

# Tarsal Tunnel Syndrome in a Patient on Long-Term Peritoneal Dialysis: Case Report

## Uzun Süreli Periton Diyalizi Alan Hastada Tarsal Tünel Sendromu: Vaka Sunumu

### ABSTRACT

Tarsal tunnel syndrome (TTS) is defined as the entrapment of the posterior tibial nerve in the tarsal tunnel of the ankle. The etiologies of tarsal tunnel syndrome are mainly the presence of a ganglion, osseous prominence with tarsal bone coalition, trauma, varicose veins, neurinoma, hypertrophy of the flexor retinaculum, or systemic disease (rheumatoid arthritis, ankylosing spondylitis). However, no specific cause can be identified in some cases. Patients with chronic renal failure tend to develop peripheral nerve entrapment and carpal tunnel syndrome is the best-known peripheral entrapment neuropathy among them. Contrary to carpal tunnel syndrome, tarsal tunnel syndrome is observed less frequently in chronic renal failure patients. The common presenting symptoms of TTS are paresthesias and/or pain in the plantar side of the foot. Motor symptoms are rarely detected. Diagnosis is made primarily by electroneuromyographic studies and physical examination. Surgery is the treatment of choice and the outcome is generally favourable. In this report, we present a patient with tarsal tunnel syndrome complicating peritoneal dialysis.

**KEY WORDS:** Chronic renal failure, Peritoneal dialysis, Tarsal tunnel syndrome

### ÖZ

Tarsal tünel sendromu (TTS) posterior tibial sinirin ayak bileğinde tarsal tünel içinde tuzaklanması olarak tarif edilmiştir. Tarsal tünel sendromunun etiolojisinde başlıca ganglionlar, tarsal eklemdaki kemik çıkıntılar, travma, varikoz venler, nörinomlar, fleksör retinakulumun hipertrofisi veya romatoid artrit ve ankilozan spondilit gibi romatolojik hastalıklar bulunur. Bununla beraber bazı vakalarda özel bir neden tespit edilemeyebilir. Kronik böbrek yetmezliği olan hastalarda da periferik sinir tuzaklanmasına yatkınlık vardır ve karpal tünel sendromu (KTS) bu tuzaklanmaların en iyi bilinenidir. KTS'nin aksine tarsal tünel sendromu kronik böbrek yetmezliğinde daha nadir izlenir. TTS'de yaygın şikayetler ayağın plantar yüzünde olan ağrı ve/veya parestezilerdir. Motor bulgular nadiren tespit edilirler. Teşhis esas olarak elektromyografik (ENMG) çalışmalar ve fizik muayene ile yapılır. Cerrahi yaklaşım tedavi seçeneğidir ve sonuçlar genellikle olumludur. Bu sunumda, bir hastada periton diyaliz komplikasyonu olarak gelişen tarsal tünel sendromunu anlattık.

**ANAHTAR SÖZCÜKLER:** Kronik böbrek yetmezliği, Periton diyalizi, Tarsal tünel sendromu

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## INTRODUCTION

Tarsal tunnel syndrome (TTS) is an under-diagnosed entrapment neuropathy of the posterior tibial nerve and its branches. The tarsal tunnel is located posterior and inferior to the medial malleolus. The flexor retinaculum (lacinate ligament) forms its roof while the floor of the tunnel is formed by the superior aspect of the calcaneus, the medial wall of the talus and the medial aspect of the tibia (2). TTS often results from a space-occupying lesion such as a ganglion, lipoma, osteochondroma or deformities of the ankle and systemic diseases (5). However, chronic renal failure is a well-known cause of peripheral neuropathies and entrapment neuropathies. Dialysis-related amyloidosis is considered as the etiology of this clinical condition. Contrary to carpal tunnel syndrome (CTS), which is the most common entrapment neuropathy in long-term dialysis patients, entrapment of the posterior tibial nerve is rarely observed (1,6). In this report we present a patient who developed TTS after long-term peritoneal dialysis.

## CASE REPORT

A 47-year-old male was admitted to our clinic complaining of a burning sensation and pain in his right foot for 2 years. He had chronic renal failure (CRF) for seven years and was followed by continuous ambulatory peritoneal dialysis (CAPD). He was prescribed gabapentin 300 mg twice daily for his complaint but had obtained no benefit. His pain and paresthesias worsened particularly in the nights. Neurological examination revealed a positive Tinel's sign at his right ankle. Magnetic resonance imaging (MRI) and X-ray graphs of the foot (Figure 1) displayed normal findings. Electroneuromyographic studies of the lower extremities revealed right tarsal tunnel syndrome. The patient was operated under local anesthesia with a curvilinear incision just posterior-inferior to the medial malleolus. The flexor retinaculum was excised and the posterior tibial nerve and its branches were carefully dissected from the posterior tibial artery and vein. However, no compressive lesion of the nerve was observed intraoperatively. The postoperative period was uneventful and patient was completely symptom-free four weeks later.

