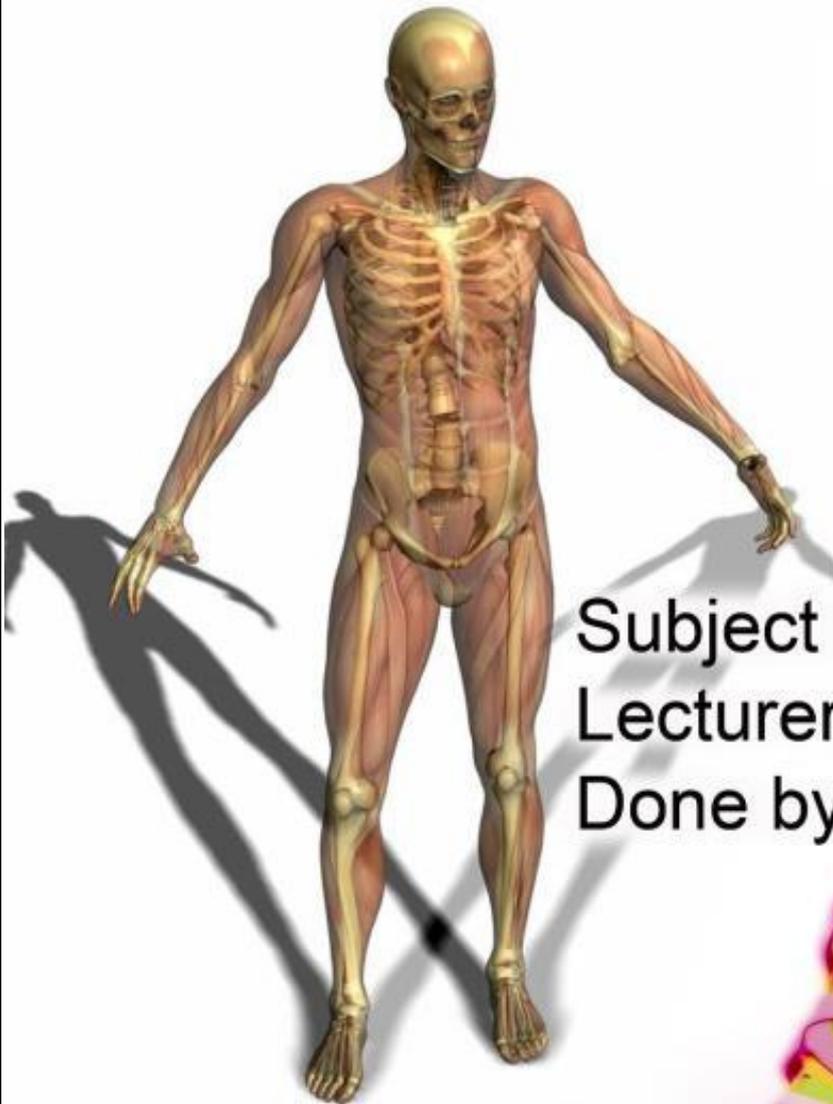




ANATOMY

Sheet



Subject : *Introduction to Anatomy*

Lecturer : *Dr. Maher Hadidi*

Done by : *Sajeda Shehda*

lecture # : 27

Date : April/7th/2013

<< Pericardium and heart >>

The subject today is about middle mediastinum which is bounded superiorly by imaginary line, inferiorly by diaphragm, anteriorly by anterior mediastinum and posteriorly by posterior mediastinum (exactly by the middle 4 thoracic vertebrae)

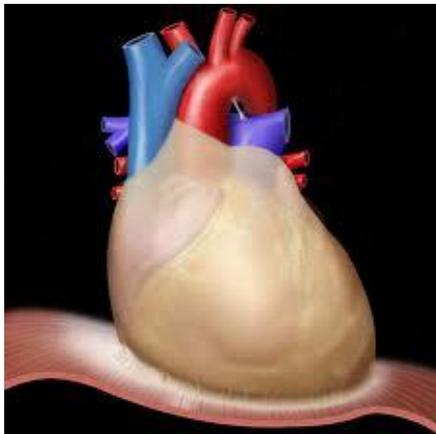
Now the contents of middle mediastinum: " number one " is pericardium and related structures as we know within the pericardium we have the heart

So first thing we want to talk about the pericardium it is conical shaped double walled sac one of the layers is fibrous part and the other one is serous part so its " fibroserous "

Briefly it's a double walled fibroserous conical shaped sac

Conical in shape means pyramidal shaped and it's located in the middle mediastinum, encloses the heart and the roots of the large vessels

