Cardiac Valve Surgery
The surgical treatment of diseased heart valves has seen many advances in the past several years. Vanderbilt Heart is proud to be a leader in this field. We offer our patients the latest innovations in cardiac valve surgery. Most of these surgeries are performed on the aortic or mitral valves. These valves are the inflow and outflow valves respectively, of the left ventricle which receives blood from the lungs and pumps blood to the entire body. The tricuspid and pulmonic valves are on the right side of the heart.

The Cardiac Valve Program unites a multidisciplinary team of cardiologists, cardiac surgeons and cardiac anesthesiologists trained in diagnosing and treating all disorders of cardiac valves. If surgery is the best option for a patient, Vanderbilt surgeons perform all types of cardiac valve procedures including aortic, mitral, pulmonary and tricuspid valve surgery. When minimally invasive surgery is appropriate, patients often have less pain and recover quicker than with traditional surgery.

Vanderbilt Heart has developed a new model for cardiovascular care. In our image-guided surgery program, we utilize a hybrid operating suite where patients undergo image-guided open-heart procedures. An angiogram can be performed immediately after surgery within the same suite. This allows physicians to use real-time imaging to help guide the conduct of the operation, ensuring the most complete and ideal results possible.

The hybrid operating suite allows the Vanderbilt team to perform minimally invasive valve surgery in the presence of coronary atherosclerotic disease (CAD) by using percutaneous intervention, such as angioplasty and stenting, instead of CABG surgery. Vanderbilt is one of the select few hospitals in the region to offer percutaneous valvuloplasty (also called valvotomy) to treat mitral stenosis, aortic valve stenosis and pulmonary valve stenosis.
Types of Valve Surgery

Valve surgery involves two major categories - valve replacement and valve repair. Valve replacement involves removing the native valve and replacing it with an artificial valve made of either mechanical parts or biological tissues. The choice between a mechanical valve vs. a biological valve is based on many factors, including patient preference, patient co-morbidities and life expectancy.

Types of Prosthetic Valves Used in Valve Replacement

Mechanical Valves
These artificial valves are made of graphite and pyralytic carbon, or other synthetic materials, which are non-reactive and tolerated well in the human body. While designed to last as long as 30 years, mechanical valves require lifelong blood thinning medications to avoid blood clots forming on the valve which can cause stroke and other complications. Because of the need for life-long blood thinning medications, patients with a mechanical valve carry a higher risk of bleeding complications following surgery.

Biologic (Tissue) Valves
These valves are made from animal tissue (pig or cow) or a donated human heart.

The animal tissue valves are sterilized and chemically treated for human use and sewn onto a frame (stented) or left intact (stentless). They last approximately 10–20 years or longer, depending on the age of the patient at implant. However, these valves may wear out over time and need re-replacement, particularly in younger patients. Long-term blood thinning medications are not required following valve replacement with biological valves, but may be needed in the first 4–6 weeks following the surgery.
Aortic Valve Surgery

Mechanical vs. Biological Aortic Valve Replacement

Mechanical valves are typically recommended for younger patients who can safely take blood-thinning medications, while biological valves are often used in older patients.

A typical patient in whom a mechanical valve may be indicated would be a patient in their 40s or 50s, in whom a congenitally bicuspid or calcific valve has become dysfunctional. Such a patient may wish to avoid repeat surgery in 10–15 years, but accept the low but finite risk of lifelong blood thinning medication. This decision is based on an understanding of the long-term risk of each choice. This is the balance between the risk of lifelong blood thinning medication and its potential complications versus the risk of reoperation if a biological valve is chosen.

A typical patient in whom a biological valve may be indicated would be a patient who wishes to avoid lifelong blood thinning medication, but who accepts the risk of reoperation in 10–15 years, depending on the age of the patient at implant. Older patients (>60–65 years), however, should probably receive a biological valve because it lasts longer in older patients. Biological valves are also typically used in women of childbearing age to avoid blood thinning medications, which can cause birth defects.
Types of Aortic Valve Procedures

Aortic Valve Replacement
Aortic valve surgery (replacement) is performed to treat the narrowing (stenosis) and/or leakage (regurgitation) of the aortic valve. It is also used for infective endocarditis. The majority of diseased aortic valves require replacement, with the original valve removed and a new valve sewn to the annulus.

