STAMFORD HEALTH & COLUMBIA

COLUMBIA UNIVERSITY IRVING MEDICAL CENTER

CARDIAC SURGERY AT STAMFORD HOSPITAL

CONTENTS

To speak with someone from our our team, please call 203.276.4400.

THE HEART OF OUR APPROACH

The Cardiac Surgery Program at Stamford Hospital brings expert lifesaving care to our community.

Dr. Nicholas Shea, Chief, Cardiac Surgery, Co-Director of the Heart & Vascular Institute, and Assistant Professor of Surgery at Columbia University Vagelos College of Physicians & Surgeons, along with partners from Columbia University Irving Medical Center, provide world-class heart care and expertise to our patients. Our heart surgeons deliver a collaborative person-centered approach to every single patient through individualized care using evidenced-based protocols and the very best practices to optimize surgical outcomes.

Each heart surgery patient will interact with a team of board-certified surgeons and physicians, physician assistants, a nurse practitioner/nurse navigator, and nurses, as well as physical and occupational therapists, nutritionists, and other vital members of the interdisciplinary team. From the very beginning, each patient will work closely with the nurse navigator, a health care professional who will act as a patient's personal advocate and can help navigate the treatment process from pre-op through recovery. The navigator will partner with each patient and provide individualized patient education about their disease and treatment.

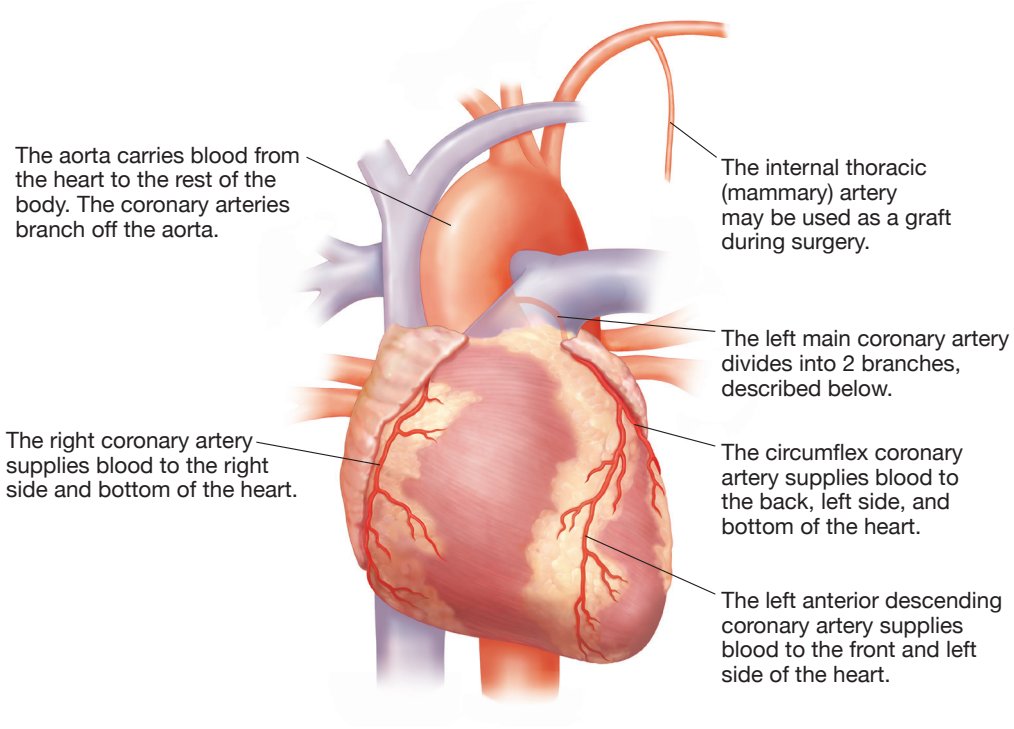
Our cardiac surgeons and their team coordinate care with every patient's primary care provider, cardiologist, and any essential specialists to optimize their care.

Cardiac operations offered at Stamford Hospital:

- Coronary artery bypass grafting (CABG).
- Aortic valve replacement.
- Mitral valve repair or mitral valve replacement.
- Combined CABG/valve surgery.
- Aortic aneurysm and dissection surgery.

