

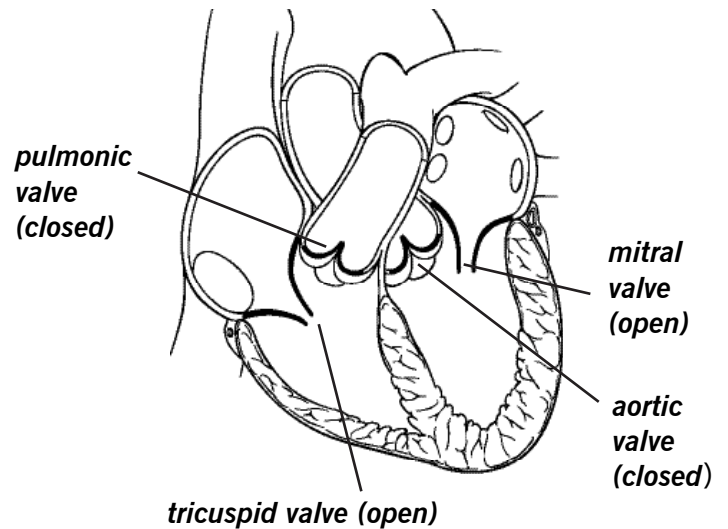
VALVE DISEASE AND TREATMENT OPTIONS

The heart valves

The heart has four valves — one for each chamber of the heart. The valves keep blood moving through the heart in the right direction.

The **mitral** and **tricuspid** valves are located between the atria (upper chambers of the heart) and ventricles (lower chambers of the heart).

The **aortic** and **pulmonic** valves are located between the ventricles and the major blood vessels leaving the heart.



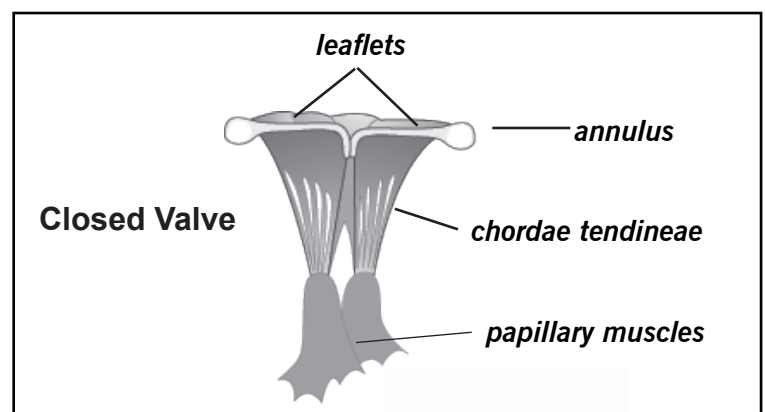
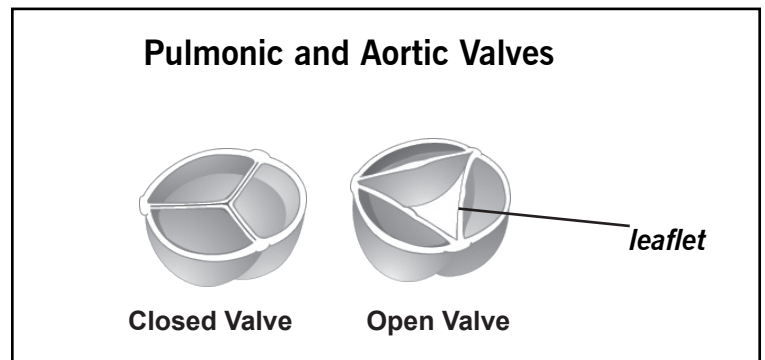
Leaflets

The valves are made of strong, thin flaps of tissue, called leaflets. The leaflets open to let blood move forward through the heart during half of the heartbeat. They close to keep blood from flowing backward during the other half of the heartbeat.

The leaflets in the mitral and tricuspid valves are supported by:

- **Annulus:** tough, fibrous ring attached to the leaflets that helps support and maintain the proper shape of the valve
- **Chordae tendineae:** tough, fibrous strings
- **Papillary muscles:** part of the inside walls of the ventricles

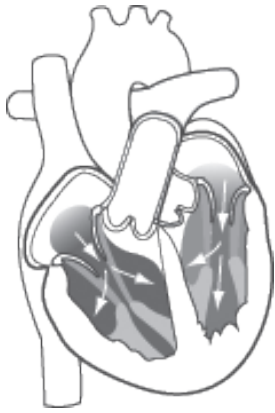
The chordae tendineae and papillary muscles keep the leaflets stable to prevent blood from flowing backward.



Blood flow through the heart

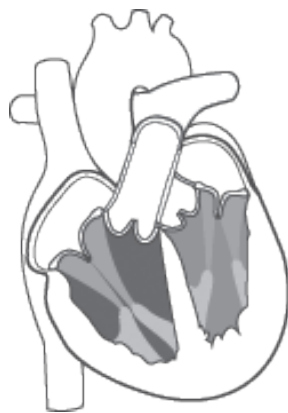
The four valves open and close to let blood flow through the heart. The illustration below shows how the blood flows through the heart and describes how each valve works to keep blood moving.

How the Valves Work



Open tricuspid and mitral valves

Blood flows from the right atrium into the right ventricle through the open **tricuspid** valve, and from the left atrium into the left ventricle through the open **mitral** valve.



Closed tricuspid and mitral valves

When the right ventricle is full, the **tricuspid** valve closes and keeps blood from flowing backward into the right atrium when the ventricle contracts (squeezes).

When the left ventricle is full, the **mitral** valve closes and keeps blood from flowing backward into the left atrium when the ventricle contracts.



Open pulmonic and aortic valves

As the right ventricle begins to contract, the **pulmonic** valve is forced open. Blood is pumped out of the right ventricle through the pulmonic valve into the pulmonary artery to the lungs.

As the left ventricle begins to contract, the **aortic** valve is forced open. Blood is pumped out of the left ventricle through the aortic valve into the aorta. The aorta divides into many arteries and provides blood to the body.



