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Diploma in Pharmacy 1st Year
Human Anatomy & Physiology
Experiment

To study the given model of human cardiovascular system.

Aim:

To study the given model of human cardiovascular system.

Reference :

Dr. Gupta G.D , Dr. Sharma Shailesh , Dr. Sharma Rahul Kumar , "Practical Manual of Human Anatomy and Physiology" Published by Nirali Prakashan , Pg.No 125 - 129

Theory :

The heart is located in the thoracic cavity in the mediastinum; it is obliquely positioned, slightly more to the left than to the right

Cardiac Cycle

The heart contracts and then reflexes with each heartbeat or cardiac cycle. Systole refers to the period of contraction, while diastole refers to the period of relaxation.

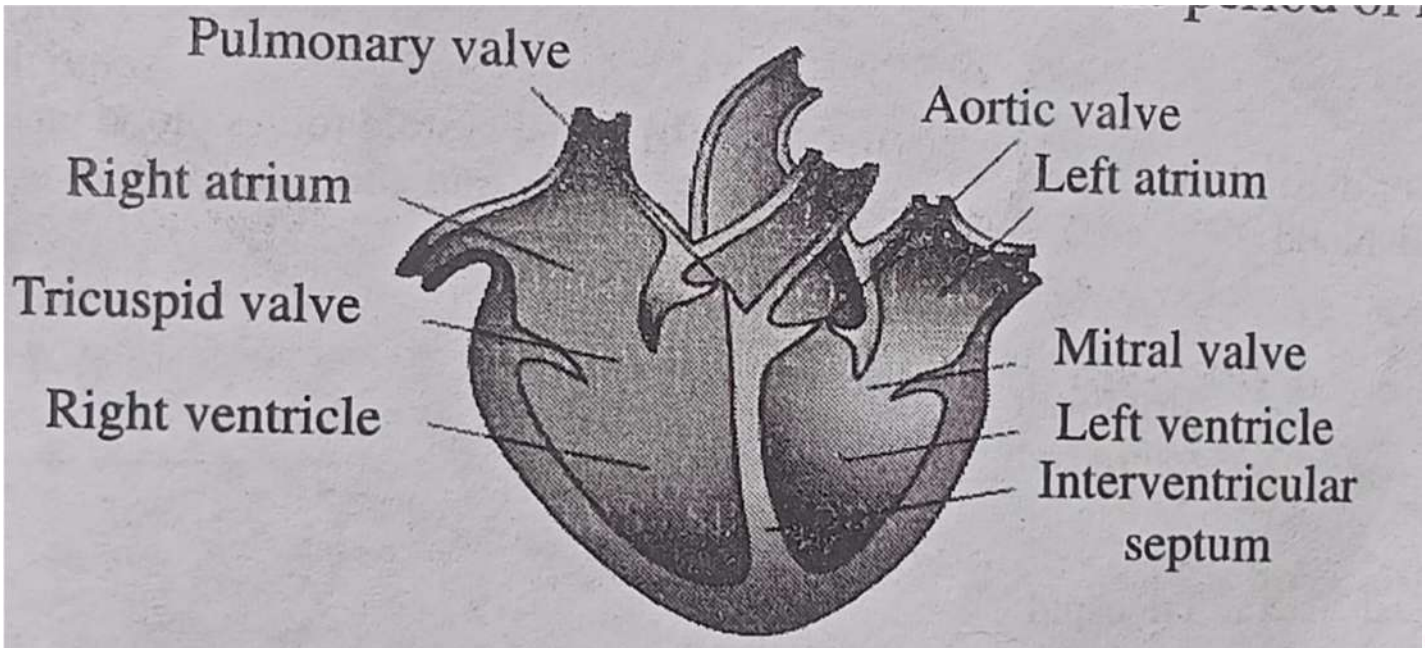

Figure 44: Cardiac Chambers and Valves

Stages of the Cardiac Cycle

Taking 74 bpm as an example, each cycle lasts about 0.8 of a second and consists of:

1) **Atrial Systole:** Contraction of the atria.
2) **Ventricular Systole:** Contraction of the ventricles.
3) **Complete Cardiac Diastole:** Relaxation of the atria and ventricles.

At the same time as the four pulmonary veins convey oxygenated blood into the left atrium, the superior vena cava and inferior vena cava deliver deoxygenated blood into the right atrium The artrioventricular valves are open, and blood flows through the ventricles in a passive manner. When the electrical impulse reaches the AV node, it is delayed, delaying atrioventricular transmission.

The SA node causes a wave of contraction that spreads over the myocardium of atria, emptying the atria and completing ventricular filling (atrial systole) This indicates that the mechanical response of atrial stimulation, atrial contraction lags behind the electrical activity by a fraction of a second. This gives the atria enough time to drain into the ventricles before the ventricle begins to contract The AV node generates its own electrical impulses, which quickly spreads along the bundle of branches and purkinje fibres to the ventricles and ventricular muscles.

