

Understanding the Role of Physical Therapy in Diabetic Peripheral Neuropathy

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Physical therapy is an excellent, yet often overlooked, adjunctive therapy in the treatment of diabetic peripheral neuropathy. I believe this is due to the sheer magnitude of the problems associated with diabetes and the lack of implementation of comprehensive, multidisciplinary treatment protocols for the treatment of diabetics.

There are an estimated 23 million diabetics in the United States. That is 7% of the population. It has been estimated by the year 2034 that the number will double far surpassing 44 million. Peripheral neuropathy affects 70 percent of diabetics and 60% of all non-traumatic amputations occur in diabetics. It has been estimated that almost 50% of these amputations are preventable with proper foot care protocols.

Neuropathy is a major cause of diabetic amputations. Diabetic peripheral neuropathy is not only a painful condition but can also affect multiple organ systems and can manifest itself as everything from mild to severe pain, lack of balance, dizziness, fainting, wild swings in blood pressure, GI problems, muscular wasting, foot deformities and severe dry skin.

Symptoms of diabetic peripheral neuropathy can be as benign as annoying tingling and numbness to severe debilitating pain. The symptoms of neuropathy can start from early in the course of diabetes and often can actually be one of the hallmark symptoms that lead to diagnosis. The highest rates of neuropathy are among patients who have had diabetes for the last 25 years; but the rate is also increased in those patients with poorly controlled blood sugars and obesity.

The perceived cause of diabetic neuropathy is multi-factorial. Research has shown that everything from metabolic factors such as high blood sugars and duration of diabetes; neurovascular factors such as damage to the blood vessels carrying oxygen and nutrients to the nerves; autoimmune factors that cause inflammation in the nerves; mechanical injury to nerves such as tarsal tunnel syndrome and life style factors such as smoking and alcohol abuse. Many of these causes can be mitigated by lifestyle changes.

Signs and symptoms of diabetic neuropathy are numbness, tingling and pain in the feet and/or hands usually in a stocking glove distribution. Muscular wasting causing an increasing intrinsic minus cavus foot type, i.e., a progressively high-arched foot, is also quite common. Other symptoms can be fainting or dizziness due to drops in blood pressure, problems with indigestion and nausea, and a generalized weakness causing balance issues.

Diabetic neuropathy is most commonly described as a peripheral sensory neuropathy but is also important to understand that it also affects the motor and autonomic systems.

The **sensory neuropathy** usually affects the feet first and is often noticed earlier by the physician and not the patient. It starts as numbness or the inability to discern pain or temperature. It is often described as a burning and cramping sensation and can progress to extreme sensitivity and pain; especially at night.

Autonomic neuropathy affects the nerves that control the heart and blood pressure, many internal organs, and even the sweat glands. This can lead to orthostatic hypotension, difficulty swallowing, decreased symptoms of hypoglycemia, digestive problems, and dry, cracking skin.

Motor neuropathy causes muscular wasting and weakness that can lead to foot and ankle deformities as well as increasing gait abnormalities. Often a loss of balance and coordination accompanies increasing symptoms and even a loss of ankle reflexes can occur. Foot deformities lead to pressure ulcerations which lead to amputations.

How is diabetic peripheral neuropathy diagnosed? Usually diagnosis is made on the basis of physical exam and symptoms. The American Diabetes Association recommends that every diabetic have a comprehensive foot exam yearly to check for peripheral neuropathy and other foot-related complications. Those diabetics already diagnosed with peripheral neuropathy need more frequent exams due to the higher incidence of foot related complications in this group.

In a comprehensive foot exam, the podiatrist will assess the circulation, skin, sensory perception, and bones of the foot. Sensation is assessed with a temperature probe, a tuning fork and a mono-filament to assess light touch and pin-prick. If any of these exams are abnormal, the podiatrist may order non-invasive arterial doppler studies to further assess circulation and nerve conduction studies and electromyography to assess the extent of the neuropathy. Nutritional studies, neuropathy screening blood work and as well as a thorough biomechanical exam are also important to assess for other complicating factors that may increase the symptoms of neuropathy; such as a thiamine deficiency, hypothyroidism and mechanical tarsal tunnel syndrome.

How is diabetic neuropathy treated? The first line of therapy for diabetic neuropathy is glucose control. Multiple complication studies have shown that progressive neuropathy can be prevented or at least slowed with tight glucose control.

Medications for pain control are often needed to treat the symptoms of neuropathy. Medications used for symptomatic control fall into many different classes: anti-inflammatories, anti-depressants, anti-convulsants, opioids and opioid-like narcotics.

Many patients require combination therapy to suppress their symptoms. Topical anesthetic therapies can also be helpful.

Nutritional therapy with high dose B vitamins and even some medical grade food supplements have been helpful in some patients with peripheral neuropathy.

There are a number of modalities have been seen to be helpful for patients that cannot control their symptoms with medications or cannot tolerate the side effects of these medications. Modalities such as electrical nerve stimulation with a TENS unit, light therapy, laser therapy and magnetic therapy are commonly introduced. Biofeedback and acupuncture have also been seen to be effective for some patients, but are less commonly utilized.

Spinal cord stimulators have recently become more popular in the treatment of diabetic peripheral neuropathy pain. Commonly used for chronic regional pain syndrome (CRPS), many pain management physicians are using this modality for the pain associated with diabetic neuropathy with great success. Early research also shows an increase in peripheral arterial circulation as an added bonus; but more studies need to be done to confirm this finding.

Some patients still have neuropathy symptoms even with tight control of their blood sugars. In these cases, it is important to assess the mechanical control of their foot. Many diabetics diagnosed with peripheral neuropathy have an underlying tarsal tunnel syndrome. This can often be controlled with functional foot orthotics, bracing, and in some cases; require surgical decompression of the tarsal tunnel.

Physical therapy is often a useful addition to pharmaceutical therapy, especially when pain and muscular weakness are significant symptoms. One of the major goals of physical therapy is to improve quality of life by alleviating many of the symptoms of diabetic neuropathy. Improved range of motion and balance are the cornerstone of physical therapy treatment. This by itself often helps the patient maintain their glucose control by allowing them to be more active and independent.

The physical therapist can not only instruct the patient in a general exercise program to maintain their strength and mobility; but can also educate them on independent pain management and relaxation strategies to assist with pain control. In patients with significant autonomic neuropathy, fall prevention education and balance training is important. Treatment should focus on maintaining and improving range of motion, as well as muscle strengthening. Therapy must follow an individual treatment plan due to the significant variability of diabetic peripheral neuropathy symptoms. For some patients, the goal of therapy is as simple as learning how to stand without getting dizzy. For others, it may include more advanced balance and proprioception training to learn how to maneuver over different surfaces and avoid tripping and falling when going about everyday activities.

Every diabetic with peripheral neuropathy and a foot deformity or weakness should be in protective shoe gear and accommodative orthotics. Prevention of ulceration and amputation are the goals of all therapeutic shoe programs. Many patients also require bracing to help with balance and instability. Physical therapists can assist the podiatrist or orthotist in selection of brace materials and implementation. Often the implementation of a walking aid and gait training may be necessary.

As you can see, it is important for the physical therapist to work as part of the multi-disciplinary team in the treatment of diabetic neuropathy. A fundamental understanding of the devastating effects of diabetic peripheral neuropathy is paramount in order to prescribe and maintain effective treatment protocols for these complicated patients.