Surface anatomy of the heart:

Surface anatomy of the sterno-costal surface of the heart is represented by the following points;

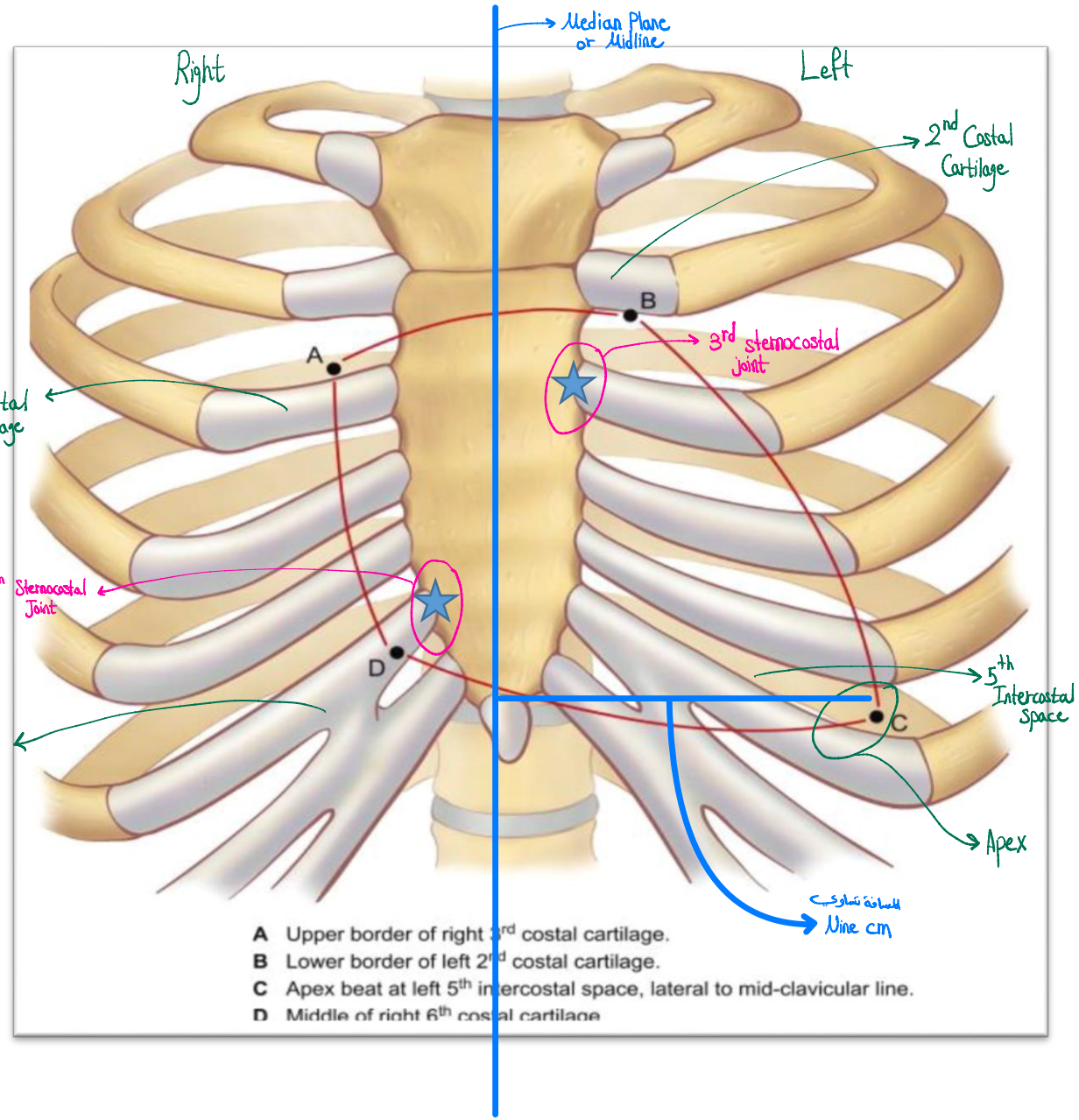
Point B: at **Lt. 2nd c.c.** (1 cm) from the sternum.

Point A: at **Rt. 3rd c.c.** (1 cm) from the sternum.

Point D: at **Rt. 6th c.c.** (1 cm) from the sternum.

Point C (apex): at **Lt. 5th intercostal space,** (9cm) to the left from median plane.

Coronary groove: Oblique line from lt. 3rd to rt. 6th sternocostal junctions.



Pericardium

it looks like the pleura (just Serous Sac) but pericardium is

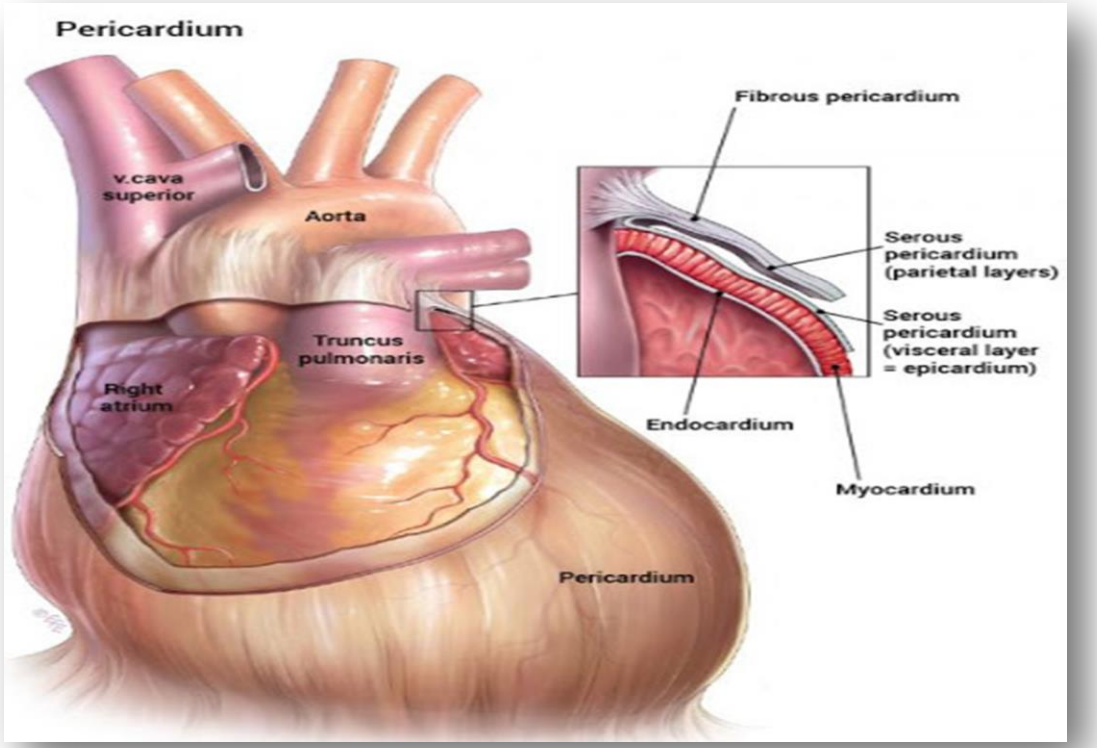
Definition: a fibro serous sac" which surrounds the heart & the proximal parts of the great vessels.

