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Basivertebral Nerve Ablation in the Setting of Existing Fusion Hardware Case Report

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Background: Chronic low back pain (LBP) is a widespread disease particularly as the population continues to age. The most common type of chronic LBP is axial LBP caused by disc degeneration leading to vertebrogenic back pain. Recently, the concept of vertebrogenic LBP has become more mainstream as has its treatment, basivertebral nerve ablation (BVNA). Herein, we report a case where BVNA was performed in the setting of existing hardware at the treatment levels.

Case Report: Sixty-eight-year-old woman with chronic LBP status post anterior L5/S1 instrumented fusion presents with persistent chronic LBP centralized to L5/S1. Preoperative imaging demonstrates increased signal on bone scan at L5/S1 and BVNA was performed adjacent to the screws, resulting in significant relief of LBP and without complication.

Conclusions: BVNA is feasible to perform at levels where existing spine hardware is present.

Key words: BVNA, basivertebral nerve ablation, radiofrequency ablation, low back pain, chronic low back pain, vertebrogenic low back pain, disc degeneration, fusion hardware, interventional radiology, case report

BACKGROUND

Chronic low back pain (LBP) from discogenic disease is ubiquitous within the population of the United States (1). Conservative therapies for LBP are highly variable in efficacy and ephemeral in nature (2). Approved in 2019, basivertebral nerve ablation (BVNA) is an emerging treatment for chronic LBP that has significant promise in its efficacy and durability to manage pain in these patients (1,3). BVNA is performed using radiofrequency ablation (RFA) to generate a lesion, which destroys the unmyelinated BVN within the vertebral body and there have been hundreds of successful ablations reported within the existing literature; however, BVNA in the presence of hardware has yet to be reported. Herein, we report the outcome of BVNA in the setting of existing fusion hardware at the level of ablation in a patient with severe LBP.

CASE PRESENTATION

A 68-year-old woman with a history of hypertension, hyperlipidemia, brain aneurysm, chronic bladder pain, and chronic lumbar pain status post L5-S1 anterior fusion was referred for evaluation of persistent chronic LBP by neurosurgery. She had L5/S1 fusion in 2009 and states that she had no relief from the fusion, described the pain as constant, aching, and midline without radiculopathy and 8-9 on the Numeric Pain Scale. She has undergone multiple epidural injections at an outside hospital with varying and limited relief. Her imaging workup included lumbar spine magnetic resonance

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imaging (MRI) (Fig. 1a), which demonstrated limited visibility of L5/S1 due to hardware. A nuclear medicine bone scan with single photon emission computed tomography (Fig. 1b) demonstrated increased uptake at L5/S1. She was scheduled for an L5/S1 BVNA as that was thought to be her primary pain generator on history and physical exam with concordant imaging findings. Note is made that there was also increased focal uptake at L2/L3.

RFA was performed with fluoroscopy and cone-beam computed tomography (CT) using SpineSTAR (Merit Medical, South Jordan, UT). Monitored anesthesia care was provided for the procedure and the L5 and S1 vertebral bodies were accessed via unipedicular access. An articulating mechanical stylet (PowerCURVE, Merit Medical, South Jordan, UT) was used to create a channel and then the 5/10 SpineSTAR RFA probe was placed with ablation centered within the region of the BVN at L5 and S1 (Fig. 2). Ablation was performed to a temperature of 50 °C at proximal thermocouple and the system was removed, hemostasis achieved using manual compression for 10 minutes. The patient endorsed immediate relief of LBP by about 80% and 85% at 3-month follow-up without complications.

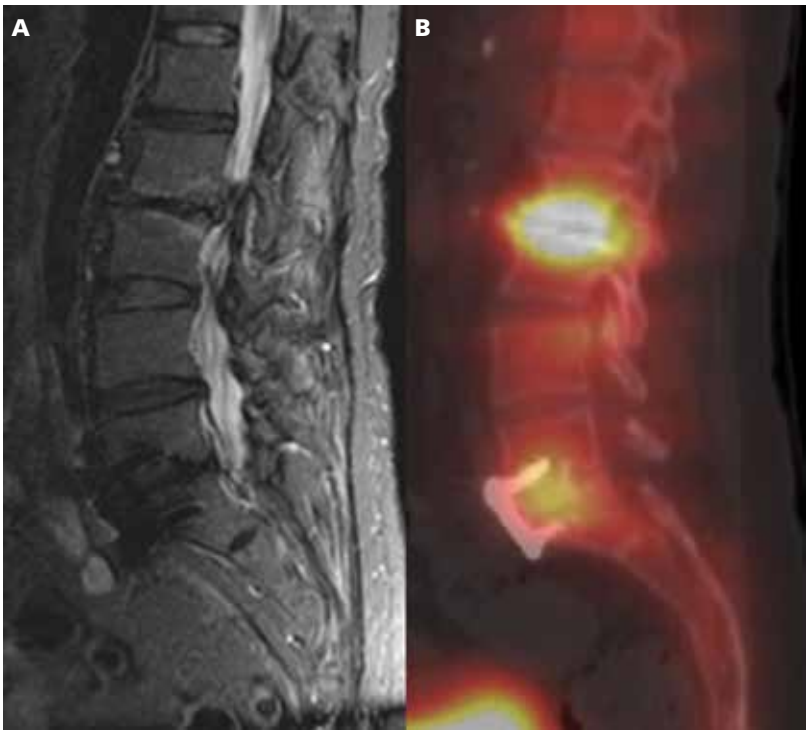

Fig. 1. (a) Preprocedural T2-STIR image demonstrating anterior fusion hardware as L5-S1. (b) Preprocedural Tcm MDP SPECT scan showing increased uptake at L5-S1 and L2-L3, consistent with ongoing bony remodeling. STIR, short tau inversion recovery; SPECT, single photon emission computed tomography.

