

## Cardiac Surgery: Ross Procedure for Heart Valve Disease

*If you have  
any questions,  
please ask  
your physician  
or nurse.*

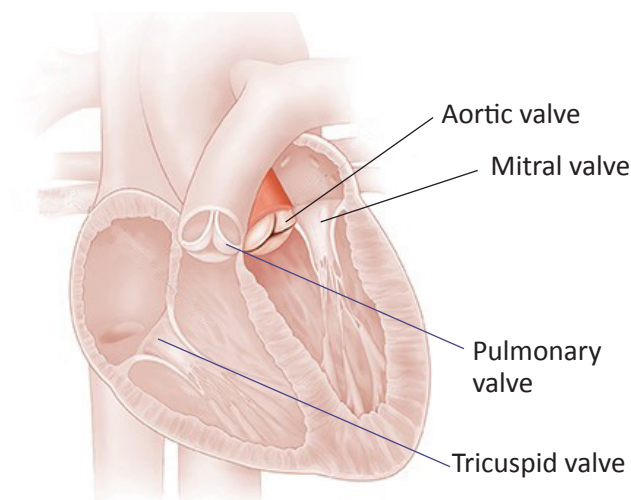
Your healthcare team may have discussed the need for heart valve surgery with you. To better understand these discussions and what to expect, this brochure will explain how the heart valves work and the types of valve disease. You will learn about the Ross procedure for valve disease.

### Understanding valve disease

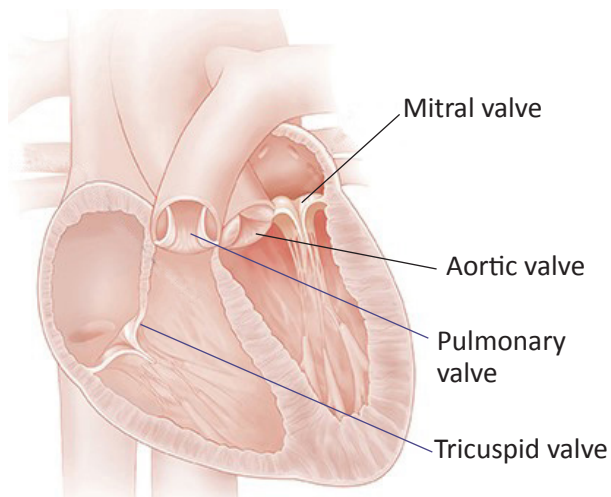
To understand heart valve disease, it is helpful to understand how the valves in the heart work. There are 4 heart valves: mitral, tricuspid, aortic and pulmonary. Valves have either 2 or 3 leaflets (flaps). Each valve opens and closes about 50 million times a year, up to 4 billion times in a typical lifetime. The valves keep the blood moving forward through the heart and out to the rest of the body.

In a front view of the heart, when the mitral valve on the left side of the heart and the tricuspid valve on the right side of the heart open (Figure 1), blood flows into the left and right ventricles (lower heart chambers). The aortic and pulmonary valves are closed so the ventricles can fill with blood.

**Figure 1. Closed aortic and pulmonary valves**



**Figure 2. Open aortic and pulmonary valves**



When the mitral and tricuspid valves close, the aortic and pulmonary valves open (Figure 2). When the pulmonary valve opens, the heart pumps blood into the blood vessels of the lungs. This allows the blood to fill with oxygen before continuing its journey to the left ventricle. When the aortic valve opens, the heart pumps blood out to the rest of the body.

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In heart valve disease, the valve leaflets do not open or close properly. This affects the blood flow. Two common heart valve problems are valve regurgitation (insufficiency or leaking) and valve stenosis (narrowing or obstruction). Both regurgitation and stenosis cause the heart to work harder. This may then lead to heart failure. Each of these conditions is briefly explained below.

### ***Valve regurgitation***

Regurgitation happens when the valve does not close tightly. This causes blood to flow backward instead of forward.

This happens at the same time the heart is trying to pump the blood out into the body.

### ***Valve stenosis***

Stenosis happens when the valve does not fully open or close. This limits the amount of blood that flows through.

