

Orthopaedic Observations

A Matter of Medicine...

TM pending

Nerve Disorders of the Foot and Ankle

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Nerve disorders such as Carpal Tunnel Syndrome are common problems in the upper extremity. Nerve disorders also affect the foot and ankle. Two common nerve disorders of the foot and ankle include: Interdigital Neuroma and Tarsal Tunnel Syndrome.

An Interdigital Neuroma or Morton's Neuroma is an inflammation (peri-neural fibrosis) of the common digital nerve as it courses under the transverse metatarsal ligament in the forefoot. This nerve provides sensation between the toes. An Interdigital Neuroma normally affects the 2nd interdigital space (between the 2nd and 3rd toe) or the 3rd interdigital space (between the 3rd and 4th toe.) It is very uncommon in the 1st and 4th web space. One must consider other etiologies of pain in patients with pain in these areas.

Patients with an Interdigital Neuroma complain of burning and tingling in the interspace of the involved toes. The pain can radiate to the toes. At times patients may describe a vague pain that radiates up the leg. Symptoms are exacerbated by walking and running. With walking (especially during toe off) the interdigital nerve becomes compressed by the intermetatarsal ligament in the plantar aspect of the forefoot. High-heeled shoes with a narrow toe box exacerbate the symptoms from a neuroma as there is compression of the forefoot by the shoe.

Physical Exam demonstrates tenderness to palpation of the forefoot just proximal to the toes in the area between the metatarsal heads. Some patients have a snap or click with compression of the forefoot. This is called a Mulder's click and some think that this is secondary to bursal inflammation that can accompany an Interdigital Neuroma. At times the nerve enlargement is palpable. One can consider a diagnostic lidocaine/bupivacaine injection beneath the intermetatarsal ligament to confirm the diagnosis.

The differential diagnosis of a Interdigital Neuroma includes: a metatarsal stress fracture (pain is more dorsal),

metatarsalgia (pain under metatarsal heads and not in the interspace), synovitis/instability of the MTP joint (tenderness over the MTP joint rather than the interspace), degenerative joint disease, or possibly a lumbar disc herniation.

Radiographs of the foot are obtained to rule out bony pathology. An MRI can show the neuroma however it is not usually necessary to make the diagnosis. Some patient require a bone scan if there is concern regarding degenerative joint disease of the MTP joint.

Many Interdigital Neuromas can be managed without surgery. Patients are advised to obtain wider shoes with lower heels to reduce the pressure on the forefoot. Metatarsal pads are soft felt pads placed just proximal to the metatarsal heads and this serves to unweight the area of the neuroma. A metatarsal bar is a similar device built into an orthotic. Larger braces such as an AFO can be used, however these can be cumbersome. Some patients benefit from one to two cortisone injections into the interspace. This decreases the inflammation around the neuroma. Multiple injections should be avoided to prevent fat pad atrophy/degeneration of the volar plate or collateral ligaments.

Patients with long standing symptoms (greater than 6 months) may require surgery. Surgery is not indicated in patients with a poor circulatory status, atypical symptoms, or reflex sympathetic dystrophy. During surgery an incision is made on the dorsum of the foot over the appropriate interspace. The transverse intermetatarsal ligament is divided. The thickened common digital nerve is identified along with the branching proper digital nerves. The nerve is then dissected proximally and divided 1-2 cm proximal to the weight-bearing pad of the forefoot. The entire neuroma and all distal nerve branches are removed. A neuroma will be formed at this area of the proximal transection, however it should not be symptomatic. Patients are allowed to weight bear in a post-op shoe. Review of the literature demonstrates that approximately 80% of patients are significantly improved following surgery. Major activity restrictions are uncommon

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and patients can return to all sports and activities. Some patients report some shoe wear restrictions. There can be numbness between the toes, however this is typically not bothersome.

Tarsal Tunnel Syndrome is a less common condition caused by the compression of the tibial nerve in the tarsal tunnel. This condition is akin to Carpal Tunnel Syndrome of the upper extremity in which the median nerve is compressed by the transverse carpal ligament in the wrist. In Tarsal Tunnel Syndrome, the tibial nerve is compressed by the flexor retinaculum behind and distal to the medial malleolus. The compression of the tibial nerve can be caused by: a lipoma, ganglion, bony exostosis or neoplasm within the tarsal tunnel. Other

causes of compression include: a plexus of veins or an accessory flexor digitorum longus muscle. The condition can be associated with a flatfoot or valgus position of the heel.

Patients with Tarsal Tunnel Syndrome complain of ankle pain that radiates along the plantar side of the foot and sometimes up into the calf. Other patients report parathesias or foot numbness. Physical exam

can demonstrate a positive Tinel sign behind the medial malleolus. Other patients have increased pain with manual compression over the tarsal tunnel. Some patients may have atrophy of the foot. Two point discrimination tests may be abnormal on the plantar aspect of the foot.

EMG and nerve conduction tests can be helpful in the diagnosis of Tarsal Tunnel Syndrome. A recent study reported that 81% of patients with tarsal tunnel syndrome had abnormal EMG studies. An MRI is a useful study in the work up of patient with Tarsal Tunnel Syndrome as it can be used to identify space-occupying structures within the tarsal canal as well as the specific site of compression of the tibial nerve.

Many patients improve with rest, NSAIDS and possibly orthotics. Surgery is recommended for patients with persistent symptoms and a space-occupying lesion within the tarsal canal. During a Tarsal Tunnel Release an incision is made along the medial aspect of the ankle and the tibial nerve and its branches are decompressed. The cause of the compression is removed i.e. the venous plexus surrounding the nerve or the ganglion compressing the nerve is removed.

Dr. Zell grew up in Westchester County, New York. After graduating from the University of Notre Dame, he attended medical school at the State University of New York at Stony Brook. Dr.Zell completed a five-year residency in Orthopaedic Surgery at the University of Connecticut Integrated Residency Program (University of Connecticut Health Center, Hartford Hospital, St. Francis Hospital and Connecticut Children's Medical Center.)

Dr.Zell continued his training with two orthopaedic fellowships. The first fellowship was in sports medicine and arthroscopy of the shoulder and knee. The second fellowship was in foot and ankle surgery at the Hospital for Joint Diseases (an orthopaedic specialist hospital in New York City). He is currently a member of both the Arthroscopic Association of North America and the American Foot and Ankle Society.

Dr.Zell is an assistant Clinical Instructor of Orthopaedic Surgery at the Yale School of Medicine. He was awarded the 2004 Yale Orthopaedic Residents teaching award. This is given annually to the community attending physician who contributes the most to the orthopaedic resident's education.

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