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DEPT: ANATOMY **COURSE:** ANATOMY OF THE THORAX AND ABDOMEN
COURSE CODE: ANA 202

Q:

1. You will be provided with a video, watch it and use it to describe the heart and its functions
2. Write on five (5) different congenital anomalies of the heart.

A:

1.

The heart is a muscular organ that contracts rhythmically to pump blood through the circulatory system and is located at the mediastinum. It is bordered bilaterally by the lungs, anteriorly by the sternum and posteriorly by the oesophagus and thoracic vertebrae. It is about the size of your fist. The inside of the heart is divided into four (4) chambers and

The first two chambers are called the atria and collection chambers for blood while the bottom two chambers are called the ventricles and receive blood from the atria and pump it to the lungs and the body

The chambers are separated by valves that control the direction of blood flow. There are four valves

a) Tricuspid Valve- this separates the right atrium and the right ventricle. Allowing blood to enter the ventricle but not flow backwards to the atrium
b) Pulmonary Valve – Blood leaves the right ventricle and flows through this to get to the lungs
c) Mitral/bicuspid valve- Separates the left atrium and the left ventricle
d) Aortic valve- Blood flows from the left ventricle to the aorta through this valve

Circulation of blood begins from the right side of the heart where blood(deoxygenated) from the body comes from the right atrium. The blood passes to the right ventricle where it is pumped to the lungs to receive oxygen once it receives oxygen, it flows to the left atrium and then to the left ventricle where it is pumped to the aorta that takes it to the rest of the body

Arteries carry blood and other nutrients throughout the body while veins take blood back to the heart which pumps it to the lungs to be oxygenated. The heart arteries coronary arteries provide the oxygen and nutrients to the heart muscle

- The right coronary artery supplies blood to the bottom and posterior of the heart
- The left coronary artery splits into two vessels. One branch supplies blood to the anterior of the heart while the other supplies blood to the left side of the heart

An electric system transmits signals throughout the heart to control its pumping. The electrical signal starts in the sinoatrial node (natural pacemaker) which is located in the upper portion of the right atrium. This signal passes down to the lower chamber of the heart via the Atrioventricular node which controls the signals so the atrial contracts before the ventricles.

In the ventricles pathways carry the signals throughout the muscle, so they contract at the same time to pump blood to the lungs and through the body.

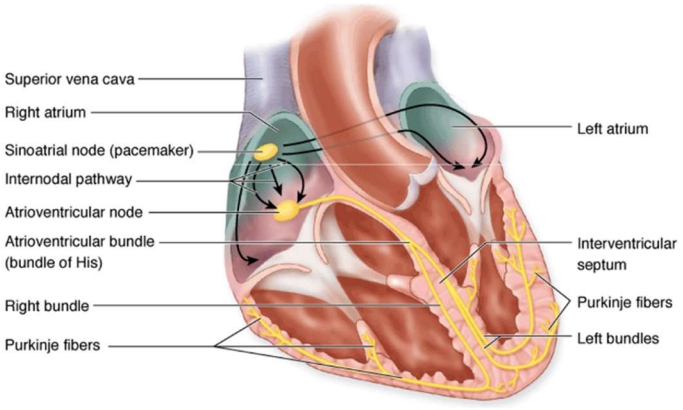


Diagram of the heart

Functions of the heart

1. It pumps blood via the circulatory system, supplying blood and nutrients to the tissues and organs of the body.
2. It also helps in the removal of metabolic wastes such as carbon dioxide via its blood vessels
3. Blood pumped from the heart defends the body against foreign microbes and toxins. Clotting mechanisms are also present in the blood that protect the body from blood loss after injuries

Congenital Heart Anomalies

1)Tetralogy of fallot

It is a common group of heart defect. It is the most important type of malformation causing cyanosis. It consists of;

a) Pulmonary stenosis
b) Ventricular septal defect
c) Overriding aorta and
d) Hypertrophy of the right ventricle

Pulmonary stenosis

The cusps of the pulmonary valve are fused together to form a dome with a narrow central opening. This, together with stenosis of the truncus arteriosus results in hypertrophy of the right ventricle.