WHAT TO KNOW ABOUT CORONARY ARTERIES

- Coronary arteries are vessels that run across the surface of the heart and supply the heart with blood and oxygen. There are two main coronary arteries that supply blood to the heart: left main coronary artery and right coronary artery.
- The right coronary artery supplies blood to the right side of the heart and to a portion of the back side.
- The left main coronary artery is divided into two branches: left anterior descending artery and left circumflex artery.
  - o The left anterior descending artery provides blood and oxygen to the front of the heart and to most of its muscle tissue.
  - o The left circumflex artery supplies the left wall and part of the back of the heart.



Problems with the coronary arteries:

Coronary artery disease (CAD) is the most common type of heart disease in the United States.[1] CAD is caused by plaque buildup (atherosclerosis) in the internal wall of the coronary arteries which supply blood and oxygen to the heart. Left untreated, it can lead to a heart attack. Plaque buildup causes the inside of the arteries to narrow over time, which can partially or totally block the blood flow.

About 20.1 million adults aged 20 years and older have CAD in the U.S.[2]

Risk factors for CAD:

- High blood pressure.
- High cholesterol (high blood levels of low-density lipoprotein).
- Family history of atherosclerosis.
- Diabetes.
- Obesity.
- Lack of physical activity.
- Diet high in saturated fats, trans fat, and cholesterol (fast food, processed food).
- Tobacco use.
- Drinking too much alcohol.

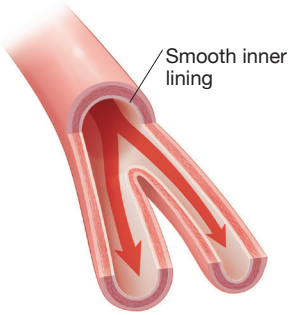
Symptoms of CAD:

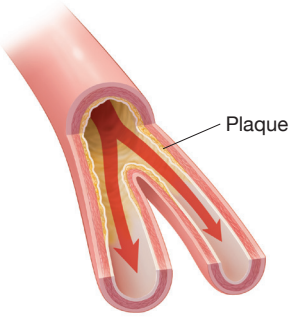
A common symptom is angina, which is a feeling of pain, pressure, heaviness, aching, tingling, or burning in the chest, discomfort in the arms (especially the left arm), back, jaw, neck, shoulders or abdomen, or both. Women and men can experience these symptoms differently: Women are more likely to have jaw, neck, throat, abdomen, shoulders and upper back pain, fatigue, nausea, and feeling out of breath.

Other symptoms include:

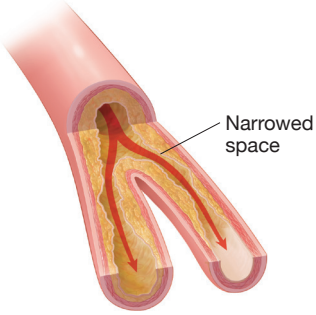
- Tiredness.
- Shortness of breath.
- Cold sweats.
- Dizziness.
- Nausea.

It's important to note that some people with CAD have no obvious symptoms.

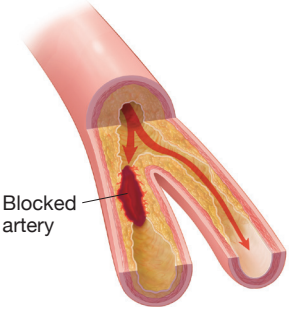




Plaque forms between layers of the artery wall when the inner lining of the artery is damaged.



Plaque narrows the channel where blood flows. The artery can't meet increased demands for blood.



Plaque may rupture, narrowing the artery even more. A blood clot may cut off blood flow.

HOW CORONARY ARTERY DISEASE IS DIAGNOSED

Some or all of the below testing may be performed to diagnose CAD. Your provider will work with you to determine what tests will be needed to diagnose your condition. Here is a brief description of each test that helps to diagnose CAD.

Blood tests: Check the levels of different substances that can increase the risk of CAD.

