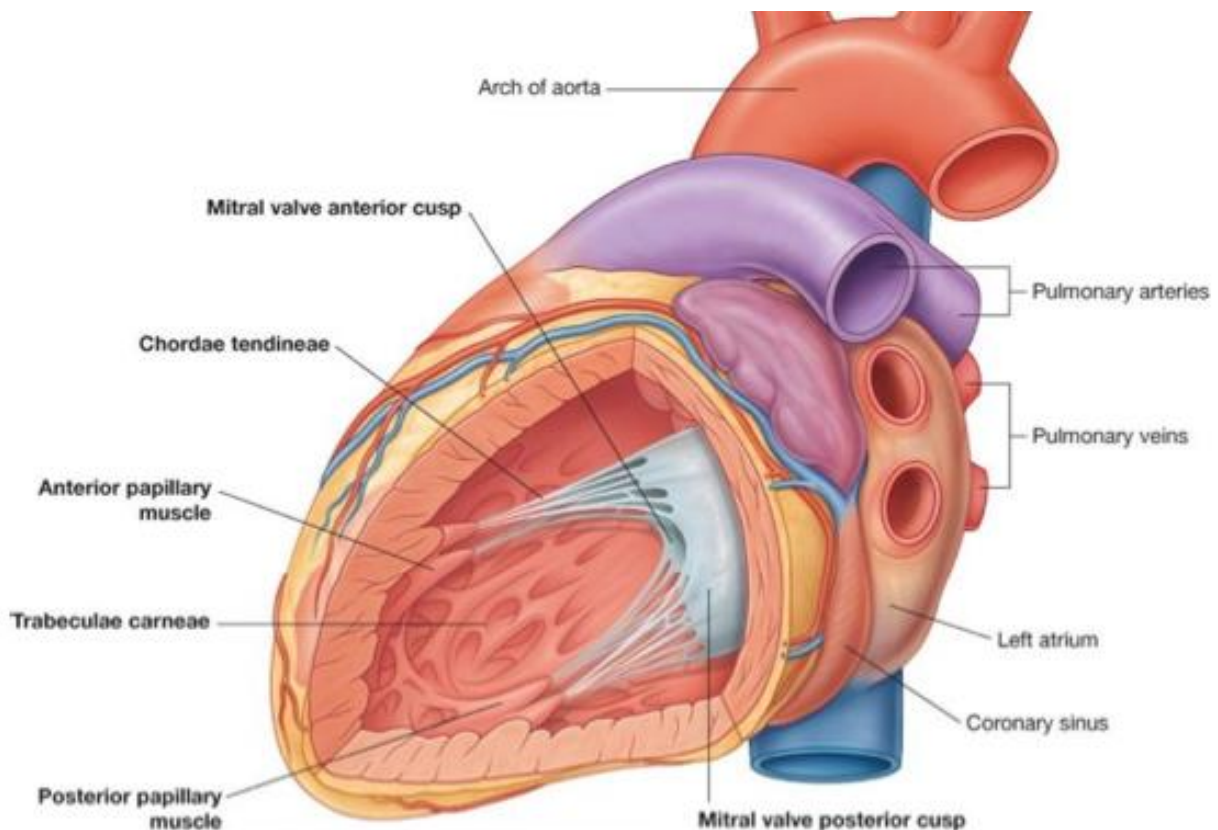


Anatomy lab -1-

Imp note: the arrangement of this sheet is different than the lab recording, it has been arranged in a certain way to make it easier to study.

