PAIN MEDICINE CASE REPORTS

ISSN 2768-5152

Volume 5, Number 8, pp. 413-416

Peripheral Nerve Stimulator for Treating Sural and Posterior Tibial Neuralgias – Case Report

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Background: Sural neuralgia is persistent pain in the distribution of the sural nerve that provides sensation to the lateral posterior corner of the leg, lateral foot, and fifth toe. Sural neuralgia is a rare condition, but can be challenging to treat and cause significant limitations. Posterior tibial neuralgia, also known as tarsal tunnel syndrome, is an injury or stretch affecting the tibial nerve at the medial border of the ankle and heel. We present one case of sural neuralgia complicated by superimposed posterior tibial neuralgia resistant to conservative management that were effectively treated with a peripheral nerve stimulator placement.

Case Report: A 60-year-old man developed sural and posterior tibial neuralgias after a motorcycle accident resulting in severe injury of his left lower extremity. He underwent surgery for his open left distal tibia fracture. The patient continued to have pain which was not alleviated with physical therapy and conservative management. Six years after the initial injury and failing conservative management, he underwent successful sural and posterior tibial nerve blocks followed by placement of a peripheral nerve stimulator with improvement in pain and daily function.

Conclusions: Peripheral nerve stimulators may be a safe and effective treatment for both sural and posterior tibial neuralgias that do not respond to conservative therapy. However, large scale studies are needed to elucidate its effectiveness and safety profile.

Key words: Peripheral nerve stimulator, posterior tibial neuralgia, sural neuralgia

BACKGROUND

Sural neuralgia is pain caused by injury or inflammation of the sural nerve. The sural nerve, along with 4 other nerves, provides sensation to the foot. Specifically, the sural nerve provides sensation to the lateral posterior corner of the leg, lateral foot, and fifth toe. The sural nerve is superficial, predisposing it to injuries (1). Common causes of sural neuralgia are direct trauma, external compression, vasculitis, diabetes, and nerve entrapment. Sural nerve entrapment is a feared postoperative complication of many orthopedic procedures involving the ankle, such as Achilles tendon repair, ankle surgery, fifth metatarsal fracture surgery, and ganglion cyst removal (2).

Posterior tibial neuralgia is similarly difficult to treat. It is most commonly caused by compression of the posterior tibial nerve as it crosses the medial border of the ankle which is termed tarsal tunnel syndrome. Other causes of posterior tibial neuralgia are direct trauma, vasculitis, and diabetes.

Sural and posterior tibial neuralgias are relatively rare conditions and often respond to conservative treatments, such as rest, physical therapy, massage therapy, anti-inflammatory medications, tricyclic antidepressants,

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Disclaimer: There was no external funding in the preparation of this manuscript.
Conflict of interest: Each author certifies that he or she, or a member of his or her immediate family, has no commercial association (i.e., consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest in connection with the submitted manuscript.
Accepted: 2021-09-10, Published: 2021-11-30

gabapentin, calcium channel blockers, and serotonin/norepinephrine inhibitors. Many clinicians have limited experience treating refractory sural neuralgia due to its low prevalence. Limited exposure combined with the paucity of data regarding effective treatment modalities, makes treating patients suffering from sural neuralgia difficult (1,2).

We describe a case with both sural and posterior tibial neuralgias after a traumatic injury that are resistant to conservative therapy. We utilized a peripheral nerve stimulator (PNS) to achieve a sustained 50% pain relief.

CASE REPORT

A 60-year-old man developed sural and posterior tibial neuralgias after a motorcycle accident resulting in severe injury of his left lower extremity. He underwent surgery for his open left distal tibia fracture. The patient continued to have pain which was not alleviated with physical therapy and conservative management (Fig. 1).

Six years after the initial injury and failing conservative management, he was referred to the chronic pain team. The patient had trialed Aleve, gabapentin, morphine, tramadol, aspirin, and oxycodone. He reported his pain as burning and tingling in nature. Pain was not referred, but constant. The pain improved with sitting and worsened with weight bearing. Using the Visual Analog Scale (VAS) in which 0 represents no pain and 10 represents the worst pain imaginable, he described his chronic pain as an average 8 of 10 which is improved to a 6 of 10 with large doses of oxycodone.

After a physical examination, which showed both sural and posterior tibial neuralgias, he underwent successful nerve blocks (x2) using a local anesthetic that reduced his pain by 75%. We decided to proceed with a PNS to provide longer-term pain control for the patient.

