SPINAL EPIDUROSCOPIC EPIDUROPLASTY (SEE) effectively improved symptoms in patients with failed back surgery syndrome: 3 cases

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Abstract

Failed back surgery syndrome (FBSS) is characterized by the presence of persistent, disabling pain in the lower back and/or lower extremities following surgical intervention to the back. The etiology of FBSS is remains uncertain. However, the recent findings point out that the fibrosis and adhesion in the epidural space might be the contributor of the lower back pain and the radiculopathy of lower limbs. The purpose of this treatment is to provide an opening in the epidural space to facilitate further caudal epidural injections effective in outpatient clinics.

Three patients with FBSS who did not respond to conservative treatment underwent spinal epiduroscopic epiduroplasty (SEE). Three cases have had a surgical history of interbody fusion, interlaminar fenestration, and laminectomy, respectively. Caudal epidural injections, lumbar sacral plexus blocks, psoas compartment blocks and other treatments failed to improve the pain scores and the scores of daily activities (RDQ, ODI and JOA scores). SEE was performed. Each patient showed excellent improvement in disability scores after SEE for 24 weeks. The intensity and the area of pain also decreased after SEE. All patients were satisfied with the procedure. For the treatment of remaining symptoms, patient continued to accept caudal epidural blocks in the outpatient clinics, surprisingly changed from “non-responders” to “responders”. From our experience of three cases, SEE is considered to be an alternative technique in treating pain in FBSS, not only to give immediate relief but to facilitate the further treatment in outpatient clinics.

Key words: epiduroscopy, failed back surgery syndrome, case report, epidural adhesion

INTRODUCTION

Failed back surgery syndrome (FBSS) is characterized by the presence of persistent, disabling pain in the lower back and/or lower extremities following surgical intervention to the back¹. Patients suffering from this syndrome often consult several physicians time after time and a majority of the patients end up
with unsatisfactory outcomes from the treatment.

The pathophysiology of FBSS remains unclear. However, epidural fibrosis and radiculitis following back surgery have been reported to be possible contributors to the unexplained pain in the lower back and/or lower extremities\textsuperscript{2,3}. Radiological (CT, MRI) and endoscopic studies concerning the relationship between epidural fibrosis and pain have been reported. However, the exact explanation of the cause has not yet been defined\textsuperscript{4,5}. Since the 1990’s, epiduroscopic surgery has been used as an alternative treatment for FBSS. However, it has shown only limited success\textsuperscript{6}.

Starting in 2000, we also began employing SPINAL EPIDUROSCOPIC EPIDUROPLASTY (SEE) for the treatment of patients with FBSS who were resistant to conservative treatment, such as nerve block, pain medication, and rehabilitation. The principle of SEE is to mechanically release the adhesion and restore an opening to the epidural space which will theoretically provide us with an effective route for further caudal epidural injections in outpatient clinics.

From March 2000 to August 2000, three patients with FBSS underwent SEE.

**MATERIAL AND METHODS**

**Assessment of disability**

Prior to the surgery, we obtained “The Roland-Morris Disability Questionnaire (RDQ)\textsuperscript{7}” and “Oswestry Disability Index 2.0 (ODI)\textsuperscript{8}”, a reliable and sensitive measure of disability in lower back pain. Additionally, the Japan Orthopedic Association: Assessment of treatment for low back pain (JOA)\textsuperscript{9} was obtained to evaluate the effectiveness of the procedure. The patients’ basic characteristics and pre-surgical disability scores are shown on Table 1.

**Patient’s history**

**Case 1**: A 37-year-old male (170 cm, 70 kg) reported lower back pain in January 1999 and was diagnosed as having lumbar disk herniation (L5/S1). On March 2000, the patient underwent posterior lumbar interbody fusion with metal cages to the L5 vertebral body. Bilateral lower limb pain occurred immediately after surgery and all conservative treatments failed to reduce its symptoms.