Closed pulmonic and aortic valves

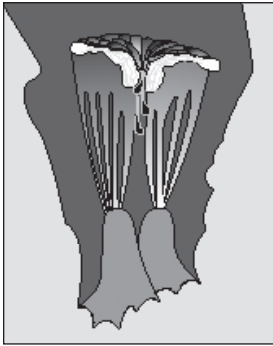
When the right ventricle finishes contracting and starts to relax, the **pulmonic** valve snaps shut. This keeps blood from flowing back into the right ventricle.

When the left ventricle finishes contracting and begins to relax, the **aortic** valve snaps shut. This keeps blood from flowing back into the left ventricle.

This pattern is repeated over and over, causing blood to flow continuously to the heart, lungs and body. The four normally working heart valves make sure that blood always flows freely in one direction and that there is no backward leakage.

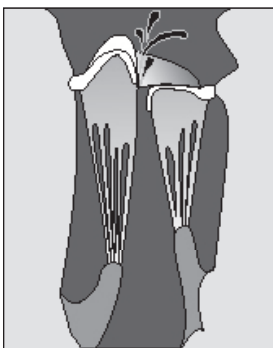
What is valve disease?

Heart valve disease means one of the heart valves isn't working properly because of valvular stenosis or valvular insufficiency (see descriptions below). These conditions cause the heart to work harder to pump the right amount of blood through the body.



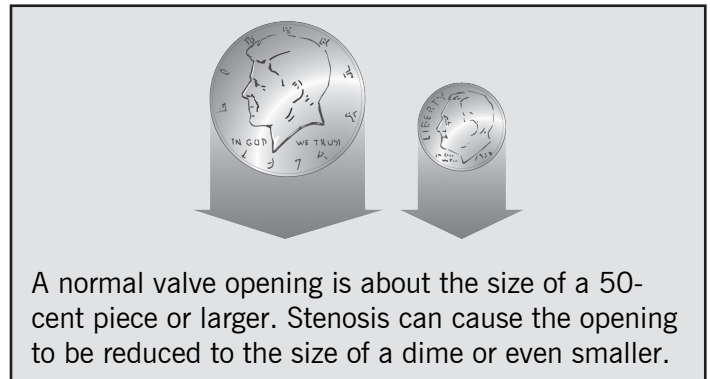
Valvular stenosis:

The valve leaflets become stiff, and the valve opening becomes narrow. This limits the amount of blood that can flow through the valve.



Valvular insufficiency

(also called regurgitation, incompetence or "leaky" valve): The valve leaflets do not close completely. This lets blood flow backward through the valve.



A normal valve opening is about the size of a 50-cent piece or larger. Stenosis can cause the opening to be reduced to the size of a dime or even smaller.

It is possible to have valvular stenosis and valvular insufficiency in one or more valves.

If you have valve disease, you will need treatment. Many patients with valve disease can have surgery to repair or replace the diseased valve(s). The treatment causes the valve to work normally again and then you can return to your normal activities. Without treatment, valve disease can reduce your quality of life and become life-threatening.

What causes valve disease?

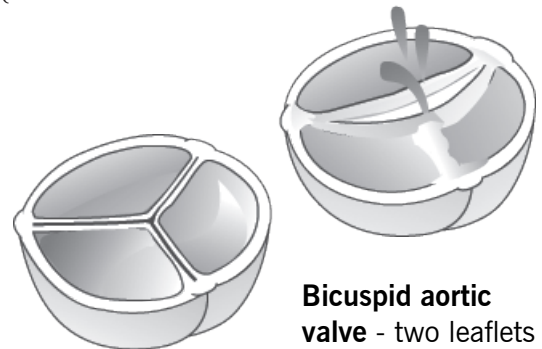
A person can be born with valve disease (congenital) or develop a problem later in life (acquired).

Common causes of acquired valve disease include infection (such as rheumatic fever and infective endocarditis) and changes to the valve that develop over time.

CONGENITAL VALVE DISEASE

Congenital valve disease develops before birth. Common problems that cause this type of valve disease are abnormal valve size, leaflets that are not properly formed, and abnormal leaflet attachment. Congenital valve diseases include bicuspid aortic valve disease and mitral valve prolapse.

Bicuspid aortic valve disease is a type of congenital valve disease that affects the aortic valve. The valve has two leaflets instead of three. At least 25 percent of patients with this disease have a larger than normal aorta above the valve. The condition affects about 2 percent of the population.



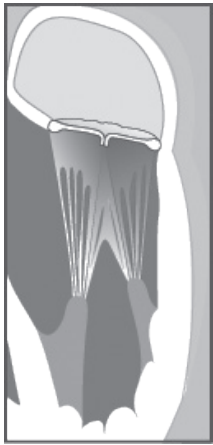
Normal aortic valve - three leaflets

Bicuspid aortic valve - two leaflets

The valve may not open fully (stenosis) or may not close tightly (regurgitation).

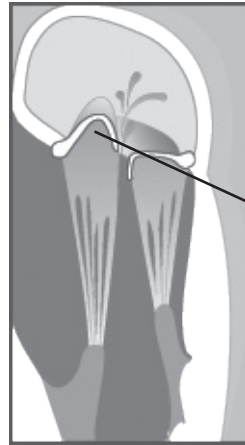
CONGENITAL VALVE DISEASE (CONTINUED)

Mitral valve prolapse (MVP) is a type of valve disease caused by weaker than normal connective tissue in the mitral valve. The condition causes the leaflets of the mitral valve to flop back into the left atrium when the heart contracts. The tissues of the valve also become abnormal and stretchy. This causes the valve to leak.



Normal mitral valve

Leaflets close tightly to keep blood from flowing backward when the ventricle contracts



Mitral valve prolapse

- Mitral valve leaflets are stretched
- The leaflets bow or flop back into the left atrium with each heartbeat
- The valve may leak

Mitral valve prolapse affects about one to two percent of the population. Men and women have the same risk of MVP. The condition usually isn't a reason for concern. Only a small percentage of patients with MVP eventually need surgery. If the prolapse becomes severe or is associated with torn chordae or flail leaflets (floppy and lacking support), it could lead to a bad leak, and surgery may be needed.