Before consideration for a PNS, a health psychological assessment was performed. This evaluation assesses the patient's willingness and ability to make necessary lifestyle changes. The psychology team reported no contraindications to a PNS trial.

A PNS trial was then performed. At the 3-month follow-up, the patient reported a 75% improvement in his pain with marked improvement in activity level. At the 6-month follow-up, his pain was reduced by 50%

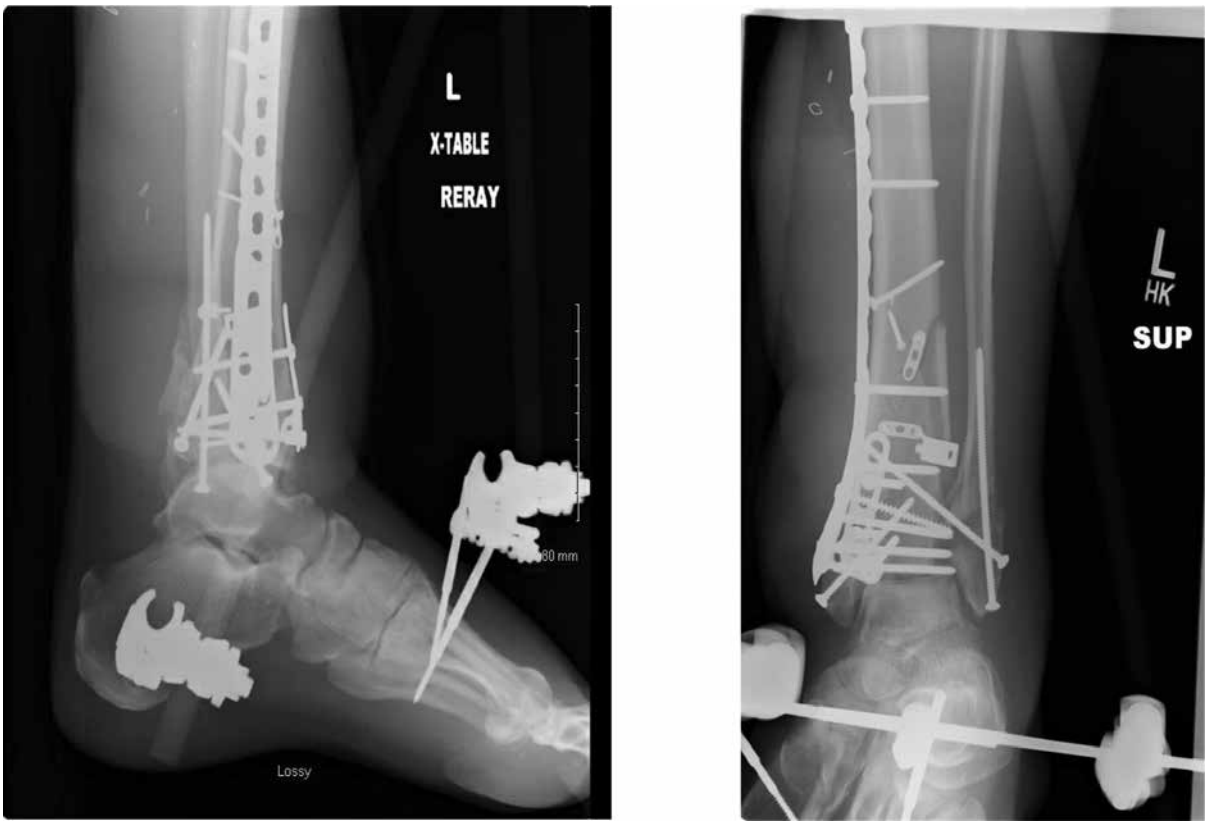

Fig. 1. Patient is status postfixation of tibial and fibular fractures. Fracture lines are improving, but remain evident.

with continued improvement in his ability to ambulate and perform activities of daily living. The patient also reported a drastic reduction in pain flares (Table 1).

Table 1. Pain score and percent improvement.

Variable	Before PNS	3 Months PNS	6 Months PNS
Pain Score	8	2	4
% improvement	N/A	75%	50%

Procedures

Sural Nerve Block

Informed consent was obtained. The foot of interest was cleaned with chlorhexidine and sterilely draped. The area between the lateral malleolus and Achilles tendon was identified. Under ultrasound guidance, a 25-gauge needle was inserted toward the lateral malleolus in the anatomic location of the sural nerve. Following negative aspiration, 2 cc of 0.25% bupivacaine was injected, and the needle was removed. We monitored the patient for immediate postprocedure complications. The patient reported pain scores and percent improvement after the procedure (3).

