CONDITION

Aortic arch syndrome

Learn how reduced blood flow through the aortic arch or its branches can affect the brain and arms, and how doctors diagnose, treat, and monitor it.

WHAT IT IS
Reduced or blocked blood flow through aortic arch branches

BODY SYSTEM
Heart and circulation

MAIN SYMPTOMS
Arm weakness, unequal arm blood pressure, dizziness, vision changes

WHAT CAUSES IT
Inflammation, atherosclerosis, blood clots, aortic dissection

HOW IT IS DIAGNOSED
Duplex ultrasound, CT angiography, MR angiography, catheter angiography

MAIN TREATMENT
Cause-directed medicines and blood-flow procedures

CAN IT BE CURED?
Sometimes - procedures can restore blood flow

IS IT AN EMERGENCY?
Sometimes - sudden stroke symptoms or severe arm ischemia

LONG-TERM OUTLOOK
Variable, with ongoing follow-up usually required

Overview

Aortic arch syndrome describes a group of problems that reduce or block blood flow through one or more arteries arising from the aortic arch. The aorta is the body's largest artery. Its arch gives rise to major vessels that supply the brain, neck, and arms.

The term is a clinical description rather than one specific disease. Some clinicians use it mainly for narrowing caused by inflammation, especially Takayasu arteritis. It may also describe similar blood-flow problems caused by atherosclerosis, a blood clot, an aortic dissection, or another condition.

Symptoms depend on which artery is affected, how severe the blockage is, and how quickly it develops. Slowly developing narrowing may allow smaller blood vessels to create alternate routes for blood flow. A sudden blockage does not give the body time to adapt and may cause

a stroke or severe loss of circulation to an arm.

Aortic arch syndrome matters because it can affect blood flow to the brain. It can also be a sign of disease elsewhere in the aorta or other arteries. Early evaluation helps identify the cause and guide treatment before permanent tissue damage occurs.

Symptoms

Symptoms may develop gradually, appear only during activity, or begin suddenly. Some people have no clear symptoms, and the problem is first suspected because the pulse or blood pressure differs between the arms.

Possible symptoms include:

Symptoms such as dizziness or vision changes can have many causes. Their presence does not by itself confirm aortic arch syndrome.

Some people develop subclavian steal syndrome . In this condition, narrowing near the start of a subclavian artery, which supplies an arm, causes blood to reverse direction in a nearby vertebral artery. This can reduce blood flow toward the back of the brain, particularly when the affected arm is active. It may cause dizziness, unsteadiness, visual symptoms, or arm discomfort.

Inflammatory diseases can cause additional symptoms before or alongside circulation problems. These may include fatigue, fever, night sweats, unintended weight loss, muscle or joint aches, and tenderness over an artery. These symptoms are not specific and require medical assessment.

Call emergency services for sudden facial drooping, one-sided weakness, difficulty speaking, severe loss of balance, or sudden vision loss. Also seek emergency care for abrupt severe chest or upper-back pain, fainting, or an arm that suddenly becomes painful, pale, cold, numb, or difficult to move. These can be signs of stroke, aortic dissection, or acute limb ischemia.

- Arm tiredness, aching, cramping, or weakness during use
- A cool, pale, or numb hand or arm
- A weak or absent pulse in one wrist
- A noticeable difference in blood pressure between the arms
- Dizziness, poor balance, fainting, or blurred vision
- Trouble speaking, facial drooping, or weakness on one side
- Brief episodes of vision loss

- Headache or difficulty concentrating

Causes and risk factors

Several conditions can interfere with blood flow through the aortic arch or its branches.

Large-vessel vasculitis is inflammation of major arteries. Takayasu arteritis often affects the aorta and its branches. Over time, inflammation may thicken and scar artery walls, causing narrowing or complete blockage. It can also weaken a vessel wall and lead to an aneurysm, which is an abnormal widening.

Giant cell arteritis is another inflammatory disease that can involve the aorta and its major branches. It occurs mainly in older adults and may also cause new headaches, scalp tenderness, jaw pain while chewing, or visual symptoms.

Atherosclerosis is the buildup of fatty plaque within artery walls. It can narrow vessels arising from the arch or create an uneven surface where a clot may form. Risk factors include smoking, high blood pressure, high cholesterol, diabetes, chronic kidney disease, and increasing age.

Other possible causes include:

Risk factors depend on the underlying cause. A person with inflammatory symptoms may need a different evaluation from someone with long-standing cardiovascular risk factors. In some cases, more than one process is present.

- A blood clot that forms in an artery or travels there from another location
- Aortic dissection, in which a tear allows blood to enter layers of the aortic wall
- An aortic aneurysm that changes or compresses branch-vessel blood flow
- Injury to an artery, including previous surgery or catheter procedures
- Scarring after radiation treatment to the chest or neck
- Less common congenital differences in the aorta or its branches

Diagnosis

Diagnosis begins with a medical history and physical examination. The clinician may ask when symptoms began, whether arm activity brings them on, and whether there have been brief neurological symptoms. They may also ask about smoking, cardiovascular disease, autoimmune illness, radiation treatment, or previous procedures involving the chest, neck, or

blood vessels.

Blood pressure is usually checked in both arms. The clinician may compare pulses at the wrists, neck, and legs and listen for a bruit , a rushing sound caused by turbulent blood flow. The examination may also look for differences in arm temperature or color and for signs of nerve or muscle injury.

