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Technical Note

Sacral Nerve Stimulation (SNS) for Pudendal Neuralgia via the Sacrococcygeal Approach: A Technical Note

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Background: Pudendal neuralgia is a debilitating pain syndrome, and finding long-lasting treatment modalities has been challenging in pain management. Sacral nerve stimulation (SNS) has emerged as a treatment option for pudendal neuralgia but the correct placement of SNS leads can be challenging. Previously described techniques include placing the stimulator at the conus, as well as retrograde and transforaminal approaches.

Objective: We aim to describe the relevant anatomy and technique for precise SNS lead placement using a sacrococcygeal approach.

Study Design: A technical report.

Setting: An interventional pain management practice.

Methods: Description with accompanying fluoroscopic and anatomical images; this technical report describes the specific technique we employed in 7 patients suffering from intractable pelvic pain as a result of pudendal neuralgia.

Results: Successful placement of percutaneous SNS leads using a sacrococcygeal approach in all 7 patients suffering from pudendal neuralgia. Six of the 7 patients experienced a decrease in the visual analog scale (VAS) pain score (> 50%), improvement in function during the trial period, and proceeded with permanent neurosurgical implantation. Four out of 6 patients that underwent permanent implantation reported persistent pain relief and improvement in the activities of daily living at long-term follow-up (range: 12–33 months).

Limitations: The design of this study limits the ability to determine the definitive risks, potential complications, and long-term benefits. The precise clinical value of this approach remains to be determined in larger prospective studies.

Conclusions: Although infrequently performed, the sacrococcygeal approach may represent a more successful and safe alternative method for the placement of SNS leads for a SNS trial.

Key words: Technical note, neuromodulation, sacral nerve stimulation, pudendal neuralgia, pelvic pain, SCS, SNS

Pudendal neuralgia typically presents as pain in the perineal, genital, and anal regions and may be accompanied by bowel, bladder, and sexual dysfunction (1). A wide variety of conservative (physical therapy, anticonvulsants, opioids, muscle relaxants, tricyclic antidepressants) and interventional methods (injections, surgical decompression) have been used to treat pudendal neuralgia, with limited success (2). Recently, sacral nerve stimulation (SNS) has emerged as a treatment option and this modality shows promising results in preliminary studies (3).

The main challenge and obstacle for the use of SNS in the successful treatment of pudendal neuralgia is the correct placement of the leads. The goal of both the trial and final placement of leads is to capture the pudendal nerve distribution and avoid any additional stimulation in non-painful regions (aberrant stimulation). The objective of this technical note is to evaluate the ability to stimulate the painful region successfully

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during the trial period using the sacrococcygeal anterograde approach.

Description

We herein describe the sacrococcygeal anterograde approach we employed in 7 patients with pudendal neuralgia who underwent SNS trials. All of the patients had only partial or short-lasting relief with conservative and interventional treatments. The patients all had pain limited to the pudendal nerve distribution. Moreover, each patient reported transient pain relief in response to a nerve-stimulation-guided pudendal nerve block performed dorsally onto the ischial spine. Each patient was given counseling about the treatment and placement of the SNS, in addition to information provided by the manufacturer. Furthermore, a full psychological evaluation was performed prior to the trial.

In each case, the epidural space was accessed through the sacrococcygeal ligament under fluoroscopy with 2 14 gauge Tuohy needles (Fig. 1). Once the epidural space was successfully obtained, 2 Octrode™ leads (St. Jude Medical Inc., St. Paul, MN) were placed in the anterior sacral epidural space bilaterally (Fig. 2), medial to the sacral foramina, with the tips at the top of the S1 foramina level. The placement of the leads was confirmed with fluoroscopy in both anteroposterior and lateral views. Intraoperative stimulation was performed in the procedure room to confirm the proper placement of the leads. Paresthesia coverage in the reported specific pain localization was obtained in all 7 patients, with minimal to no additional need for lead manipulation after initial placement. There was no reported aberrant stimulation reported by any of the patients. The leads were then affixed to the skin using anchoring devices (St. Jude Medical Inc., St. Paul, MN) and attached to an external pulse generator. All of the procedures were performed on an outpatient basis.

