

Ankle Nerve Disorder

“Tarsal Tunnel Syndrome”

ICD-9-CM: 355.5 Tarsal tunnel syndrome

Diagnostic Criteria

History: Medial foot pain
Paresthesias
Numbness

Physical Exam: Symptoms reproduced with tibial nerve tension test
Symptoms reproduced with palpation/provocation of tibial nerve in tarsal tunnel



Tibial Nerve Tension Test

Cues: SLR to first resistance
 Full dorsiflex and evert the ankle and foot.
 Assess symptom reproduction/elimination with alteration to hip flexion



Provocation of Tibial Nerve in Tarsal Tunnel

Cues: Determine ability to reproduce symptoms
 Remember Tom, Dick, "an" Harry
 T = Tibialis Posterior
 D = Flexor Digitorum Longus
 A = Posterior Tibial Artery
 N = Posterior Tibial Nerve
 H = Flexor Hallucis Longus

Tarsal Tunnel Syndrome

ICD-9: 355.5 tarsal tunnel syndrome

Description: An extrinsic or intrinsic compression neuropathy of the posterior tibial nerve or one of its branches. Patients with TTS often report 1) burning pain in the heel and medial arch and/or plantar aspect of the foot, 2) tightness, swelling, and “fullness” in the medial portion of the foot, and 3) sensory disturbances including burning, tingling, and numbness. Pain located around the ankle and extending to the toes is increased with walking and is relieved by rest. Nerve conduction tests demonstrate a time delay across the tarsal tunnel area. EMG may demonstrate fibrillation potential and positive sharp waves in tibial innervated muscles. MRI showed TTS abnormality 88% of time. Positive tincl’s sign is a common finding. Mixture of corticosteroids and local anesthetics may be injected for pain relief. Foot taping and the use of orthotics may be used to reduce pressure on the nerve. If all other treatment fail, surgery (tarsal tunnel release) may be necessary to alleviate pain. There is another less common type TTS, anterior tarsal tunnel syndrome, which entraps the deep peroneal nerve.

Etiology: Any lesion that occupies space within the tarsal region may cause pressure on the nerve and subsequent symptoms. Examples of intrinsic factors include ganglions, tenosynovitis, lipomas, varicose veins, fibrosis, and synovial hypertrophy. Extinsic factors may also place trauma and tension across the flexor retinaculum. Examples include bone fracture, hypertrophic flexor hallucis tendon, or pronation and subtalar eversion, which can stretch the flexor retinaculum and cause a narrowing of the tunnel. Half of the patients who present with tarsal tunnel syndrome relate a history of a previous sprain or ankle fracture. Other causes may include repetitive stress with activities, flat feet, and excess weight.

Physical Examination Findings (Key Impairments)

Acute Stage/ Severe Condition

- Tenderness over the nerve at the tarsal tunnel
- Positive Tinel sign (percussion over the flexor retinaculum of the tarsal tunnel)
- Diminution of two point discrimination and hypothesias to pin prick
- With prolonged, extreme compression, nerve demyelination with Wallerian degeneration may take place with numbness, muscular weakness, and atrophy

Sub Acute Stage/ Moderate condition

As above: Now when less acute, signs of coexisting foot disorders may be revealed, For example:

- Tight Achilles tendon
- Increased hind foot valgus and the appearance of “too many toes sign”
- Weak or absent inversion of the heel

- Rear foot valgus/calcaneous eversion
- Depressed medial longitudinal arch
- Inability to do unilateral heel raises
- Gait lacks effective push-off

Settled Stage/ Mild condition

As above with the following differences

- Resolving symptoms
- Decreased paresthesia and pain
- Improved pain-free soft-tissue motion along the course of the tibial nerve
- Improved strength of tibialis posterior
- Improved functional activity tolerance; standing and walking

Intervention Approaches / Strategies

Acute Stage/ Severe Condition

Goal: Reduce pain and inflammation and tissue stress

- Physical Agents
 - Ice
 - Contrast baths
 - Pulsed ultra sound/ phonophoresis with 0.5 percent hydrocortisone or 2.5 percent lidocaine ointment
 - Iontophoresis
 - Interferential current therapy
- Orthotics or Taping
 - University of California Berkeley Laboratory (UCBL) orthosis to improve hind foot alignment
 - Ankle braces, controlled ankle motion (CAM) walkers
 - Plantar arch taping to reduce tissue stress
 - Medial Heel Wedge or Heel Seat – may assist by inverting the heel and removing traction from tibial nerve
 - Advise regarding footwear, such as the use of wider shoes, may be beneficial
- Therapeutic Exercise
 - Calf stretching exercises
 - Nerve mobility exercises
- Manual Therapy
 - Soft tissue mobilization to fascial of myofascial tissues suspected of creating the entrapment
 - Neural mobilization

Sub Acute Stage/ Moderate Condition

Goal: Restore muscle strength and flexibility

As above with following differences

- Therapeutic Exercise
 - Posterior tibialis strengthening exercise

Settled Stage/ Mild Condition

Goal: Normalize strength, flexibility, and restore lower extremity functional mobility

As above with following differences

- Therapeutic Exercise
Posterior tibialis strengthening exercise in weight bearing.

Selected References

Daniels TR, Lau JT, Hearn TC. The Effects of Foot Position and Load on Tibial Nerve Tension. *Foot Ankle International*. 1998 Feb; 19(2); 73-8

Meyer J, Kulig K, Landel R. Differential diagnosis and treatment of subcalcaneal heel pain: a case report. *Journal of Orthopaedic & Sports Physical Therapy*. 2002; 32(3):114-124.

Kinoshita M MD, Okuda R MD, Morikawa J MD, Tsuyoshi J MD, Abe M MD. The dorsiflexion test for diagnosis of tarsal tunnel syndrome. *Journal of Bone & Joint Surgery*. 2001;83-A(12):1835-1839.

Romani W, Perrin DH, Whiteley T. Tarsal tunnel syndrome: Case study of a male collegiate athlete. *Journal of Sport Rehabilitation*. 1997;6:364-370.

Patla CE, Abbott HJ. Tibialis posterior myofascial tightness as a source of heel pain: diagnosis and treatment. *Journal of Orthopaedic & Sports Physical Therapy*. 2000;30(10):624-632.

Geideman WM MD, Johnson JE MD. Posterior tibial tendon dysfunction. *Journal of Orthopaedic & Sports Physical Therapy*. 2000;30(2):68-77

Kupper, BC. Tarsal tunnel syndrome. *Orthopaedic Nursing*. 1998;17(6):9-16.