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BASIVERTEBRAL NERVE ABLATION IN A PATIENT WITH ANKYLOSING SPONDYLITIS: A CASE REPORT

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Background: Lower back pain is a symptom of ankylosing spondylitis (AS), stemming from arthritic changes within the sacroiliac joints, lumbar facet joints, and between the vertebral bodies. Most commonly, interventional techniques targeting the sacroiliac or facet joints have been used to mitigate AS-related pain.

Case Report: In this case report, we describe a patient with AS and axial lower back pain who experienced insufficient and temporary relief with these first-line procedures. Furthermore, magnetic resonance imaging (MRI) showed degenerative changes to vertebral endplates suggesting a vertebrogenic cause for his pain. We proceeded with basivertebral nerve ablation for this patient, which resulted in superior and enduring pain relief.

Conclusions: This is the first published report of basivertebral nerve ablation in a patient with AS that we know of. We demonstrate the potential for basivertebral nerve ablation to alleviate axial lower back pain for patients with AS who have vertebrogenic changes on MRI.

Key words: Basivertebral nerve ablation, case report

BACKGROUND

Ankylosing spondylitis (AS) is a chronic autoimmune condition, leading to axial arthritis and progressive spinal stiffness. Patients with AS typically present with back pain due to both axial spinal arthritis as well as sacroiliitis. Syndesmophyte formation results in impaired spinal mobility and can progress to complete spinal fusion, commonly referred to as "bamboo spine" (1). Corticosteroid injections into the sacroiliac joint have been shown to benefit pain related to sacroiliitis, but there is little evidence for interventional techniques targeting spinal components of axial lower back pain for these patients (2,3).

Axial back pain for patients suffering from AS can be attributed to both sacroiliac joint dysfunction and facet arthropathy; however, vertebrogenic pain can be a possible pain generator. Vertebrogenic pain is thought to exist due to disc and endplate damage triggering the release of inflammatory mediators, giving rise to Modic changes on magnetic resonance imaging (MRI) (4). These changes can contribute to vertebrogenic pain, which is transmitted through the basivertebral nerve (5). Multiple studies (6,7) have shown that radiofrequency ablation of the basivertebral nerve is safe and effective in treating vertebrogenic back pain. In our case study, we describe a patient with vertebrogenic pain from inflammatory changes due to AS who received sustained pain relief from basivertebral nerve ablation. Written Health Insurance Portability and Accountability Act authorization has been obtained from the patient.

CASE PRESENTATION

A 50-year-old man with a history of AS (positive for the human leukocyte antigen [HLA]-B27), peptic ulcer disease, and hypertension was referred by rheuma-

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tology to our pain management service for chronic low back. He was nonresponsive to several disease-modifying antirheumatic drugs (DMARDs), including adalimumab, secukinumab, and etanercept.

The patient reported lower back pain for over 20 years that localized to his lumbar spine and described it as a constant, dull pain that was 5 out of 10 on the Numeric Rating Scale in severity. The pain was exacerbated by sitting and movement of his lumbar spine. He reported rare episodes in which the pain radiated to his bilateral thighs. He had attempted physical therapy and acupuncture in the past with minimal benefit. His medications included celecoxib 200 mg twice daily and cyclobenzaprine 5 mg 3 times daily, which were minimally helpful. On examination, his lumbar paraspinal muscles were mildly tender to palpation, and he had reproducible lower back pain with flexion-abduction-external rotation, Yeoman, and modified Gaenslen tests bilaterally. Lumbosacral radiograph revealed grade 3 sacroiliitis bilaterally and minimal degenerative disc disease at L3/L4 and L5/S1.

After evaluation in the pain management clinic, the patient underwent bilateral sacroiliac joint and lumbar epidural corticosteroid injections, which provided minimal relief. He had a positive response (> 80% relief) with bilateral lumbar L3, L4, and L5 medial branch nerve blocks, but only a few weeks of pain relief after radiofrequency ablation at the same levels.

