

PERIPHERAL NERVE STIMULATION OF THE DORSAL SCAPULAR NERVE FOR ATYPICAL SHOULDER PAIN TREATMENT: A CASE REPORT

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- Background:** Shoulder pain is a common cause of musculoskeletal pain affecting millions of patients each year. Common treatment modalities include physical therapy, pharmacologic agents, injections, and surgery. However, these treatments may not be effective for all patients.
- Case Report:** We present the case of a 46-year-old woman with over 20 years of chronic refractory right shoulder pain. The patient underwent multiple interventions, including trigger point injections, a right subacromial bursa injection, a barbotage procedure, and epidural steroid injections, all of which failed to adequately control her pain. A peripheral nerve stimulator (PNS) trial targeting the dorsal scapular nerve was subsequently performed with remarkable improvement throughout the trial period.
- Conclusions:** To the best of our knowledge, this is the first reported case of PNS of the dorsal scapular nerve used for the treatment of refractory shoulder pain. Our case suggests that dorsal scapular nerve stimulation may represent a viable therapeutic option in carefully selected patients.
- Key words:** Shoulder pain, scapulalgia, peripheral nerve stimulation, neuromodulation, dorsal scapular nerve
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BACKGROUND

Chronic shoulder pain affects millions of patients each year. While not the main cause of musculoskeletal pain, scapulalgia or “shoulder pain” is responsible for 16% of all musculoskeletal complaints in the healthy adult population. Patients with persistent shoulder pain often experience impaired mobility, sleep disturbance, and psychological distress related to chronic symptoms (1).

The shoulders’ large range of motion and complex mechanical anatomy allow for numerous painful disorders to occur. Common etiologies for scapulalgia include rotator cuff injuries, subacromial impingement, muscle or joint overuse or strain, postsurgical pain from procedures, such as scapulothoracic arthrodesis, or cervical injuries causing nerve impingement. These diagnoses for

shoulder pain are usually made through history, physical exams, and imaging. Common treatments for chronic shoulder pain include physical therapy, pharmacologic agents, such as nonsteroidal anti-inflammatory drugs, corticosteroid or anesthetic injections, and surgical interventions (2). Despite these interventions, a subset of patients continues to experience persistent pain, highlighting the need for alternative treatment strategies.

Peripheral nerve stimulation (PNS) is a minimally invasive procedure in which a small-caliber electrode is percutaneously implanted to deliver electrical impulses proximal to a peripheral nerve lesion, thereby disrupting pain signal transmission and providing targeted pain relief. By applying electrical current to a peripheral nerve, large-diameter myelinated afferent fibers are

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stimulated, which interferes with the central processing of pain signals transmitted by small-diameter afferent fibers at the level of the spinal cord (3). Evidence-based clinical guidelines support the use of PNS as an adjunct for chronic and acute postoperative pain following adequate patient screening and a positive diagnostic nerve block or stimulation trial (4). Compared with traditional surgical interventions, PNS offers several advantages, including reversibility, preservation of neural structures, and reduced procedural morbidity. Further, unlike systemic medications, neuromodulation avoids dose-limiting adverse effects and minimizes risks of tolerance, dependency, or systemic toxicity (4).

Herein, we report what is, to the best of our knowledge, the first case of dorsal scapular nerve PNS used for the treatment of refractory shoulder pain.

CASE PRESENTATION

A 46-year-old woman presented with chronic right shoulder blade pain consistent with mononeuropathy. Her medical history was notable for migraines and hypothyroidism. Physical examination revealed pain with passive right shoulder abduction and pain-limited weakness of shoulder abduction. Strength was otherwise preserved. Sensation and reflexes were normal. Spurling's test was negative, and shoulder magnetic resonance imaging demonstrated only minimal acromioclavicular degenerative changes. The patient had previously undergone multiple pain interventions, including right-sided trigger point injections, a subacromial bursa injection, a barbotage procedure, and a C5-C6 transforaminal epidural steroid injection. However, none of these approaches provided sustained or meaningful pain relief.

