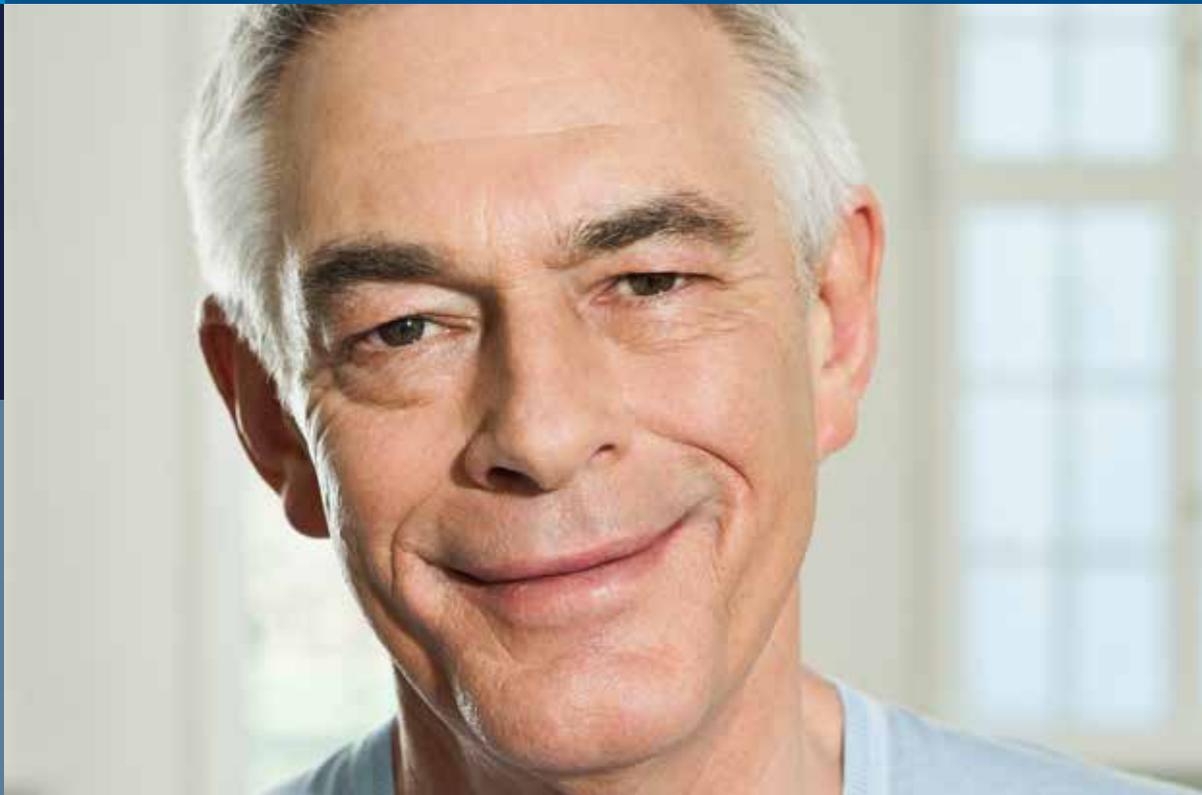


# A PATIENT'S GUIDE TO **HEART VALVE SURGERY**



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# INTRODUCTION

This information is intended for patients who have had or who will be facing heart valve surgery. If you are a family member or friend, you may also find this information helpful. However, because each patient has his or her unique medical history, this information cannot replace discussions with your healthcare professional. You should see your healthcare professional whenever you have symptoms or changes in your health and especially if you have questions about your heart valve surgery.

Heart valve disease is a common condition, affecting hundreds of thousands of individuals. Surgeons have been performing heart valve surgery for quite a long time. The first recorded surgical operation on a heart valve took place in 1913. Replacement of diseased valves, however, was not possible until the 1960s, when artificial valves became available. Today's well-designed valves can help patients to return to more healthy, active lifestyles.



