CONDITION

Acute coronary syndrome

Learn about acute coronary syndrome, including heart attack warning signs, emergency diagnosis and treatment, possible complications, and recovery.

WHAT IT IS
Group of emergencies from reduced heart muscle blood flow

BODY SYSTEM
Heart and circulation

MAIN SYMPTOMS
Chest discomfort, shortness of breath, sweating, nausea

WHAT CAUSES IT
Ruptured coronary plaque and blood clot

HOW IT IS DIAGNOSED
ECG and cardiac troponin blood tests

MAIN TREATMENT
Emergency clot prevention and blood flow restoration

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

IS IT AN EMERGENCY?
Yes - new or unexplained chest pressure

LONG-TERM OUTLOOK
Varies; severe damage can cause heart failure or cardiac arrest

Overview

Acute coronary syndrome, or ACS, is a group of medical emergencies caused by a sudden reduction in blood flow to the heart muscle. Without enough oxygen-rich blood, heart tissue can become injured or die.

ACS includes:

The coronary arteries supply blood to the heart. Most cases of ACS begin when a fatty deposit, called plaque, breaks open inside one of these arteries. A blood clot forms around the damaged plaque and partly or completely blocks blood flow.

ACS matters because heart damage can progress quickly. Early emergency care can restore blood flow, limit damage, treat dangerous heart rhythms, and improve the chance of recovery.

- ST-elevation myocardial infarction (STEMI): A heart attack usually caused by a complete blockage in a coronary artery.
- Non-ST-elevation myocardial infarction (NSTEMI): A heart attack in which blood flow is severely reduced, but the electrical changes on an electrocardiogram differ from those of STEMI.
- Unstable angina: New, worsening, or rest-related chest discomfort caused by reduced blood flow, without blood-test evidence of heart muscle death.

Symptoms

Chest discomfort is the most recognized symptom. It may feel like pressure, squeezing, fullness, heaviness, burning, or pain in the center or left side of the chest. It may last more than a few minutes or go away and return.

Other possible symptoms include:

Symptoms are not always severe or obvious. Older adults, women, and people with diabetes may be more likely to have shortness of breath, nausea, unusual fatigue, weakness, or back or jaw discomfort. However, anyone can have symptoms that do not follow a typical pattern.

When to get emergency help

Possible ACS symptoms require emergency assessment. Call your local emergency number immediately for new or unexplained chest pressure or pain, especially if it lasts more than a few minutes, returns, or occurs with shortness of breath, sweating, nausea, faintness, or discomfort elsewhere in the upper body.

Do not drive yourself if emergency medical services are available. Paramedics can begin testing and treatment on the way to the hospital. Do not wait to see whether symptoms improve, and do not delay the call while looking for medicine.

An emergency dispatcher may recommend chewing aspirin if it appears safe. Follow the dispatcher's instructions because aspirin is not appropriate for everyone, including some people with an allergy or active bleeding. If you have prescribed nitroglycerin, use it only as your clinician instructed. It should not replace an emergency call.

If a person becomes unresponsive and is not breathing normally, call emergency services, begin cardiopulmonary resuscitation if able, and use an automated external defibrillator when available.

- Discomfort in one or both arms, the shoulder, back, neck, jaw, or upper abdomen

- Shortness of breath, with or without chest discomfort
- Sweating or clammy skin
- Nausea or vomiting
- Lightheadedness, weakness, or fainting
- A fast, pounding, or irregular heartbeat
- Sudden unusual tiredness

Causes and risk factors

The most common cause of ACS is coronary artery disease. In this condition, cholesterol-containing plaque builds up in the walls of the coronary arteries. If a plaque ruptures or erodes, platelets and other clotting factors gather at the site. The resulting clot can suddenly restrict blood flow.

Less common causes include a severe spasm of a coronary artery, a spontaneous tear in an artery wall, or a clot that traveled from another part of the body. A major mismatch between the heart's oxygen needs and its blood supply can also injure the heart. Examples include severe anemia, very low blood pressure, or an unusually fast heartbeat. Clinicians evaluate these situations differently from a typical plaque-related heart attack.

Factors associated with coronary artery disease and ACS include:

Having a risk factor does not mean that a person will develop ACS. Some people who have a heart attack have few recognized risk factors. Risk can also change over time, so routine blood pressure, cholesterol, and diabetes screening remains important.

- Tobacco use or exposure to secondhand smoke
- High blood pressure
- High LDL cholesterol or other unhealthy cholesterol levels
- Diabetes
- Chronic kidney disease
- Older age
- A personal or family history of early cardiovascular disease
- Limited physical activity
- Excess body weight

- A dietary pattern high in sodium, refined carbohydrates, or saturated fat
- Inflammatory conditions and certain pregnancy-related complications

Diagnosis

Emergency clinicians begin with the person's symptoms, medical history, vital signs, and a physical examination. Testing usually starts promptly because no single symptom can confirm or rule out ACS.

An electrocardiogram , commonly called an ECG or EKG, records the heart's electrical activity. Certain changes can show that part of the heart is not receiving enough blood and may identify STEMI. A first ECG can be normal or unclear, so clinicians may repeat it if symptoms continue or the diagnosis remains uncertain.

