mediastinum

** Boundaries;

- ✓ **Anteriorly,** pericardium.
- ✓ **Posteriorly,** The bodies of T5 to T12 thoracic vertebrae.
- ✓ **Superiorly,** The horizontal transverse thoracic plane
- ✓ **Inferiorly,** diaphragm.
- ✓ **On each side,** pleura and lung.



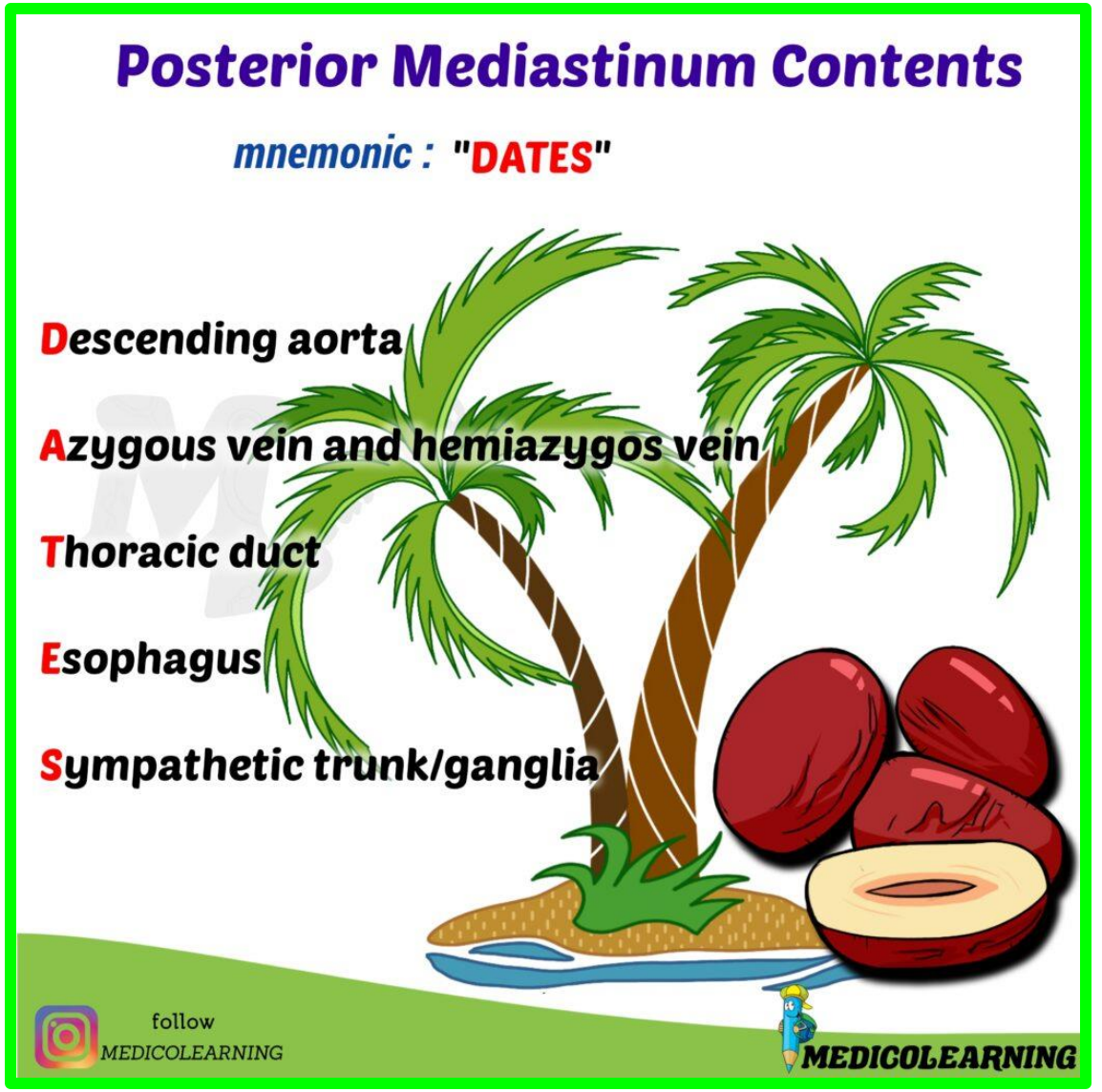




Posterior mediastinum

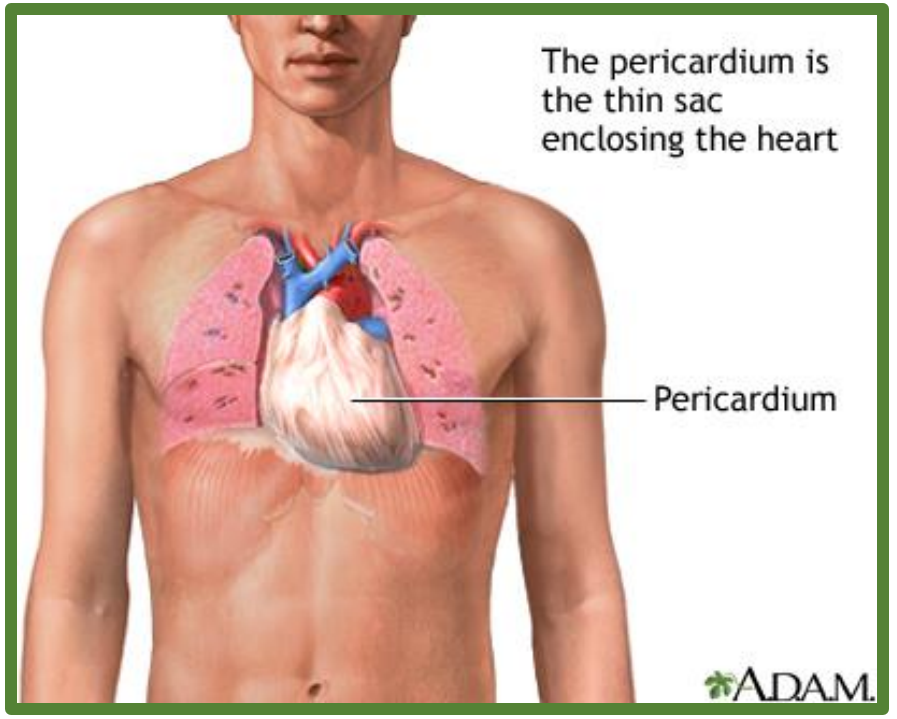
** Contents

1) Esophagus and oesophageal nerve plexus.
2) Descending thoracic aorta.
3) Thoracic duct.
4) Azygos vein.
5) Hemiazygos vein.
6) Accessory hemiazygos vein.
7) Right and left vagus nerves.
8) Sympathetic chains
9) Posterior mediastinal lymph nodes.
10) Pre-vertebral muscles.
11) Anterior longitudinal ligament.



Pericardium

The pericardium is a fibroserous sac that encloses the heart and the roots of the great vessels.

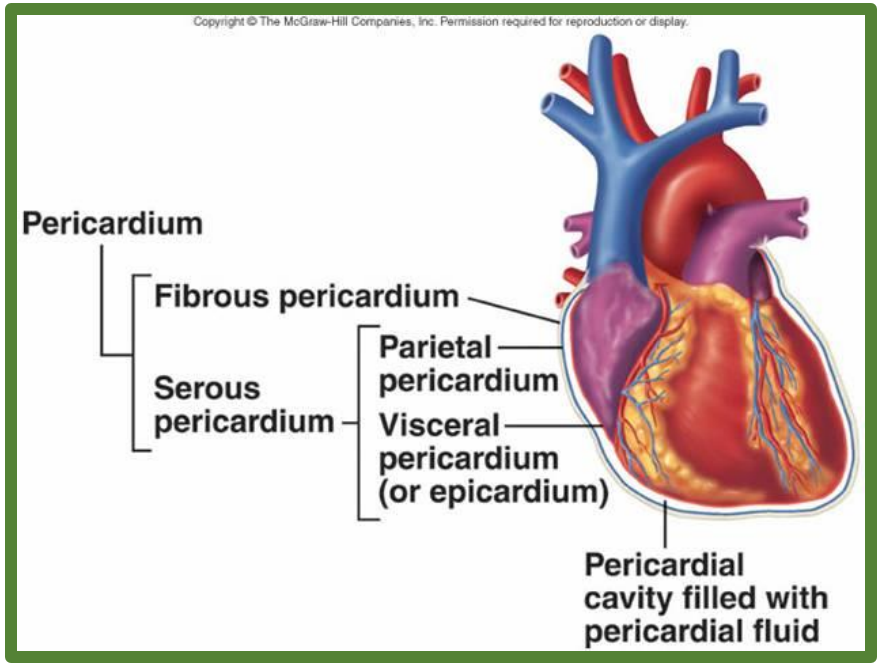


** Functions

1- Maintains a constant position of the heart.

