- LECTURE 39
- Dr. REHAN
- By the end of session, the student should able to:
- Describe the conducting system of the heart.
- Discuss arterial supply, venous drainage and nerve supply of the heart.
- Describe the surface anatomy of the cardiac valves.
- Correlate this knowledge to clinical conditions.

- Conducting system of the heart
- Consists of specialized cardiac muscle
- Present in the sinoatrial node, the atrioventricular node, atrioventricular bundle and its right and left terminal branches,

and subendocardial plexus of Purkinje fibers.

- Conducting system of the heart
- **Sinoatrial Node**

✓ Located in the wall of the right atrium in the upper part of the sulcus terminalis

✓ It is present right of the opening of the superior vena cava

- **Atrioventricular Node:** placed on the lower part of the atrial septum just above the attachment of the septal cusp of the tricuspid valve

- Conducting system of the heart
- The atrioventricular bundle (bundle of His) descends through the fibrous skeleton of the heart.

- The atrioventricular bundle descends behind the septal cusp of the tricuspid valve to reach the inferior border of the membranous part of the ventricular septum.
- At the upper border of the muscular part of the septum, it divides into two branches, one for each ventricle.
- Conducting system of the heart
- The right bundle branch (RBB) passes down on the right side of the ventricular septum to reach the moderator band.
- From here, it is continuous with purkinje plexus.
- The left bundle branch (LBB) pierces the septum and passes down on its left side beneath the endocardium.

- Purkinje fibers: subendocardial plexus of conducting cells.

- **The Arterial Supply of the Heart**
- **Right coronary artery**

✓ arises from the anterior aortic sinus of the ascending aorta and runs forward between the pulmonary trunk and the right auricle.

- The **left coronary artery** supplies the major part of the heart including the greater part of the left atrium, left ventricle, and ventricular septum.

✓ It arises from the left posterior aortic sinus of the ascending aorta and passes forward between the

pulmonary trunk and the left auricle

- Right coronary artery branches
- Right conus artery
- Anterior ventricular branch: two to three in number
- ✓ Largest is known as marginal artery
- Posterior ventricular branch
- Posterior interventricular artery
- Atrial branch

- Left coronary artery
- It enters the atrioventricular groove and divides into an anterior interventricular branch and a circumflex branch.
- Some times left diagonal artery arises directly from left coronary artery

- Left marginal artery is large branch of circumflex artery

- Venous drainage of heart
- Most blood from the heart wall drains into the right atrium through the coronary sinus
- Coronary sinus lies in the posterior part of the atrioventricular groove and is a continuation of the great cardiac vein.
- The small and middle cardiac veins are tributaries of the coronary sinus.
- Small amount is drained in the right atrium by the anterior cardiac vein

- Innervation
- Innervated by sympathetic and parasympathetic fibers of the autonomic nervous system via the **cardiac plexuses** situated below the arch of the aorta.
- The sympathetic supply arises from the cervical and upper thoracic portions of the sympathetic trunks, and the parasympathetic supply comes from the vagus nerves.

- **Surface Anatomy of the Heart Valves**

- The **tricuspid valve** lies behind the right half of the sternum opposite the 4th intercostal space.

- **Mitral valve** lies behind the left half of the sternum opposite the 4th costal cartilage.
- **Pulmonary valve** lies behind the medial end of the third left costal cartilage and the adjoining part of the sternum.
- A**ortic valve** lies behind the left half of the sternum opposite the 3rd intercostal space.

- Clinical correlations
- **Arrhythmias:** Failure of the bundle to conduct the normal impulses results in alteration in the rhythmic contraction of the ventricles
- **Commotio Cordis:** results in ventricular fibrillation and sudden death

- Caused by a blunt nonpenetrating blow to the anterior chest wall over the heart.
- sudden blow is frequently produced by a baseball, baseball bat, lacrosse ball, or fist or elbow.
- Ventricular fibrillation is most likely to occur if the blow occurs during the upstroke of the T wave

- Coronary artery disease
- Clinical correlations
- In **right dominance,** the posterior interventricular artery is a large branch of the right coronary artery. Right dominance is present in most individuals (90%).

- In **left dominance,** the posterior interventricular artery is a branch of the circumflex branch of the left coronary artery (10%).
- Clinical correlations
- **Carotid angiogram**: a small catheter introduced through the skin into an artery in either the groin or the arm.
- Assistance of a fluoroscope (a special x-ray viewing instrument), the catheter is then advanced to the opening of the coronary arteries (the blood vessels supplying blood to the heart).
- The images that are produced are called the angiogram.

- Clinical correlations
- The **tricuspid valve** is best heard over the right half of the

lower end of the body of the sternum.

- The **mitral valve** is best heard over the apex beat, that is, at the level of the fifth left intercostal space, 3.5 in. (9 cm) from the midline
- The **pulmonary valve** is heard with least interference over the medial end of the second left intercostal space
- The **aortic valve** is best heard over the medial end of the second right intercostal space
- Summary
- Conducting system of heart
- Arterial supply of heart
- Venous drainage
- Innervation
- Clinical correlations

- References
- **Clinical Anatomy by Regions: R.S. Snell, 9th ed.**
- Gray's Anatomy for students, 2nd ed.
- http://www.medicinenet.com/coronary_angiogram/article.htm