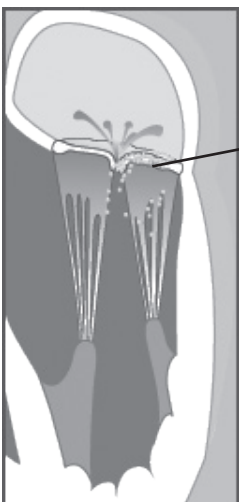
All patients with MVP should ask their doctor if they need to take precautions to prevent endocarditis.

ACQUIRED VALVE DISEASES

Acquired valve diseases include problems that develop with valves that were once normal. Acquired disease can be the result of infection, such as infective endocarditis and rheumatic fever. It can also be caused by changes in the valve structure, such as stretching or tearing of the chordae tendineae or papillary muscles, fibro-calcific degeneration or dilatation of the valve annulus. Sometimes the cause of acquired valve disease is unknown.

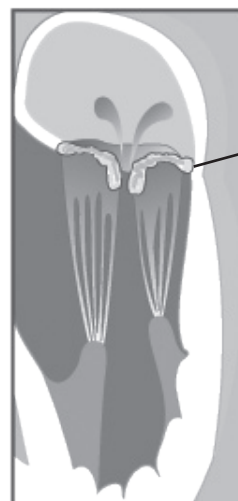
Infection

Infective endocarditis and rheumatic fever can lead to valve disease.



Infective endocarditis is a major infection and can be life-threatening.

Germs attack the heart valve and may cause the valve to leak.



Rheumatic fever may cause the valve leaflets to become inflamed.

The leaflets may stick together and become scarred, rigid, thickened and shortened.

One or more of the valves (most commonly the mitral valve) may become stenotic (narrowed) or leaky.

How does infective endocarditis develop?

Infective endocarditis (also called bacterial endocarditis) is an infection of the heart valves or the heart's inner lining (endocardium).

It occurs when germs (especially bacteria, but occasionally fungi and other microbes) enter the blood stream and attack the lining of the heart or the heart valves.

Bacterial endocarditis causes growths or holes on the valves or scarring of the valve tissue. This often causes a leaky heart valve. Bacterial endocarditis can be deadly if it is not treated.

How does rheumatic fever develop?

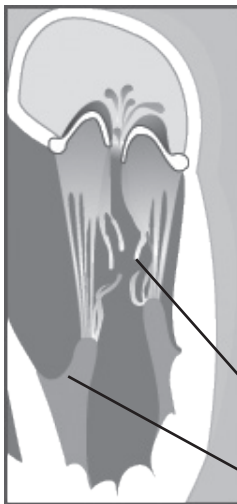
Rheumatic fever is usually the result of an untreated streptococcal infection, such as strep throat. The use of penicillin to treat strep throat can prevent this disease.

Rheumatic fever occurs most often in children between the ages of five and 15. It sometimes takes years for symptoms of valve disease to develop.

The valve itself is not infected when you have rheumatic fever. Instead, the body produces antibodies to fight the infection, and they react with the heart valves, causing inflammation and eventual scarring.

Structural Valve Disease

Structural valve diseases include stretching or tearing of the chordae tendineae or papillary muscles, fibro-calcific degeneration or dilatation of the valve annulus.



Stretching or tearing of chordae tendineae or papillary muscles: The valve leaflets may flop backward (flail leaflet) when the ventricles contract, causing a leaky valve. The mitral valve is most affected. The condition can be caused by a heart attack, heart valve infection or trauma.

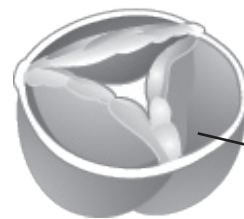
torn chordae

stretched papillary muscles

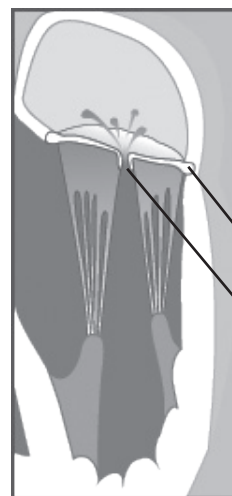
Dilatation: The widening or stretching of the valve annulus. This causes the leaflets to lack support and not close tightly, which leads to leaking.

Dilatation may occur when the heart muscle is damaged due to conditions such as heart attack (heart muscle injury), cardiomyopathy (weakened heart muscle), congestive heart failure or advanced stages of high blood pressure. An inherited heart condition, such as Marfan syndrome, can cause the aorta to become bigger and keep the aortic valve leaflets from closing properly, leading to valve leaks. This can also happen if the aorta is enlarged for other reasons, such as an aneurysm, rheumatological conditions or high blood pressure.

Fibro-calcific degeneration: The valve opening becomes narrowed. Fibro-calcific degeneration most commonly affects the aortic valve. It often occurs in adults over age 65. Risk factors for this condition include age, low body weight and high blood pressure.



Valve leaflets become thick (fibrotic) and hard (calcific)



Annulus widens

Leaflets lack support and do not close tightly

What are the symptoms of heart valve disease?

When the heart valves begin to fail, the heart beats harder to make up for the reduced blood flow. As the heart beats harder, symptoms of valve disease may occur, including:

- Increased shortness of breath
- Heart palpitations (feeling of skipped heartbeats)
- Chest pain or discomfort
- Swelling of the ankles, feet or abdomen (edema)
- Rapid weight gain (3 pounds in one day is possible)
- Increasing fatigue
- Weakness or dizziness

Symptoms can occur quickly if the onset of valve disease is severe and sudden. Some people slowly develop symptoms, possibly without noticing them.

Call your doctor if you have any of these symptoms so you can be checked for valve disease. If you have already been diagnosed with valve disease, keep your regular follow-up appointments and call your doctor if you have any new symptoms or if they get worse or happen more often. **Don't wait for your next appointment to tell your doctor about changes in your symptoms.**

Valve disease and other heart conditions

Patients with valve disease often also have heart failure or atrial fibrillation.

