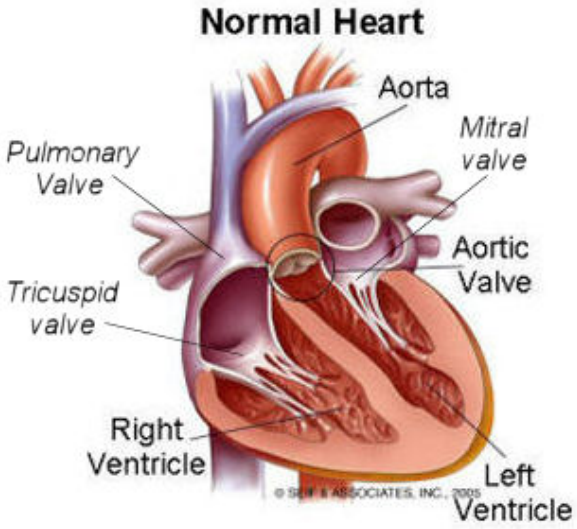
Heart Valve Problems
General Information, AHA

Heart valves open to allow blood to be pumped forward. They close to prevent fluid from flowing backward. Human heart valves are formed by flaps of tissue called leaflets or cusps. The heart has four valves:

- Aortic.
- Mitral.
- Tricuspid.
- Pulmonary.

HEART-VALVE PROBLEMS FALL INTO TWO CATEGORIES:

Stenosis -- The opening of the valve is too narrow. This interferes with the forward flow of blood.
Regurgitation --The valve does not close properly. It leaks, sometimes causing a significant backflow of blood.



CONGENITAL AND ACQUIRED PROBLEMS

Heart-valve problems can be **congenital**. This means present at birth. They can also be acquired following birth. Congenital heart-valve disease affects about one in 1,000 newborns. The majority of these infants have narrowing of either the pulmonary or aortic valve.

The exact cause of heart defects at birth is not known. Heart defects seem to run in families. Because of this, it is felt that there is a *genetic* (inherited) cause.
In 2 percent to 4 percent of heart valve problems, the heart defect is related to health or environmental factors that affected the mother during pregnancy. These include:

- Diabetes.
- Phenylketonuria (a rare disease of metabolism).
- Rubella ("German measles").
- Systemic lupus erythematosus.
- Drugs taken by the mother:
  - Alcohol.
  - Street drugs.
  - Lithium.
  - Certain seizure medications.

Your caregiver can explain any medical conditions listed which may apply to you.

A heart-valve problem is **acquired** if it happens in a valve that was normal at birth. Some common causes of acquired heart-valve problems include:

- **Rheumatic fever** - An illness that may follow an untreated strep throat infection.
- **Endocarditis** - Infection of the heart valves.
- **Idiopathic calcific aortic stenosis** - A worsening condition seen in the elderly, in which the aortic valve becomes:
  - Thickened.
  - Fused.
  - Full of calcium deposits.
- **Syphilis.**
- **High blood pressure.**

- **Arteriosclerosis** (blood vessels thickening and losing elasticity).
- **Connective-tissue disorders** - Such as Marfan's syndrome (a rare inherited problem).

Your caregiver can explain any medical conditions listed that may apply to you.

HEART-VALVE PROBLEMS AFFECT EACH VALVE IN SLIGHTLY DIFFERENT WAYS.

Aortic Valve

The aortic valve opens to allow blood to pass from the left ventricle to the aorta. This large blood vessel leads oxygenated blood (blood that is rich in oxygen after passing through the lungs) from the heart to the rest of the body. Disorders of this valve include:

