



Tarsal Tunnel Syndrome

Written by
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Tarsal tunnel syndrome (TTS) was first reported in 1962 by Drs. Keck and Lam. It relates to symptoms developing because of nerve entrapment at the ankle. There is an anterior (top of foot) and posterior (bottom of the foot) tarsal tunnel. Different nerves provide sensibility (carry sensation) from each. Symptoms include tingling and numbness of the feet involving some or all of the toes or limited to the heel. Pain about the foot and/or ankle and a feeling of tightness about the ankle are also typical symptoms.

Pain in diabetics is usually described as burning and may involve the whole foot and calf i.e. 'stocking' due to associated peroneal nerve entrapment at the knee.

Symptoms may be worse at night when one is trying to lie down and may feel better getting up and walking on the feet though prolonged walking is often not tolerated and, in fact, walking duration may be limited. Because of the discomfort, a person may be taking anti-inflammatory medication in the futile hope that this will treat the "arthritis", which is the wrong diagnosis. Tarsal tunnel syndrome occurs at increased frequency in diabetics causing decreased sensibility. This is associated with a high rate of skin ulceration and ultimately toe or foot amputation when the ulcers become infected and fail to heal.



Aggressive treatment of the tarsal tunnel syndrome may eliminate the abnormal sensation in the feet and prevent skin breakdown!

Who gets Tarsal Tunnel Syndrome?

This is a problem restricted to adults usually beyond the age of 30. No absolute cause is usually identifiable though obesity and diabetes are frequently associated. In diabetics, increased fluid is accumulated in nerves because of accumulation of non-digestible sugar sorbitol. There may also be thickening of the nerve from amyloidosis. Tarsal tunnel syndrome may develop even with well-controlled blood sugar. The symptoms are frequently misconstrued as "diabetic neuropathy" which is an untreatable disease-specific entity but tarsal tunnel syndrome is, in fact, correctible. As in carpal tunnel syndrome (CTS), tarsal tunnel syndrome (TIS) occurs much more commonly in women.

Painful heel syndrome usually occurs in markedly overweight people and is sometimes due to nerve entrapment at the tarsal tunnel rather than "plantar fasciitis", another common problem.

What Causes TTS?

The culprit for *posterior tarsal tunnel* is pressure upon the tibial nerve going from the calf around the inner anklebone and then through the fibrous abductor hallucis muscle origin (muscle to the great toe). Two branches-the calcaneal and the plantar-have been associated with ITS. Age, physical condition, and sometimes even a prior injury such as a broken ankle may be related. In *anterior tarsal tunnel* the deep peroneal nerve may be compressed beneath the inferior extensor retinaculum on the front side of the ankle. This causes pain over the anterior ankle and decreased sensibility or burning in the space between the big toe and the second toe. A feeling of tightness about the ankle may exist. In diabetics *common peroneal nerve* entrapment just below the knee often occurs at the same time. Symptoms of common persistent entrapment may overlap or be masked by entrapment of the tibial nerve at the tarsal tunnel. Preoperative nerve testing with the Pressure Specified Sensory Device™ helps to identify single or multiple nerve involvement and tends to be useful for monitoring nerve recovery. In diabetics developing TTS is probably related to subtle nerve enlargement in confined spaces as well as other physiologic changes.



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How is the diagnosis confirmed?

Symptoms about the foot and ankle require careful tests for a malfunctioning nerve. For example, tapping upon the tibial nerve at the ankle may result in local pain or tingling (Tinel's sign) or that is referred to the toes in an "electric shock" fashion. Though it's more difficult to identify, there may be weakness of great toe movement away from the foot (abductor hallucis muscle weakness).



Figure 1 Pressure measurements are digitally analyzed on IBM computer

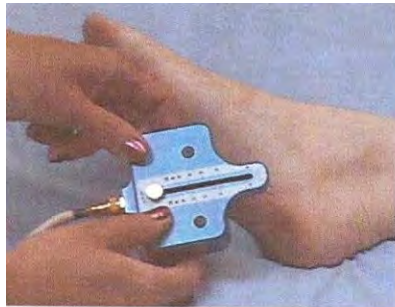


Figure 3a Example of nerve sensibility testing on (2a) the Calcaneal nerve



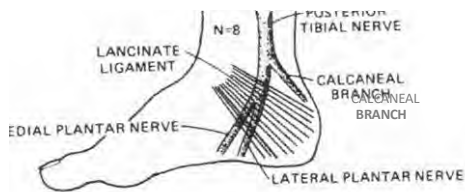
Figure 2b and the Tibial nerve with the PSSD™

Absolute confirmation of nerve dysfunction is obtained with a thorough nerve conduction study or the newly introduced quantitative sensory test (Pressure- Specific Sensory Device™).



