Introduction

- Plantar fascia release is one of the surgical options for intractable plantar fasciitis and may result in peripheral nerve injury leading to nerve dysfunction and neuropathic pain.

- The innervation of the foot is complex with anatomical variations which makes diagnosis and targeted management challenging.

- The plantar foot is mainly innervated by the tibial nerve (TN) via its three branches: medial calcaneal nerve (MCN), medial plantar nerve (MPN), and lateral plantar nerve (LPN) (Fig 1A and B).

- Medial and lateral aspect of plantar foot is also innervated by saphenous nerve (SA) and sural nerve (SU), respectively.

- The tibial nerve arises in the popliteal fossa as a division of the sciatic nerve, divides in terminal branches at the level of medial malleolus; but variations exist.

- Tibial nerve stimulation with open implantation of Peripheral Nerve Stimulation (PNS) system has showed effectiveness in neuropathic pain in the heel, but connections to implanted generator poses limitations.

- StimRouter is a percutaneous wireless PNS system overcome this limitations.

- Our patient’s successful management using StimRouter for neuropathic pain of the heel emphasizes the importance of consideration of neural variations in choosing target nerve for stimulation.

Case Report

- A 44 yo female s/p plantar fascial release surgery with post operative infective course was referred for possible complex regional pain syndrome at right heel and medial half of plantar foot.

- Presented with 4 year history of constant burning and throbbing pain along with intermittent tingling in the right heel radiating to ankle and medial plantar foot/toes. It is worst in the evening, aggravated by standing or walking, and improved by rest.

- Physical exam consistent with allodynia and dysesthesia over right heel pad and medial half of foot, mild tenderness over peroneous brevis insertion area along with normal strength and range of motion.

- MRI of right foot was negative for nerve compression. Ultrasound showed no neuroma and suggested maximal pain at the lateral plantar nerve (LPN) in proximity to surgical site (Fig 2A).

- Later in 2018, diagnostic right posterior tibial nerve injection at distal leg near malleolus only provided <30% pain relief, even with whole foot numbness from local anesthetic.

- Lack of substantial pain relief (30%) from distal tibial nerve block at the malleolus level suggested the main pain signals was transmitted through other nerve pathways. Those variations can include: 1) much proximal division of tibial nerve, 2) innervation supplied through sural nerve, 3) aberrant nerve from popliteal nerve or common peroneal nerve.

Discussion

- Bifurcation of TN into MPN and LPN can occur 9 cm proximal to the malleolus. MCN can take off from TN 7 cm proximal to the malleolus. Multiple calcaneal branches can arise from TN. Injection at the malleolus level may not block the whole TN if any of these anatomical variations are present.

- Keeping various anatomical variations in mind, patient’s unwillingness to follow proves of elimination from consecutive diagnostic nerve block; a diagnostic right popliteal nerve diagnostic block performed with >90% benefit, followed by PNS application to this nerve.

- Neuromodulation with PNS has been increasingly used for the treatment of peripheral neuropathic pain. This present case is of clinical interest in planning diagnostic nerve blocks in the preparation for PNS placement by keeping possibility of neural variations in mind.

- Stimulating popliteal sciatic nerve with StimRouter® is a viable treatment option for neuropathic pain in the heel.

References: