CONDITION

Arterial embolism

Learn how an arterial embolism blocks blood flow, what symptoms require emergency care, and how doctors diagnose, treat, and help prevent further emboli.

WHAT IT IS
Sudden artery blockage from material carried in blood

BODY SYSTEM
Heart and circulation

MAIN SYMPTOMS
Sudden limb pain, cold or pale limb, weakness or numbness, sudden vision loss

WHAT CAUSES IT
Usually a traveling blood clot

HOW IT IS DIAGNOSED
Duplex ultrasound or angiography

MAIN TREATMENT
Urgent blood flow restoration and anticoagulation

CAN IT BE CURED?
Sometimes - blood flow can be restored

IS IT AN EMERGENCY?
Yes - sudden symptoms need immediate assessment

LONG-TERM OUTLOOK
Depends on treatment speed and permanent tissue damage

Overview

An arterial embolism is a sudden blockage in an artery caused by material that traveled there through the bloodstream. The blockage reduces or stops the supply of oxygen-rich blood to tissue beyond it. Without prompt treatment, the affected tissue can become permanently damaged.

Most arterial emboli are blood clots. They often form in the heart or a large artery, break loose, and travel until they become stuck in a smaller artery. Less common emboli may contain cholesterol crystals, fat, air, infected material, or other substances.

An embolism is different from a thrombosis. An embolism travels from another part of the body. A thrombosis forms at the site of the blockage, often within an artery already narrowed by plaque. Both can cause acute ischemia, meaning a sudden loss of blood flow.

Arterial emboli can affect many organs. Common serious examples include:

A suspected arterial embolism is usually an emergency. Rapid assessment can improve the chance of restoring blood flow and preserving the affected organ or limb.

- A limb artery, causing acute limb ischemia
- A brain artery, causing an ischemic stroke
- An intestinal artery, causing acute mesenteric ischemia
- An eye artery, causing sudden vision loss
- A kidney artery, causing kidney tissue damage

Symptoms

Symptoms depend on which artery is blocked, how completely blood flow has stopped, and whether other vessels can supply the area. They usually begin suddenly.

An embolism in an arm or leg can cause the classic features of acute limb ischemia. These are sometimes described as the "six Ps":

Not everyone has all six signs. Loss of feeling or movement can mean the limb is in immediate danger.

A brain artery embolism may cause sudden facial drooping, weakness or numbness on one side, trouble speaking, confusion, vision changes, loss of balance, or a severe coordination problem. These are possible stroke symptoms.

An embolism affecting the intestines often causes sudden, severe abdominal pain. Early in the condition, the pain may be much stronger than expected from the initial abdominal examination. Nausea, vomiting, diarrhea, abdominal swelling, or blood in the stool may develop.

A retinal artery embolism may cause sudden, painless loss of vision in one eye or a dark area in the field of vision. A kidney artery embolism may cause pain in the side or back, blood in the urine, nausea, or reduced kidney function. Some kidney emboli cause few obvious symptoms.

Call emergency services immediately for sudden limb pain or coldness, new weakness or numbness, stroke symptoms, sudden vision loss, or severe unexplained abdominal pain. Do not drive yourself. Note the time when symptoms began or when the person was last known to be well, because treatment choices may depend on timing.

- Sudden pain
- Pale skin

- A weak or absent pulse
- Pins-and-needles, tingling, or numbness
- Paralysis or difficulty moving the limb
- A limb that feels unusually cold

Causes and risk factors

The heart is a major source of arterial blood clots. Atrial fibrillation, an irregular heart rhythm, can allow blood to pool and clot inside the heart. A clot may then travel to the brain, a limb, or another organ.

Other possible heart-related sources include a recent heart attack, weakened heart muscle, certain heart valve diseases, artificial heart valves, and infection of a heart valve. Valve infection, called infective endocarditis, can release emboli containing clot and infectious material.

The aorta and other large arteries can also be sources. Atherosclerosis causes fatty plaque to build up inside arteries. Pieces of clot or plaque can break away, especially when the aorta is enlarged, diseased, or treated during a vascular procedure.

Factors associated with arterial embolism include:

Rarely, a blood clot from a vein passes through an abnormal opening between the right and left sides of the heart. This is called a paradoxical embolism. It may occur through a patent foramen ovale, a small flap-like opening that remains after birth in some adults.

Fat emboli can occur after major bone injuries. Air or gas emboli may be associated with certain procedures, trauma, or diving-related pressure changes. Cholesterol emboli can arise when cholesterol crystals break away from diseased arteries, sometimes after an arterial procedure.

- Atrial fibrillation or another condition that promotes clot formation in the heart
- A recent heart attack or significant heart muscle weakness
- Heart valve disease, an artificial valve, or infective endocarditis
- Aortic aneurysm or extensive atherosclerosis
- A previous arterial embolism, stroke, or transient ischemic attack
- Recent heart, artery, or catheter-based procedures

- Smoking, high blood pressure, diabetes, or high cholesterol, which contribute to vascular disease

Diagnosis

Diagnosis starts with a rapid history and examination. The healthcare team will ask when symptoms began, whether they were sudden, and whether there is a history of atrial fibrillation, vascular disease, recent procedures, or blood clots.

