

Diabetic Ulcerations and Foot Care

Mark Charrette, DC

According to the American Diabetes Association, 24 million adults and children in the United States live with [diabetes](#). One of the most common problems diabetics face is foot ulcerations; when not properly cared for, such ulcerations can lead to loss of part or all of the lower extremity. Fifteen percent of all diabetics develop some type of foot ulcer, and the resulting infections account for more in-hospital days than any other complication of diabetes. Each year, about 82,000 nontraumatic lower-limb amputations are performed on diabetic patients. Foot lesions in diabetics commonly result from a combination of diabetic peripheral neuropathy and peripheral vascular disease, with the primary event being the development of an insensitive foot.¹

The feet and legs are target organs for many of the manifestations and complications of diabetes mellitus, some of which may result in disturbances of ambulation, while others may threaten the viability of the lower extremity. Gangrene is approximately 50 times more frequent in diabetic men than in nondiabetic men over age 40, and 70 times more frequent in women in this same age group.²

Decreased Circulation, Sensation Loss and Weakness



Another problem in diabetics is a decrease in circulation to the extremities. Peripheral vascular disease is estimated to occur 11 times more frequently and to develop about 10 years earlier in diabetics. Diabetic patients in general have higher levels of circulating cholesterol and lipids. This causes the development of atherosclerosis, arteriosclerosis, coronary heart disease, and multiple microcirculatory lesions far more frequently in the diabetic patient when compared to the normal population.³

A common problem in diabetic patients is loss of nerve sensation. It is important that the person who is unable to feel pain get in the habit of self-observation every day to check for red spots, ingrown toe nails, splits, cracks, calluses, nail infections and changes in interdigital spaces. Lack of sensation can cause a simple thing such as a pebble in a shoe to wear a cut in the sole of the foot or a burn to the foot from walking on hot pavement.

Motor-nerve problems can cause weakness of the intrinsic muscles of the foot, including [the lumbricals](#). These and other short muscles are responsible for stabilizing the foot during midstance and propulsion periods of the gait cycle. The foot is made of 26 bones held together by numerous ligaments and moved by 42 intrinsic and extrinsic muscles. The smooth interplay of the successive motions within the foot that takes place in standing, walking, and running is coordinated by the presence of intact nerves. The sensory nerves are constantly giving feedback to the brain, and the motor nerves in turn need to make the proper muscles contract at the right time. In the diabetic person, the function of these nerves may be compromised, and abnormal formations and motions may result.

In chronic cases of diabetes, it is common to see weakness in the lumbricals, which normally function in the extending of the toes and flexion at the metatarsophalangeal joints. This creates an imbalance between the long, deep toe flexors and long extensors of the toes. This intrinsic muscle malfunction causes a protrusion of the ball of the foot and in advanced stages, a pes cavus and hammer toes.⁴ This deformity causes a shift of the fat pad that normally shields the ball of the foot.

In a growing or grown person, when we see plantar prominence of the metatarsal heads and extension subluxation of the toe bases, this in itself is suggestive of the presence of diabetes mellitus. Normally, the foot distributes the weight evenly over the foot; but in the deformed foot, overloading of certain parts of the foot becomes a problem, which leads to local thickening of the skin, followed by callus formation and eventually ulceration of the skin.

Foundational Protection and Support

Custom shoes are available to the chiropractor that help alleviate diabetic symptoms in the foot. The most sophisticated of these shoes are crafted with individually designed stabilizing orthotics inside that support all three arches of the foot. Newer high-tech trends in orthotic manufacturing can help the diabetic patient by offering sound postural support, temperature regulation to keep the foot cool and dry, and a design that is made specifically for that person's foot. With high-tech footwear permeating the marketplace, neuropathic ulcerations have become less frequent, no doubt coinciding with the availability of proper footwear.⁵

To help alleviate the problem of sores developing due to pressure being put on certain areas, custom

orthotics should be prescribed, which will help cushion the foot and redistribute the stress over the whole sole of the foot.⁶ Diabetics should avoid going barefoot and should always shake out their shoes before putting them on to remove any foreign objects that may have gotten in them.

A rule of thumb when examining an ulcer on a foot is to look at the foot and determine if it has good vascular competence. If it is hot and red, the prognosis for healing is good; if it is cool and bluish, other types of therapy may need to be considered. A proper pair of shoes may improve collateral circulation and [muscle metabolism](#).

Prevention Is the Key

Diet and exercise seem to be the keys to preventing adult-onset diabetes. For the patient with diabetes, management of the condition should include diet, exercise and proper supplementation. If the patient is losing sensation to the feet due to neuropathy and vascular challenges, it is vital that they protect those feet with stabilizing orthotics, daily inspection and use of a program to keep the skin of the feet from drying out and cracking. Lack of good foot care can set up a battle against infection, which is not easily won and may lead to amputation.

References

1. Berkow R (ed.). *The Merck Manual of Diagnosis and Therapy*. Rahway, NJ: Merck Sharp & Dohme Research Labs Pubs, 1987:1082.
2. *Ibid*, pg. 389.
3. Guyton AC. *Textbook of Medical Physiology, 7th Edition*. Philadelphia: W.B. Saunders Co., 1986:935.
4. Brodoff BN. *Diabetes Mellitus and Obesity*. Baltimore: Williams & Wilkins, 1982:716.
5. Rifkin H, Porte D (eds.). *Diabetes Mellitus: Theory and Practice, 4th Edition*. New York: Elsevier Science Publishing, 1990:809.
6. Hyland JK. "Diabesity" and lower extremity support. *Practical Res Studies*, 2010;24(3):1-4.

NOVEMBER 2011