# YOUR HEART AND ITS VALVES

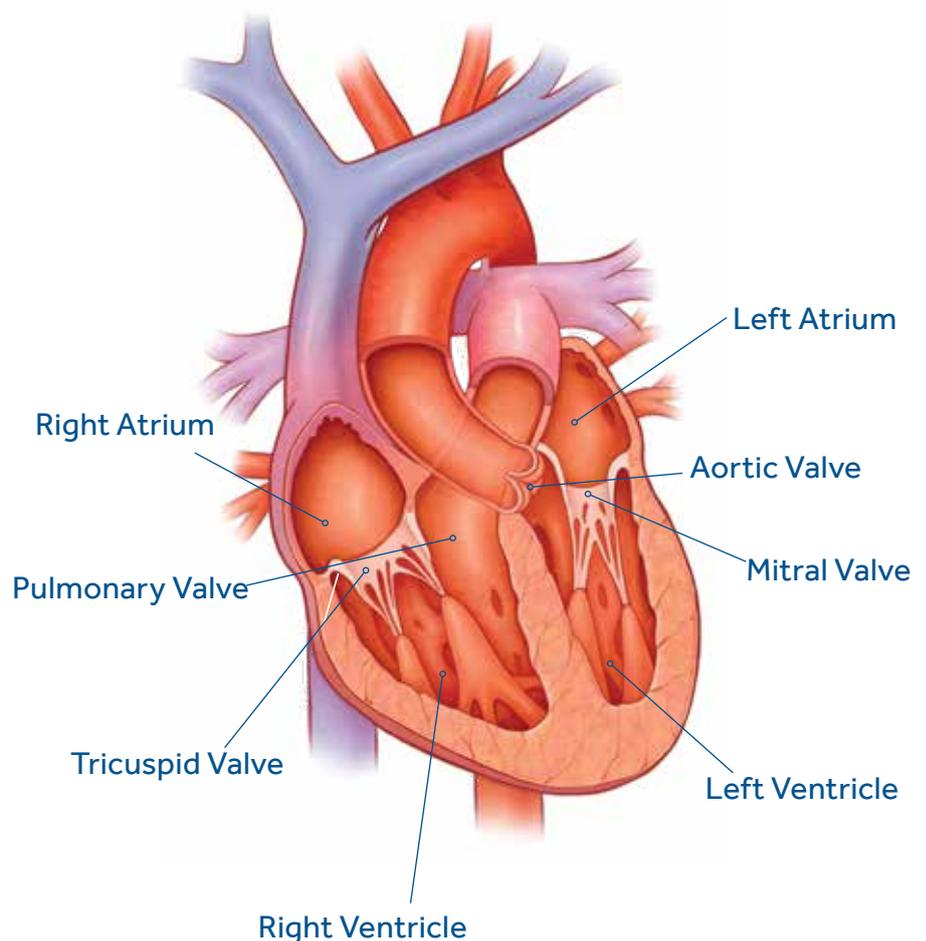
## How Your Heart Works

Your heart is about the size of your fist and located between your lungs in the area called the “mediastinum.” The normal heart has four pumping chambers (two atria — a right and a left atrium and two ventricles — a right and a left ventricle).

The normal heart has four valves. On the right side of the heart, the tricuspid valve is located between the right atrium and right ventricle and a pulmonary valve is located between the right ventricle and the lungs. On the left side of the heart, the mitral valve is between the left atrium and the left ventricle. Blood that is pumped out of the heart by the left ventricle passes through the aortic valve and enters the aorta (and to the rest of the body). It's the heart's continuous pumping action (contracting) that keeps your body supplied with oxygen-rich blood. A cardiac (heart) cycle (beat) includes the following two steps that occur at the same time:

- Oxygen-poor blood from the body enters the right atrium and ventricle and is pumped to the small blood vessels (capillaries) of the lungs and receives oxygen.
- Oxygen-rich blood enters the left atrium and is pumped into the left ventricle, which forces the blood back out to the body.

Arteries carry blood away from the heart and the veins carry blood to the heart. Valves keep the blood flowing through the heart in the correct direction. The valve opens and then closes in order to prevent the blood from going backwards.