Given the refractory nature of her symptoms and the failure of conventional treatments, a more targeted approach was considered. After shared decision-making, it was agreed to proceed with a diagnostic right dorsal scapular nerve block, followed by a PNS trial if the block proved effective.

The dorsal scapular nerve block was performed using 0.5% bupivacaine and resulted in substantial pain relief. Given this result, the patient proceeded with the PNS trial 2 months later. The trial was performed under ultrasound guidance using the SPRINT PNS system (SPR Therapeutics, Cleveland, OH). The right dorsal scapular nerve was carefully mapped for accurate lead placement. Once optimal coverage was confirmed, the lead was secured externally.

Throughout the 6-week trial period, the patient consistently reported excellent pain control and experienced near-complete resolution of her shoulder pain, with improvement in daily activities and sleep quality. She reported no adverse effects. Despite this improvement, she declined permanent implantation. Nevertheless, she confirmed sustained benefit throughout the entire trial.

DISCUSSION

The evidence supporting PNS for chronic pain continues to expand. Systematic reviews and meta-analyses (5) reported moderate evidence for efficacy across various neuropathic, postoperative, and musculoskeletal pain conditions, with meaningful reduction in pain intensity and improved function. Temporary percutaneous PNS has also demonstrated persistent benefit even after lead removal, suggesting durable neuromodulation rather than transient analgesia alone (6).

For shoulder pain, existing literature has largely focused on stimulation of the suprascapular and axillary nerves. Several case series and prospective studies (7) report reductions in pain scores, opioid consumption, and disability in patients with chronic shoulder pathology refractory to standard intervention. However, dorsal scapular nerve stimulation has not previously been described in the literature.

The dorsal scapular nerve innervates the rhomboids and levator scapulae, structures implicated in medial scapular and periscapular pain syndromes. The patient's symptom distribution and dramatic response to a diagnostic dorsal scapular nerve block support this nerve as a plausible and anatomically rational target, particularly when conventional interventions fail. Clinically, this patient experienced a near-complete resolution of pain during the 6-week stimulation period with no adverse effects. Such improvement is consistent with prior shoulder-PNS outcomes (8,9) reported for other nerve targets, supporting the hypothesis that dorsal scapular nerve PNS may modulate aberrant nociceptive signaling contributing to refractory shoulder pain.

Interestingly, despite experiencing substantial pain relief during the trial period, the patient elected to decline permanent implantation based on personal preference rather than lack of efficacy or adverse effects. This observation may reflect a durable benefit following temporary PNS trials (6) and supports the concept that neuromodulation can induce sustained

changes in nociceptive processing beyond time-limited analgesia.

In highly mobile regions, such as the shoulder, lead migration remains an important consideration in PNS, as it may compromise therapeutic coverage and necessitate lead revision or removal (1). These factors must be weighed when considering permanent implantation and, when discussed during shared decision-making, particularly in the context of a highly mobile joint, may influence patient preference and contribute to the decision to decline permanent implantation despite a successful trial.

Some limitations should be acknowledged. The lack of permanent implantation limits conclusions regarding long-term durability, and data specific to dorsal scapular nerve PNS are unavailable. Although PNS is generally safe, targeting novel nerves carries potential risk, emphasizing the importance of image guidance and careful patient selection. Finally, the current evidence base for PNS relies largely on observational studies, highlighting the need for larger prospective trials to define long-term efficacy and optimal technique.

CONCLUSIONS

Our case describes the dorsal scapular nerve as a novel target for PNS and expands the potential role of PNS in refractory shoulder pain. It underscores the importance of individualized patient assessment, including patient preferences and risk tolerance, and highlights that meaningful analgesia may be achieved even with temporary stimulation. While these findings are promising, further evaluation through controlled studies with larger cohorts and long-term follow-up is warranted.

Consent Statement

Written informed consent was not obtained from the patient for publication of this case report and accompanying images. Per institutional policy, case reports are exempt from requiring consent when all patient identifiers are removed.

Use Of Artificial Intelligence

Artificial intelligence (AI) tools were used for language editing and formatting only. No clinical content was generated using AI.

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