For a limb problem, clinicians compare the temperature, color, pulses, feeling, and strength of both limbs. A handheld Doppler device can check blood-flow signals that are too weak to feel. The findings help determine whether the limb is viable, immediately threatened, or already severely damaged.

Imaging depends on the affected area. Duplex ultrasound uses sound waves to show blood flow in an artery. CT angiography uses contrast material and CT imaging to locate a blockage and map the surrounding vessels. Catheter angiography may be used when an endovascular treatment is being considered.

Possible stroke requires urgent brain imaging. A noncontrast CT scan can look for bleeding, while CT angiography or MR angiography can identify a blocked artery. MRI may provide more detail about injured brain tissue. Suspected intestinal ischemia is commonly evaluated with urgent CT angiography.

Blood tests may check blood counts, kidney function, electrolytes, clotting measures, and signs of tissue injury. Results can support treatment planning, but a blood test alone cannot rule out an arterial embolism.

An electrocardiogram and heart-rhythm monitoring can look for atrial fibrillation. An echocardiogram uses ultrasound to examine the heart for clots, valve disease, or other possible sources. Blood cultures may be needed when fever or other findings suggest infective endocarditis.

Testing should not unnecessarily delay treatment when a limb, organ, or the brain is at immediate risk.

Treatment and management

The first goal is to restore blood flow before irreversible damage occurs. The treatment approach depends on the artery involved, the severity of ischemia, how long symptoms have been present, and the person's bleeding risk and overall health.

For acute limb ischemia, clinicians often begin an intravenous anticoagulant, commonly unfractionated heparin, to reduce further clot growth while urgent treatment is planned. Anticoagulation is not suitable in every situation, so it requires medical supervision.

Ways to remove or bypass a limb embolus include:

A severely threatened limb generally needs immediate revascularization. Thrombolytic medicines can cause serious bleeding and are used only after clinicians assess whether the potential benefit outweighs the risk.

For an embolic stroke, some patients may be eligible for an intravenous clot-dissolving medicine. A large blocked brain artery may be treated with mechanical thrombectomy, a catheter procedure that removes the clot. Eligibility depends on brain imaging, timing, medical history, and other clinical findings.

An intestinal artery embolism may require endovascular treatment or open surgery. Surgeons may also need to examine the bowel and remove any section that has been permanently damaged. Sudden retinal artery blockage requires emergency assessment because it is considered a form of acute ischemic stroke and may signal a risk of emboli elsewhere.

After the emergency is controlled, treatment focuses on the source. Depending on the cause, this may involve anticoagulation for atrial fibrillation, treatment of heart or valve disease, management of aortic or arterial plaque, or antibiotics and possible surgery for infective endocarditis. Antiplatelet medicines, cholesterol-lowering treatment, blood pressure control, diabetes care, and smoking cessation may be appropriate when atherosclerosis contributes to risk.

These treatments have different benefits and bleeding risks. A clinician should select and monitor them rather than a patient starting, stopping, or changing them independently.

- Surgical embolectomy, in which a surgeon removes the blockage through an artery
- Catheter-based thrombectomy, which removes or breaks up the clot from inside the vessel
- Catheter-directed thrombolysis, which delivers a clot-dissolving medicine near the blockage
- Angioplasty, stenting, or bypass surgery when underlying arterial narrowing is also present

Complications

The main complication is permanent tissue death, also called infarction or necrosis. The result

depends on the affected artery. Brain injury can cause lasting stroke-related disability. Intestinal injury can lead to bowel perforation, infection, sepsis, or death. Kidney infarction can reduce kidney function.

Severe limb ischemia can cause nerve and muscle damage, chronic pain, weakness, wounds, or the need for amputation. Even after blood flow is restored, injured tissue can release substances into the bloodstream. This reperfusion injury may cause swelling, abnormal heart rhythms, or kidney damage.

Swelling inside tight muscle spaces can produce compartment syndrome, which places further pressure on nerves and blood vessels. It requires urgent treatment.

Procedures and clot-dissolving or anticoagulant medicines can cause bleeding. Another embolism may occur if the original source is not identified or controlled.

Follow up

Follow-up care aims to support recovery and prevent another embolism. The plan may involve vascular surgery, cardiology, neurology, ophthalmology, or other specialists, depending on the affected artery and the suspected source.

Appointments may include checks of circulation, wound healing, strength, sensation, kidney function, and recovery of the affected organ. Rehabilitation may include physical, occupational, speech, or vision-related therapy.

Medicines should be reviewed regularly. Some anticoagulants like warfarin or apixaban require blood testing, while others require monitoring of kidney function, medication interactions, and bleeding symptoms. Take these medicines exactly as directed and ask before using nonprescription pain relievers, supplements, or herbal products.

Routine follow-up should also address smoking, blood pressure, cholesterol, diabetes, physical activity, and heart-rhythm management. These visits are important, but they are different from emergency care.

Seek urgent medical advice for a worsening wound, increasing limb pain, fever after a procedure, or new medication-related concerns. Call emergency services for another sudden cold or numb limb, stroke symptoms, sudden vision loss, severe abdominal pain, chest pain, fainting, uncontrolled bleeding, vomiting blood, or black or bloody stool.

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