CONDITION

Gas gangrene

Gas gangrene is a rapidly worsening bacterial infection that destroys muscle and produces gas within tissues.

WHAT IT IS
Rapid bacterial destruction of muscle that produces gas

BODY SYSTEM
Muscles, skin and whole-body circulation

MAIN SYMPTOMS
Severe pain, swelling, skin discoloration, fever

WHAT CAUSES IT
Clostridium bacteria entering damaged or poorly supplied tissue

HOW IT IS DIAGNOSED
Urgent surgery with tissue microscopy and culture

MAIN TREATMENT
Emergency surgery and intravenous antibiotics

CAN IT BE CURED?
Sometimes - rapid treatment can remove all infected tissue

IS IT AN EMERGENCY?
Yes - suspected gas gangrene needs immediate hospital treatment

LONG-TERM OUTLOOK
Early treatment improves survival; tissue loss may cause disability

Overview

Gas gangrene is a rare but life-threatening infection that destroys muscle and nearby soft tissue. This muscle destruction is called myonecrosis . It is usually caused by bacteria from the Clostridium group.

These bacteria grow especially well in tissue with little or no oxygen. As they multiply, they release toxins that damage cells, blood vessels and red blood cells. They can also produce gas within tissue. The main danger is not the gas itself but the rapidly spreading damage and the body's severe response to infection.

Gas gangrene may develop after a deep or contaminated injury, such as a crush injury, puncture wound or open fracture. It can also follow surgery. Less often, bacteria spread from inside the body without an obvious injury.

The condition can worsen within hours. Suspected gas gangrene needs immediate hospital treatment; waiting for a routine appointment is not appropriate.

Symptoms

Symptoms often begin suddenly and worsen quickly. Severe pain may be the first sign and can be much stronger than expected from the wound's appearance.

Other possible symptoms include:

Not everyone has visible gas or a crackling feeling, so their absence does not rule out gas gangrene.

The skin may initially look less affected than the muscle underneath. As tissue and nerves are destroyed, the area may become numb. Pain that suddenly lessens is therefore not always a sign of improvement.

Toxins and inflammation may affect the circulation and organs, causing very low blood pressure, reduced urine production, yellow skin or eyes, and collapse.

- Rapidly increasing swelling around a wound or painful area
- Skin that becomes pale, red, bronze, purple or black
- Blisters containing clear, brown or blood-stained fluid
- Thin, unpleasant-smelling fluid from a wound
- Fever, sweating, fast heartbeat or rapid breathing
- A crackling feeling beneath the skin caused by gas
- Weakness, dizziness, confusion or reduced alertness

Causes and risk factors

Most cases are caused by Clostridium perfringens . Other species, including Clostridium septicum , can also cause gas gangrene. These bacteria occur in soil, dust and the intestines of people and animals.

The bacteria usually enter through a wound and multiply in damaged tissue with a low oxygen supply. Risk is higher when an injury has crushed muscle, damaged blood vessels or left dead tissue.

Situations linked with gas gangrene include:

Gas gangrene can occasionally occur without an external wound. In this spontaneous form, bacteria may cross the bowel wall and travel through the bloodstream.

Spontaneous infection caused by C. septicum is associated with some bowel and immune-system conditions, including colorectal cancer, blood cancers and very low levels of infection-fighting white blood cells. This does not mean everyone with the infection has cancer. After the emergency is controlled, the hospital team may recommend tests for an underlying condition.

- Deep, contaminated or crush injuries
- Open fractures and major traumatic wounds
- Surgery involving the bowel or other contaminated areas
- Injection injuries
- Tissue with a poor blood supply
- Severe peripheral artery disease or diabetes-related foot damage

Diagnosis

Gas gangrene is suspected from the symptoms, speed of progression and appearance of the tissue. Treatment may begin before all test results are available.

Urgent surgery allows the team to inspect the muscle directly. Infected muscle may be swollen, discoloured, unable to contract and bleed very little because its blood supply is damaged.

Fluid and tissue samples are examined under a microscope and cultured to identify bacteria. Blood cultures may show whether bacteria have entered the bloodstream.

X-rays or CT scans can sometimes show gas in tissue, but gas may not yet be visible and can have other causes. MRI provides detailed images of soft tissue but must not delay necessary surgery.

Blood tests assess illness severity and effects on blood cells, kidneys, liver, muscles and clotting. Lactate may be measured because it can rise when tissues receive too little oxygen.

Treatment and management

Gas gangrene is treated in hospital as an emergency. The main treatments are immediate surgery and antibiotics like amoxicillin or doxycycline given into a vein.

During surgery, dead and infected tissue is removed in a procedure called debridement . More than one operation may be needed because the full extent of damage is not always clear at first.

If infection has extensively destroyed a limb and cannot otherwise be controlled, amputation may be necessary. It is not required in every case. Surgeons aim to stop the infection while preserving as much function as safely possible.

Intravenous antibiotics are started promptly and may initially cover several possible bacteria. The treatment plan can be adjusted when laboratory results identify the cause. For confirmed clostridial myonecrosis, specialist guidelines recommend antibiotics that kill the bacteria and reduce toxin production.