The average duration of the SNS trials was 5 days. Six of the 7 patients chose to proceed with permanent implantation. Criteria for proceeding with implantation were: significant decrease in the visual analog scale (VAS) pain score (> 50%), increased patient activity and function, and overall patient satisfaction with the treatment. One patient did experience adequate stimulation in the area of her pain, but did not find the SNS treatment to help her increase her overall activity and function.

Permanent implantation of appropriately sized

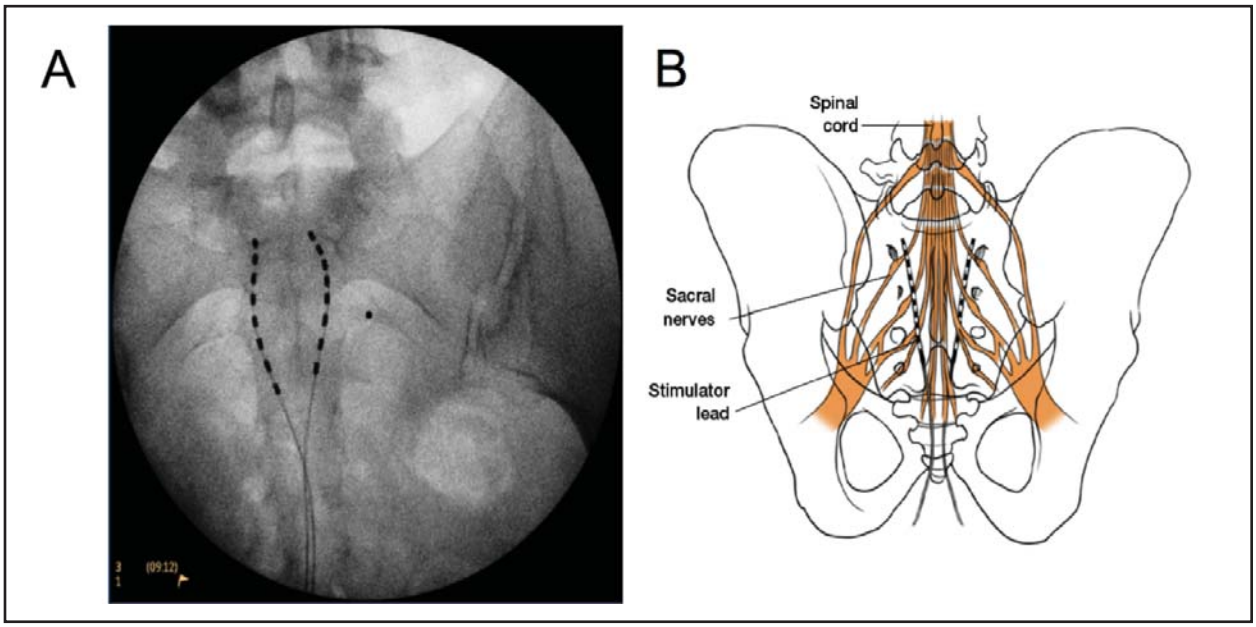

Fig. 1. Anteroposterior fluoroscopic image (A) and artistic rendering (B) of sacral nerve root lead placement. Notice the first electrodes are at the superior-tip of the S1 foramen and the leads lay medial to the foramen.