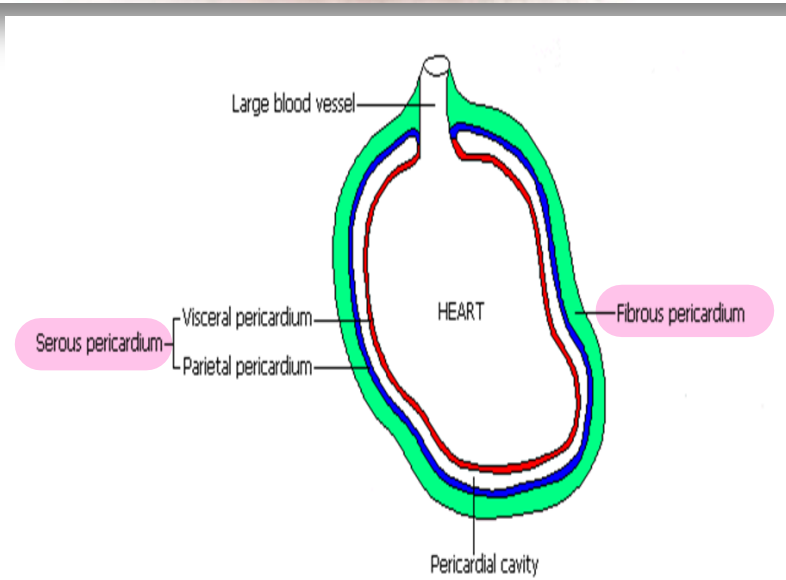
why?
- for protection
- for preventing over distention of the heart
- for maintaining the heart on it's position (How? fibrous pericardium is attached to the central tendon of the Diaphragm & the great vessels).

Extension: it extends from 2 to 6 costal cartilages.

Structure:

- Outer fibrous layer called " **Fibrous pericardium**". → Tough / just One layer
- Inner serous sac known as "**Serous pericardium**". → Soft / Double layers





Fibrous pericardium

Shape: It is conical having base, apex and four surfaces (Anterior, Posterior & two laterals).

Relations & fixation:

Base: Directed downwards firmly attached to central tendon of diaphragm.

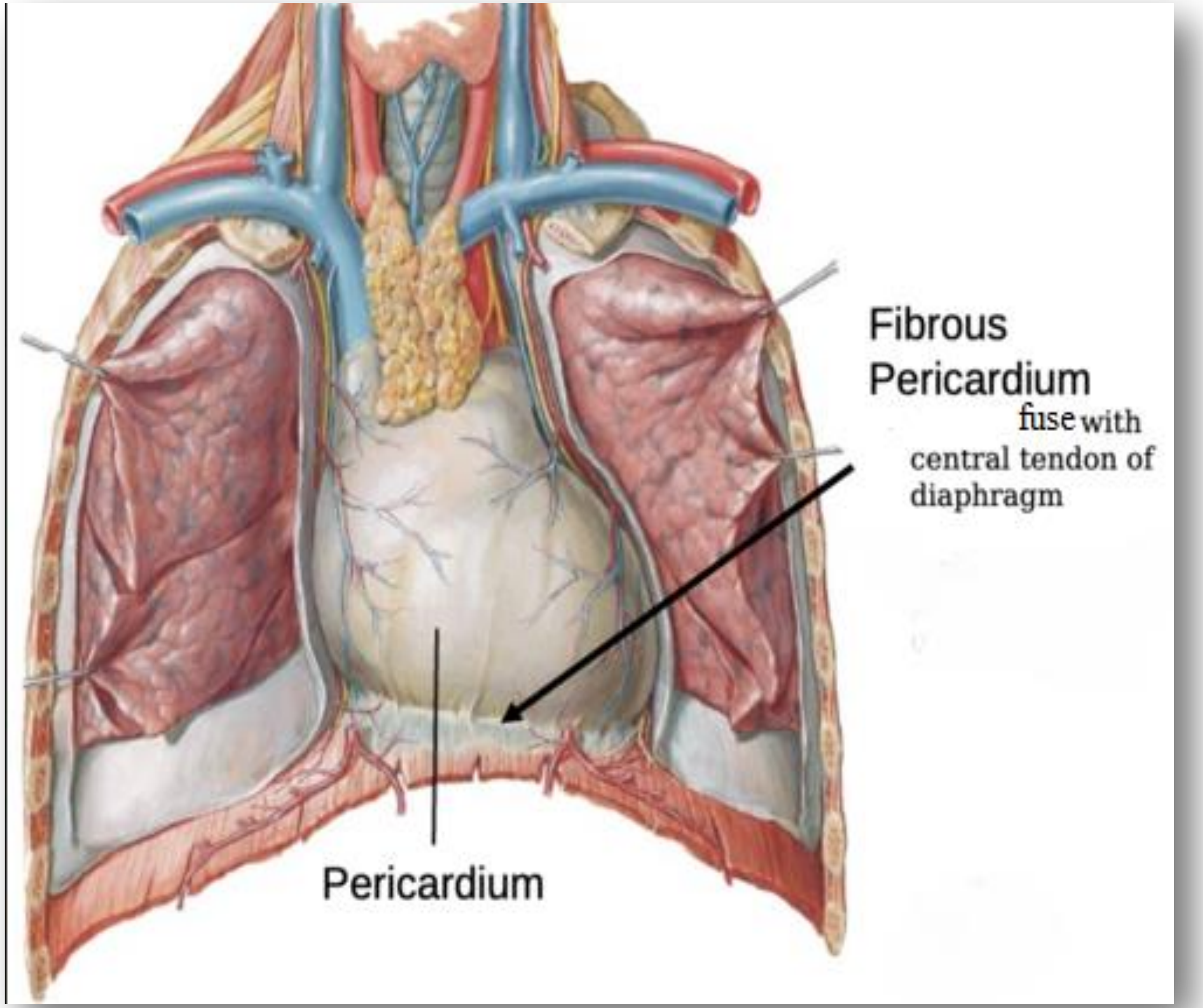
لأنه القلب بالنص فما بنفع تمسك بأي Copula of the Diaphragm

اتجاهاتهم عكس القلب

هو ثابت ليثبت القلب لأنه ما بنفع أثبت القلب في Central tendon of the Diaphragm وهو عمله وظيفة Pumping Blood

Apex: Directed upwards, and fused with the outer coats of the great vessels. (Ascending Aorta & Pulmonary Trunck)