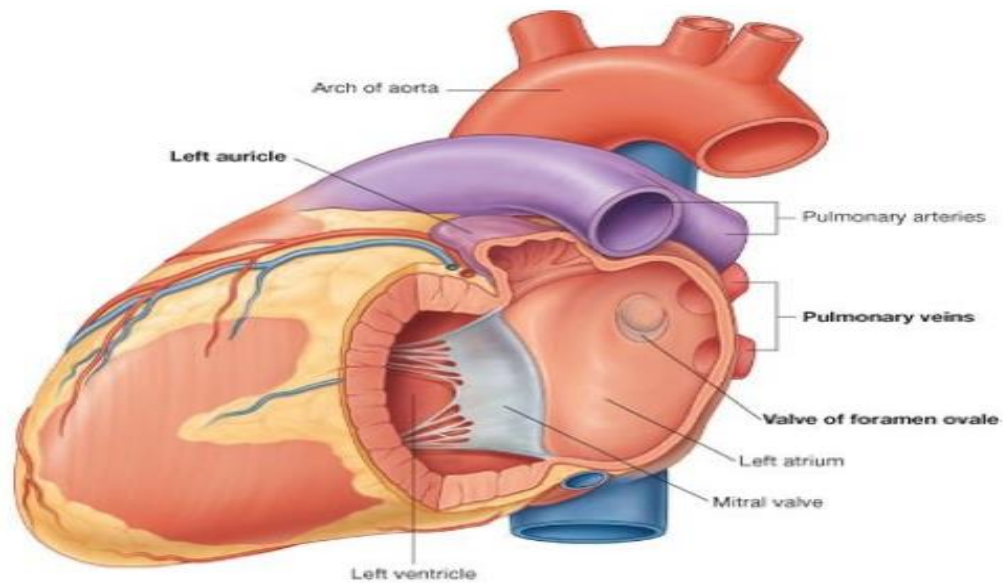
When you open the left ventricle you can see that it has a thick wall (more than right ventricle). There are 2 projections that coming from the left ventricle wall, the most important one is the **papillary muscle** and the other one is the **Trabeculae Carneae**. The papillary muscle is attached to the cusp by **chordae tendineae**. You can see the anterior cusp and behind it the posterior cusp and in between them the bicuspid valve (so in front and behind the bicuspid valve there is a cusp). So if you insert the forceps in the valve you will be in the left atrium.



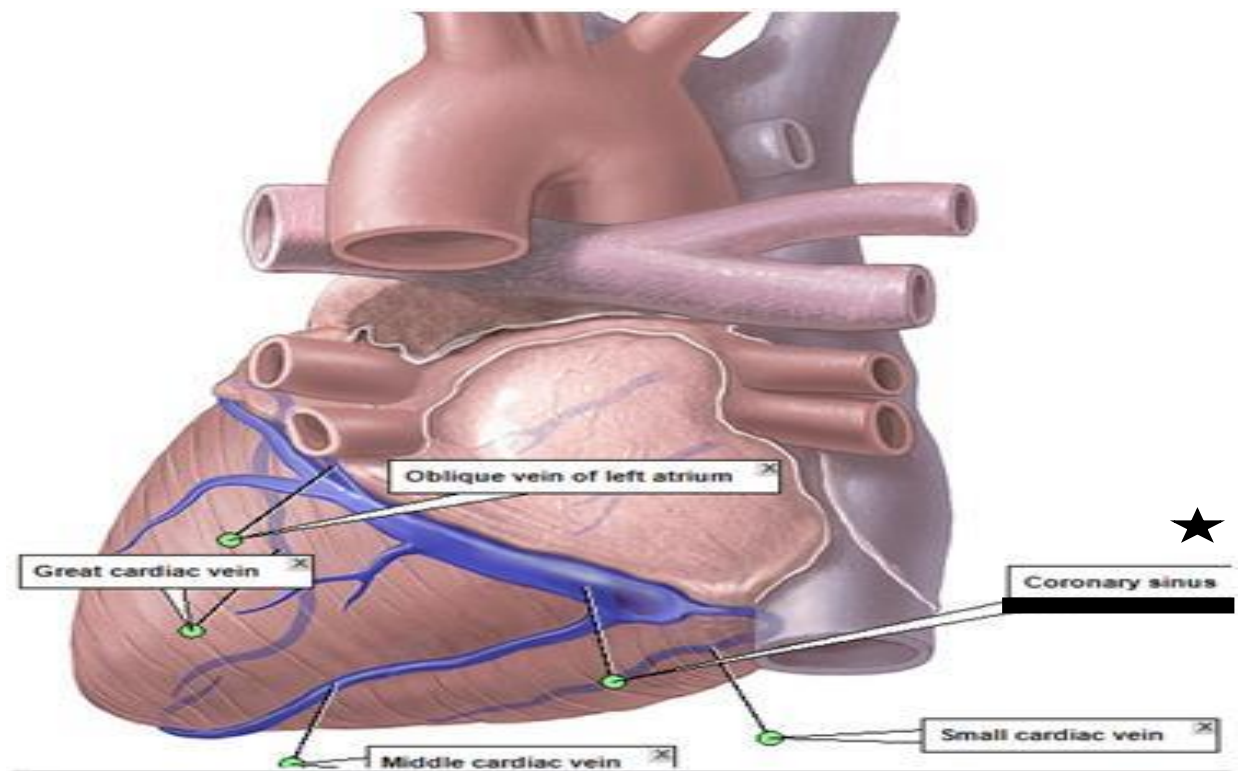
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Figure 3.67 Internal view of the left ventricle.