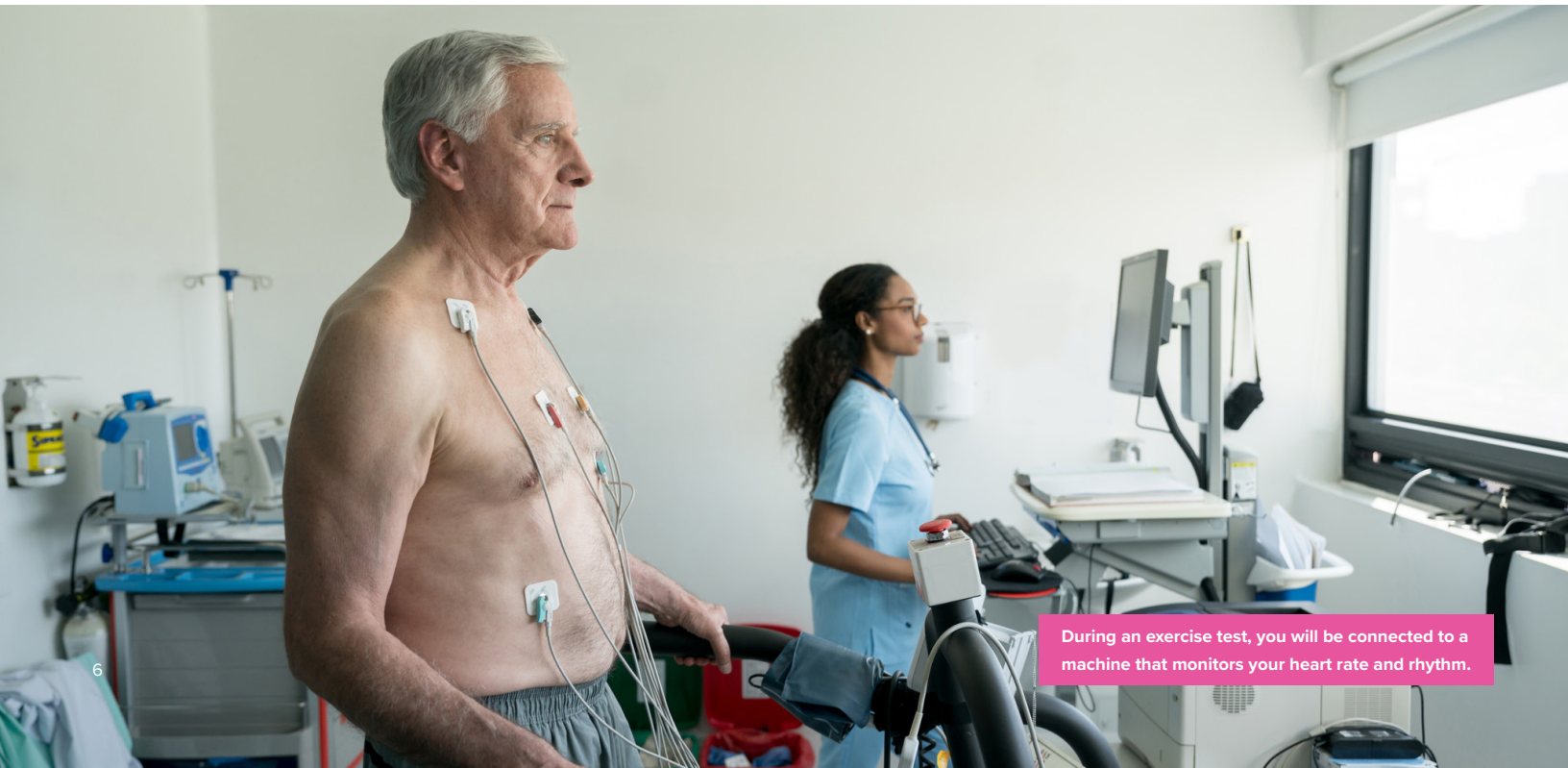
Electrocardiogram (EKG): An EKG records electrical signals from your heart. It can show whether you have had or are having a heart attack.

Coronary calcium scan: Also called cardiac calcium scoring, this type of computerized tomography (CT) scan checks the walls of the arteries for calcium buildup, a sign of coronary artery disease.

CT coronary angiogram: A CT coronary angiogram can reveal plaque buildup and identify blockages in the arteries. A contrast dye is injected through an IV to make the arteries more visible.

Cardiac catheterization: A catheterization is a procedure that passes a catheter, a flexible tube, into a blood vessel via arteries in the groin or arm and then guided to the heart. A dye (contrast material visible on X-ray) is injected in the catheter to determine whether blockages or narrowing are present in the arteries and to measure how well the heart valves and muscle function. This is the gold standard for diagnosing CAD.