- Congenital aortic stenosis - The problem is almost always a valve that has two flaps instead of the usual three (bicuspid aortic valve).
  - In about 10 percent of affected newborns, the aortic valve is so narrow that the child develops severe symptoms in the first year of life.
  - In the remaining 90 percent, aortic stenosis is discovered during a physical examination.
- Acquired aortic stenosis - Aortic stenosis accounts for 25 percent of all heart valve problems in adults. Eighty percent of patients are male. In adulthood, aortic stenosis usually is caused by:
  - Rheumatic fever.
  - Idiopathic calcific aortic stenosis (a condition where calcium deposits narrow the opening at the valve).
- Aortic regurgitation - The aortic valve does not close properly. This allows for blood to flow backward into the left ventricle. This decreases the forward flow of oxygenated blood through the aorta. Backflow also stretches the ventricle out of shape. In adults, about two-thirds of cases are caused by rheumatic fever. Seventy five percent of patients are male.

Mitral Valve

The mitral valve opens to allow blood to pass from the left atrium to the left ventricle. Disorders of this valve include:

- Mitral stenosis - The common adult patient is a woman whose mitral valve was damaged by rheumatic fever. In many cases, the rheumatic fever is mild, and it is hard to know exactly when this problem originally happened.
- Mitral regurgitation - The most common conditions causing mitral regurgitation are:
  - Mitral valve prolapse. The leaflets of the mitral valve fail to close properly. It tends to affect women between the ages of 14 and 30. The underlying cause is unknown. Most patients never have symptoms.
  - Rheumatic fever.
  - Infective endocarditis (infection that gets to the inner walls of the heart and the valves).
  - Buildup of calcium deposits on the valve.
  - Blockages in the coronary arteries and other blood vessels that provide oxygen and blood to the heart muscle.

Pulmonary Valve

The pulmonary valve is located between the right ventricle and the pulmonary artery (the artery that takes blood from the heart to the lungs). Blood passes through this valve to allow oxygen-poor blood to flow from the right side of the heart to the lungs for oxygenation. Disorders of this valve include:

- Congenital pulmonic stenosis - Infants develop heart failure or cyanosis (a bluish color to the lips, fingernails and skin) within the first month of life. In most cases the valve is deformed. Two or three leaflets are partially fused.
- Adult disorders of the pulmonic valve - The pulmonic valve most often is damaged because of pulmonary hypertension (high pressure within the blood vessels in the lungs). This condition is usually related to chronic obstructive pulmonary disease or emphysemsa.

Tricuspid Valve

The tricuspid valve allows blood to flow from the right atrium to the right ventricle. Disorders of this valve

include:

- Tricuspid stenosis - This usually is caused by an episode of rheumatic fever. This fever often damages the mitral valve at the same time. This condition is rare in North America and Europe.
- Tricuspid regurgitation - Usually occurs because of pulmonary hypertension. Also can be caused by:
  - Heart failure.
  - Trauma
  - Endocarditis
  - Myocardial infarction ("heart attack").

SYMPTOMS

Many patients with mild heart-valve problems have no cardiac symptoms. The abnormal valve is discovered only when a heart murmur is heard during an exam. For more severe heart-valve problems, symptoms vary slightly according to the specific valve involved.

Congenital heart-valve problems - Severe valve narrowing can cause:

- Cyanosis (a bluish coloring to the skin).
- Symptoms of heart failure.
- **Aortic stenosis** - Aortic stenosis usually does not produce symptoms until the valve opening narrows to about one-third of normal. This generally happens between the ages of 40 and 70. Symptoms include:
  - Shortness of breath during exercise.
  - Heart-related chest pain.
  - Fainting spells.

Aortic regurgitation - A patient can have significant aortic regurgitation for 10 to 15 years without developing significant symptoms. When symptoms begin, there may be:

- Palpitations.
- Cardiac arrhythmias.
- Shortness of breath during exercise.
- Breathlessness while lying down.
- Sudden and severe shortness of breath during the middle of the night.
- Sweating.
- Chest pains and symptoms of heart failure as outlined above.

Mitral stenosis - Symptoms include:

- Shortness of breath during exercise.
- Sudden and severe shortness of breath during the middle of the night.
- Abnormal heart rhythms, especially atrial fibrillation.
- Coughing up blood.

