

Diabetic foot ulcers: Causes, prevention, and management

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Description

A diabetic foot ulcer is an open sore or wound that usually forms on the bottom of the foot. It can result from a combination of factors common in people with diabetes, such as nerve damage (diabetic neuropathy), poor circulation, and a weakened immune system. These ulcers can vary in severity, from superficial sores to deep wounds that expose underlying structures like tendons and bones [1].

■ Causes and risk factors

Several factors contribute to the development of diabetic foot ulcers, often working in combination [2,3].

Diabetic neuropathy: High blood sugar levels can damage nerves, particularly in the lower extremities. This condition, known as diabetic neuropathy, can cause loss of sensation in the feet, making it difficult to notice injuries, blisters, or pressure sores that can develop into ulcers.

Peripheral Artery Disease (PAD): Diabetes often leads to poor circulation, especially in the legs and feet. PAD reduces blood flow to the extremities, impairing the body's ability to heal wounds. Without adequate blood supply, even minor injuries can progress to severe ulcers.

Foot deformities: Conditions such as bunions, hammertoes, and Charcot foot (a severe deformity caused by neuropathy) can increase pressure on certain areas of the foot, leading to the development of ulcers.

Inadequate foot care: Poor foot hygiene, improper footwear, and neglecting regular foot inspections can increase the risk of ulcers. Ill-

fitting shoes can cause blisters, calluses, and other problems that may lead to ulceration.

High blood sugar levels: Consistently high blood glucose levels impair the body's immune response and ability to heal, increasing the risk of infections and slowing down the healing process for existing ulcers.

Smoking: Smoking further impairs circulation and delays healing, exacerbating the risk of foot ulcers in people with diabetes.

■ Symptoms of diabetic foot ulcers

Diabetic foot ulcers can present with various symptoms, depending on their severity. Common signs are provided below [4,5].

Redness and swelling: The area around the ulcer may appear red and swollen, indicating inflammation or infection.

Pain or tenderness: While neuropathy can reduce sensation, some people may still experience pain or tenderness around the ulcer, especially if it becomes infected.

Black tissue (Eschar): In advanced cases, tissue around the ulcer may turn black, indicating necrosis or gangrene.

Visible wound: The ulcer may appear as an open sore or crater on the foot, often located under the big toe, heel, or ball of the foot.

■ Complications

Following are the complications of diabetes foot ulcers [6].

Infection: Infected ulcers can spread to the bone (osteomyelitis) or cause systemic infections,

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requiring hospitalization.

Gangrene: Inadequate blood supply can lead to tissue death (gangrene), which may necessitate amputation.

Amputation: Severe ulcers that do not respond to treatment or become gangrenous may require partial or complete amputation of the foot or leg.

■ Prevention of diabetic foot ulcers

Preventing diabetic foot ulcers is a top priority for individuals with diabetes. With proper care and vigilance, many ulcers can be avoided. Following are the key preventive measures [7,8].

Regular foot inspections: People with diabetes should inspect their feet daily for any signs of cuts, blisters, redness, or swelling. Using a mirror or seeking help from a family member can make it easier to check hard-to-see areas.

Proper footwear: Wearing well-fitting shoes that provide adequate support and cushioning can reduce pressure points and prevent injuries. Custom orthotic shoes or insoles may be recommended for individuals with foot deformities.

Good foot hygiene: Keeping feet clean and dry is essential. Wash feet daily with mild soap and water, and make sure to dry them thoroughly, especially between the toes. Moisturize dry skin to prevent cracking, but avoid applying lotion between the toes, as it can encourage fungal infections.

Regular medical check-ups: Regular visits to a healthcare provider or podiatrist can help detect potential problems early. Professional foot care, including trimming toenails and treating calluses, can prevent injuries that might lead to ulcers.

Managing blood sugar levels: Keeping blood glucose levels within the target range helps reduce the risk of neuropathy and other complications that contribute to foot ulcers.

Avoiding smoking: Quitting smoking can improve circulation and overall foot health, reducing the risk of ulcers.

■ Management and treatment of diabetic foot ulcers

If a diabetic foot ulcer develops, prompt and appropriate treatment is essential to prevent complications. Treatment strategies are given below [9,10].

Wound care: Proper wound care is crucial. This may involve cleaning the ulcer, removing dead tissue (debridement), and applying dressings that promote healing. Specialized wound care centers may offer advanced treatments, such as negative pressure wound therapy or growth factor applications.

Offloading: Reducing pressure on the ulcerated area, known as offloading, is essential for healing. This may involve wearing special shoes, boots, or casts to relieve pressure on the affected area.

Infection control: If the ulcer becomes infected, antibiotics may be prescribed. In severe cases, hospitalization may be required for intravenous antibiotics or surgical intervention.

Blood sugar management: Tight control of blood sugar levels is critical for promoting healing and preventing further complications.

Surgical intervention: In some cases, surgery may be necessary to remove infected or dead tissue, correct foot deformities, or improve circulation. In extreme cases, amputation may be required to prevent the spread of infection.

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