Stress test: A stress test monitors heart rate, breathing, blood pressure, the heart's electrical activity, and how tired a patient is. It checks how their heart responds when it's working hard. An abnormal result can indicate that the heart is not receiving enough blood and oxygen during activity, this is called ischemia. The reduction in blood flow is typically caused by a blockage in the coronary artery. There are several different types of these tests: exercise stress test, echo stress test, and nuclear stress test.



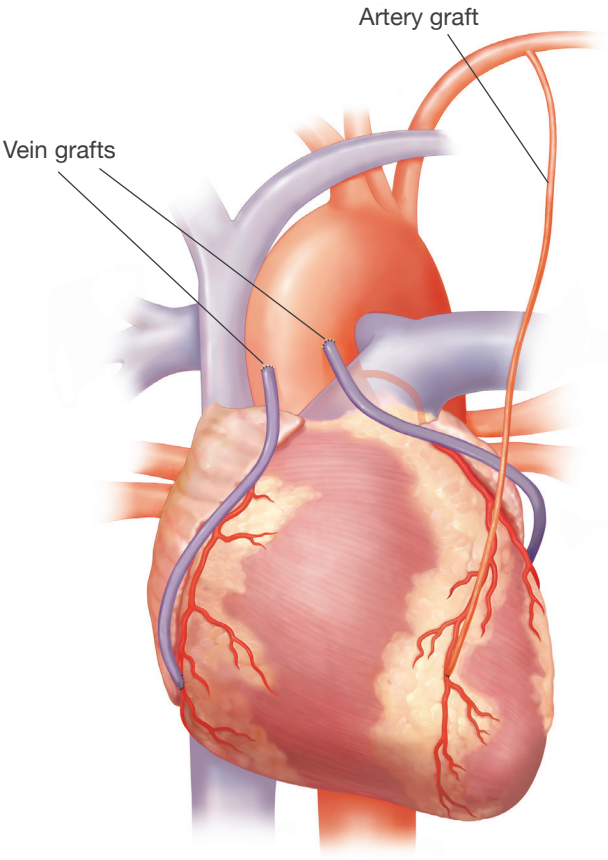
During an exercise test, you will be connected to a machine that monitors your heart rate and rhythm.

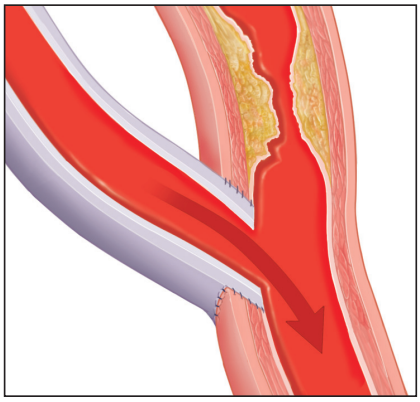
BYPASS SURGERY

Coronary artery bypass surgery, also called coronary artery bypass grafting or CABG, is a surgical treatment for when coronary artery blockage is severe. The goal of this procedure is to reroute the blood supply around a blocked coronary artery.

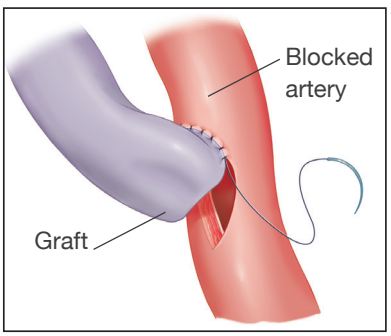
Bypass surgery involves the use of healthy veins or arteries from other parts of the body to build detours (or bypasses) around obstructed arteries. The blood vessels used for the bypasses can come from the leg, arm or chest.

When a leg vein is used, one end is sewn to the aorta while the other is sewn to the coronary artery below the blockage. When an artery from the chest, called the internal mammary artery, is used, it is left attached to a branch of the aorta while its lower end is sewn to the coronary artery below the blockage.





Once the graft is attached, blood can flow around the blockage.



WHAT TO KNOW ABOUT HEART VALVES

Your heart's job is to pump blood to your lungs and the rest of your body. The space inside the heart is divided into four chambers. The flow of the blood through the chambers and out of the heart is controlled by one-way gates called valves. A problem valve may not open wide enough, not close tightly enough, or both. In any case, not enough blood gets sent out to the body. The heart tries to make up for that by working harder, this helps only for a little while. Over time, the extra work damages and may also weaken your heart. Surgery can be done to repair or replace a problem valve.

