Common types of congenital heart defects

Congenital heart defects are abnormalities that develop before birth. They can occur in the heart's chambers, valves or blood vessels. A baby may be born with only one defect or several that tend to occur in combination. Of the dozens of heart defects, some are mild and may need minimal or no medical treatment even through adulthood, while others are life-threatening, either immediately to the newborn or over time. Here's a look at some of the more common congenital heart defects. Compare them to the NORMAL HUMAN HEART, SHOWN HERE.
Congenital Heart Disease

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<th>Type of Defect</th>
<th>Mechanism</th>
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<td>Ventricular Septal Defect (VSD)</td>
<td>There is a hole within the membranous or muscular portions of the intraventricular septum that produces a left-to-right shunt, more severe with larger defects</td>
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<tr>
<td>Atrial Septal Defect (ASD)</td>
<td>A hole from a septum secundum or septum primum defect in the interatrial septum produces a modest left-to-right shunt</td>
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<tr>
<td>Patent Ductus Arteriosus (PDA)</td>
<td>The ductus arteriosus, which normally closes soon after birth, remains open, and a left-to-right shunt develops</td>
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<tr>
<td>Tetralogy of Fallot</td>
<td>Pulmonary stenosis results in right ventricular hypertrophy and a right-to-left shunt across a VSD, which also has an overriding aorta</td>
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<tr>
<td>Transposition of Great Vessels</td>
<td>The aorta arises from the right ventricle and the pulmonic trunk from the left ventricle. A VSD, or ASD with PDA, is needed for extrauterine survival. There is right-to-left shunting.</td>
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<tr>
<td>Truncus Arteriosus</td>
<td>There is incomplete separation of the aortic and pulmonary outflows, along with VSD, which allows mixing of oxygenated and deoxygenated blood and right-to-left shunting</td>
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<td>Hypoplastic Left Heart Syndrome</td>
<td>There are varying degrees of hypoplasia or atresia of the aortic and mitral valves, along with a small to absent left ventricular chamber</td>
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<tr>
<td>Coarctation of Aorta</td>
<td>Either just proximal (infantile form) or just distal (adult form) to the ductus is a narrowing of the aortic lumen, leading to outflow obstruction</td>
</tr>
<tr>
<td>Total Anomalous Pulmonary Venous Return (TAPVR)</td>
<td>The pulmonary veins do not directly connect to the left atrium, but drain into left innominate vein, coronary sinus, or some other site, leading to possible mixing of blood and right-sided overload</td>
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Ventricular septal defect

Sometimes called a hole in the heart, this defect — the most common congenital heart defect — occurs when the septum, the muscular wall separating the right and left ventricles, fails to fully form. The hole allows oxygen-rich blood to leak from the left ventricle into the right ventricle, instead of moving into the aorta and on to the body. Too much blood may flood the lungs.

This defect can lead to heart failure, excessive blood pressure in the lungs (pulmonary hypertension), infections of the heart (endocarditis), irregular heart beats (arrhythmias) and delayed growth. Small holes may heal on their own or cause no symptoms. Larger holes may require surgical repair by stitching together or covering with a patch.
Atrial septal defect

Similar to a ventricular septal defect, this is a hole that occurs when the septum separating the right and left atria doesn't close properly. This allows blood from the left atrium to flow into the right atrium, instead of into the left ventricle and on to the aorta and the rest of the body.

The defect can cause several complications, including arrhythmias, heart failure, stroke and, in rare cases, pulmonary hypertension. Minor cases may cause no symptoms and may not require treatment. Larger defects may require surgical closure or cardiac catheterization.

Patent ductus arteriosus

Before birth, a temporary blood vessel called the ductus arteriosus connects the pulmonary artery and the aorta. This allows blood to bypass the lungs because oxygen is delivered to the fetus through the placenta and umbilical cord. The temporary vessel normally closes within a few hours or days of birth since the lungs take over. If it remains open (patent), some blood that should circulate through the body is misdirected to the lungs.

This defect can cause heart failure or endocarditis. In infants, it can be closed with medications. In older children and adults, plugs, coils or surgery can be used to close the vessel.
Pulmonary stenosis

In this condition, the flow of blood from the right ventricle to the pulmonary artery is obstructed by narrowing at the pulmonary valve. When there's an obstruction (stenosis), the right ventricle must pump harder to get blood into the pulmonary artery. The defect may occur along with other defects, such as thickening of the muscle of the right ventricle immediately below the valve. In many cases, pulmonary stenosis is mild and doesn't require treatment. But because it can cause heart failure, arrhythmias or enlargement of the right heart chambers, surgery may be necessary to repair the stenosis or replace the valve. Special balloons to widen the valve (balloon valvuloplasty) may also be used.