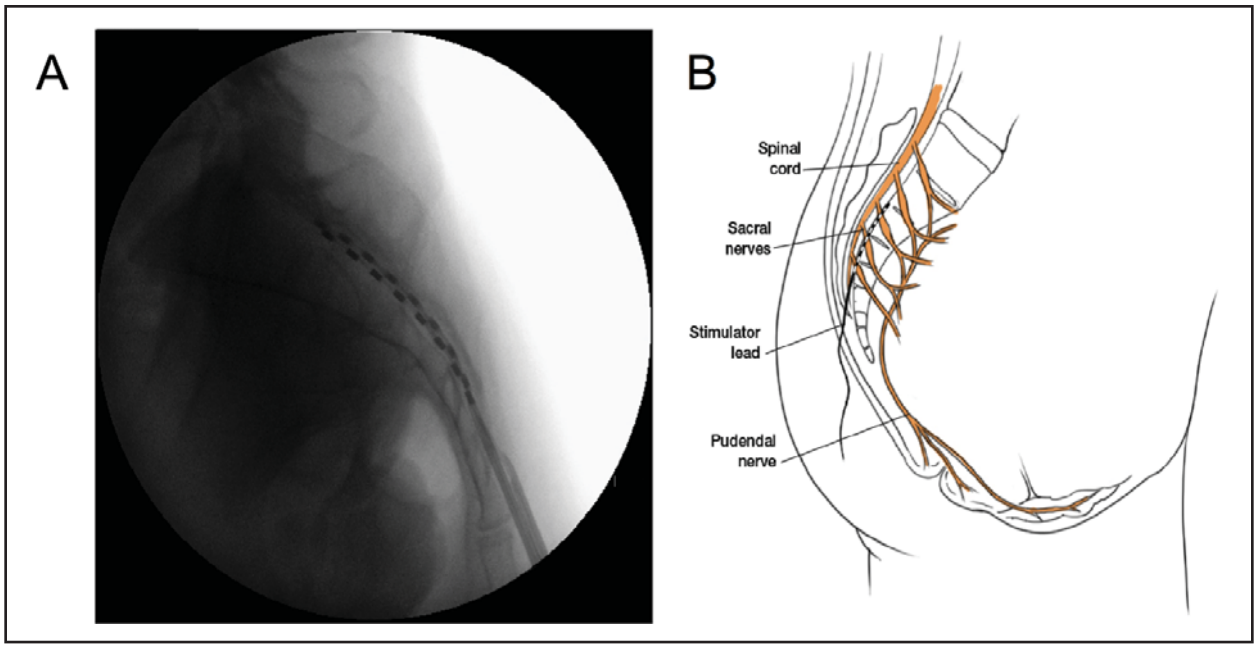

Fig. 2. Lateral fluoroscopic image (A) and artistic rendering (B) of sacral nerve root lead placement with Tuohy needles entering through the sacrococcygeal ligament.

paddle leads (St. Jude Medical Inc., St. Paul, MN) was performed via a L5-S1 laminectomy (Fig. 3). The widest possible paddle lead, preferably a 5-column Penta™ lead, was used to cover all of the descending sacral nerve roots. Four out of 6 patients that underwent permanent implantation reported persistent pain relief and improvement in the activities of daily living at long-term follow-up (range: 12–33 months). None of the patients requested to have the stimulator explanted.

DISCUSSION

Pudendal neuralgia is a neuropathic condition involving the pudendal nerve that causes severe, sharp pain in the genital area. The Nantes criteria (4) were established in 2008 to help to make the diagnosis of pudendal neuralgia, which include: 1) pain in the anatomical area of the pudendal nerve, 2) pain that is worsened by sitting, 3) the patient is not woken at night by the pain, 4) no objective sensory loss on clinical examination, and 5) pain relief with an anesthetic pudendal nerve block. The exclusion criteria include: 1) purely coccygeal, gluteal, or hypogastric pain, 2) isolated pruritus, or 3) the presence of imaging abnormalities that are able to explain the symptoms.

There is no universally agreed upon approach to the treatment of pudendal neuralgia (2). A retrospective study in 2005 showed that conservative treatment with medications and sitting pads provided slight to moderate improvements in pain (2). A study in 2007, that followed patients for 4 years after transperineal, transgluteal, or transichiorectal decompressive surgery of the pudendal nerve, found that only 50% of patients had some improvement in VAS pain scores (5). Although our study was clearly not aimed at comparing SNS to decompressive surgery, the favorable outcomes that were achieved in two-thirds of the patients in our cohort at long-term follow-up seem to suggest that SNS is, at the least, not inferior to surgery in the treatment of pudendal neuralgia. Consistent with our findings, other studies have previously reported long-term relief in patients that respond favorably to SNS in the trial period (6). Though spinal cord stimulation has proven helpful in treating pudendal neuralgia, the optimal location for SNS placement remains unclear (3).