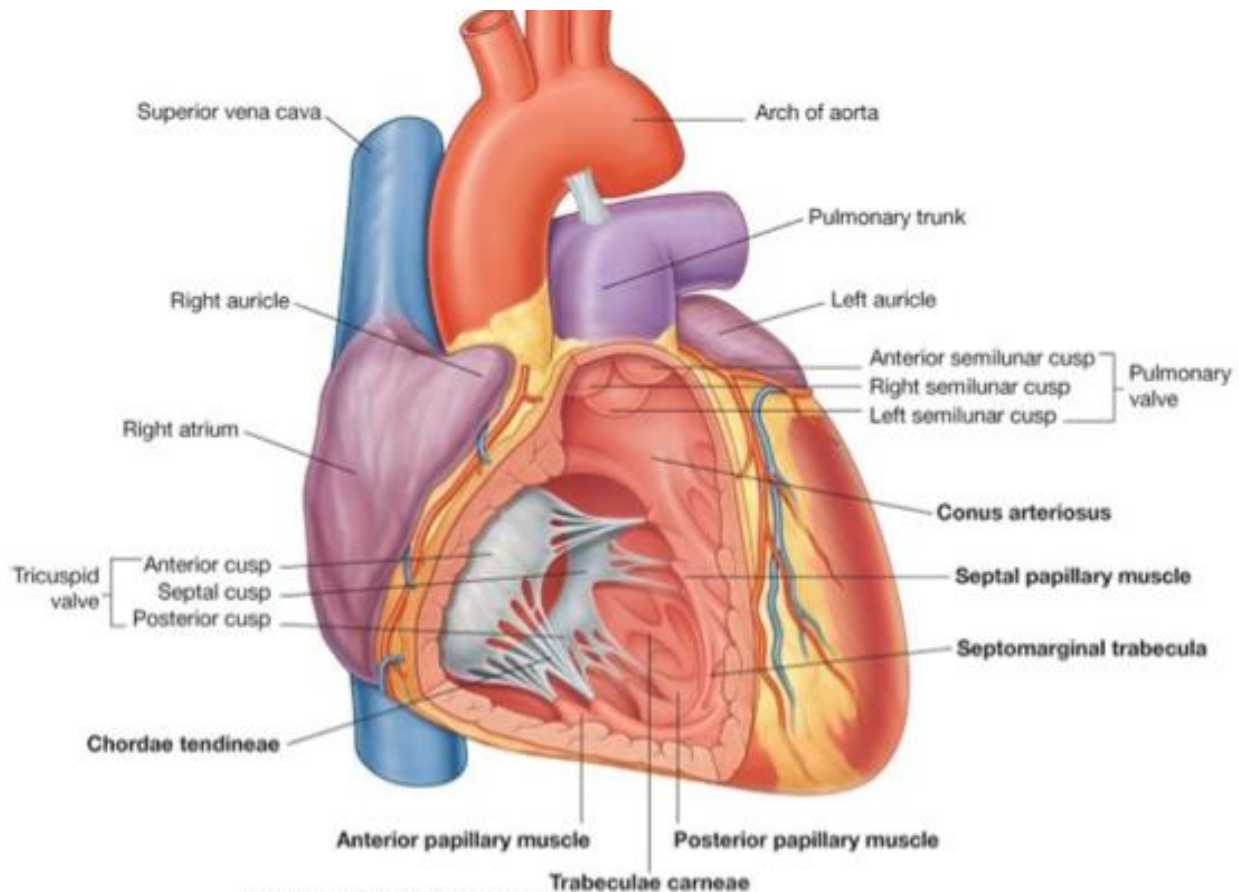
On the left atrium (we look at it from behind because the left atrium is forming the base of the heart) you can see 2 pulmonary veins on each side, and its wall is smooth except its auricle. (Even the right atrial auricle is rough)



* you may see a vein between the left atrium and the left ventricle, we call it the coronary sinus that collect the deoxy blood from the heart muscle.



