Use of a Novel Percutaneous Peripheral Nerve Stimulation System for Treatment of Peripheral Neuropathic Pain

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Introduction:

With the introduction of several percutaneous, minimally invasive devices, the indications and approaches for PNS continue to grow at a rapid rate. We present a case of a patient with peripheral neuropathy who underwent a PNS trial and subsequent permanent implant of the radial and ulnar nerves.

Methods:

We present a 62-year-old gentleman with a history prostate cancer diagnosed seven years prior to our intervention. He underwent successful treatment with brachytherapy but developed paraneoplastic syndrome with sensory neuropathy involving the hands and feet. He complained of burning and allodynia along the left dorsal forearm and lateral hand. We elected to perform a PNS trial with a percutaneous microstimulation device (Nalu Medical, Carlsbad, CA). A trial lead was implanted parallel to the radial nerve at the spiral groove. After a week of stimulation, the patient reported 60-70% relief in his dorsal hand and forearm pain, but he still endorsed medial hand pain involving the ring and small fingers (ulnar distribution).

Results:

Based on the trial feedback, we elected to implant untined, 8-contact leads on both the radial and ulnar nerves (FIGURE 1) for the permanent procedure. The leads were implanted using ultrasound with placement distal to proximal and parallel to each nerve (FIGURE 2). Leads were then tunneled and connected to the micro-IPG that was pocketed in the subcutaneous space overlying the deltidoid (FIGURE 3). The patient is early in therapy, but he is already reporting >50% improvement in his hand and arm pain.

Conclusion:

The rapid development of new, novel PNS systems has expanded the treatment options for neuropathic pain. More investigation is needed, but
this treatment modality can be an effective choice in patients with upper extremity neuropathy.

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FIGURE 1: Placement of the battery-free, micro-IPG at the deltoid area (A) with 8-contact leads running parallel the the radial (B) and ulnar (C) nerves. Leads were placed with ultrasound and final placement was visualized with fluoroscopy (left). The external power source (Therapy Disc) contains a rechargeable lithium-ion battery and electronics for powering and running the micro-IPG (right).

FIGURE 2: Short axis view of the radial nerve (N) and the PNS lead (L) at the spiral groove of the humerus (left). Long axis view of the PNS lead and visible electrode contacts (arrows) in the same location (right).
FIGURE 3: Micro-IPG with a two-lead configuration. The volume of the IPG is approximately 1.5cm³. Tuned and untuned leads can be used with this system.