CONDITION

Necrotizing soft tissue infection

A necrotizing soft tissue infection is a rapidly spreading bacterial infection that destroys tissue beneath the skin.

WHAT IT IS
Rapidly spreading infection that destroys tissue beneath skin

BODY SYSTEM
Skin, soft tissues, and sometimes muscles

MAIN SYMPTOMS
Severe pain, swelling, skin color change, fever

WHAT CAUSES IT
Bacterial infection, often through broken skin

HOW IT IS DIAGNOSED
Surgical examination with tissue samples and cultures

MAIN TREATMENT
Emergency surgery and intravenous antibiotics

CAN IT BE CURED?
Yes - with prompt surgery and antibiotics

IS IT AN EMERGENCY?
Yes - suspected infection needs immediate hospital care

LONG-TERM OUTLOOK
Recovery may include scarring, disability, and prolonged rehabilitation

Overview

A necrotizing soft tissue infection is a serious infection that spreads quickly through the tissues beneath the skin. "Necrotizing" means causing tissue to die. Soft tissues include fat, the strong tissue around muscles called fascia, and sometimes muscle itself.

Necrotizing fasciitis is the best-known type. It mainly affects the fascia. Fournier gangrene is a type involving the genitals or the area between the genitals and anus. These conditions are sometimes described as "flesh-eating" infections, but that term is not medically precise. The bacteria do not literally eat tissue. They cause inflammation, damage blood vessels, and release substances that injure tissue.

This condition is uncommon, but it is always a medical emergency. The infection can advance over hours and may cause sepsis, a dangerous whole-body response to infection. Early surgery

and antibiotics like amoxicillin or doxycycline offer the best chance of controlling it.

It can be difficult to recognize at first because the skin may not look severely affected. Pain that is much worse than expected from the visible injury is an important warning sign.

Symptoms

Symptoms often begin near a cut, wound, injection site, burn, surgical incision, or other area of skin damage. Sometimes there is no obvious point where bacteria entered.

Early symptoms may include:

The pain may seem out of proportion to what can be seen on the skin. However, not everyone has severe pain. Reduced sensation from nerve damage, diabetes, medication, or advancing tissue injury can make pain less noticeable.

As the infection progresses, the skin may become dusky, purple, grey, or black. Blisters may develop, sometimes containing dark or blood-stained fluid. Fluid may drain from the area, and the skin may feel unusually firm or crackle because of gas in the tissues.

Later symptoms can include low blood pressure, fast breathing, a rapid heartbeat, reduced urination, extreme drowsiness, or loss of consciousness. These can be signs of sepsis or shock.

Not every red, painful, or swollen area is a necrotizing infection. Cellulitis, abscesses, blood clots, and other conditions can cause similar symptoms. Because it is not possible to safely distinguish them at home, rapidly worsening symptoms need urgent assessment.

- Severe or rapidly worsening pain
- Swelling, warmth, or redness
- Tenderness extending beyond the visibly affected area
- Fever, chills, weakness, nausea, or confusion

Causes and risk factors

Necrotizing soft tissue infections are caused by bacteria. A single type of bacterium may be responsible, or several types may grow together. Group A Streptococcus is one recognized cause. Other causes include Staphylococcus aureus , certain bacteria that normally live in the bowel, and bacteria found in seawater.

Bacteria can enter through:

An infection can also develop after a minor injury that did not appear to break the skin. In some

cases, no entry point is found.

Anyone can develop this condition. Factors that can increase risk include diabetes, reduced blood flow, kidney or liver problems, cancer, obesity, and a weakened immune system. Heavy alcohol use and injected drug use can also raise risk. Recent surgery or a major injury may provide a route for infection.

Some people who develop necrotizing infections were previously healthy and had no clear risk factors.

