Cleveland Clinic

Valve Disease Overview and Treatment Guide
HEART VALVE DISEASE: TREATMENT OPTIONS

The type of valve disease treatment that is recommended for you will depend on several factors, including the type of valve disease you have, the severity of the damage, your age and your medical history. Your health care team will discuss the specific treatment options that are recommended for you.

Medical Treatment of Heart Valve Disease

Medications may be prescribed to increase the pumping action of the heart to compensate for a valve that isn’t working properly. However, heart valve disease is a mechanical problem, and surgery may eventually be needed to repair or replace the damaged valve.

Valve Surgery

Over the past several years, there have been great advances in the surgical treatment of diseased heart valves. Diagnostic tests have helped your heart doctor identify the location, type and extent of your valve disease. The results of these tests, the structure of your heart, your age, the presence of other medical conditions, and your lifestyle will help your cardiologist, surgeon and you determine what type of valve treatment is best.

At Cleveland Clinic, valve surgery may be combined with other heart surgeries, such as more than one valve procedure, bypass surgery, aortic aneurysm surgery or surgery to treat atrial fibrillation (an irregular heart beat that is common in patients with valve disease).

What is Valve Disease?

Heart valve disease occurs when one or more of the heart valves do not work correctly because of valvular stenosis (narrowing of the valves) or valvular insufficiency (“leaky” valve). These conditions cause the heart to pump harder to circulate the right amount of blood through the body.

Left untreated, heart valve disease can reduce a person’s quality of life and become life-threatening. In many cases, valves can be surgically repaired or replaced, restoring normal function and allowing the person to return to normal activities.

There are two types of valve surgery:

- valve repair surgery
- valve replacement surgery.

VALVE REPAIR SURGERY

During valve repair surgery, the surgeon fixes the damaged or faulty valve, often without the use of artificial parts. The mitral valve is the most commonly repaired valve, but the aortic and tricuspid valves may also undergo some of the following repair techniques.

This information is not intended to replace the medical advice of your doctor or health care provider. Please consult your health care provider for advice about a specific medical condition.
Types of Valve Repair Surgery

Types of valve repair techniques include:

- Commissurotomy
- Decalcification
- Quadrangular resection of leaflet
- Creation of new chords
- Annulus support
- Patched leaflets
- Bicuspid aortic valve repair

Commissurotomy

BEFORE:
Valve leaflets are fused, causing stenosis (narrowing)

AFTER:
Valve leaflets are separated, widening the valve opening

Quadrangle Resection of Leaflet

BEFORE:
A portion of the mitral valve leaflet is flail (floppy) 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

BEFORE:
Valve annulus is too wide; the leaflets lack support and do not close tightly, causing the valve to leak

AFTER:
The leaflet may be reshaped or tightened by sewing a ring around the annulus (annuloplasty). The ring may be made of tissue or synthetic material.
Types of Valve Repair Surgeries (continued)

**Patched Leaflets**

<table>
<thead>
<tr>
<th>BEFORE:</th>
<th>AFTER:</th>
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<tbody>
<tr>
<td>Valve leaflet has a hole or tear</td>
<td>Tissue patches may be used to repair the hole or tear</td>
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**Bicuspid Aortic Valve Repair**

<table>
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<th>BEFORE:</th>
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<tr>
<td>Bicuspid aortic valve has two leaflets instead of three. The valve may not open fully (stenosis) or may not close tightly (regurgitation).</td>
<td>The aortic valve leaflets may be surgically reshaped, allowing the valve to open and close more easily.</td>
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The potential advantages of valve repair versus valve replacement are:

- Decreased risk of infection
- Decreased need for life-long anticoagulant (blood thinner) medication
- Preserved heart muscle strength

Types of valve repair techniques include commissurotomy, decalcification, quadrangular resection of leaflet, creation of new chords, annulus support, patched leaflets and bicuspid aortic valve repair.
VALVE REPLACEMENT SURGERY

During valve replacement surgery, the surgeon removes the faulty valve (native valve) and replaces it by sewing a mechanical or biological valve to the annulus of the native valve. All valve replacements are “biocompatible,” which means they will not be rejected by the patient’s immune system. *Valve replacements are described on Page 5.*

Valve replacement surgery is performed when valve repair surgery is not a treatment option. Valve replacement surgery is commonly performed for patients with aortic valve disease, although the aortic valve can be repaired in some cases. Your doctor will discuss the type of valve replacement that is recommended for you.