### ***Causes of valve disease***

Valve disease may have many different causes, such as:

- Degenerative disease
- Calcium buildup on and around the valve leaflets
- Bicuspid aortic disease (present at birth)
- Genetic disorders (born with valve disease)
- Heart damage
- Cardiomyopathy (enlarged heart)
- Rheumatic heart disease
- Endocarditis (infection)
- Heart tumors

Your physician will talk with you about the specific cause to help you understand your treatment options.

### ***Symptoms of valve disease***

Symptoms of valve disease may happen suddenly or develop slowly. They may include:

- Fatigue
- Chest pain
- Racing or pounding heartbeat, or skipping a beat
- Feeling dizzy or faint
- Swelling in the ankles and feet
- Shortness of breath (may get worse during activity or when lying down)

For more information about valve disease and the Northwestern Medicine Center for Heart Valve Disease, please go to **[heartvalvedisease.nm.org](http://heartvalvedisease.nm.org)**.

### ***Assessment of patients with valve disease***

Before planning surgery, you will need to come to the Center for Heart Valve Disease. Here, you will see physicians and nurses who are experts in this field. They will talk with you in detail about your medical history, your valve disease and any symptoms you may be having. You will also have an in-depth physical exam that focuses on heart murmurs and other signs of valve stenosis or regurgitation.

Your physician may also want to see other test results that show how well your heart and valves function. These include:

- Echocardiogram (echo). An echo is an ultrasound of your heart. It is the most common test used to evaluate heart valve disease. It shows real-time heart and valve function. Often, an echo will be done before and after an exercise test to show how the heart responds to stress.
- Transesophageal echo (TEE). In some cases, this is needed for an even clearer look at your heart valves.
- CT scan. This may be needed to provide a detailed 3-dimensional (3D) image of the heart.
- MRI scan. Sometimes used instead of a CT scan, the MRI may be needed to provide a more detailed look at how well the heart chambers function and how much valve regurgitation exists.
- Cardiac catheterization. Finally, this may be needed to precisely define any blockages in your coronary arteries and to measure the pressures within the heart. For this test, the physician inserts a small catheter into the wrist or groin, and threads it through a vein and up to the heart.

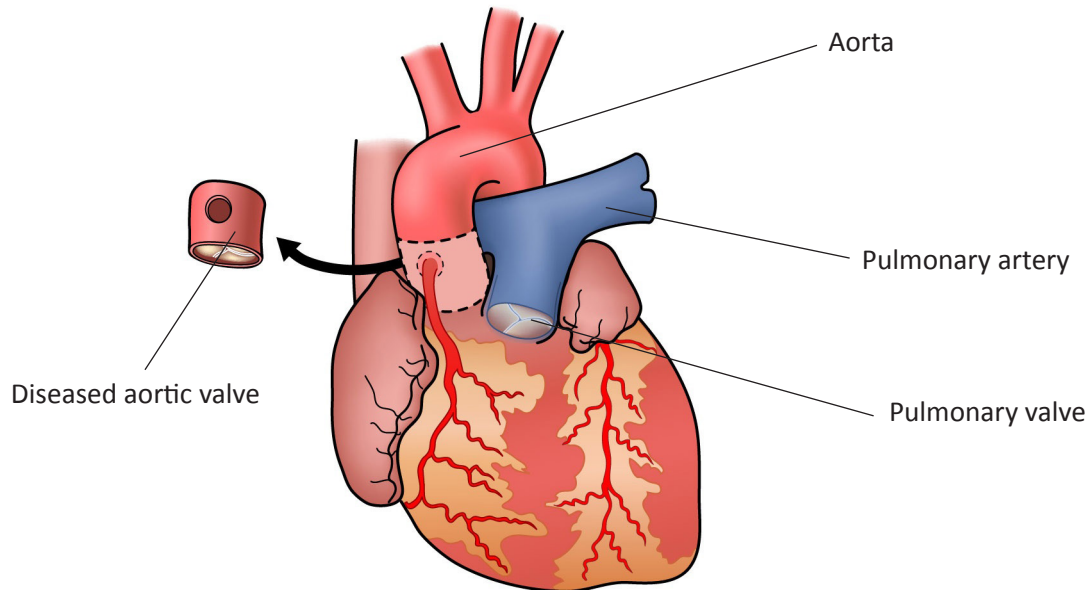
For more information on testing, please refer to the “Pre-surgery evaluation” section of the Northwestern Memorial Hospital brochure *Heart Surgery: A Patient Guide*.