Heart failure means your heart is working less efficiently and cannot pump a normal amount of blood. Symptoms of heart failure and valve disease are similar. If you have heart failure, it is important to follow your treatment plan, which may include:

- Not smoking
- Weighing yourself daily and report sudden changes
- Medications to control body fluid and help your heart pump better
- Limiting the amount of salt/sodium in your diet
- Maintaining a healthy weight
- Regular exercise
- Regular doctor visits

Atrial fibrillation is an abnormal heart rhythm that starts in the atria (upper chambers of the heart). It can cause a rapid and disorganized heartbeat.

Many treatment options are available for patients with atrial fibrillation. These include medications, lifestyle changes, procedures and surgery. The best treatment for you is based on your heart rhythm and symptoms.

How is valve disease diagnosed?

Your doctor will perform an exam and diagnostic tests. Those results, along with your symptoms, will help the doctor make a diagnosis.

The physical exam may show that you have fluid in your lungs, an enlarged heart or a heart murmur. A heart murmur is the sound made by blood moving through a narrowed or leaky valve.

Diagnostic tests help determine the location, type and extent of your valve disease. They help your doctor see how severe the leak or stenosis is and how it is affecting your heart's function and ability to pump blood. These tests may include:

- **Echocardiogram (echo):** A graphic outline of the heart's movement. High-frequency sound waves are sent through a transducer that is placed on your chest. This produces pictures of the heart's valves, chambers and pumping action. An echo can show a narrowed or insufficient valve.

Specialized echos include:

- **Exercise stress echocardiogram:** An echo performed while you exercise to see how your heart works when you are active.
- **Transesophageal echo (TEE):** This type of echo uses a special tube (called an endoscope) that is passed into the mouth and down the esophagus ("food pipe"). This lets your doctor get a closer view of your heart.
- **Myocardial strain imaging:** Used to check for changes in heart function.
- **3D echo:** This echo can display parts of your heart in 3 dimensions so your

doctor can more completely measure the size and check the function of your heart and valves.

- **Electrocardiogram (ECG or EKG):** A picture on graph paper of the electrical impulses traveling through the heart muscle. Electrodes (small, sticky patches) are placed on the body, and they send the information that creates the picture. An EKG can detect abnormal electrical activity in the heart.
- **Cardiac catheterization (cardiac cath or coronary angiogram):** An invasive imaging procedure used to check heart function. During a cardiac catheterization, a long, narrow tube (catheter) is guided through a blood vessel in the arm or leg to the heart with the help of a special X-ray machine. Contrast dye is injected through the catheter, and X-ray movies are created as the dye moves through the heart. A cardiac cath can detect a narrowed or insufficient valve.
- **Magnetic resonance imaging (MRI):** A large magnet and radio waves are used to produce a picture of the heart's valves and chambers. It can create moving images of the heart as it is pumping and can detect abnormal blood flow through the heart.
- **Other tests to get more detailed information about your condition and heart function.**

If you are seen at Cleveland Clinic, you may need to have tests done elsewhere repeated. Our physicians have the ability to perform more sophisticated and advanced testing than is available at some hospitals.

You will receive detailed information about testing you need, including how to prepare and what to expect. If you have questions at any time about testing, please ask your doctor or other member of your healthcare team.

By repeating these tests over time, your doctor can keep track of how your valve disease progresses and help you make treatment decisions.

What treatments are available for patients with valve disease?

Treatments for valve disease include:

- Protecting your valve from further damage by reducing the risk of infective endocarditis
- Medications to ease symptoms and reduce the risk of further valve damage
- Valve repair or replacement surgery, if needed
- Catheter-based procedures, if needed
- Following up with your doctor for regular visits. Valve disease can get worse without any symptoms, so it is important to see your doctor as scheduled to check your condition.

The best treatment options for you depends on several factors, including the type of valve disease you have, the severity of the damage, your age and medical history. Your healthcare team will talk to you about each option.

Treatment with Medication

You may need to take medication to help your heart pump better. This helps make up for the loss of pumping power because of the diseased valve. But because heart valve disease is a mechanical problem, you may eventually need surgery.

Valve Surgery

There are two types of valve surgery — valve repair surgery and valve replacement surgery.

If you need valve surgery, your doctor will determine the best type of surgery for you based on your condition and other factors.

Valve surgery may be combined with other heart surgeries, such as other valve procedures, bypass surgery, aortic aneurysm surgery or surgery to treat atrial fibrillation.

VALVE REPAIR SURGERY

During valve repair surgery, the surgeon fixes the damaged or faulty valve. This surgery is often done without using artificial parts. The mitral valve is the most commonly repaired valve, but repair surgery can also be used to treat problems with the aortic and tricuspid valves.

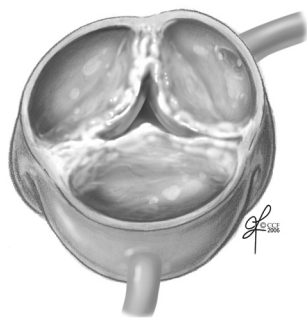
Types of Valve Repair Surgeries

The potential advantages of valve repair versus valve replacement are:

- Lower risk of infection
- Less need for life-long anticoagulant (blood thinning) medication
- Preserved heart muscle strength

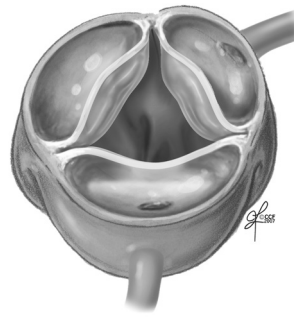
Types of valve repair techniques include commissurotomy, decalcification, resection of a portion of the valve leaflet, creation of new chords, annulus support, patched leaflets and bicuspid aortic valve repair.

