CHAPTER 2

Tarsal Tunnel Syndrome

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Tarsal tunnel syndrome is both a diagnostic and therapeutic challenge. It is a diagnostic challenge because frequently it can be confused with pathology in other anatomical structures in the same vicinity. In addition, it is important that once a tarsal tunnel syndrome has been diagnosed, the exact etiology of the syndrome must be determined wherever possible. Some patients with heel pain may have symptoms very similar to tarsal tunnel syndrome. Therefore, it becomes important to differentiate those patients in whom the tarsal tunnel syndrome is primary, versus those patients in whom the plantar fascitis or other heel pain syndrome is primary. Similarly, approximately fifteen percent of patients with tibialis posterior dysfunction have neurologic symptoms consistent with tarsal tunnel syndrome. Often, patients with tibialis posterior dysfunction can be diagnosed as having tarsal tunnel syndrome, instead of the recognition that they have a musculoskeletal dysfunction.

The classic description of tarsal tunnel syndrome is of an entrapment neuropathy caused by compression of the posterior tibial nerve beneath the flexor retinaculum. Throughout the literature, the most frequent descriptions of the clinical features are of pain around the medial malleolus radiating proximally or distally, paraesthesias, dysesthesias, burning pain, and sharp stabbing pain. Some patients will describe more of a tightening in the vicinity of the posterior tibial nerve.

CLINICAL EXAMINATION

Commonly, patients with tarsal tunnel syndrome will have their pain reproduced by percussion along the posterior tibial nerve. If paraesthesias are reproduced, this indicates a positive Tinel's sign. Particular attention should be paid to compression of the nerve against the sustentaculum tali and compression of the medial plantar nerve beneath the navicular. Both of these areas tend to be acutely sensitive in these patients. In addition to evaluation of the nerve itself, it is important to evaluate the surrounding mideal aspect of the foot and ankle. It is particularly helpful to determine whether or not the patient is prone to venous varicosities. The presence of multiple varicosities on the medial side of the ankle might raise the index of suspicion regarding this issue. For many of these patients, a venous occlusion test should be performed. A blood pressure cuff is placed around the calf and inflated to 30 or 40 mm of mercury. This occludes the venous return, and if the patient's symptoms are reproduced or increased by this maneuver, then it is likely that there are venous varicosities that may be causing the compression of the posterior tibial nerve.

Muscle testing and evaluation is important in order to rule out the presence of adjacent tenosynovitis of the tibialis posterior or long flexor tendon sheath. Radiographic evaluation can also be helpful to rule out the presence of a coalition or other osseous masses which might be compressing the nerve.

A variety of special diagnostic tests can be performed. Electrophysiologic studies have generally been viewed as the gold standard for tarsal tunnel diagnosis. EMG studies seek to identify muscle fibrillations, particularly in the abductor hallucis muscle belly. Nerve conduction studies are performed to identify motor and sensory latencies. The literature seems to indicate that the sensory conduction studies are more sensitive than motor conduction studies. Nonetheless, there are many reports in the literature indicating that electrodiagnostic studies are neither fully sensitive, nor entirely specific. Therefore, it should be concluded that an abnormal EMG or nerve conduction study is not necessary in order to have a diagnosis of tarsal tunnel syndrome. Indeed, many patients who have negative electrical studies are determined not to have a tarsal tunnel syndrome, and unfortunately are treated for other entities or not treated at all. Despite the limitations of electro-diagnostic studies, they are important in ruling out the presence of any radiculopathy that may be mimicking the tarsal tunnel syndrome.

Takakura et. al performed an interesting study

on fifty feet in forty-five patients with tarsal tunnel syndrome from 1975 to 1988. They found that the majority of these patients had identifiable musculoskeletal pathology as the cause for the tarsal tunnel syndrome. Ganglia were identified in eighteen of these feet, a bony prominence and talar calcaneal coalition in fifteen, a tumor in three, five feet had sustained an injury to the area, and in only nine cases was there no obvious cause. Based upon this study, it seems clear that imaging technology plays an important role in the evaluation of patients with tarsal tunnel syndrome. Specifically, MRI evaluation can help to determine the presence of any soft tissue masses, or tenosynovitis which may be causing the tarsal tunnel syndrome. This assists the surgeon in preoperative planning.

TREATMENT

Clearly, the treatment of tarsal tunnel syndrome depends, to a great degree, on the etiology of the syndrome. Those patients who have a mechanical etiology for stress on the posterior tibial nerve may respond to intensive mechanical therapy, along with a variety of symptomatic measures including nonsteriodal anti-inflammatories and steriod injections. There is not a large body of evidence in the literature that indicates conservative therapy is successful for any prolonged period of time. Nonetheless, if the diagnosis has been made relatively early, if there is no evidence of electrical deterioration, and if there is no evidence of a space-occupying lesion, then mechanical therapy may be worthwhile in those patients for whom mechanics appears to be the etiology.

