

Diabetic foot ulcer

What you're feeling

A diabetic foot ulcer usually starts where your shoe or your sock rubs, often under the ball of the foot, on a bent toe, or on the side of a bony bump. Because diabetes can dull the feeling in your feet, the first sign is often not pain at all. It may be a blister, a crack between the toes, a callus that turns dark, or fluid on your sock. When there is pain, it tends to sit under the ulcer and gets worse when you stand or walk, and eases when you are off your feet.

Several things work together to cause this. Nerve damage can make your toes curl down like claws and can tighten the tendon at the back of your ankle, which shifts extra pressure onto the front of your foot. Dry, cracked skin from reduced sweating lets bacteria in. Narrowed blood vessels below the knee mean less blood reaches the wound to heal it. Problems are more common if you have had diabetes for more than a decade, or if your blood sugar has been hard to control.

Daily life changes in quiet ways. You may find you are checking your sock for fluid each morning, or choosing flat, roomy shoes because anything snug rubs the sore spot. Walking the dog, standing at the stove, or a trip to the shops can become things you plan around. Some people notice swelling, warmth and redness in the foot, and the foot may slowly change shape. If infection sets in, you might feel feverish or shaky, and your blood sugar can become harder to manage. A deep infection can sometimes be the first sign that someone has diabetes at all.

If the joints in the middle of your foot break down, a condition called Charcot arthropathy, the foot can become red, hot and swollen, and may look infected when it is not. Pain is present in up to 50% of these cases, so a painless, warm, swollen foot still needs checking.

What's actually happening

A foot ulcer is not just a sore spot. It is the end point of several slow changes that diabetes causes in your feet, and understanding them helps explain why the ulcer appeared where it did.

The first change is in your nerves. Over time, high blood sugar damages the nerves that carry feeling from your feet to your brain. Think of the wiring in a house: if the alarm bell is disconnected, you never hear it ring. When the nerves in your feet stop reporting, you cannot feel a stone in your shoe, a blister forming, or a callus rubbing

raw. This loss of feeling is called loss of protective sensation, and it is the most common reason these ulcers start. The nerves that control sweating can be affected too, so the skin dries out and cracks, giving bacteria an easy way in.

The second change is in the shape and mechanics of your foot. Small muscles inside the foot weaken, while the stronger muscles on the outside keep pulling. The result is toes that curl down like claws and a tendon at the back of the ankle that tightens. This shifts your body weight onto the ball of the foot, so the same spot takes a pounding every time you stand. Standing pressure under the foot can reach 400 kPa, and without the warning signal of pain, that pressure never eases off. The skin eventually breaks down under the load.

The third change is in your circulation and your defences. Diabetes narrows the medium-sized blood vessels below the knee, so less blood reaches the wound. Blood carries the oxygen and building blocks a wound needs to close, so with poor circulation, healing slows or stalls. High blood sugar also weakens the immune system, and it can blunt the usual signs of infection such as redness, warmth and pus. That is why an infected ulcer may look surprisingly calm on the surface while trouble spreads beneath.

None of these changes can be fully reversed once they have happened. What can be done is to take pressure off the ulcer, improve blood flow where possible, treat infection, and protect the rest of your foot from the same fate.

What we can do about it

Dr Kieran Hirpara, an orthopaedic surgeon at Mater Private Hospital Rockhampton, starts with the least invasive options that suit your condition. Patients are generally referred to our clinic by their GP; if a physiotherapist has suggested you see us, you will still need a referral from your GP in order to be eligible for the Medicare rebate. At the clinic visit we take a history, examine your foot, and arrange imaging where it is needed. Because this is a long-standing problem, we usually begin with non-operative care and consider surgery when that has not given enough improvement.

The first step is taking pressure off the ulcer so it can close. This is called offloading, and it means spreading your weight over a larger area of the foot. Options include a healing shoe, a custom insole, or a total contact cast, a closely fitted cast that protects the foot while you walk. The cast is changed every 2 to 4 weeks until redness and swelling have settled and the foot's temperature matches the other foot. A walking brace is an alternative that comes off more easily, though a badly changed foot shape can make it hard to wear. Dressings keep the wound moist, soak up fluid, and guard against infection. Alongside this, we teach daily foot checks, safe nail and callus care, and how to choose footwear that does not rub. Therapeutic shoes with cushioned insoles protect your feet once the ulcer has healed. Care from a team that may include your GP, a diabetes educator, a podiatrist and a vascular specialist matters here: foot care programs of this kind, combined with patient education, can reduce lower limb amputation rates as much as 45% to 60%. Some wounds also respond to added treatments, such as shock wave therapy combined with standard care, which led to complete wound closure in 53.33% of cases versus 33.33% with standard care alone, with healing in 60.8 days versus 82.2 days.

If infection has reached the bone, a condition called osteomyelitis, or if an abscess has formed, surgery becomes part of the plan. This usually starts with cleaning out the infected tissue, called debridement, and antibiotics

matched to the bacteria found. Sometimes bone that is pressing on the wound needs trimming, a tight tendon at the back of the ankle needs lengthening, or a curled toe needs straightening. For severe wounds, a skin stretch system or negative pressure wound therapy, which uses gentle suction to help the wound close, can be used. Where the foot has become unstable or unbraceable, surgery can realign and fuse the joints to create a stable, walkable foot. Amputation of part of the foot is sometimes needed, and we discuss that carefully with you when it is.

What to expect

A diabetic foot ulcer can heal, but it rarely heals quickly, and it rarely heals on its own. Healing depends on five things being in place: blood sugar that is under control, pressure taken off the wound, enough blood reaching the foot, no infection, and good nutrition. If any one of these is missing, the ulcer tends to sit still or keep coming back rather than close.

With treatment, the usual course is weeks to months rather than days. The wound is checked and cleaned at each cast or dressing change, and X-rays are repeated every 4 to 6 weeks to watch the bones. Those numbers give you a sense of the pace even with active care.

It is honest to say what happens when the ulcer is left alone. Infection can reach the bone, and diabetic foot ulcers lead to about 85% of lower limb amputations in people with diabetes. If part of the foot does need to be removed, the outlook afterwards varies. After one type of midfoot amputation, 94% of patients developed wound complications and only 44% walked with a prosthesis. After amputation below the knee, one third of patients do not survive the first two years, and about 30% of amputees lose the other leg within 3 years. These figures are the reason your team pushes hard on offloading, circulation and infection control before things reach that point.

If the ulcer does close, the job is not finished. The same spot can break down again, so therapeutic shoes with cushioned insoles and regular foot checks become part of your routine. Some people regain their original walking ability fully after treatment of stubborn ulcers, and most toe transfers cause no obvious change in how the foot works, with 86% of patients recovering completely within 6 months. The realistic picture is a wound that closes with steady care, then a lifetime of protecting your feet to keep it closed.

When to see someone

See your GP if you notice any break in the skin on your foot that does not close within a few days, a blister, crack or callus that looks darker or weeps fluid, or a spot that keeps rubbing in the same place. Ask for a specialist review if you cannot feel the sore spot at all, if the wound is deeper than the skin, or if you can see bone or tendon in it. Go to an emergency department if you have fever, chills or shakiness, if redness or swelling is spreading up the foot or leg, if the foot is hot, red and swollen with no injury to explain it, or if your blood sugar has become suddenly hard to control. These can signal a deep infection or an abscess, and they need same-day assessment rather than a GP appointment.