Commissurotomy (aortic valve shown)



BEFORE:

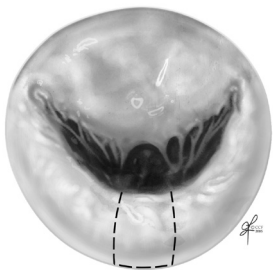
Valve leaflets are fused, causing narrowing (stenosis).



AFTER:

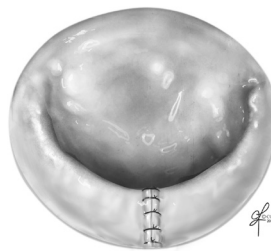
Valve leaflets are separated, widening the valve opening.

Quadrangle Resection of Leaflet (mitral valve shown)



BEFORE:

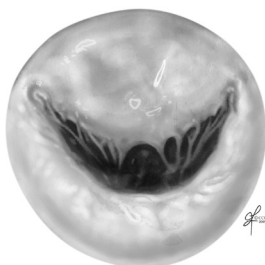
A portion of the mitral valve leaflet is floppy (flail) and bows back into the left atrium. A rectangular-shaped section is cut out.



AFTER:

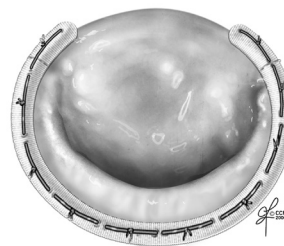
The leaflet is sewn back together, allowing the valve to close more tightly.

Annulus Support (mitral valve shown)



BEFORE:

Valve annulus is too wide; the leaflets lack support and do not close tightly. This causes the valve to leak.

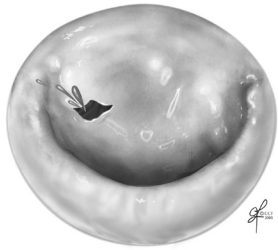


AFTER:

The leaflet is reshaped or tightened by sewing a ring around the annulus (annuloplasty). The ring is made of cloth or metal with a cloth covering. It acts like a belt, supporting the valve and bringing the leaflets together.

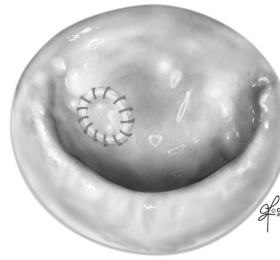
Types of Valve Repair Surgeries (continued)

Patched Leaflets (mitral valve shown)



BEFORE:

Valve leaflet has a hole or tear.



AFTER:

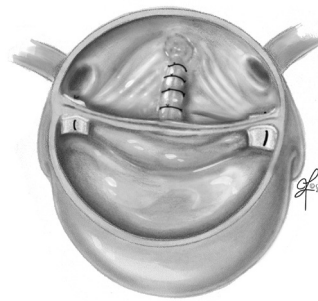
Tissue patches are used to repair the hole or tear.

Bicuspid Aortic Valve Repair



BEFORE:

A bicuspid aortic valve has two leaflets instead of the normal three. The valve may not open fully (stenosis) or may not close tightly (regurgitation).



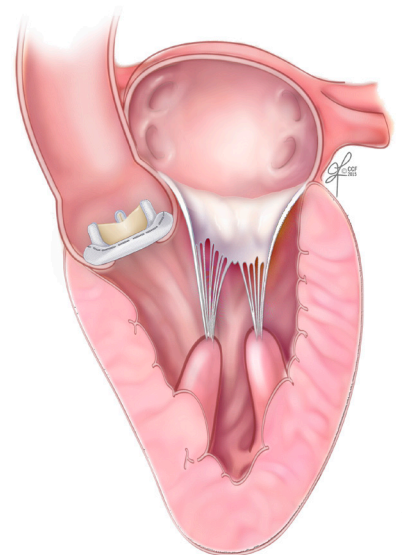
AFTER:

The aortic valve leaflets are surgically reshaped, allowing the valve to open and close more easily.

VALVE REPLACEMENT SURGERY

Valve replacement surgery is performed when valve repair surgery is not a treatment option. Valve replacement surgery is most often used to treat patients with aortic valve disease, especially those with aortic stenosis.

Valve replacement surgery involves removing the faulty valve (native valve) and replacing it with a mechanical or biological valve. The new valve is sewn to the rim (annulus) around your native valve. All valve replacements are “biocompatible,” which means the new valve will not be rejected by your immune system.

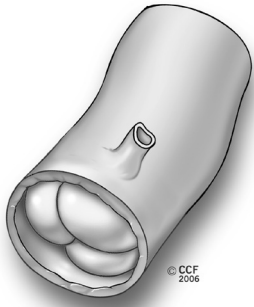


Types of Valve Replacement Surgeries

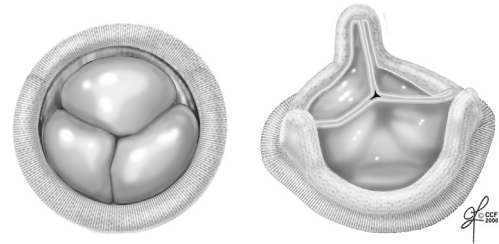
Biological Valves

Biological valves (also called tissue or bioprosthetic valves) are made from cow tissue (bovine), pig tissue (porcine) or human tissue (allograft or homograft). Biological valves may have some artificial parts to give the valve support and to make it easier to put them into place.

Most patients who receive a biological valve replacement do not need lifelong anticoagulant therapy after surgery.



Homograft valve



Biological valves (bovine or porcine)

In the past, biological valves were thought to be less durable than mechanical valves. But, recent studies show these valves often last at least 10 to 15 years without a decline in function.

A **homograft valve** is a human heart valve that comes from a donor after death. It is frozen and used to replace the native valve. A homograft can be used to replace a diseased aortic valve, especially if there is an infection. It can also be used to replace the pulmonic valve during the Ross procedure.

The Ross procedure is most often used to treat children and young adults with aortic valve disease. The surgery involves removing the pulmonic valve and using it to replace the diseased aortic valve. The pulmonic valve is then replaced with a homograft valve.