When we look to it inferiorly there is the diaphragm



And the root of large vessels it means "superior vena cava + aortic arch + pulmonary trunk"

The pericardium has anterior and inferior wall (the diaphragm)

So by a sagittal section we have these structures:

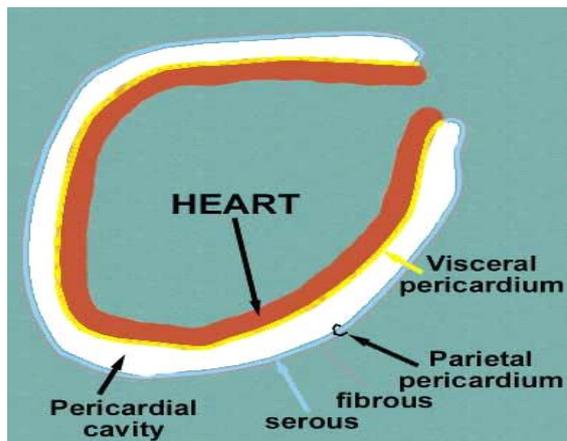
The pericardium divide into two parts: fibrous pericardium" outside" and serous pericardium" inside" or the inner layer"

fibrous pericardium : its conical shaped sac it has a base attached to the diaphragm and apex attached to the root of the large vessels

the function of it is to prevent overextension of the heart on the neighboring structures (right and left lungs) .

the fibrous pericardium is attached with the central tendon of diaphragm

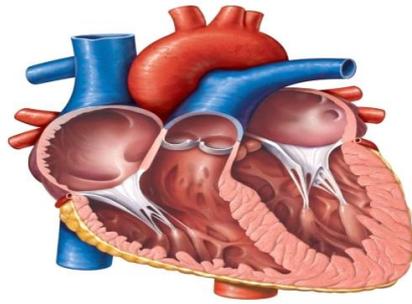
so they never rupture because they go up and down together.



Inside the fibrous pericardium we have the serous pericardium it's exactly like the pleura. invaginated by the heart so it's complete sac "like balloon"

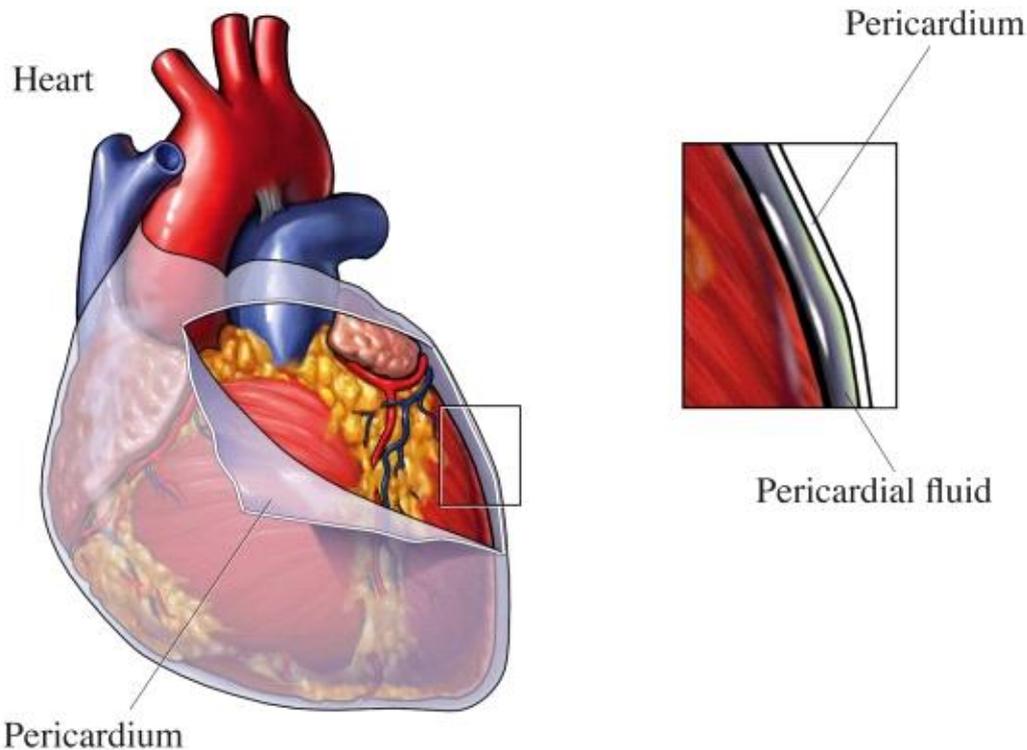
The part which is covering the heart itself is visceral layer and the part which lines the fibrous pericardium is the parietal layer of serous pericardium , the space between them is called pericardial cavity which is a potential space that has no air , no pressure, why? To allow the heart to beat freely.