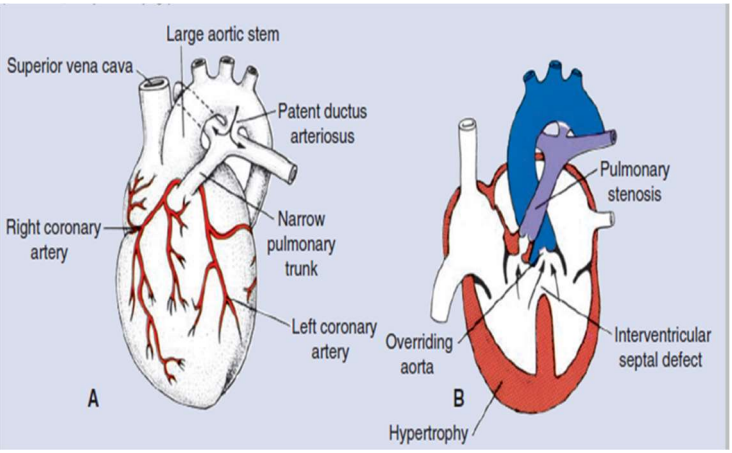
Ventricular septal defect (VSD)

There are two types

i. Membranous VSD: it results from failure of incomplete closure of IV septum or the subendocardial tissues fail to grow from the right of the fused endocardial cushion
ii. Muscular VSD : This is due to excessive cavitation of myocardial tissue during formation of the ventricular walls and muscular part of the intraventricular septum

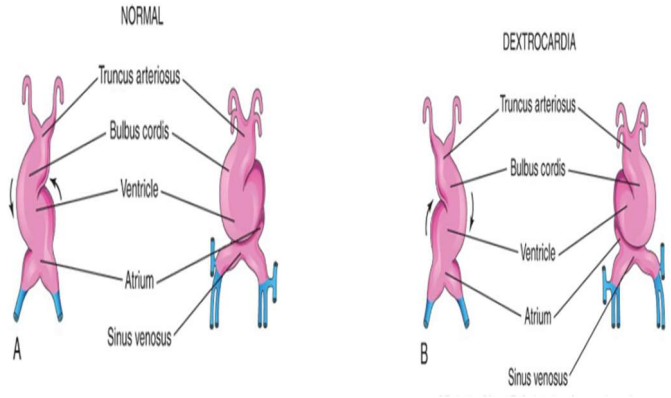
Overriding aorta: The aorta develops under the right and left ventricles in this anomaly. It receives blood from the right and left ventricle.

Hypertrophy of the right ventricle: this results from pulmonary stenosis and stenosis of the truncus arteriosus



2) DEXTROCARDIA

This is when the heart lies on the right side of the thorax instead of the left. This is because the heart loops to the left instead of the right. It is the most frequent positional abnormality and may occur in isolation or with situs inversus (transposition of abdominal viscera). The isolated one is usually complicated by severe cardiac anomalies e.g single ventricle and transposition of great arteries



3) ECTOPIA CORDIS : The heart is in abnormal location. It is extremely rare. In the thoracic form, heart is partly or completely exposed on the thoracic surface. It results from faulty development of sternum and pericardium leading to widely separated sternum and

open pericardial sac. Death occurs few days after birth, usually from infection, cardiac failure or hypoxia

Many may survive to adulthood if there are not severe cardiac defects. In some cases, heart protrudes through the diaphragm into the abdomen

4) Atrial Septal Defect

It occurs more in females than males

Anomalies

1. Patent foramen Ovale
2. Common atrium
3. Ostium secondum defect
4. Endocardial cushion defect
5. Ostium primum defect
6. Sinus venosus defect

Patent Foramen Ovale: this results from abnormal resorption of the septum primum during the formation of the foramen secondum, resulting in the short septum primum not closing the oval foramen. Also, if an abnormally large oval foramen occurs because of defective development of the septum secundum, a normal septum primum will not close the abnormal oval foramen at birth. It Does not allow intracardiac shunting of blood. It is the most common type of atrial septal defect

Common atrium: In this condition the interatrial septum is absent because of the failure of the septum primum and secondum to develop.

Ostium secundum defect: The patent foramen ovale usually results from excessive cell death and resorption of septum primum and inadequate development of septum secundum

Considerable intracardiac shunting of blood may occur from left to right

Endocardial cushion defect with ostium primum defect: these are the less common forms

There is deficiency of endocardial cushions and AV septum. Septum primum does not fuse with endocardial cushion (ostium primum defect). Fusion of endocardial cushions may fail to occur leading to AV septal defect

Sinus venosus defect

It is very rare and is located in the superior part of interatrial septum close to SVC entry. It results from incomplete absorption of the sinus venosus into right atrium and/or abnormal development of the septum secundum. Commonly associated with partial anomalous pulmonary venous connections

5) **PERSISTENT TRUNCUS ARTERIOSUS(TA)**

Results from failure of truncal ridges and aorticopulmonary septum to develop normally and divide the truncus arteriosus into the aorta and pulmonary trunk

It is always accompanied by VSD since the ridges also participates in formation of IV septum. The undivided truncus overrides both ventricles and receives blood from both sides

Recent studies show that developmental arrest of outflow tract, semilunar valves and aortic sac in the early embryo is invvolved in the pathogenesis of TA anomalies

0.8/ 10000 births