This causes a wave of contraction to sweep up from the heart's apex and across the walls of both ventricles, pumping blood into the pulmonary artery and the aorta (ventricular systole) Because the high pressure generated during ventricular contraction is higher than that in the aorta and forces the atrioventricular valves to close, preventing blood from flowing back into the atria

After ventricular contraction, a complete cardiac diastole of 0.4-second occurs when the atria and ventricles are relaxed. During this time, the myocardium heals and prepares for surgery. The atria will refill in preparation for the next cycle and

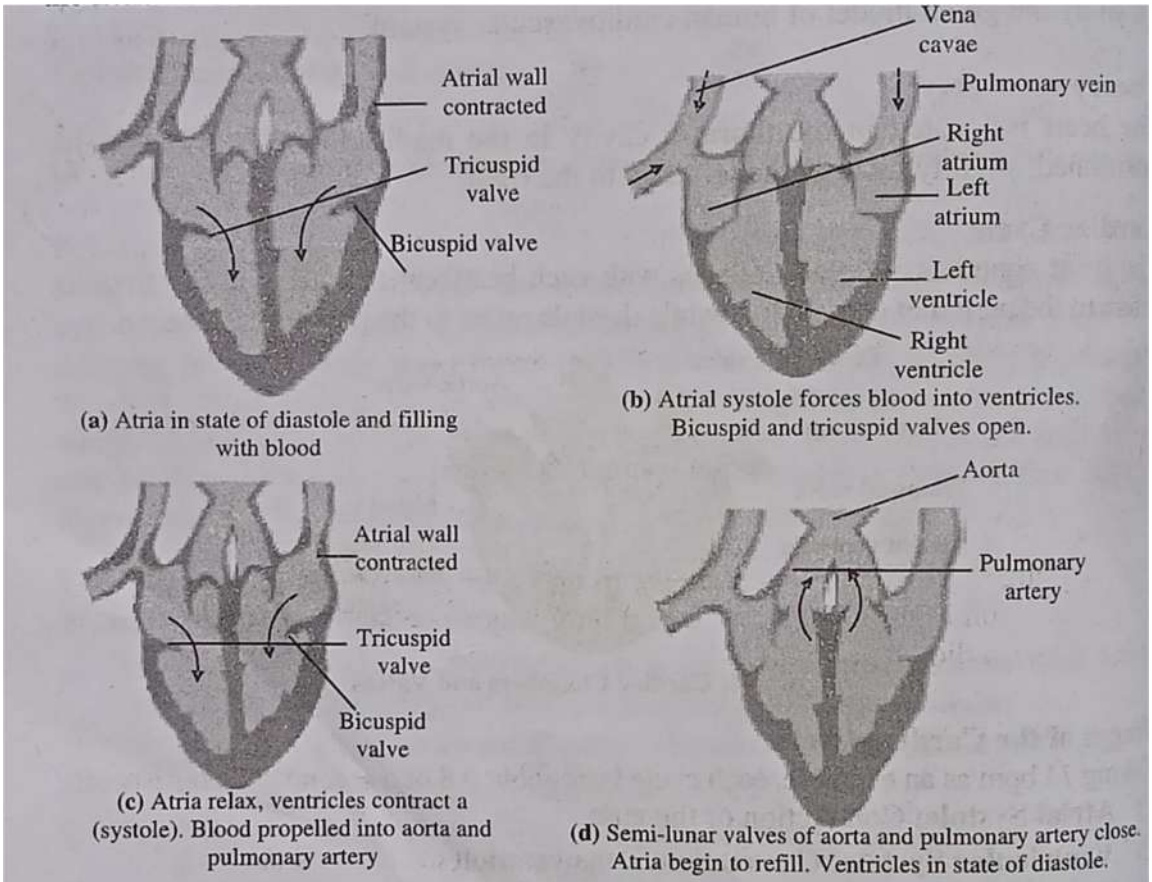

Figure 45: Stages of the Cardiac Cycle

During atrial filling and systole, the AV valves are open and the ventricular muscle is relaxed. The pressure in these chambers nses rapidly when the ventricles contract, and when it gets above atrial pressure, the atrioventricular valves collapse The pulmonary and aortic valves open when the ventricular pressure increases above that of the pulmonary artery and the aorta, allowing blood to flow into these vessels. The process is reversed when the ventricles relax and the pressure within them lowers The pulmonary and aortic valves close first. followed by the atrioventricular valves opening, and the cycle repeats.

Pulmonary Circulation

1) The flow of blood from the right ventricle of the heart to the lungs and back to the left atrium in the lungs. Oxygen is absorbed while CO_2 is expelled

2) Deoxygenated blood leaves the upper part of the right ventricle of the heart via the pulmonary artery. At the level of the 5 thoracic vertebra, it separates into left and right pulmonary arteries
3) The left pulmonary artery flows from the heart to the root of the left lung. where it splits into two branches, one for each lobe
4) The night pulmonary artery divides into two branches as it goes through the root of the right lung. Blood is carried to the middle and lower lobes by the bigger branch, while the upper lobe is served by the smaller branch
5) These arteries were separated and subdivided into smaller arteries, arterioles, and capillaries within the lung. Gases are exchanged between capillaries in the blood and air in the alveoli of the lungs. The oxygenated blood capillaries in each lung merge into progressively larger venules, finally becoming two pulmonary veins
6) Each lung has two pulmonary veins that return oxygenated blood to the left atrium of the heart. This blood is pumped into the left ventricle during the atrial system, and during ventricular systole, it is driven into the aorta, the first artery of the general circulation.

Result: The given model of cardiovascular system was studied