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VENTRICULAR SEPTAL DEFECT

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VENTRICULAR SEPTAL DEFECT

Condition and Description

A ventricular septal defect (VSD) is a congenital heart defect where the wall (septum) between the two lower pumping chambers of the heart (the ventricles) does not fully form, leaving a hole between these two chambers. Before birth, the heart starts out as a single tube that gradually differentiates into 4 chambers during embryological development. Abnormalities can arise at several steps in the process, resulting in defects in the muscular walls that normally separate the heart's right and left ventricles.

With a VSD, the stronger left side of the heart will pump extra blood to the right ventricle through the hole, and that extra blood will go through the pulmonary artery to the lungs. Overloading the lungs with blood can cause congestive heart failure.

In most cases the hole is in the membranous part of the septum; more serious VSDs are located in the muscular part of the septum. Occasionally the hole involves the septum near the aortic valve, which causes additional difficulties. Up to 1% of babies have a very small hole between the ventricles at birth, and in 80-90% of those babies, the hole closes as the heart grows in the first months of life. However, in other babies, the VSD is large and does not close.

Babies with large VSDs will have excess fluid in their lungs, causing rapid and labored breathing and a fast heart beat. They may have difficulty feeding because of tiring, and thus gain weight slowly, and they will be prone to respiratory infections. The flow of blood through the hole will cause a heart murmur, a sound of blood flow that can be heard through a stethoscope. A smaller VSD will typically have a louder murmur than a large VSD because the sound is made as the blood passes through the narrowed opening, and the narrower the opening the louder the sound, generally. With a medium-size or large VSD, the heart will enlarge, which can be seen on an x-ray.

Prevalence

Ventricular septal defect is the most common of the congenital heart conditions, making up 25-30% of the congenital heart defects. VSDs occur in 1-4 of 1000 of live births.

Common Associated Conditions

In 5% of babies, the VSD will be accompanied by other cardiac defects (tetralogy of fallot, for example). VSD is found in many children with Down Syndrome (Trisomy 21) as well as with Trisomy 13 and 18.

Short-term Treatment and Outcomes

Small VSDs will close by themselves, so babies will be closely observed for a few weeks or months to see if their symptoms improve. They may be treated for congestive heart failure with digoxin that strengthens the heart muscle and with diuretics that remove extra fluid from the body.

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Nutrition will be important so that the baby will grow well and have better resistance to common childhood infections. Occasionally a short-term procedure called pulmonary banding will be done to decrease the amount of blood flowing to the lungs prior to the full septal closure surgery. If the hole does not close by itself in the first months, surgery will be necessary. It is typically done in the first two years of life and the VSD is closed using a silicone patch. In time the body will cover this patch with the heart's own tissue and the heart will function very well.

Long-term Treatment and Outcomes

Sometimes small VSDs cause no problems and so are not surgically treated; however children will need to see a cardiologist periodically to be assessed for any signs of heart failure or other difficulties.

Surgical correction is successful 99% of the time, and beyond the immediate post-operative recovery period, there will be no long-term problems. After surgery the enlarged heart will return to normal size and pressure in the lungs should return to normal as the congestive heart failure disappears.

Common Complications

A serious complication is infection of the heart (infective bacterial endocarditis). Individuals who have unrepaired VSDs will take antibiotics when they have dental work to prevent bacteria from the mouth from migrating through the blood system to set up an infection in the heart. For the first six months after VSD surgery antibiotics for dental work will be required; after that healing period, it will not be necessary for the child to take antibiotics for with dental work because the body's own tissue will have covered the silicon patch and there will no longer be an area of the heart that is prone to infection.

Another complication is leaking of the valve in the left ventricle (aortic insufficiency) that causes extra burden on that chamber of the heart. Another post-operative complication that might cause long-term problems is damage to the heart's nerves that conduct the impulses to the heart muscle and make it contract. If the nerve fibers are do not conduct the impulse properly, the heart will not contract properly and thus will not pump with a steady rate and rhythm (called arrhythmias).

If the heart surgery is not done soon enough to prevent lung damage from the extra blood flow through the VSD, a condition called pulmonary hypertension can develop. The blood vessels in the lungs will thicken from the high pressure of the extra blood flow, and blood will have difficulty passing through the lungs to be refreshed with oxygen. Thus the VSD repair must be carefully timed, carefully performed and closely followed to detect complications and treat them promptly.

Children will require periodic visits to a cardiologist to detect and treat any subsequent conditions promptly.

Implications for Children's Development

Because VSD is the most common of heart defects, surgical repair is commonly done and the outcomes are generally excellent. Children with repaired VSDs should have a full recovery and no after-effects and normal growth and development. However, in some cases, the VSD is associated with other significant problems that affect the child's health in other ways (i.e., chromosome abnormalities).

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