CONDITION

Aortic stenosis

Learn how aortic stenosis affects blood flow, what symptoms to watch for, and how doctors diagnose, monitor, and treat this heart valve condition.

WHAT IT IS
Narrowing of the aortic heart valve

BODY SYSTEM
Heart and circulation

MAIN SYMPTOMS
Shortness of breath, chest pain, fainting, unusual tiredness

WHAT CAUSES IT
Calcium buildup, congenital valve abnormality, rheumatic disease

HOW IT IS DIAGNOSED
Echocardiogram

MAIN TREATMENT
Monitoring and valve replacement

CAN IT BE CURED?
Sometimes - valve replacement replaces diseased valve

IS IT AN EMERGENCY?
Sometimes - severe chest pain or fainting

LONG-TERM OUTLOOK
Variable, from years of stability to heart failure

Overview

Aortic stenosis is a narrowing of the aortic valve, one of the four valves in the heart. This valve opens when the heart's main pumping chamber, the left ventricle, sends blood into the aorta. The aorta then carries oxygen-rich blood to the rest of the body.

When the valve becomes narrowed or stiff, the heart must work harder to push blood through it. The left ventricle may gradually become thicker from this extra work. Over time, the heart may have difficulty pumping enough blood, especially during physical activity.

Aortic stenosis can range from mild to severe. Mild disease may not cause symptoms and may remain stable for years. Severe disease can limit blood flow and eventually lead to heart failure or other complications. Symptoms often become more important than the amount of narrowing alone, so regular follow-up matters even when a person feels well.

The condition is most common in older adults because calcium can build up on the valve with age. It can also affect younger people born with an abnormal valve. Aortic stenosis does not usually improve on its own. However, monitoring and valve replacement can help manage the condition and relieve symptoms when treatment becomes necessary.

Symptoms

Aortic stenosis often develops slowly. Some people have no noticeable symptoms for a long time. Symptoms are more likely when the narrowing becomes severe or the heart can no longer compensate for it.

Possible symptoms include:

Symptoms may be subtle at first. A person may walk more slowly, avoid stairs, or stop certain activities without realizing that breathing or fatigue has changed. Comparing current activity levels with those from several months earlier may help identify a gradual decline.

Older adults may report weakness, reduced mobility, or difficulty completing everyday tasks rather than classic chest pain. Infants and children with significant congenital aortic stenosis may have feeding problems, poor growth, rapid breathing, or reduced exercise tolerance.

New symptoms should be discussed promptly with a clinician, particularly in someone already known to have aortic stenosis. Severe chest pain, fainting, severe breathing difficulty at rest, or signs of a stroke require emergency medical care.

- Shortness of breath during activity
- Chest pain, pressure, or tightness, especially with exertion
- Fainting or feeling close to fainting
- Unusual tiredness or reduced stamina
- A fast, pounding, or irregular heartbeat
- Dizziness during physical activity
- Swelling in the feet or ankles
- Difficulty breathing while lying flat or waking at night short of breath

Causes and risk factors

In many older adults, aortic stenosis results from progressive calcium buildup on the valve. This is called calcific aortic stenosis. The calcium makes the valve leaflets-the thin flaps that

open and close-thicker and less flexible. This process is not the same as simply having too much calcium in the diet.

Some people are born with a bicuspid aortic valve. A typical aortic valve has three leaflets, while a bicuspid valve has two. A bicuspid valve may become narrowed earlier in life. It can also be associated with enlargement of the aorta, so doctors may assess both the valve and the nearby aorta.

Rheumatic heart disease is another possible cause. It can occur after rheumatic fever, a complication of untreated or inadequately treated strep infection. Rheumatic disease often affects more than one heart valve and is less common in countries where strep infections are treated promptly.

Factors associated with calcific aortic valve disease include:

These factors do not prove that someone has aortic stenosis. They also do not predict exactly how quickly existing disease will progress. Although some risk factors overlap with those for blocked arteries, cholesterol-lowering medicine has not been shown to reverse established aortic stenosis.

- Increasing age
- A bicuspid aortic valve or another congenital valve difference
- High blood pressure
- Smoking
- High cholesterol
- Diabetes
- Chronic kidney disease
- Previous radiation treatment to the chest

Diagnosis

A clinician may first suspect aortic stenosis after hearing a heart murmur. A murmur is an extra sound caused by turbulent blood flow. The clinician may also ask about exercise tolerance, chest discomfort, fainting, breathing changes, and how symptoms affect daily activities.

An echocardiogram is the main test used to diagnose and assess aortic stenosis. This painless ultrasound test creates moving pictures of the heart. It can show the valve's structure, measure blood flow through the valve, estimate the degree of narrowing, and assess how well the left ventricle is pumping.

Severity is not determined by one measurement alone. Doctors consider several echocardiogram findings together, including the speed of blood passing through the valve, the pressure difference across it, and the estimated valve opening area. These results are interpreted alongside symptoms and heart function.

Other tests may include an electrocardiogram, or ECG, which records the heart's electrical activity. A chest X-ray may show heart enlargement, calcium around the valve, or fluid in the lungs, but it cannot measure valve narrowing reliably.

An exercise test may be used in selected people with severe aortic stenosis who say they have no symptoms. It must be performed under medical supervision. It can reveal symptoms or abnormal blood pressure responses that are not apparent during routine activity. Exercise testing is generally not used when a person already has clear symptoms from severe stenosis.

