Tarsal Tunnel Syndrome: Report of Two Cases With Atypical Etiology

Tarsal Tünel Sendromu: Atipik İki Olgu Sunumu

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Abstract: Tarsal tunnel syndrome involves compression of the posterior tibial nerve due to trauma, repetitive microtrauma, ankle fracture, tumors of the tunnel contents, and systemic diseases including ankylosing spondylitis, uremia, and rheumatoid arthritis. The symptoms are focal pain, and paresthesia over the distribution of the posterior tibial nerve and its branches. The diagnosis is based on physical examination findings and electrophysiological evaluation. Surgery is the only curative treatment. Here we describe two cases of tarsal tunnel syndrome, both of which arose due to unusual causes. One patient developed problems associated with deep venous thrombosis of the leg that occurred secondary to a spinal operation, and the second case was associated with rheumatoid arthritis. The patients were operated on under local anesthesia, and outcome was good in both cases.

Key words: Deep venous thrombosis, rheumatoid arthritis, tarsal tunnel syndrome

Özet: Tarsal tünel sendromu posterior tibial sinirin değişik sebeplerle sıkışması ile ortaya çıkan bir durumdur. Bazı sistemik hastalıklar, travmai tekrarlayan mikrotravma, ayak bileğinde oluşan kırıklar, tünel içeriklerinden birisinin tümöral oluşumu gibi sebeplerle ortaya çıkabilir. Ağrı ve sinirin dağılım bölgesinde paresteziler ve hipereztezilerle karakterizedir. Tanıda fizik muayene ve elektrofizyolojik çalışmalar önemlidir. Bu yazıda birisi spinal cerrahi yapılmış bir hastada gelişen derin ven trombozu sonrası diğeri ise romatoid artritli bir hastada olmak üzere atipik etiyolojili iki tarsal tünel sendromu vakası tartışıldı.

Anahtar kelimeler: Derin ven trombozu, Romatoid artrit, tarsal tünel sendromu

INTRODUCTION

Tarsal tunnel syndrome (TTS) is an uncommon, and likely underdiagnosed, clinical condition (4,13). Diagnosis and appropriate treatment require a clear understanding of the anatomy of the tunnel and its contents. The tarsal tunnel, located at the ankle, is the anatomical counterpart of the carpal tunnel in the wrist, the site where carpal tunnel syndrome (CTS) develops. The tarsal tunnel is located posterior and inferior to the medial malleolus of the tibia. The lancinate ligament, also known as the flexor retinaculum, forms the roof of the tunnel. This ligament is thinner than its counterpart at the wrist,

the transverse carpal ligament. The lancinate ligament extends from the medial malleolus to the medial tubercle of the calcaneus. The bony floor of the tunnel is formed by the medial aspect of the calcaneus and the posterior aspect of the medial malleolus. The contents of the tunnel, listed from most anterior to most posterior, are the tendons of the posterior tibialis, flexor digitorum longus, and flexor hallucis longus muscles, the posterior tibial vessels, and the posterior tibial nerve (5,11,14). A variety of conditions are known to cause symptomatic entrapment of the tibial nerve in the tarsal tunnel (2,3,12). In this report, we present two unusual cases of TTS.

CASE 1

A 45-year-old male patient was admitted to the Neurosurgery Clinic at Yuzuncu Yil University Medical Center with the complaint of back and thigh pain on the right side. Neurologic examination revealed a positive straight-leg raising test and weakness on dorsiflexion of the foot. Magnetic resonance imaging confirmed the diagnosis of right posterolateral L4-L5 disc herniation. A microlumbar discectomy procedure was performed with the patient in the prone position. The early postoperative period was uneventful. The patient's pain resolved and his strength on foot dorsiflexion returned to normal. However, on postoperative day 5 he developed deep venous thrombosis (DVT) in his right leg. This was treated with low-molecular weight heparin. On the tenth day of the heparin treatment, the patient no longer had complaints related to the DVT, but he suddenly developed pain and paresthesia on the medial aspect of his right foot. The clinical findings and results of an electrophysiological examination were consistent with the diagnosis of TTS. Surgery was advised. Local infiltration anesthesia was carried out, a skin incision was made over medial malleolus, and the flexor retinaculum was released in standard fashion, as for CTS. There was no improvement in the patient's condition in the early postoperative period; however, at a recheck 2 months after the TTS surgery he was asymptomatic and his neurologic examination was normal.

CASE 2

A 50-year-old male patient, who had been diagnosed with rheumatoid arthritis 4 years prior to presentation, was assessed for the complaint of weakness in both feet and both hands. He had been prescribed various nonsteroidal antiinflammatory drugs for his arthritic condition and was using Salazopyrin at the time of admission. The patient had complained of burning pain in the feet, particularly at night, and weakness of the hands and feet ever since he was diagnosed with rheumatoid arthritis. A neurological examination revealed atrophy in the hypothenar region of both hands, and on the anteromedial aspect of the soles of feet. Positive Tinel's signs indicated CTS in the right hand and TTS in the left foot, and neurophysiological examinations confirmed these diagnoses. The patient underwent surgery for both conditions. In the ankle operation, the tarsal tunnel was opened and the flexor retinaculum was cut. The patient's pain in the left foot resolved completely in the early postoperative period, and 3 months after the procedure he was free of TTS symptoms in the left foot.