Adventitia يسموا

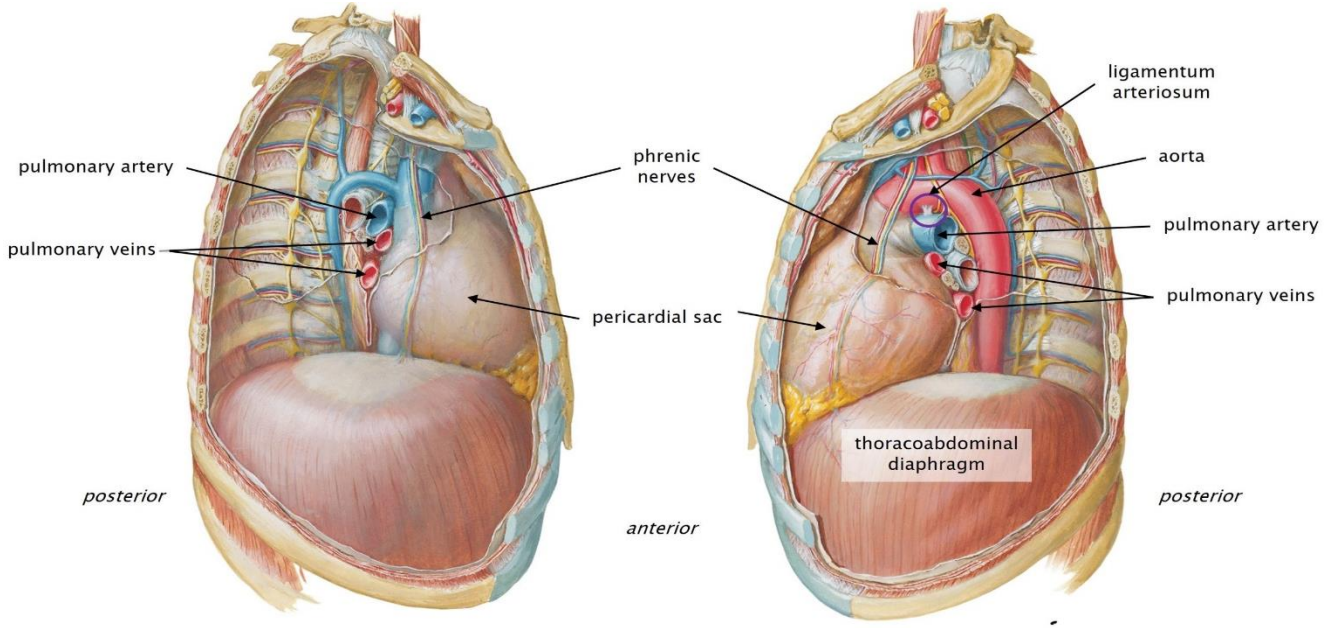


Posterior surface:

directed backward + it covers the base of the heart

- Related to the posterior mediastinum & its contents.
- Fuse with adventitia of descending thoracic aorta.

Posterior Mediastinum موجود في

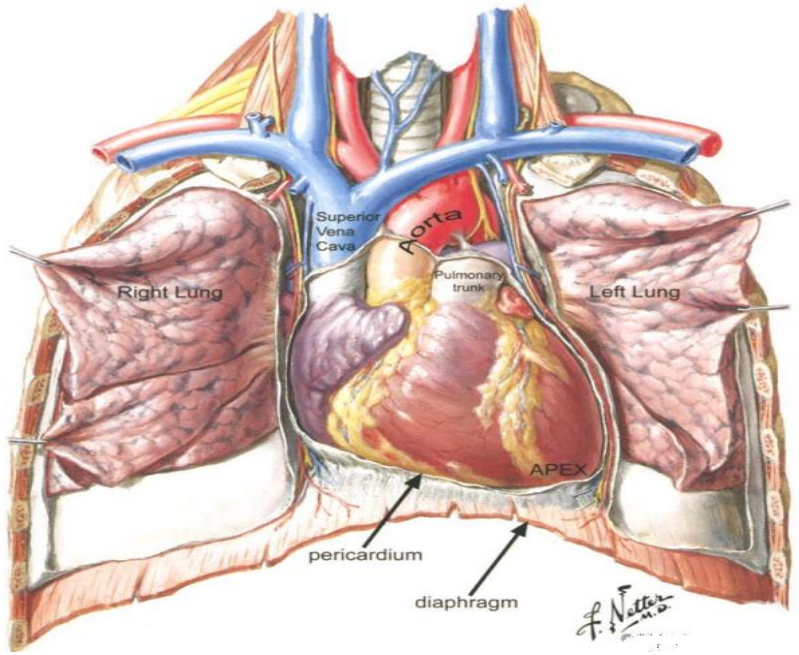


View of thoracic cavity from right side (lung removed)

View of thoracic cavity from left side (lung removed)

Two lateral surfaces:

- Related to the corresponding right & left lungs & pleura & phrenic nerves.



Function of Fibrous Pericardium

1) Maintain central position of heart within the chest.

2) Prevents the over-distension of heart.

Anterior surface of the fibrous pericardium;

- It is separated from the thoracic wall (body of sternum & 3- 6 costal cartilages of both sides) by the pleural membranes and the anterior edges of the lungs.

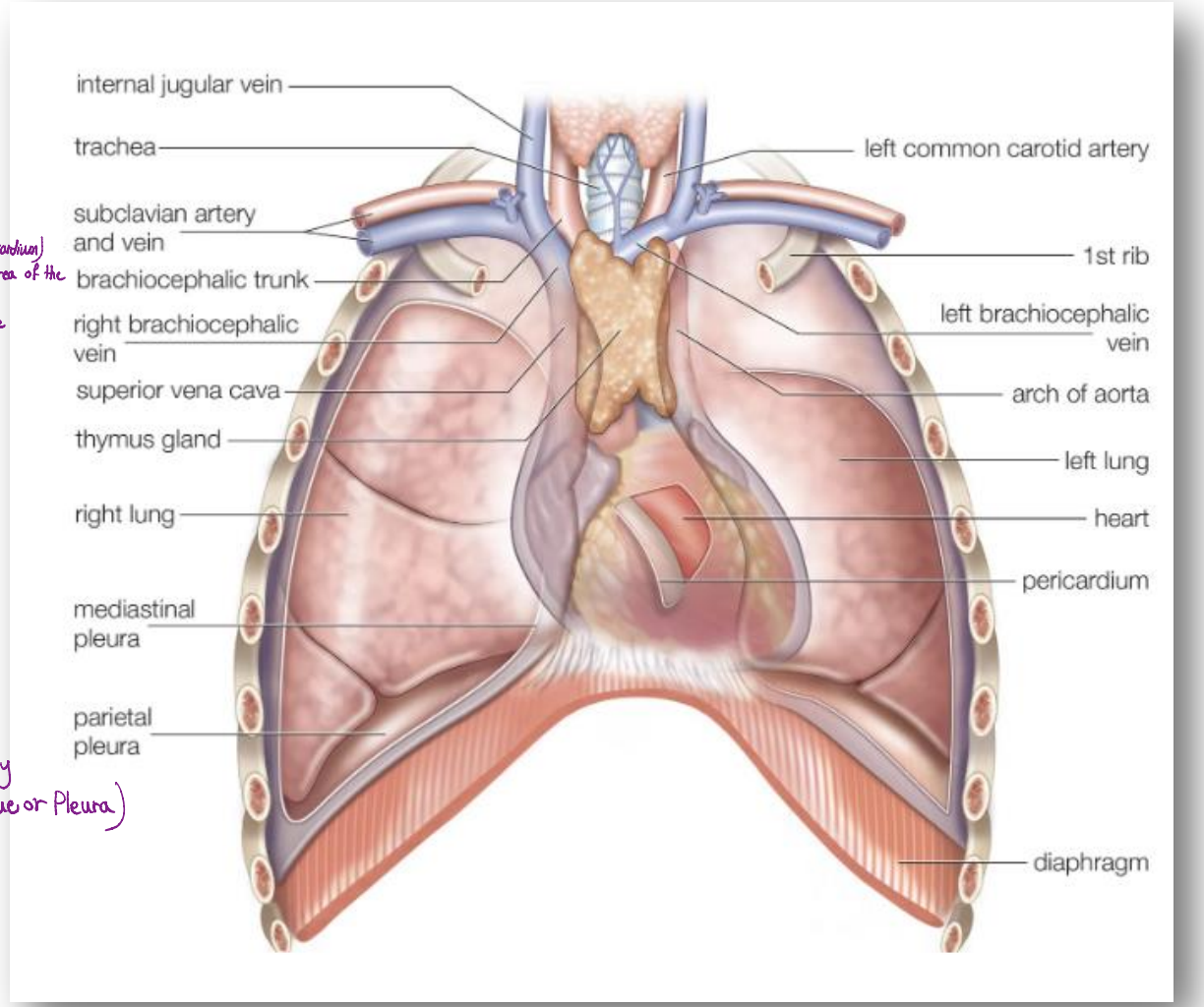
Bare area of pericardium;

this is important to know, why ?
in cases of Pericardial effusion (accumulation of fluid in the serous pericardium) so we have to apply Aspiration (penetration the needle at the Bare area of the pericardium not in the lung & pleura)
† Pericardial effusion causes compression on the heart & Heart failure

