

Bacterial meningitis and cauda equina syndrome after trans-sacral epiduroscopic laser decompression

A case report

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Abstract

Rationale: Trans-sacral epiduroscopic laser decompression (SELD) is a noninvasive pain-relieving procedure for treatment of herniated lumbar disc (HLD), and is known to have positive effects in alleviating lower back pain or radicular leg pain after HLD. However, little is known about the possible complications of SELD.

Patient concerns: A 51-year-old woman received SELD with a holmium:yttrium-aluminum-garnet laser for controlling radicular pain due to HLD on L5-S1. However, 5 days after SELD, she complained of headache, and 9 days after the SELD, cauda equina syndrome (CES) symptoms, including motor weakness of both lower extremities (manual muscle testing—left: 3, right: 4), voiding and defecation difficulties, and neuropathic pain, were manifested.

Diagnoses: Cerebrospinal fluid (CSF) analysis performed 15 days after the SELD revealed elevated white blood cell count 7560 cells/ μ L. *Staphylococcus hominis* sensitive to vancomycin was cultured from CSF. The gadolinium-enhanced magnetic resonance imaging showed diffuse leptomeningeal enhancement along the distal cord and cauda equina. The latency of electrically induced bulbocavernosus reflex (BCR) was delayed in the right side and no response of BCR was presented in the left side. Based on the patient's symptoms and the results of the clinical evaluation, we diagnosed the patient as having a bacterial meningitis and CES.

Interventions: The patient received 2g per day of intravenous vancomycin for 2 months.

Outcomes: After treatment with intravenous vancomycin for 2 months, all the CES symptoms were completely resolved.

Lessons: In this study, we described a patient who had bacterial meningitis after SELD. During SELD, clinicians should keep in mind the possibility of infection.

Abbreviations: BCR = bulbocavernosus reflex, CES = cauda equina syndrome, CSF = cerebrospinal fluid, HLD = herniated lumbar disc, Holm:YAG = holmium:yttrium-aluminum-garnet, LBP = lower back pain, MRI = magnetic resonance imaging, NRS = numeric rating scale, SELD = trans-sacral epiduroscopic laser decompression.

Keywords: bacterial infection, cauda equina syndrome, herniated lumbar disc, meningitis, trans-sacral epiduroscopic laser decompression

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1. Introduction

Trans-sacral epiduroscopic laser decompression (SELD) is a noninvasive pain-relieving procedure for treatment of herniated lumbar disc (HLD).^[1] In SELD, interventionists insert a steerable catheter into the epidural space via sacral hiatus, and then advance the epiduroscope and laser device through the inserted catheter. Under the direct guidance of epiduroscopy, via laser vaporization, decompression of the ruptured HLD and adhesiolysis in the epidural space are performed.^[2–4] Because of its noninvasiveness that general anesthesia and bone removal are not required during the procedure, clinicians' interest in SELD is increasing and the procedure is increasingly being applied in the clinical fields. Although the effectiveness of SELD was demonstrated in patients with lower back pain (LBP) and radicular leg pain after HLD,^[2–4] some previous studies reported the occurrence of its complications, such as incomplete decompression, recurrent HLD, hematoma, dural tearing, subchondral osteonecrosis, and sacral root injury.^[1,5] For the safe use of SELD, further knowledge of complications of SELD is needed.

In this study, we report the occurrence of bacterial meningitis and cauda equina syndrome (CES) after SELD procedure.