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This is a reliable, non-invasive (painless), computer-based technique of identifying and tracking subtle change in sensory function. Conventional nerve conduction study (NCS) is advisable to localize nerve entrapment. EMO (poking the muscles with needles to evaluate electrical activity) is still sometimes necessary. Peroneal nerve entrapment at the fibular neck (just below the knee) may result in local discomfort just below the outer knee. Though it usually results in numbness or tightness about the ankle and the top of the foot. If it goes untreated foot drop, inability to lift one's foot, may develop.



How is TTS treated?

In people who are excessively overweight (medically known as morbid obesity) drastic weight loss may be of value both in eliminating the problem and in preparing for surgery. Optimizing serum glucose levels in a diabetic or use of an arch support in a person with arch-related discomfort may benefit others. Ultimately, most people with TTS will probably require a minor outpatient operation. This is performed with spinal or general anesthesia though it's also possible under heavy intravenous sedation plus local anesthesia.



TARSAL TUNNEL RELEASE

Surgeon	# of patients	patients w/ ulcers pre-op	Mean age (Years)	Follow- up (Months)	Successful	Wound complications
Wieman	26	41	59	13	92%	12%
Caffee	38	31		32	86%	20%
Dellon	110	0	58	208	80%	6%

Walking upon the foot is not absolutely contraindicated as long as it's kept covered enough for the wound to seal itself. Avoiding excessive walking is also advisable. A cane held in the opposite hand or crutches may be used for several weeks. It does take about 2 to 3 weeks before sutures are ready for removal and ultimately, I expect someone to be completely healed within about 6-8 months or less.

Marked relief of pain is often possible shortly after the surgery. People typically realize benefit within 24 hours of the operation though it may take longer depending upon the magnitude and character of one's symptoms.

Early treatment before irreversible nerve damage yields the best results.

Outcome reported in the literature varies due to the age of the patients treated, duration of disease, and accuracy of diagnosis and comorbidity such as diabetes and lower back arthritis.

Diabetics with TIS have an enormous potential gain: improved comfort, healing of open ulcers, and prevention of sores/ulcers has been demonstrated for years by A. Lee Dellon, M.D., Professor of Plastic Surgery and Professor of Neurosurgery at Johns Hopkins University Medical Center. Drs. Wieman and Patel at the Department of Surgery in Louisville, Kentucky and Dr. Caffee at the University of Florida, Department of Surgery and others also report good results.



Who should be tested?

The American Diabetes Association recommends quantitative sensory (PSSD) testing of the feet of diabetics once a year. The person suited for intervention is beginning to experience loss of sensibility, but their feet are not yet "numb". The greater the sensory loss, the greater the nerve cell (axon) loss. PSSD enables the doctor to monitor gradual changes and discern which nerves are involved early enough to correct the problem and prevent skin breakdown.

Results/Benefits

For diabetics who meet criteria for surgery, 60% to 80% or 6 to 8 out of 10 people, get a good result according to Dr. Dellon. Drs. Wieman and Patel reported success in 92% (24 of 26) if the patients had electrical sensation upon tapping the involved nerve pre op (Tinel's sign). Dr. Caffee reported 86% good results. Variation in outcomes reflect patient differences and variation in delay to surgery. The majority of patients note almost immediate elimination of burning pain after nerve decompression. Most notable has been the healing of long-term ulcers upon improvement in nerve function.

Outcome/benefit from surgery?

Recovery rate varies. For the first couple weeks, the patient is advised to elevate the foot on a pillow above heart level to reduce or prevent throbbing related to swelling. If anti-inflammatory medication is not contraindicated, its use will markedly improve one's comfort level. Within 2-5 days most people are back to sedentary jobs.



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ABOUT DR. ICHTERTZ:

Dr. Ichtertz attended Baylor College of Medicine in Houston, Texas. He completed his orthopaedic surgery training at University of California, San Francisco. He then completed a fellowship in hand and microvascular surgery at Loma Linda University Medical Center. He is board certified by the American Board of Orthopaedic Surgery and he is among few hand surgeons to be granted a Certificate of Added Qualifications in Hand Surgery. His current interest is on nerve entrapment, especially in the upper and lower extremities, with the goal of "eliminating pain and suffering, thereby keeping people feeling youthful and productive".

Dr. Ichtertz has published articles in medical journals and has been a featured speaker at local and national conferences.



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