Mechanical Valves

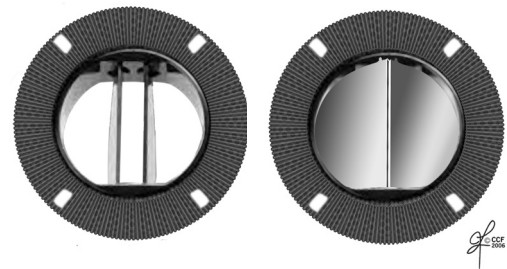
Mechanical valves are made of metal or carbon. They are well-tolerated by the body, very durable and are made to last a lifetime.

The bileaflet valve is the most common type of mechanical valve. It is made up of two carbon leaflets mounted in a ring that is covered with polyester knit fabric.

If you have your valve replaced with a mechanical valve, you will need to take a blood-thinning medication (anticoagulant), such as warfarin (Coumadin), for the rest of your life. Anticoagulant medication causes blood to clot slower than normal. It helps prevent blood clots from forming on the replaced valve. This helps reduce your risk of a heart attack or stroke.

If you take Coumadin, you need to have regular blood tests (Prothrombin time/PT). This test calculates your International Normalized Ratio (INR), which is a measurement of how quickly your blood clots. Measuring your INR helps your doctor see how well you are responding to the medication and if you need a change in your dose.

Some patients who have a mechanical valve replacement hear the valve make a clicking noise. This is the sound of the valve leaflets opening and closing.

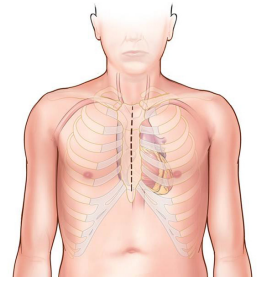


Mechanical valves

Valve Surgery Techniques

Traditional Surgical Approach (Median Sternotomy)

Traditional heart surgery involves a 6-to-8-inch incision through the breastbone to open the chest wall and reach the heart and arteries. This type of incision is needed for many types of heart surgery. The surgeon will use the smallest incision possible to perform the surgery.



Minimally Invasive Valve Surgery

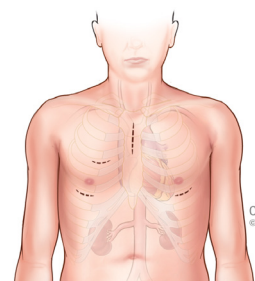
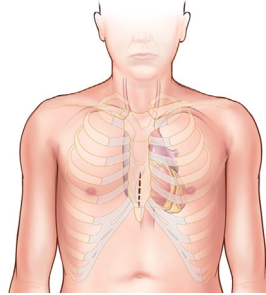
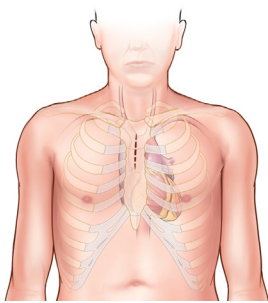
Minimally invasive heart valve surgery is performed using smaller incisions than those in traditional heart valve surgery. Techniques include endoscopic or keyhole approaches (also called port access, thoracoscopic or video-assisted surgery) and robotically assisted surgery. Your surgeon will be able to tell you if you are a candidate for this type of surgery.

The benefits of minimally invasive surgery include a smaller incision (3-4 inches or smaller than traditional incisions) and smaller scars. Other possible benefits include a reduced risk of infection, less bleeding and trauma, a shorter hospital stay (3-5 days) and shorter recovery.

Valve surgery (replacement and repair) is the most common type of minimally invasive procedure.

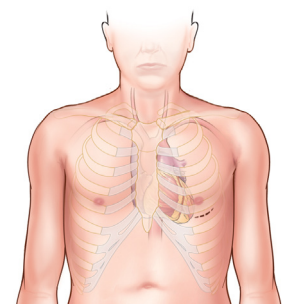
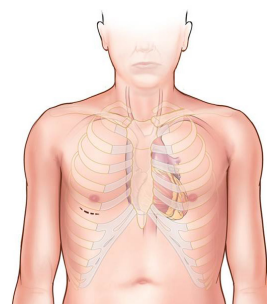
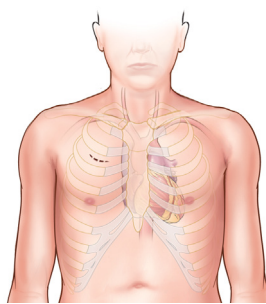
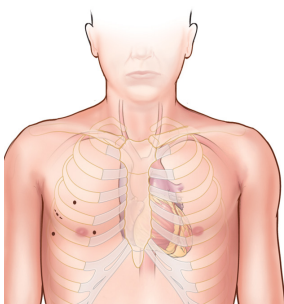
Types of Incisions

There are many types of incisions used by surgeons who perform valve surgery. Please talk to your surgeon about the type of incision(s) and scar(s) you can expect to have.



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Types of Minimally Invasive Sternotomies



Types of Incisions Used for Minimally Invasive and Transcatheter Valve Procedures

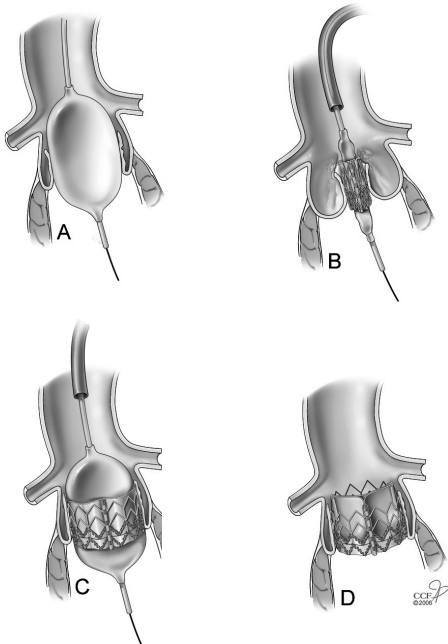
Transcatheter Approaches

Transcatheter Aortic Valve Replacement (TAVR)

Transcatheter aortic valve replacement (TAVR) is a treatment option for some patients with severe aortic stenosis who either too high-risk to have traditional open-heart surgery or cannot have an operation because they have too many other health problems. The TAVR procedure is used to replace the aortic valve.

