CONDITION

Cardiac tamponade

Learn how cardiac tamponade affects the heart, which symptoms need emergency care, how it is diagnosed, and how excess fluid around the heart is treated.

WHAT IT IS
Pressure on the heart from fluid in its surrounding sac

BODY SYSTEM
Heart and circulation

MAIN SYMPTOMS
Shortness of breath, chest pain, fast heartbeat, fainting

WHAT CAUSES IT
Injury, infection, disease, or unknown

HOW IT IS DIAGNOSED
Echocardiography and clinical assessment

MAIN TREATMENT
Drainage of fluid around the heart

CAN IT BE CURED?
Sometimes, drainage works but fluid recurs

IS IT AN EMERGENCY?
Yes, suspected tamponade needs immediate assessment

LONG-TERM OUTLOOK
Prompt drainage can restore blood flow, with recurrence depending on cause

Overview

Cardiac tamponade is a serious condition in which fluid, blood, pus, or gas collects in the sac around the heart and puts pressure on the heart. This sac is called the pericardium . It normally contains a small amount of fluid that helps the heart move smoothly as it beats.

The abnormal collection is called a pericardial effusion . Not every pericardial effusion causes tamponade. Tamponade occurs when pressure inside the pericardium prevents the heart's chambers from filling normally. The heart then pumps less blood to the brain and other organs.

How quickly the fluid builds up is often more important than the total amount. A small amount of blood that collects within minutes may cause severe tamponade because the pericardium has no time to stretch. Fluid that collects slowly may become much larger before it seriously affects the heart.

Cardiac tamponade is a medical emergency. Prompt treatment can relieve pressure on the heart and restore blood flow. The immediate priority is usually to drain the fluid. Doctors also look for and treat the underlying cause.

Symptoms

Symptoms depend on how quickly pressure develops and how much it affects circulation. People with rapidly developing tamponade may become very unwell over a short period. Slowly developing tamponade can cause less specific symptoms that worsen over days or weeks.

Possible symptoms include:

Some people have symptoms related to the cause. For example, infection may cause fever, while trauma or a recent procedure may be followed by chest pain, weakness, or breathlessness.

Doctors may find low blood pressure, a fast heart rate, cool skin, reduced alertness, or swollen neck veins. Heart sounds may be difficult to hear. The combination of low blood pressure, swollen neck veins, and muffled heart sounds is known as Beck's triad , but many people with tamponade do not have all three findings.

Another possible sign is pulsus paradoxus , an unusually large fall in blood pressure while breathing in. Despite its name, this is not a stopped or irregular pulse. A clinician measures it with a blood pressure cuff or specialized monitoring.

When to seek emergency care

Call emergency services for new or rapidly worsening shortness of breath, fainting, confusion, severe weakness, chest pain, or signs of shock such as pale or clammy skin and reduced alertness. This is especially important after a chest injury, heart procedure, or surgery.

Do not drive yourself if you feel faint or severely short of breath. A stable pericardial effusion without signs of tamponade may be managed through scheduled follow-up, but suspected tamponade requires immediate medical assessment.

- Shortness of breath, especially when lying flat
- Chest pressure, discomfort, or pain
- A fast or pounding heartbeat
- Lightheadedness, weakness, or fainting
- Unusual tiredness

- Restlessness, confusion, or a feeling that something is seriously wrong
- Swelling of the legs or abdomen when the problem develops more gradually

Causes and risk factors

Cardiac tamponade can result from any condition that causes fluid or blood to collect around the heart. Sometimes no single cause is found.

Possible causes include:

Medicines that reduce blood clotting can increase the amount of bleeding if a blood vessel or heart structure is injured. They do not usually cause tamponade by themselves. Do not stop a prescribed anticoagulant or antiplatelet medicine without medical advice unless an emergency clinician directs you to do so.

Risk depends on both the cause and the speed of fluid accumulation. A person with a known effusion may need closer monitoring if it is increasing in size, causing symptoms, or linked to cancer, infection, recent heart treatment, trauma, or bleeding.

- Chest injury: A penetrating wound or blunt injury can cause bleeding into the pericardium.
- Medical procedures: Rarely, bleeding or perforation may follow cardiac catheterization, pacemaker placement, ablation, heart biopsy, or another procedure involving the heart.
- Heart or aortic disease: A rupture involving the heart muscle or a tear in the aorta can allow blood to enter the pericardium.
- Cancer: Cancer may spread to the pericardium or interfere with normal fluid drainage. Lung cancer, breast cancer, blood cancers, and other cancers can be involved.
- Infection: Viral, bacterial, fungal, or tuberculosis-related infection can inflame the pericardium and produce fluid.
- Kidney failure: Severe kidney dysfunction may cause pericardial inflammation, sometimes called uremic pericarditis.
- Autoimmune and inflammatory disease: Conditions such as lupus or rheumatoid arthritis may inflame the pericardium.
- Inflammation after heart injury: Pericarditis may occur after a heart attack, heart surgery, or other injury to heart tissue.
- Radiation treatment: Prior radiation to the chest can damage or inflame the pericardium.
- Severe underactive thyroid: Hypothyroidism may lead to a slowly developing pericardial effusion, although tamponade is uncommon.

