

DIABETES FOOT CARE

Introduction

Diabetic foot ulcers are the commonest cause of non- traumatic lower-extremity amputations (LEAs). The diabetic patient's feet should be examined regularly. In particular, patients at risk should be followed up.

Pathophysiology

- Peripheral neuropathy affects sensory, motor, and autonomic pathways
- Because of sensory neuropathy patient does not experience signs of pain or pressure from footwear, from inadequate soft tissue padding, or from infection
- Autonomic neuropathy produces chronic venous swelling
- Motor peripheral neuropathy can produce bony deformity, which, combined with the loss of protective sensation, can produce skin ulceration from pressure or from shear forces
- Motor neuropathy leads to muscle weakness and intrinsic muscle atrophy in the hands and feet
- Severe tissue swelling can lead to ulceration and infection
- Ischemic peripheral vascular disease is the second risk factor for developing diabetic foot ulcer and infection. Immune deficiency is often seen in this patient population.
- The diabetic foot is susceptible to abnormal mechanical stresses which can initiate a foot infection that cannot be resolved easily
- Pressure over bony prominence is another cause for skin breakdown in patients with diabetes

Screening for foot problems and recognition of patients at risk

- The feet of all diabetic patients should be examined once a year
- Patients at risk should be recognized on the basis of the findings and they should be followed up frequently
 - Previous ulcers and infections
 - Callus
 - Macerations and bullae of the skin
 - Deformities of the feet and toes.
 - Hammer toes
 - Hallux valgus
 - Prominent metatarsal bones in the base of the foot
 - Decreased sense of touch (neuropathy)
 - Decreased circulation in the feet, previous vascular surgery

Examination of a diabetic patient's feet

1. Search for signs of neuropathy

- Tingling, paraesthesias, cramps, restlessness, lack of sensation, pain, and hyperaesthesia are the signs of sensory neuropathy
- Disappearance of the sense of vibration, absence of the Achilles tendon reflexes and weakened sense of touch are the most easily recognized signs of neuropathy

2. The examination of the shoes and their suitability

- Is the shoe big enough (= the length of the foot + 1 - 1.5 cm)? Are there distensions around the first and second toes? Where is the lining worn?

- Are the socks of a suitable size and made of soft cotton?
3. Examine the circulation
- Are there symptoms of claudication?
 - Cold feet and a thin, gleaming and reddish skin suggest poor arterial blood flow
 - The femoral arteries should be auscultated and the peripheral arteries should be palpated. Marked macroangiopathy can be excluded only if peripheral pulses are clearly palpable
4. Look for signs of tarsal deformities, changes in the skin, changes in the nails, ulcers and lacerations (also between the toes), and infections
- Thickening of the skin in the pressure areas

Treatment

Preventive strategies

- Preventive strategies combine patient education, prophylactic skin and nail care, and protective footwear
- Foot-specific individualized patient education - Low-risk individuals must wear nonconstrictive shoes. Soft leather or athletic footwear decreases the risk of tissue breakdown from direct pressure. Cushioned stockings are helpful. Nails should be cut transversely to decrease the risk of an ingrown toenail. Once a problem arises, the patient is instructed to seek medical attention immediately
- When individuals progress to a higher degree of risk, they require accommodative footwear and prophylactic skin and nail care. Depth-inlay soft leather laced oxford shoes with accommodative pressure and shear-dissipating custom foot orthoses (insoles) have been shown to appreciably decrease the development of a diabetic foot ulcer

Ulcer treatment

- The first step in the treatment of a patient with diabetes who has a foot ulcer is medical management of the systemic diabetes
- Neuropathic ulcers are caused by pressure or by shear forces. Once the ulcer is unroofed and the necrotic tissue is debrided, the soft tissue base reveals healthy granulation tissue. If the ulcer is unroofed and the tissue at the base is necrotic, the ulcer is likely to be ischemic. A vascular surgeon should evaluate patients with ischemic ulcers to determine if the limb can be salvaged. If the ulcer is neuropathic, noninvasive vascular testing is in order in the absence of palpable pedal pulses
- Ischemic ulcers generally require angioplasty or vascular bypass surgery to achieve wound healing. Neuropathic ulcers require debridement of nonviable or infected tissue, combined with local wound care and offloading
- Keep dry wounds moist with saline-soaked dressings or hydrocolloid gels. Treat wounds that produce massive quantities of exudative material with absorbant materials and dressings while keeping the wound moist
- Offloading distributes weightbearing pressure over a larger surface area and provides an interface to decrease shear forces. The optimal offloading device is the total contact cast (TCC). This device acts to dissipate weightbearing and shearing loads by eliminating foot or ankle motion, using an interface material to distribute pressure and shear forces. When the ulcer shows appreciable improvement, foot care can be simplified with prefabricated walking braces. When the swelling decreases or when ankle immobilization is not necessary, healing shoes can be used

Depth classification	Definition	Treatment
0	At-risk foot, no ulceration	Patient education, accommodative footwear, regular clinical examination
1	Superficial ulceration, not infected	Offloading with total contact cast (TCC), walking brace or special footwear
2	Deep ulceration exposing tendons or joints	Surgical debridement, wound care, offloading, culture-specific antibiotics
3	Extensive ulceration or abscess	Debridement or partial amputation, offloading, culture-specific antibiotics

- Following wound healing, patients should use offloading permanently

Persistent or recurrent ulceration

- Ulcers that do not heal or that recur in appropriate footwear require careful evaluation. Consider surgery when accommodative methods are unsuccessful. Plastic surgery intervention may be indicated. The key to success in these patients is patient education, accommodative proper footwear, and careful monitoring

Amputation

Partial and whole foot amputations frequently are necessary as treatment for infection or gangrene. The goal of treatment is preservation of function, not just preservation of tissue. Amputation surgery should be the first step in the rehabilitation of the patient.

Patient education

- The shoes must be suitable
- Minor injuries should be avoided
- Walking bare foot outside should be avoided
- The feet should be kept clean
- Artificial warming is harmful
- The nails should be treated carefully
- Fungal infections should be prevented effectively
- The formation of callus should be prevented
- Regular moisturizing is important

Complications

- Deep infection and amputation.

Brain Teaser

1. For all patients with diabetes, perform an annual comprehensive foot examination
 - a. Once every 2 years
 - b. Once every 3 years
 - c. Once every year**
 - d. None of the above
2. **Comprehensive foot examination should include**
 - a. inspection,

- b. assessment of foot pulses, and
- c. testing for loss of protective sensation
- d. All of the above**

3. Foot self-care education should be given to all patients with diabetes
- a. **True**
 - b. False