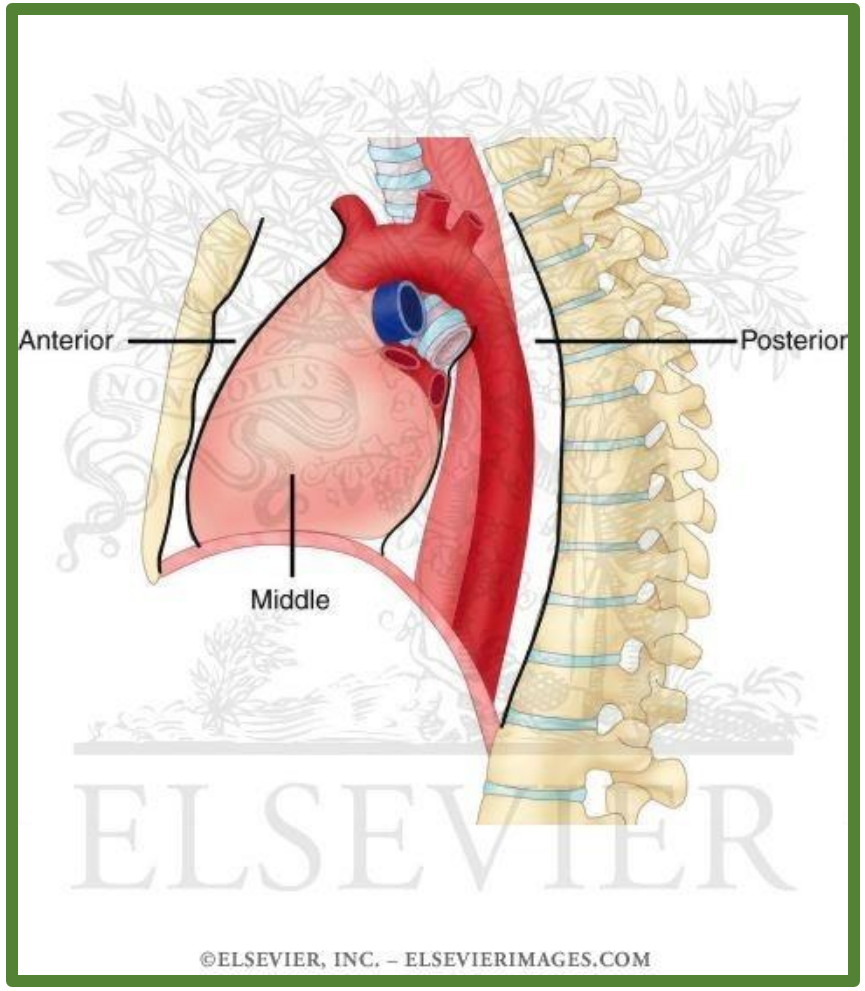
2- Being non elastic, it prevent over distension of the heart.

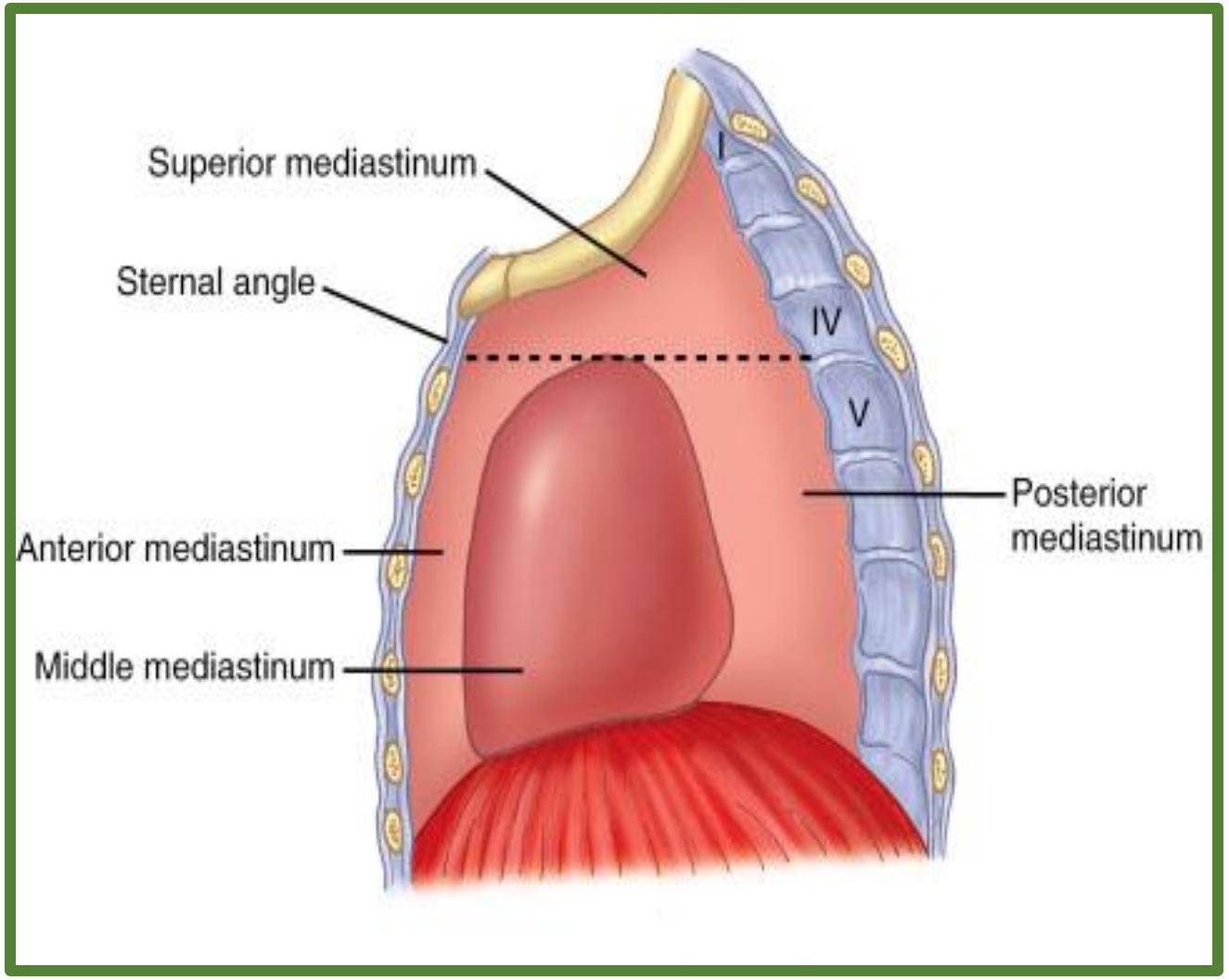
3- Keeps the mouths of the blood vessels open.



Pericardium

The pericardium lies within the middle mediastinum , posterior to the body of the sternum and the 2nd to the 6th costal cartilages and anterior to the 5th to the 8th thoracic vertebrae