This patient first visited our outpatient clinic on October 2001 (19 months after the surgery). His current medication (Indomethacine lotion, 25 mg/day of amitryptiline, and meloxicam 10 mg QD) failed to provide any relief, either for the lower back pain or for the pain in his left limb. RDQ, ODI, and JOA scores were 15 points, 26 points and 14 points, respectively. Caudal epidural block with 1% lidocaine + 20 mg methylprednisolone, facet joint blocks, and other nerve blocks (details unknown) administered at his previous hospital produced no noticeable effect. Physical examination revealed dysesthesia of the left L5, S1 and S2 dermatomes. Diagnostic imaging (MRI and X-ray image of lumbosacral area) showed no compression of the spinal cord and no instability of the vertebral body. Caudal epidural block (1% lidocaine 12 ml + 20 mg methylprednisolone) was given once a month for four months.

**Case 2**: A 72-year-old male (165 cm, 64 kg) had suffered from lower limb pain and numbness for two decades and had undergone interlaminal fenestration surgery to L4 and L5 spine in July 2000. The symptoms improved for 8 months, but reappeared in toto after a year. Rehabilitation and pain medication (Indomethacine lotion with p.r.n aspirin) was prescribed but no other treatment was given to this patient. The patient was “dumped” by the primary physician.

The patient first visited our outpatient clinic in October 2001. The patient had discontinued taking the pain medicine on his own since it had no effect on the pain and numbness. RDQ, ODI, and JOA scores were 3 points, 13 points and 20 points, respectively. Caudal epidural block with/without steroids were given once a week for 8 weeks. During this therapeutic period, other blocks such as facet joint blocks, psoas compartment blocks, and lumbosacral plexus blocks were subsequently given to the patient.

**Case 3**: A 61-year-old male (162 cm, 63 kg) had been experiencing intermittent claudication for several years. In April 2001, numbness of both lower limbs deteriorated and he was subsequently unable to walk. The primary diagnosis was not defined, however, L4,
L5 laminectomy was performed on the patient. Despite an improvement in intermittent claudication, the patient reported persistent pain in the back and in both lower limbs that was not apparent before the surgery. The patient was given caudal and/or lumbar epidural blocks in the outpatient clinic as deemed necessary for 10 months but neither gave any relief to the pain. His first visit to our outpatient clinic was in February 2002. The painful area was of bilateral S2 dermatome, left L2, L3, L4 dermatome, and right S1 dermatomes. RDQ, ODI, and JOA scores were 10 points, 15 points and 16 points, respectively. Meloxicam 10 mg QD, amitryptiline 25 mg QD, and diclofenac suppository 50 mg p.r.n. were prescribed to the patient. Caudal epidural blocks were given to the patient 7 times in 3 consecutive months. Psoas compartment blocks, trigger point blocks, and lumbosacral plexus blocks were also given during this period.

Despite this conservative treatment series, no remarkable symptom improvement was observed in any of the three cases. All three patients requested further non-invasive treatment to relieve their pain. SEE was scheduled.

**Spinal epiduroscopic epiduroplasty**

Written informed consent from the patient was obtained before the SEE procedure. The patient fasted from the night before and no pre-anesthetic medication was given.

In the operating room, a venous line was secured and ECG, blood pressure was monitored in the supine position subsequently to the prone position. No sedatives were permitted during the whole procedure for the purpose of preventing nerve injuries. After aseptic preparation, the sacral hiatus was marked under the fluoroscope. A percutaneous flexible endoscope was advanced through the sheath placed in the sacral hiatus to investigate the pathologic status of the epidural space. Spinal epiduroscopic epiduroplasty was performed to mechanically release the adhesion of the epidural space using a flexible guide catheter specifically designed for this procedure (Myelotec Inc.). Additionally, the foraminal space was also mechanically opened using this technique limited only to the previously examined nerve root irritation. 0.9% neutral saline was infused both to clear the view and to wash out substances held in place by adhesions that may have been causing the irritation. After the fibrosis was thoroughly released, 0.25% bupivacaine and 40 mg of methylprednisolone were injected into the epidural space. The patient was ordered to remain in bed for 4 hours and was allowed to move only after the recovery of strength in his lower limbs.