An important consideration of valve replacement surgery is that anticoagulant medications (“blood thinners”), such as warfarin (Coumadin) may need to be taken for the rest of the patient’s life, depending on the type of valve replacement that was used. Blood thinners are medications that delay the clotting action of blood. They help prevent blood clots from forming on the replaced valve to reduce the risk of a heart attack or stroke.

Patients who take Coumadin need to have regular blood tests (called Prothrombin time, or PT for short) to calculate the International Normalized Ratio (INR), a measurement of how fast the blood is clotting. This test helps your doctor evaluate your response to the medication and helps determine if your dosage needs to be adjusted.

Types of Valve Replacement Surgeries

Biological Valves

Biological valves (also called tissue or bioprosthetic valves) can be made from cow tissue (bovine), pig tissue (porcine) and human tissue (allograft or homograft). Biological valves may have some artificial parts to give the valve support and to aid placement.

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

Traditionally, biological valves were not considered as durable as mechanical valves. However, recent studies show these valves may last at least 17 years without a decline in function.

A *homograft valve* is a human heart valve that is obtained from a donor after death, frozen and then transplanted in the recipient. A homograft may be used to replace a diseased aortic valve, or it may be used to replace the pulmonic valve during the Ross procedure (see Page 6). Homograft valves are well tolerated by the body because they are most like your own native valves. Most patients who receive a homograft valve replacement do not need to take anticoagulant medications for the rest of their lives.
**Mechanical Valves**

A mechanical valve is made totally of mechanical parts that are tolerated well by the body. Mechanical valves are made of metal or carbon and are designed to perform the functions of the patient’s native valve. A mechanical valve is very durable and is designed to last a lifetime.

The bileaflet valve is the most common type of mechanical valve and consists of two carbon leaflets in a ring covered with polyester knit fabric.

Most patients who receive a mechanical valve replacement need to take anticoagulant medications for the rest of their lives.

Some patients who have a mechanical valve replacement report a valve-clicking noise at times. This is the sound of the valve leaflets opening and closing.

**Switch Operation (Ross Procedure)**

The Ross procedure is used to treat aortic valve disease. During this procedure, the patient's own pulmonic valve is removed and used to replace a diseased aortic valve. The pulmonic valve is then replaced by a homograft valve.

Most patients who undergo the Ross procedure do not need to take anticoagulant medications for the rest of their lives.

This procedure is mainly used in children or young adults with aortic valve disease.
Minimally Invasive Valve Surgery

Minimally invasive heart valve surgery is a type of surgery performed through smaller incisions than traditional heart valve surgery.

Other minimally invasive valve surgery techniques include endoscopic or keyhole approaches (also called port access, thoracoscopic or video-assisted surgery) and robotic-assisted surgery.

The benefits of minimally invasive surgery include a smaller incision (3 to 4 inches – or even smaller with robotic surgery – instead of the 6- to 8-inch incision with traditional surgery) and smaller scars. Other possible benefits may include a reduced risk of infection, less bleeding, less pain and trauma, decreased length of stay in the hospital (3 to 5 days) and decreased recovery time.

Valve surgeries, including valve repairs and valve replacements, are the most common minimally invasive procedures.

The surgical team will carefully compare the advantages and disadvantages of minimally invasive valve surgery versus traditional valve surgery. Your surgeon will review the results of your diagnostic tests before your surgery to determine if you are a candidate for any of these minimally invasive techniques.

What happens before surgery?

When valve surgery is determined to be an appropriate treatment option for you, a presurgical appointment will be scheduled. At this appointment, you will receive instructions about when and where to report for surgery, what to expect before and after surgery, and whether you need further testing before surgery. If you need to see another health care provider or need testing during this preoperative appointment, you may be at Cleveland Clinic all day or you may need to return another day.

During this appointment, you will have the opportunity to talk with a nurse or patient educator about the procedure and the Cleveland Clinic surgical experience. You may also meet with your surgeon and anesthesiologist to talk about your upcoming surgery.

Is the heart-lung machine used during surgery?

Yes. During surgery, the heart-lung bypass machine (called “on-pump” surgery) is used to take over for the heart and lungs, allowing
To maintain your cardiovascular health after surgery, making lifestyle changes and taking medications as prescribed are strongly recommended.

