Clinical Case Report

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Sacral epiduroscopic laser decompression for complex regional pain syndrome after lumbar spinal surgery

A case report

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Abstract

Rationale: CRPS after a lumbar surgery has symptoms that are similar to PSSS. However, standard criteria for distinguishing CRPS from PSSS do not exist. We present a case report of a 31-year-old female with CRPS symptoms after lumbar spinal surgery treated by performing SELD.

Patient concerns: This patient was referred to our pain clinic for left ankle pain. She received a lumbar discectomy for a herniated lumbar disc (L5/S1) but the pain was aggravated after surgery.

Diagnoses: The characteristics of the pain were burning, tingling, and cold, and were accompanied by other symptoms such as swelling, color change and mail dystrophy. The patient was diagnosed with CRPS.

Interventions: Medications and interventional therapies were not effective in reducing pain. SELD was performed and severe adhesive inflammation was observed in the L4-S1 epidural space. We performed mechanical adhesiolysis and injected hyalurodinase and dexamethasone near the L5 and S1 root. One month after, a second SELD was performed as same manner.

Outcomes: After second SELD, the patient's pain markedly decreased. On the second visit in the outpatient clinic, the patient was absent of pain without any other medications.

Lessons: CRPS like symptoms can appear after lumbar spinal surgery due to adhesion and inflammation in the epidural space. In such cases, SELD can be considered as diagnostic and therapeutic option.

Abbreviations: CRPS = complex regional pain syndrome, DITI = digital infrared thermal imaging, IASP = International Association for the Study of Pain, MRI = magnetic resonance image, PSSS = post spinal surgery syndrome, SELD = sacral epiduroscopic laser decompression, VAS = visual analogue pain scale.

Keywords: complex regional pain syndrome, post spinal surgery syndrome, sacral epiduroscopic laser decompression

1. Introduction

Complex regional pain syndrome (CRPS) is a chronic pain condition that often affects 1 limb (i.e., arm, leg, or foot) usually after an injury. CRPS is caused by a dysfunction in the peripheral and central nervous systems. The symptoms of CRPS include continuous, intense pain that is characterized by burning, stabbing, and cold sensations. The other symptoms include swelling and stiffness in the affected joints, motor disability, skin change, and dystrophy in the nails and hair. The causes of CRPS are varied and include trauma, nerve injury, fracture, operation, and spinal cord injury. Although 1 case of CRPS after lumbar surgery that was diagnosed with the exclusion of the causes of post spinal surgery syndrome (PSSS) was reported, lower extremity pain is rarely diagnosed as CRPS after lumbar spinal surgery.[1] Those cases are often diagnosed as PSSS because it is very difficult to differentiate it from CRPS. Standard criteria to distinguish CRPS from PSSS have yet to be developed. Pain management for these patients is challenging. Although pain physicians take every effort to provide appropriate treatments, the results are often unsatisfactory. This report provides the details of a successful case involving a patient diagnosed with CRPS after lumbar spinal surgery who experienced a remarkable reduction in pain from sacral epiduroscopic laser decompression (SELD) after conventional therapy failed.

2. Case study

A 31-year-old woman presented with left ankle pain in the medial malleolus with a visual analogue pain scale (VAS) score of 70 (0 = no pain and 100 = not supportable pain). She was diagnosed with a lumbar intervertebral herniated disc and received a discectomy (L5/S1). Her ankle pain improved but recurred 1 month after

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surgery. The VAS score at rest was 70 and during breakthrough pain was between 80 and 100. The patient complained of paroxysmal paresthesia, which included burning, tingling, cold, and "pins and needles" sensations. These symptoms were not present before the surgery. She was referred to our pain clinic for evaluation and pain management. Postoperative magnetic resonance image (MRI) displayed only degeneration of the intervertebral disc at L5/S1 and a postoperative change at the posterior aspect of the L5 and S1 vertebral body (Fig. 1).