- Cuts, punctures, bites, burns, or injection sites
- Surgical or childbirth-related wounds
- Pressure injuries or long-lasting skin ulcers
- Skin conditions that cause cracking or open sores
- Injuries exposed to contaminated fresh water or seawater

Diagnosis

Diagnosis begins with an urgent examination and assessment of how quickly the symptoms are changing. Blood tests may show inflammation, infection, organ stress, or changes in blood clotting. Blood cultures may identify bacteria in the bloodstream.

Ultrasound, CT, or MRI scans can show swelling, fluid, or gas in the tissues. However, a normal scan does not always rule out an early infection. Imaging should not delay surgery when the medical team strongly suspects a necrotizing infection.

The diagnosis is confirmed by examining the tissue during surgery. The surgeon looks for dead fascia or other damaged tissue and checks how easily tissue layers separate. Samples of tissue and fluid are sent to a laboratory for microscopy and culture. Cultures help identify the bacteria and guide antibiotic treatment.

Scoring tools based on blood test results may support an assessment, but they cannot safely exclude the condition on their own.

Treatment and management

Treatment starts in hospital as soon as the condition is suspected. It usually involves emergency surgery, intravenous antibiotics, and support for the body's organs.

During surgery, damaged and dead tissue is removed. This is called debridement. Removing

dead tissue helps stop the infection and allows antibiotics to reach healthier areas. A person may need several operations because further damaged tissue can become visible after the first procedure.

In some cases, removing part of a limb is the safest way to control extensive infection. Amputation is not needed for everyone, and surgeons aim to preserve healthy tissue whenever possible.

Broad-spectrum antibiotics are given through a vein to cover several possible bacteria. Treatment can then be adjusted when laboratory results identify the cause. Antibiotics are essential, but they cannot replace surgery because blood flow through dead tissue is poor.

Care may also include intravenous fluids, oxygen, pain relief, blood pressure support, and treatment in an intensive care unit. Nutrition is important because the body needs extra energy and protein to heal.

After the infection is controlled, wounds may require specialist dressings or negative-pressure wound therapy, which uses gentle suction. Skin grafts or reconstructive surgery may be needed to close larger wounds.

Hyperbaric oxygen therapy and immune globulin are sometimes considered in selected cases. Evidence for their benefit is uncertain, and they must never delay surgery or antibiotics.

Complications

The infection can damage skin, fat, fascia, muscle, nerves, and blood vessels. Possible complications include:

Some complications come from the severity of the illness rather than the wound alone. A long intensive care stay can cause muscle weakness, poor sleep, memory problems, and reduced stamina.

Necrotizing soft tissue infection can be fatal even with treatment. Prompt recognition and surgery improve the outlook, but they cannot guarantee a particular result.

- Sepsis, shock, or failure of organs such as the kidneys
- Major wounds, scarring, and long-term pain
- Loss of strength, movement, or sensation
- Amputation or loss of other affected tissue
- Blood clots and complications from prolonged hospital care
- Emotional distress, anxiety, depression, or trauma symptoms

Prevention

Not every necrotizing soft tissue infection can be prevented. It may follow a very small injury, and sometimes there is no visible wound.

Basic wound care may reduce the chance of bacteria entering damaged skin. Wash cuts and grazes with clean running water, keep them covered while healing, and follow instructions for surgical wounds. Seek medical advice if a wound becomes increasingly painful, swollen, hot, or red.

Avoid swimming or soaking in natural bodies of water when you have an open wound or a new surgical incision. Cover unavoidable exposure with a waterproof dressing. People with liver problems or weakened immune systems should be especially careful about exposing wounds to warm seawater or handling raw seafood, because certain marine bacteria can cause severe infection.

Managing diabetes and circulation problems can support wound healing. This lowers some risks but cannot remove them completely.

Good hand hygiene and keeping draining wounds covered may reduce the spread of bacteria. The necrotizing condition itself is not usually passed directly from one person to another, although some bacteria that can cause it are contagious.

