

BLUHM CARDIOVASCULAR INSTITUTE

Surgical Instructions

Heart Valve Surgery

Valve Repair or Replacement



To our patients:

The Bluhm Cardiovascular Institute of Northwestern Memorial Hospital is a world-class heart and vascular program that offers comprehensive services and state-of-the-art surgical treatments in all areas of cardiovascular care. Our Center for Heart Valve Disease offers a multidisciplinary approach to the diagnosis and treatment of patients with heart valve disease. Patients benefit from the most advanced medical and surgical techniques based on the latest research findings.

The medical staff includes cardiologists who are internationally recognized for their research, teaching and expertise in the care of patients with heart valve disease. Cardiac surgeons who are a part of our team are renowned for their expertise and their contributions to the field include extensive experience in valve repair and replacement as well as the pioneering of advanced surgical techniques and the development of a device widely used in the surgical repair of leaking mitral valves.

This booklet has been developed to answer your basic questions and provide information about heart valve disease including symptoms, causes, diagnostic tests and treatments. It describes valve repair and valve replacement, how these procedures are performed and how to prepare for surgery.

At the Bluhm Cardiovascular Institute, we are dedicated to ensuring that you and your family have the best possible experience and that you thoroughly understand your care plan. Please contact your physician or nurse practitioner if you have additional questions or concerns.

Sincerely,

Bluhm Cardiovascular Institute Team

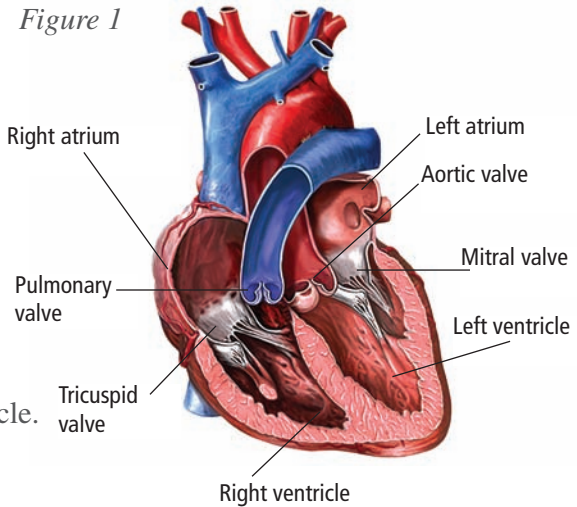
What You Need to Know About Heart Valve Surgery: Repair or Replacement

This booklet has been developed to help answer the questions you may have about your upcoming heart valve surgery. It will guide you through the process for heart valve repair or replacement including preparation for surgery and follow-up care after surgery.

The Heart

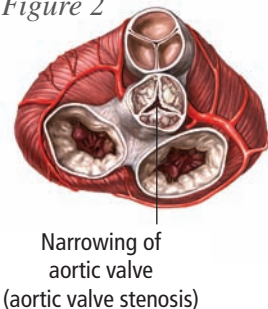
The heart (see Figure 1) is a pump with four chambers. The two upper chambers are known as the right atrium and the left atrium. The two lower chambers are called the right ventricle and left ventricle.

Figure 1



In addition, four valves in the heart allow the blood to flow in only one direction. The **mitral** and **tricuspid** valves control the flow of blood from the upper (atria) to the lower (ventricle) chambers. The **aortic** and **pulmonary** valves control the flow of blood out of the lower chambers to the body and lungs, respectively. The opening and closing of the heart valves produces the sound of the heartbeat.

Figure 2



Valve Disease

Valve disease occurs most often when heart valves are too tight, when they leak, or both.

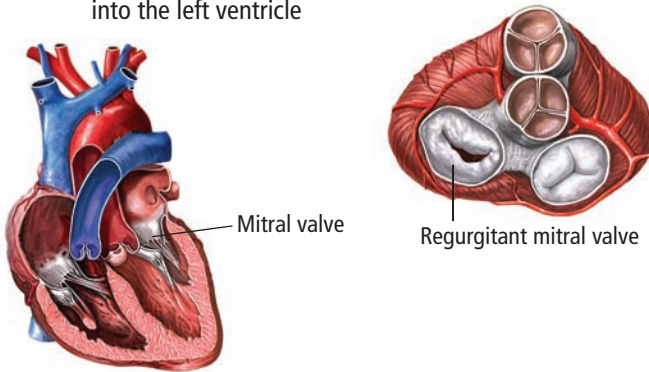
- **Stenotic valves** (see Figure 2) are too tight and they restrict blood flow. Over time the heart weakens as it struggles to get enough blood through a smaller valve opening.