The doctor uses a catheter to replace the diseased valve with a biological valve. The catheter is inserted into an artery through your groin or an incision in your chest.

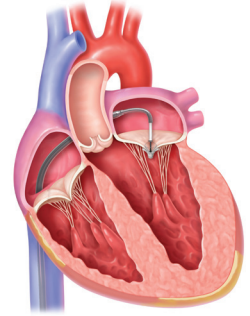
Not all patients are eligible for TAVR. If you are interested in this treatment, please talk to your doctor.



- A. Balloon valvuloplasty: The native aortic valve is forced open.
- B. Balloon catheter with replacement valve (compressed) is positioned in the diseased valve.
- C. Balloon is inflated to expand the replacement valve and secure it in place.
- D. The replacement valve is in place. The catheter and balloon are removed.

Transcatheter MitraClip Mitral Valve Repair

The MitraClip is a treatment option for some patients with severe symptomatic mitral regurgitation (leaky valve) who are too sick to have traditional open-heart surgery to repair the valve.



The doctor uses a catheter to place the MitraClip on the valve leaflets. This helps them close more tightly. The catheter is inserted into an artery through your groin or an incision in your chest.

Not all patients are eligible for the MitraClip procedure. If you are interested in this treatment, please talk to your doctor.

Preparing for Valve Surgery

Some of this information may not apply to you if you are having minimally invasive surgery or a transcatheter procedure. Please talk to your doctor or another member of your healthcare team if you have any questions about your surgery.

What happens before surgery?

Patients who are interested in having heart surgery at Cleveland Clinic can have a visit with one of our cardiologists or send in their medical records for the doctor to review. Then, the surgery is scheduled.

If you live far from Cleveland Clinic, please arrive in the area a few days before surgery.

Part of your preparation for surgery includes a presurgical appointment. You will have an evaluation and meet members of your healthcare team. You may also meet your surgeon and anesthesiologist. We will answer any questions you have, and you will get a surgical binder that contains helpful and important information about what to expect before, during and after surgery.

At this appointment, we will let you know when and where to go on the day of surgery. We will also let you know if you need more tests before your surgery.

Your presurgical appointment can take a whole day or longer, depending on the type of surgery you are having and any tests you need.

Procedure Length

The amount of time your procedure takes depends on the type of procedure you are having. A general guideline is 3 to 6 hours, not including the time you spend in the prep and recovery areas.

Is the heart-lung machine used during surgery?

Yes. The heart-lung bypass machine is used during valve surgery to take over the work of the heart and lungs for a brief period of time. This keeps blood circulating throughout the rest of your body. Your heartbeat is stopped so the surgeon can operate on a “still” heart. This type of surgery is referred to as “on-pump” surgery.

What happens after surgery?

After the valve has been repaired or replaced, the heart-lung machine is turned off, the heart starts beating on its own, and normal blood flow returns.

You may have temporary pacing wires and a chest tube to drain fluid. Sometimes a temporary pacemaker is attached to the pacing wires to keep your heart rhythm regular until your condition improves. Both the wires and the chest tube are put in place before you come out of surgery.

Stitches will be used to close your incision. These may be internal and/or external, depending on the type of surgery you have and the type of incision used.

You will stay in an intensive care unit (ICU) for a day or two after surgery. While you are in the ICU, we will closely monitor your heart, blood pressure, oxygen level and vital signs.

Your recovery continues in a special step-down nursing unit. You will be here for about 3 to 5 days, but amount of time you spend in the hospital depends on the type of surgery you have and how quickly you recover.

Recovery

It will take 2 to 3 months to fully recover from valve surgery. Most patients are able to drive 3 to 8 weeks after surgery (sooner if you have a robotic or transcatheter procedure). Your doctor will give you



specific recovery guidelines, including information on activity, returning to work, how to care for your incision and general health guidelines.

Staying Healthy

An important part of staying healthy after surgery is a healthy lifestyle and taking medications as prescribed. Depending on your lifestyle, you may need to make changes that include:

- Quitting smoking
- Treating high cholesterol
- Managing high blood pressure and diabetes
- Exercising regularly
- Maintaining a healthy weight
- Eating a heart-healthy diet
- Participating in a cardiac rehabilitation program, as recommended
- Following up with your doctor for regular visits

Follow-Up Care

Your first post-op appointment will be during the first week after you leave the hospital. If you are unable to come to Cleveland Clinic for this appointment, please let us know as soon as possible so we can make arrangements for you to see your local doctor. Your first appointment is very important. We will make sure you are taking the right types and amounts of medications and check for any problems with your healing and recovery.

Your next visit will be with your primary care doctor or cardiologist 6 weeks after you leave the hospital. Your doctor will check to see how your recovery is going, make sure you are taking the right types and amounts of medications, and give you the okay to return to normal activities like driving and working.

Medications, surgery and other treatments will not completely cure your heart valve disease. You will need to see your doctor for lifelong follow-up (exams and tests) to make sure your heart valves work as they should.

You will need regular appointments with your cardiologist at least once per year. Please be sure to keep these appointments, even if you do not have symptoms. Talk to your cardiologist about how often you need to be seen.

Call your doctor if you have any new symptoms or if your symptoms become worse or happen more often. **Do not wait until your next appointment to tell your doctor about changes in your symptoms.** All patients seen at Cleveland Clinic's Heart & Vascular Institute have access to a phone line that is staffed by registered nurses 24/7. We are there to support you and answer your questions throughout your care and after you return home.

FREQUENTLY ASKED QUESTIONS

Q: How does my doctor determine the best treatment for me?

A: The type of valve disease treatment that is recommended will depend on several factors, including the type of valve disease you have, how severe the damage is, your age and medical history. Your healthcare team will talk to you about your best treatment options.