- It is an area of the anterior surface of the pericardium, at cardiac notch, behind the lower part of the left half of the body of the sternum and the sternal ends of the left 4th to 6th costal cartilages.
- At this area, the pericardium is in direct contact with the thoracic wall without lung in between. (not covered by fibrous tissue or Pleura)

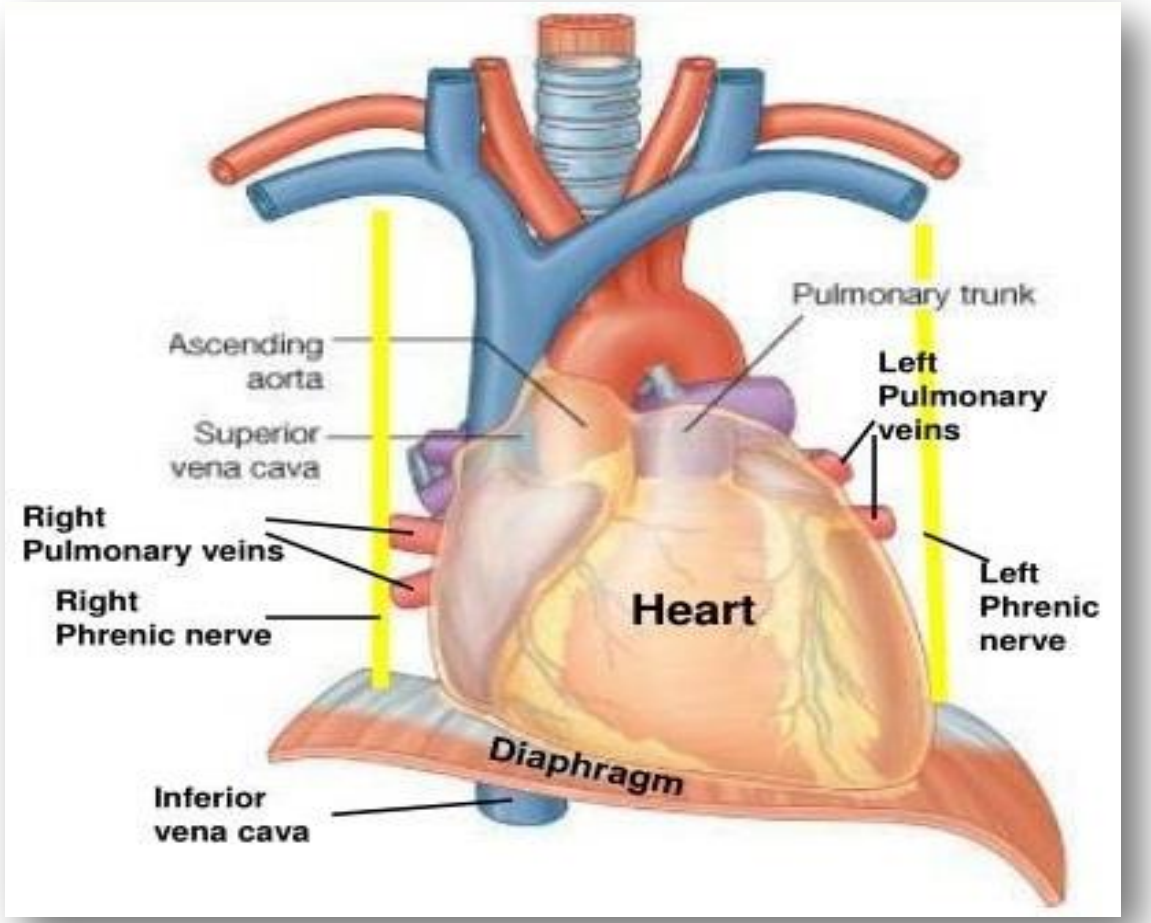
→ area is Bare

- This surface **attached to the** body of sternum by pericardio-sternal ligaments.



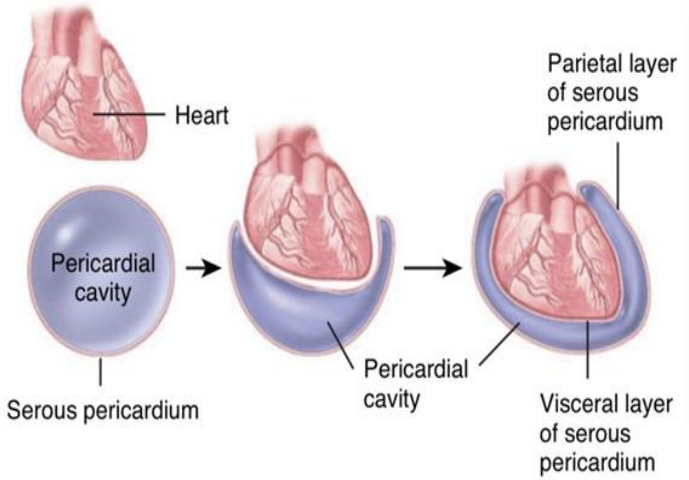
Contents of the fibrous pericardium

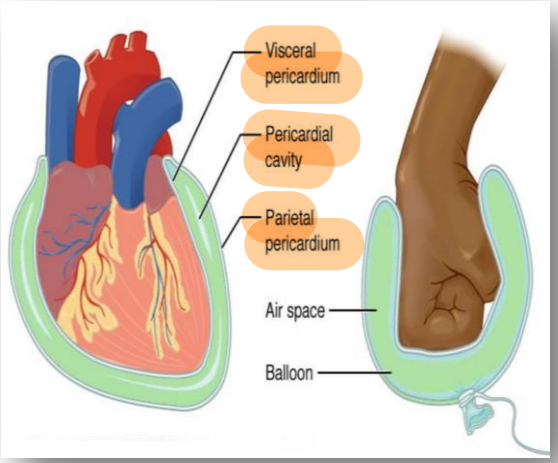
- Serous pericardium & its sinuses
- Heart & its blood supply
- Great vessels of the heart
  - Ascending aorta
  - Pulmonary trunk
  - Lower 1/2 of SVC (Superior Vena Cava)
  - Termination of IVC (Inferior Vena Cava)
  - Four pulmonary veins



Serous pericardium:

It is a closed serous sac, formed of two layers:





1) Visceral layer (epicardium of the heart)