People who are severely unwell may need intensive care, including intravenous fluids, blood-pressure medicines, oxygen, ventilation, blood transfusion or kidney support.

Some specialist centres use hyperbaric oxygen, which increases the oxygen carried in the blood. Evidence of benefit is limited, and it must never delay surgery, antibiotics or transfer to an appropriate surgical centre.

After infection is controlled, further surgery may close or reconstruct the wound. Skin grafts, rehabilitation, mobility support or a prosthetic limb may be needed.

Complications

Gas gangrene can damage tissue beyond the original wound, while toxins entering the bloodstream may affect several organs.

Possible complications include:

Severe haemolysis can develop particularly quickly in some C. perfringens infections, causing anaemia, dark urine and yellow skin or eyes.

Complications are more likely when treatment is delayed or the person is already seriously unwell. Even with prompt care, the infection can be difficult to control.

- Loss of muscle, skin or a limb
- Sepsis and dangerously low blood pressure
- Breakdown of red blood cells, called haemolysis
- Kidney, liver or breathing failure
- Abnormal blood clotting and bleeding

- Long-term weakness, pain or reduced mobility
- Death despite treatment

Prevention

Not every case can be prevented, particularly spontaneous infections and those following major accidents.

Prompt, thorough care of deep or contaminated wounds can reduce risk. These wounds may need professional cleaning and removal of dead tissue or foreign material. Seek medical assessment for deep punctures, crush injuries, open fractures, wounds contaminated with soil or animal waste, and injuries with worsening pain or swelling.

Keep minor wounds clean and follow wound-care instructions. Do not inject non-prescribed substances, especially into muscle or damaged skin.

If you have diabetes, nerve damage or poor circulation, check your feet regularly and arrange assessment for ulcers, colour changes or wounds that are not healing. Managing circulation and blood glucose supports healing but cannot guarantee prevention.

Tetanus vaccination does not prevent gas gangrene. However, wound assessment may include checking tetanus protection because the same injuries can carry a tetanus risk.

Living with it and what to expect

Gas gangrene is an acute emergency rather than a long-term infection. During the first hours and days, treatment focuses on stopping tissue destruction and supporting the organs. Surgery may be repeated until the remaining tissue is healthy.

Once bacteria and dead tissue have been removed, the infection does not usually remain active for months or years. Recovery from the damage can take much longer.

Large wounds may need dressings, reconstructive surgery or skin grafting. Rehabilitation may include physiotherapy, occupational therapy and help with daily activities. After an amputation, healing, prosthetic fitting and learning new ways to move may take several months or longer.

Some people recover with few lasting effects. Others experience chronic pain, weakness, scarring or disability. Outcomes depend on the infection's location, the amount of tissue damaged, how quickly treatment began and whether organs were affected.

Sudden severe illness or limb loss can also affect sleep, mood and confidence. Psychological support, rehabilitation services and peer support can help.

Follow-up may include wound checks, rehabilitation reviews and assessment of any underlying condition. Report new fever, increasing wound pain, spreading redness, discharge or sudden swelling promptly rather than waiting for a routine visit.

When to get medical help

Call emergency services now if you or someone else has rapidly worsening severe pain around a wound, especially with swelling, skin discoloration, blisters, fever or a crackling feeling under the skin.

Emergency help is also needed for:

Do not wait to see whether symptoms settle. Do not drain, cut or treat the affected area yourself. A person who is faint, confused or severely unwell should not drive.

During recovery, contact the hospital or wound-care team promptly for new fever, worsening pain, increasing swelling, spreading redness, bad-smelling discharge or wound breakdown. Stable scars and rehabilitation needs can usually be discussed at routine follow-up.

- Confusion, fainting or difficulty staying awake
- Fast or difficult breathing
- Cold, clammy or mottled skin
- Very little urine
- Rapidly spreading purple or black skin changes
- Sudden severe illness after an injury or operation

Common questions

Is gas gangrene contagious?

It does not usually spread through ordinary contact. It generally develops when bacteria enter damaged, oxygen-poor tissue. Healthcare staff still use appropriate infection-control measures around wounds and body fluids.

Can gas in a wound mean something other than gas gangrene?

Yes. Air can enter during an injury or procedure, and other infections can produce gas. Imaging alone cannot determine the cause. Rapidly increasing pain, swelling or illness needs emergency assessment.

How quickly does gas gangrene develop?

It can progress over hours, although timing after an injury or operation varies. Treatment begins as soon as the condition is suspected.

Can gas gangrene be cured?

Sometimes. Surgery and antibiotics may control the infection before damage becomes overwhelming. Treatment cannot restore tissue that has already died, and severe cases can be fatal.

Does gas gangrene always lead to amputation?

No. Some infections can be controlled by removing only damaged tissue. Amputation may be needed when a limb is extensively affected or when it is the safest way to stop the infection.

Can gas gangrene happen without a wound?

Yes, although this is less common. Bacteria may spread from the bowel through the bloodstream. Clinicians may then investigate for a bowel problem, reduced immunity or another underlying condition.

Sources

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