**Study design:** A retrospective analysis of prospectively collected data was carried out.

**Objective**: The objective of the present study is to evaluate the efficacy of surgical decompression alone via patient-reported outcome scores in patients with symptomatic idiopathic spinal epidural lipomatosis (SEL).

**Materials and methods :** A total of 7 patients (4 men and 3 women) who underwent spine surgery for SEL between 2013 and 2015 were included in this study. Inclusion criteria were epidural lipomatosis confirmed by preoperative magnetic resonance imaging scans and subsequent decompression surgery without spinal fusion.The patients were evaluated using a Visual Analogue Scale for both back and leg pain, modified Oswestry Disability Index and Whitecloud’s criteria. Preoperative scores and postoperative 4-month, 8-month, 12-month, and 24-month scores were compared. The study did not require Institutional Review Board approval as this was not a clinical trial. There were no conflict of interests amongst any of the authors.

**Results:** The fourth, eighth, and twelfth month scores were significantly better than the preoperative scores, and the improvements were maintained at the 24-month follow-up.

**Conclusion:** Decompression surgery without fusion is an effective management strategy in patients with symptomatic spinal epidural lipomatosis.

**Keywords:** Idiopathic lumbar spinal epidural lipomatosis; decompressive surgery; patient outcome scores

**INTRODUCTION**

Epidural fat is a natural anatomical structure of the spinal canal that protects dural contents against any trauma inflicted on the vertebral column. Excessive amounts of epidural fat could, however, lead to compression of neural structures leading to clinical symptoms arising from cord or nerve root compression.

Spinal Epidural Lipomatosis (SEL) is characterized by an increase in epidural fat content. Excessive fat deposits around the dural sac (figure 1), causing compression, may present with neurological symptoms. This pathology is specifically associated with patients receiving prolonged corticosteroid therapy (e.g., transplant patients, patients with autoimmune disorders, rheumatoid arthritis, etc) [5, 6]. SEL has also been described in patients with morbid obesity, Cushing’s syndrome, hypothyroidism, etc. However, idiopathic SEL is extremely rare and these patients usually present with lower back pain with variable neurological presentations. More uncommon presentations of idiopathic SEL are bowel and bladder incontinence. The definitive diagnosis of SEL is made on the clinico-radiological evidence of excess epidural fat in absence of any other structural causes of compression.

Treatment options include conservative therapy and surgical intervention. Depending on the pre-existing conditions, these include weight reduction [9], reducing steroid excess [16], epidural steroid injections [17], and different methods of surgical decompression [18, 19]. Spontaneous resolution of SEL has also been described [20].

Overall, the treatment of SEL appears to be varied and controversial. There is limited literature studying the surgical management for SEL from the patient’s perspective.

The objective of the present study was to analyze the efficacy of surgical decompression without fusion using patient- reported outcome scores to support the findings.

**MATERIALS AND METHODS**

This single center study comprised a retrospective analysis of data collected from consecutive patients with symptomatic idiopathic lumbar SEL who underwent surgical treatment in the years 2013–2015. Inclusion criteria were symptomatic patients with epidural lipomatosis confirmed by preoperative MRI scans and subsequent decompression surgery without spinal fusion.

During this period, a total of 7 patients (4 males and 3 females) were operated for symptomatic idiopathic SEL. The mean age of the patients was 55.14 years (15-77). No patient had history of prolonged steroid intake for any medical condition. 2 patients were on therapy for diabetes mellitus. 1 patient was under treatment for hypothyroidism.

All patients presented with history of long standing back pain and intermittent neurogenic claudication. 1 patient had subtle neurological deficit. All patients had failed the conservative trial of management.

Magnetic resonance imaging (MRI) was used to assess the involved segments and the severity of stenosis. MRI scans demonstrated lipomatous tissue (hyperintense in T1- and T2-weighted images) leading to a compression of the dural sac within the spinal canal (image 1,2). Grading was based on axial images by evaluating the morphologic appearance of the dural sac according to Ishikawa et al [21].

**Ishikawa et al [21] grading for epidural stenosis based on MRI**

Range 0-3

Criteria Morphologic appearance of the dural sac on T1 weighted MRI

Description Grade 0: No dorsal epidural fat

Grade 1: Concave

Grade 2: Flat

Grade 3: Convex or Y-sign

All patients were treated with wide laminectomy and debulking of the lipomatous tissue without any spinal fixation and fusion.

Data was retrieved from our own local Spine Registry. Preoperative VAS for back and leg pain were noted and the modified Oswestry Disability Index (mODI) scores of each patient were calculated as per the questionnaire answered by the patients. These scores were then noted at the routine follow up at 4, 8, 12 and 24 months. Patients were also assessed using the Whitecloud’s Criteria [27] during each follow up.

**RESULTS**

The mean preoperative modified Oswestry Disability Index (mODI) for the patients was 72.28%. The preoperative mean VAS for back pain and leg pain were 6.57 and 7 respectively. These scores showed significant improvement in the postoperative 4, 8, 12 and 24 months follow up period. The mean postoperative mODI at 24 months follow up was 13.14% while the mean VAS for the back pain and leg pain were 2 and 1.71 respectively.