Computed tomography, or CT, can measure valve calcium and examine the aorta. It also helps doctors plan transcatheter valve replacement. Cardiac catheterization or coronary angiography may be needed when test results do not agree or when the coronary arteries must be assessed before a procedure.

Treatment and management

Treatment depends on the severity of the narrowing, symptoms, heart function, other medical conditions, and whether the disease is changing over time.

People with mild or moderate aortic stenosis usually have periodic examinations and echocardiograms. Severe disease requires closer follow-up, even when symptoms are absent. The exact schedule is individualized because progression varies.

No medicine can open a narrowed aortic valve or reliably stop established stenosis from progressing. Medicines may still be used to treat related conditions such as high blood pressure, coronary artery disease, an abnormal heart rhythm, or fluid buildup. Treatment needs to be planned carefully because blood pressure and fluid changes can affect how a person with severe stenosis feels.

Regular activity may be appropriate for many people with mild or moderate disease. Exercise limits depend on severity, symptoms, and heart function. Someone with severe stenosis should ask a cardiology professional before starting strenuous exercise or competitive sports.

Valve replacement is the main treatment for severe aortic stenosis that is causing symptoms or affecting heart function. It may also be considered in certain people without symptoms when tests suggest a higher risk of deterioration.

There are two main approaches:

The choice is not based on age alone. A heart valve team considers surgical risk, overall health, life expectancy, valve and blood vessel anatomy, the need for other heart surgery, and the expected durability of the replacement. The person's goals and preferences are also important.

Mechanical valves are durable but require lifelong medicine to prevent blood clots. Tissue valves usually do not require lifelong anticoagulation solely because of the valve, but they can wear out over time. TAVR uses a tissue valve. The risks and benefits of each option should be discussed in the context of the individual patient's health.

Balloon aortic valvuloplasty uses a balloon to stretch the narrowed valve. In adults, the improvement is often temporary, so it is generally reserved for selected situations, such as a bridge to valve replacement. It may have a different role in children and young adults with congenital stenosis.

Good dental care is important because bacteria from the mouth can sometimes infect an abnormal or replacement valve. Antibiotics like amoxicillin or doxycycline before dental work are not routinely recommended for every person with native aortic stenosis. People with a replacement valve or certain other heart conditions should ask whether preventive antibiotics are needed.

- Surgical aortic valve replacement , or SAVR, removes the diseased valve through heart surgery and replaces it with a mechanical or tissue valve.
- Transcatheter aortic valve replacement , or TAVR, places a collapsible tissue valve through a catheter, often inserted through an artery in the groin.

Complications

As stenosis worsens, the heart may not pump enough blood to meet the body's needs. Pressure can build up in the heart and lungs, leading to heart failure. Heart failure does not mean the heart has stopped; it means the heart cannot fill or pump as effectively as needed.

Other possible complications include:

Replacement procedures also have risks, including bleeding, infection, stroke, blood vessel injury, rhythm problems, or leakage around the new valve. The likelihood of each complication varies by procedure and health status. A heart valve team can explain how these risks compare with the risks of leaving severe disease untreated.

- Abnormal heart rhythms, such as atrial fibrillation
- Reduced blood flow to the heart muscle, causing chest pain

- Fainting related to limited blood flow during activity
- Enlargement or weakening of the left ventricle
- High pressure in the blood vessels of the lungs
- Infection of the valve, called infective endocarditis
- Sudden cardiac death, mainly in advanced disease

Follow up

Aortic stenosis requires ongoing follow-up because it can progress without obvious symptoms. Routine visits may include a symptom review, physical examination, and repeat echocardiograms. Keeping scheduled appointments is important even when daily activities feel normal.

Contact the treating clinician promptly if exercise tolerance decreases or if new shortness of breath, chest pressure, dizziness, fainting, swelling, or unusual fatigue develops. Do not wait for the next routine appointment to report a meaningful change.

After valve replacement, follow-up checks the new valve, heart function, incision or catheter site, and any medicines. Patients should tell dentists and other healthcare professionals about a replacement valve. A valve identification card can help provide accurate information during future care.

Seek emergency help for:

Less severe but new symptoms usually call for prompt medical advice rather than emergency care. A cardiology team can help determine whether testing or an earlier visit is needed.

- Severe or persistent chest pain
- Fainting, especially with chest discomfort or breathlessness
- Severe trouble breathing at rest
- Sudden weakness, facial drooping, speech difficulty, or other possible stroke symptoms
- Collapse or unresponsiveness

Sources

- Otto CM, Nishimura RA, Bonow RO, et al. "2020 ACC/AHA Guideline for the Management of Patients With Valvular Heart Disease." Circulation . 2021;143(5):e72-e227.

- Vahanian A, Beyersdorf F, Praz F, et al. "2021 ESC/EACTS Guidelines for the Management of Valvular Heart Disease." European Heart Journal . 2022;43(7):561-632.
- National Institute for Health and Care Excellence. Heart Valve Disease Presenting in Adults: Investigation and Management . NICE guideline NG208. Published 2021.
- National Heart, Lung, and Blood Institute. Heart Valve Diseases . U.S. National Institutes of Health.
- Lindman BR, Clavel MA, Mathieu P, et al. "Calcific Aortic Stenosis." Nature Reviews Disease Primers . 2016;2:16006.
- Otto CM, Prendergast B. "Aortic-Valve Stenosis-From Patients at Risk to Severe Valve Obstruction." New England Journal of Medicine . 2014;371(8):744-756.