

Guiding Treatment for Foot Pain

David Del Toro, MD*, P. Andrew Nelson, MD

KEYWORDS

- Tibial nerve • Peroneal nerve • Electrodiagnostic • EDX • Tarsal tunnel syndrome
- Foot pain

KEY POINTS

- In the electrodiagnostic approach of the patient who presents with foot pain, numbness, and/or tingling, it is important to consider a broad differential diagnosis of both neuropathic and nonneuropathic conditions, including focal and systemic causes.
- A vital precursor to this type of electrophysiologic study is that one needs to have a firm understanding of the neuroanatomy of the foot and ankle, with a particular focus on the local neuroanatomy, including potential entrapment sites.
- The electrodiagnostic evaluation of the foot typically requires numerous motor and sensory nerve conduction studies, as well as needle electromyography examination of various intrinsic foot muscles.
- A well conceived and organized electrodiagnostic assessment incorporating a combination of the most appropriate NCS and needle EMG of relevant intrinsic foot muscles can localize a neurogenic pathology and guide appropriate treatment of a patient with foot pain.

INTRODUCTION

In the electrodiagnostic (EDX) approach of the patient who presents with foot pain, numbness, and/or tingling, it is important to consider a broad differential diagnosis of both neuropathic and nonneuropathic conditions, including focal and systemic causes. A vital precursor to this type of electrophysiologic study is that one needs to have a firm understanding of the neuroanatomy of the foot and ankle with a particular focus on the local neuroanatomy, including potential entrapment sites. The EDX evaluation of the foot typically requires numerous motor and sensory nerve conduction studies (NCS) as well as needle electromyography (EMG) examination of various intrinsic foot muscles. This article assists the electromyographer in the selection and utilization of the most appropriate EDX studies, both NCS and needle EMG

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Department of Physical Medicine & Rehabilitation, Medical College of Wisconsin, 8701 Watertown Plank Road, Milwaukee, WI 53226, USA

* Corresponding author.

E-mail address: ddeltoro@mcw.edu

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examination, for evaluation. The EDX findings and impression can then help guide potential treatment options for the patient with foot pain and other symptoms. Moreover, this discussion demonstrates the added value that EDX evaluation of the foot provides to the comprehensive assessment of foot pain.

ANATOMY

Fibular (Peroneal) Nerve

The common fibular nerve (CFN, also known as the common peroneal nerve) branches from the sciatic nerve proximal to the knee and descends in the posterolateral knee and around the fibular head, where it then divides into the superficial fibular nerve (SFN) and the deep fibular nerve (DFN). Both branches contain fibers originating from the L5 and S1 nerve roots.

The SFN innervates the fibularis longus and brevis in the lateral compartment of the leg and then enters the foot at the anterolateral ankle (superficial to the inferior extensor retinaculum) and supplies cutaneous innervation to the dorsal ankle and foot. In approximately 28% of cases, the SFN supplies an accessory branch of the DFN that travels posterior to the lateral malleolus and then innervates the extensor digitorum brevis (EDB).¹

The DFN courses through the anterior compartment of the leg (where it supplies motor innervation) before dividing into medial and lateral branches just proximal to the ankle. Both branches then pass deep to the inferior extensor retinaculum (sometimes referred to as the anterior tarsal tunnel).² The lateral branch provides motor innervation to the EDB. The medial branch supplies cutaneous innervation to the first dorsal web space. In 92.1% of cases, the medial branch also supplies some motor innervation to the first dorsal interosseus pedis (DIP), with significantly less innervation to the second and third dorsal interossei.³

Tibial Nerve

The tibial nerve (TN), carrying fibers from the S1 and S2 nerve roots, enters the foot posterior to the medial malleolus deep to the overlying flexor retinaculum within the tarsal tunnel. In the upper, or proximal, tarsal tunnel there is a distinct compartment for the TN, which is a potential site of entrapment.³ The TN has 4 terminal branches: the medial plantar nerve (MPN), lateral plantar nerve (LPN), first branch of the LPN (also referred to as inferior calcaneal nerve or Baxter's nerve), and the medial calcaneal nerve⁴ (Fig. 1).

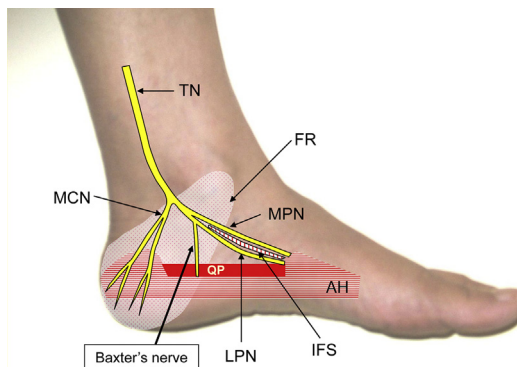


Fig. 1. The tibial nerve. AH, abductor hallucis; FR, flexor retinaculum; IFS, interfasicular septum; QP, quadratus plantae; TN, tibial nerve. (Copyright AANEM, Nandedkar Productions, LLC, 2008.)

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