Now if you open the right ventricle you can see that there is a septum that separates the left and the right ventricles, which is the interventricular septum. You can see the cusp which is **on the interventricular septum** that is called the **septal cusp of the Tricuspid**, and the other 2 cusps are anterior and posterior cusp. We can know the anterior cusp by the largest papillary muscle that is attached to it, because in the right ventricle the papillary muscles are small except the **anterior papillary muscle which is large**.



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- The papillary muscles on the left ventricle are much larger than the right ventricle, because the left ventricle has a higher pressure than the right one so it needs a larger papillary muscle to do their job properly. Each papillary muscle attaches to 2 cusps to tightening the closure of the valve.

How does the Bicuspid valve close (the Tricuspid valve will close in the same mechanism)??

During early systole there is a stage we call it the **Isovolumetric contraction** (the ventricle contracts without changing in its fibers length), this contraction increases the pressure inside the ventricle → the blood pressure increases → the interventricular pressure increases → the closed valve will try to move to the atrium side, and try to open but the **papillary muscle** with the **chordate tendineae** will **prevent the valve from moving and opening**.

So what closes the valve is the increase in the interventricular pressure in early systole (in the isovolumetric contraction stage), and it will open when : the blood fill the atrium during systole → then the atrium pressure will be higher than the ventricular pressure → the valve will open .

The papillary muscle doesn't open or close the valve, they just strengthens the closure of the valve. If there was a problem in its closure like for ex: the papillary muscle had been cut, the valve become incompetent, then the blood will come back to the atrium .We call this phenomenon " Regurgitation " or "Back flow"

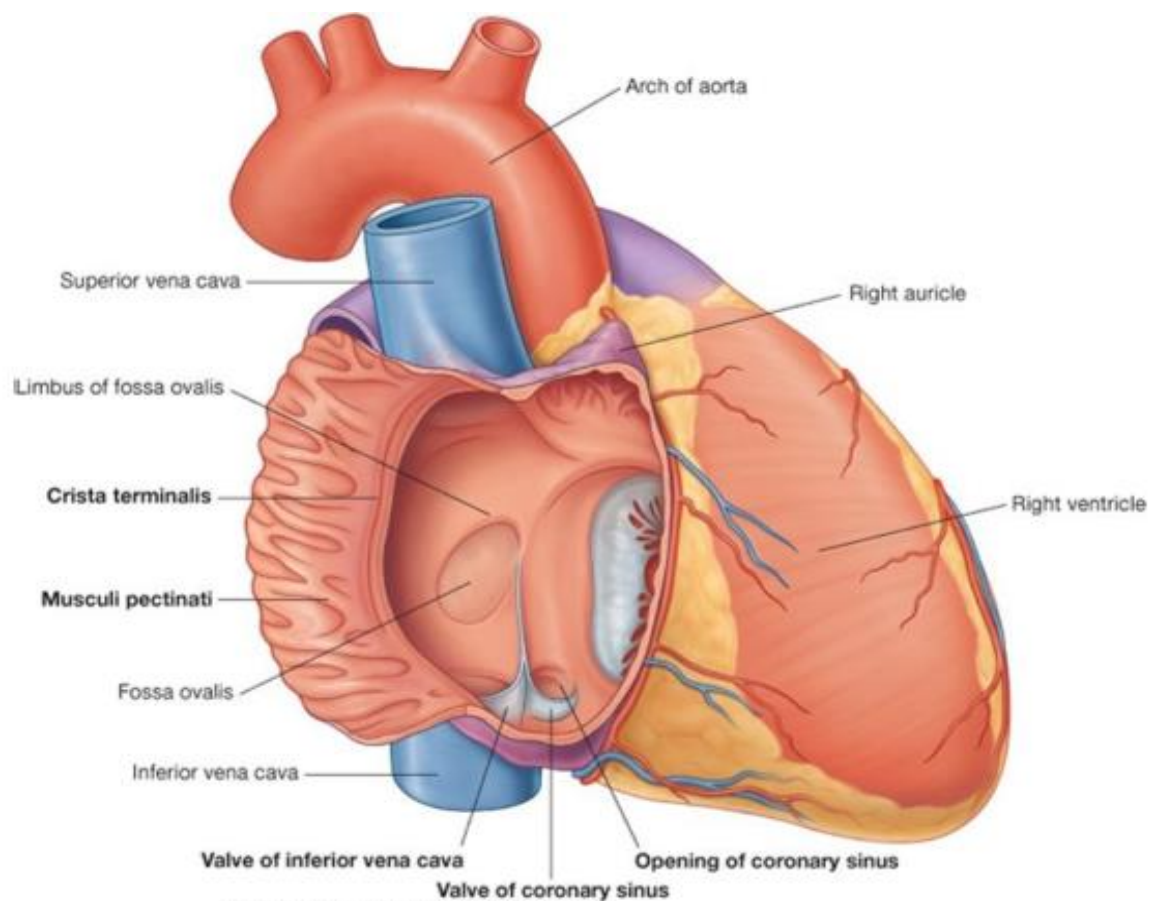
All cusps in the bicuspid (or tricuspid) valve have **atrial surface** where the blood flow in front of it (which is the **smooth surface**), and a **ventricular surface** where the blood doesn't flow on it (which is the **rough surface**). But the anterior cusp of bicuspid or mitral valve (we call this anterior cusp "**The aortic cusp of mitral** " because its near the aorta), is different in which the blood flow in front of it to go to the aorta , and flow behind it from the left atrium, **so it's smooth from each side**.