Living with it and what to expect

The first days usually focus on controlling the infection and supporting vital organs. Repeated operations may be needed until no further dead tissue remains. The length of a hospital stay is shaped by the infection's location, the amount of tissue affected, and any complications.

After the infection has cleared, recovery may continue for months. Wounds need time to close, and skin grafts or reconstructive surgery may take place later. Physical or occupational therapy can help rebuild strength, mobility, and skills used in daily life.

Some people return to their previous activities. Others have lasting scarring, pain, numbness, weakness, reduced mobility, or changes in appearance. People who have had an amputation may need rehabilitation, a prosthesis, and changes at home or work.

Emotional recovery matters as well. Memories of emergency surgery or intensive care can lead to anxiety, low mood, nightmares, or fear that the infection will return. Psychological support, peer support, or trauma-focused care may help.

Routine follow-up may involve surgical teams, wound-care specialists, rehabilitation services, and primary care. Appointments are used to monitor healing, manage pain, restore function,

and plan further reconstruction if needed.

When to get medical help

Go to an emergency department now or call emergency services for severe or rapidly worsening pain, swelling, or skin changes, especially when the pain seems much worse than the visible injury.

Other emergency warning signs include:

Do not wait for all symptoms to appear. Do not drive yourself if you feel faint, confused, or severely unwell.

After hospital treatment, contact the follow-up team promptly if a wound becomes more painful, starts draining new fluid, develops spreading redness, or opens. Routine concerns about scar care, rehabilitation, sleep, or returning to work can usually be discussed at scheduled follow-up appointments unless symptoms are worsening quickly.

- Redness or swelling spreading over hours
- Purple, grey, or black skin
- Blisters, skin numbness, or blood-stained fluid
- Fever with confusion, faintness, fast breathing, or extreme weakness
- Severe illness after surgery, childbirth, an injection, or a wound

Common questions

Is necrotizing soft tissue infection the same as flesh-eating disease?

"Flesh-eating disease" is a non-medical name often used for necrotizing fasciitis. The bacteria do not eat flesh. They damage tissue directly and interfere with its blood supply.

Can it start from a small cut?

Yes. It can follow a small cut, graze, insect bite, injection, or other minor injury. It can also occur without an obvious break in the skin. Most small wounds do not develop this infection.

Is it contagious?

The tissue infection itself is not usually spread directly between people. However, bacteria such as group A Streptococcus can pass between people and usually cause much milder infections. Close contacts do not normally develop necrotizing infection, but public health teams may provide specific advice in some situations.

Will I need an amputation?

Not everyone needs an amputation. The decision is based on the amount and location of dead tissue and whether the infection can be controlled while preserving the limb. Surgery may still leave a large wound requiring grafting or reconstruction.

Can it come back after treatment?

A fully treated infection does not usually remain dormant. A new infection is possible if bacteria enter damaged tissue again, particularly when underlying risk factors continue. New rapidly worsening pain, swelling, or skin changes require urgent assessment.

How long does recovery take?

Recovery may take weeks to many months. It is influenced by the infection's severity, the number of operations, wound size, organ complications, and previous health. Rehabilitation and reconstructive care may continue after the infection itself has cleared.

Sources

- Centers for Disease Control and Prevention. Clinical Guidance for Type II Necrotizing Fasciitis
- Infectious Diseases Society of America. Practice Guidelines for the Diagnosis and Management of Skin and Soft Tissue Infections: 2014 Update
- Stevens DL, Bryant AE. Necrotizing Soft-Tissue Infections. New England Journal of Medicine . 2017;377:2253-2265
- Bonne SL, Kadri SS. Evaluation and Management of Necrotizing Soft Tissue Infections. Infectious Disease Clinics of North America . 2017;31(3):497-511
- Sartelli M, Guirao X, Hardcastle TC, et al. 2018 WSES/SIS-E Consensus Conference: Recommendations for the Management of Skin and Soft-Tissue Infections. World Journal of Emergency Surgery . 2018;13:58