Since the patient was nonresponsive to previous interventions, a lumbar spine MRI was obtained for advanced imaging. The lumbar spine MRI revealed moderate multilevel degenerative changes of the lower lumbar spine resulting in moderate neural foraminal narrowing at L5/S1 bilaterally. The radiology report also described T2 hyperintense regions in the corners of the L2 and L3 vertebral bodies, which may represent osteitis (Romanus lesions) and/or Modic type II changes related to the reported history of AS (Fig. 1).

In light of the findings of Romanus and/or Modic changes on MRI combined with the patient's history/examination concerning for possible vertebrogenic pain, a decision was made to proceed with basivertebral nerve ablation at L2 and L3. The procedure was done under general anesthesia. Radiofrequency ablation was performed at L2 and L3 at 85° for 15 minutes at each level, following standard protocol at the time. The patient tolerated the procedure with no complications.

At one-week follow-up, the patient reported 25% improvement in axial back pain and reported being able to sleep with less pain with no adverse effects from the procedure. At 6-week follow-up, the patient reported 50% relief of back pain and mild pain with physical activity. At 6-month follow-up, the patient reported sustained relief in his axial low back pain (> 50% relief) and importantly, sustained ability to sleep through the night (Fig. 2). The patient's experience with this procedure was very positive; he expressed his gratitude to his treatment team and stated he would recommend this treatment to others. He did, however, report that it took longer than expected for his insurance company to approve the procedure.

DISCUSSION

This case report describes a patient with AS and vertebrogenic pain with inflammatory changes found on lumbar MRI who received sustained pain relief from basivertebral nerve ablation. To our knowledge, this is the first reported treatment of a patient with AS with basivertebral nerve ablation.

AS is a chronic autoimmune condition that can cause axial lower back pain. This condition affects men more commonly than women, and onset is typically in the second and third decades of life (8). It is estimated that this condition affects 1.0% to 1.4% of the population worldwide (9). While the etiology of this disease remains unknown, it is associated with the HLA-B27 allele (9). Axial lower back pain can occur due to a combination of facet arthropathy, spinal column degeneration, and sacroiliitis, all of which can lead to impaired spinal mobility. Nonarticular features include anterior uveitis, psoriasis, and inflammatory bowel disease (8). Medical therapies include nonsteroidal anti-inflammatory drugs, tumor necrosis inhibitors, and interleukin-17 inhibitors (10). DMARDs are also frequently employed when signs of peripheral arthritis are present (10).

Axial back pain in the setting of AS can be difficult to treat. For patients who are not responsive to medical therapies, interventional pain procedures, such as medial branch blocks to target facet-mediated pain and corticosteroid injections into the sacroiliac joint, are often considered and can be helpful (2). However, if pain persists, a lumbar MRI may be warranted to evaluate for pathology associated with vertebrogenic pain.

Vertebrogenic pain presents as axial back pain that is worse with bending, lifting, sitting, and activity (11). These patients are generally found to have Modic type 1 or type 2 changes on MRI due to degenerative changes (12). Modic type 1 changes appear as hypointense le-

