* 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