Diagnosis

Diagnosis begins with urgent assessment of breathing, circulation, blood pressure, heart rate, oxygen level, and mental alertness. Doctors ask about recent illness, cancer, kidney disease, chest injury, heart surgery, procedures, and medicines.

Echocardiography , or an ultrasound of the heart, is the main imaging test. It can show fluid around the heart and whether pressure is affecting chamber filling or blood flow. An ultrasound may be performed quickly at the bedside if the person is unstable.

Echocardiography can show findings that support tamponade, such as compression of the right-sided heart chambers and marked changes in blood flow during breathing. These findings must be interpreted together with symptoms, examination results, and circulation. An effusion seen on a scan does not automatically mean tamponade.

Other tests may include:

An ECG may show a fast heart rate, low electrical signal strength, or electrical alternans , in which the ECG pattern changes as the heart moves within a large effusion. These findings are not present in every case.

A chest X-ray can appear normal when tamponade develops rapidly. With a large, slowly developing effusion, the heart's outline may look enlarged.

If fluid is drained, it may be tested for blood cells, bacteria, cancer cells, protein levels, or other features. Results can help identify the cause, but fluid testing does not always provide a definite answer.

- An electrocardiogram, or ECG, to examine the heart's electrical activity
- A chest X-ray to assess heart size and look for lung or chest problems
- Blood tests for anemia, infection, inflammation, kidney function, thyroid disease, or heart injury
- CT or MRI imaging when more detail is needed and the person is stable

Treatment and management

Treatment depends on the person's condition, the cause, and how quickly pressure is developing. When tamponade is causing unstable blood pressure or poor organ blood flow, drainage should not be delayed for nonessential testing.

Pericardiocentesis is a procedure in which a clinician guides a needle and then a thin tube, called a catheter, into the pericardial space. Ultrasound or other imaging is usually used to

improve accuracy. The catheter may stay in place temporarily so fluid can continue to drain.

Some people need surgery instead. A surgeon may create a pericardial window , an opening that allows fluid to drain from around the heart. Surgery may be preferred when there is traumatic bleeding, clotted blood, pus, recurrent fluid, a need for tissue testing, or an injury that must be repaired.

Supportive treatment may include oxygen and carefully selected intravenous fluids while drainage is being arranged. These measures are temporary and do not remove the pressure. Treatments that lower the heart's filling pressure can worsen circulation in some people, so emergency management requires close monitoring by experienced clinicians.

Cardiac arrest caused by tamponade requires immediate resuscitation and rapid relief of pressure around the heart. In traumatic cases, emergency surgery may be necessary.

After pressure is relieved, treatment focuses on the cause. This may involve treatment for infection, kidney failure, inflammation, thyroid disease, cancer, or an injury to the heart or aorta. Anti-inflammatory treatment may be used when active pericardial inflammation is present, but it does not replace drainage when tamponade is causing poor circulation.

A stable effusion without tamponade may sometimes be monitored rather than drained. The decision is based on symptoms, scan findings, effusion size and growth, and the suspected cause.

Complications

Without prompt relief, tamponade can cause obstructive shock . This means the heart is physically prevented from filling and pumping enough blood, even though the heart muscle may still be contracting. Reduced blood flow can injure the kidneys, brain, liver, and other organs. Severe cases can lead to cardiac arrest.

Possible complications of the condition or its treatment include:

The risk of recurrence varies with the cause. Effusions linked to cancer, infection, or ongoing inflammation may require additional treatment or longer monitoring.

- Recurrence of the pericardial effusion
- Persistent or repeated pericardial inflammation
- Bleeding
- Abnormal heart rhythms
- Infection

- Injury to the heart, blood vessels, lung, or nearby organs during drainage
- Constrictive pericarditis , in which a thickened or scarred pericardium restricts heart filling

Follow up

Follow-up is tailored to the cause and the likelihood that fluid will return. It may include repeat echocardiograms, symptom checks, physical examinations, and blood tests. If a drainage catheter was used, the care team may monitor how much fluid continues to drain before removing it.

Keep scheduled cardiology and primary care appointments even if symptoms improve. Follow-up may also involve oncology, infectious disease, kidney, rheumatology, endocrine, trauma, or surgical specialists.

Ask for clear instructions about activity, wound care, medicines, and when repeat imaging is planned. Take medicines only as directed. Do not stop anticoagulants like warfarin or apixaban , anti-inflammatory medicines, or treatment for another medical condition without speaking with the prescribing clinician.

Contact the care team promptly for gradually increasing breathlessness, chest discomfort, swelling, fatigue, fever, or a faster heartbeat. These symptoms need timely review but may not always represent recurrent tamponade.

Call emergency services for fainting, confusion, severe or rapidly worsening shortness of breath, marked weakness, clammy skin, or severe chest pain. These symptoms should not wait for a routine appointment.

Sources

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