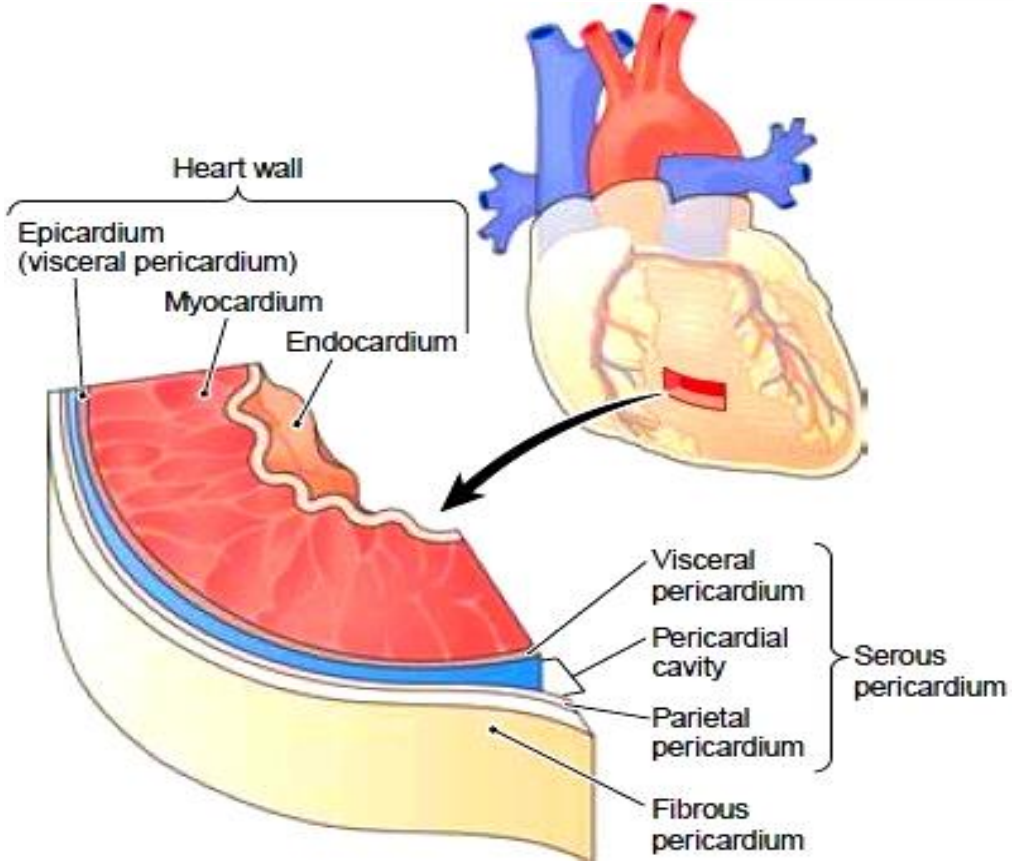
→ Inner layer of the Serous Pericardium

- This layer is closely applied on the surface of the heart.

2) Parietal layer:

→ Outer layer of the Serous Pericardium

- This layer lines the inner surface of the fibrous pericardium.
- It is reflected around the roots of the great vessels to become continuous with the visceral layer of the serous pericardium.



Pericardial cavity

- It is found between the visceral and parietal layers and contains thin film of fluid. (normally)

→ if it increases, it cause pericardial effusion

Function of serous pericardium:

- Responsible for lubrication of heart preventing the friction (احتكاك) during its movement.

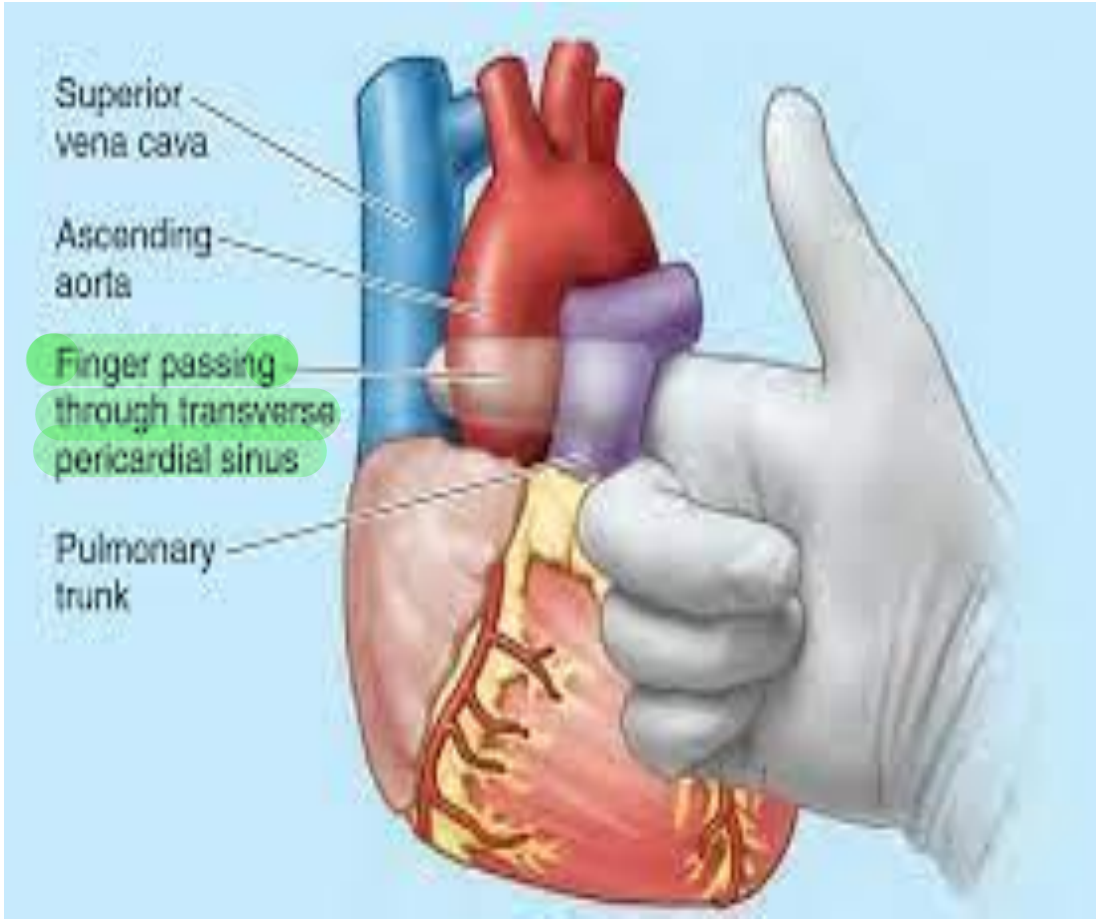
Pericardiocentesis

- It is a surgical puncture of the pericardial cavity for the aspiration of fluid, which is necessary to relieve the pressure of accumulated fluid on the heart in case of (pericardial effusion). A needle is inserted into the pericardial cavity through the fifth intercostal space left to the sternum, the needle doesn't penetrate the pleura and lungs, but it penetrates the pericardium

Pericardial Sinuses:

1-Transverse sinus:

- It is a transverse passage lined by the serous pericardium.
- It is **situated** between the ascending aorta and pulmonary trunk in front (anteriorly), and the superior vena cava, and pulmonary veins behind (posteriorly).