- if the bicuspid valve become narrow, the blood will accumulate in left atrium and the blood will go back to the lungs , the patient will become pulmonary congested and he will suffer from dyspnea and orthopnea (which is the difficulty in breathing that occurs when lying down). If the patient doesn't get the proper care, this will affect the right ventricle negatively by becoming over loaded.
- If the patient has a myocardial infarction that destroyed the muscle of the left ventricle, the blood will accumulate in the left atrium and the blood will go back to the lungs and its cardiac output will decrease. If the patient doesn't get the proper care, this will affect the right ventricle negatively by becoming over loaded .So here the 2 ventricles are becoming weak, we call this **the congestive heart failure " هبوط القلب الاحتقاني "**. (the lungs become congested because of the weakness of the left ventricle , and the liver and spleen become congested because of the weakness of the right ventricle (which take the blood from the right atrium and the right atrium take the blood from S.V.C and I.V.C (**that collect blood from systemic circulation**))

- The closure of the AV valve on the right and left sides makes **the first heart sound (lub)** , the closure of the semilunar valves makes **the second heart sound (dup)** “lub → dup”

- If you open the **right atrium** you can see the **rough** wall which is formed by **crista terminalis** and **musculi pectinati** (it is a derivative of **the primitive atrium** in embryo), but its **posterior wall** (which is the interatrial septum) is **smooth** (it is a derivative of **the sinus venosus** from the heart tube in embryo) , on this wall you can see the fossa ovalis that has a margin that is called the limbus of fossa ovalis, but in fetus it was **called the foramine ovali** (it closes at birth)

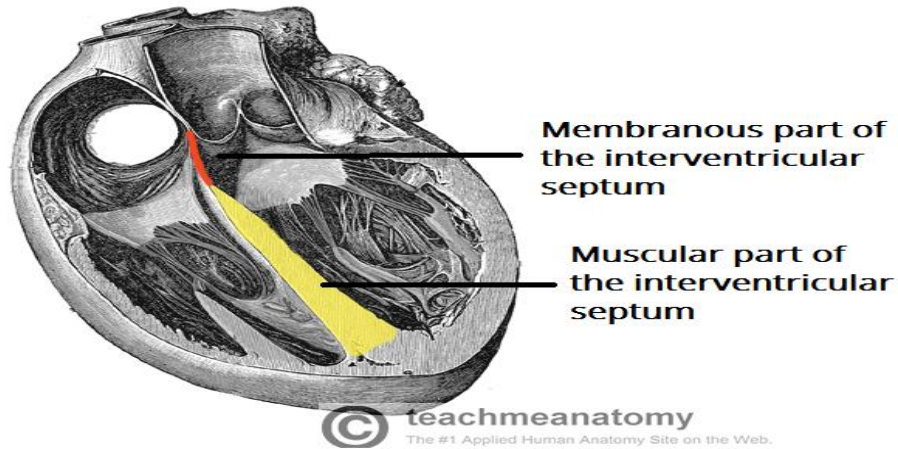
“Usually different structures have different embryological origin”