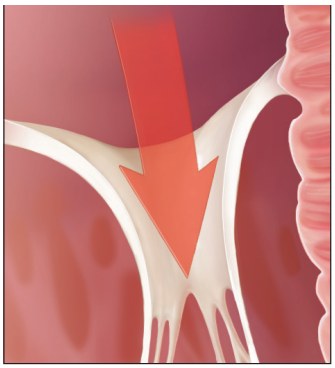
Heart valve conditions to be aware of:

Problems opening:

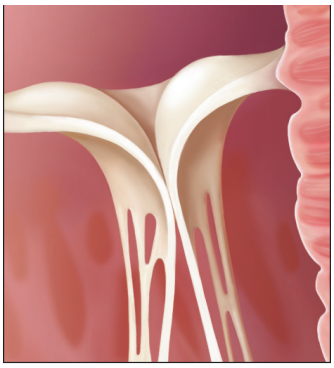
- **Stenosis:** A valve does not open all the way. The leaflets may be stuck together or be too stiff to open fully.
- When the valve does not open fully, the heart muscle must work harder to push the blood through the smaller opening.

Problems closing:

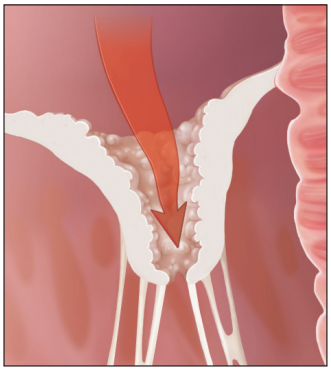
- **Regurgitation:** This is also called insufficiency, is when a valve does not close tightly enough. The valve may be described as "leaky."
- The leaflets fit together poorly or the structures that support the leaflets may be torn.
- When the valve does not close appropriately, some blood leaks through the valve back into the chamber it just left.



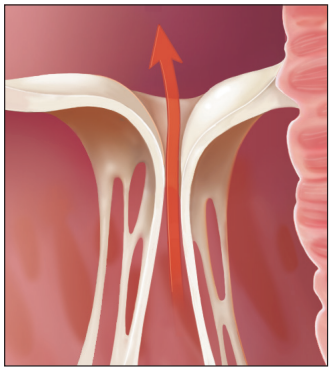
A healthy valve opens fully, so blood flows out of the chamber.



A healthy valve closes tightly, so blood can't flow backward.



With stenosis, a valve doesn't open all the way, so not enough blood gets through.



With regurgitation, a valve doesn't close all the way, so some blood leaks backward.

Risk factors of valve disease:

- Being born with an abnormal valve (congenital valve disease).
- Wear and tear due to aging.
- Buildup of calcium or scar tissue on a valve.
- Damage from rheumatic fever or other infections.
- Damage due to other heart problems, such as coronary artery disease.

Symptoms of valve disease:

- Chest pain or palpitations (rapid rhythms or skips).
- Shortness of breath and/or difficulty catching your breath when you exert yourself or lie flat.
- Weakness, tiredness, or inability to maintain regular activity level.

- Feeling dizzy, faint, or lightheaded.
- Swollen ankles, feet, or abdomen.

These symptoms do not necessarily determine the seriousness of a person's valve problems. A valve problem can be severe with no symptoms. Also, a valve problem can be insignificant in terms of leakage, but problematic because of the uncomfortable symptoms. It's important to tell your health care provider any time you notice new symptoms that may relate to your condition.

Symptoms of valve disease, such as chest pain, fatigue, lightheadedness, shortness of breath or passing out can be signs of several other conditions. Always discuss any new or unusual symptoms with your physician.

HOW VALVULAR DISEASE IS DIAGNOSED

A murmur is one of the first signs of a heart valve problem. In most cases an echocardiogram is recommended.

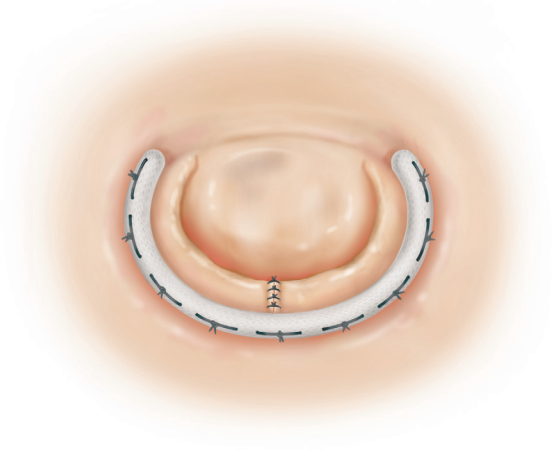
Echocardiogram: An echocardiogram (echo) (pictured below) is a special ultrasound that looks at the heart muscle and valves.