Surgical treatment of tarsal tunnel syndrome is particularly successful when the diagnosis is made early. On the other hand, revisional tarsal tunnel surgery is frequently unsuccessful, or only partially successful. The techniques used for decompression of the posterior tibial nerve have changed somewhat over the years. The initial technique for tarsal tunnel syndrome was to place a curved incision behind the medial malleolus and release the flexor retinaculum, following the medial and lateral plantar nerves distally. More recently, there has been a much greater interest placed on a more thorough release around the medial and lateral plantar nerves. Lee Dellon, MD has emphasized the need to release a fascial band joining the two nerve branches. John Kenzora, MD has emphasized the need to release the abductor fascia and abductor muscle belly.

The author's technique is to perform a curvilinear incision which extends from behind the medial malleolus, following the posterior tibial nerve, and then coursing beneath the navicular. A Metzenbaum scissor is then used to incise the retinaculum posterior to the tibialis posterior and flexor digitorum longus tendons. The posterior tibial nerve is identified proximally, and a Penrose drain, or vascular loop, is used to separate the nerve from the surrounding tissue. The nerve is then followed distally into the medial and lateral plantar nerve branches. The calcaneal nerve branches should also be identified and inspected for any possible entrapment.

At this point, the extent of the release depends to a great degree on the patient's clinical symptoms. Those patients who have pain along the calcaneal nerves should have an adductor release around the calcaneal nerves. Those patients who have more inferior pain congruent with the position of the lateral plantar nerve should also have a more aggressive dissection approach around the abductor hallucis. Regardless of the patient's symptoms, the author performs a more distal reflection of the abductor muscle belly from the medial column. This frees the abductor from the medial plantar nerve, which is particularly important in those patients who have medial plantar nerve pain.

Attention is then focused back on the lateral plantar nerve. Tracing the lateral plantar nerve is somewhat more difficult due to its relationship with the abductor muscle belly. In some patients, it will be necessary to incise the abductor fascia as it lies over the lateral plantar nerve. In revisional surgery patients, or in those patients who are particularly symptomatic in this area, it may be worthwhile to incise the abductor muscle belly in order to decompress the lateral plantar nerve.

The venous structures around the posterior tibial nerves are also important to mobilize and reflect. Any venous structures which cross the posterior tibial nerve should be identified, ligated and divided. If a varicosity is present over the posterior tibial nerve, it should be excised.

If the etiology of the tarsal tunnel syndrome is traumatic, it may be necessary to release the epineurium in order to get adequate decompression of the nerve. However, the author does not perform an epineural release on a routine basis.

The surgery is performed under tourniquet hemostasis. The tourniquet is released prior to closure, which allows the surgeon to ensure that adequate hemostasis has been achieved. A TLS drain is also used, and the patient is placed in a posterior splint.

POSTOPERATIVE CARE

The postoperative care for tarsal tunnel syndrome has traditionally been to immobilize the patient for a period of three weeks. For the last several years, the author has taken a much more aggressive approach towards mobilizing these patients postoperatively. The patient is placed in a removable posterior splint, and after the first postoperative visit in three to five days is instructed to begin ankle sagittal plane range of motion exercise, three to four times a day, for fifteen minutes at a time. Once the incision is stabilized (at ten to twelve days), the patient is allowed to bathe the foot and engage in much more aggressive range of motion exercises. The prevention of fibrosis in this area is important and can only occur when the patient is adequately mobilized.

SUMMARY

Tarsal tunnel syndrome should be evaluated in patients who present with pain along the posterior tibial nerve, or pain which radiates into the heel region. A positive electrical study is not necessary to make the diagnosis. It is important to carefully evaluate the patient for space-occupying lesions which may be the cause of the tarsal tunnel syndrome.

Surgical treatment should be extremely meticulous and thorough with a full release of the laciniate ligament. Release of the abductor muscle belly is performed as needed in order to free the medial and lateral plantar nerves. Venous structures can also play an important role in tarsal tunnel syndrome and should be identified and ligated when necessary.

When tarsal tunnel surgery is successful, it is extremely gratifying to both the patient and the surgeon. In patients with Reflex Sympathetic Dystrophy (RSD), or additional entrapment neuropathies, the prognosis is guarded. Revisional tarsal tunnel surgery is generally more frustrating for the patient and the surgeon.