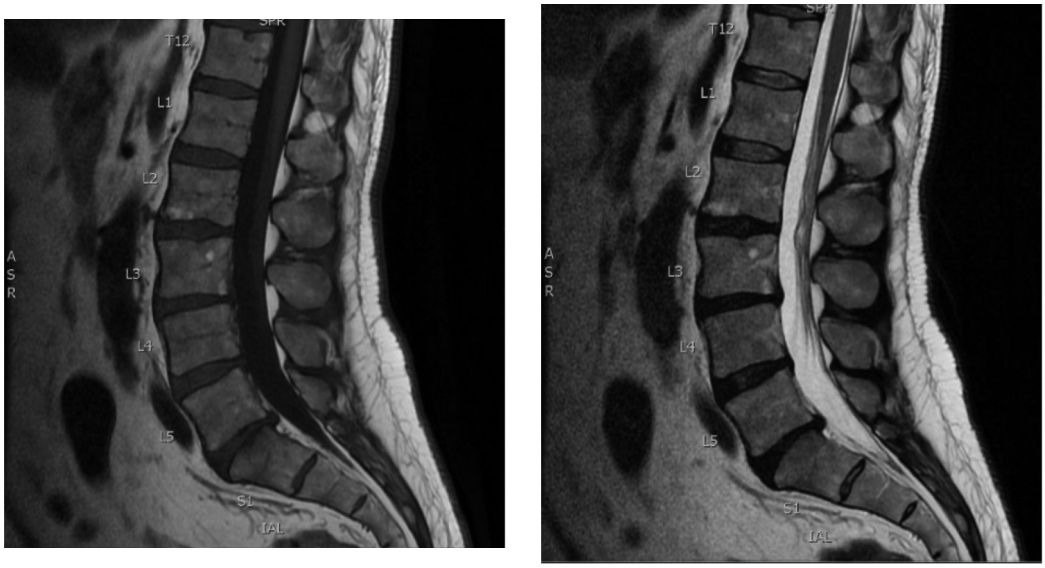

Fig. 1. Panel A and B show magnetic resonance imaging (MRI) of the lumbar spine revealing hyperintense lesions at the L2 and L3 vertebrae consistent with Modic Type 2 changes. In the radiology report, these lesions were reported as Romanus lesions that may represent osteitis.

sions on T1-weighted imaging and hyperintense lesions on T2-weighted imaging and represent bone marrow edema and inflammation. Modic type 2 changes appear as hyperintense lesions on both T1- and T2-weighted imaging and represent marrow ischemia and the conversion of healthy red marrow to yellow fatty marrow (12). Romanus lesions are a finding in inflammatory spondyloarthropathies, such as AS, which are due to irregularity and erosion involving the anterior and posterior edges of the vertebral endplates (13-15). Romanus lesions due to inflammatory changes are similar in appearance to Modic changes and can be seen on MRI in patients with AS (14). Our patient had a component of degenerative changes in his lumbar spine; however, in the setting of AS, he had a component of inflammatory changes as well. The T2 hyperintense lesions at the L2 and L3 vertebrae on lumbar MRI could be consistent with Modic changes and/or Romanus lesions with the degenerative and inflammatory processes superimposed (Fig. 1).

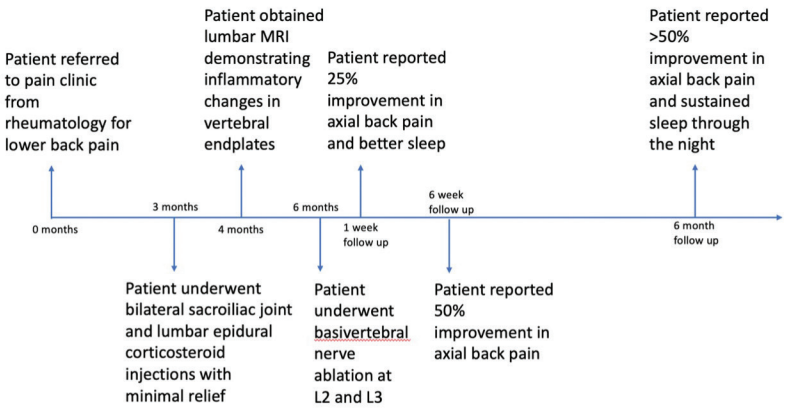

Fig. 2. Timeline of Case.

This case report showcases a potential therapy for patients with AS who have axial lower back pain, which can be difficult to treat in this specific population. Furthermore, it emphasizes the importance of looking for inflammatory changes on MRI as they may indicate a vertebrogenic cause for pain, making basivertebral nerve ablation an even more suitable option. However, basivertebral nerve ablation is a new therapy; therefore, health insurance companies might be reluctant to approve this procedure for patients.

Our patient with AS and axial back pain responded well to basivertebral nerve ablation reporting signifi-

cant improvement in pain and restorative sleep after the procedure.

CONCLUSIONS

To our knowledge, this is the first reported treatment of a patient with AS with basivertebral nerve ablation. Basivertebral nerve ablation may, therefore, be a potential option for treating axial back pain in patients with AS who were not responsive to prior medical and interventional treatments.

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