Cardiac catheterization: This is done prior to any valve procedure to help diagnose valve disease in challenging cases or if the echo is non-diagnostic. A catheterization is a procedure that passes a catheter, a flexible tube, into a blood vessel via veins in the groin or arm and then guided to the heart. A dye (contrast material visible on X-ray) is injected in the catheter to determine whether blockages or narrowing are present in the arteries and to measure how well the heart valves and muscle function.

One of our cardiologists looking at an echocardiogram image.

VALVE SURGERY

The valves of the heart may need to be repaired or replaced. If replacement is needed, either a mechanical or tissue valve will be used. When deciding on the replacement valve type, a surgeon will discuss these choices and advise the type of valve that will work best, considering factors such as the recipient's age, size and location of the natural valve, condition of the heart, heart rhythm abnormalities, and more.



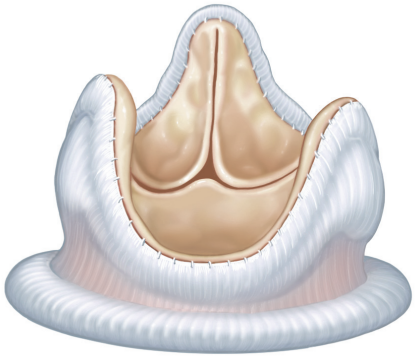
Repair of the valve:
The most common kind of repair involves sewing a ring around the entrance to a valve to improve its size or shape. Another type of repair involves cutting away excess or damaged tissue to allow leaflets to open or close more easily. When repair is not possible, the valve will be replaced.

Replacement with a mechanical valve:

- Mechanical valves are man-made and made of metal or hard carbon.
- Mechanical valves can last for decades to a lifetime.
- Requires the daily use of an anticoagulant, or blood thinner, to prevent blood clots from developing on the valve. The most common blood thinner used is warfarin (Coumadin).

Replacement with a tissue valve:

- A tissue valve usually comes from a pig or a cow.
- Lasts approximately 10-15 years.
- Does not require lifelong blood thinners.



ALL ABOUT THE AORTA

The aorta is the tube-like structure that connects the heart to all other organs in the body. It consists of the aortic root, the ascending aorta, the aortic arch, and the descending aorta. It is the largest blood vessel in the body. The thoracic aorta is responsible for transporting oxygen-rich blood from the heart to the rest of the body. The most common problem with the aorta is an aneurysm. An aortic aneurysm occurs when part of the aorta wall weakens, allowing it to abnormally balloon out or widen which causes the aorta wall to become thinner.

Complications of a thoracic aortic aneurysm include rupture of the aorta or an aortic dissection. An aortic dissection is a serious condition in which a tear occurs in the inner layer of the aorta. Blood rushes through the tear, causing the inner and middle layers of the aorta to split (dissect).

Thoracic aneurysms may involve one or more aortic segments (aortic root, ascending aorta, arch, or descending aorta). About 60% of thoracic aortic aneurysms involve the aortic root and/or ascending aorta, 40% involve the descending aorta, 10% involve the arch, 10% involve the thoracoabdominal aorta.[3]

Risk factors of aortic aneurysm:

- High blood pressure.
- Tobacco use.
- Buildup of plaques in the arteries.
- Family history of aortic aneurysm.
- Genetic conditions that affect the connective tissue in the body:
    - Marfan syndrome.
    - Vascular Ehlers-Danlos syndrome.
    - Loeys-Dietz syndrome.
    - Turner syndrome.
- Bicuspid, two leaflet, aortic valve.

The causes of aneurysms are sometimes unknown.

Symptoms of aortic aneurysm:

- Thoracic aortic aneurysms typically grow slowly.
- There are usually no symptoms, making them difficult to detect.
- Many start small and stay small, others grow larger over time.

As a thoracic aortic aneurysm grows, symptoms may include:

- Back pain.
- Cough.
- Hoarseness.
- Shortness of breath.
- Tenderness or pain in the chest.