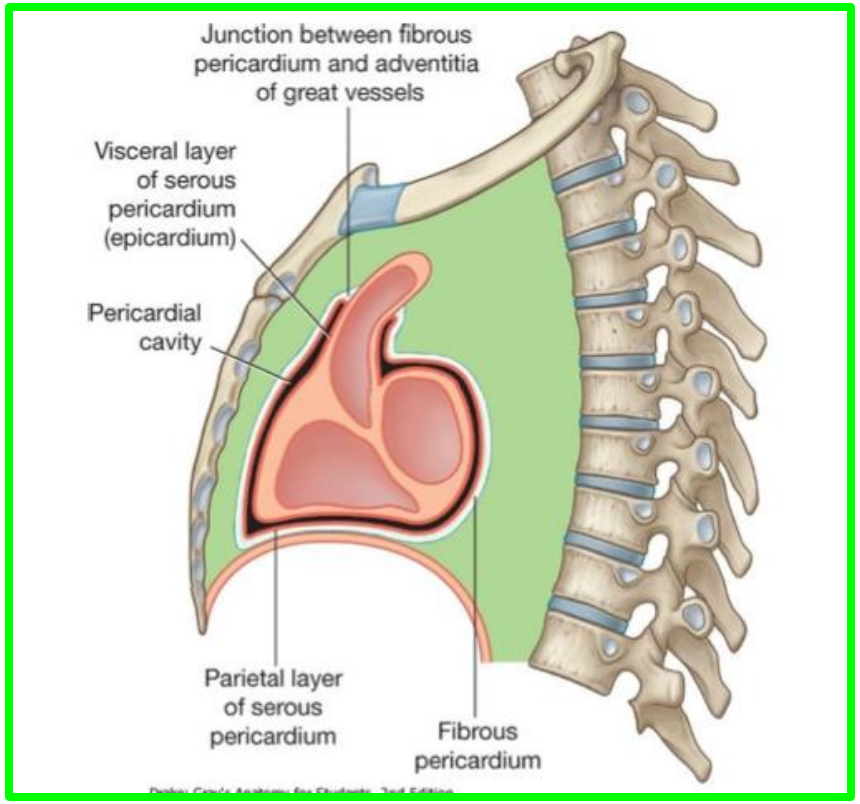


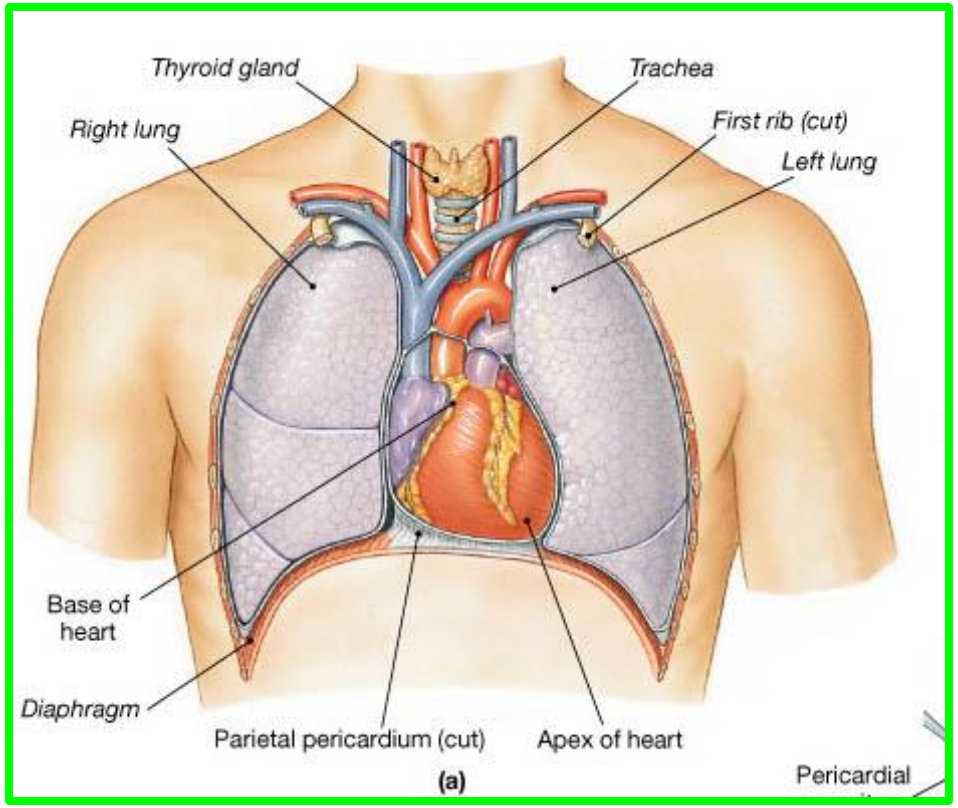
Dr. Aiman Qais Afar

Sunday 3 November 2024

Fibrous Pericardium

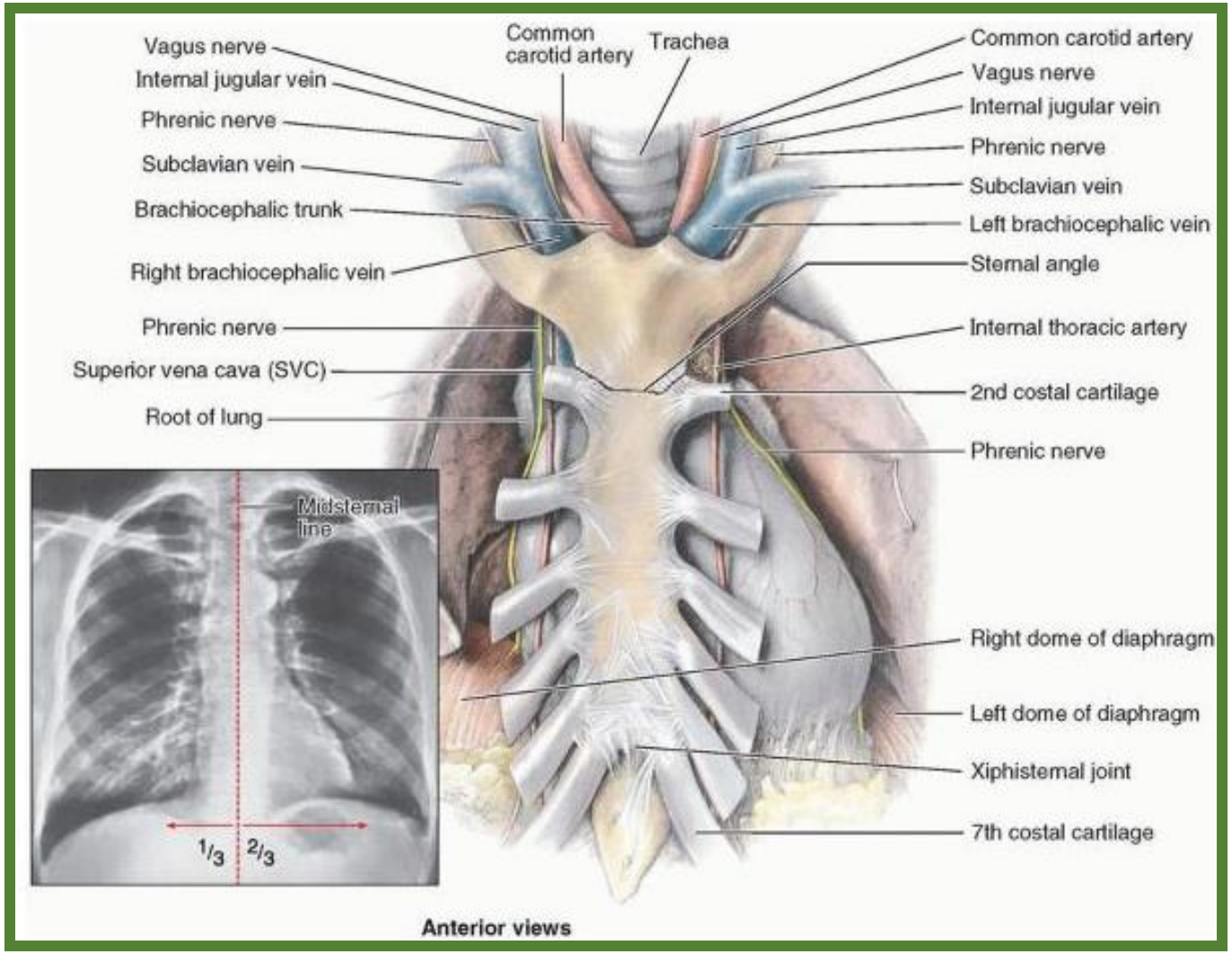
- ✓ Is the strong fibrous part of the sac.
- ✓ It is firmly attached below to the central tendon of the diaphragm.
- ✓ It fuses with the outer coats of the great blood vessels passing through it namely, the aorta, the pulmonary trunk, the superior and inferior venae cavae, and the pulmonary veins





Fibrous Pericardium

The fibrous pericardium is attached in front to the sternum by the sternopericardial ligaments (Superior and Inferior)



Dr. Aiman Qais Afar

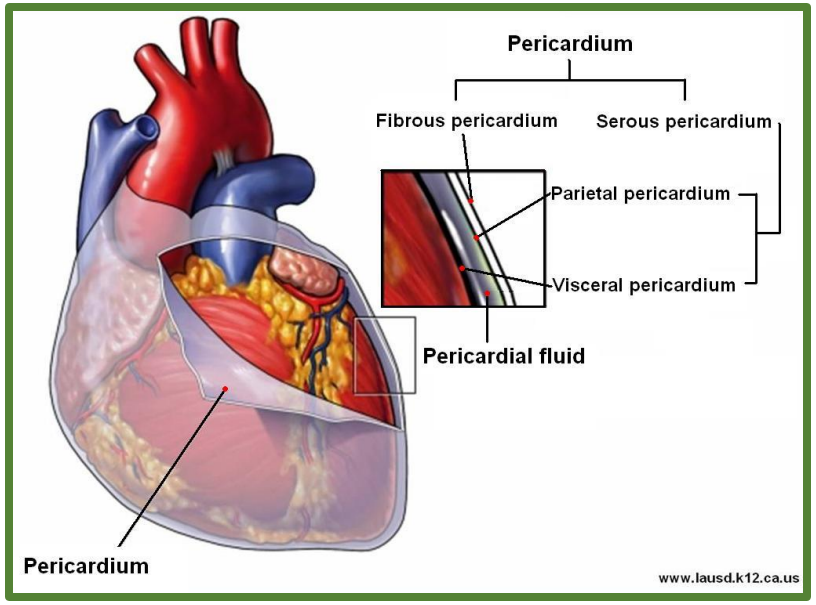
Sunday 3 November 2024

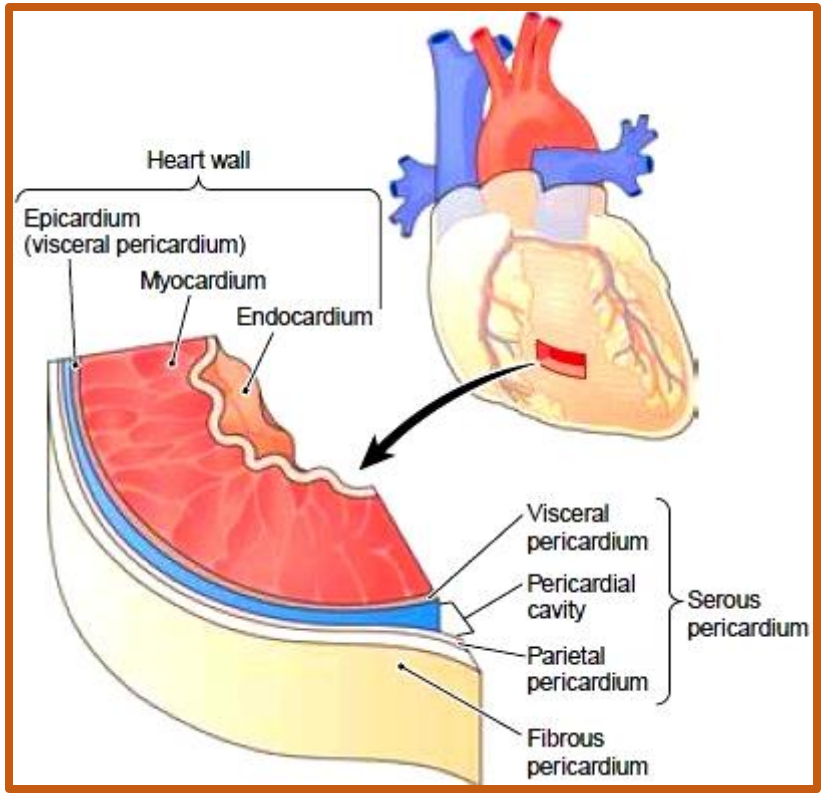
Serous Pericardium

The serous pericardium lines the fibrous pericardium and coats the heart.

