



CVS - Anatomy

Lec #2.

Lec Date : 28/1/2019-Mon .

Lec Title : The Myocardium: Chambers, valves and innervation .

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- Review of Heart surface anatomy :
 - The heart has a **conical shape** (Flattened cone).
 - Its base is directed **posteriorly**
 - remember it consists of : (**For better understanding**)
 1. Mainly the left atrium .
 2. Small portion of right atrium .
 3. Proximate parts of the great veins (**SVC** and **IVC**).
 - Apex of the heart : from the base of the heart projects **forward , downward and to the left** , positioned deep to the **5th intercostal space** .
- ✓ The heart is called to be a **dual** machine(or dual pump) pumping both **arterial** and **venous** blood , where the left side pumps the fresh oxygenated ,arterial blood and the right side deals with the deoxygenated blood .
- ✓ Be careful , both pumps work **in the same efficiency** meaning that the same blood volume pumped from the left side is returned (drained into) the right side ; so they have an integrative function .
- ✓ Notice:
 - Pulmonary Heart Failure : result from a failure of the right ventricle .
 - Congestive Heart Failure (CHF) : occurs when the left ventricle doesn't properly pump blood out to the body .
- Referring back to heart anatomical structure :
 - It consists of **4** chambers (RV , RA, LV and LA)
 - Atria is separated from the ventricles by what's called the **Coronary Sulcus**.
 - The 2 ventricles (RV and LV) are separated by **Interventricular Sulcus** (both **anteriorly** and **posteriorly**).
- We are going to start studying the 1st chamber which is the **Right Atrium** :
 - Located in front of the LA , its posterior wall forms the anterior wall of the LA .
 - During the embryonic life , there is an opening found between the 2 atria called Foramen Ovale ,which allows the blood to enter the LA from the RA .This foramen normally closes at birth when the lungs become functional . As a result of this closure , a depression called Fossa Ovalis is formed .
 - Surrounding the fossa ovalis there is an elevation called **Limbus of fossa ovalis** .
 - 2 Veins drains into the RA : SVC and IVC .
 - On the left side of the RA there is what's called the Right auricle ,which is an ear-like ,conical muscular pouch that externally overlaps the ascending aorta .
 - The post. wall of RA is smooth , whereas the Ant. one (inside) has muscular bands running **transversely** (called **Musculi Pectinati**) ,ending with a vertical elevated muscular band called **Crista Terminalis** .



- Externally(external anterior wall of RA), anterior to the crista terminalis (internally) there is a depression called Sulcus Terminalis , this sulcus extends from the SVC to IVC .
 - Inferiorly , an opening of IVC is found , surrounded with endocardial flap that works as a valve for the IVC .
 - Inferiorly , there is a Tricuspid valve , positioned between the RA and RV also called R. AV valve.
 - Another opening situated between the opening of IVC and the tricuspid valve which is : **coronary sinus orifice** , remember that coronary sinus delivers the less-oxygenated blood after collecting it from the myocardium to the RA .
 - Anterior to the opening of the coronary sinus there is also endocardial flap .
 - Right auricle wall is also trabeculated ; not smooth .
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- Moving now to the 2nd chamber , **RV (Right Ventricle)** :
 - Directed downward and to the left , found in front of the RA and LV .
 - Separated (internally) from the LV by interventricular septum , this septum is deviated to the right side ,so bulging into the right ventricle making it crescentic in cross section .
 - This septum , structurally , composed from a membranous part (Sup) and muscular part (inf) forming the major part of the septum .
 - RV wall is rough ; trabeculated .
 - There is a muscular band crossing the inferior tip of the RV , called Septomarginal band , forms a bridge between the lower portion of interventricular septum and the base of ant papillary muscle .
 - Superiorly , the ventricle is smooth , this smooth area leads to the pulmonary trunk . The pulmonary trunk is guarded by a tricuspid valve(2 cusps directed ant and the 3rd post) called Pulmonary valve .
 - Chordae tendineae connect the papillary muscles to the tricuspid valve , functions to prevent the backflow of blood (**When the ventricles of the heart contract in ventricle systole , there is an increased in blood pressure in both chambers which push the AV valves - L and R- to close simultaneously preventing the backflow of blood into the atria " Source : Lec notes + Wiki")**
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- The 3rd chamber to be explained is : **The Left Atrium** .
 - Forms **most of the base or post surface of the heart** .
 - Rectangular in shape .
 - Receives four pulmonary veins on its posterior , smooth wall .
 - On its ant wall , left AV orifice is positioned .
 - The posterior wall of the LA is related to the esophagus , left bronchus and descending aorta .
 - Esophagus tumors commonly causes depression to the LA (Affect the LA) .
 - *Commonly asked* , After performing an X-Ray to a patient , a mass posterior to the LA has been found ,what do you think this mass is ?
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- The last one to be mentioned is : **The LV (Left Ventricle)** .
 - The wall of LV is **much more thicker** than that of the RV ; bcz it is the LV that pumps the blood all around the body into the systemic circulation so it needs to generate a fairly high pumping pressure.



- Thickness **further increases when there is an increase in resistance** , Cardiac Hypertrophy .
 - Aortic vestibule ; superior region of the left ventricle , inferior to the aortic orifice .
 - **Aortic Valve** , similar in structure to the pulmonary valve , consists of 3 semilunar cusps , and the free margin of each cusp projects upward into the lumen of ascending aorta .
 - **Mitral Valve** ; bicuspid valve or L. atrioventricular valve , lies between the LA and the LV .
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● *Skeleton of the heart* :

- Definition : collection of dense , fibrous CT in the form of 4 rings with interconnecting areas in plane between the atria and the ventricles .
 - The **4 rings** of the cardiac skeleton surrounds :
 - ◆ 2 atrioventricular orifices .
 - ◆ Aortic orifice .
 - ◆ Opening of the pulmonary trunk .
 - The Skeleton merges with the interventricular septum .
 - Functions :(Written in the Slide#7)
 - ◆ Electrically isolates the atria from the ventricles .
 - ◆ Provides the rigidity to prevent the dilatation of valves .
 - ◆ Provides point of attachment for valve leaflets and the myocardium .
 - Calcification can be found on the skeleton ,especially in elderly people .
 - Muscles of the atria **aren't continuous** with those of the ventricles (The muscles of atria ends with the skeleton , in turn ventricular muscles starts from the skeleton extending downward) .
 - Mitral valve and the Tricuspid valve positioned in the same plane ; connected with a fibrous tissue .
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● Conductive System of the Heart :

- Sinuatrial node ; located on the right side of the opening of SVC at the top of sulcus terminalis .
- The conduction system consists of nodes and networks of specialized cardiac muscle cells organized into 4 basic components :
 - ◆ The SA node .
 - ◆ The AV node .
 - ◆ The AV bundle with its right and left bundle branches (RBB , LBB) .
 - ◆ The subendocardial plexus of conduction cells (The purkinje fibers) .
- This system initiates the complex cardiac muscle contractions comprising the cardiac cycle , and it controls its regularity .
- Fibrillation : irregular heart beat , there are 2 major classes
 - Atrial Fibrillation , relating to defect or uncoordinated contraction of the atrial muscles .
 - Ventricular Fibrillation .

End Of The Sheet