The wall of the heart is like the wall of the uterus interior wall the endocardium , muscular wall is myocardium and the epicardium



Another name for visceral layer of pericardium is the epicardium (it's name in surgery).

By the removal of the anterior part of pericardium we found the heart



now

the contents of the pericardium:

Heart and related arteries, veins and nerves

There are 8 vessels : 2 arteries and 6 veins , the 2 arteries are pulmonary trunk and aortic arch and the 6 veins are 2 right and 2 left pulmonary veins + superior and inferior vena cava (2 A 6 V)

so as we say The contents of the pericardium is the heart and its arteries , veins and nerves and the root of the large vessels are:

1- ascending aorta

2- the whole pulmonary trunk but it's branches are not included in pericardium

((no part of ascending aorta or pulmonary trunk is in the superior mediastinum they are in the middle mediastinum within pericardium))

3-terminal part of superior vena cava (lower 2cm)

4- inferior vena cava (upper 2 cm)

And terminal ends of the 4 pulmonary veins

- The heart:

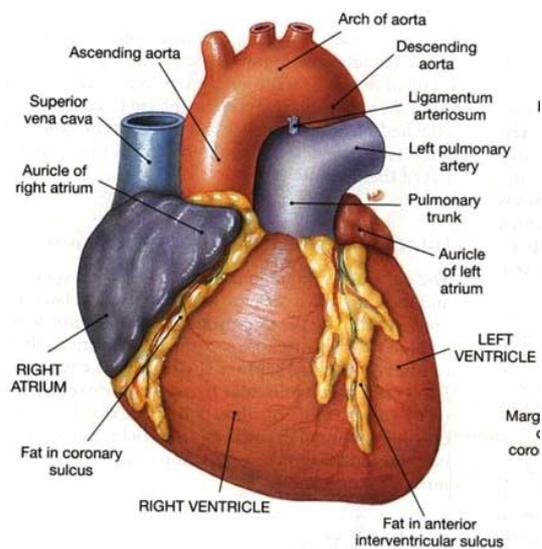
** A muscular pump inside the pericardium it has apex in the left side and base

Why the apex is in the left side? because the heart is rotated 90 degree to the left

It has 4 chambers: right and left atrium + right and left ventricle

** it is a powerful pyramidal shaped muscular organ , about the size of person's own fist

p.s to measure the heart's size by the patient's own fist not by your fist



The apex of the heart is mainly formed by the left ventricle and located left 5th intercostal space about 9 cm from the midline

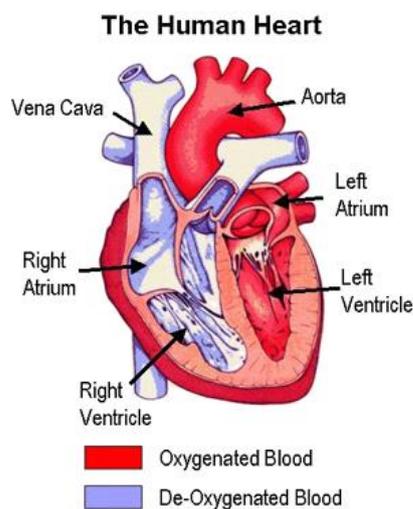
It is the site of maximum beat of the heart so it's where you should put your Stethoscope to hear pumping

The base is directed posteriorly formed by the left atrium

If we cut the heart in coronal section and remove the anterior wall we can see 2 atria and 2 ventricles.

The 2 atria are separated by interatrial septum "thin" that's why the heart hole usually occur in this septum

The 2 ventricles are separated by interventricular septum "thick"



The heart is divided into right venous side and left arterial side by septum

The right atrium will send the blood to the right ventricle through the tricuspid valve and left atrium will send the blood to the left ventricle by bicuspid valve

If we look at the septum and the valves it's like cross and it's called "sketch"

(above we have atrium and down we have ventricle and the valves looks like a belt it is called heart waist it can be seen from outside , this is the site where valves are fixed in their place)

** the coronary arteries which come from ascending aorta are forming the heart waist

There's left and right coronary arteries connected to each other in circular shape and formed coronary groove which is a pathway for coronary arteries to move between atrium and ventricle

--another name for it is coronary sulcus—

The two ventricles separated externally by: 1-anterior interventricular groove 2-posterior interventricular groove