- It is divided into parietal and visceral layers

- The parietal layer lines the fibrous pericardium and is reflected around the roots of the great vessels to become continuous with the visceral layer of serous pericardium that closely covers the heart

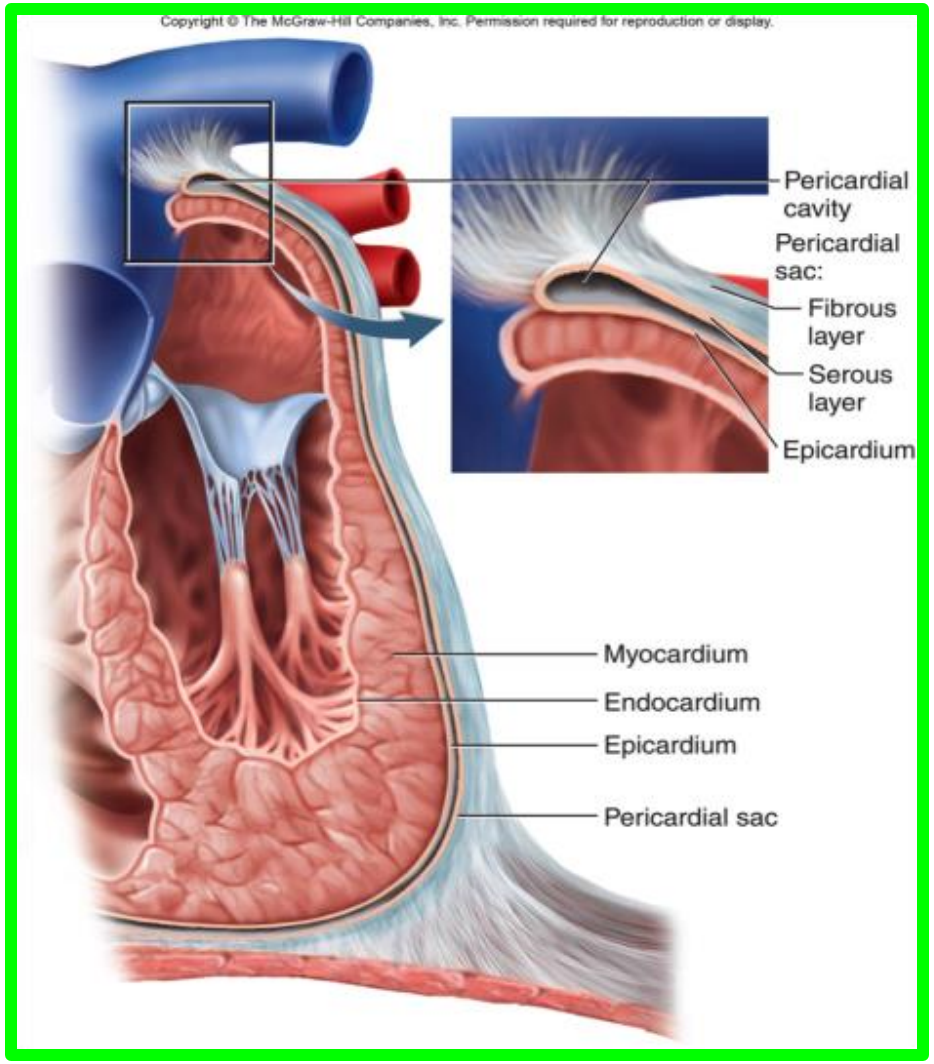




Serous Pericardium

- The visceral layer is closely applied to the heart and is often called the epicardium.

The slitlike space between the parietal and visceral layers is referred to as the pericardial Cavity.

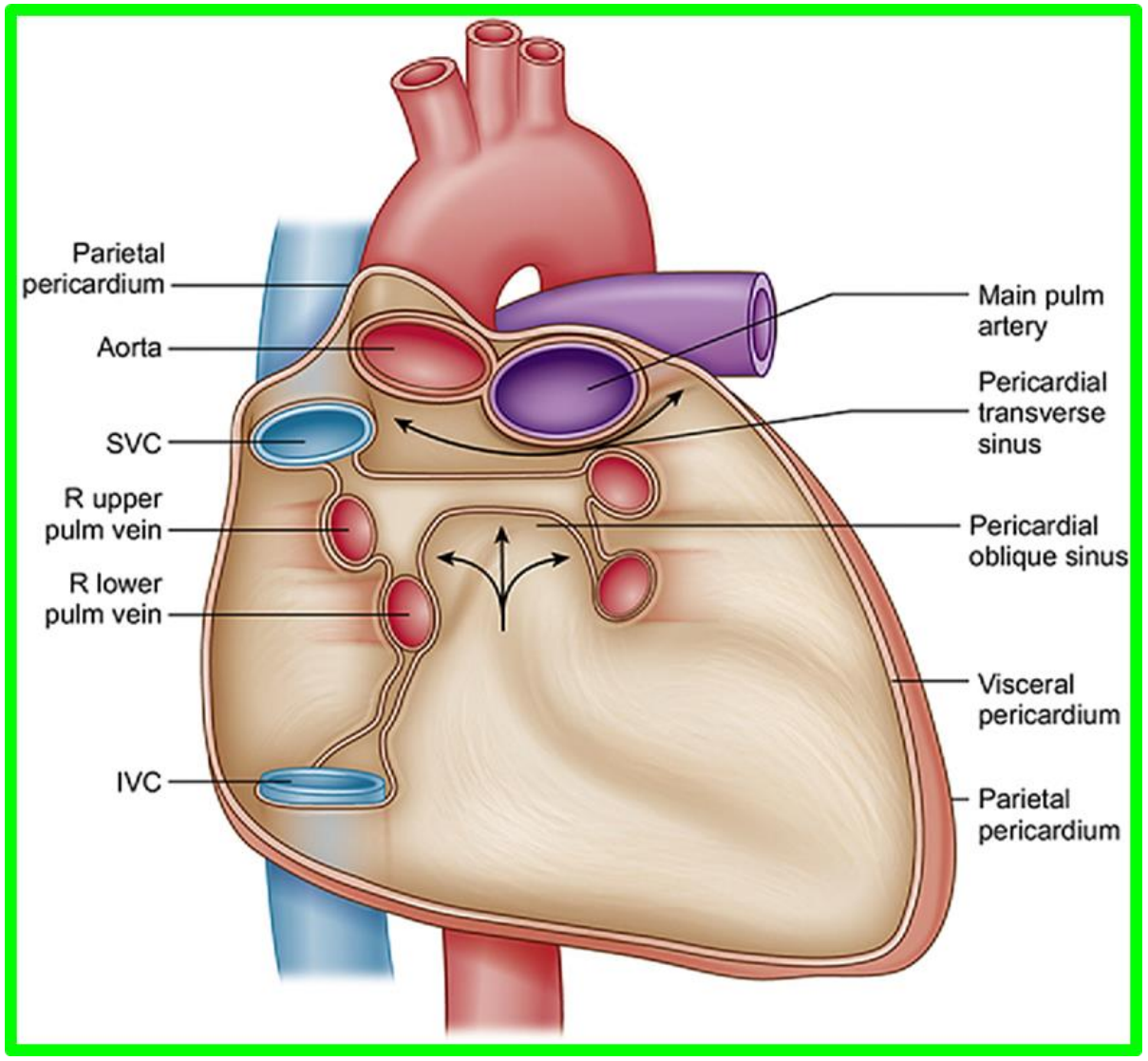


Normally, the cavity contains a small amount of tissue fluid (about 50 mL), the pericardial fluid, which acts as a lubricant to facilitate movements of the heart

Pericardial Sinuses

Between parietal and visceral layers there are two sinuses:

