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Department: Anatomy

Course: ANA 202

**ASSIGNMENT**

1. **The Heart**

The heart is a muscle about the size of your fist. It lies behind and to the left of the sternum. The purpose of the heart is to pump blood through blood vessels, arteries and veins to all parts of the body. The inside of the heart is divided into 4 chambers. The top 2 chambers are called the atria which are collection chambers for blood. The bottom 2 chambers are called the ventricles and receive the blood from the atria and pump it to the lungs and the body. The chambers are separated by valves which control the direction of blood flow. There are 4 valves which include the tricuspid, pulmonic, mitral and aortic. Circulation of blood begins at the right side of the heart where blood from the body comes to the right atrium. This blood passes to the right ventricles where it’s 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 and the rest of the body. On the right side of the heart, the tricuspid valve separates the right atrium and the right ventricle allowing blood to enter the ventricle but not flow backward to the atrium. Blood flows through the pulmonic valve to go to the lungs. On the left side of the heart, the mitral valve separates the left atrium and the left ventricle, blood flows from the left ventricle to the aorta through the aortic valve and to the rest of the body. Arteries carry blood with oxygen and other nutrients through out the body. Veins take blood back to the heart which pumps it to the lungs to be oxygenated. The heart arteries ( coronary arteries) provide oxygen and nutrients to the heart muscle. The right coronary artery supplies blood to the back and bottom of the heart. The left coronary artery splits into 2 vessels. One branch supplies blood to the front of the heart, the other branch delivers blood to the left side of the heart. An electric system transmits signals through out the heart to control it’s pumping. The electrical signal starts in the sinoatrial or SA node which is located in the upper portion of the right atrium and is known as the natural pacemaker of the heart. The electrical signal passes down to the lower chambers of the heart via the atrioventricular or AV node which controls the signal so the atria can track before the ventricles. In the ventricles, pathways carry the signals through out the muscle so that they can track at the same time to pump blood to the lungs and through the body.

1. **Anomalies of the heart**

Ventricular septal defect

Ventricular septal defect is the most common congenital heart defect in Victoria. The incidence is around one in every 344 births.

The ventricles are the two lower pumping chambers of the heart. Ventricular septal defect means there is a hole in the wall between the ventricles. This hole lets oxygenated and deoxygenated blood mix.

In a child with this condition, the heart has to work much harder than normal, and may enlarge. Symptoms include breathlessness, difficulty feeding, increased heart rate and failure to grow at the expected rate. Depending on the severity of the condition, the child may develop congestive heart failure and have an increased risk of developing pneumonia.

### Treatment

Treatment for ventricular septal defect depends on the severity of the defect. If the hole is small, it may heal by itself with time, and no treatment – other than careful monitoring – is needed. Large defects, with symptoms in infancy, may require open-heart surgery. Closing the hole (usually with a ‘patch’) allows the blood to circulate normally, relieving strain on the heart. In some cases, generally in older children when the hole has not closed and is still causing strain on the heart, a catheter procedure may be possible and the defect closed with an implantable device.

## Transposition of the great vessels

The incidence of transposition of the great vessels in Victoria is around one in every 2,000 births.

Normally, blood from the heart’s right ventricle is taken to the lungs by the pulmonary artery. Blood from the left ventricle is taken to the body by the aorta (the main artery of the body).

Transposition of the great vessels means this situation is reversed, with the pulmonary artery attached to the left ventricle and the aorta to the right. Oxygenated blood is pumped back to the lungs instead of around the body.

This defect can be fatal in the early weeks of life if it is not treated. Some babies survive longer if there is a hole in the partition between the upper or lower chambers of the heart, allowing the blood to mix. The main symptom of transposition of the great vessels is cyanosis, the blue coloring to the skin caused by lack of oxygen.

### Treatment

Treatment for transposition of the great vessels involves a procedure called balloon septostomy. This may need to be carried out to enlarge the small opening between the atria that is normally present at birth, so that more oxygenated blood can reach the body. Subsequent surgery will be organized, usually in the first two weeks of life, to reconnect the arteries normally.

## Coarctation of the aorta

The incidence of coarctation of the aorta in Victoria is around one in every 2,000 births. The aorta is the main artery of the body, and ‘coarctation’ means it is narrowed or pinched, usually in the upper chest. This means that blood pressure in the lower body is lower than normal.

This condition often leads to serious symptoms in the early weeks of life. Symptoms typically occur in the first week of life and include breathlessness and difficulty breathing, and may include collapse.

Less commonly, this disorder may not be diagnosed in infancy and may be discovered much later in life during investigations for high blood pressure.

### Treatment

Surgery will be needed to treat coarctation of the aorta if the condition is severe and causes symptoms in early infancy. In older children, the narrowed section can sometimes be stretched open with special balloons or ‘stents’.

## Tetralogy of Fallot

The incidence of tetralogy of Fallot in Victoria is around one in every 2,000 births.
When a child has tetralogy of Fallot, their heart is affected by four main defects:

* A ventricular septal defect
* Blockage of blood flow out of the right ventricle
* Thickening of the wall of the right ventricle
* Displacement of the aorta towards the right ventricle.

These four defects allow oxygenated and deoxygenated blood to mix inside the heart. The main symptom is cyanosis (blue coloring) that develops in the early weeks or months of life.

### Treatment

Treatment for tetralogy of Fallot requires surgery to close the septal defect and remove obstruction to blood flow out of the right ventricle. Some infants with severe symptoms in early life may have a preliminary ‘shunt’ operation, which increases blood flow to the lungs and relieves cyanosis, but does not correct the underlying defect.

## Hypoplastic left heart syndrome

The incidence of hypoplastic left heart syndrome in Victoria is around one in every 4,000 births. In this condition, the entire left side of the heart, including valves and blood vessels, is underdeveloped. Without prompt treatment, the baby is likely to die within days or weeks of birth. Symptoms include a grey complexion and severe breathing difficulties.

### Treatment

Hypoplastic left heart syndrome will require surgery. The techniques involved include a ‘Norwood’ operation, which allows the right ventricle to become the pumping chamber that supplies the body and lungs. The surgery is difficult and involves high risk. At least two further operations in early childhood will be needed to achieve normal heart function.