healthTalks from The Cleveland Clinic

A Closer Look at Heart Treatments

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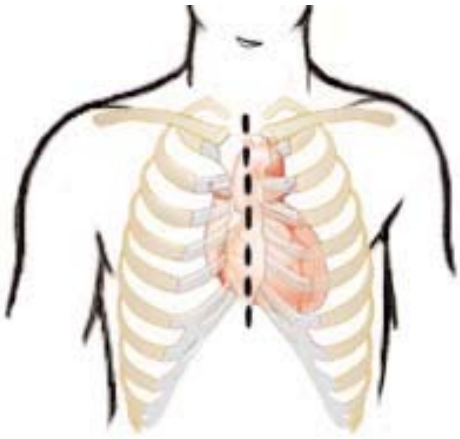
Treatment Options: Heart Valve Surgery and Balloon Valvotomy

Over the past few years, there have been great advances in the surgical treatment of diseased heart valves. The diagnostic tests your heart doctor orders help to identify the location, type and extent of your valve disease. The results of these tests, the structure of your heart, your age, and your lifestyle will help your cardiologist, surgeon, and YOU decide what type of procedure will be best for you.

Heart surgery

Traditional heart valve surgery

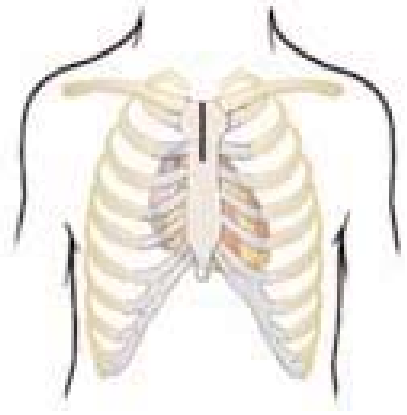
During traditional heart valve surgery, a surgeon will make an incision down the center of your sternum (breastbone) to get direct access to your heart. The surgeon then repairs or replaces your abnormal heart valve or valves. Often, the surgeon and cardiologist will use transesophageal echocardiography during the operation to help determine the functioning of the valve before and after surgery.



Traditional heart surgery: If you have traditional heart valve surgery, expect to be in the hospital five to seven days.

Minimally invasive heart valve surgery

Your surgeon will review your diagnostic tests prior to your surgery to see if you are a candidate for minimally invasive valve surgery. This type of surgery requires a much smaller incision (about 3 inches instead of the 6 to 8 inches required for traditional valve surgery).



Minimally invasive valve surgery.

The benefits to minimally invasive valve surgery include:

- Smaller incision - smaller scar
- Shorter hospital stay - in some cases, only 3 days is needed (instead of the average 5 days for traditional surgery)

Other benefits may include:

- Shorter recovery time
- Less bleeding
- Less potential for infection
- Less pain and trauma.

Valve repair surgery

Valve repair allows the surgeon to fix your valve, often without the use of artificial parts. If your valve can be repaired, your surgeon will take this approach

Valve repair for mitral and tricuspid valve stenosis

Commissurotomy

Fused valve leaflets are separated to widen the valve opening.

Commissurotomy (repaired opening)

Decalcification

Calcium deposits are removed to allow the leaflets to be more flexible and close properly.

Valve repair for mitral and tricuspid regurgitation

Quadrangular resection

If one of the leaflets is flail (floppy), and bows back into the left atrium, a segment maybe cut out and the leaflet sewed back together, allowing the valve to close more tightly.

Quadrangular resection (repaired leaflet)

Annulus support

If the valve annulus is too wide, it may be reshaped or tightened by stitches or sewing a ring structure to the annulus. The ring may be made of tissue or synthetic material.

Photo of Cosgrove-Edwards Annuloplasty ring with permission from Edwards Lifesciences

Annulus support (repaired annulus)

Patched leaflets

The surgeon may patch any leaflets with tears or holes with tissue patches.

Patched leaflets (repaired leaflet)

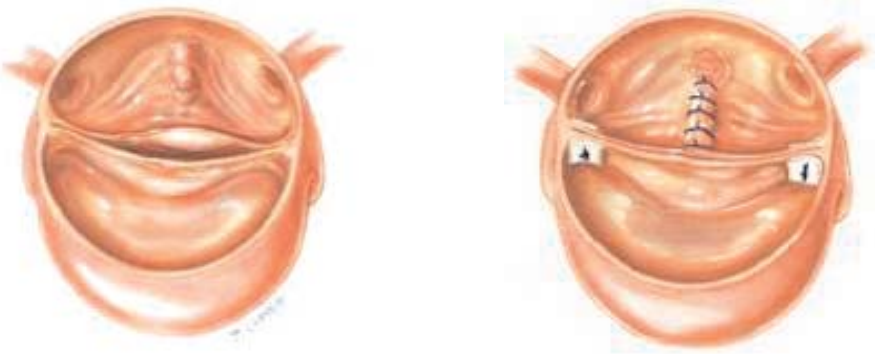
Valve repairs for aortic and pulmonic valve disease

When you have aortic or pulmonic valve disease, heart surgery most often requires replacement of the valve. In some cases, the aortic valve can be repaired.

Patched leaflets

Bicuspid aortic valve repair

If you have a bicuspid aortic valve (two leaflets instead of three), the surgeon may be able to reshape the aortic valve leaflets, allowing the valve to open and close more easily.