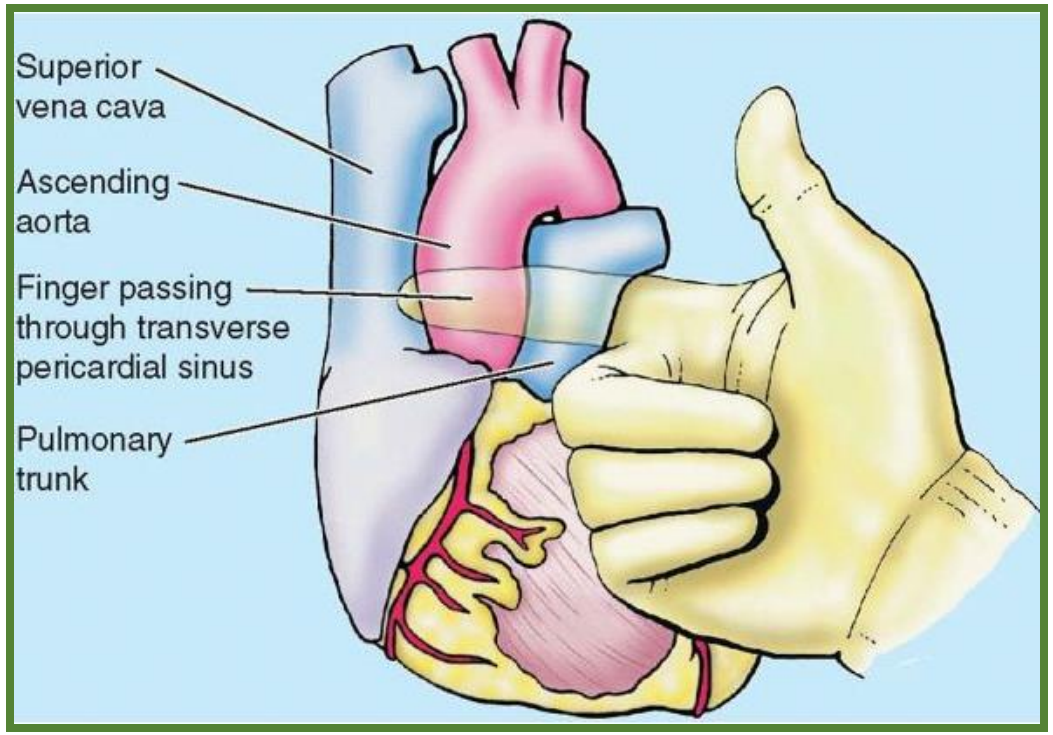
- **the transverse sinus and**
- **the oblique sinus of the pericardium.**

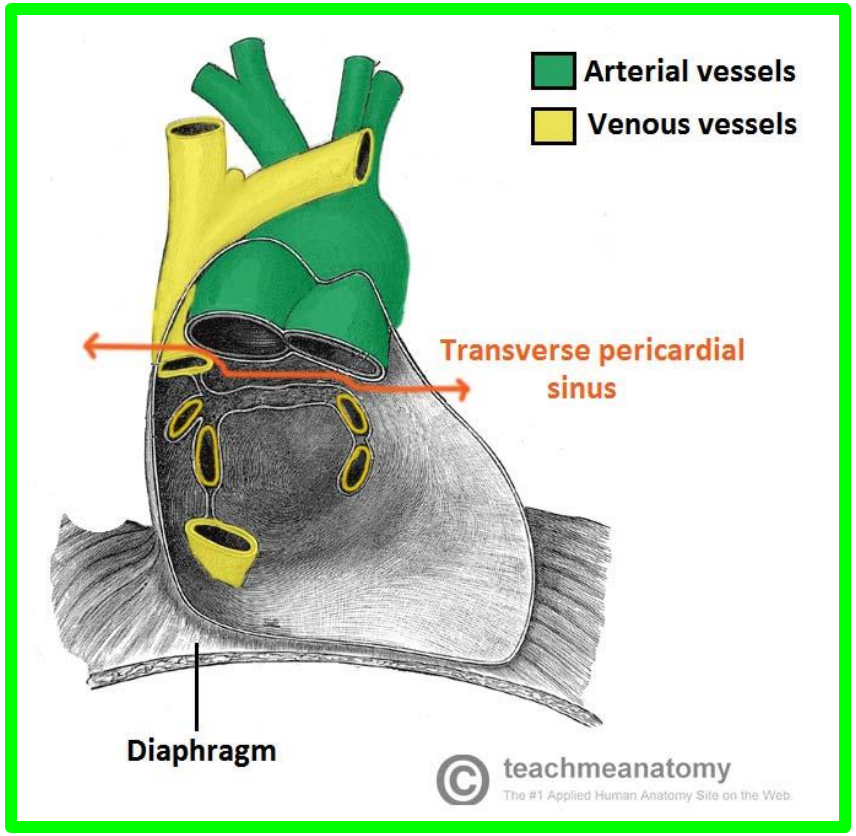


Dr. Aiman Qais Afar
Sunday 3 November 2024

Pericardial Sinuses

❖ The transverse sinus is a passage above the heart, between the ascending aorta and pulmonary trunk in front and the superior vena cava, left atrium and pulmonary veins behind





✓ It is through the transverse sinus that temporary ligature is passed to occlude pulmonary trunk and aorta during pulmonary embolectomy and cardiac operations.

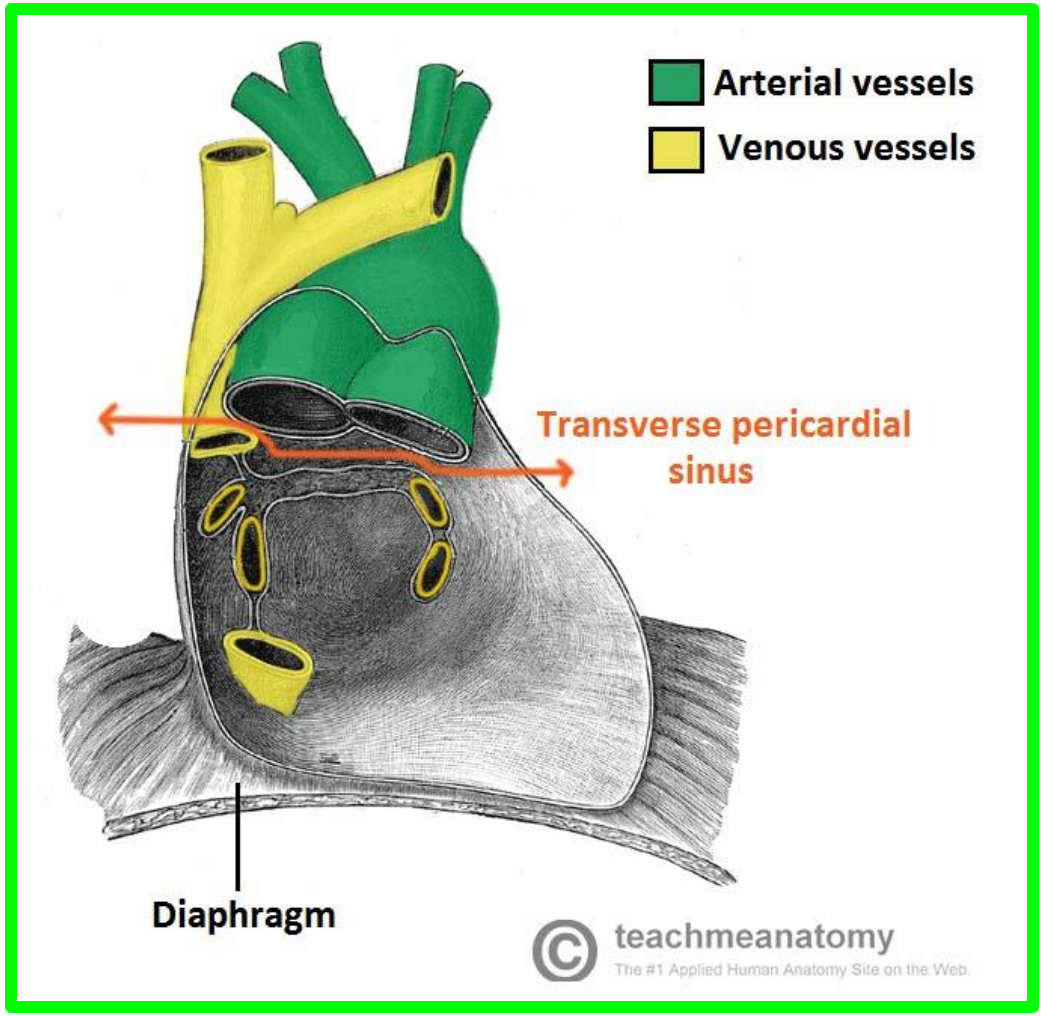
The transverse sinus

** Formation:

- It is formed by the reflection of the visceral pericardium from the front of the 2 atria to the back of the ascending aorta and pulmonary trunk.