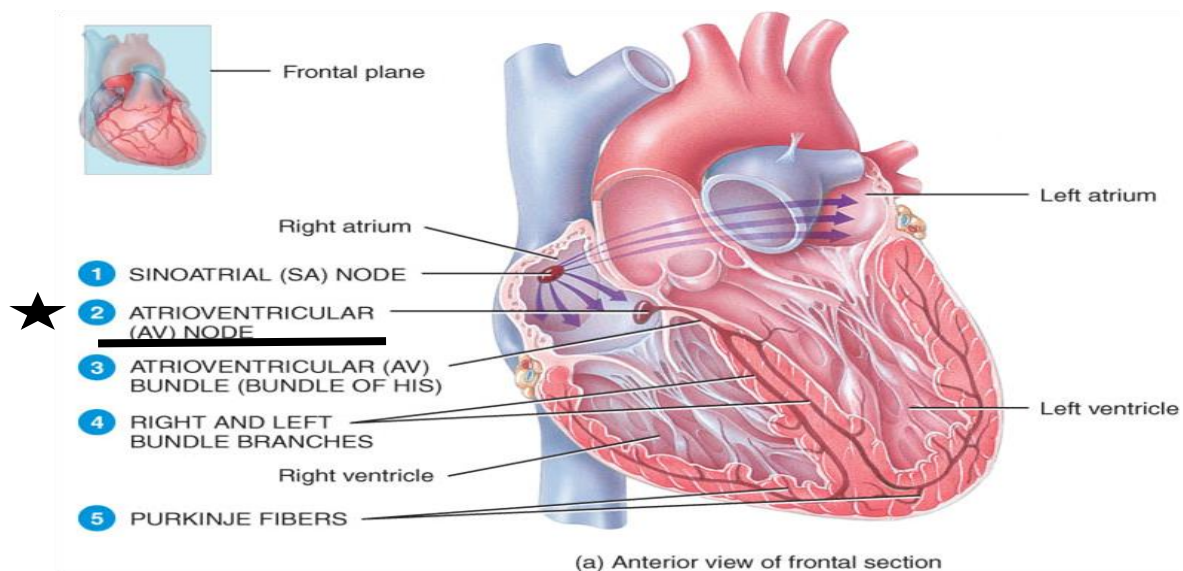
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Figure 3.63 Internal view of right atrium.

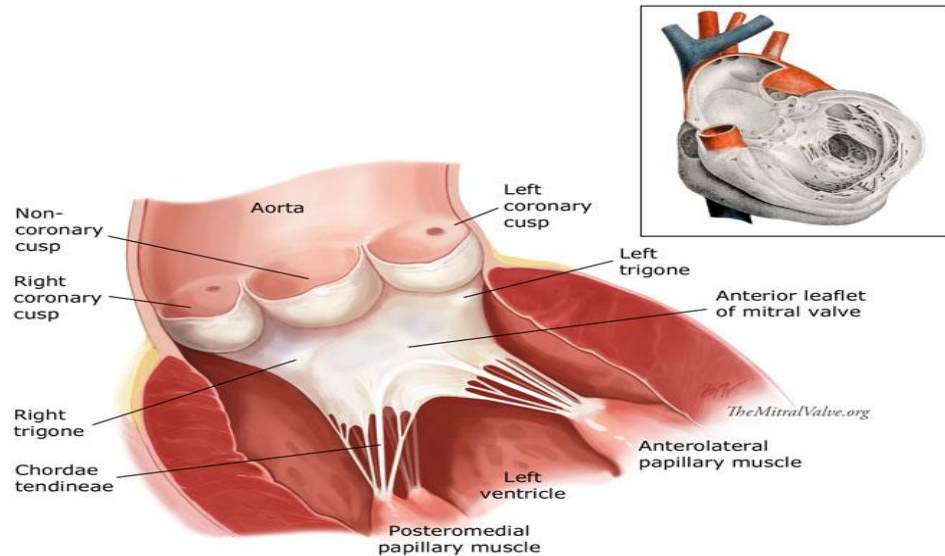
The interventricular septum is thick in its lower part .If you put your left index under the aortic valve (we mean on the left ventricle) on interventricular septum side, and you put your right index above the septal cusp (we mean on atrium) —→ you will have between your fingers a part from the interventricular septum we call it the membranes part which has a high incidence of exposure to " Congenital malformations " (فتحة خلقية)



