

What is a ventricular septal defect (VSD)?

The septum is the wall that separates the left and right sides of the heart. The wall that separates the two lower chambers or the ventricles is called the ventricular septum. If there is a hole in the wall between the two ventricles, it is called a ventricular septal defect (VSD).

How common are VSDs?

VSD is the most common heart birth defect. It can occur alone or with other congenital heart defects (CHDs). About 1 in 500 babies is born with a VSD. About 20%-30% of all heart defects are isolated VSDs. They vary in location, symptoms, other defects, and history.

What other heart problems can occur with a VSD?

Some people born with VSDs have other heart defects, such as leaking or narrowing heart valves. A VSD can also be a part of other more complex heart defects, like tetralogy of Fallot. If you have a more complex defect in addition to VSD, the more complex defect is your primary diagnosis.

How do VSDs develop?

In the womb the heart starts out as a single tube. As this tube loops, the two bottom tubes lie side-by-side and a wall (septum) develops to complete the division of the heart into left and right sides. The right side pumps blood to the lungs, and the left side pumps blood to the body. Sometimes this wall does not grow completely and a hole remains.

What causes a VSD to develop?

No one knows exactly why a VSD forms. Genes and environment may be a factor. As we learn more about human

DNA, we may understand more about what causes this heart defect. A VSD is common in children with other genetic problems, such as Down syndrome.

How is a VSD diagnosed?

Most ventricular septal defects are found shortly after birth. By listening to your heart, a doctor can usually hear the rumble of blood as it goes through the hole. This is called a murmur. Sometimes you can even feel the rumble by putting a hand on your chest. This is called a thrill. Some VSDs are not found until later in childhood or adulthood. Tests to confirm the presence and effect of a VSD may include:

- Chest X-ray, a picture to look at the heart and lungs to see if they are too big or have fluid in them.
- Electrocardiogram, a tracing of the heart's electrical system.
- Echocardiogram, a picture of the heart to look at its parts and how they work.
- Cardiac MRI, a special scan looking at the heart.

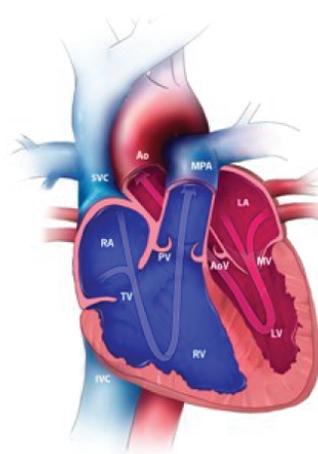
If I have a VSD, can I have children?

Most women with a small or repaired VSD will do well during pregnancy, but there is a small risk of heart-related problems. If you have been told you have a VSD, repaired or not, you should see an adult congenital heart disease (ACHD) doctor before getting pregnant. If you have a larger unclosed VSD, and/or additional heart or lung problems, you should get care by experts in heart defects and pregnancy. If you have pulmonary hypertension (high blood pressure in your lungs) or Eisenmenger's syndrome (low blood oxygen levels), most ACHD doctors say you should not become pregnant. In one study, up to 50% of mothers in this situation did not survive.

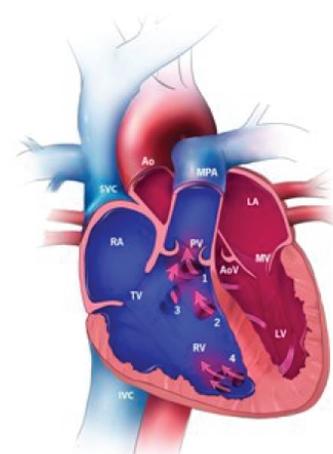
RA – Right Atrium
RV – Right Ventricle
LA – Left Atrium
LV – Left Ventricle
SVC – Superior Vena Cava
IVC – Inferior Vena Cava
MPA – Main Pulmonary Artery
Ao – Aorta
AoV – Aortic Valve
TV – Tricuspid Valve
MV – Mitral Valve
PV – Pulmonary Valve
1. Conoventricular, malaligned
2. Perimembranous
3. Inlet
4. Muscular

Image courtesy of the Centers for Disease Control and Prevention, National Center on Birth Defects and Developmental Disabilities

Normal Heart



Ventricular Septal Defect (VSD)



If I have a VSD, do my children have a higher risk of having a heart defect?