According to her operation history and symptoms, the patient was initially diagnosed with PSSS. Medications such as gabapentin, nonsteroidal anti-inflammatory drugs, anti-depressant, and opioids were prescribed but failed to control any of her pain. The patient also underwent a diagnostic selective transforaminal epidurography at the left L5-S1 transforaminal levels and provided a lumbar sympathetic ganglion block; however, the pain did not decrease.

The patient complained of not only pain but also edema on the affected side, sweating, and motor dysfunction due to the pain. Furthermore, nail dysmorphism on the 3rd and 4th toe and a change in skin color to red were observed. We re-evaluated her diagnosis and treatment. An electromyography exhibited a left L5 radiculopathy. Diffuse decreased blood flow and pool with an overall decreased osseous uptake in the left foot were observed in a 3-phase bone scan. In addition, the results from a digital

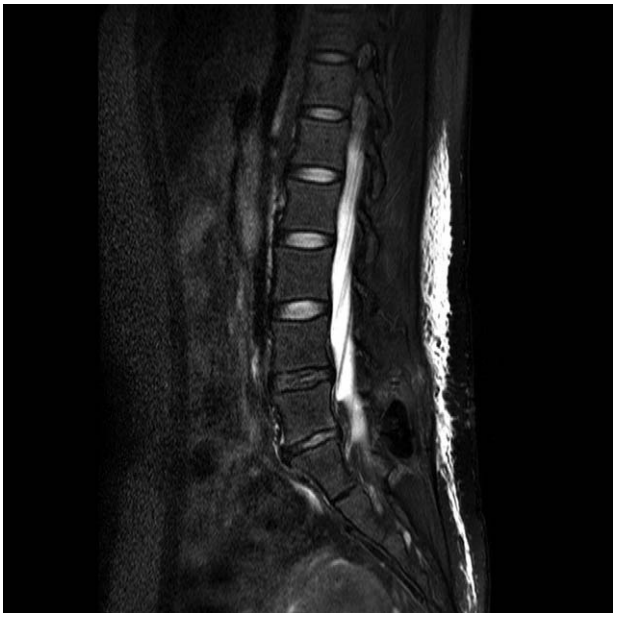

Figure 1. Postoperative magnetic resonance imaging displayed nonspecific findings without degeneration change of the intervertebral disc at L5-S1 and postoperative change of the posterior aspect of the L5 and S1 vertebral body.