- **Regurgitant** or incompetent valves (*see Figure 3*) leak because they do not close completely. This causes the blood to flow backwards and increases stress on the heart.

Over time, valve disease can cause the heart to become less efficient. As a result, it enlarges and becomes weak as it attempts to meet the body's needs. This weakening of the heart can lead to heart failure.

Failure of the mitral valve to close tightly causes back flow of blood into the left ventricle

Figure 3



Causes of Valve Disease

There are many causes of valve disease, including:

- An aortic valve that has two leaflets instead of three (bicuspid)
- A history of rheumatic fever
- Previous valve or heart infections (endocarditis)
- Mitral valve prolapse, where the mitral valve billows out and does not close properly
- A buildup of calcium
- Valve damage resulting from a heart attack
- Ventricular aneurysm, a weakening of the left ventricle
- Diseases of the heart, such as cardiomyopathy, where the heart muscle is enlarged

Symptoms of Valve Disease

If you are suffering from valve disease, you may:

- Tire easily
- Become short of breath with activity or when lying flat
- Have swelling of the feet, ankles, legs or abdomen
- Experience discomfort in your chest
- Exhibit no symptoms at all
- Feel fluttering in your chest (palpitations)
- Feel faint or pass out

Tests

To determine the cause of your problem, your physician will review your health history and conduct a physical exam. During the exam, your physician will listen to your heart. One indication of valve disease is the presence of a murmur, an abnormal sound caused by turbulent blood flow across a valve. A heart murmur does not always indicate a heart valve problem. However, most abnormal heart valves cause a murmur.

- An **echocardiogram** uses high frequency sound waves to determine how the parts of the heart are working. This allows the physician to determine valve leakage or to measure the opening of a stenotic valve.
- A **transesophageal echocardiogram (TEE)** also uses sound waves to look at the heart and measure a valve opening or to determine leakage. This test differs from a standard echocardiogram because a probe is inserted into the esophagus. In this procedure, the probe sits directly behind the heart, allowing certain parts of the heart to be seen more clearly than with the standard test.
- A **cardiac angiogram** or **cardiac catheterization** looks at blood flow to the heart, helping detect the area and extent of any blockage or narrowing of the arteries. During the procedure, a thin tube is inserted into the femoral artery (located in the groin) and passed into the heart. Contrast dye is injected into the tube and

X-rays are taken, allowing blood vessels and valves to be seen clearly on the X-ray.

- **Cardiac magnetic resonance imaging** uses a magnetic field and radio waves to create detailed images of the heart chambers, blood vessels and valves.

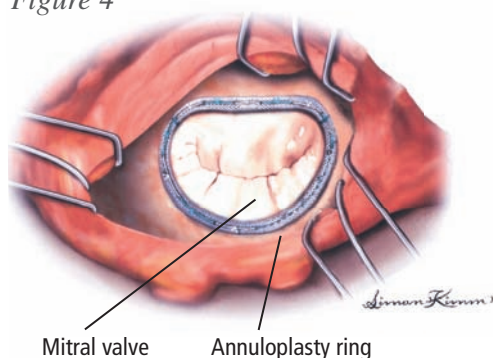
If you have had these or other heart-related tests recently, please obtain copies of the test results and share them with your surgeon. In some cases, this may prevent repeat testing.

Treatment

Valve Repair

Your physician may determine that valve repair is the best treatment. Heart surgeons on the medical staff at Northwestern Memorial Hospital prefer to repair a diseased valve whenever possible, as this often provides the best long-term outcome in restoring proper valve function.