**Post-operative assessment of the SEE**

RDQ, ODI and JOA scores were obtained 4, 12 and 24 weeks after the procedure. Numeric Rating Scale (NRS: A number is assigned to the intensity of pain on a scale of 0; “no pain” to 10; “worst pain possible”) was routinely obtained from the patient at the

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RDQ contains 24 statements describing the natural history of back pain and patients were given a score of one point for each selection of 24 items on the questionnaire. ODI contains 10 sections concerning activities of daily life with 6 statements, 0 to 5 points classed by the severeness, in each section (total of 50 point at maximum). Both questionnaires can be completed in less than 5 minutes and scored in less than 1 minute. The higher the score the severer the disability.

The JOA score is separated into three sections: Subjective symptoms (9 points), Objective findings (6 points), and Daily activity scores (14 points), that total a maximum of 29 points. The higher the score the less significant the symptom or the disability.

RDQ, ODI and JOA scores shown on the table are the scores obtained during the first visit to our outpatient clinic.

RDQ: Roland Morris Disability Questionnaire, ODI: Oswestry Disability Index, JOA: Japan Orthopaedics Association Assessment of Treatment for low back pain.
outpatient clinic. The dermatome of the painful area was mapped and evaluated at the same time.

RESULTS

In case 1, the spread of the dye was sealed below the surgery area (Fig 1; 1A). The image from the microfiber showed the white ligament strongly attached like a “wall”. We carefully scratched the wall and succeeded in breaking through (Fig 1; 1B). At the end of the procedure, dye spread over the surgery site cephalad up to T10 level (Fig 1; 1C). Subsequently, Bupivacaine 20 ml and methylprednisolone 40 mg were injected through the guide catheter. The patient reported a level of relief of his low-back pain that he had never experienced before. On 3 post-operative days, the patient reported almost no pain in the back and improvement of the dysesthesia in the lower limbs. Some symptoms recurred, however, with minimum NRS. The patient visited once to twice a month taking caudal epidural blocks for 24 weeks after the SEE. The distribution of the pain 4 weeks after the SEE showed a remarkable decrease in the painful area and low back pain was reduced from 10 to 2 on the NRS (Fig. 2; Case 1).

In case 2, pre-surgical injection of the dye showed minimum spread to the nerve roots (Fig. 1; 2A). Con-
Consistently with the fluorographic examination, the view from the microfiber showed massive fibrosis with adhesion of the epidural space. Since the patient's main symptom was in the left leg and not in the back, we mechanically released the adhesion of the sacral area but not all the way up to the lumbar area. After we obtained an opening in the epidural space, we advanced to the mechanical release of the foraminal space according to the symptoms. The guide catheter was advanced from left S3 up to L5 foraminal space. When the tip approached the nerve root, the patient reported paresthesia in the lower limb. The sign of paresthesia in the area of the symptom was the go sign for the mechanical release of the foramen. L5, S1, and S2 foramens were the designated nerve root. All three foraminal spaces were mechanically released. Caudal epidurography obtained four weeks after the SEE showed good spread to the sacral nerve roots consistent with the improvement of the symptoms (Fig. 1; 2B and Fig. 2; Case 2).

In case 3, identical to case 1 and case 2, fibrosis in the epidural space was moderate to severe. Mechanical release of both the epidural space and the designated foraminal space was performed. The pain symptoms in the back and in the lower limbs improved after the surgery (Fig. 2; Case 3).

No unwanted outcome or complication was noted during the stay at the hospital. All three patients were discharged from the hospital and followed up for 6 months at the outpatient clinic. The changes in RDQ, ODI, and JOA scores are shown on Figure 3. In case 1 and case 3, conservative treatment failed to provide any improvement to the impairment experienced in daily activities. However, scores 4, 12 and 24 weeks after SEE showed remarkable improvement in their ability to perform everyday activities. In case 2, the initial score did not show much impairment in the RDQ score which seemingly contradicted the pain complaint. In spite of the readily understandable nature of the questionnaire, the age and character of this patient could have contributed to this contradiction. All three patients reported superb symptom relief and satisfaction after SEE.
Failed back surgery syndrome (FBSS) is characterized by various degrees of lower back and lower limb pain following one or more surgeries to the lumbosacral spine. Over the decades, numerous treatments have been developed but have failed to give satisfactory outcomes to the patient. Poor outcomes from conservative treatments are due to the complicated pathophysiology underlying these conditions.