There are multiple approaches for the placement of SNS electrodes. Placing the electrodes in the midline at the conus would appear most logical, but anatomical structures and the movement of the conus may

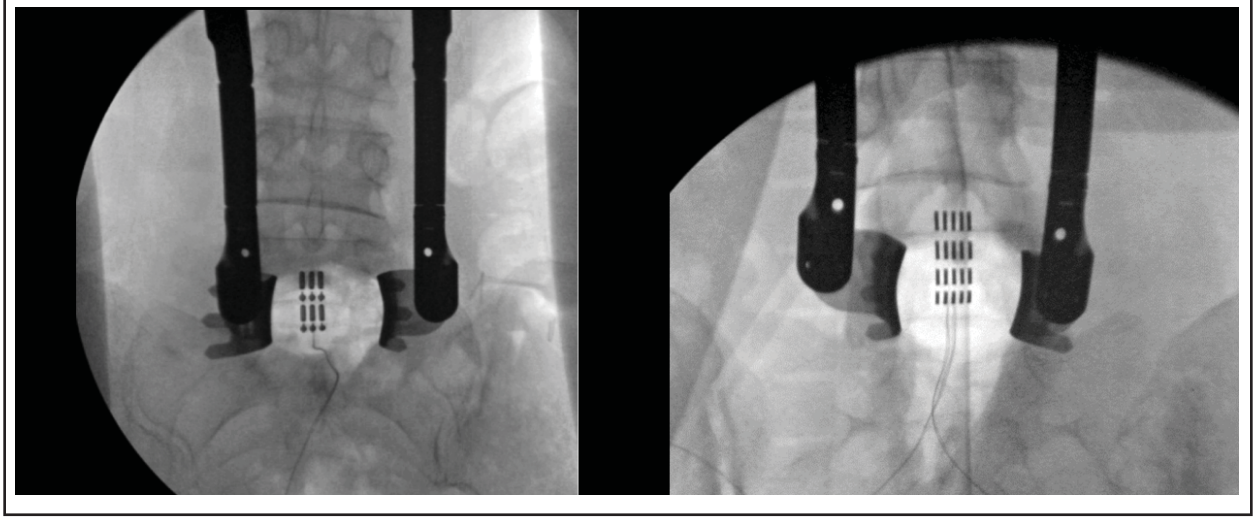

Fig. 3. Anteroposterior fluoroscopic image showing the paddle leads (A: Exclaim™, B: Penta™; St. Jude Medical Inc., St. Paul, MN), placed via L5-S1 laminectomy.

contribute to the occasional failure of this treatment modality (7). Others have advocated the use of a retrograde/cephalocaudal, placement of electrodes over the clinically important roots just before they exit their respective foramina, which has been associated with good pain coverage, low rate of migration, and low risk of infection (8). The technical difficulty, however, of accessing the epidural space percutaneously in a cranial to caudal angulation limits the application of this technique and may result in misplaced leads and dural puncture. Yet another approach is the transforaminal approach, targeting roots distally near the foramina, where they are spatially restricted and can be stimulated selectively (3). However, the increased mobility characteristic of the lumbosacral junction limits the use of this approach in terms of optimal capture and the risk of lead migration.

The advancement of leads in an anterograde fashion through the sacrococcygeal ligament may allow for a much simpler, safer, and faster method of lead placement. Positioning the leads such that the coverage of painful areas is obtained is much easier with the ability to "curve" the leads so that all of the sacral roots are adequately captured. Upon literature review, we found 2 case reports describing a similar approach to lead placement. Both Park et al (9) and Falco et al (10) described single cases of uncomplicated placement of bilateral leads using a caudal anterograde approach. The main disadvantage of this approach is the concern of hygiene and infection associated with the placement of the leads at a lower insertion site. We did not encounter any infectious complications in the current case series. While infectious complications would be less likely during a temporary trial, the concern for infection for leads that are placed permanently via this route led us to choose the laminectomy and paddle lead approach for permanent implant. Whereas the final paddle lead is placed in a higher anatomical location, at the lumbosacral junction, the multiple columns of the lead allow selective activation of the descending sacral nerve roots and similar paresthesia coverage and pain relief. The surgical approach to lead placement when using paddle leads may be a relative barrier to SNS, which has led others to attempt stimulation of the pudendal nerve at the ischial spine (11,12). The technical approach to lead placement using this technique can be found elsewhere (11). Although there is evidence for effectiveness of both SNS and pudendal nerve stimulation, the optimal method of neuromodulation in the context of pelvic pain remains to be determined (13).

CONCLUSION

The sacrococcygeal trial approach for SNS for pudendal neuralgia may provide more efficient re-

sults in regards to its ability to capture the pudendal nerve distribution of the pelvic region, with little to no undesired aberrant stimulation and may be safer as well. Larger scale studies should be undertaken to corroborate the effectiveness of this approach.

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