Behind the membranous part a very important conducting system which is the AV node, that is the only connection between the atrium and ventricle. The atrium is myocardium by its own and the ventricle is myocardium by its own, between them is the fibrous ring and **the AV bundle come across this ring** .If you cut it during surgery on **the open membranes part of the interventricular septum** this will progress to **bundle branch block "BBB"** , you should solve this by: putting a pacemaker to the ventricle and not for atrium because it has one by its own which is **the SA node** or else the patient will never wake up from surgery and he will die .

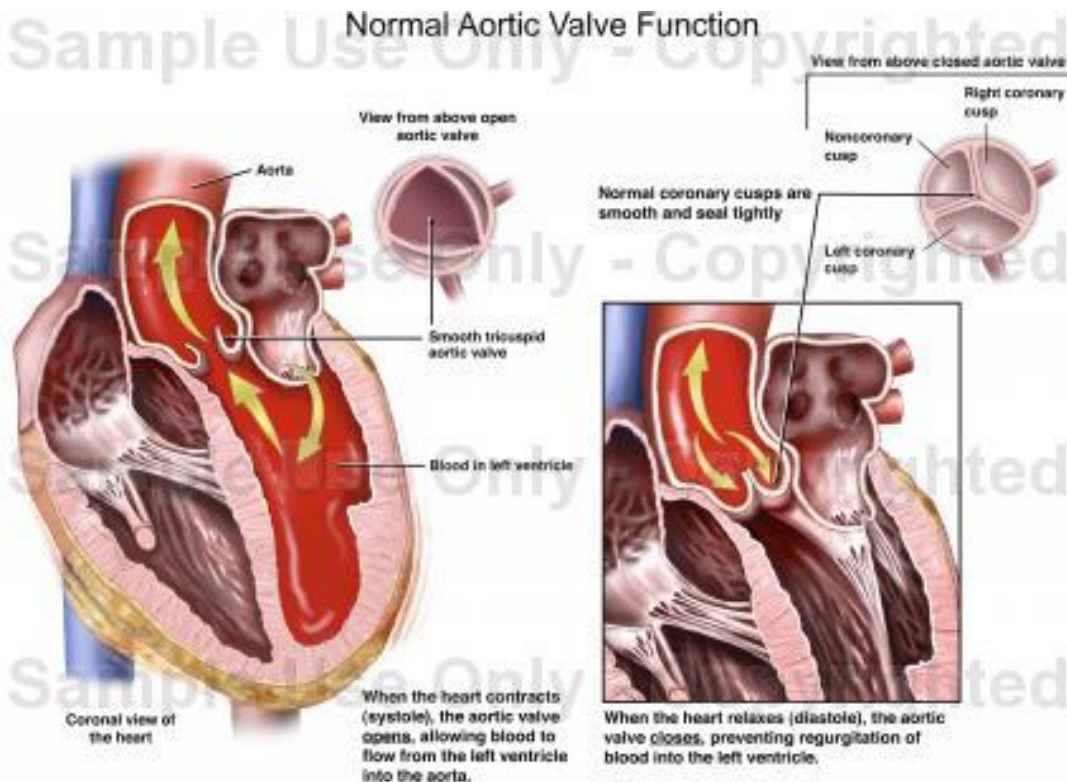


- Beside the anterior cusp of the bicuspid you can see the semilunar Aortic valve which has 3 cusps.



- During the diastole the blood come back from the aorta to the left ventricle, (and from the pulmonary trunk to right ventricle), but the blood will face these cusps → they will adhere to each other → and they will be closed and filled with blood.

Normal Aortic Valve Function



The pulmonary trunk in its start is anterior to the ascending aorta, then when it goes up it start going to be on the aortic left side, then it will divided to left and right pulmonary arteries under the arch of the aorta. But during fetal life the aorta and pulmonary trunk were one tube, we call them **truncus arteriosus** . The ascending aorta and pulmonary trunk are inside the pericardium cavity but the arch of the aorta (and its branches) and the pulmonary branches are in **SUPERIOR Mediastinum OUT side the pericardium cavity**.