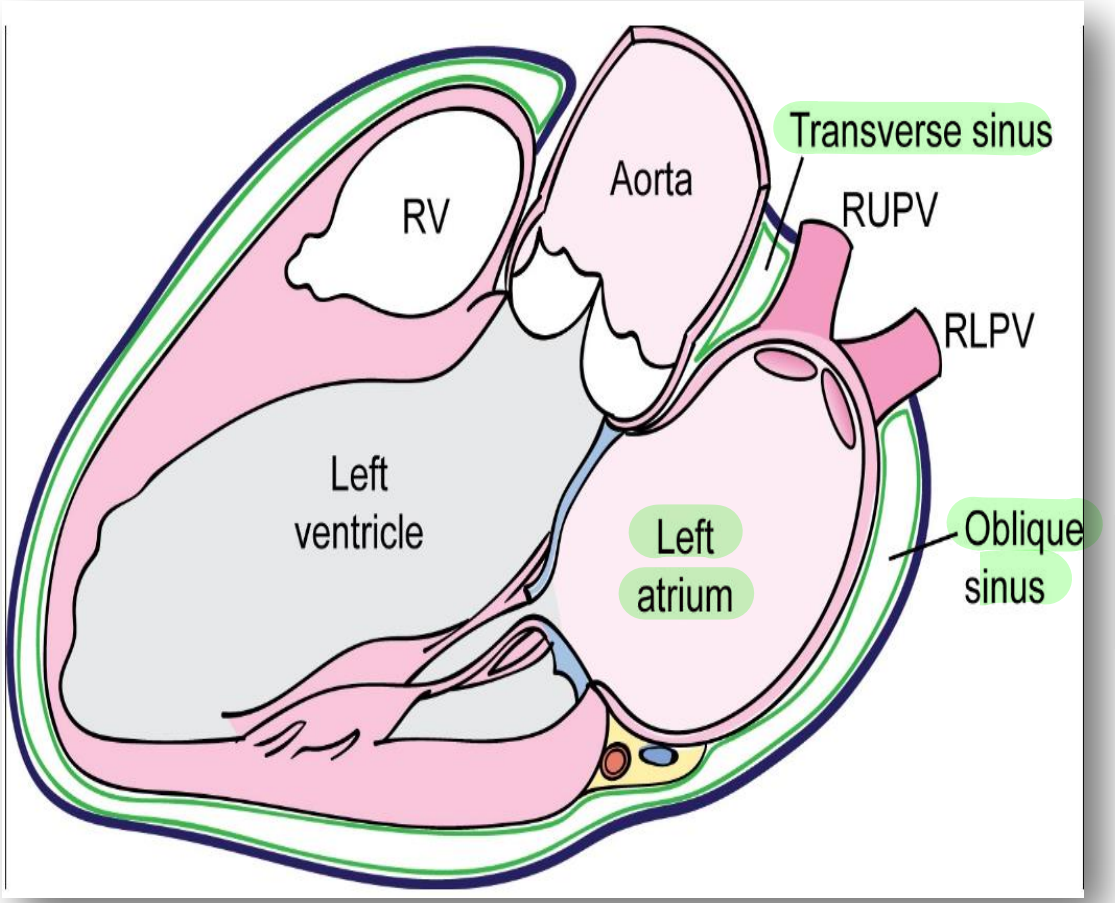


Clinical significance

During cardiac surgery, the transverse pericardial sinus allows a surgeon to isolate the pulmonary trunk and ascending aorta and apply a temporary ligature or (by) clamp.

2- Oblique Sinus:

- It is a recess of the serous pericardium, lies behind the left atrium of heart.
- The parietal layer of serous pericardium & fibrous pericardium separate the oblique sinus from the structures of the posterior mediastinum.

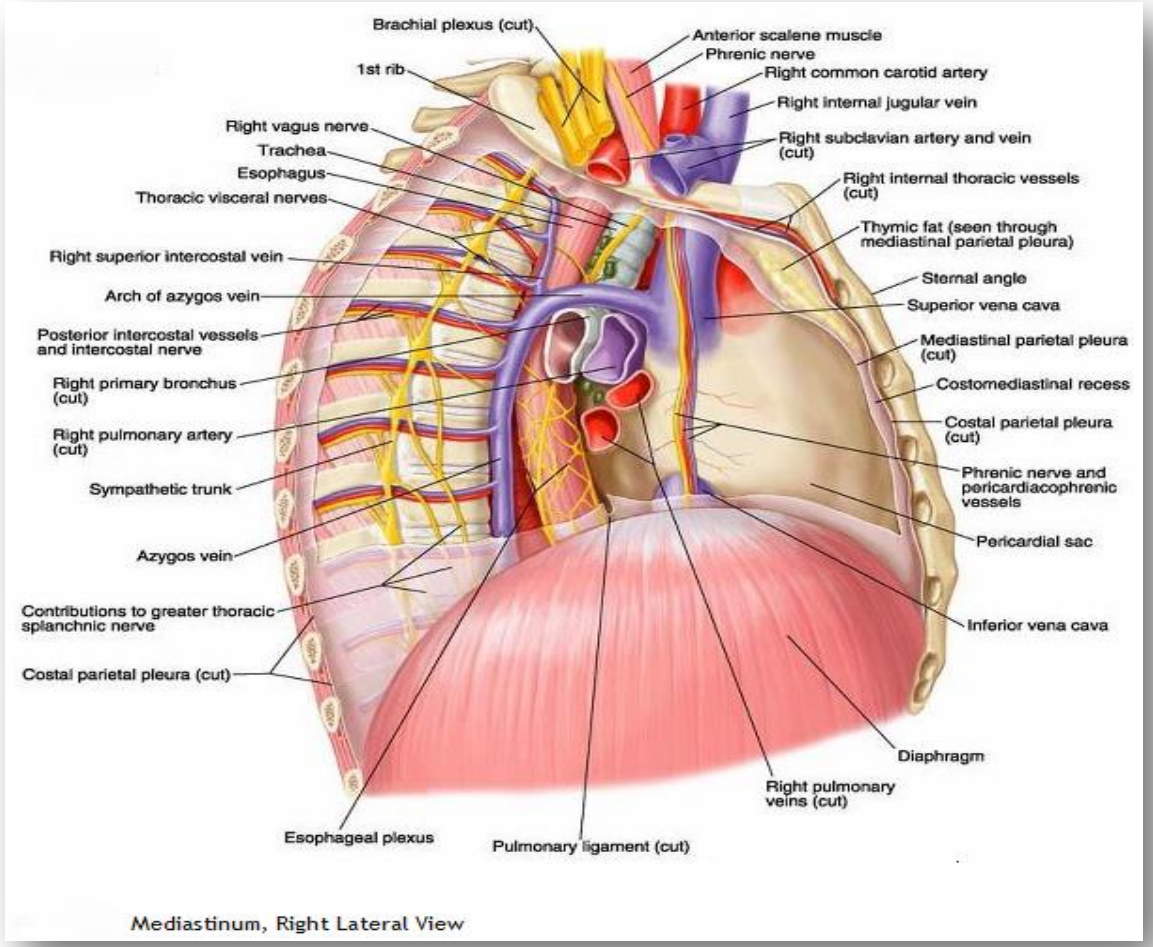


Arterial supply of pericardium:

Fibrous pericardium & parietal layer of the serous pericardium:

- Pericardiacophrenic artery.
- Pericardial branches of descending thoracic aorta.

Visceral layer of serous pericardium: like cardiac muscle supplied by **coronary arteries.**



Nerve supply:

Fibrous & parietal layer of the serous pericardium: sensory fibers (or somatic fibers) from the **phrenic nerve** (sensitive to pain).

Visceral layer of serous pericardium: supplied by **autonomic fibers** (not sensitive to pain).

Interior of Right Atrium (Internal Surfaces or Features)

A- Rough anterior part, show:

1- **Openings of anterior cardiac veins.**

2- **Crista terminalis:** Vertical muscular ridge between SVC & IVC, separate anterior part from posterior part and represented externally by the sulcus terminalis.