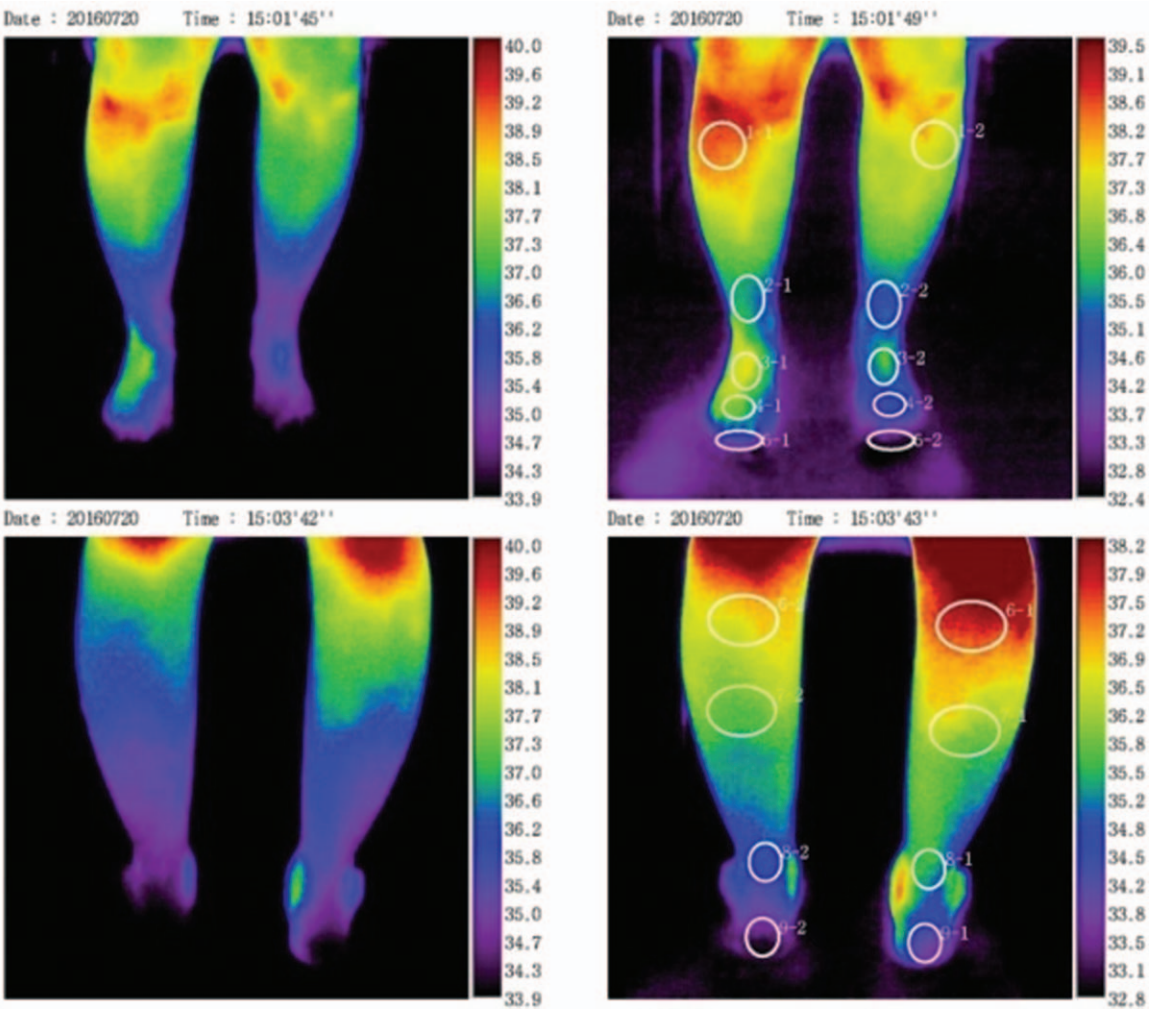

Figure 2. The digital infrared thermal imaging demonstrated the significant difference in body temperature between both ankles.