Other Aortic Valve Procedures

Root Enlarging Procedure: particularly effective in smaller aortic valves

Aortic Root Replacement: typically used for connective tissue disorders, large aortic root aneurysms, endocarditis or aortic dissections, and valve-sparing root surgery

Valve-Sparing Root: usually used for young patients with intact aortic valves, with isolated disease of the aortic root, who wish to avoid long-term blood thinning medication

Biological Aortic Valve Replacement

Stented Biological Aortic Valves
Stented biological valves are by far the most common biological valve used in aortic valve replacement. They are either porcine valves removed from pig hearts, treated and mounted on an artificial stent (see illustration), or bovine valves made of cow pericardium which is also mounted on a stent. Both porcine and bovine valves have a long track record of excellent performance and durability, particularly in older patients.
Stentless Biologival Aortic Valves

Stentless valves are biological valves from pigs (xenograft) or human cadavers (homograft), which are treated and structured such that they do not need a stent. These valves are technically more challenging to place into patients, but they have certain advantages in selected patients.

These valves are useful in patients in whom a smaller stented valve may not provide adequate performance because of the high gradient across the replaced valve. Stentless valves perform more like our own native valves, but have limited durability, particularly in younger patients.

Homografts
(Human Cadaver Valve)

A homograft valve is a valve that was removed from a donated human heart, preserved, treated with antibiotics and frozen under sterile conditions. This is one of the ideal valve options for aortic valve replacement in the setting of infective endocarditis. Homograft valve can be placed using either full root technique of sub coronary methods. They last about 10-20 years.
Aortic Root Replacement

When the entire aortic root is diseased, or when aortic root replacement is deemed preferable for isolated aortic valve replacement (see illustration), aortic root replacement is performed. It involves the replacement of not only the aortic valve, but also the aortic sinus tissue down to the valve. It also requires reimplantation of the coronary arteries. A composite valved conduit (mechanical or biological) includes a new valve as well as new aortic tissue. This procedure is typically used for connective tissue disorders such as Marfan syndrome, large aortic root aneurysms, endocarditis or aortic dissections. The choice between mechanical vs. biological aortic root replacement is based on factors similar to isolated aortic valve replacement.

Valve-Sparing Root Surgery
(Sparing the Native Valve)

In valve sparing root surgery, the native valve is preserved and a tube graft is used to replace the diseased aorta. This often requires that the native aortic valve has preserved function (no significant leakage). If the native valve is dysfunctional, a full root replacement is often needed. Valve sparing root surgery is typically performed for young patients with intact aortic valves, with isolated diseases of the aortic root, who wish to avoid long-term blood thinning medication.
Mitral Valve Surgery

This surgery is typically performed for mitral valve stenosis (narrowing) from rheumatic heart disease. It is also used to repair regurgitation (leakage) or for infective endocarditis. Most diseased mitral valves can be repaired, but replacement is occasionally needed. Like the valves in aortic valve replacement, they can be mechanical or biological. However, biological valves in the mitral position often do not last as long as in the aortic position.

Types of Mitral Valve Repair

Valve repair allows a surgeon to reconstruct a faulty valve using the patients’ own tissue. The advantages of heart valve repair are lower risk of infection, decreased need for lifelong blood thinner medications and preserved heart muscle strength.