**Lifestyle changes 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

During the first few months after surgery, you will probably need to visit a few times with the doctor who referred you for surgery. You will need to schedule regular appointments with your cardiologist (even if you have no symptoms).

Your follow-up appointments may be scheduled every year, or more often, as recommended by your doctor. Your appointments should include a medical exam. You may be scheduled for regular diagnostic tests, such as an echocardiogram (EKG).

You should call your doctor if your symptoms become more severe or frequent. **Don’t wait until your next appointment to discuss changes in your symptoms.**

Medications, surgery and other treatments will not fully cure your heart valve disease. You will always need to see your doctor for lifelong follow-up visits to make sure your heart valves work as they should.
FREQUENTLY ASKED QUESTIONS

Q: How does my doctor determine what treatment is right 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, the severity of the damage, your age and your medical history. Your health care team will discuss specific treatment options with you.

Q: Will surgery be better for me than medication alone?
A: Medications often help in the initial stages of valve disease but are less effective as the disease progresses. The decision to have surgery is a major one that depends on several factors that differ among patients. Surgery does not need to be delayed until your symptoms become unbearable. For some valve conditions, surgery is most effective when performed before symptoms begin. The decision to undergo surgery is a joint one between you, your cardiologist and your heart surgeon.

Q: How will I feel after surgery?
A: For a while after the surgery, you may feel worse than you did before surgery. This is normal and is usually related to the trauma of surgery, not necessarily to the functioning of your heart valves. It may take you four to 10 weeks to fully recover from surgery.

How you feel after surgery depends on your overall health, how the surgery went, and how well you take care of yourself after surgery. After recovering from surgery, most patients do feel better. To some extent, how you feel will depend on how you felt before surgery. Patients with more severe symptoms before surgery may experience 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 longevity of your valve repair or replacement will depend on several factors: your health at the time of surgery, the type of surgical treatment you undergo, and how well you take care of yourself after the surgery. In a few patients, valve repair does not stop the progression of valve disease, and further surgery may be necessary. Mechanical valves rarely wear out, but occasionally they may need to be replaced if a blood clot, infection or a growth of tissue interferes with their function. Biological and homograft valves may need to be replaced, particularly when they are implanted in younger patients.

Q: Are there any risks of major complications from the surgery?
A: As with any surgery, there are risks involved. Your surgical risks are related to your age, the presence of other medical conditions and the number of procedures you undergo during a single operation. Your cardiologist will discuss these risks with you before surgery; please ask questions to make sure you understand all of the potential risks and why the procedure is recommended.

Q: Will I need to take anticoagulants (blood thinners) after surgery?
A: The need for anticoagulant medications after surgery varies from patient to patient. Patients receiving a mechanical heart valve must take anticoagulants for the rest of their lives. Patients receiving biological valves may only need to take anticoagulants for several weeks after surgery, or they may not need to take them at all. Patients receiving homograft valves do not need to take anticoagulants. However, other conditions associated with valve disease are also sometimes treated with anticoagulants. These conditions include an enlarged heart, irregular heartbeats, a weakened heart and a history of blood clots.
Nonsurgical Valve Treatment: Balloon Mitral Valvotomy

Balloon mitral valvotomy is used to increase the opening of a stenotic (narrowed) valve. This treatment is an option for:

- Certain patients who have mitral valve stenosis (narrowing) with symptoms of valve disease
- Some older patients who have aortic valve stenosis but are not able to undergo surgery
- Some patients with pulmonic valve stenosis

This procedure can be performed on the mitral, tricuspid, aortic or pulmonary valves. The procedure is performed in the cardiac catheterization lab by a cardiologist and a team of nurses and technicians.

During the procedure, a specially designed balloon catheter is inserted in the groin and guided to the heart. The balloon tip is directed inside the narrowed valve and is inflated and deflated several times to widen the valve opening. The balloon is removed after the valve opening has been widened enough.

The procedure takes about two hours, but preparation and recovery add more time. Patients usually stay in the hospital overnight and go home the next day. New research-based percutaneous, nonsurgical procedures to treat mitral and aortic valve regurgitation (leaky valve) are being tested.