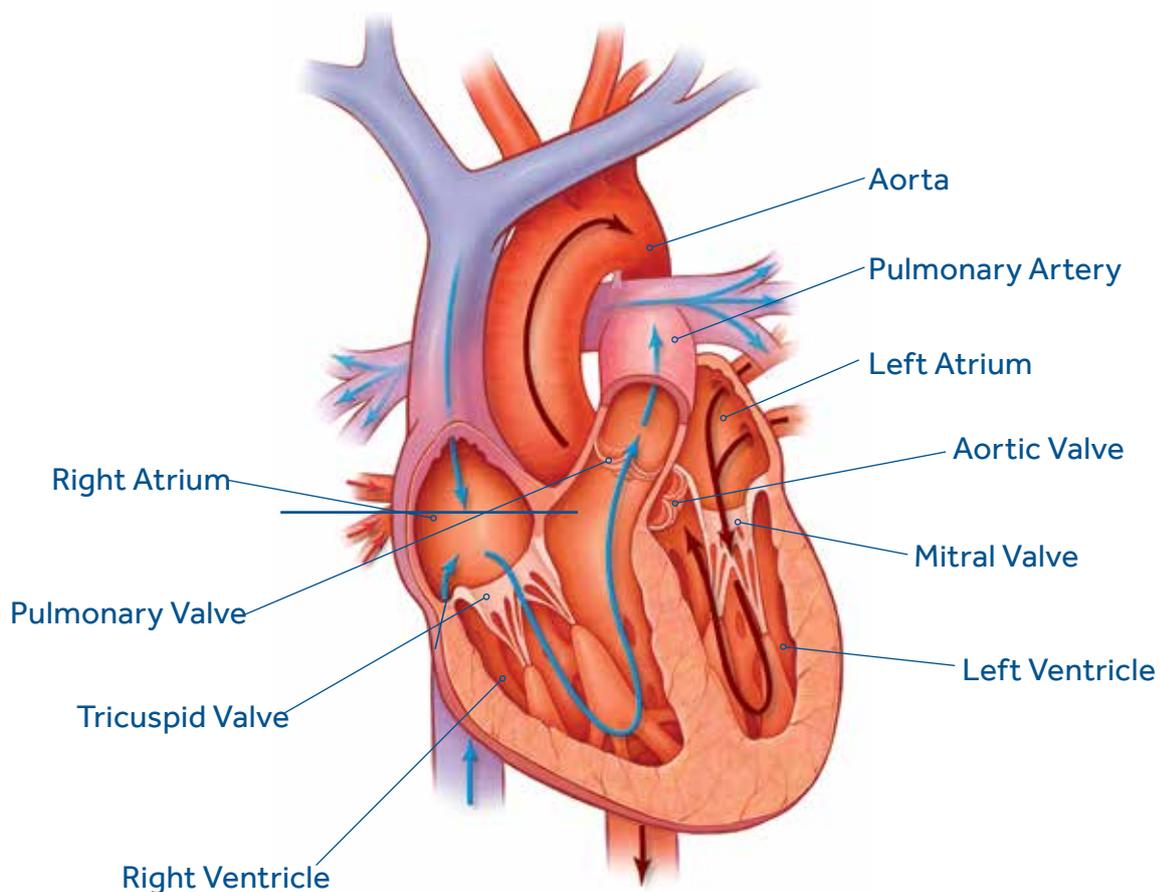
## Your Heart Valves

Heart valves are made up of tissue and this tissue forms the leaflets which open and close during the cardiac (heart) cycle allowing blood to move between the chambers. When they are functioning properly, they work with the heart to continuously pump blood during rest and during exercise. The tricuspid valve, the

pulmonary valve, and the aortic valve all have three leaflets; the mitral valve has two. The mitral valve and tricuspid valves have chords (chordae tendineae) that help control the movement of the valve leaflets. The area of the heart where valve leaflets are attached is a thicker, fibrous, tissue called the valve annulus.

In general, the flow of blood during a heart cycle follows this pathway:

**From the body » right atrium » tricuspid valve » right ventricle » pulmonary valve » lungs » left atrium » mitral valve » left ventricle » aortic valve » body**



# HEART VALVE DISEASE

Approximately five million Americans are diagnosed with heart valve disease each year. Heart valve disease can affect any one or more of the heart's four valves. When valves are damaged, this can disrupt normal blood flow through the heart.

Heart valves can develop one or both of the following conditions:

- Regurgitation or Insufficiency: The valve may not close completely
- Stenosis: The valve opening becomes narrow

## Valve Insufficiency

Sometimes the valve leaflets become damaged and fail to close completely. When this happens, some of the blood can leak backwards instead of going forward. This valve condition impairs the heart's ability to pump the necessary amount of blood to the rest of the body.

For example, if the mitral valve does not close completely, blood can pass back into the left atrium instead of moving forward through the aorta. Blood regurgitating or being forced back into the atrium can build pressure in the atrium and the lungs. This excess pressure in the lungs keeps them from working properly.



## Valve Stenosis

Over time, calcium deposits can collect around your normal valve, causing a narrowing of the valve opening. When the valve narrows, the heart doesn't pump as well, which can cause several problems. For instance, if the mitral valve is narrow, less blood is able to fill the ventricle when the left atrium contracts. This limits the amount of blood pumped out to the body.

## Diagnosis of Valve Disease

Whatever your symptoms, your healthcare professional will want to perform a series of tests to find out exactly the nature of your valve damage. Your healthcare professional will usually begin with simple tests such as listening to heartbeats and taking blood samples. By listening to the heart, cardiologists can hear the valves opening and closing and the sound of blood flowing through the valves.

A cardiologist may want to perform an echocardiogram, which involves placing a probe on the surface of your chest. It is very similar to an x-ray but without the radiation. Instead of using x-rays, it uses high-frequency sound waves (ultrasound) to take a picture of the four heart chambers and the four heart valves. The sound waves bounce back from the heart chambers and valves. This test produces a picture called an echocardiogram, which can be used by the healthcare professional to detect damage and disease.

Another technique, called Doppler Echocardiography, can estimate the amount of blood flow and indicate its direction (forward or backward). Thus, echocardiography gives the healthcare professional an accurate analysis of the extent of valve disease, which is necessary for making decisions regarding the best type of treatment.

Further advances have led to the development of probes that can be placed in the esophagus to take images of the heart. This is called Transesophageal Echocardiography (TEE) and is used if additional information is needed. TEE is also used during surgery to allow the surgeon to see the condition of your valve before the operation and after repair or replacement of your valve.

Healthcare professionals can detect a heart valve problem by talking to you about your symptoms, listening to your heart, and performing tests. If your valve is not functioning properly, you may experience any of these symptoms:

- Chest pain or tightening of your chest (called angina)
- Shortness of breath
- Inability to sleep
- General fatigue and inability to perform everyday activities
- Swollen ankles and feet or an abnormally large abdomen



Stenotic Valve



Normal Valve

# TREATMENT OF VALVE DISEASE

Your healthcare professional considers many factors in selecting the right approach to treat your valve problem. Typically, your healthcare professional will consider:

- Your age
- The presence and extent of heart or other diseases
- Your lifestyle and level of physical activity
- Whether you can tolerate daily anticoagulant medication
- Whether you are a woman of childbearing age

You are encouraged to discuss specific treatment recommendations with your healthcare professional. For some individuals, problem valves can be treated through medication. However, when medical treatment is not sufficient, your healthcare professional may recommend other techniques, including surgery, to repair or replace your valve.