Tetralogy of Fallot

This defect is a combination of four (tetralogy) congenital abnormalities. The four defects typically are ventricular septal defect (VSD), pulmonary stenosis, a misplaced aorta and a thickened right ventricular wall (right ventricular hypertrophy). They usually result in an insufficient amount of oxygenated blood reaching the body. Complications of tetralogy of Fallot (fuh-LOE) include cyanosis — sometimes called "blue baby syndrome," since the lips, fingers and toes may have a bluish tinge from lack of oxygen — as well as poor eating, inability to tolerate exercise, arrhythmias, delayed growth and development, and stroke. Surgical repair of the defects is required early in life.
Transposition of the great vessels (arteries)

With this defect, the positions of the aorta and the pulmonary artery (the great arteries) are reversed (transposed). The aorta arises from the right ventricle instead of the left and the pulmonary artery arises from the left ventricle instead of the right. This creates a circulatory pattern that prevents nourishing oxygenated blood from reaching the body. This condition would quickly be fatal to a newborn except it's generally accompanied by another defect — commonly a septal defect or patent ductus arteriosus — that does allow oxygen-rich blood to get to the body. Surgical repair is usually necessary shortly after birth.

Truncus arteriosus

This is a defect in which the normally distinct pulmonary artery and aorta merge into one single great vessel (truncus) arising from the right and left ventricles. In addition, there's usually a large ventricular septal defect, essentially turning the right and left ventricles into a single chamber. This allows oxygenated and unoxygenated blood to mix. Too much blood may flow to the lungs, flooding them and making it difficult to breathe. It can also result in life-threatening pulmonary hypertension. Surgery is needed to close the septal defect with a patch and to separate the pulmonary arteries from the trunk. A conduit is placed to connect the right ventricle to the pulmonary artery. Because the conduit doesn't grow with the child, repeat surgery may be necessary over time.
Hypoplastic left heart syndrome

In this condition, the left side of the heart is underdeveloped (hypoplastic), including the aorta, aortic valve, left ventricle and mitral valve. As a result, the body doesn't receive enough oxygenated blood. In the first few days after a baby is born, the ductus arteriosus remains open (patent), allowing normal circulation, so the baby may seem fine initially. But when the ductus arteriosus naturally closes, signs and symptoms begin, including a bluish cast to the skin from lack of oxygen, difficulty breathing and poor feeding. This condition may be accompanied by an atrial septal defect. Treatment options for this life-threatening condition are a heart transplant or a multistage surgical procedure done during the first few years of life.

Coarctation of the aorta

This is a narrowing (coarctation), or constriction, in a portion of the aorta. Coarctation forces the heart to pump harder to get blood through the aorta and on to the rest of the body. This defect can cause several life-threatening complications, including severe hypertension, aortic aneurysm, dissection or rupture, endocarditis, brain hemorrhage, stroke, heart failure and premature coronary artery disease. Repair is typically recommended before age 10, either by surgically removing the affected portion or widening it through balloon angioplasty and placement of a stent.
Aortic stenosis

This is a defect that narrows or obstructs the aortic valve opening, making it difficult for the heart to pump blood into the aorta. Mild cases may not have symptoms initially, but they can worsen over time. The defect can cause heart enlargement, left-sided heart failure, arrhythmias, endocarditis and fainting. Treatment includes surgical repair or replacement of the valve or, in young children, widening through balloon valvuloplasty.

Ebstein's anomaly

This is a defect of the tricuspid valve, which controls blood flow between the heart's right atrium and right ventricle. The valve is positioned lower than normal into the ventricle instead of remaining between the atrium and the ventricle. Consequently, the ventricle is too small and the atrium too large, and neither functions properly. The valve is also malformed, often allowing blood to leak from the ventricle into the atrium. This defect often occurs along with other heart defects, including patent foramen ovale, atrial septal defect or Wolff-Parkinson-White syndrome. Severe cases are life-threatening. Milder cases may have no signs or symptoms until adulthood. Treatment is with medications or with surgery to repair or replace the tricuspid valve, as well as treatment of associated conditions.
Atroventricular canal defect

This is a combination of defects, including a large hole in the center of the heart and a single common valve instead of the separate tricuspid and mitral valves. Also called atroventricular septal defect, this defect is classified by whether it’s only partial, involving only the upper chambers of the heart, or complete, in which blood can travel freely among all four chambers of the heart. Both forms allow extra blood to circulate to the lungs, causing the heart to enlarge.

The condition is often associated with Down syndrome. Infants may also have trouble breathing and not grow well. Surgery is often done in infancy to close the hole and reconstruct the valves.