Q: What if I don’t choose surgery?
A: Some types of valve disease can be treated with medicine, at least in the early stages of the disease. Some patients may also be eligible for nonsurgical valve treatment (see below). However, the natural course of valve disease is to worsen, as indicated by an increase in the number or severity of symptoms and a decrease in overall health. These changes are often gradual, but they can occur quickly. Thus, we recommend that patients who choose not have surgery remain in close contact with their physicians. Surgery usually remains a treatment option, even in advanced disease, and it may be the only effective treatment.
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, most often resulting in a leaky heart valve. Without treatment, bacterial endocarditis can be a fatal disease.

To reduce your risk of bacterial endocarditis:

- Practice good oral hygiene habits every day. Take good care of your teeth and gums by seeking professional dental care every six months, regularly brushing and flossing your teeth, and making 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 seek 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.

Who’s at risk?

Most patients can reduce their risk of developing bacterial endocarditis by simply following the steps listed above.

Patients who have the highest risk of developing bacterial endocarditis include those who have:

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

These patients may reasonably benefit from taking preventive antibiotics before certain medical and dental procedures, in addition to following the steps above. If you have any of the conditions listed above, please talk to your doctor about the type and amount of antibiotics you should take, and for what procedures you should take them. A bacterial endocarditis identification card is available from the American Heart Association and should be carried with you. Ask your doctor for a card or go to www.americanheart.org and search for “bacterial endocarditis wallet card.”
For More Information

For more information about valve disease and treatment options, please visit our Web site at www.clevelandclinic.org/heart or e-mail us using the Contact Us form.

To talk with a nurse about valve disease and available treatment options, please contact the Sydell and Arnold Miller Heart & Vascular Institute Resource Center Nurse toll-free at 866.289.6911.

About the Sydell and Arnold Miller Family Heart & Vascular Institute

The Sydell and Arnold Miller Family Heart & Vascular Institute at Cleveland Clinic is one of the largest cardiovascular specialty groups in the world, providing patients with expert medical management and a full range of therapies. Our cardiac care program has been ranked number one since 1995 by U.S. News & World Report.

Our areas of expertise combine research, education and clinical practice to provide innovative and scientifically-based treatments for cardiovascular disease. The commitment of our physicians and scientists to the prevention and cure of cardiovascular disease has led to innovative care, better outcomes and improved quality of life for patients with cardiovascular disease.

To Make an Appointment

To make an appointment, please call 800.223.2273 or 216.444.6697.

International patients, please call Global Patient Services at 001.216.444.8184 to make an appointment, or visit us on the Web at www.clevelandclinic.org/appointments.

This information is not intended to replace the medical advice of your doctor or health care provider. Please consult your health care provider for advice about a specific medical condition.
Cleveland Clinic, located in Cleveland, Ohio, is a nonprofit multispecialty academic medical center that integrates clinical and hospital care with research and education. Cleveland Clinic was founded in 1921 by four renowned physicians with a vision of providing outstanding patient care based upon the principles of cooperation, compassion and innovation. U.S. News & World Report consistently names Cleveland Clinic as one of the nation’s best hospitals in its annual “America’s Best Hospitals” survey. About 2,000 full-time salaried physicians and researchers and 7,600 nurses at Cleveland Clinic represent more than 100 medical specialties and subspecialties. In addition to its main campus, Cleveland Clinic operates nine regional hospitals in Northeast Ohio, Cleveland Clinic Florida, the Lou Ruvo Center for Brain Health in Las Vegas and Cleveland Clinic Canada. In 2008, there were more than 4.2 million visits throughout the Cleveland Clinic health system and 165,000 hospital admissions. Patients came for treatment from every state and from more than 80 countries. Visit Cleveland Clinic at clevelandclinic.org.

Cleveland Clinic’s main campus, with 50 buildings on 180 acres in Cleveland, Ohio, includes a 1,000-bed hospital, outpatient clinic, specialty institutes and supporting labs and facilities. Cleveland Clinic also operates 17 family health centers, nine regional hospitals, one affiliate hospital, a rehabilitation hospital for children, Cleveland Clinic Florida, the Lou Ruvo Center for Brain Health in Las Vegas, and Cleveland Clinic Canada. Cleveland Clinic Abu Dhabi (United Arab Emirates), a multispecialty care hospital and clinic, is scheduled to open in 2012.