## Balloon Valvuloplasty

Balloon valvuloplasty is a non-surgical procedure that is performed to open a stenotic valve by placing a balloon into the valve and inflating the balloon. A thin flexible tube (catheter) is first inserted through an artery in the groin or arm and threaded into the heart. Once the tube reaches the narrowed valve, a balloon located on the tip of the catheter is quickly inflated. The balloon presses against the narrowed valve leaflets, which separates and stretches the valve opening and allows more blood to flow through the heart. This procedure does not require open-heart surgery, which makes recovery easier.

A balloon valvuloplasty may be recommended if you have symptoms and moderate to severe stenosis.

## Valve Repair

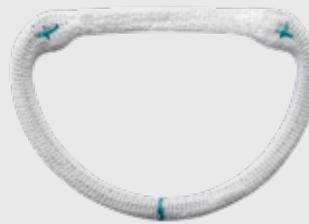
If valve repair is an option for you, the surgeon may perform an annuloplasty procedure. During an annuloplasty, the surgeon may also need to repair the leaflet tissue, remove calcium deposits or repair the tough chords that control movement of the mitral valve leaflets. These cords are also called chordae tendineae. In most cases, repair is more successful if there is limited damage to certain areas of the valve.

For heart valve repair, one of the following procedures is done:

- Reshaping of the valve by removing excess valve tissue
- Attaching the valve to its chords
- Adding support to the valve annulus by adding tissue or by sewing a band or ring around the outside of the valve

## Valve Repair with an Annuloplasty Ring or Band

An annuloplasty ring or band is made up of durable plastic, metal, and fabric. It may be rigid, semi-rigid or flexible. Rings and bands are designed to maintain the natural shape, motion and flexibility of your annulus. The rings or bands may also contain a radiopaque marker that makes it possible for the healthcare professional to see them on x-ray.



Annuloplasty Ring



Annuloplasty Band

## Valve repair procedures may include, but are not limited to the following risks:

- Blood clot formation on or around the valve. These blood clots may break loose and travel in the bloodstream (thromboembolism/ thrombosis)
- Damage to red blood cells (hemolysis)
- Any problem with the ring or band that causes narrowing of the valve opening (stenosis)
- Small amounts of blood leaking through the valve opening even after it closes
- Abnormal heart rhythms
- Inflammation of the lining of the heart (endocarditis)
- Anticoagulant-related bleeding or hemorrhage

**This list is not inclusive of all risks. Talk to your physician regarding more information about valve repair surgery.**

# VALVE REPLACEMENT

## Valve Replacement with Prosthetic Valves

If you're not a good candidate for valve repair, your surgeon may recommend valve replacement. In that case, you'll receive an artificial (prosthetic) valve. A prosthetic valve can be either a tissue or mechanical valve. You and your healthcare professional should discuss the various valve replacement options. Valve replacement surgery is a safe and effective treatment for diseased or problem valves.

## Types of Prosthetic Valves

After carefully diagnosing your valve problem, your healthcare professional will talk to you about the appropriate type of prosthetic valve. Two main types of prosthetic valves are used in surgical replacement procedures:

- Tissue valves
- Mechanical valves

Your healthcare professional will make a decision on which valve is best for you based on several things, including your unique life experience and medical history.





Stented Tissue Valve



Stentless Tissue Valve



Mechanical Valve

## Tissue (Bioprosthetic) Valves

All tissue valves are made from animal tissue that is specially treated to help them last longer.

### Stented Tissue Valves

Stented tissue valves are very commonly used to replace a damaged valve. A cloth-covered plastic or metal frame, called a stent, lies underneath and supports the tissue.

### Stentless Tissue Valves

Of the different replacement valve types, stentless tissue valves are more similar to the heart's natural valves.

## Mechanical Valves

Mechanical valves are made from well-tested materials, such as titanium or carbon and are known for being durable and non-toxic.