Figure 4



During surgery, your surgeon will decide what procedures may be needed including:

- Opening up the stenotic valve (commissurotomy)
- Tightening the opening of the leaking valve (annuloplasty)
- Repairing a problem with a valve leaflet (valvuloplasty)

During an annuloplasty, (*see Figure 4*) a ring is placed at the base of the heart valve to provide added support to the repaired valve.

Valve Replacement

If the heart valve is damaged beyond repair, you will need to undergo surgery to replace the diseased valve with either a bioprosthetic (tissue) valve or a mechanical valve.

Figure 5



Courtesy of Edwards LifeSciences

Replacement valves come in different sizes and materials. The bioprosthetic valve (*see Figure 5*) is made from animal (cow or pig) or human tissue. This valve does not require you to take anticoagulant medicine. Tissue valves are less durable than mechanical valves, but the chance of needing a repeat operation in less than 15 years is very low.

Mechanical valves (*see Figure 6*) often are made of special carbon compounds and titanium. These valves are sturdy and designed to last a lifetime. To prevent blood clots from forming on the mechanical valve, you will need to take a blood-thinning medicine (anticoagulant) for the rest of your life. Taking anticoagulants increases your risk of bleeding, so you will need periodic blood tests to make sure that you are receiving the proper dose.

Figure 6



The decision to choose a tissue valve versus a mechanical valve is based on many factors including your age, lifestyle and ability to take a blood-thinning medication.

Advantages of Tissue Valves

With tissue valves, which are made from animal or human tissues, long-term anticoagulant medications such as warfarin (Coumadin®) or are not necessary unless you have other medical conditions that require it.

Disadvantages of Tissue Valves

Tissue valve durability is improving and many tissue valves are lasting 20 years or more without a decline in function. Biological valves are not as durable as mechanical valves, so you may need another valve replacement surgery in the future. The durability of a valve depends on your age. A tissue valve lasts longer as you age.

Advantages of Mechanical Valves

Mechanical valves, which are made from special metals, are durable and are designed to last a lifetime.

Disadvantages of Mechanical Valves

Anticoagulation medications are required for the rest of your life following mechanical valve surgery. This may result in lifestyle modifications such as sports or activity restrictions and dietary constraints. There is an increased risk of stroke with mechanical valves, which is cumulative with each year after surgery. If you become unable to take anticoagulation medications, you would require surgery to replace the mechanical valve with a tissue valve. Fewer mechanical valves are used than in the past.

Valve surgery may be done in one of three ways:

- **Minimally invasive** (see *Figure 7*), which requires the surgeon to make a small incision (about 3 inches) in the upper or lower chest and open part of your breastbone (mini-sternotomy). The site of the incision depends on the location of the diseased valve. Using special instruments, the surgeon then repairs or replaces the valve, wires the breastbone together and closes the incision.
- A **sternotomy** (see *Figure 8*), which involves a 6- to 8-inch incision down the middle of your chest. After surgery, the breastbone is wired together and the incision is closed with sutures.
- A **thoracotomy** (see *Figure 9*), which is a chest incision made between the ribs.

Prior to surgery, your surgeon will discuss your plan of care, explain the available surgical options, the type of incision to be used and answer any questions.

Figure 7

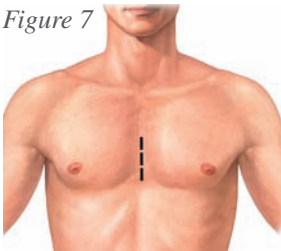


Figure 8

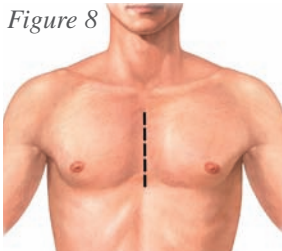
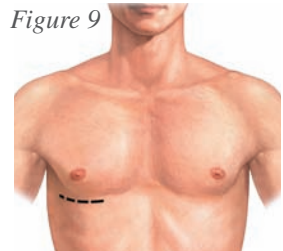


Figure 9



Risks

Every surgery carries some risk. The amount depends on factors such as your age and overall health. Risks may include bleeding, infection and lung or heart problems. In some cases, a pacemaker may be needed. In rare instances, stroke or kidney failure may occur. With either a valve repair or valve replacement, you may need additional valve surgery at some point in your life.