The cause of FBSS varies and includes inadequate fusion, inadequate surgical decompression, pseudarthrosis, recurrent disc herniation, secondary instability, surgically related degenerative changes and fibrosis development\(^\text{10}\). Due to the complexity of the nature of this syndrome, physicians often experience difficulty in selecting the proper treatment and eventually end up handling the patient in a bit or miss manner. Anonymous treatments had been attempted by pain physicians to find the solution for reducing this complicated pain condition. Epidural steroids\(^{11,12}\), spinal cord stimulation\(^{13}\), opioids\(^{14}\), acupuncture\(^{15}\), and exercises\(^{16}\) have been reported to be “rather effective treatment” for FBSS; however, the success of such treatments has not been clearly established.

The development and clinical use of epidural endoscopy enables physicians to directly visualize the epidural space and examine its pathophysiological nature\(^{17}\). The findings point to pathologic degeneration as a cause of chronic back pain and radiculopathy\(^{18,19}\). When epidural adhesion contributes to the cause of indefinable pain in FBSS patients, spinal epiduroscopic epiduroplasty is considered for treatment. This procedure is not as invasive as surgical intervention; however, the procedure itself has a risk of creating epidural abscess, epidural hematoma, accidental subdural and/or subarachnoid puncture, headaches, retinal hemorrhage and nerve root injury\(^{20,21}\). So far, there has been no report of fatal complications due to SEE.

From our experience, careful selection of the patient is by all means necessary. If the responsible nerve or the cause is accurately determined from the physical examination and it is believed that the conservative treatment might provide pain relief, SEE should not be the primary treatment. The three cases presented in this paper were carefully selected from a number of patients with FBSS. SEE was considered for these patients because they 1) did not respond to conservative treatments, 2) had no other underlying disease, 3) presented strong request for alternative treatment, and 4) had a pain area consistent with the distribution of the dermatomes. The reason for the exclusion of other patients included: responded to conservative treatments; had psychosocial problems; took anti-coagulant medication; and considered to be a better candidate for surgical intervention.

Our cases appear to have experienced marked relief from symptoms and an increased ability to perform daily activities free from pain. All three cases received caudal epidural blocks once or twice a month for 6 consecutive months after SEE. Fig. 3 indicates that conservative treatment started to be effective following SEE. SEE is considered to have advantages in that it washes out possible inflammatory or pain causing
substances and creates an opening in the epidural space allowing for the distribution of agents to the designated areas.

The following are comments from these patients. “I feel the numbness in my leg is more extensive and longer lasting after the caudal injection than it was before”, “I used to feel strong compression at the time of the caudal injection, but that is not the case anymore” and “I finally understand why doctors ordered me to rest for an hour after the caudal injection. I cannot stand up!”. These comments indicate that providing an opening in the epidural and foraminal space with inflammation and fibrosis facilitates further caudal epidural injections in outpatient clinics. Thus we consider that SEE is an effective treatment for patients with FBSS by restoring the opening in the epidural space.

**CONCLUSION**

Most patients with FBSS have gone through various treatments before finally visiting a pain physician. Reevaluation of the current status and non-invasive treatment should be considered before SEE. The most common cause of FBSS is “inappropriate patient selection”22; likewise, careful selection of patient is necessary in demonstrating the effectiveness of SEE for FBSS.

Three patients suffering from FBSS were treated with spinal epiduroscopic epiduroplasty following the failure of conservative treatment. Pain relief and the ability to perform daily activities improved markedly after SEE and caudal epidural injections were more effective during the follow up period.

Although statistical significance of the efficacy of SEE on FBSS cannot be determined from only three cases, it is obvious that SEE is a useful technique in treating pain due to the epidural fibrosis from failed back surgery syndrome. Suffering patients who seek help may benefit from this procedure. Further studies and research into the etiology of FBSS are warranted before advocating SEE as a standard treatment for FBSS.

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