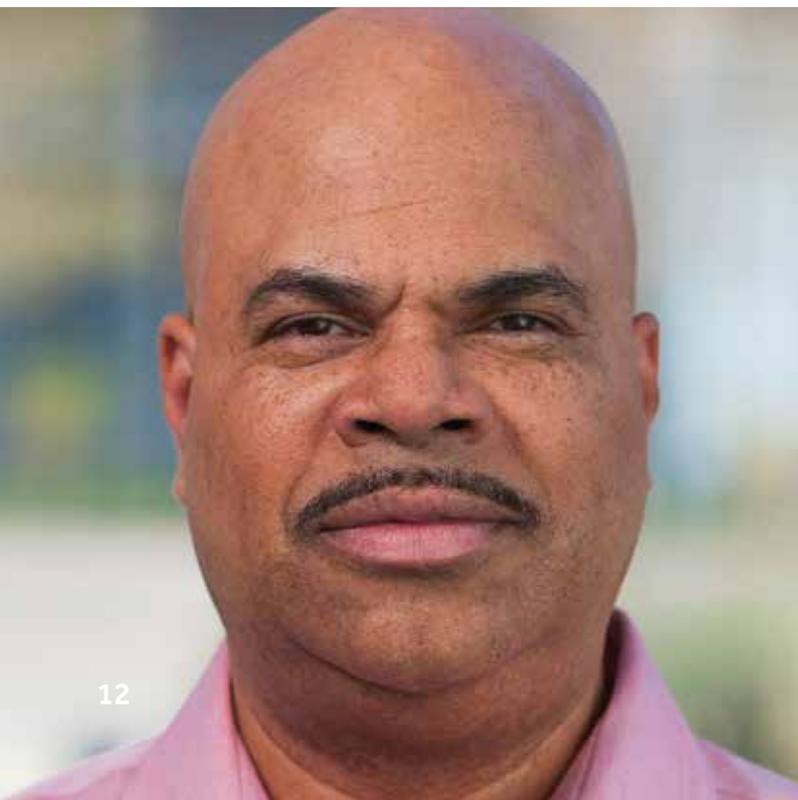
Patients with a mechanical valve must take daily blood thinning medication, called anticoagulants, throughout their lives to prevent the formation of blood clots.

# TISSUE AND MECHANICAL VALVE RISKS

Valve replacement surgery can include the following risks:

- Angina
- Heart failure
- Death
- Abnormal heart beat (cardiac arrhythmia and dysrhythmia)
- Blood leaking around the outside of the prosthetic valve (paravalvular leak) or any problem with the valve that causes leaking of blood after the valve has closed (transvalvular leak)
- Damage to red blood cells (hemolysis) that can result in anemia
- Inflammation of the lining of the heart (endocarditis)
- Any problem with the prosthetic valve that causes narrowing of the valve opening (stenosis)
- Blood clots that develop in the heart or on the replacement valve. These clots may break loose and travel through the bloodstream (thromboembolism). This problem may cause a stroke or heart attack
- Obstruction of blood circulation to the heart resulting in damage to the heart tissue (myocardial infarction)
- Failure of the valve to open and close properly

**This list is not inclusive of all risks. Talk to your physician regarding more information about valve repair surgery.**



# YOUR HEART VALVE SURGERY

Valve repair or replacement surgeries have been performed safely and effectively for many years. Advances in surgical techniques and new products have led to the development of minimally invasive cardiac surgery. Minimally invasive valve surgery involves a smaller incision than the one the surgeon makes in the traditional surgical approach. A smaller incision may lead to a reduced chance of infection,

less pain during recovery, and is often more cosmetically appealing because it leaves a smaller scar. Nevertheless, minimally invasive surgery is not for everyone. Feel free to discuss with your surgeon which option might be best for you.



# ABOUT THE OPERATION

## Before the Surgery

It is natural to feel anxious and concerned about heart valve surgery. Many patients who have had heart valve surgery have said that their fears eased when they learned more about the operation by asking questions and talking with the surgical team. These patients also emphasized that a positive attitude throughout the surgical experience helped their recovery.

The healthcare professional and staff will give you specific instructions before surgery. Some preparations include:

- Talking with different members of the surgical team, such as the anesthesiologist, surgeon, cardiologist, respiratory therapist, and nurses
- Discussing details of the operation with family members
- Visiting the intensive care unit (ICU) where you may be sent for postoperative recovery
- Fasting eight hours prior to the operation

## During the Surgery

If your valve is being repaired or replaced, the surgical team will prepare you for the surgery and give you medication that will put you to sleep. The operation varies from patient to patient, lasting a minimum of two hours and often longer.

Your surgery will be performed while the function of your heart is taken over by a heart lung machine (called CPB, for cardiopulmonary bypass). As blood enters the CPB system, it exchanges carbon dioxide for oxygen (just as your lungs would), by using tubing that acts as your veins and arteries. Your blood is also filtered, and cooled or heated to keep your body at the proper temperature.

During the operation, the surgeon will remove any tissue and calcium deposits that are interfering with the normal function of the valve. If your surgeon is doing a repair, the annuloplasty ring or band will be sewn onto the ring of tissue where your own valve is located. If your surgeon is doing a replacement, your damaged valve may be completely removed. Then, the new valve will be sewn into the space where your own valve was removed. The replacement valve will perform the function of your damaged valve.

After the surgeon ensures your valve is working properly, blood flow will be restored to your heart and the incisions will be closed.

## After the Surgery

Immediately after the operation, you'll probably feel drowsy. You will spend the next few hours, or possibly the night, in the ICU. There, the staff will monitor your heart rate, temperature, blood pressure and other important body signs. You may be uncomfortable because of the monitoring equipment. Nurses will frequently assist you in turning, coughing, and deep breathing during this period to promote a healthy recovery. Family members and close friends are usually welcome to visit you.

When intensive care monitoring is no longer needed, you will be moved to a step-down unit and eventually to a routine-care hospital floor. A patient may be in the hospital from as little as one day and up to seven days. Most patients are often surprised at how soon they feel better and how quickly they can resume some normal daily activities such as walking, eating and bathing.