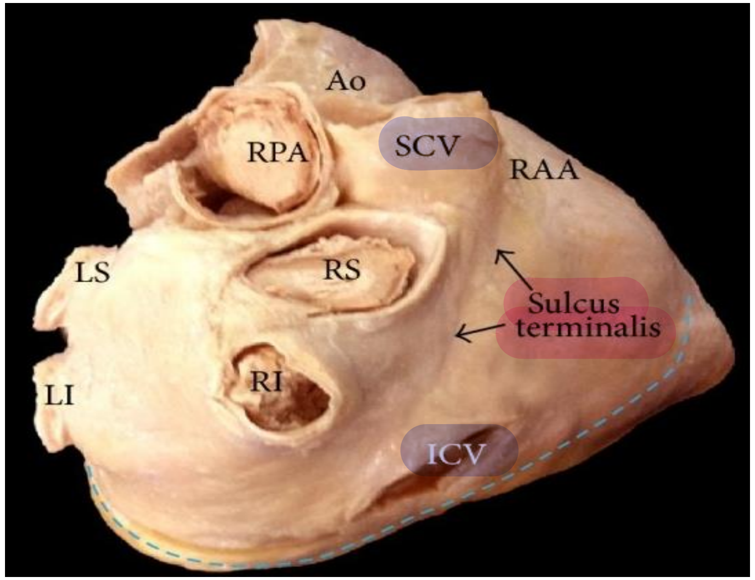
(internally)

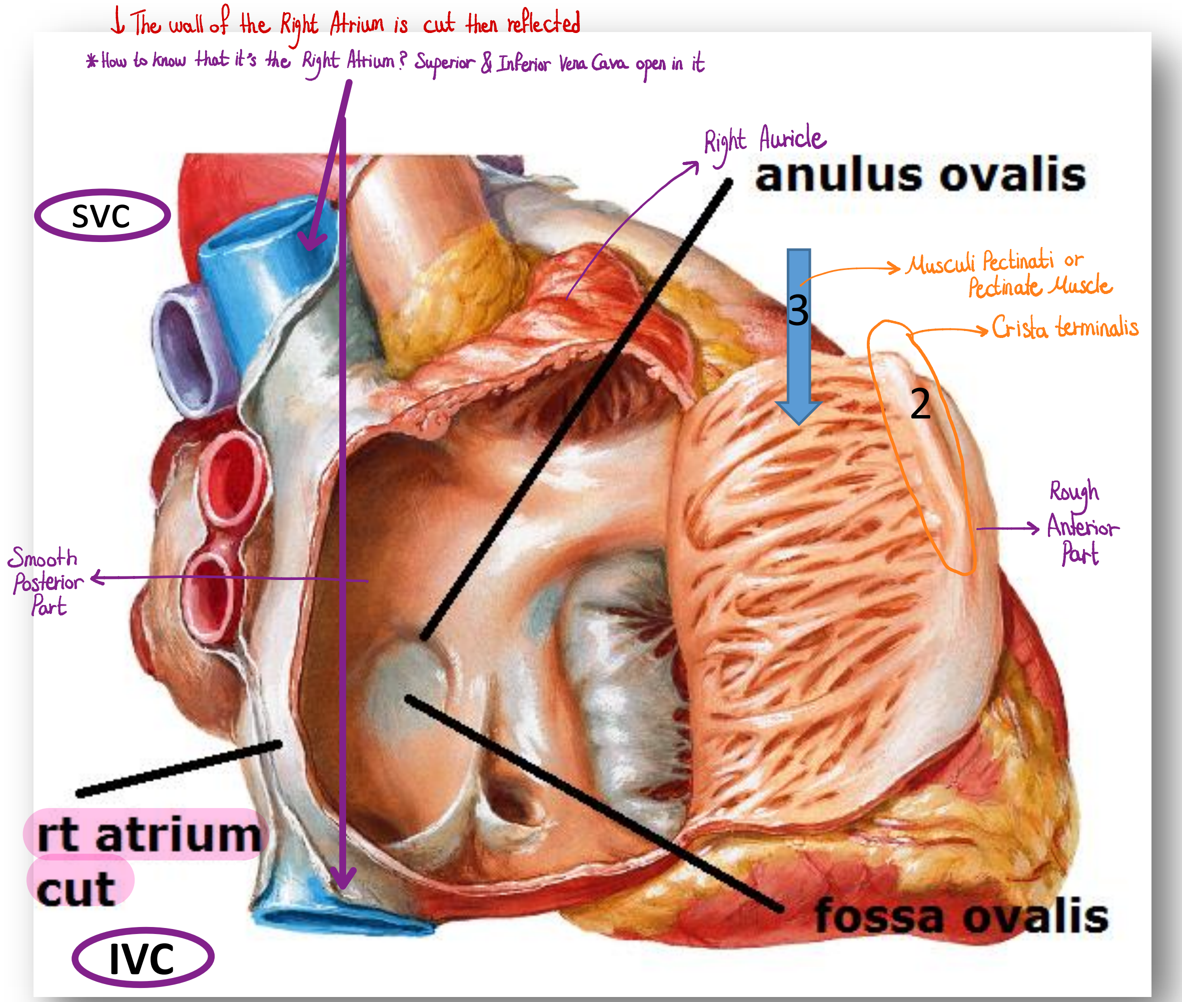
(openings of)

3- **Musculi Pectinati:** Transverse muscular ridges from crista terminalis to the right auricle.

(a bandage from the right atrium)

(So the anterior part of the Right Auricle is rough because it filled with Musculi Pectinati)

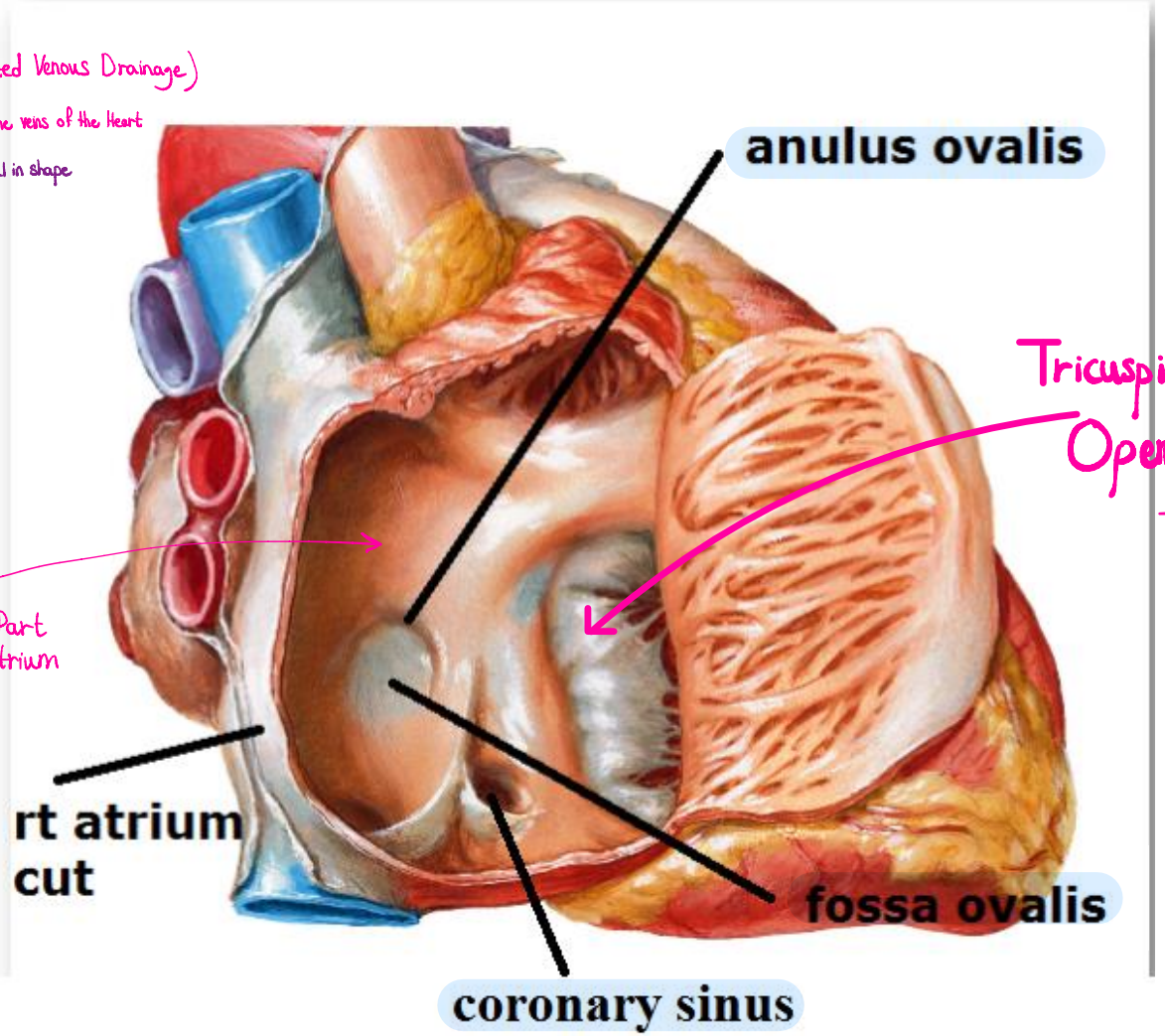




B- Smooth Posterior part, shows:

1. **Openings of:** S.V.C, I.V.C & coronary sinus. (Deoxygenated Venous Drainage)
   - ↓ the septum between Right & Left atria
   - a venous sinus collects the venous drainage of the veins of the Heart
2. **Interatrial septum which has:** fossa ovalis, → oval in shape
   - Depression
   limbus fossa ovalis.