** Boundaries:

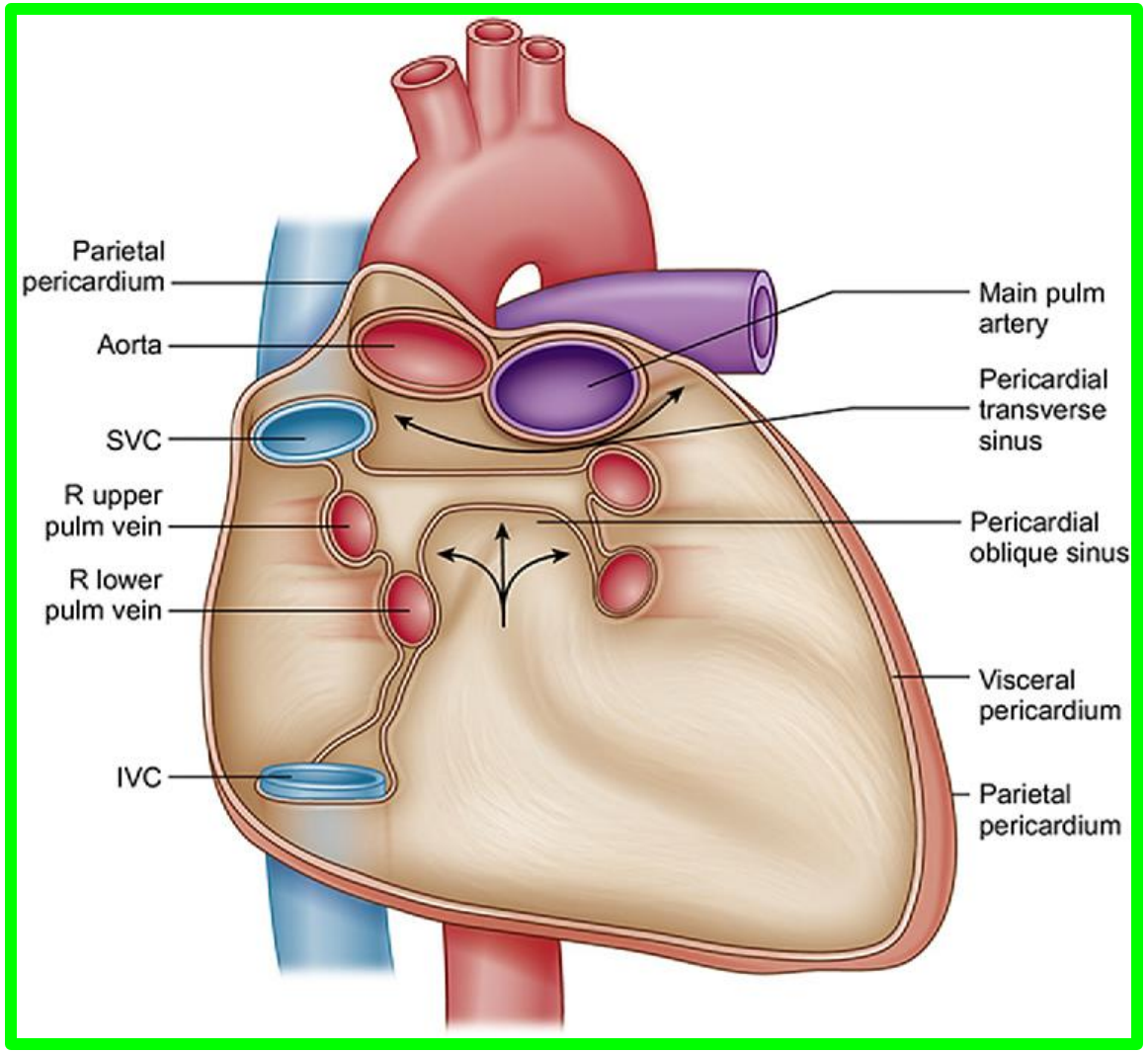
- ✓ Anteriorly, ascending aorta and pulmonary trunk.
- ✓ Posteriorly, SVC and 2 atria.
- ✓ Superiorly, Right pulmonary artery.
- ✓ Inferiorly, reflection of the visceral pericardium from the front of the 2 atria to the back of the great vessels.



Pericardial Sinuses

- The oblique sinus is a space behind the heart, between the left atrium in front and the fibrous pericardium behind, posterior to which lies the oesophagus.

- A hand passed from below easily enters the oblique sinus, but the fingertips can only pass up as far as a double fold of serous pericardium that separates the oblique and transverse sinuses from each other



The oblique sinus

** **Formation:** It is formed by the reflection of the visceral layer at the upper part of the posterior aspect of the left atrium to lined the fibrous pericardium.

** **Boundaries:**

- ✓ **Anteriorly:** posterior wall of the left atrium.
- ✓ **Posteriorly:** Fibrous pericardium which separate the sinus from the contents of the posterior mediastinum.
- ✓ **Superiorly:** it is closed by reflection of the visceral layer from the back of the left atrium to fibrous pericardium.
- ✓ **Inferiorly (opening of the sinus):** continues with the pericardial cavity.
- ✓ **Right side:** I.V.C and 2 right pulmonary veins.
- ✓ **Left side:** 2 left pulmonary veins.

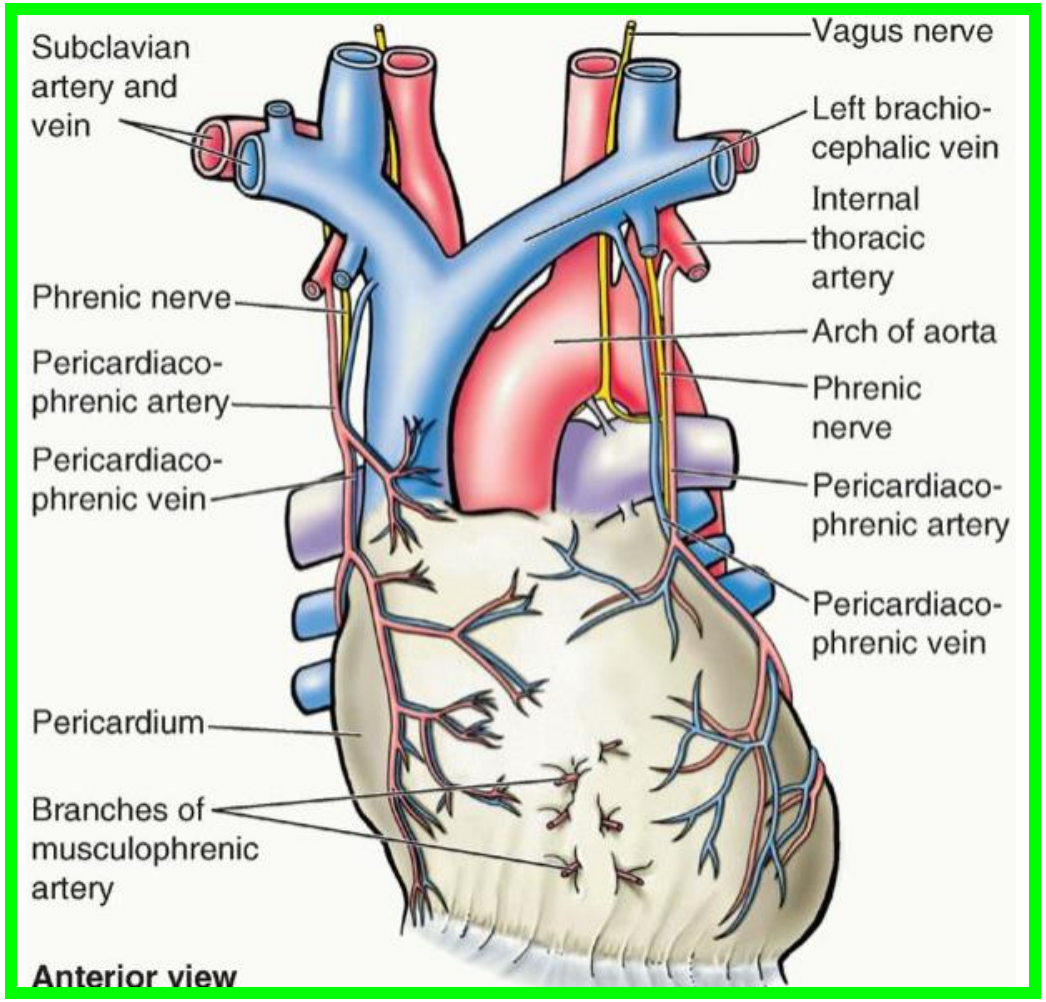
The arterial supply of the pericardium

Dr. Aiman Qais Afar

is mainly from branch of the internal thoracic artery, (the pericardiacophrenic artery)

Smaller contributions of blood come from the:

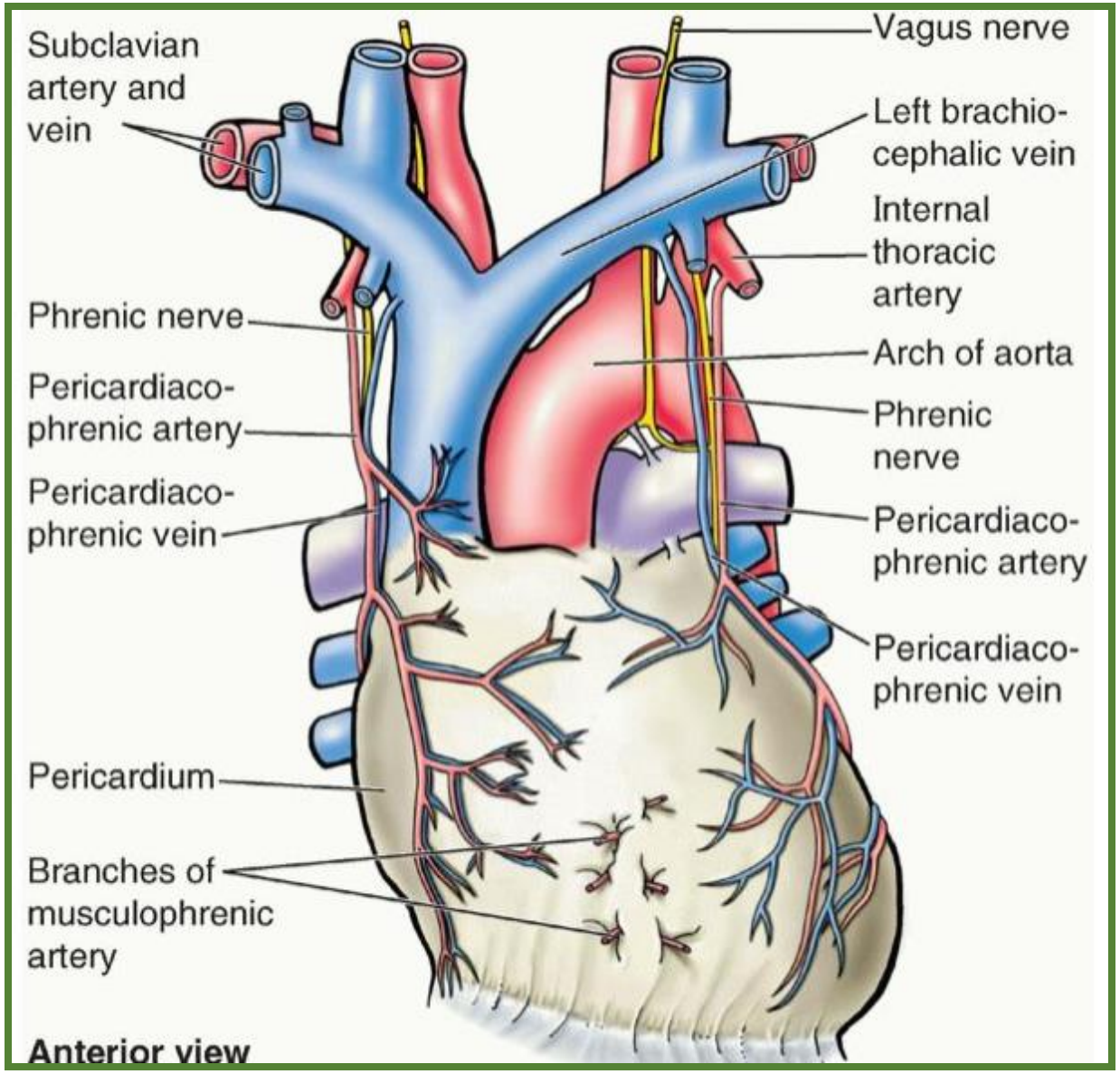
- **Musculophrenic artery, a terminal branch of the internal thoracic artery.**
- **Bronchial, esophageal, and superior phrenic arteries, branches of the thoracic aorta.**
- **Coronary arteries (visceral layer of serous pericardium only), the first branches of the aorta.**