Before Surgery

You should be in the best possible health at the time of surgery. Your physician may recommend certain tests to rule out specific health problems prior to surgery.

Dental Exam

Good dental health helps prevent any infection in your mouth from spreading to your new or repaired valve. It is important to have your teeth cleaned and have a full dental exam to rule out infection before surgery. Tell your dentist that you will be having heart valve surgery. You will need to have a special X-ray (panorex) of your jaw. Your dentist will need to give you a letter stating you have had an exam and are cleared for heart surgery. Bring this letter to all of your presurgery appointments.

If you are unable to see your dentist, we can assist with scheduling.

Please note: Surgery may be delayed if you have any dental problems that require treatment.

Other presurgery appointments may include visits with a cardiologist, cardiac surgeon, nurse practitioner, behavioral medicine specialist and preoperative assessment service.

- The *behavioral medicine specialist* will identify your risk factors for coronary artery disease, explain ways to reduce your risk factors and provide assistance with stress management, smoking cessation and preparation for upcoming surgery.
- The *nurse practitioner* will review important activities before and after surgery, details about medicines that may need to be

discontinued before surgery and your arrival time on the day of surgery. These visits will include a thorough review of your health history and a physical exam. Our staff will assist you in scheduling the necessary appointments and tests.



For each appointment, please bring:

- A list of your current medications and allergies
- Questions for your physician and nurse practitioner
- Your medical insurance card

Medications

Certain medicines can increase your risk for bleeding during and after surgery. Talk with your surgeon if you are taking any blood-thinning medicines such as warfarin (Coumadin®), heparin, Lovenox® or Plavix®. You also must stop taking nonsteroidal anti-inflammatory drugs such as Advil® or Motrin® prior to surgery. Please contact your physician to confirm when to stop taking these medicines. This could be as little as two days or as long as 14 days before surgery. You must stop taking any aspirin or aspirin-containing products one week before surgery and any herbal medicines two weeks prior.

If you are diabetic, ask your physician whether you should take insulin on the day of surgery. Do not take any new medication without informing the prescribing physician about your impending surgery.

The Day Before Surgery

If you develop a cold or flu prior to surgery, please call the nurse practitioner. Surgery may be postponed until you are well.

Antibacterial Shower

On the evening before or the morning of surgery, you will be asked to shower with a special soap (such as Dial®) to reduce the amount of germs on your skin. Also be sure to wash your hair. Patients with beards may consider shaving. This may ease care in the weeks after surgery.

Nail Polish and Makeup

Patients should remove any nail polish and makeup before surgery. During surgery your circulation is checked by looking at your skin and nail beds.

Diet

Eat a bland meal for dinner the night before your surgery. Do not eat or drink anything after midnight the night before surgery or the morning of your surgery. This includes gum and hard candy.

Preparing for Your Hospital Stay

All valuables such as money and jewelry should be left at home. Please bring the following items with you:

- Photo ID
- Your medical insurance card
- Your Medicare card if applicable
- A list of your allergies
- A list of current medicines including vitamins and herbal supplements
- Containers for eyeglasses, contact lenses and dentures
- Toiletries

At Home

Do not swallow water when brushing your teeth the night before or morning of surgery. Unless instructed otherwise, take your regular medicine on the morning of surgery with a small sip of water. If you are diabetic, follow your physician's guidelines.

At the Hospital

Please arrive two hours before the time of surgery (unless told otherwise) at Northwestern Memorial Hospital's Galter Pavilion, 201

E. Huron St. Parking is available at the garage located across from the hospital facility at 222 E. Huron St. Please bring your ticket with you for parking validation.

Stop at the reception desk in the main lobby of the Galter Pavilion, where your family can check in and obtain visitor passes. Then go to the fifth floor registration desk in the Same Day Surgery Unit.

When you first arrive at the registration desk, your information will be checked and updated as needed. You will be directed to the waiting area until called by the nurse. From the fifth floor, you will go to the seventh floor preoperative (pre-op) room.

Once in the pre-op room, a nurse will review your medical history, take your temperature, blood pressure and pulse and insert an intravenous line (into the vein) in your arm or hand.