## Ross procedure for valve disease

The Ross procedure is usually done on people younger than age 50 who want to avoid taking long-term anticoagulant medications after surgery. It is a type of cardiac valve surgery in which the diseased aortic valve is replaced with the person's own pulmonary valve (pulmonary autograft). The person's pulmonary valve is then replaced with a human (cadaver) pulmonary valve (pulmonary allograft).

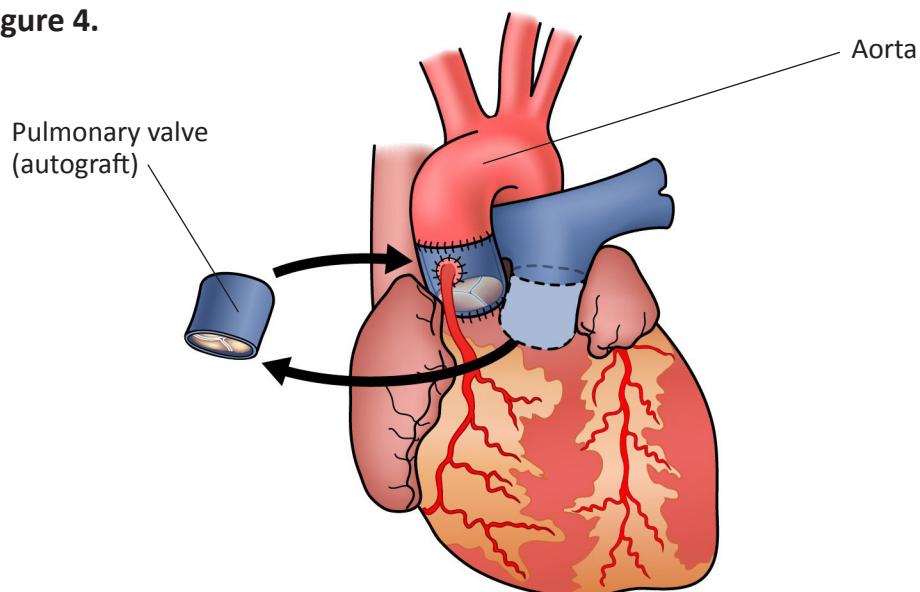
The physician carefully opens the aorta and pulmonary artery and inspects the aortic and pulmonary valves. They remove the diseased aortic valve (Figure 3).

**Figure 3.**



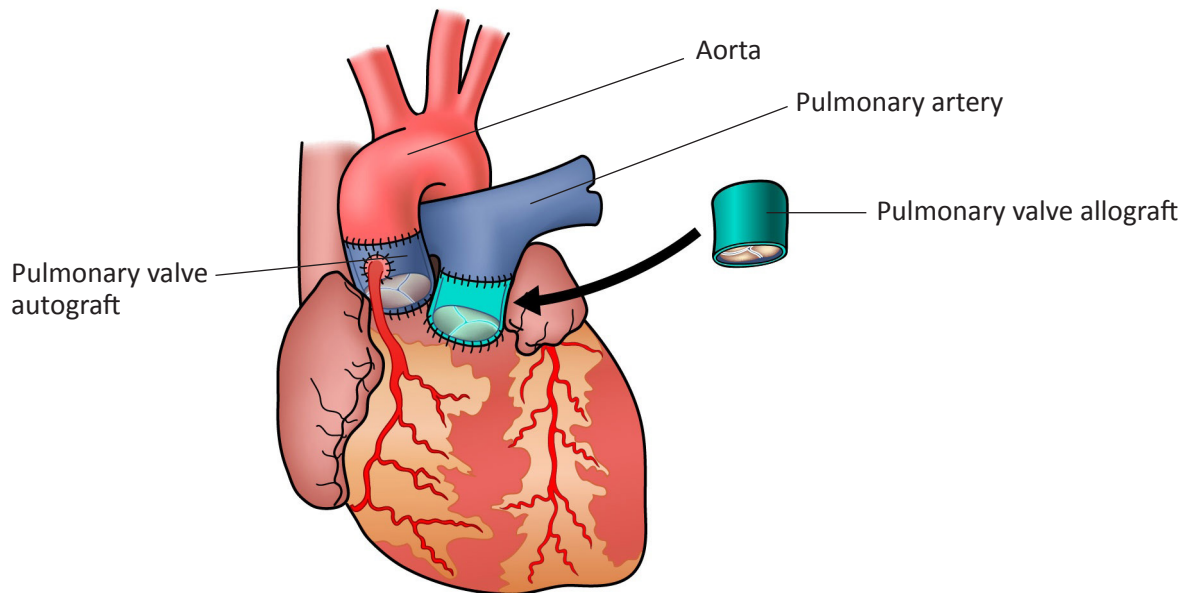
Then, they remove the pulmonary valve (autograft) and place it in the aortic position (Figure 4). They reattach the coronary arteries.