DISCUSSION

Tibial nerve

The posterior tibial nerve, which is a terminal branch of the sciatic nerve, enters the tarsal tunnel just behind the posterior tibial vessels. The nerve divides into three terminal branches either within the tunnel or at its distal end, forming the calcaneal, medial plantar, and lateral plantar nerves. The calcaneal nerve, which is purely sensory in nature, may course superficial to the lancinate ligament. The medial and lateral plantar nerves, which supply the intrinsic muscles of the foot and provide sensory innervation to the sole, pass through separate openings at the origin of the abductor hallucis muscles. Each of these openings is formed by fibrous tissue, which puts the nerve branches at risk of being compressed individually. With regard to sensory distribution, the medial plantar nerve corresponds to the median nerve, and the lateral plantar nerve to the ulnar nerve (5,11,13).

Clinical presentation and diagnosis

TTS may develop after trauma to the osseous or soft tissue structures of the ankle (1), or due to tenosynovitis of any etiology, to systemic conditions such as chronic uremia or rheumatoid arthritis (12), to venous stasis after prolonged standing or ankle

fractures (1,2,6), or to muscle action or muscle growth (5,11). The syndrome is particularly common in runners and mountain climbers, whose activities demand repetitive dorsiflexion of the ankle joint (1). The most common complaint is burning pain or paresthesia on the plantar aspect of the foot and toes. Often the paresthesia is confined to the medial or lateral aspect of the sole, the region that corresponds to the distribution of the medial and lateral plantar nerves. Activity aggravates the symptoms, and the pain tends to be worse at night. There may also be atrophy and weakness of the intrinsic muscles of the foot.

Concerning diagnosis, Tinel's sign can be elicited by palpating the area proximal to the tarsal tunnel (13,14,15). Electroneuromyography (ENMG) can also help with diagnosis, but if a patient has already undergone tarsal tunnel release surgery, clinical history and physical examination are more important for determining the extent and site of tibial nerve irritation. The typical ENMG study in a case of TTS reveals the following: normal conduction velocity in the posterior tibial nerve prolonged distal motor latency to the abductor hallucis, representing medial plantar nerve problems; prolonged distal motor latency to the abductor digiti quinti pedis, representing lateral plantar nerve problems; and decreased amplitude of evoked muscle potentials in the abductor hallucis or the abductor digiti quinti pedis (9,14). Computerized tomography and magnetic resonance imaging may also be used to identify compression of the tunnel structures, and can be used to follow up patients with nonsurgical causes of TTS, such as tenosynovitis (8,10,11).

Treatment

TTS generally responds better to surgical treatment than conservative management. The indications for surgery are incapacitating focal pain associated with paresthesia and hyperesthesia, with all problems being refractory to nonsurgical therapy. The operation can be done under general, spinal, or local anesthesia, according to surgeon or patient preference and the patient's general health status. A curvilinear incision is made 1.5 cm distal and posterior to the medial malleolus. Dissection reveals the flexor retinaculum, which is divided to expose the posterior tibial nerve. The deep fibrous septations in the tunnel must be severed to release the structures from any constriction. It is important to follow the medial and lateral plantar nerves to the point where they go deep into the tissue near the origin of the abductor hallucis longus. Any fibrous bands at these locations must also be severed (4,14). Release of tarsal tunnel syndrome via endoscopy has also been reported, but this is not as effective in TTS as in CTS due to the septations that are present in the tarsal, but not the carpal, tunnel, and because the lateral and medial plantar branches may be individually affected at any level within the tarsal tunnel (7).

CONCLUSION

Tarsal tunnel syndrome is a rarely reported neuropathy in which the tibial nerve becomes entrapped under the flexor retinaculum along the medial aspect of the ankle. Multiple local and systemic causes have been implicated in TTS, and the two cases presented here describe unusual causes of the syndrome. In the patient with rheumatoid arthritis, it appears that the systemic disease led to multiple nerve entrapment syndrome through soft tissue changes. In the patient who developed DVT after undergoing surgery for lumbar disc herniation, we believe that the thrombosis aggravated already existing but asymptomatic TTS by interfering with the vascular supply and venous drainage through the tunnel. Although varicose veins have been reported to cause these symptoms (10), we are the first to report a case of TTS aggravated by DVT. This type of thrombosis is a common complication in surgical patients, and TTS should always be considered when diagnosing foot pain or paresthesia that has developed postoperatively. Preexisting asymptomatic TTS may become symptomatic following some events as described in our cases.

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