All adults with CHDs are more likely than the general population to have a child with a heart defect. The defects may be the same or different than the parent's defect. As we learn more about what causes CHD, we may find that each individual's risk is higher or lower.

What are the long-term outcomes for adults with unrepaired VSD?

Many small VSDs never require treatment. Women with large VSDs that were not closed at a young age have a high risk of developing other heart, lung, and blood problems. These would include high blood pressure in the lungs and low blood oxygen levels. If this happens, VSD closure may no longer be an option.

Most VSDs are closed by placing a patch or plug into the hole during open heart surgery. Some clinical trials are using a catheter to put the patch or plug into the hole.

What health problems are caused by a VSD?

If the hole between the two sides is too big, blood will go from the left side of the heart into the right side. This means that extra blood is pumped to the lungs, making the heart and lungs work harder. This can cause high blood pressure in the lungs, which over time may lead to permanent damage in the lung's blood vessels. Increased blood flow in the heart may also lead to heart failure.

Do all VSDs cause health problems?

No, some children and adults have a small VSD that does not affect the way the heart works. Instead of closing these VSDs, doctors may watch the heart closely to make sure that treatment does not become necessary. If you have a VSD, it is important that you see an ACHD doctor as recommended to make sure your heart stays healthy.

Are there limits on how much those with VSD can exercise?

People with a small or repaired VSD and no other problems usually have no exercise limits. It is important for anyone born with a heart defect to ask their ACHD doctor before taking on any new physical activity.

If you have other problems, such as a heartbeat that is too fast, too slow or not regular; high blood pressure in your lungs; low blood oxygen levels and/or valve problems, you should ask your ACHD doctor about what kind of exercise is right for you.

When and how was the VSD surgery first performed?

VSDs were one of the first heart defects to be repaired.

The first surgery to close a VSD was done in 1954. Some children who had an early repair are still alive today. Over the years, VSDs have been closed using different materials and approaches. How your VSD was closed may affect your long-term health.

How are VSDs treated now?

Most VSDs are closed by placing a patch or plug into the hole during open heart surgery. Some clinical trials are using a catheter to put the patch or plug into the hole. A catheter is a long, thin tube that the doctor guides into the heart through a blood vessel.

What are the long-term outcomes for adults with repaired VSD?

The oldest survivors of VSD closure are now in their 50s and 60s—or older if operated on as adults. We do not know what the lifelong impact of VSD closure is nor do we know how long people with repaired VSDs will live. If surgery was done early, before serious heart and lung problems developed, the outlook is excellent. Adults with closed VSDs are expected to have a normal lifespan. A small number have needed re-operation. The most common reason was to close small leaks around the original patch.

Even if you have a repaired VSD, you do not have a “normal” heart. Everyone born with a VSD has a lifelong risk of other heart problems. Some can occur many years after the original repair. One risk is endocarditis, or infection of the lining of the heart and the valves. It is very important that you ask your ACHD heart doctor about how to protect yourself from endocarditis. People with a repaired VSD can also develop a slow, fast or irregular heartbeat. This is sometimes caused by scars in your heart created by your previous surgery. Other possible problems include valve problems, stroke and heart failure.

What kind of heart care is recommended for adults with repaired and unrepaired VSD?

Experts recommend that all adults with CHD be seen once at an ACHD center to make sure that the diagnosis is correct and the repair is still working. Patients who have a small unrepaired VSD are still at risk of developing narrowing under the aortic or pulmonary valves, leaking of the aortic valve, or an infection of the lining of the heart and valves.

If you have other heart defects or complex CHD, regular care by a specialized ACHD clinic is recommended. This is also true if you have problems with lung or heart function. If you have high blood pressure in your lungs or low blood oxygen levels, you should also receive regular care at a specialized ACHD clinic. It is important that you see doctors who know about your special needs and can help keep you feeling your best.

Thank you to Lisa Kirkland, MD, and Karen Kuehl, MD, MPH, for their work on this article.