2. Case presentation

A 51-year-old woman who had no specific medical diseases other than HLD underwent SELD with a holmium:yttrium-aluminum-garnet (Holm:YAG) laser in a local medical center due to left buttock and lateral thigh and calf pain (numeric rating scale [NRS] 6) lasting for 1 month. For the procedure, 1500 joules of a 2100 nm Holm:YAG laser were delivered to the herniated disc. Her pain was caused by disc extrusion at L5-S1, which was observed in lumbar spine magnetic resonance imaging (MRI) performed 1 month after pain onset. Five days after SELD, headache occurred. Nine days after the procedure, motor weakness of both lower extremities, voiding and defecation difficulties, and neuropathic pain (NRS 7) at both lower extremities were presented. Fifteen days after SELD, she visited the rehabilitation department of our university hospital for above symptoms manifested after SELD. On admission to our hospital, she showed weakness in both extremities (manual muscle testing—left: 3, right: 4). In a sensory examination, we observed an impairment of pinprick and light touch sensations from the left L4 to left S5. Manually examined bulbocavernosus reflex (BCR) and anal wink were preserved. In the follow-up MRI performed on the admission day, no newly developed lesions, such as hematoma, infection, and aggravated HLD, were observed. We assessed the electrically induced BCR using electromyography, and found no response in the left side and delayed BCR latency (50.6 milliseconds) in the right side (cut-off value 45.0 milliseconds).^[6] Cerebrospinal fluid (CSF) analysis revealed elevated white blood cell count 7560 cells/ μ L (polymorphonuclear cell 80%, lymphocyte 20%). The protein concentration of 160 mg/dL was found. Antibody for herpes zoster and varicella zoster was not presented. Adenosine deaminase level was within normal range (6.0 U/L). *Staphylococcus hominis* sensitive to vancomycin was cultured from CSF. The gadolinium-enhanced MRI showed diffuse leptomeningeal enhancement along the distal cord and cauda equina (Fig. 1), which is consistent with inflammation of these structures. Based on the patient's symptoms and the results of the clinical evaluation, we diagnosed the patient as having a bacterial meningitis and CES. The patient received 2 g per day of intravenous vancomycin for 2 months. Two months after initiating treatment with vancomycin, all the symptoms related with meningitis and CES were completely resolved, and the patient was discharged. Written informed consent was obtained from the patient for publication of this case report. The study was approved by the local Institutional Review Board of our hospital (YUH-2018-10-042).

3. Discussion

We reported a patient who had bacterial meningitis and CES during SELD. In our case, *S hominis* was the causative organism. staphylococcus meningitis is a rare disease, and the cases caused by staphylococci were usually postoperative infection.^[7] *Staphylococcus aureus*, *Staphylococcus haemolyticus*, and *Staphylococcus hominis* are known to be causative strains of staphylococcus meningitis.^[7] The meningitis in our patient seems to be caused by introduce of *S hominis* into the epidural, subdural, or subarachnoid space by the inserted catheter, epiduroscope, or laser device during SELD. Also, we can propose that bacteremia might have been caused by translocation of *S hominis* from the skin during the procedure, and hematogenous dissemination of bacteria might have resulted meningitis.

In 2017, Chang^[11] reported that CES can be occurred during SELD by thermal injury via the laser or mechanical injury by the



Figure 1. T1-weighted gadolinium-enhanced sagittal MRI performed 15 days after trans-sacral epiduroscopic laser decompression shows leptomeningeal enhancement along the distal cord and cauda equina.

catheter. By these causes, symptoms of CES are manifested immediately after CES.^[11] However, in our patient, CES was developed as late complication, which was initiated 9 days after SELD. It indicates that meningitis would be the causative factor of CES, which was supported by the MRI finding of contrast enhancement in the cauda equine.^[8] The possible mechanism of CES after meningitis is that toxins released by the bacteria would produce the inflammation on the cauda equine.^[8] Also, changes in vascular permeability after the meningeal infection would produce neural edema or ischemia on the cauda equina, which is able to cause CES.^[9] Several previous studies reported the occurrence of bacterial or fungal meningitis after epidural procedures and related CES.^[8,10–12] However, this is first study to report meningitis and CES after SELD.

4. Conclusion

In this study, we reported a patient who had bacterial meningitis and CES-related symptoms, such as motor weakness of both lower extremities, voiding and defecation difficulties, and neuropathic pain. Clinicians should be aware of the possibility of this complication when performing SELD.

Author contributions

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