So the coronary groove is like circle and the AIV groove + PIV groove is U shaped

REMEMBER:

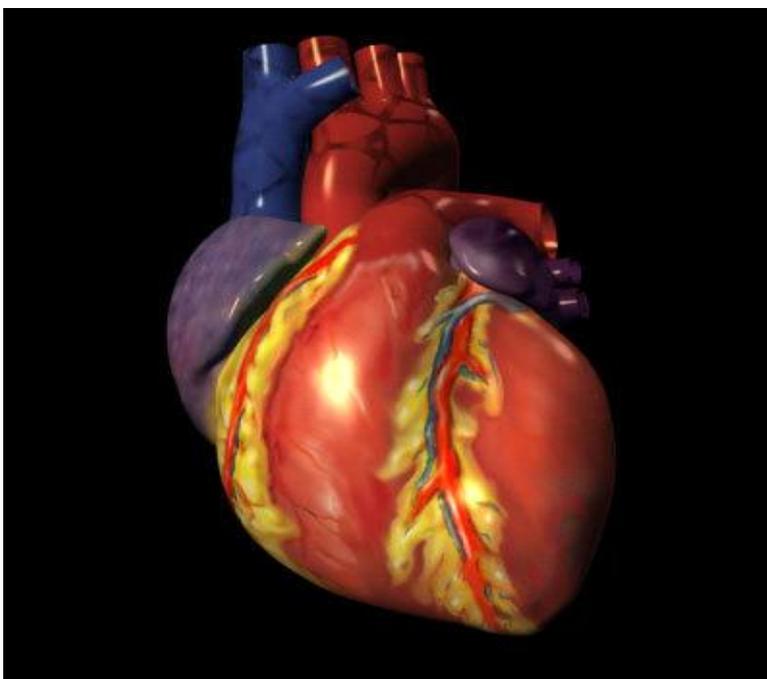
THE CORONARY GROOVE is pathway for CORONARY ARTERY **

** THE AIV+ PIV GROOVE is pathway for anterior IV ARTERY + posterior IV ARTERY

** ALL GROOVES are designed for vessels (ARTERIES)

p.s you will not be a surgeon or anatomist in one semester of 1st year, you need 6 or 7 to be and gradual information is better than dumping information in your head ...

Note :- we should study the heart from outside and this is called "surface anatomy of the heart"



- The borders of the heart:

Right: formed by right atrium so problem in it will involve the right lung

Inferior: formed by right ventricle so problem in it will involve the diaphragm

Left : form by left ventricle so problem in it will involve the left lung

"" the right side of the heart is more important forming two borders ""

- The surfaces of the heart are 3 in number:

1- anterior surface formed mainly by right ventricle and by right atrium

2- inferior surface (diaphragmic surface) formed by 2 ventricles the left and right

3- Posterior surface (base)

p.s if the heart stopped pumping then the injection should be given in the right ventricle so it will work again.

if we look to the inferior surface you will see the posterior interventricular sulcus "it's a branch from aortic artery "

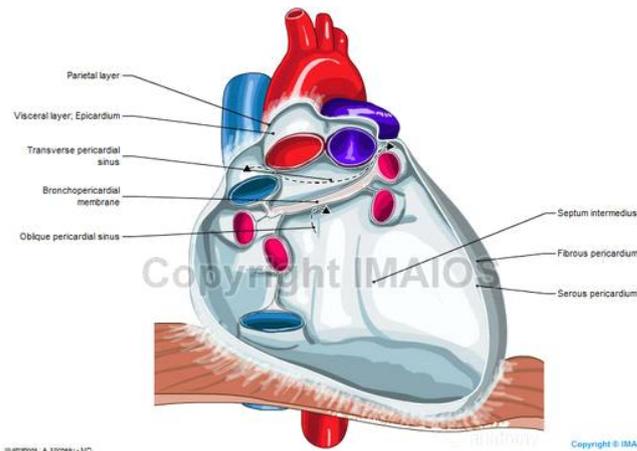
** remember : when we talked about the coronary groove it's like a circle anteriorly and continue posteriorly , the coronary artery pass through it now we have coronary vein .

- coronary artery : bringing blood to the heart tissue itself

- coronary veins : carry blood from the heart itself and send it to the right atrium

the coronary veins have another name which is coronary sinus and it means swollen

3- posterior surface (the base) it is formed by the left atrium and the esophagus located behind it, this is why when you swallow a bulk of food this will compress the left atrium and cause a face with blue color.