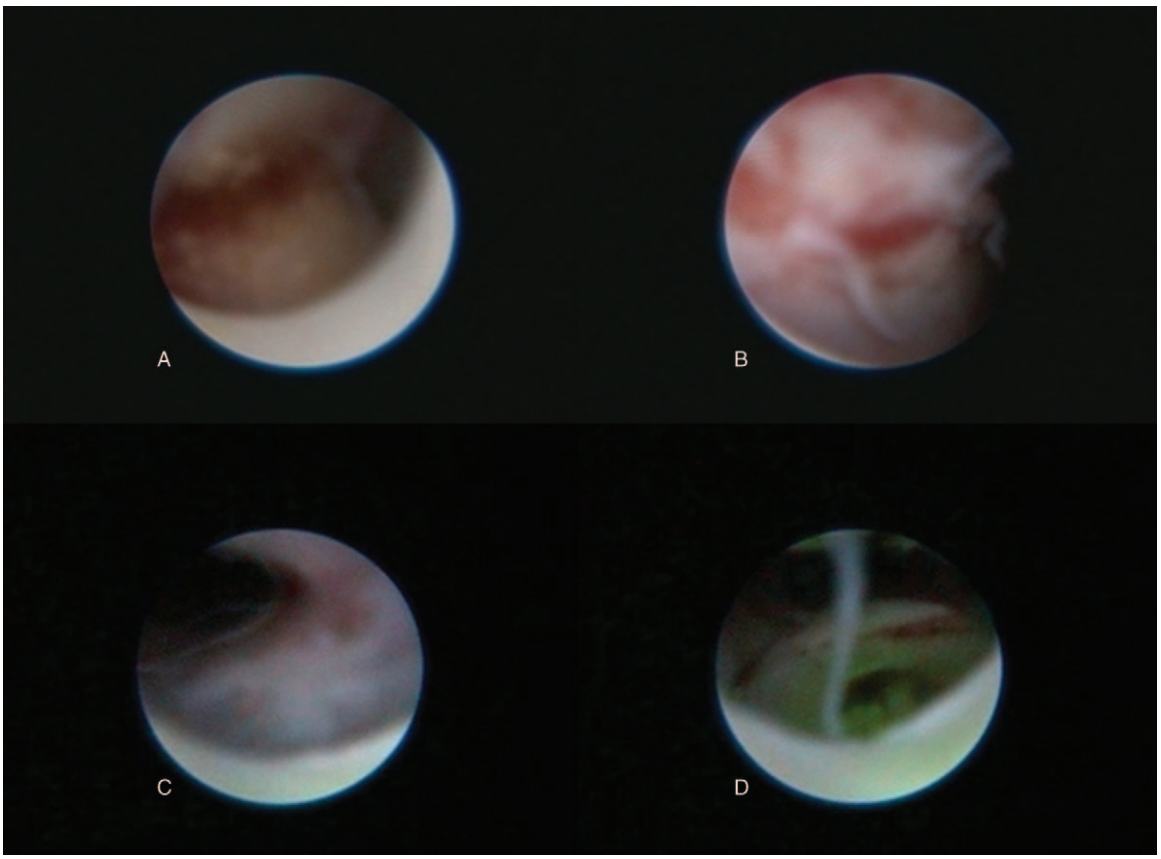

Figure 3. The severe adhesion and inflammation findings in the epidural space were observed through an epiduroscopy (A, B) and epiduroscopic image after mechanical adhesiolysis and laser decompression (C, D).

infrared thermal imaging (DITI) scan indicated a lower temperature in the left ankle than the opposite ankle (Fig. 2). We diagnosed her as CRPS type II according to the International Association for the Study of Pain (IASP). As the patient had no response to conventional therapy, a trial insertion of spinal cord stimulation [Vectris Lead (977A2-75); Medtronic, Minneapolis, MN] was performed. However, her pain improved only slightly (i.e., less than 30% improvement) and the trial lead was removed after 1 week.

A SELD (Videoguide catheter; BSMED, Myelotec) was performed for diagnostic and therapeutic purposes. A severe adhesion and inflammation at the L4-S1 epidural space was detected and the catheter was moved to perform mechanical adhesiolysis and laser decompression at the herniated intervertebral disc. She complained of headache and pain in posterior neck in an hour after the operation had started. The pain was not relived even after 10 minutes of break time, and we decided to stop the operation. Her ankle pain slightly improved after the procedure (VAS score decreased from 70 to 60). One month later, because the adhesions and fibrotic tissues in the epidural space were possibly causing the recurrent or persistent pain, a second SELD was performed to manage the remaining lesions. There were still severe adhesion and inflammatory lesions in the ventral epidural space from L4 to S1 (Fig. 3). The procedure was performed using the same technique as the previous procedure, and extensive adhesiolysis was conducted without any complications such as headache and neck pain. Three days after the second procedure, the patient's pain dramatically decreased (i.e., VAS score decreased from 60 to 20) and she was discharged uneventfully. On the second visit in the outpatient clinic, the patient was absent of pain without any other medications. Eight months later, the patient reported an absence of pain during a phone session and she never returned to the hospital for pain. This case report is with a human patient; however, approval of institutional review board was thought to be unnecessary, as it is impossible to identify an individual and as long as anonymity is ensured. As for the informed consent, unfortunately, she was lost to follow-up at the time of reporting. It was difficult to obtain a written informed consent; instead, we made a phone call to her and obtained the oral consent.