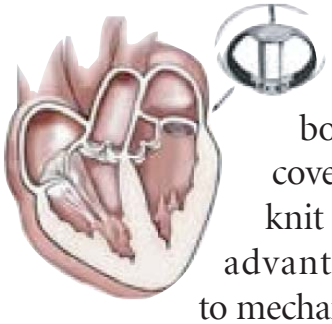
Bicuspid aortic valve repair (repaired aortic valve)

Valve replacement surgery

If your valve is replaced, the old valve is then removed and a new valve is sewn to the annulus of your old valve. The new valve can either be mechanical or biological.

Mechanical valve replacement

Mechanical valves are made totally of mechanical parts which are tolerated well by the body.



The bileaflet valve is used most often. It consists of two carbon leaflets in a ring covered with polyester knit fabric. There are advantages and drawbacks to mechanical valves.

Advantages

- Mechanical valves are very sturdy. They aredesigned to last a lifetime.

Drawbacks

- Due to the artificial material involved, patients who receive these valves will need to be on a blood-thinner (anticoagulant) medication lifelong. Blood-thinners are medications (such as warfarin or Coumadin) that delay the clotting action of the blood. They help prevent clots from forming in the replaced valve, which can cause a heart attack or stroke.
- Some patients report a valve ticking sound that is usually not bothersome. It is the sound of the valve leaflets opening and closing.

The Carbomedics Prosthetic Heart Valve (CPHV™)

Three mechanical heart valves are most commonly used at the Cleveland Clinic: The “TopHat” Suprannular, the Reduced “R” is available for aortic valve replacements, and the standard Carbomedic valve is used in the mitral valve position.

The valve housing and leaflets are made of Pyrolite carbon, a unique form of carbon which Carbomedics engineers discovered in the sixties. Attached to the carbon housing is a reinforcing band of titanium and attached to the titanium band is a suture ring of PET fabric. A metallic nitinol wire holds the titanium ring to the housing with an interference groove system. Pyrolite is biocompatible.

Top Hat™ Supra-Annular Aortic Valve

Standard Mitral

Reduced R Aortic Valve

Posted with Permission from Carbomedic, Inc.

Another mechanical prosthesis available to the Cleveland Clinic Surgeons is the St. Jude Medical® (SJM) mechanical heart valve. This bileaflet mechanical heart valve is designed and manufactured of pyrolytic carbon.

Photograph posted with permission from St. Jude Medical®

Biological valve replacement

Biological valves (also called tissue or bioprosthetic valves) are made of tissue. But they may have some artificial parts to help give the valve support and sew it in place. They can be made from pig tissue (porcine) or cow tissue (bovine).

Photograph of PERIMOUNT mitral valve with permission from Edwards Lifesciences

Homograft valve

Diseased aortic or pulmonic valves may also be replaced by a homograft valve. A homograft is an aortic or pulmonic valve which has been removed from a donated human heart, preserved and frozen under sterile conditions.

Photo of aortic homograft, courtesy of Cryolife, Inc.

Advantages:

Most patients do not need to be on lifelong blood-thinner medication, unless they have other conditions (such as atrial fibrillation) which warrant it.

Drawbacks:

Biologic valves are not as durable as mechanical valves, especially in younger people. They may need to be replaced at about 10 years. In older people (greater than age 60), these valves last longer, often 15 years or more. Homograft valves have been used for only about 15 years, but they are expected to last much longer and may not need to be replaced.

Non-surgical procedures — Balloon mitral valvotomy

Balloon valvotomy is used to increase the opening of a narrowed (stenotic) valve. It is used for:

- Select patients who have mitral valve stenosis with symptoms
- Older people who have aortic stenosis, but are not able to undergo surgery
- Some patients with pulmonic stenosis

This procedure is performed in the cath lab by a cardiologist and a team of nurses and technicians.

A specially designed balloon catheter is nserted in the groin and guided to the heart. The balloon tip is directed inside the narrowed valve. There, it is inflated and deflated several times to widen the valve opening. Once the cardiologist is satisfied the valve has been widened enough, the balloon is removed.

Balloon mitral valvotomy

The procedure takes about an hour; however the preparation and recovery adds more time. Patients usually stay overnight and go home the next day.

The Cleveland Clinic Heart Center surgeons and cardiologists specialize in the treatment of valve disease. Cleveland Clinic heart surgeons have developed many innovations in valve epair and replacement surgery. Often times, valve surgery may be combined with other procedures (bypass surgery or Maze procedure) to fully treat the patient's heart disease. The team approach at the Cleveland Clinic Heart Center insures that patients receive the best care before, during and after their valve procedure.

Resources

1. Sapirstein JS, Smith PK. The "ideal" replacement heart valve. American Heart J 2001; 141:856-860.
2. Banbury MK, Cosgrove, DM, Thomas JD, et al. Hemodynamic Stability Over 17 Years of the Carpentier-Edwards Aortic Pericardial Bioprosthesis, accepted for publication.
3. Gillinov AM, Cosgrove DM, Blackstone EH, Diaz R, Arnold JH, Lytle BW, Smedira NG, Sabik JF, McCarthy PM, Loop FD. Durability of mitral valve repair for degenerative disease. J Thorac Cardiovasc Surg 1998;116:734-43.
4. World View Through 8 Centimeters: An International Tele-Symposium on Minimally Invasive Direct Access Valve Surgery, Edwards CVS Division and the Cleveland Clinic Foundation, 1997
5. http://www.edwards.com*
6. http://www.carbomedics.com/patients_links.asp
7. http://www.cryolife.com*
8. http://www.sjm.com*

* *The inclusion of links to other web sites does not imply any endorsement of the material on the web sites or any association with their operators*

notes

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