**Figure 4.**



The physician attaches a pulmonary allograft (donor graft) to the right ventricle outflow tract. They attach the aorta to the autograft and attach the pulmonary artery to the allograft (Figure 5).

**Figure 5.**



### ***Valve surgery risks***

Every surgery carries some risk. The amount of risk depends on factors such as your age and overall health. Risks may include bleeding, infection, and lung or heart problems. Atrial fibrillation (a type of irregular heart rhythm), or AFib, is 1 example of a heart problem that may happen after surgery. In some cases, a you may need a pacemaker or another procedure. In rare cases, patients can have a stroke or kidney failure. Your surgeon will talk with you about your individual risks.

### **After surgery**

During the first 6 to 12 months after surgery, it is very important to keep your systolic blood pressure (top number) below 115 mmHg. This will allow the pulmonary autograft to heal well. You must also take anti-inflammatory medication as prescribed by your physician during the first 6 months after surgery. This medication will help prevent inflammation of the pulmonary allograft.

### ***Follow-up care***

**Follow-up care is required after all valve repair and valve replacements.**

Please read the Northwestern Memorial Hospital home care brochure *Heart Surgery: Care After Leaving the Hospital* to completely understand all aspects of follow-up care. Below are a few key points.

## ***Dental/surgical procedures***

### ***To help prevent infection to your heart valve:***

- You should not have any dental procedures for 12 weeks after valve surgery.
- You will always need to take antibiotics before dental or surgical procedures in the future.
- Before any dental or surgical procedures, let all medical professionals who care for you know that you have had heart valve surgery.
- Tell your dentist that your heart surgeon suggests following the *American College of Cardiology/American Heart Association Valvular Heart Disease Guidelines*.

**Appendix A of the *Heart Surgery: Care After Leaving the Hospital* brochure provides more information on long-term follow-up care after heart valve surgery.**

## **Bicuspid aortic valve**

If you have a bicuspid aortic valve (BAV), please read the following. It is important to understand the nature of this disease and how it may affect you and your family.

The aortic valve controls the flow of blood from the heart out to the body. Normally, the aortic valve has 3 leaflets that keep blood moving in 1 direction. With a BAV, 2 of the 3 leaflets of the aortic valve fuse together before birth. This creates a 2-leaflet valve, instead of the normal 3-leaflet valve.

A BAV also affects the thoracic aorta, the largest artery in the body that carries blood from the heart to the rest of the body.

A heart with a BAV may work well for a long time without causing problems. However, many people **will** eventually have complications. Then, they will need surgery either to fix the aortic valve, the thoracic aorta or both.

A BAV is one of the most common congenital (present at birth) heart defects. It is at least 2 times as likely to happen in men as in women. A BAV may be inherited in families.

## **Family screening**

If you have a BAV, your family members may have a BAV, as well. This makes family screening very important because most people with a BAV have no symptoms until they begin to have complications. Close family members (parents, siblings, children) should have an echocardiogram to see if they have a BAV. An echocardiogram is a test that uses ultrasound waves to get real-time images of the heart and heart valve function.

For more information on the Northwestern Medicine BAV Program, go to **bav.nm.org**. **For more information on family screening or to make an appointment, please contact our BAV nurse coordinator at bav\_rn@nm.org or call 312.664.3278 (TTY: 711).**