Blood tests measure cardiac troponin , a protein released when heart muscle is injured. High-sensitivity troponin tests can detect small amounts. Results are interpreted with the symptoms, ECG, timing, and changes between repeated measurements. An elevated troponin does not always mean that a blocked coronary artery caused the injury.

Other tests may include:

Clinicians also consider other urgent conditions that can resemble ACS, such as a blood clot in the lung or a tear in the body's main artery. The type and timing of testing depend on the person's stability and initial results.

- A chest X-ray to look for other causes of symptoms or signs of heart failure
- An echocardiogram, which uses sound waves to show heart movement and pumping function
- Coronary angiography, in which contrast dye and X-rays show narrowing or blockage in the coronary arteries
- CT coronary angiography or a stress test in selected people whose initial assessment does not confirm ACS

Treatment and management

Treatment begins while testing is underway. The immediate goals are to stabilize the person, prevent the clot from growing, restore blood flow when needed, and reduce complications.

Monitoring may include repeated ECGs, blood tests, blood pressure measurements, and

continuous heart-rhythm tracking. Supplemental oxygen is generally used when oxygen levels are low or there are other clinical reasons for it, rather than automatically for every patient.

Medicines used in hospital may include antiplatelet drugs, which make platelets less likely to form clots, and anticoagulants like warfarin or apixaban , which interfere with the clotting process. Other medicines may relieve symptoms, reduce the heart's workload, control blood pressure, lower cholesterol, or treat an abnormal rhythm. The appropriate combination depends on the type of ACS, planned procedures, bleeding risk, kidney function, and other health conditions.

For STEMI, the priority is opening the blocked artery as quickly as possible. The preferred procedure, when it can be performed promptly, is percutaneous coronary intervention , or PCI. A cardiologist passes a thin tube through an artery, often from the wrist, to the heart. A balloon may open the blockage, and a mesh tube called a stent is commonly placed to keep the artery open.

If timely PCI is not available in some STEMI situations, a clot-dissolving medicine may be considered. These medicines can cause serious bleeding and are not used for unstable angina or NSTEMI. Clinicians screen carefully before giving them.

People with NSTEMI or unstable angina are assessed according to their symptoms, test findings, overall risk, and medical stability. Some need urgent angiography and PCI. Others may have angiography after initial medical treatment. Coronary artery bypass graft surgery may be recommended when several major vessels are affected or the artery anatomy is not well suited to PCI.

After the immediate event, treatment commonly focuses on preventing another cardiovascular event. This may involve cholesterol-lowering therapy, antiplatelet treatment, blood pressure or heart-protective medicines, diabetes management, and support for stopping tobacco. Treatment plans must be individualized, especially when a person has bleeding concerns or needs other medicines that affect clotting.

Medicines commonly used for this include clopidogrel and prasugrel . Which one suits you, if any, is a decision for you and your doctor.

Complications

The outcome after ACS varies. The amount of heart damage depends partly on which artery was affected, how long blood flow was reduced, and how quickly treatment restored circulation.

Possible complications include:

Hospital monitoring helps identify early complications. Some problems, including heart failure symptoms or emotional distress, may appear or continue after discharge and should be discussed during follow-up.

- Abnormal heart rhythms, some of which can cause cardiac arrest
- Heart failure, meaning the heart cannot pump well enough for the body's needs
- Cardiogenic shock, in which severe heart damage leads to dangerously poor circulation
- Inflammation around the heart
- Damage to a heart valve or other internal heart structures
- Bleeding related to antithrombotic medicines or procedures
- Kidney injury, sometimes related to poor circulation, illness, or contrast dye
- Another heart attack, stroke, or recurrent chest discomfort
- Anxiety, depression, sleep problems, or fear about physical activity

Follow up

Follow-up after ACS is part of treatment, not an optional extra. Before discharge, the care team should explain the diagnosis, medicines, activity plan, wound care if a catheter procedure was performed, and symptoms that require help.

Take prescribed medicines exactly as directed. Do not stop an antiplatelet medicine without speaking with the clinician managing the heart condition. Stopping it too soon after a stent can allow a dangerous clot to form inside the stent. Report unusual bleeding, black stools, blood in urine, severe bruising, or difficulty taking the medicine.

Cardiac rehabilitation is a supervised program that combines exercise, education, risk-factor management, and emotional support. It can help people return safely to activity and build habits that protect the heart.

Routine follow-up may address blood pressure, cholesterol, blood sugar, tobacco use, nutrition, physical activity, sleep, mood, return to work, driving, and sexual activity. The clinician may order follow-up blood tests or heart imaging based on the event and treatment.

Call the treating clinician promptly for increasing shortness of breath, new swelling, rapid weight gain, worsening fatigue, medication problems, or recurring mild symptoms. Use emergency services for chest discomfort suggestive of another ACS event, severe breathing difficulty, fainting, or sudden symptoms of stroke. Do not wait for a routine appointment in those situations.

Sources

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