

## Idiopathic Proximal Tibial Neuropathy as an Atypical Presentation of Radicular Leg Pain

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### Introduction

Isolated tibial neuropathy most commonly occurs at the level of the tarsal tunnel. Proximal tibial neuropathy is uncommon and when reported typically causes denervation to the gastrocnemius and soleus muscles. Baker cysts, both ruptured and intact, are the most common cause of proximal tibial neuropathy. We report an unusual case of a 57-year-old male with recent lumbar decompression and fusion who presented with acute onset left foot pain, swelling, paresthesias and weakness after mild trauma to the lower extremity. Diagnostic work up was negative for radiculopathy and he was diagnosed with a proximal posterior tibial neuropathy distal to the innervation of the gastrocnemius and soleus due to unknown etiology with spontaneous resolution of symptoms.

### Case Report

A 57-year-old male presents to a private physiatry and spine clinic for follow-up evaluation after spinal decompression and fusion with complaint of significant swelling and pain in his left lower extremity into the sole of the foot. He reported a recent increase in knee swelling after jumping out of a work truck about a month prior to examination but reported no history of blunt trauma. MRI of the left knee a week after the onset of knee pain and swelling was also reviewed and a small lobulated popliteal cyst was noted. At the time of evaluation, the pain was rated as severe and worsening since time of injury. There was associated with dense numbness and tingling in a similar distribution of pain. MRI of the lumbar spine was obtained which did not reveal any significant nerve compression therefore the patient was referred for electrodiagnostic evaluation.

Examination prior to electrodiagnostic study revealed an antalgic gait with slight limp. He had increased edema bottom of the foot and leg. There was significant sensory loss with diminished light touch throughout the sole of the left foot and medial ankle. Muscle strength was grade 0/5 for the left flexor

hallucis longus, abductor hallucis, and toe flexors. The left tibialis anterior and extensor hallucis longus muscles were grade 5/5 strength.

Nerve conduction studies were significant for an absent left tibial motor response. The left fibular distal motor response was normal. Sensory studies were not completed due to significant edema. On electromyography evaluation there were denervation potentials identified in the left abductor hallucis and tibialis posterior muscles with absent motor unit recruitment. The left medial gastrocnemius and tibialis anterior muscles showed a normal motor unit response. The results prompted an MRI of the lower leg proximal to the ankle with emphasis on the tibial nerve.

MRI of the left tibia fibula with emphasis on the tibial nerve showed no mass or ganglion along the course of the tibial nerve from the popliteal fossa to the superior tarsal tunnel. However, intramuscular edema was found in the left popliteus muscle belly in addition to edema within the posterior tibialis, flexor digitorum longus, and flexor hallucis longus muscle bellies. Findings compatible with sequela of tibial neuropathy. A small Baker cyst was noted as well. Ultrasound evaluation a month following MRI was negative for acute pathology. The patient's symptoms improved with spontaneous return of strength and alleviation of pain in paresthesias.

### Discussion

Proximal tibial neuropathy is extremely rare but has been reported in the literature. The differential diagnosis includes pathology of the popliteal structures including Baker cysts, popliteal artery aneurysms, posterior compartment syndrome, intraneural ganglia or neoplastic invasion of the sciatic and tibial nerves, soleus tendon entrapment, popliteus muscle hemorrhage, or trauma. Gastrocnemius mediated entrapment via hypertrophy and anomalous fibers have been reported as well [5]. However, the most common presentation is caused by

both intact and ruptured Baker cysts and the related sequelae such as posterior compartment syndrome [1-3]. Sanchez et al conducted an extensive literature review of 30 publications including 73 cases of compression syndromes due to Baker cysts and the detailed variants. In contrast to our case, the review demonstrated Baker cyst pathology usually causes denervation to the gastrocnemius and soleus muscles [3]. Sparing of these muscles is an even rarer finding and would indicate pathology distal to innervation of these muscles.

Elucidating the etiology of nerve injury involves localizing the site of the lesion. Electrodiagnostic studies and advanced imaging such as MRI and ultrasound are typically useful for localization. The tibial nerve is a branch of the sciatic nerve that innervates the posterior compartment of the distal leg. It supplies branches to the medial and lateral heads of the gastrocnemius as it descends through the popliteal space. Just distal to the tibiofemoral joint it continues inferiorly lying just posterior to the popliteus muscle supplying innervation via a branch called the nerve to the popliteus. From here it innervates the soleus and dives anteriorly traversing the tendinous arch of the soleus. As it continues in the posterior compartment it supplies three branches to the tibialis posterior, flexor digitorum longus, and flexor hallucis longus. These structures enter the foot beneath the flexor retinaculum entering the sole where the tibial nerve terminates into medial and lateral plantar nerves and innervates the muscles of the foot. The retinaculum is the most common site of entrapment causing tibial neuropathy and is commonly known as tarsal tunnel syndrome. In this case it is likely that the nerve was entrapped distal to the soleus innervation. A review of the literature resulted in cases with similar presentation where popliteus muscle hemorrhage and rupture caused proximal tibial neuropathy with sparing of the

gastrocnemius and soleus [4]. An additional case with similar findings was caused by entrapment at the tendinous arch of the soleus with formation of pseudoneuroma [5].

The nerve injury in this case was never clearly elucidated but it was thought to be secondary to the knee injury that resulted in increased joint and lower extremity swelling. It is plausible the swelling was a ruptured popliteal cyst as there was a small one found on MRI. Other explanations could be traction injury, popliteus swelling due to intramuscular hemorrhage or soleus tendinous arch entrapment. This case demonstrates how electrodiagnostic testing and imaging studies including magnetic resonance imaging and ultrasound can be utilized in the differential diagnosis of a mononeuropathy of the lower extremity.

### Conflicts of Interest

The authors declare that they have no financial or other conflicts of interest in relation to this research and its publication.

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