After you're released from the hospital, you will need to see your healthcare professional periodically for follow-up visits. During these follow-up visits, you may need an x-ray or echocardiography, which can reveal any malfunction or leaking of the valve.

Patients taking anticoagulants may need to undergo regular blood tests to monitor their medication dosage. These tests usually require going to the hospital, healthcare professional's office or laboratory on a monthly, bimonthly or weekly basis. Some prescription and over-the-counter medications can affect coagulation or blood clotting. Patients should inform their healthcare professional about any medications they are taking.

It is also important for patients with an artificial heart valve to carry a form of identification (card, necklace, bracelet) in case of emergency.

**For any questions around anticoagulation therapy after your procedure please contact your healthcare professional.**

Living with a prosthetic heart valve may cause a patient to think of dramatically adjusting his or her lifestyle. But in fact, most patients often feel physically much better after valve surgery because they are no longer hindered by the symptoms of their valve disease. Patients usually find that symptoms improve gradually in the first few weeks post-operatively. Many patients notice the most significant changes several weeks and months into their recovery.

## Post-operative Considerations

To help you recover as soon as possible, your healthcare professional will prescribe an exercise program and may recommend a special diet. With your healthcare professional's help, you can set realistic goals for increasing your physical activity. It is important that you have specific guidance for resuming familiar activities like household tasks, exercise, driving and returning to work.

Often patients experience some unexpected feelings after the operation, some of which may include:

- Elation, lasting a few days
- Depression, lasting the first few weeks
- Loss of appetite, lasting up to a month
- Disturbed sleep, lasting a few weeks
- Disturbed vision, lasting a few weeks (the eyeballs absorb water temporarily, affecting vision and making eyeglasses inadequate)
- Swollen legs, lasting a few weeks

Remember, these reactions are normal and usually go away within a few weeks.

## Long-term Considerations

It's important to remember that heart valve surgery is not a cure for heart disease. Heart valve surgery only replaces or repairs valves that have been damaged by heart disease. Therefore follow-up care and maintaining a healthy lifestyle are two very important considerations for good health.

## Follow-up Care

Your surgeon may schedule your first outpatient exam around three to four weeks after you have been discharged from the hospital and typically will include the following tests:

- Complete history and physical examination
- ECG
- Chest x-ray
- Echocardiography
- Blood tests
- Urinalysis
- INR check

Your surgeon may also order additional tests that will help him or her assess your heart function during this visit. How often you will need to visit your healthcare professional after your initial examination depends on your individual needs and may be based on several factors such as; complications that occurred during or right after surgery, the seriousness of your heart disease, how well your left ventricle is pumping blood, the progression of any other heart disease (such as heart failure and pulmonary hypertension), and the presence of other non-heart related diseases.

If you're not having any complications and are considered to be in good health by your cardiologist, then you may need to visit your healthcare professional once each year. A complete history and a thorough physical examination should be done at this time. Other tests that may be completed during this visit include:

- ECG
- Chest x-ray
- Echocardiography
- Blood tests

If your condition changes, then your healthcare professional may schedule you to have follow-up visits more frequently than once per year. Again, all of this will be based on your individual needs.

## Maintaining a Healthy Lifestyle

- Be sure to take all of your medications exactly as your healthcare professional prescribes. Do not stop taking medications or skip a dose unless your healthcare professional tells you to.
- Tell your dentist or other healthcare professionals caring for you that you have had valve surgery. For example, antibiotics should be given to you before and after any dental work, including routine cleaning. During dental work, as in other surgical procedures, bacteria can be released into the bloodstream and lodge on the heart's prosthetic valve, causing an infection. Antibiotics before and after surgical procedures prevent possible infection.

- Sometimes valve patients retain water, even after successful surgery. They may gain weight, even though they are not overeating. Tell your healthcare professional about dramatic, unexplained weight gain.
- A low-salt diet is often recommended for valve patients to minimize the body's retention of fluid
- Be sure to tell your healthcare professional if you're experiencing pain or other symptoms
- If you have a tissue valve, talk to your healthcare professional if you take calcium pills or are on a diet high in calcium
- High calcium intake may reduce the life of your tissue valve

## Congenital Heart Disease

Congenital heart disease (CHD) is the name given to any heart defect or malformation that is present at birth. Most types of CHD involve a deformity within the heart or the large blood vessels connected to the heart, such as the aorta and pulmonary artery. There are about 35 different types of congenital heart defects.

- Mitral valve problems may be the result of damage caused by rheumatic fever and infections because of heart muscle problems. Or they may be caused by problems that are present from birth.
- Aortic valve disease may be congenital, or it may be caused by rheumatic fever or infections.

In the past, when rheumatic fever was more common, it caused most valve problems. Today, as the frequency of rheumatic fever has declined, most valve defects are the result of other causes.

In some patients, the defect may be mild and unnoticed at birth, then diagnosed later in life. In other children, the symptoms caused by the defect are so severe that the healthcare professional can make a diagnosis either before birth or around the perinatal (newborn) period. By using advanced medical technology now available for diagnosis and treatment, many babies born with congenital heart disease can go on to lead healthy, normal lives.