3. Discussion

As the numbers of spinal surgery have increased, the complications associated with spinal surgery have also increased.[2] PSSS is one of the complications that can occur after spinal surgery and includes symptoms such as ongoing back pain or radiating lower extremity pain. Approximately 5% to 36% of patients who underwent a lumbar spinal surgery experienced recurrent pain in the back or leg within 2 years of surgery.[2] In addition, in our case, the patient had an intervertebral lumbar disc and received discectomy, but her left ankle pain was even more aggravated. The patient's condition was exacerbated by other pain symptoms such as continuous allodynia, hyperalgesia, edema, skin color change, and nail dystrophy. There was a temperature difference between both ankles according to the DITI and the 3-phase bone

scan displayed decreased blood flow and osseous uptake in the left foot. Although there are no definite differential criteria for CRPS with PSSS, her symptoms and the results of the imaging scans met the diagnostic criteria for CRPS of IASP, so her diagnosis was changed to CRPS rather than PSSS.[3]

There have been only a few case reports involving a diagnosis of CRPS after spinal surgery.[1,4,5] In previous cases of CRPS after spinal surgery, although patients' pain improved with medication or a sympathetic nerve block, it still persisted. The authors suggest that the cause of CRPS after spinal surgery is a small nerve or sympathetic trunk injury due to the surgical procedure.[4,5] Chae et al[1] reported a patient who was diagnosed as CRPS after lumbar laminectomy and fusion operation. The patient was treated with a spinal cord stimulation insertion. Goh et al[6] recommended neuromodulation such as spinal cord stimulation as a therapy for CRPS patients who are unresponsive to conventional therapy or sympathetic blockades. In the current case, spinal cord stimulation was also performed but was not effective in relieving the patient's pain. So, SELD was performed for diagnostic and therapeutic purposes. SELD is a minimally invasive technique for the management of spine-origin diseases that offers direct visualization of the spinal structure and allows focused adhesiolysis, dilution of biochemical irrigators by saline irrigation, and targeted deposition of the steroid injection. Furthermore, the laser can reduce pressure by vaporizing a volume of the herniated intervertebral disc that is compressing the nerve root or spinal cord.[7–9] In addition, an epiduroscopy is a useful diagnostic procedure for pain originating from the spinal area. Visualization of the epidural space allows for the evaluation of nerve roots and identification of adhesions, inflammation, and other abnormalities. An epiduroscopy is more sensitive than a MRI in detecting epidural fibrosis.[8] In our case, we detected severe adhesions and inflammation in the patient's epidural space during the epiduroscopy. We suspected that these lesions were causing her ankle pain and CRPS-like symptoms; therefore, a second SELD was performed to remove the remaining adhesions and inflammation 1 month after the first procedure.

CRPS resulting from a problem originating in the spine is rarely diagnosed and its mechanism is yet to be determined. We suspect that the continuous small nerve, nerve root, and sympathetic trunk irritation, which were induced by severe adhesions and inflammations after the lumbar surgery, caused CRPS. Recently, a case of CRPS caused by a mild herniated lumbar disc without a history of trauma or surgery was reported.[10] The authors suspected that the inflammatory mediators or radiating pain was caused by a herniated lumbar disc induced CRPS. The diagnosis of CRPS in this case is controversial. Epidural adhesion and inflammation seen during the procedures were highly likely to have caused the pain, although the CRPS diagnostic criteria were met before conduction of SELD. It cannot be proven without epiduroscopy. Epiduroscopy was used to differentiate PSSS presenting CRPS-like symptoms from CRPS and led to the final diagnosis. In conclusion, we successfully treated the patient presenting CRPS-like symptoms after lumbar surgery by performing SELD. If CRPS-like symptoms originating from the lumbar spine cannot be treated by conventional therapy, SELD can be considered as an appropriate diagnostic and therapeutic option.

Author contributions

Conceptualization: Yong Han Kim.
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Formal analysis: Hyunji Jo.
Investigation: Eunsu Kang.
Writing – original draft: Myoung Jin Ko.
Writing – review & editing: Jae-Wook Jung.

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