Tibial Nerve External Neurolysis with Nerve Wrap and Flatfoot Correction for Revision Tarsal Tunnel Surgery

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Statement of Purpose

To identify and bring recognition to the potential multifactorial etiology of tarsal tunnel syndrome and the need to simultaneously address contributing pathologies while performing nerve release..

Literature Review

Tarsal tunnel syndrome is an entrapment of the posterior tibial nerve or one of its branches within the fibro-osseous tunnel located deep to the flexor retinaculum. Causes of tarsal tunnel syndrome are often multifactorial but can be defined as intrinsic or extrinsic in nature. Intrinsic causes include pathologies such as space-occupying lesions, osteophytes or scarred/hypertrophic flexor retinaculum. Extrinsic causes include hindfoot deformity, trauma to the area and systemic inflammatory conditions such as rheumatoid arthritis. As much as 80% of cases of tarsal tunnel syndrome have an identifiable cause (1). Reported surgical outcomes for tarsal tunnel syndrome vary widely and have been shown to be influenced by factors such as duration of symptoms, presence of space occupying lesions and presence of pre-existing metabolic disease. Some early studies on tarsal tunnel release surgery have significant improvement in symptoms post-surgery (2). A study by Gondring et al with 68 feet undergoing tarsal tunnel release surgery reported a 85% complete resolution of symptoms (3). Sammarco et al also reported predictable outcomes and improvement in symptoms when comparing pre- and post-operative AOFAS scores in 72 patients undergoing tarsal tunnel release surgery (4). Recent literature points to potential differences in outcomes following tarsal tunnel release surgery based on presenting etiology. Lalevee et al published a retrospective series of 45 patients undergoing tarsal tunnel release surgery. They placed each patient into one of three groups: group one had an identifiable space occupying compressive structure either within or outside the tunnel, group two had intermittent intratunnel venous dilations and group three had idiopathic tarsal tunnel syndrome. They found that group 1 had greater postoperative improvements/complete resolution of symptoms when compared to the other groups. Failed tarsal tunnel surgery presents a unique challenge (5). A study by Bouysset et al aimed to identify certain factors which could influence the outcome of surgical release of the tarsal tunnel. They evaluated duration of symptoms prior to operative intervention, trauma/microtraumas as a triggering event, static disorders of the foot, hindfoot alignment, presence of space occupying lesions and presence of accessory muscles. Of the 84 feet that underwent surgical release in their cohort, 51% showed improvement. Absence of improvement post-operatively was significantly associated with hindfoot alignment with marked valgus or varus deformity. On the other hand, history of trauma, presence of accessory muscle and duration of symptoms did not affect the efficacy of surgical decompression (6).

Case Study

A 33-year-old female who initially presented with shooting burning pain in her right foot/ankle. The patient had a tarsal tunnel release done several years prior to presentation. She had short term relief after the initial procedure, but developed recurrent symptoms. Along with worsening tarsal tunnel pain she also complained of pain along the arch of her foot. On physical exam she had positive Tinel sign to the tibial nerve and pain along the posterior tibial tendon. She had reducible hindfoot valgus. She tried conservative treatment with orthotics, ultrasound guided injections, and physical therapy without relief. An MRI was done which showed significant scar tissue and entrapment of the tibial nerve within the tarsal tunnel.

Surgical Procedure

An incision was made over the prior surgical incision and curved distally for access to the navicular and flexor tendon. Under loupe magnification dissection was started proximally where the tibial nerve was identified and appeared normal. The nerve was followed distally and scar tissue was released and the flexor retinaculum was re-released. The calcaneal nerve was identified and appeared free and mobile. The medial and lateral branches had significant scar tissue which was excised until the porta pedis was reached. The septum within the porta pedis was also released. After verifying that the nerve was mobile and free of adhesions it was wrapped with allowrap. The incision was extended distally to the navicular tuberosity. The posterior tibialis tendon was identified. The flexor digitorum longus (FDL) was identified and followed to the knot of Henry where it was transected. The tendon was whip-stiched with fiberloop. A guide pin was placed in the navicular tuberosity and reamed. The sustentaculum was identified, drilled, and a SwiveLock anchor was placed. The suture tape was brought through the tunnel in the navicular. One arm of the suture tape was brough from dorsal to plantar and then the second arm was placed with the FDL from plantar to dorsal. The suture and FDL were tensioned and a biotenodesis screw was placed from plantar to dorsal. An open strayer gastrocnemius recession was performed.

Figure 1: Tibial nerve with medial and lateral branches tagged

Figure 2: Pre-op radiographs

Figure 3: Post-op radiographs

Analysis and Discussion

Tarsal tunnel syndrome is a complex, potentially multifactorial disorder. Patients typically present with paresthesia although clinical symptoms may vary widely and lead to misdiagnosis. There is a slight female predilection, 56%. An identifying cause may be seen in 60-80% of cases, including: trauma, space occupying lesions, fibrosis, or hindfoot deformity. Underlying valgus deformities may play a significant role in the symptoms of tarsal tunnel syndrome, contributing to increased tension on the nerve. Failure to identify and correct other contributing pathologies may lead to inadequate patient outcomes. Revision cases require detailed physical examination and diagnostic modalities to ensure proper treatment is performed but outcomes are seen as variable with several treatment approaches described.

References

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