* At the interior of the heart:

It is divided into right venous side and left arterial side

The right atrium receive blood from superior vena cava "the upper half of the body " and inferior vena cava " the lower half of the body "

Then send it via tricuspid valve to the right ventricle

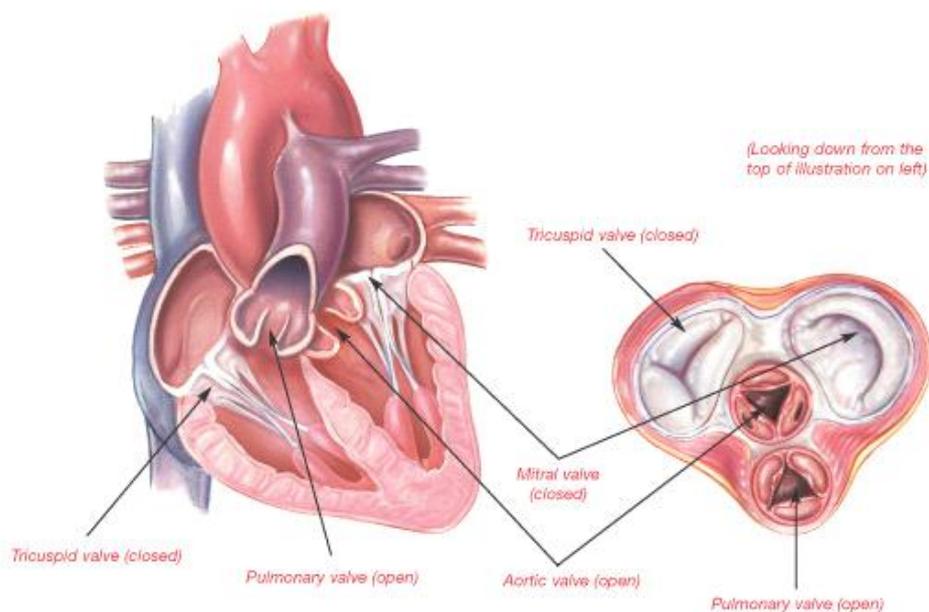
The inferior part of the ventricle that receive the blood called inflow part , then the blood back from right ventricle to the pulmonary trunk the same thing will always occur whenever the heart receives blood

the inflow part is always rough, it's bulging to minimize the force on the wall of ventricles, It is located at the apex and then blood go to outflow part which is always smooth and funnel shaped (infundibulum) to direct the current (flow) of the blood easily .

- If we cut the outer border of the right atrium by a knife and flip it inside out we will find that it has an anterior wall "rough" and posterior wall "smooth" which is the interatrial septum, the same as right ventricle, removal of the anterior wall --- finding the interventricular septum.

in the embryo the superior vena cava and inferior vena cava will drain in the right atrium and then the blood goes through the interatrial septum to the left atrium and it can't pass through tricuspid valve because the lungs are not working " the embryo doesn't breath".

p.s sometimes when the pregnant woman delivers early in the 7th month the baby may have a foramen in his heart



****the right ventricle receives the blood through the tricuspid valve and it has inflow part and outflow part**

In the inflow part : the anterior wall is rough and almost the posterior wall is rough except small part which is smooth

Rough means group of muscles ounded in a network, one of these muscles is papillary muscles..... the right atrium receives blood and sends it , its wall is thicker than right atrium's wall

The right ventricle has two walls, the inflow part is rough with projecting cardiac muscle bundles forming network of ridges Why?????????

To work as one unit at the same time, when all ventricular muscles receive the impulse message they should contract at the same time they are called "syncytium"

The conductive system "autorhythmic system" if we put the heart outside the body with Ca^{+2} ions it will contract

SA node: sends signal and AV node receives it

AV node is divided into right and left branches

AV node sends the signal all over the septum "converge the signal through the septum of the atrium because there's no connection between muscles of atrium and muscles of ventricle

So the SA node sends the signal to AV node and then to AV bundles to the left and right branches

The first part that receives the signal is the papillary muscle which is connected to a valve that closes then the papillary muscle contracts

p.s : the papillary muscle is like a parachute man when it receives the signal it directly contracts .

Question: who is responsible for closure of the valve? papillary muscles

If this muscle is weak the blood will be mixed because the valve did not close and this is called heart failure.

Finally: remember that the papillary muscle shuts the two valves (bicuspid valve and tricuspid valve) so the ventricles will contract at the same time but the pressure in the left is higher than the right.

Good Luck

“Coming together is a beginning; keeping together is progress; working together is success.”