- **Fossa ovalis:** shallow depression on interatrial septum. → it was opened during Intrauterine life but after birth it closed
  if it is still opening after birth → Congenital Anomaly
- **Annulus** (Margin) **ovalis:** Curved ridge that form upper & anterior boundaries of fossa ovalis.



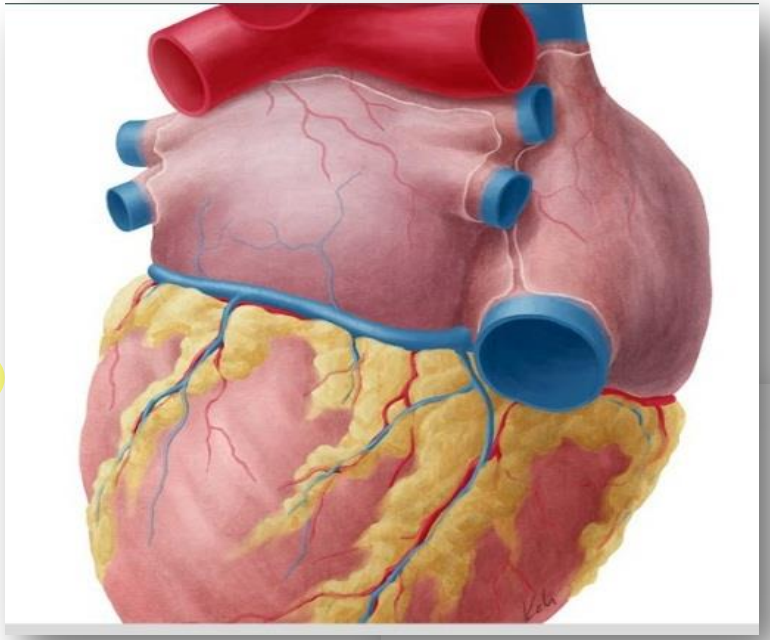
C-Tricuspid opening: → between Right Atrium & Right Ventricle

-In lower (inferior) anterior part of the right atrium.

-Guarded by tricuspid valve

-Admit (يسمح بدخول) three fingers.

Interior of Left atrium



A- Rough anterior part:

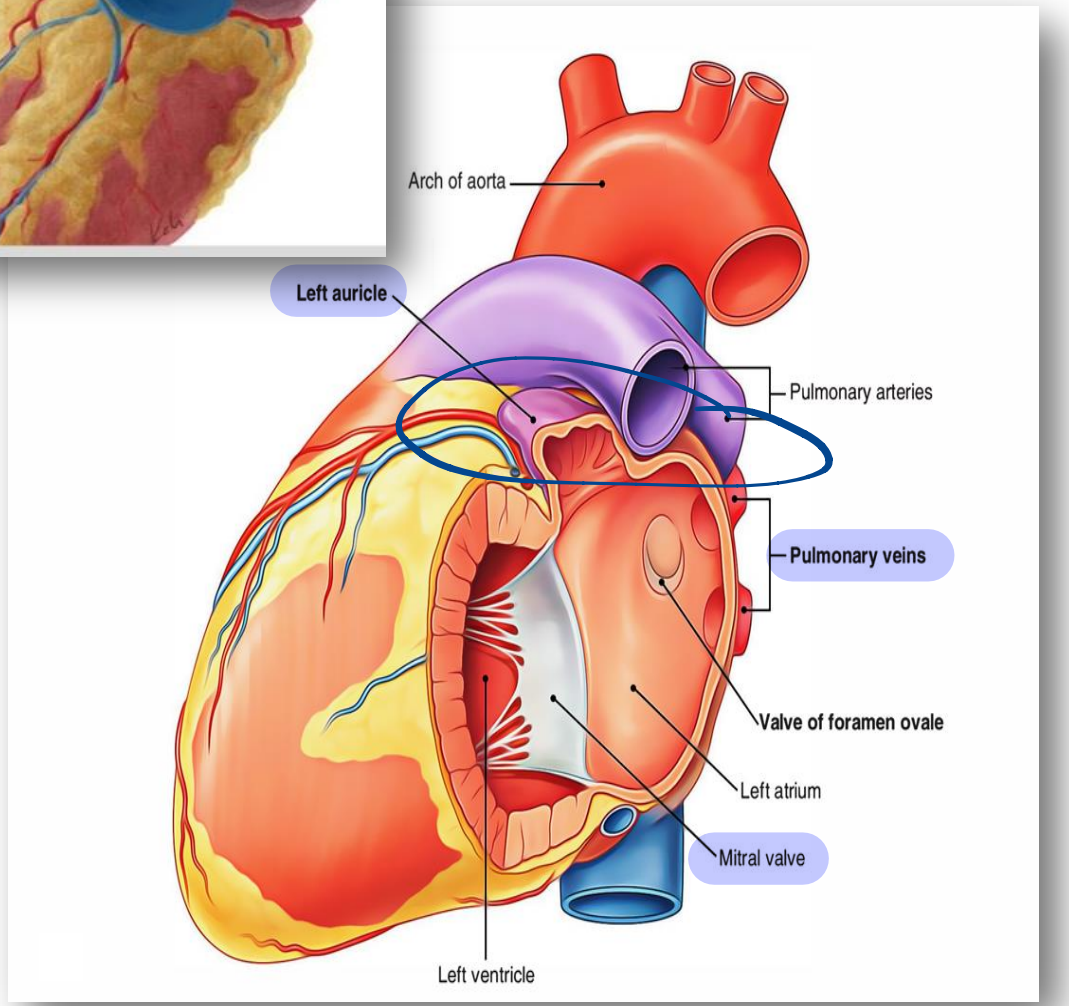
- Only its auricle (↓ Left) that has musculi pectinate.

B- Smooth posterior part shows:

- Openings of four pulmonary veins (Two at each side).

C- Mitral opening: ⟶ between Left Atrium & Left Ventricle

- Guarded by mitral valve.
- Admit two fingers. ⟶ it's diameter is less than Tricuspid Opening



Quiz

Which structure(s) compress(es) the posterior surface of the heart during cardiopulmonary resuscitation?

الإنعاش

applied in cases of cardiac arrest
"pressure on the aspect of the heart anteriorly & posteriorly + sternum anteriorly"

a) The body of the sternum

b) The bodies of the thoracic vertebra

c) The tracheal bifurcation

d) The inferior vena cava

In a posteroanterior radiograph of the thorax, the following structures form the left margin of the heart shadow except which?

(a) Left auricle ✓

(b) Pulmonary trunk ✓

(c) Arch of aorta ✓

(d) Left ventricle ✓

(e) Superior vena cava