**Table 1**: modified Oswestry Disability Index (mODI) [in%]

**Table 2**: Visual Analogue Scale for Back pain

**Table 3:** Visual Analogue Scale for leg pain

Following the Whitecloud’s Criteria, 5 patients (71.42%) had an excellent result while 2 patients (28.57%) had a good result [27].

**DISCUSSION**

Epidural fat contributes to the shape of the epidural space in the spinal canal. The epidural fat extends in the cranio-caudal direction from the inferior aspect of one vertebral lamina to the superior aspect of the lamina of the next caudal vertebra and in the lateral direction towards the junctional point of facets and the ligamentum flavum. It also fills the space between vertebral arches and intervertebral foramina, wrapping the dural sleeves along the nerve roots. The epidural fat is non-adherent to these structures, allowing mobility of the dura within the vertebral canal.

The pathophysiology of spinal epidural lipomatosis (SEL) is unclear. In a review of 104 thoracic and lumbar SEL cases, Fogel et al stated that 55.3% of all cases were associated with exogenous steroid use, making this the most common underlying mechanism [23]. None of the patients in our series had a history of prolonged exposure to exogenous steroids. In accordance with other case series, this study observed a male predominance (57.4%) [21,24].

The diagnosis of SEL is based on clinical symptoms caused by the compression of the spinal roots and spinal cord with consequent myelopathy and confirmed by magnetic resonance imaging (MRI), which is considered the most sensitive modality for the assessment of fatty tissue [7,8,9,10,11,12]. A hyperintense epidural mass on T1-weighted images with intermediate intensity on T2- weighted sequences is specific for lipomatous tissue. In the differential diagnosis of SEL, epidural hematomas and extradural lipomas have been described [13,14]. The typical findings of SEL in axial T1-weighted MRI scans, not seen in any other spinal disorders, are polygonal deformations of the dural sac [15]. Geers et al described thin but resistant fibroelastic meningovertebral ligaments responsible for the typical polygonal, stellar, or Y-shaped deformation of the dural sac [26]. This finding of a Y shaped deformation of the dural sac is termed as the ‘Y-sign’ [15].

This study included patients with stenosis of the dural sac due to excessive epidural fat alone, confirmed on MRI, without any other pathologies leading to neural compression. In this study, the grading system evaluating the morphologic appearance of the dural sac was used.

There are no specific guidelines for the therapeutic management of SEL. Usually conservative line of management, including reduction of glucocorticoid excess, weight reduction and epidural steroids, is considered to be the first approach.

Various surgical treatment strategies for SEL have been reported. Lisai et al proposed early wide multilevel laminectomy, fat debulking, and instrumented posterolateral fusion, and reported that this led to an improvement in patients’ symptoms and a return to their previous levels of work and daily activities [10]. Alternate methods include small laminotomy and endoscopically guided fat aspiration [19, 22]. Full resolution of leg pain after surgery has been reported in all studies [10, 19, 22]. Ferlic et al is one of the first groups to apply patient related outcome scores to evaluate the results of surgical decompression without fusion and showed that the majority of the patients had improvement in the outcome scores over a period of 24 months [25]. Ishikawa et al reported a mean postoperative Japanese Orthopaedic Association score recovery rate of 67.4% [21]. However, they evaluated a heterogeneous case series of seven patients, where only four received decompression surgery, two underwent additional spinal fusion due to spondylolisthesis, and one underwent sequestrectomy due to lumbar disc herniation. In their individual case reports, Frank and Sairyo et al each reported that leg pain fully recovered after endoscopic decompression in patients with idiopathic SEL [22,19]. Lisai et al reported an improvement in symptoms after fat debulking and instrumented posterolateral lumbar fusion in three patients with SEL [10].

In the present study, spinal fusion was an exclusion criterion, as the patients had less significant back symptoms as compared to leg symptoms and the radiological imaging showed no signs of instability that warranted a fusion. All the patients underwent a wide laminectomy alone and showed significant improvement in the outcome scores.

The good results after surgical decompression seen in the previously mentioned studies are experienced in the present study as well. The patient reported outcome scores of VAS for back and leg pain and mODI showed significant improvement in the regular postoperative follow ups and were found to be maintained at 24 months as well. No patient had any complication in the perioperative or postoperative period. None of the patients had any recurrence of the lipomatosis.

The present study has some limitations. First, no controls were used in this study. However, due to the low incidence of SEL, it would be difficult to perform a randomized controlled trial to examine the effectiveness of surgery compared with non-operative treatment. Secondly, it was a retrospective analysis, although based on prospectively collected data. Also, the number of patients studied are few.

**CONCLUSION**

The present study demonstrates that surgical decompression is associated with a significant improvement in patient-reported outcome scores in patients with symptomatic idiopathic SEL. Surgical decompression hence represents an effective treatment option for symptomatic SEL.

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