## Types of Heart Defects

- Defects in the wall (septum) between the atria or ventricles, which allow mixing of blood between the right and left sides of the heart
- Narrowing (stenosis) or complete closure of one of the four valves, which impedes or totally obstructs blood flow
- Leakage (insufficiency or regurgitation) of one of the four valves, which allows blood to leak back into the chamber from which it came
- Abnormal connections among the veins, heart and great arteries (aorta and pulmonary). These abnormal connections can allow unoxygenated (blue) blood to flow to the body instead of the lungs, or to allow oxygenated (red) blood to flow to the lungs instead of the body.
- Narrowing of either the veins leading into the heart, or the great arteries leaving the heart. The narrowing decreases blood flow.

## Heart Failure Symptoms in Infants

The healthcare professional may become suspicious about the presence of congenital heart disease if the child has one or more of the symptoms listed below, is not growing normally or has a heart murmur.

- Breathing trouble
- Poor feeding
- Poor growth
- Excessive sweating
- Low blood pressure
- Heart failure can look like other problems such as colic, pneumonia, or other respiratory infections

## Testing for Heart Valve Disease

Healthcare professionals will order tests to determine the nature of the problem.

The most common tests include:

- **Echocardiography:** This test uses sound waves to view the structures and functions of the heart, including the septum (the wall between the left and right sides of the heart). A moving image of the patient's beating heart is displayed on a video screen, which allows a healthcare professional to study the heart's thickness, size and function. The image also shows the motion and structure of the four heart valves, revealing any potential leakage or narrowing. During this test, a Doppler ultrasound may be done to evaluate blood flow.
- **Chest x-ray:** This test takes a picture of the size of the heart
- **Pulse oximeter:** This sensing device is placed on the tip of the finger or earlobe. It reads the amount of oxygen in the blood.
- **XMR:** XMR is a new diagnostic technique that combines magnetic resonance imaging (MRI) and x-rays to create a three-dimensional image of the heart. It helps the healthcare professional measure blood flow and tell how the heart is beating.

- **Cardiac catheterization:** During this procedure, the healthcare professional threads a thin tube, called a catheter, into blood vessels in the arm or leg, and passes the tube all the way up into the heart. The catheter measures the pressure in the different heart chambers and can detect mixing of blood between the two sides of the heart. Pictures of the heart, called angiograms, can also be taken by injecting a special dye through the catheters and into the heart and great arteries.

## Treating Heart Valve Disease in Young Children

Surgery for congenital heart disease is intended to relieve or reduce the intensity of uncomfortable symptoms. It may not produce a cure for the underlying disease. Ongoing care is invariably necessary and multiple operations are not uncommon.

# CONCLUSION

Today, with the ever-expanding realm of medical knowledge and technology available, children with a wide range of congenital heart defects are receiving treatment that can enable them to live long, healthy, active and productive lives. Heart valve surgery and modern prosthetic valves have become an established and effective treatment for valve disease in children and adults. Without this treatment, patients would lead severely limited lives. Patients can now lead fuller, more active lives because of the surgical techniques and products available for valve repair and replacement surgery. And fortunately, many resources are available for families and patients who want to know more about living with a new heart valve.



## Questions to ask your healthcare professional:

- What are my specific activity limitations?
- When can I return to work?
- What medications are given and what do they do?
- Are blood transfusions necessary?
- How is the blood tested for presence of disease?

## How long will my valve last?

Artificial valves in some patients have lasted as long as 25 years without problems. So, it is possible that your new artificial valve could last for the rest of your life. But in some cases, a valve has to be replaced within a matter of years or months, for any number of reasons.

Mechanical valves are more resistant to the constant demands on them. Your new valve must work each time the heart beats, so it must open and close at least 100,000 times each day! The materials used in mechanical valves stand up well to this wear and tear and tend to last longer.

Bioprosthetic or tissue valves don't tend to last as long as mechanical valves, becoming torn and leaky over time. They usually have to be replaced after about 10-15 years, or more often in younger patients or children who may have outgrown their valve.

## How will I know if my prosthetic valve isn't working well?

Prosthetic (artificial) valves can wear out in much the same way a natural valves does. If your prosthetic valve isn't working well, you may feel the same symptoms you experienced when your natural valve wasn't working well, different symptoms than before, or no symptoms at all. This is one of the many reasons why it is important that you follow your healthcare professional's recommendations, have routine follow-up care, and maintain a healthy lifestyle. As with all heart disease and natural valves, prevention and early detection of any problem with your prosthetic valve is important.

## Is it safe to have an x-ray after valve repair or replacement?

Most prosthetic heart valves and valve repair products are safe with x-ray examinations. However, please check with the manufacturer of your product for specific information about your product.

## Is it safe to go through airport security after valve repair or replacement?

Airport security systems generally have no adverse effects on most valves or valve repair products; the device should not activate alarms. We recommend that you carry your identification card with you when you travel. However, please check with the manufacturer of your product for specific information about your product.

## What about cell phones, electric toothbrushes and magnets?

These items generally will not cause problems with most valve or valve repair products. However, please check with the manufacturer of your product for specific information about your product.

## **Angina**

Chest pain caused by a lack of oxygen to the heart.

## **Angiogram or Angiograph**

A picture of blood vessels taken during an angiography exam.