Your anesthesiologist will talk with you prior to surgery. Be sure to tell the anesthesiologist about any crowns, bridges or loose teeth so extra care can be taken. You also may be visited by a surgical resident or fellow. During this time your family can relax in the waiting area on the seventh floor. They will be able to visit you in the pre-op room once the nurse has you prepared for surgery. You may have two adult visitors at one time.

The wait time before surgery is about two hours. If your wait is extended for any reason, your nurse will provide updates.

When you are in the operating room, your family will be shown to the waiting room on the seventh floor. Family members should check in with the volunteer stationed in that area, who will provide updates during your surgery.

The booklet, *After Heart Surgery What to Expect*, provides more detailed information about your hospital stay, homecare guidelines and long-term follow-up care. Please ask your nurse practitioner for a copy if you do not have one.

Follow-up Care

Certain follow-up care is required for all valve repair and valve replacement patients.

Monitoring Levels of Blood Thinners

If you are taking a blood thinner such as warfarin (Coumadin®), heparin, Lovenox® or Plavix®, you will need routine blood tests to make sure the dose is right for you.

Taking Antibiotics Before Dental Procedures

After your surgery, you will need to take antibiotics before dental or surgical procedures. This helps prevent infection to your heart valve. Before any minor surgical or dental procedures, always inform *all of* your other healthcare providers that you have had heart valve surgery. Tell your dentist that your surgeon suggests following the American Heart Association guidelines.

During Surgery

In the operating room, you will be given medication to help you relax and feel drowsy. You will be connected to a heart monitor and you will breathe oxygen through a face mask.

Next, you will be given general anesthesia. It includes intravenous medicine and anesthetic gases mixed with oxygen delivered through the face mask.

An intravenous (into the vein) line will be placed to deliver medications and fluid and measure the pressure in your heart and lungs. A transesophageal echocardiogram (TEE) probe will be placed in your throat. The probe allows the surgeon to look at your valves before and after the surgery. A breathing tube will assist you during surgery and may cause a slight sore throat afterward.

During surgery, you will be placed on a heart-lung machine, which takes over the work of your heart and lungs. This machine provides oxygen-rich blood to all parts of the body using two tubes. The first tube is placed in your heart to carry blood to the machine, the second tube returns the blood to your body. Once your valve is repaired or replaced, you will be taken off the heart-lung machine.

After Surgery

You will go directly to the Intensive Care Unit (ICU) after surgery. Your surgeon will speak with your family to answer any questions they may have. You will have many tubes and wires attached to your body that will:

- Help you breathe
- Empty your stomach
- Remove blood or fluid that may build up near your incision
- Provide fluid and medicines
- Measure blood pressure and oxygen levels
- Monitor your heart rate
- Drain urine

As you recover, each of these tubes or wires will be removed.

At Northwestern Memorial Hospital, a comprehensive range of inpatient and outpatient services are provided in a healing environment where patients and their caregivers are supported by advanced technology and an organizational commitment to quality and patient satisfaction. We are a major referral center for the Midwest and beyond with a longstanding tradition of providing patient-focused care.

As one of the country's premier academic medical centers, Northwestern Memorial serves as the primary teaching hospital for Northwestern University's Feinberg School of Medicine. We are committed to the advancement of healthcare through clinical innovation, medical education and scientific research. The medical staff represents virtually every specialty and is comprised of more than 1,460 affiliated physicians who also serve as faculty members of the Feinberg School. At Northwestern Memorial, physicians and nurses are supported by the efforts of more than 6,000 employees and hospital volunteers who work to advance our mission of *Patients First*.

Northwestern Memorial's heart and heart surgery specialties are ranked among the nation's best by *U.S. News & World Report* magazine.

For More Information

Please contact us with any questions, for consultations or to request additional materials:

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At night or on weekends, call 312-695-4965 and ask for the Cardiothoracic Surgery fellow to be paged.

To learn more about the Bluhm Cardiovascular Institute, please visit www.heart.nmh.org.

If you would like additional information about Northwestern Memorial Hospital, please visit www.nmh.org.

Northwestern Memorial Hospital is a community of caregivers who welcome, respect and serve with dignity all people without regard to race, color, gender, national origin, religion, disability, age, veteran status or sexual orientation.

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