The venous drainage of the pericardium is from the:

Pericardiacophrenic veins, tributaries of the brachiocephalic (or internal thoracic) veins.

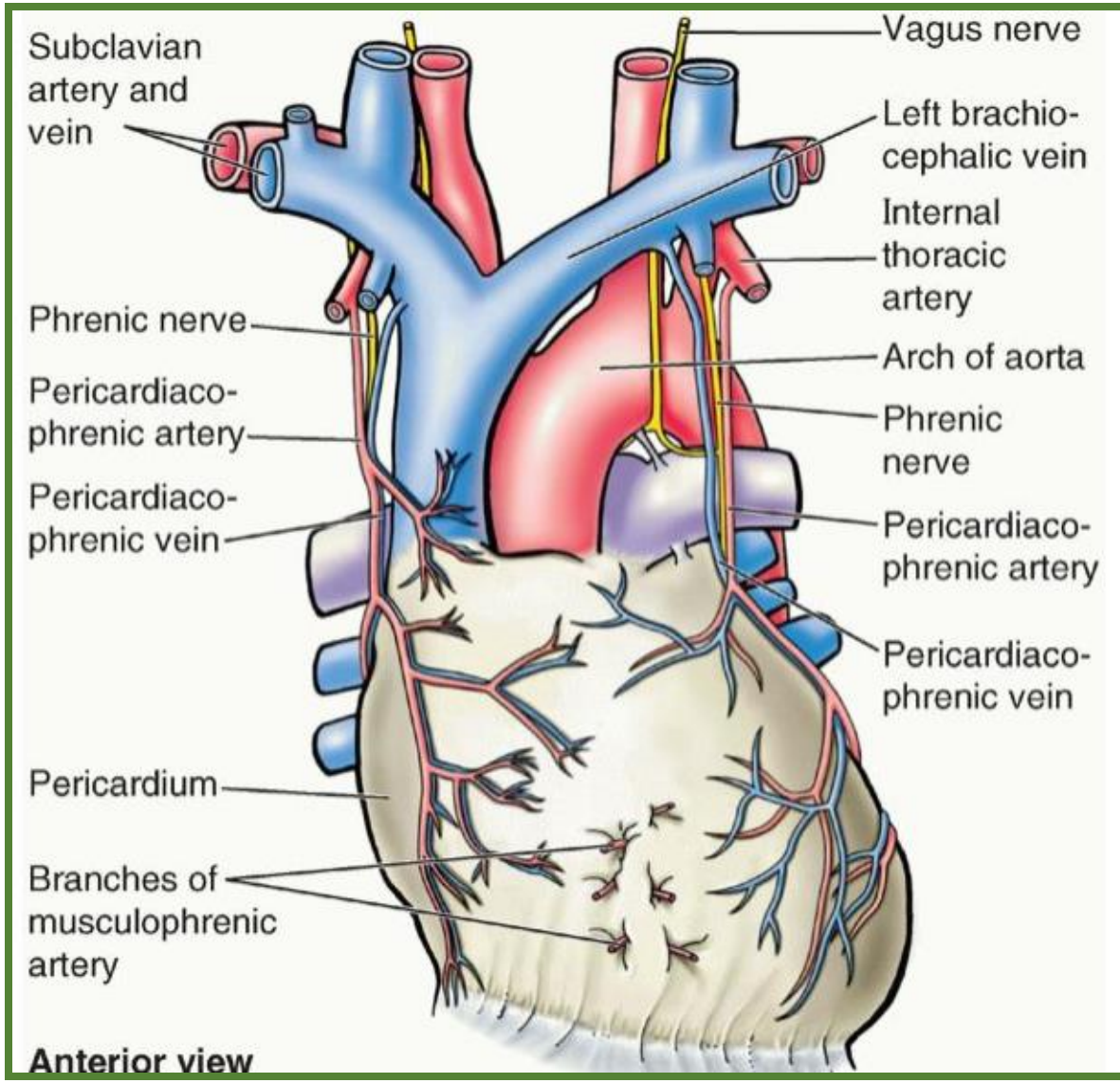
Variable tributaries of the azygos venous system



Nerve Supply of the Pericardium

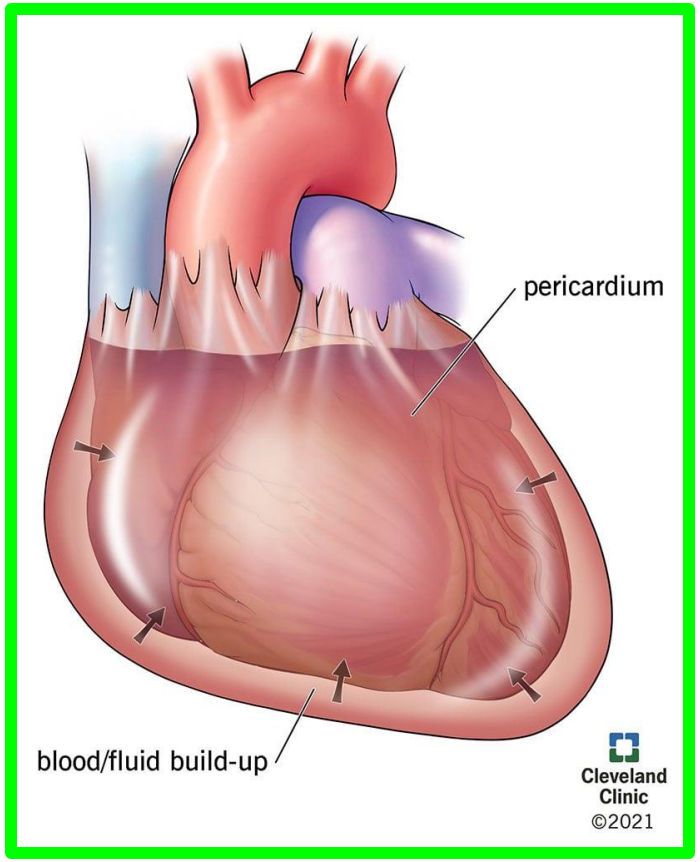
The fibrous pericardium and the parietal layer of the serous pericardium are supplied by the phrenic nerves.

The visceral layer of the serous pericardium is innervated by branches of the sympathetic trunks and the vagus nerves.



** Applied anatomy; in certain disease the pericardial cavity may contain.

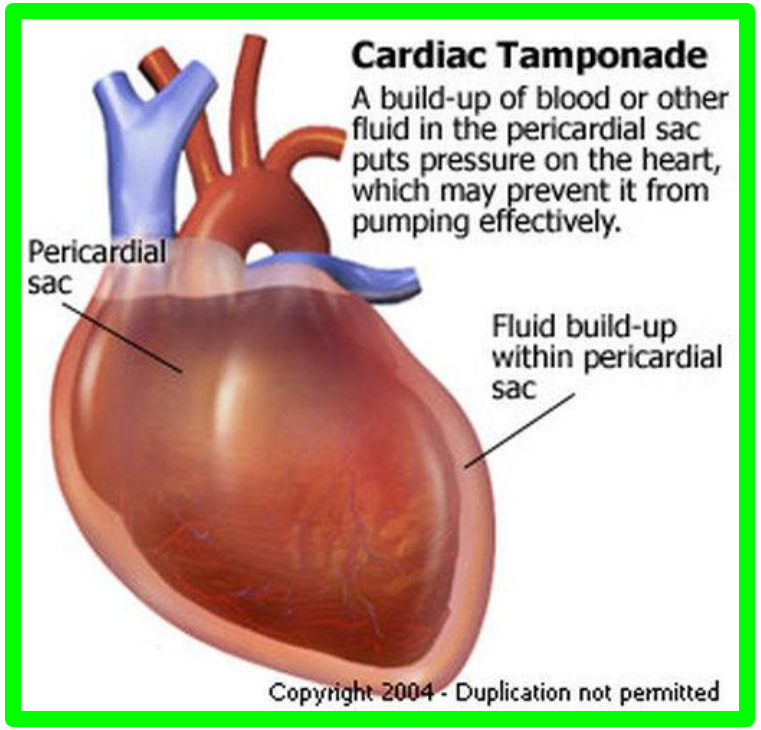
1. Blood (haemopericardium).
2. Pus (pyopericardium).
3. Lymphatic (chylopericardium).
4. Excess fluid than normal (pericardial effusion).