Posterior Tibial Nerve Block

Informed consent was obtained. The patient was placed in a supine position, and the left ankle was cleaned with chlorhexidine and sterilely draped. The posterior tibial region was cleaned with chlorhexidine (at medial malleoli). Then, under ultrasound guidance, a 25-gauge needle was inserted just behind the medial malleolus on the left side and 2 cc of bupivacaine 0.25% was injected after negative aspiration.

Peripheral Nerve Stimulator

After obtaining an informed consent, the patient was placed in a prone position. The left lower extremity was cleaned with chlorhexidine and covered with sterile drapes. The left lower extremity was placed on a wedge. The posterior tibial nerve was identified with ultrasound between the medial malleolus and Achilles tendon, in addition to the sural nerve between the lateral malleolus and Achilles tendon. One percent lidocaine was injected in the left lower extremity. A number 10 blade was used to make one small incision for lead placement. Then utilizing ultrasound, a PNS needle was inserted close to the left sural nerve. After placing the lead in the appropriate locations, the stylets were removed, and an octad lead was placed through the needles. A subsequent PNS catheter and 4 contact leads were placed close to the left posterior tibial nerve. Placement was then confirmed by fluoroscopy (3,4).

A small receiver subcutaneous pocket incision was made with a number 15 blade approximately 10 cm proximal to the first incision. After copious irrigation with a bacitracin solution, hemostasis was confirmed with the aid of cautery. The needle was passed through the small pocket to the lead site. For both leads, the receiver was tunneled proximally from the first incision to the subcutaneous pocket through the length of the needle. An intraoperative transmitter was used to verify the proper connection with the receiver. Stimulation was performed with adequate paresthesia in the distribution of the patient's pain.

The first follow-up visit was one week after the Stimwave placement. At this time, the patient was reporting 50% improvement in his pain and increased function. He was then seen again 2 weeks postoperatively for suture removal. He reported slightly more pain control and mobility from the week prior. Six months after the Stimwave {"StimWave®"?} was placed, the patient still reported a 50% improvement in symptoms when compared to preoperative pain scores (Fig. 2).

DISCUSSION

Both sural and posterior tibial neuralgias can be resistant to conservative treatments making them difficult to manage and can negatively impact patients' lives. Limited data is available regarding effective treatment options for refractory neuralgias. We have described a case of sural neuralgia with superimposed posterior tibial neuralgia that was treated with a peripheral spinal cord stimulator (SCS). Our patient had a 50-75% reduction in pain which is comparable to Oswald's results (3) where they also observed a pain reduction of 75% for their case of sural neuralgia treated with a peripheral spinal cord stimulator. Our results are similar in efficacy to the limited case reports utilizing radiofrequency ablation for the treatment of refractory sural neuralgia.

Our case is unique due to the coexisting neuralgias. Our results contribute to the small body of literature describing the effectiveness of spinal cord stimulators for the treatment of sural and posterior tibial neuralgias. Currently, no gold standard treatment has been identified for refractory sural and posterior tibial neuralgias, and treatment is entirely provider specific.

Fig. 2. A diagram demonstrating the relationship of the posterior tibial nerve and sural nerve to the Stimwave leads, respectively.

Surgical intervention is common for patients suffering from treatment-resistant sural neuralgia despite limited evidence demonstrating the effectiveness of surgery.

A peripheral spinal cord stimulator is a viable alternative method to surgical intervention and is a particularly appealing option because it is minimally invasive, preserves the integrity of the nerves, and is easily adjustable to the patient's needs. The potential applications of peripheral spinal cord stimulators are numerous. Our study is limited by the nature of being a case report, lack of controls, and lack of long-term follow-up data. This is one of the first studies describing the treatment of both sural and posterior tibial neuralgias together, along with the exact nerve location of a PNS implantation and its efficacy.

CONCLUSIONS

Both treatment-resistant sural and posterior tibial neuralgias are rare conditions that few providers have experience managing. Here, we describe a safe and effective use of a peripheral spinal cord stimulator that provided a 50% pain reduction. These results are promising; however, future research is needed to further define its scope of practice, effectiveness, and its safety profile. Spinal cord stimulators have rapidly advanced and have the ability to increase our patient's quality of life.

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