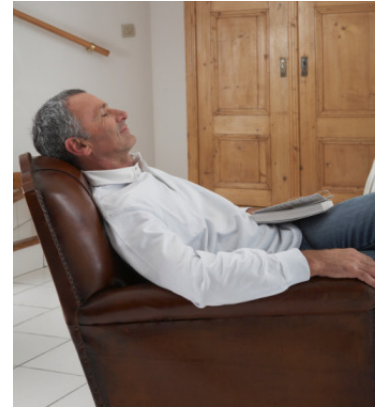
Q: Is surgery better for me than medication alone?

A: Medications often help during the first stages of valve disease, but they don't work as well as the disease gets worse. **You do not need to delay surgery until your symptoms are unbearable.** It is sometimes best to have

surgery before you start to have symptoms. The decision to have surgery is a major one that is based on your individual needs. It involves input from you, your cardiologist and your heart surgeon.

Q: How will I feel after surgery?

A: Every patient has a different experience after valve surgery. In general, you can expect to be sore and possibly tired for a while. This is due to the trauma from the surgery and is not a sign of how your heart valves are working. It may take 2 to 3 months to fully recover from surgery. Your recovery time will be shorter if you have a robotic or minimally invasive procedure.



How you feel after surgery depends on your overall health, how the surgery went, and how well you take care of yourself after surgery. Most patients do feel better after they recover. To some extent, how you feel will depend on how you felt before surgery. Patients with more severe symptoms before surgery may have a greater sense of relief after surgery. Call your doctor if you are concerned about your symptoms or the speed of your recovery.

Q: How long will my valve last?

A: The amount of time your valve repair or replacement lasts depends on several things — your health at the time of surgery, the type of surgical treatment you have and how well you take care of yourself after the surgery. In some cases, valve repair surgery does not keep the valve from getting worse, and you may need another surgery.

Mechanical valves rarely wear out, but they may need to be replaced if a blood clot, infection or tissue growth keeps them from working properly. **Biological and homograft valves** will eventually need to be replaced. This is especially true for younger patients who have a biological valve replacement.

Q. What are the risks of major complications from the surgery?

A: All surgery involves risks. These risks are related to your age, other medical conditions you have and the number of procedures you have done during a single operation. Your cardiologist and surgeon will talk to you about these risks before surgery. Please ask questions to make sure you understand all of the possible risks and why the procedure is recommended.

Q: Will I need to take blood-thinning medication (anticoagulants) after surgery?

A: Your doctor will let you know if you need to take an anticoagulant and for how long. If you have a mechanical heart valve, you will need to take an anticoagulant for the rest of your life. If you have mitral valve repair or a biological valve replacement, you may need to take an anticoagulant for several weeks after surgery, or maybe not at all. If you have a homograft valve, you will not need to take an anticoagulant. However, anticoagulants are sometimes used as treatment for other conditions related to valve disease. These conditions include an enlarged heart, irregular heartbeat, a weakened heart and a history of blood clots.

Anticoagulants have few, if any, side effects. They protect against stroke and generally do not disrupt normal living. There are some special precautions and instructions you will need to know about if you take an anticoagulant. Your healthcare team will go over this information with you.

Q: What if I choose not to have surgery?

A: Medication can be used to treat some types of valve disease, at least in the early stages. You may also be able to have a nonsurgical treatment. But, valve disease does not go away and it gets worse with time. As this happens, you will have more symptoms that will get worse. Your overall health will also get worse. Many times, symptoms come on slowly, but they can happen quickly. If you decide against surgery, you should stay in close contact with your doctor. Surgery usually remains a treatment option, even for patients with advanced valve disease, and it may be the only effective treatment.

Important Information for Cleveland Clinic Patients

A complete review of your medical history is important for your doctor to fully understand your condition. This review includes your medical records, test results, medications you're taking and other items.

You will receive information about what to send to your doctor before your appointment or bring with you the day of your appointment.

We will also send you an appointment schedule so you know what to expect. Please plan on spending at least 4 hours at Cleveland Clinic for your first visit.

Also, please let us know who you would like to receive reports from your visit at Cleveland Clinic.

Thank you!

Protecting Your Heart Valves

Bacterial or infective endocarditis is an infection of the heart valves or the heart's inner lining (endocardium). It occurs when germs (especially bacteria, but occasionally fungi and other microbes) enter the blood stream and attack the lining of the heart or the heart valves. Bacterial endocarditis causes growths or holes on the valves or scarring of the valve tissue, which usually cause a leaky heart valve. Without treatment, bacterial endocarditis can be deadly.

To reduce your risk of bacterial endocarditis:

- Practice good oral hygiene habits every day. See your dentist every six months, brush and floss regularly, and make sure dentures fit properly.
- Call your doctor if you have symptoms of an infection, including a fever over 100 degrees F (38 degrees C); sweats or chills; skin rash; pain, tenderness, redness or swelling; wound or cut that won't heal; red, warm or draining wound; sore throat, scratchy throat or pain when swallowing; sinus drainage, nasal congestion, headaches or tenderness along upper cheekbones; persistent dry or moist cough that lasts more than two days; white patches in your mouth or on your tongue; nausea, vomiting or diarrhea.
- Don't wait to get treatment. Colds and the flu do not cause endocarditis, but infections, which may have the same symptoms, do cause endocarditis. To be safe, call your doctor and describe the symptoms and remind your doctor that you are a heart valve patient.

Who's at risk?

You are most at risk of developing bacterial endocarditis if you have:

- An artificial heart valve, including bioprosthetic and homograft valves
- Previous bacterial endocarditis
- Certain congenital heart diseases
- Heart valve disease that develops after heart transplantation

If you have any of these conditions, talk to your doctor about taking a preventive antibiotic before certain medical and dental procedures. Ask your doctor about the type and amount of antibiotic you should take, how much you should take, and which procedures require the medication. Follow the above tips to reduce your risk of infection.

A bacterial endocarditis identification card is available from the American Heart Association. Ask your doctor for a card or go to www.americanheart.org and search for "bacterial endocarditis wallet card." Be sure to carry this card with you.

This information is not intended to replace the medical advice of your doctor or healthcare provider. Please consult your healthcare provider for advice about a specific medical condition.



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