## **Angiography**

An exam during which the specialist takes an x-ray picture of blood vessels.

## **Annuloplasty**

Surgical techniques used to support or repair a patient's valve.

## **Annulus**

The outer border or limit of the normal valve.

## **Anticoagulant**

A substance or medication that prevents blood clotting.

## **Aortic Valve**

The aortic valve controls blood flow out of the left ventricle into the aorta (the major blood vessel leaving the heart).

## **Atrium**

A hollow space, or chamber, in your heart that acts as a passage for blood flow. Human beings normally have a left and right atrium.

## **Balloon Dilatation**

A non-surgical procedure that is performed to open the stenotic valves by introducing a catheter through the valve and inflating the balloon, a technique similar to PTCA. Significant long-term improvement is achieved in patients with stenosis of the pulmonary and mitral valves. For patients with stenosis of the aortic valve, it provides only a limited relief and is used as a palliative procedure if surgery is not possible.

## **Bioprosthesis**

An artificial valve that contains biological (natural) material (often from a pig or cow).

## **Blood Pressure**

A measurement of how hard your heart has to work to pump the blood through your body. It is measured in millimeters (mm) of mercury (Hg), and is represented by two numbers, such as 135 over 85. The higher number is your systolic blood pressure and the lower number is your diastolic blood pressure.

## **Capillaries**

Tiny blood vessels that transport oxygen and other nutrients to the tissue.

## **Cardiac**

Pertaining to the heart.

## **Cardiopulmonary Bypass (CPB)**

A machine used during heart surgery that takes over the function of your heart is a heart lung machine. As blood enters the CPB system, it exchanges carbon dioxide for oxygen (just as your lungs would), by using tubing that acts as your veins and arteries. Your blood is also filtered, and cooled or heated to keep your body at the proper temperature.

## **Catheter**

A tube of flexible material that is used to withdraw or transfer fluid.

## **Chords, Chordae Tendineae**

The cords that connect each cusp of the tricuspid and mitral valves to muscles in the heart ventricles.

## **Congenital Heart Disease (CHD)**

A defect or disease that exists before birth. These conditions are present at birth.

## **Diastolic Blood Pressure**

The lower number in your blood pressure reading. This is the pressure in your blood vessels when your heart is resting (between beats).

## **Diuretics**

A group of medicines that help remove extra water from the body by stimulating the kidneys to get rid of more urine.

## **Echocardiogram**

A picture produced during an echocardiography exam. It records the position and motion of the heart walls and the internal structures of the heart.

## **Echocardiography**

A test that uses a machine to send beams of ultrasonic waves through the chest wall. This test produces a picture of the heart and its internal structures. Types of echocardiography are: Doppler and Transesophageal (TTE).

### **Electrocardiogram (EKG or ECG)**

An electrocardiogram is a picture that shows the electrical impulses that control the pumping action of the heart. A healthcare professional may order an ECG to gain insight into a suspected heart problem.

### **Insufficiency**

Defective functioning of the aortic or mitral valves with incomplete closing of the leaflets of the valve, causing leaking back of the blood.

### **International Normalization Ratio (INR)**

A specific number, gained from performing a blood test, which helps your healthcare professional and other healthcare professionals to evaluate and monitor the effectiveness of your anticoagulant medication.

### **Leaflets**

The tissue flaps in a normal heart valve that open and close, allowing blood to move between your heart's four chambers.

### **Mediastinum**

The region between the lungs where the heart and great vessels are located.

### **Mitral Valve**

The mitral valve controls blood flow from the left atrium into the left ventricle.

### **Mitral Valve Prolapse**

The mitral valve leaflets bulge backwards into the left atrium.

### **Prosthetic Valve**

A substitute for the patient's own valve. A prosthetic valve can be tissue or mechanical.

### **Prothrombin Time**

A test that measures how much your blood's clotting system is affected by the anticoagulant medication. The test gives the healthcare professional a number, which is called an International Normalization Ratio, or the INR.

### **Pulmonary Valve**

The pulmonary valve controls blood flow out of the right ventricle into the pulmonary artery (into the lungs).

### **Regurgitation**

Flow in the opposite direction from normal.

### **Septum**

A dividing wall in the heart.

### **Stenosis**

Stenosis of the valve occurs when the valve becomes narrowed and tight, a condition that limits the blood flow through the valve and causes the blood to back up as if behind a dam.

### **Stent**

A plastic or metal frame that lies underneath and supports the tissue of a stented tissue valve.

### **Stentless**

A valve without a stent.

### **Stroke**

Damage to part of the brain caused by an interruption of the blood supply or leakage of blood through the walls of the blood vessels. Sensation, movement, or function controlled by the damaged area of the brain is impaired. Strokes can be fatal.

### **Systolic Blood Pressure**

The higher number in your blood pressure reading. It is the pressure in your blood vessels when your heart is beating.

### **Tricuspid Valve**

The tricuspid valve controls blood flow from the right atrium into the right ventricle.

### **Ventricle**

A hollow space, or chamber, in your heart that acts as a passage for blood flow. Human beings normally have a left and right ventricle.

#### General References

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