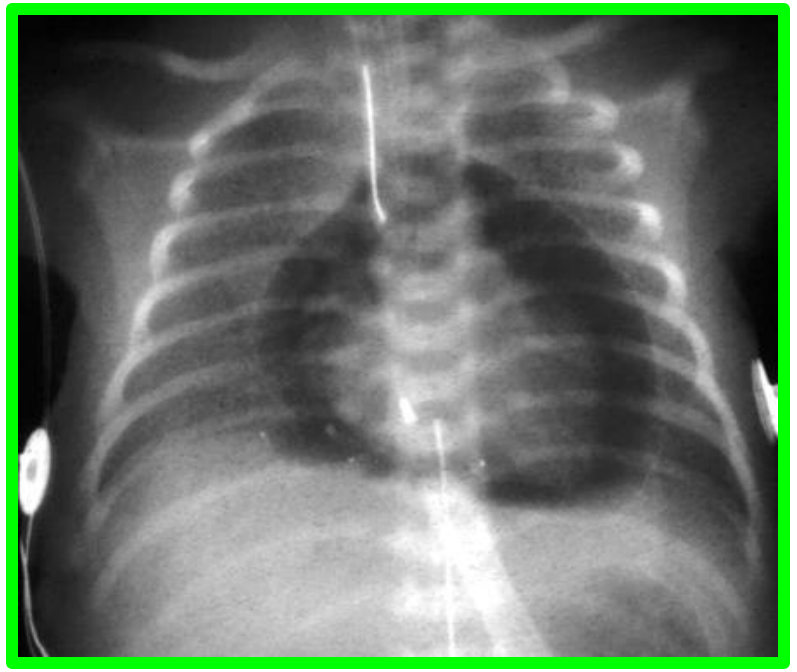


Cardiac Tamponade

The fibrous pericardium is a tough, inelastic, If **extensive pericardial effusion** exists, the compromised volume of the sac does not allow full expansion of the heart, limiting the amount of blood the heart can receive, which in turn reduces cardiac output.

Cardiac Tamponade (heart compression), is a **potentially lethal condition** because heart volume is increasingly compromised by the fluid outside the heart but inside the pericardial cavity.

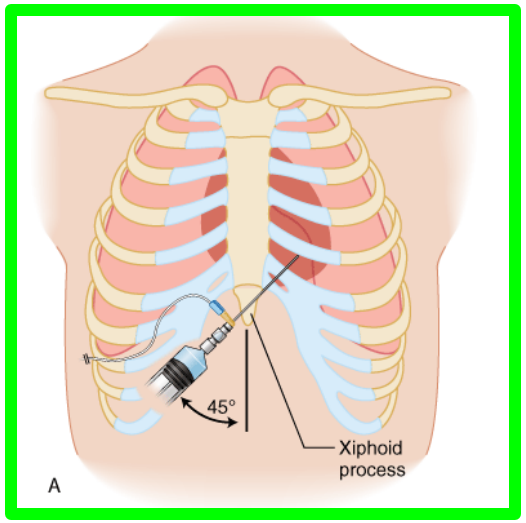


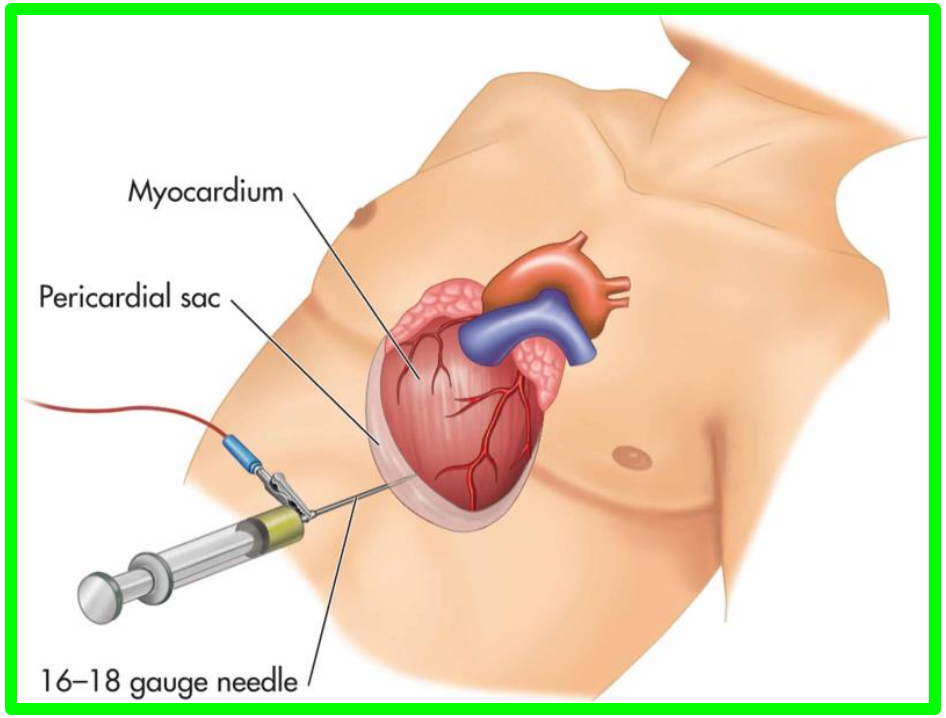


Pericardiocentesis

Drainage of fluid from the pericardial cavity,, is usually necessary to relieve cardiac tamponade, a wide-bore needle may be inserted through the left 5th or 6th intercostal space near the sternum

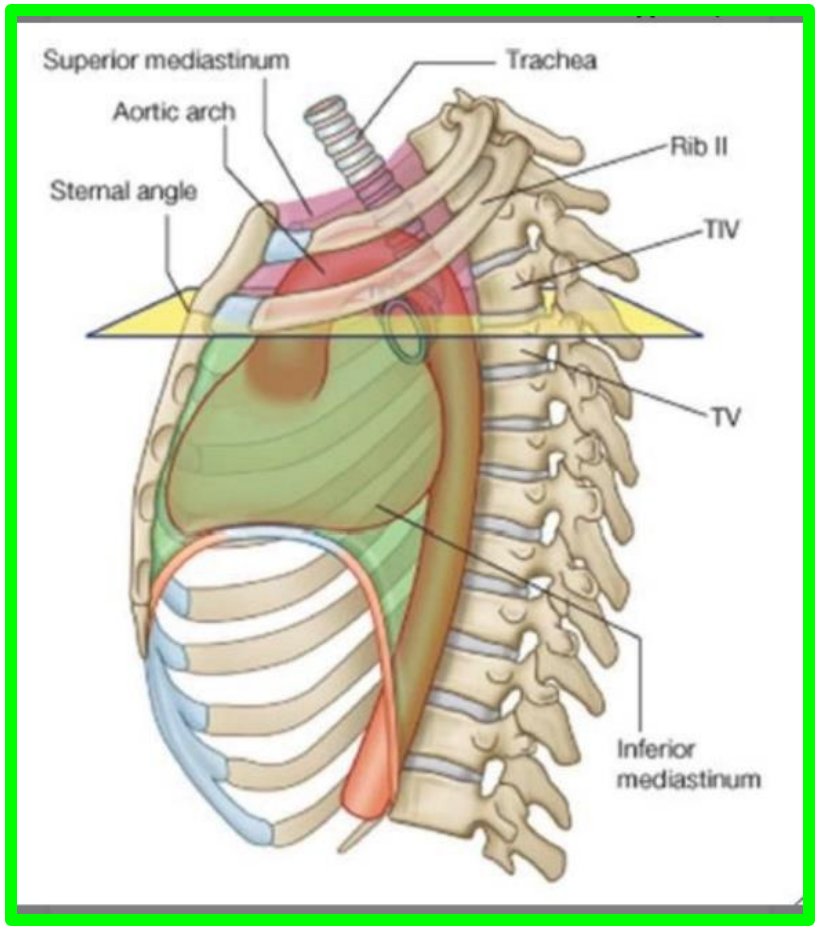
In acute cardiac tamponade from hemopericardium, an emergency thoracotomy may be performed so that the pericardial sac may be incised to immediately relieve the tamponade and establish stasis of the hemorrhage (stop the escape of blood) from the heart





Importance of the level of T4/T5 (sternal angle)

1. Junction of superior and inferior mediastinum.
2. Level of beginning and termination of arch of aorta.
3. Level of beginning of descending aorta.
4. Level of termination of azygos vein in the back of SVC.
5. Level of bifurcation of the trachea.
6. Level of bifurcation of the pulmonary trunk.
7. Level of sternal angle and anterior end of the 2nd rib.



Dr. Aiman Qais Afar
Sunday 3 November 2024