## DISCUSSION

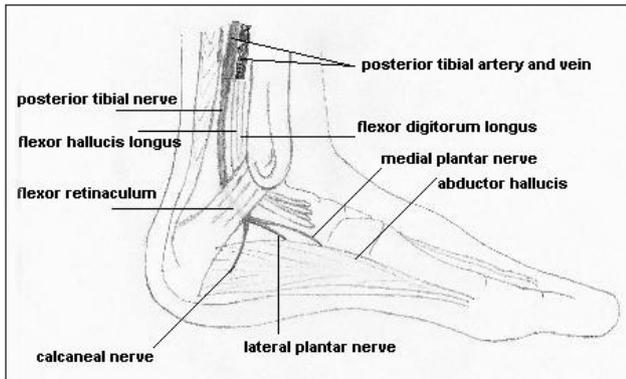
The term 'tarsal tunnel' was first used by Keck and Lam in 1962. Tarsal tunnel syndrome refers to



**Figure 1:** MRI of the patient's right foot showing the posterior tibial nerve and its branches.

the entrapment of posterior tibial nerve and its branches within the tunnel made by the flexor retinaculum, calcaneus and talus (4). Within the tunnel, the posterior tibial nerve runs together with tibialis posterior tendon, flexor digitorum longus tendon, flexor hallucis longus tendon and the posterior tibial artery and vein. The posterior tibial nerve then divides into three terminal branches: medial plantar, lateral plantar and calcaneal nerves. The medial plantar nerve provides sensory innervation to the plantar-medial aspect of the foot from the great toe to the medial half of the 4th toe and motor supply to the abductor hallucis, flexor brevis and the 1st lumbrical. The lateral plantar nerve provides sensation to the 4th and 5th digits and toes and motor supply to abductor digiti quinti, the interossei, adductor hallucis, and 2nd to 5th lumbricals. The calcaneal branch provides only sensation to the heel pad (Figure 2) (2,4,5).

The most common etiologies of tarsal tunnel syndrome are mass lesions in the tunnel such as lipomas, ganglions, osteochondromas, varicosities and synovitis due to rheumatoid arthritis or chronic uremia. Foot deformities, calcaneus or talus fractures, exostoses, talocalcaneal coalition, sport lesions or thrombophlebitis are the other causes of TTS. Pain and paresthesias in the foot are the most frequent clinical manifestations. Pain characteristically begins in the plantar aspect of the forefoot and radiates to the toes. It is usually aggravated in the night due to the alteration of foot



**Figure 2:** Schematic drawing of the tarsal tunnel and its contents.

posture that causes nerve tethering or venous congestion. Motor weakness or atrophy of intrinsic foot muscles can be seen rarely (5,9). Although physical examination gives little information, foot deformities can be detected by palpation and percussion over the nerve (Tinel's sign) and may produce paresthesias. In order to identify the cause of the entrapment, magnetic resonance imaging and computerized tomography should always be performed. However, the exact diagnosis is provided by electroneuromyographic examination. Characteristically, prolongation of distal motor latencies of abductor hallucis correspond to medial plantar nerve entrapment and prolongation of distal motor latencies of abductor digiti quinti correspond to lateral plantar nerve entrapment. Plantar fasciitis, calcaneal stress fractures, heel spurs and bursitis should be considered in the differential diagnosis (2).

On the other hand, chronic renal failure (CRF) is one of the best-known systemic diseases that cause peripheral nerve entrapment. Patients who underwent long-term dialysis had increased rates of various forms of entrapment neuropathies and dialysis-related amyloidosis is considered as the possible cause. The duration and type of dialysis, type of biocompatibility of the dialysis membrane, dialysate, and patient age have all been identified as factors in the etiology of dialysis-related amyloidosis (1,6). Additionally, alterations in the phosphate and calcium metabolisms result in soft tissue calcification and can cause peripheral neuropathies (3). Carpal tunnel syndrome is one of the most common complications of amyloid deposition. Few cases of cubital tunnel syndrome and Guyon's tunnel syndrome have been reported in dialysis patients (1). Contrary to the above-mentioned entrapment

syndromes, TTS is observed seldom in dialysis patients possibly due to the relatively rare incidence of compressive factors along the course of the nerves of the lower extremities (6,7).

Conservative treatment including anti-inflammatory drugs, immobilisation, and steroid injection or reducing tension on the nerves with an orthosis usually does not provide satisfactory results and surgical intervention is the treatment of choice. Surgery is indicated when conservative treatment methods fail, clinical symptoms persist for longer than 6 months and when physical examination indicates nerve entrapment. Surgical intervention can be performed under the general or local anaesthesia. The outcome after surgery is better when any etiological factor is detected. Furthermore, a longer interval between the onset of the disease and the operation, advanced age and idiopathic TTS result in a poor prognosis (4,5,8,9).

In conclusion, tarsal tunnel syndrome is a rare complication of chronic renal failure. It may be under-diagnosed because of poorly defined complaints, particularly in patients with systemic diseases. Neurosurgeons should keep in mind that heel pain or foot paresthesias could be caused by TTS and early surgery results in good prognosis.

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