Common Valve Repairs

Leaflet Repair: leaflets are repaired by patching of holes or tears in valve leaflets, and/or by reconstructing leaflets to rebuild the native valve. (see illustrations A–C)

Ring Annuloplasty: a ring is attached to the tissue around the valve to provide the needed support so that the valve can close tightly. (see illustration D)

Tricuspid Valve Surgery

The majority of tricuspid valve disorders are due to leakage and can be safely repaired. There are multiple repair techniques, each with certain advantages. Some are as simple as “bicuspidalization” of the valve with a single suture, while others involve placement of a suture or ring around the annulus. Tricuspid valve replacement is occasionally needed in cases of severe tricuspid valve disease.
MINIMALLY INVASIVE HEART VALVE SURGERY

Minimally invasive heart valve surgery is performed through a small incision in the chest wall. Benefits from this type of procedure include faster recovery with less pain. Minimally invasive valve operations are performed through an upper mini-sternotomy (Aortic Valve), or a small right thoracotomy (Mitral Valve).

Minimally Invasive Aortic Valve Surgery
Aortic valve replacement can be performed through an incision 6 cm in length to open the upper part of the sternum.

Minimally Invasive Mitral Valve Surgery
Mitral valve and tricuspid valve repairs and replacements can be performed through a 5–7 cm incision in the right chest.

INTERVENTIONAL CARDIOLOGY

Percutaneous Mitral Valvuloplasty: Symptomatic mitral valve stenosis (narrowing) can be treated with balloon valvuloplasty, which has emerged as an alternative to surgery. During valvuloplasty, a thin catheter (tube) with a balloon tip is used to stretch or open the narrowed mitral valve. The catheter, threaded from the groin, is guided into place by X-ray and ultrasound (Echocardiography). The procedure, which is done in the cardiac catheterization laboratory, takes 1–2 hours and requires an overnight hospital stay.

Percutaneous Aortic Valvuloplasty: Although aortic valve replacement is the treatment of choice for aortic valve stenosis, percutaneous balloon aortic valvuloplasty can be used as a bridge to aortic valve replacement in selected high-risk patients, in patients undergoing emergent non-cardiac surgery, and in patients who are too ill to undergo cardiac
surgery. It may represent the only treatment for some frail elderly patients or treatment of choice in certain adolescent congenital defects. In balloon aortic valvuloplasty, a balloon catheter is placed through the valve and expanded in order to increase the opening size of the valve and improving blood flow.

Vanderbilt Heart and Vascular Institute has a multidisciplinary (Interventional Cardiology, Cardiac Surgery, Cardiac Imaging, and Cardiac Anesthesia) team that is experienced in these procedures and is the only hospital in the region to perform such procedures.

**KEEPING THE HEART PUMPING IS OUR PASSION**

The Cardiac Valve Program at Vanderbilt is committed to helping its patients determine the optimal treatment for their valve condition. Whether this treatment involves medical therapies alone or surgery, our goal is to treat every patient like they are our only patient. That’s why we give care to one person and one heart at a time.

**VALVE CLINIC**

The Vanderbilt Heart Valve Clinic is a multidisciplinary team of physicians and surgeons who evaluate unique heart valve patients on Wednesdays. They follow this clinic with a comprehensive valve conference on Thursday mornings to review the unique cases and determine the most appropriate treatment plan. The team will then communicate the plan to the patient and referring physician and arrange follow-up as needed.
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Our guarantee:
We will answer the phone within two rings, 24 hours a day, 7 days a week.

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Appointments and Scheduling for Valve Clinic

To make an outpatient appointment for consultation, simply call 615-343-9195 Monday through Friday from 8 am until 5 pm, CST.

Emergency Calls

For urgent physician needs or for a patient transfer, please call:
866-886-2478
or
615-343-9188
Fax: 615-343-6559
to reach the access coordinator.

Our guarantee:
We will answer the phone within two rings, 24 hours a day, 7 days a week.

The Vanderbilt Valve Surgery program is located in Medical Center East, South Tower. Parking is available in the East Garage located in the same building. Valet parking available.

Remember to have your parking ticket stamped at the registration desk for complimentary parking.

Red Coat Volunteers

The Vanderbilt Heart Red Coats are volunteers from the community who welcome you as you arrive. They are stationed in Medical Center East at the second floor entrance. Many of our Red Coat volunteers have been patients here themselves, or have had loved ones cared for at Vanderbilt. They are happy to escort you and your family members to your clinic appointment.