Symptoms that a thoracic aortic aneurysm has ruptured or dissected include:

- Sharp, sudden pain in the upper back that spreads downward.
- Pain in the chest, jaw, neck, or arms.
- Difficulty breathing.
- Low blood pressure.
- Loss of consciousness.
- Shortness of breath.
- Trouble swallowing.

Some aneurysms may never rupture or lead to dissection.

HOW AORTIC ANEURYSMS ARE DIAGNOSED

CT scan: A CT scan is the gold standard for the diagnosis of an aortic aneurysm. It can show the size and shape of the aneurysm. A contrast dye may be injected through an IV to help the arteries show up more clearly.

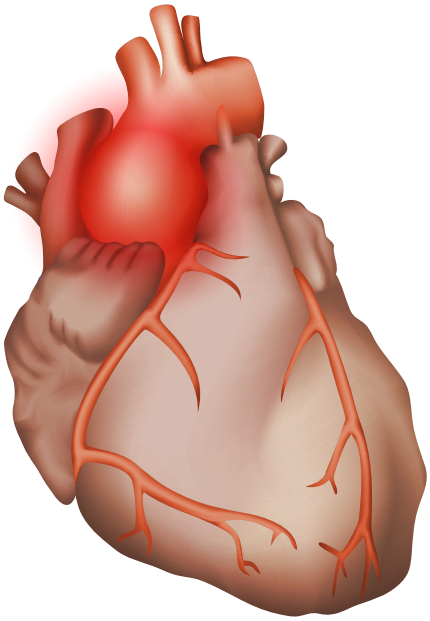
Echocardiogram, transthoracic echocardiogram or transesophageal echocardiogram: An echocardiogram (echo) is a special ultrasound that looks at the heart muscle and valves.

Cardiac magnetic resonance imaging (MRI): The MRI creates detailed images of the heart and aorta. A contrast dye may be injected through an IV to help blood vessels show up more clearly.

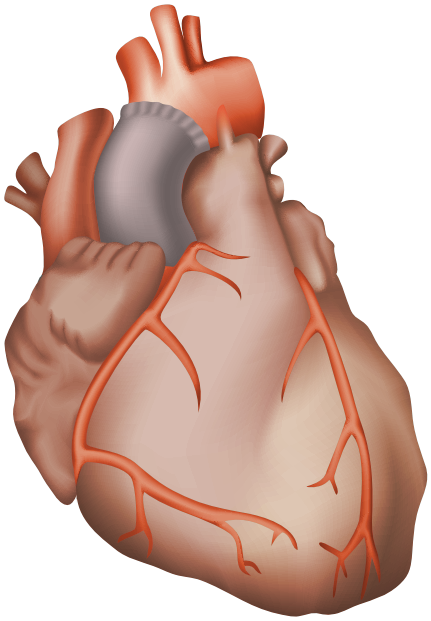
AORTIC ANEURYSM TREATMENT

- Treatment of a thoracic aortic aneurysm may vary from regular surveillance appointments with a cardiac surgeon to emergency surgery.
- The type of treatment depends on the cause, size, and growth rate of the thoracic aortic aneurysm.
- If your aneurysm is smaller than the recommended size for surgery, a CT scan will be performed from a range of every six months to every two years. Aortic aneurysms are closely monitored to allow for intervention prior to any serious complications.
- Surgery is performed to remove the aneurysm and eliminate the risk of tearing, rupture, or aortic dissection. Various surgical strategies exist to deal with problems in each part of the aorta (root, arch, and ascending).
- A surgeon will discuss and advise the type of aortic surgery that will work best, considering which part of the aorta is affected and if aortic valve disease is present.
- Descending aortic aneurysms, or abdominal aortic aneurysms, are usually followed by a vascular surgeon and can sometimes be treated with minimally-invasive techniques such as vascular stents.

Ascending aortic aneurysm



After surgery



Footnotes:

1 & 2: Centers for Disease Control and Prevention (2023, May 15). Heart Disease Facts [Fact sheet]. National Center for Chronic Disease Prevention and Health Promotion, Division for Heart Disease and Stroke Prevention. https://www.cdc.gov/heartdisease/facts.htm

3: (Circulation. 2005; 111: 816-828).

STAMFORD HEALTH

Heart & Vascular Institute
Bennett Medical Center Campus
29 Hospital Plaza
Stamford, CT 06902
203.276.4400

StamfordHealth.org/Heart