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Refractory Lower Extremity Neuropathy Successfully Treated With Posterior Femoral Cutaneous Nerve Peripheral Nerve Stimulation: A Case Report

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Background: When pain resembles radiculopathy but remains intractable to a multitude of spinal procedures, alternative etiologies should be considered, including peripheral nerve entrapments. A rarely diagnosed neuropathy affects the posterior femoral cutaneous nerve (PFCN). While diagnosing this syndrome is uncommon, successful treatment can be a significant challenge depending on etiology.

Case Report: We present the case of a 67-year-old woman with chronic, refractory left lower extremity radicular-type pain following multiple spinal surgeries and interventional procedures. A diagnostic evaluation ultimately identified the PFCN as the primary pain generator. Following successful diagnostic blockade and subsequent placement of a PFCN peripheral nerve stimulator, she achieved complete and durable pain relief for the first time in several years.

Conclusions: Our case highlights the importance of considering extraspinal neuropathic sources of pain in patients with unresolved radicular symptoms after spine-directed treatments.

Key words: Case report, peripheral nerve stimulation, posterior femoral cutaneous nerve

BACKGROUND

Lumbosacral radiculopathy is commonly attributed to several spinal pathologies, and while interventions, such as epidural steroid injections and surgical decompression, are often effective, a subset of patients experience persistent symptoms (1,2). When pain resembles radiculopathy but remains intractable to a multitude of spinal procedures, alternative etiologies should be considered, including peripheral nerve entrapments. Some of the more common lower extremity focal neuropathies include femoral neuropathy, lateral femoral cutaneous neuropathy, peroneal neuropathy, and posterior tibial neuropathy, although neuropathies can affect any nerve and should remain on the differential regardless of the location (3). A rarely diagnosed neuropathy affects the posterior femoral cutaneous nerve (PFCN). While diagnosing this syndrome is uncommon, successful treatment can be a significant challenge depending on etiology. We present a case of a patient with posterior femoral cutaneous neuropathy who achieved complete relief of her symptoms following implantation of a permanent peripheral nerve stimulator (PNS).

CASE PRESENTATION

A 67-year-old woman with a history of breast cancer, fibromyalgia, hypothyroidism, migraines, and long-standing left gluteal and posterior thigh pain. She had an extensive workup, including x-ray, magnetic resonance imaging, and computed tomography of the lumbar spine, which demonstrated severe left lateral recess stenosis at L5-S1 in the setting of either recurrent synovial cyst or granulation tissue as a result of

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prior cyst excision. Her symptoms had been refractory to medication management, physical therapy, numerous interlaminar and transforaminal epidural steroid injections, as well as a piriformis injection. The patient went on to have multiple lumbar surgeries, including laminotomy, facetectomy, foraminotomy, discectomy, L4-L5 interbody fusion, and revision decompression and synovial cyst excision at L5-S1. Despite these interventions, her symptoms failed to improve, and so she was referred to interventional pain management for consideration of spinal cord stimulation (SCS).

On our evaluation, the patient reported pain primarily in the middle of her left gluteus maximus muscle with radiation into her posterior left thigh, which was significantly worsened by sitting and improved with activity, elevating her feet, and performing a piriformis stretch. Given the distribution of her pain and the worsening with sitting and improvement with activity, it was proposed that the she was suffering from a posterior femoral cutaneous neuropathy. A diagnostic block of the PFCN was performed with 100% relief for the duration of the anesthetic used. Next, a pulsed radiofrequency modulation of the PFCN was performed without benefit. Given the clear diagnostic improvement from the previously performed block, the patient underwent implantation of a permanent PNS (Bioventus, Cordova, TN) targeting the PFCN, and experienced long-lasting complete relief (100%) and was able to sit for a prolonged period of time for the first time in several years.

Ethics Statement: As the case report is devoid of patient-identifiable information, it is exempt from local Institutional Review Board review requirements. Informed consent was obtained prior to case report submission.

CONCLUSIONS

Our case underscores the importance of considering other sources of pain in patients with persistent radicular-type symptoms, as well as the utility of PNS in treating neuropathies. Although the patient's history of spinal stenosis and synovial cyst formation initially corresponded to her symptom distribution, the long-standing posterior thigh predominance, immediate worsening with sitting, and lack of durable relief from spine-directed therapies suggested an alternative pain generator.

The PFCN is a highly variable sensory nerve made up of the posterior divisions of the anterior rami of S1-S2 and the anterior divisions of the anterior rami of S2-S3. After exiting the pelvis through the greater sciatic foramen and passing inferior to the piriformis muscle, it courses deep to the gluteus maximus muscle and superficial to the sciatic nerve. It then descends superficially to the long head of the biceps femoris and deep to the fascia lata before piercing the fascia to access the popliteal fossa and giving off branches to the sural nerve. The PFCN in the thigh gives off the cutaneous, gluteal, and perineal branches, which, together, supply sensory innervation to the skin on the back of the thigh, inferior half of the buttock, and posterior part of the scrotum or labia majora (4). Most cases of PFCN entrapments have occurred following intramuscular injections; however, there are several other causes leading to prolonged compression of the area, including hematoma or tumor formation, piriformis syndrome, and hamstring injuries (5-9). As with most mononeuropathies, treatment often includes medication management, physical therapy, kinesiology taping, acupuncture, activity modifications, nerve ablation, and rarely surgery.

PNS has emerged as a treatment modality for focal neuropathic pain resistant to other approaches (10). Although the exact mechanism by which PNS achieves pain control is unclear, it is hypothesized to work at both the level of the central nervous system and the peripheral nervous system. Through the central mechanisms, it is thought to stimulate the A-beta fibers, which activate the inhibitory dorsal horn interneurons that suppress the transmission of nociceptive signals from A-delta fibers and C fibers. Peripherally, PNS is thought to act via gate control by downregulating inflammatory mediators and neurotransmitters associated with pain signaling. As a result of both of these mechanisms, PNS inhibits the pain signal transmission to higher centers in the central nervous system, which disrupts the sensation of pain (11).

While radiculopathy and lower back pain remain ever present, investigating extraspinal sources of pain in patients with persistent radicular-type pain unresponsive to spine-targeted treatments remains an important piece of the diagnostic process. While several pathways exist for addressing mononeuropathies, PNS has proved to be a reasonable option in cases refractory to other treatments. While PNS worked in this patient, a comparative study between it and SCS is needed to better identify the benefit and success of each.

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