Imaging is needed to identify the location and severity of narrowing. Tests may include:

Blood tests may measure markers of inflammation, such as C-reactive protein and the erythrocyte sedimentation rate. Normal results do not always rule out large-vessel vasculitis, and elevated results can occur for many reasons. Other tests may check cholesterol, blood sugar, kidney function, blood cell counts, or possible autoimmune causes.

If brain symptoms have occurred, brain imaging and evaluation of the carotid and vertebral arteries may be needed. Heart tests may also be appropriate when a clot from the heart or disease involving the nearby aorta is possible.

No single test is suitable for every person. Doctors combine symptoms, examination findings, laboratory results, and imaging to determine both the blood-flow problem and its cause.

- Duplex ultrasound , which uses sound waves to assess blood flow in accessible neck and arm arteries
- CT angiography , which uses X-rays and injected contrast material to create detailed images of the aorta and branches
- MR angiography , which uses magnetic imaging to examine blood vessels and may help evaluate artery-wall inflammation
- Catheter angiography , in which contrast is injected through a thin tube placed in an artery; this is often reserved for uncertain cases or when a procedure is being planned
- PET imaging , which may help assess active inflammation in large arteries in selected cases

Treatment and management

Treatment has two main goals: restoring or protecting blood flow and treating the disease responsible for the artery damage. The plan depends on whether the problem is sudden or chronic, whether symptoms are present, and which vessels are involved.

A sudden stroke, acute arm ischemia, or aortic dissection requires emergency hospital treatment. Depending on the cause and timing, treatment may involve clot-removing procedures, medicines that affect clotting, vascular surgery, or repair of the aorta. These

choices require rapid specialist assessment.

For narrowing caused by atherosclerosis, management usually includes reducing cardiovascular risk. This may involve stopping tobacco use, regular activity within safe limits, a heart-healthy eating pattern, and control of blood pressure, cholesterol, and diabetes. A clinician may recommend an antiplatelet medicine or cholesterol-lowering treatment when appropriate. These medicines should be chosen according to a person's overall medical history and bleeding risk.

When large-vessel vasculitis is responsible, treatment focuses on suppressing artery inflammation. Corticosteroids like prednisone or hydrocortisone are commonly used. A specialist may add another immune-suppressing medicine to improve disease control and reduce long-term steroid exposure. Certain biologic medicines, which target specific parts of the immune system, are used in selected cases. Treatment is usually managed by a rheumatologist, often working with vascular and cardiovascular specialists.

Medicines can control inflammation but may not reverse fixed scar-related narrowing. A procedure may be considered when reduced blood flow causes significant symptoms, threatens the brain or arm, or contributes to complications.

Possible procedures include:

For inflammatory disease, planned procedures are often more durable when inflammation is well controlled. Urgent loss of blood flow may still require intervention even when inflammation is active.

Not every narrowing needs a procedure. If symptoms are absent or mild and blood flow remains adequate, monitoring and treatment of the underlying condition may be safer than intervention. Decisions should consider the artery involved, the likelihood of stroke or tissue injury, and the risks of the procedure.

People with an arm blood-pressure difference should ask which arm gives the most reliable reading. Using a falsely low reading from an affected arm could make blood pressure appear better controlled than it is.

- Angioplasty , in which a small balloon widens the narrowed area
- Stent placement , which uses a mesh tube to help hold the artery open
- Bypass surgery , which creates a new route around the blockage
- Endarterectomy , which removes plaque from the inside of an accessible artery in selected situations

Complications

Possible complications depend on the cause and vessels involved. They include:

Inflammatory disease may affect other parts of the aorta. Depending on the pattern, it can contribute to aortic valve leakage, difficult-to-control blood pressure, or reduced blood flow to organs. Treatment itself can also have risks, including infection from immune-suppressing medicines or bleeding from medicines that affect clotting.

- Transient ischemic attack, sometimes called a warning stroke
- Ischemic stroke caused by reduced or interrupted brain blood flow
- Persistent weakness, pain, or tissue injury in an affected arm
- Subclavian steal syndrome
- Complete arterial blockage
- Aneurysm or aortic dissection
- Recurrent narrowing after angioplasty, stenting, or surgery

Follow up

Aortic arch syndrome usually requires ongoing follow-up because artery narrowing and the underlying disease can change over time. Care may involve a primary care clinician, vascular specialist, neurologist, cardiologist, rheumatologist, or vascular surgeon.

Follow-up visits may include blood pressure checks in both arms, pulse examination, review of neurological or arm symptoms, and monitoring for treatment side effects. Blood tests may help track inflammation or cardiovascular risk factors.

Repeat ultrasound, CT angiography, MR angiography, or other imaging may be used to monitor known narrowing, a previous procedure, or disease elsewhere in the aorta. The type and timing of imaging should be individualized rather than based only on symptoms, because some changes may develop quietly.

Contact the treating clinician promptly for new arm fatigue, a weaker pulse, increasing dizziness, brief vision changes, or short episodes of weakness or difficulty speaking. These symptoms need timely assessment even if they resolve.

Sudden stroke symptoms, severe chest or back pain, fainting, or abrupt signs of severe arm ischemia remain emergencies and should not wait for a routine appointment.

Sources

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