TARSAL TUNNEL SYNDROME

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Tarsal Tunnel Syndrome is an entrapment of the Posterior Tibial Nerve\(^1-3\)

Tunnel formed by:\(^3\)
- Flexor Retinaculum
- Posterior Talus
- Medial Malleolus
- Medial Calcaneus

Tom, Dick “AN” Harry\(^4\)
- Tibialis Posterior
- Flexor Digitorum Longus
- Posterior Tibial Artery
- Posterior Tibial Nerve
- Flexor Hallucis Longus
Symptoms

- Burning Pain in heel and medial arch on the plantar aspect of the foot
- Local Tenderness posterior to medial malleolus
- Increased pain with walking
- Toe Flexion Weakness
- Symptoms worsening at night
- Loss of two point discrimination
- Tingling and Numbness (Sensory Disturbances)
  - Usually poorly localized
Differential and Diagnostic Tests

- Anterior vs. Posterior Tarsal Tunnel\(^6\)
  - Anterior: deep peroneal nerve
  - Posterior: posterior tibial nerve
- Dorsiflexion + Eversion $\rightarrow$ Increase Sx
- Plantarflexion + Inversion $\rightarrow$ Alleviate Sx
- Tinel’s Sign
  - Posterior Tibial Nerve\(^3,7\)
- Plantar Fasciitis, Lumbar Radiculopathy\(^3,5,8\)
- Diagnosis determined through examination and history\(^2\)
Non-Surgical Intervention

- Conservative treatments
  - Reduce activity
  - Reduce pain and inflammation
    - Ice, NSAIDs, cortisone injection, ultrasound
  - Ankle strengthening, flexibility and balance \(^{2,4,5,9-12}\)
  - Nerve mobilization \(^{13}\)
    - Nerve-gliding exercises to restore soft tissue mobility.
    - Slump position, hip flexed, ankle dorsiflexed and everted, knee moves into flexion and extension 10x
  - Orthotics and taping
    - Correct hyperpronation, pes planus
    - Wider shoes \(^{3,4,13}\)
  - Gait training
    - Normal biomechanics of spine, hip, knee, ankle, foot
  - Deep friction massage
    - Release adhesions in flexor retinaculum \(^{3}\)
Timing is important because chronic nerve compression can be related to atrophy\textsuperscript{13}

Before surgery:
- Physical exam
  - Hindfoot alignment (valgus vs. varus) in weight-bearing, tarsal tunnel palpation, Tinel’s sign
- Weight-bearing radiographs
  - Identify bony abnormalities, further hindfoot alignment assessment
- MRI
  - May show cause of TTS
- Electrodiagnostic studies\textsuperscript{13}
  - Confirm diagnosis, differentiate TTS from other radiculopathy or neuropathy

Surgical success rates are between 44-96\%\textsuperscript{13}
Surgery

- Incision 6-8 cm proximal to tip of medial malleolus, extends distally along course of nerve, 1-2 cm posterior to tibia and medial malleolus
- Crural fascia divided, tibial nerve identified
- Flexor retinaculum divided/released
- Posterior tibial nerve decompressed
  - Plantar nerves may also be decompressed
  - Nerve decompression: relieves pressure on the entrapped nerve, make space for nerve
- Abductor hallucis muscle belly often removed\(^2,10,11,13,14\)
Non-operative Rehab

- Reduce painful activity for 3-4 weeks
- Week 1
  - AROM 4-way ankle
  - Gastrocnemius and soleus stretches
  - Nerve mobility\(^{15,16}\)
  - UBE
- Weeks 2-3
  - 4-way ankle with Theraband
  - Ankle circles and alphabet
  - Pool exercises - partial weight-bearing
    - Calf raises, mini-squats, step-ups and step-downs, single leg stand
    - Gait training\(^{4,16}\)
  - Recumbent bike
Non-Operative Rehab

- **Weeks 4-6**
  - Full weight-bearing
  - Calf raises, squats, step-ups and step-downs, single leg stand
  - Gait training
  - Treadmill walking, jogging
  - Recumbent bike

- **Weeks 7-8**
  - Calf raises, squats, step-ups and step-downs with weight
  - Single leg stand with eyes closed or on uneven surface
  - Cutting through cones, ‘Z’ drill
  - Agility hurdles, ladder drill
  - Sled/parachute run
  - Running, sprinting
**POST-OPERATIVE REHAB**

- **Week 1-2:**
  - Immobilization vs. Mobilization\(^{17}\)
  - Non-weight bearing
  - Ice
  - UBE

- **Week 3:**
  - Ice
  - Gentle AROM/PROM
  - Isometric resistance (4-way ankle)
  - Gradually increase to 50% weight bearing on crutch
  - Gastrocnemius and soleus stretching

- **Week 4: cast removed, full weight bearing**
  - Full AROM exercises (4-way ankle, circles, alphabet), toe curls with towel, towel stretch to dorsiflexion
  - Weight shift between parallel bars, pool exercises (mini squats, aqua jogging, forward/backward walking, single-leg stand)
  - Gait training
  - Scar mobility (cross friction massage)\(^{8}\)
  - Recumbent bike
POST-OPERATIVE REHAB

- **Week 5: Single-foot balance**
  - Pool exercises: carioca, lateral shuffle, single-leg calf raises
  - Theraband: 4-way ankle
  - Discontinue isometrics, 4 inch box mini squats, step-overs and step-downs

- **Week 6-7: Walking (forward/backward)**
  - Carioca, lateral shuffle
  - Treadmill: speed walking at 2% grade
  - Jogging at week 7
  - Plyometrics

- **Weeks 8-12: Running progression and agility**
  - Jogging every day, increase by 2 min. per week
  - Backwards jogging
  - Figure 8s, ‘Z’ drill, ‘T’ drill
  - Agility hurdles, ladder drill, cutting cones by week 10
  - Full speed/sprinting by week 12
REFERENCES


