Neuropathy, Charcot Joint Disease and Partial-Foot Amputations
by Seamus Kennedy, CPed

“An ounce of prevention is worth a pound of cure.”
– Benjamin Franklin

When it comes to peripheral neuropathy, this is certainly great advice. The presence of, or potential for, any form of neuropathy must be given full attention. It is the signal that serious foot complications may not be too far away and could arise at any time. The consequences of such complications could include all kinds of additional problems, such as pain, foot ulcers, Charcot joint disease, amputation and even death.

What Is Neuropathy?
In its simplest form, neuropathy is nerve damage. Many people may develop this nerve damage as a result of trauma, genetic conditions such as spina bifida, alcohol abuse, and diseases such as diabetes. Peripheral neuropathy, which often affects the feet and hands, can cause the loss of full sensation in the nerve endings in these areas, as well as other problems. (For information on other aspects of neuropathy, see pages 42-43).

Peripheral neuropathy is most commonly a result of complications from diabetes. Elevated blood glucose levels will cause this decrease in nerve function over time. This, in turn, can lead to a loss of sensation and then damage to the skin. In fact, one of the difficulties in treating patients with neuropathy is that they may be doing damage to themselves and not know it because of the diminished feedback from their nerves.

Since this loss of feeling usually starts at the extremities, in the hands and feet, particular attention needs to be paid to any wounds or lesions that may begin to develop there. Once damage is done, the healing process is also often impaired with these patients, making the recovery much slower.

Because of the repetitive stresses and constant weight on the feet during walking, the foot is the main site for ulceration for patients with peripheral neuropathy. It is also very difficult to heal these foot ulcers because most patients want to remain active and prefer not to sit around waiting for wounds to close.

The best solutions for these problems are:
1. Prevent the neuropathy, if at all possible.
2. Once neuropathy is present, immediately have your podiatrist treat any skin calluses or potential skin breakdown.

Charcot Joint Disease
One of the most advanced complications of neuropathy occurs when the joints of the foot begin to break down. This is more commonly known as Charcot (pronounced “shark-oh”) joint disease. Although it occurs in less than 1 percent of people with diabetes, it is a debilitating condition that needs to be treated aggressively if amputation is to be avoided. Several theories on this destructive process have been advanced, but the beginnings of the disease are not yet fully understood. It is accepted that there are many factors that lead to the condition.

The two primary components leading to Charcot joint disease are the existence of neuropathy and some trauma. This begins a cycle of degenerative joint disease and ligament laxity and is often accompanied with increased blood flow to the foot, which in turn may weaken healthy bone. In the early stages, a patient with neuropathy in both feet may notice swelling in only one foot; the temperature of the foot may also be elevated.

Due to the presence of neuropathy, the initial onset of Charcot may or may not be accompanied by foot pain. The breakdown
in foot structure usually occurs in the middle of the foot. This leads to prominent bone displacement, also known as subluxation, which often creates areas of localized high pressure on the skin. Once this begins, it is essential to offload the high-pressure locations and redistribute the weight evenly across the entire bottom of the foot. In advanced cases, taking all weight off of the foot may be necessary.

Charcot joint occurs in several stages, and early detection will greatly limit the damage while the disease is treated with conservative measures. If you have any sign of Charcot joint disease, it is therefore essential that you see a podiatrist immediately.

The most basic treatment is to get properly fitting shoes that will accommodate the swelling and allow adequate room for cushioning foot orthoses. Good shoes will include the following features:

- Firm heel counters (the back section of the shoe that goes around the heel, holding it in place) and uppers to help control the foot in the shoe and prevent excessive motion and rolling
- A firm and possibly wide outsole (the bottom tread of the shoe that contacts the ground) to provide a stable base for the foot
- An extra-depth construction with a removable inlay (sometimes referred to as the insole or sock liner) that provides added cushion. This inlay can be removed to allow room for a custom foot orthosis if prescribed.

In cases where the swelling has progressed too far, it may be necessary to buy two different-sized shoes of the same style! An alternative is to purchase custom-molded shoes that are made individually from plaster casts of each foot and include their own custom insoles. (Much like orthotics, these insoles are custom-fit in the shoes to ensure the correct support and balance.)

Full-foot custom-molded orthoses can be made with relief areas for the places where there is high pressure.

The right materials will provide cushioning, reduce friction, and protect the skin from breakdown. They will also help control the foot position and reduce excessive pronation (rotation of the foot so that excess weight is on the inside of the foot). Foot orthoses with soft-top covers will protect the skin, but they need to be refurbished frequently before they wear down too much.

Correct management of Charcot joint disease requires constant vigilance and frequent checkups of your feet by a podiatrist or other qualified expert. These professionals will evaluate the effectiveness of your current shoes and orthotic treatment, inspect the integrity of your skin, note changes in the size, shape and temperature of your feet, address the presence of any calluses forming on the skin, etc.

If the disease advances to the later stages, treatment will become more aggressive. All over the country, wound clinics have become specialists in treating and healing stubborn ulcers. Some of the options available include one or more of the following:

- The use of an ankle-foot orthosis (AFO) to offload the bottom of the foot and control the motion of the foot and ankle (the type and style of AFO that will be used depends on the level of control required).
- Total Contact Casting (TCC) to fully transfer all of the weight away from the surface of the foot
- Complete rest for the patient to allow the wound to close
- Complicated surgeries to rebalance and/or fixate the foot.

In addition, a host of specialized wound medicines and techniques are available to promote the growth of healthy skin and prevent infections.
Partial-Foot Amputations and Toe Fillers

Sometimes, despite the best of intentions and efforts, nothing can be done to prevent the advancement of wounds and ulcers. To limit further, and far more serious, complications, such as gangrene, sometimes the best option is to amputate. There are many things to consider in deciding how much to amputate, and the decision will depend on such variables as the patient's weight, activity level, vascular system integrity, and amount of remaining healthy tissue. Though some amputations may require a prosthetic device, many foot amputations will remove only a small part of the foot or a single toe.

These partial amputations do not usually require prosthetic devices. However, patients can benefit from a toe filler that mimics and replaces the part that has been removed. Good fillers may allow patients to continue wearing their existing wardrobe of footwear, and cosmetic acceptance can often be a big part of getting beyond the surgical loss. Without a toe filler, the foot may have too much room and slide inside the shoe, or the upper may crumple or collapse at the site of the missing digit or digits. Toe fillers can be made from a variety of materials, such as foam or cork, and are often incorporated onto custom foot orthoses. They can then be moved from shoe to shoe.

If the level of amputation is more severe and whole aspects of the forefoot have been removed, custom shoes may be required. These shoes can be designed with matching fronts so that, even though one foot may have a significant amputation, both shoes will appear to be the same size and shape from the outside. They may also need stiff soles and rockers (soles that gently angle up in the front to help the foot roll through each step) to prevent excessive bending during the stride.

Peripheral neuropathy is a serious condition that can lead to Charcot joint disease and possible amputation. Paying full attention to your foot health is one more way to help ensure the continuation of an active and full life.

(For a related article about Charcot joint disease, please see pages 30-31.)

About the Author
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