DISCUSSION

Current indications for BVNA are based on LBP of > 6 months, trial of conservative therapy of > 6 months, and MRI findings of Modic type I or II changes at L3-S1. There are multiple level 1 studies demonstrating patients with chronic LBP experience tremendous relief following BVNA (3). The INTRACEPT study (Relievant Medsystems, Minneapolis, MN), a multisite prospective randomized control trial, observed a 25-point Oswestry Disability Index (ODI) decrease for BVN patients contrasted against a 4-point decrease in the standard care group. The SMART trial (Relievant Medsystems, Minneapolis, MN) demonstrated improvements in ODI, Short Form-36, and Visual Analog Scale from 3 to 24 months for patients who have undergone BVNA. There is a paucity of published experience with BVNA in the setting of hardware. The concern is that RFA will interact with metallic instrumentation and cause unwanted carryover effects for nontarget tissues. Ex vivo RFA experiments performed on swine vertebrae demonstrated no increase in temperature of the ablation zone, no periscrew ablative inhomogeneities, and no evident-warming of juxtascrew remote soft tissues (4). Other large series have also reported no adverse outcomes with juxtametallic RFA represented in the American Society of Regional Anesthesia Consensus Practice Guidelines and American Society of Interventional Pain Physicians Guidelines.

CONCLUSION

BVNA has proven efficacy to treat LBP and might also offer therapeutic benefits to patients with hardware. Given the increased risk of adjacent segment disc disease development in patients with indwelling hardware, the ability to effectively ablate the BVN in this setting may represent a new minimally invasive option for many patients with LBP.

Precautions we took: Monitored anesthesia care, consistent prompt-

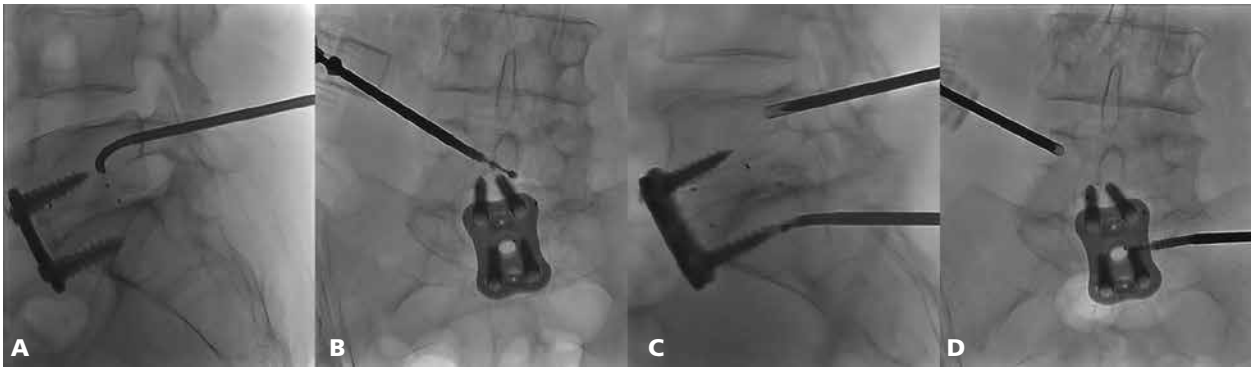

Fig. 2. (a) Lateral projection of access at L5 showing curved osteotome in position of future RF probe. (b) Frontal projection showing RF probe at L5 adjacent to surgical hardware. (c) Lateral projection of access at S1 showing RF probe in position adjacent to surgical screw. (d) AP projection showing RF probe at S1 overlying the surgical screw. RF, radiofrequency; AP, anteroposterior.

ing of the patient for biofeedback, and use of cone beam and fluoroscopy to provide appropriate navigation.

Case reports are not subject to institutional review board review at our institution.

Informed consent was obtained from the patient.

REFERENCES

1. Huang J, Delijani K, Jones J, et al. Basivertebral nerve ablation. *Semin Intervent Radiol* 2022; 39:162-166.
2. Smuck M, Khalil J, Barrette K, et al. Prospective, randomized, multicenter study of intraosseous basivertebral nerve ablation for the treatment of chronic low back pain: 12-Month results. *Reg Anesth Pain Med* 2021; 46:683-693.
3. Fischgrund JS, Rhyne A, Franke J, et al. Intraosseous basivertebral nerve ablation for the treatment of chronic low back pain: A prospective randomized double-blind sham-controlled multi-center study. *Eur Spine J* 2018; 27:1146-1156.
4. Sag AA, Sperduto WAL, Eward W, et al. Juxtametallic bipolar bone radiofrequency ablation: Thermomonitoring in an ex vivo model with specimen magnetic resonance imaging and histopathologic correlation. *J Vasc Interv Radiol* 2022; 33:1594-1600.