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# Peripheral Nervous Stimulator Reduces Refractory Pain in Patient with Lower Extremity Pain

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## Introduction

- Effective clinical treatment of different types of pain can be immensely difficult to achieve, yet this is a massive problem America is facing with over 42,000 deaths annually from opioid overdose. After failing maximum medication therapy and physical therapy, patient have few alternatives.
- Peripheral nerve stimulation is a technique used to treat neuropathic pain for decades, however, insurance carriers have been slow to adopt this technique.
- With the demonstration of quick low-cost techniques for trial therapy, peripheral nerve stimulators (PNS) have been increasing in popularity as an alternative therapy to traditional treatments.
- The application of electrical stimuli directly is hypothesized to work through the “gate control” theory of pain. Specifically, the stimulation of A-beta fibers that close the gates in the spinal cord dorsal horn cells.
- However, there remains a paucity of literature to define the scope of practice. We present a case of a PNS device providing a pain solution that allowed a patient to wean off opioids after years of chronic use.

## Case

- For PNS, we defined that the test stimulation block would need to show greater than 50% pain reduction in VAS score before considering permanent placement.
- Pain scores, a change in MME, and a change in function were measured to assess the long-term efficacy.
- The patient is a 31-year-old man who presented with chronic right lower extremity pain secondary to compartment syndrome. This occurred during while on ECMO for 21 days due to pulmonary edema status post a mitral valve replacement.
- After undergoing ankle surgery and multiple fasciotomies to correct his compartment syndrome, he developed complex regional pain syndrome refractory to physical therapy.
- Before his peripheral nerve trial, he was receiving 25 MME, baclofen, and gabapentin. He reported weight gain and 10/10 pain with weight bearing activity. Additionally, he underwent a lumbar sympathetic block that unsuccessfully reduced his pain.
- On exam, his right foot was found to have increased discoloration, temperature, swelling, and decreased range of motion.
- After discussing options, the patient decided to undergo a test block of the right superficial peroneal and posterior tibial nerve.
- This block had a >80% reduction in pain prompting permanent peripheral nerve stimulator placement.
- During the placement trial, it was found most of the pain relief resulted from the posterior tibial nerve so only permanent leads to that nerve were placed (figure 1,2).
- He was found to have a long-term VAS pain score of 2, weaned off all opioids, and resumed activity.
- Additionally, his MME requirement was weaned to 0 over three months.

## Discussion

- PNS are becoming a vital part of interventional techniques to reduce pain in patients who are refractory to physician therapy and medication.
- Over the last decade, the feasibility of PNS is a technology has improved and it has shown to be effective in case studies for the treatment of multiple pain related conditions including complex regional pain syndrome as seen in this study but also headaches, cranial neuralgias, neuropathy, and postherpetic neuralgia.
- While there are multiple types of pain that can be treated, patient selection is vital to maintain therapeutic benefit and instill confidence in our patients and insurers.
- Important contraindications to device placement include coagulopathies, psychiatric illness, and infection.
- In a private practice setting, long-term outcomes in literature showed average pain reduction of 4.2 +/- 2.5 points on an 11-point scale (7.4 +/- 1.7 decreased to 3.2 +/- 2.3) and reduction in analgesic use.
- Adequate long-term follow-up is extremely important to assess efficacy and determine if lead migration has occurred.

## Conclusion

- The permanent placement of PNS can reduce pain in patients with lower extremity neuropathy secondary to multiple surgeries who are refractory to other treatments. Additional research of PNS is needed to further define the scope of practice for pain management.

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## Figures



Figure 1

Figure 2