In some patients, blood clots form in the left atrium. These clots can travel through blood vessels and damage the brain, spleen or kidneys.

Mitral regurgitation - Symptoms include:

- Fatigue.
- Shortness of breath on exertion.
- Breathlessness while lying down.

Pulmonic-valve problems - Symptoms include:

- Fatigue.
- Fainting spells.
- Symptoms of heart failure.

Tricuspid stenosis - This usually causes fatigue and symptoms of heart failure. Many patients have symptoms of mitral stenosis at the same time.

Tricuspid regurgitation - This primarily causes symptoms of heart failure, especially heart-related breathing problems.

DIAGNOSIS

If you are having symptoms, your caregiver will begin by learning about your risk of heart valve problems. Your caregiver will ask questions about:

- Family history of heart problems.
- Your personal history of rheumatic fever.
- Syphilis.
- Hypertension.
- Arteriosclerosis or connective-tissue disorders.
- Your risk of endocarditis caused by:
  - Intravenous (IV) drug use.
  - A recent medical or dental procedure (problems after dental procedures are rare).
- In infants the mother's health or environmental risk factors during pregnancy.

Your caregiver may suspect that you have a heart-valve problem based on your:
- Specific symptoms.
- Medical history.

Your caregiver will perform a physical examination with special attention to your heart.
Your caregiver will order diagnostic tests. These may include:
- An electrocardiogram (EKG).
- A chest X-ray.
- Blood tests to check for infection in patients with suspected endocarditis.
- An echocardiogram.
- Doppler echocardiography.
- Cardiac catheterization.

In people who do not have any symptoms, diagnostic testing may become necessary after the caregiver discovers a new heart murmur during a routine physical exam.

EXPECTED DURATION

In general, heart-valve problems:
- Continue throughout life.
- May gradually worsen with time.

Those caused by endocarditis sometimes may produce severe symptoms and rapid worsening within a few days.

PREVENTION

Currently, there is no way to prevent the majority of congenital heart-valve problems. Pregnant women should have regularly scheduled prenatal care and should avoid using alcohol.

You can prevent many acquired heart-valve problems by preventing rheumatic fever. If you have any condition requiring treatment with antibiotics, take them exactly as prescribed.

TREATMENT

- If you have a mild heart-valve problem without any symptoms, your caregiver may simply watch over your condition.
- If you have moderate or severe symptoms, your treatment will be decided by:
  - How severe your symptoms are.
  - The results of diagnostic tests.

Your caregiver can give you medications to temporarily treat symptoms such as:
- Angina.
- Cardiac arrhythmias.
- Heart failure.

You eventually may need to have the abnormal valve repaired or replaced. This can be done in several different

ways:

- ***Percutaneous balloon valvoplasty*** (for stenosis) - A tiny catheter (flexible tube) with a balloon at its tip is passed through the narrowed heart valve. The tiny balloon then is inflated and pulled back through the narrowed valve to widen it.
- ***Valvotomy*** using traditional surgery (for stenosis) - The surgeon opens the heart and separates valve leaflets that are fused together.
- ***Valve replacement*** - Defective heart valves can be replaced with a mechanical heart valve made of:
  - Plastic.
  - Dacron.
  - Other material.

Defective heart valves can also be replaced with a biological valve made of tissue taken from:

- A pig.
- A cow.
- A deceased human donor.

After surgery, patients with mechanical valves must take medications to prevent blood clots.

If you have been diagnosed with a heart-valve problem, ask your caregiver if you are at risk of endocarditis. If so, you will need to take antibiotics before any medical or dental procedure in which bacteria may enter your blood and infect your abnormal valve.

SEEK IMMEDIATE MEDICAL CARE IF:

You experience any symptoms that may be related to a heart problem, especially:

- Shortness of breath.
- Chest pain.
- Rapid or irregular heartbeat.
- Fainting spells.

Information courtesy of the American Heart Association.

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