

# First report of perforation of ligamentum flavum by sequestered lumbar intervertebral disc

## ABSTRACT

Disc fragments are well known to migrate to superior, inferior, or lateral sites in the anterior epidural space, posterior epidural migrated lumbar disc fragments is an extremely rare disorder, 61 cases have been reported to date. However, there were no cases with perforated ligamentum flavum (LF). We report a different case with perforation of ligamentum flavum by disc fragment. To the best of our knowledge, this is the first report of perforation LF by a posterior epidural migrated sequester disc.

**Key words:** Epidural; ligamentum flavum; lumbar intervertebral disc; posterior.

## Introduction

Degenerative disc disease is one of the most common diseases of the spine.<sup>[1-3]</sup> Sciatica or lumbosacral radiculopathy is usually caused by disc herniation.<sup>[4]</sup> For decades, lumbar discectomy has been one of the most common surgical practices performed by neurosurgeons.<sup>[5,6]</sup> A “typical” disc herniation protrudes mediolaterally into the spinal canal, the migration of the lumbar intervertebral disc fragment to the posterior epidural space is a rare event.<sup>[7]</sup> Lombardi first described this condition in 1973.<sup>[8]</sup> At present, neurosurgical practice is confronted by an explosion of technology.<sup>[9-11]</sup>

Rapid advances in neurosurgical knowledge and technology are putting increased pressure on neurosurgeons to process huge quantities of information, with requirements for continuous learning and updating scientific knowledge and skills which are time-consuming but essential,<sup>[12]</sup> and significant advances occurred in investigative methods such as magnetic resonance imaging and computerized tomography (CT) heralded a revolution in noninvasive imaging of the spinal disorder, this revolution led to increase the preoperative diagnosis of posterior epidural migrated lumbar disc, and 61 cases have been reported to date.<sup>[7]</sup> We report the case of a 46-year-old woman presented with perforation of

her ligamentum flavum (LF) by sequestered posterior epidural lumbar intervertebral disc. To the best of our knowledge, there are no previously reported cases of perforation LF by a posterior epidural migrated sequester disc.

## Patient and Observation

A 46-year-old woman presented with left side radiculopathy started 2 weeks before admission. Clinical examination revealed steppage gait and a strength score of three-fifth on dorsiflexion of feet. Patellar reflex was depressed, and there were no sphincter dysfunction or no saddle anesthesia. History revealed no history of trauma neither

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**How to cite this article:** Ozdemir B, Kanat A, Batcik OE, Erturk C, Celiker FB, Guvercin AR, *et al.* First report of perforation of ligamentum flavum by sequestered lumbar intervertebral disc. J Craniovert Jun Spine 2017;8:70-3.

Access this article online	
<b>Website:</b> www.jcvjs.com	<b>Quick Response Code</b> 
<b>DOI:</b> 10.4103/0974-8237.199867	

fever nor weight loss. Laboratory test such as hemogram, sedimentation, and tumors markers was also normal. Magnetic resonance imaging showed a sequestered disc fragment in the posterior epidural space of the left L4–L5 level that compressed the dural sac [Figures 1 and 2]. The patient underwent surgery using posterior approach. No urinary incontinence was noted. Laboratory tests revealed no abnormal findings.

### Operative approach

The patient underwent surgery using posterior approach before performing left L4 hemipartial laminectomy, perforation of LF by posterior epidural migrated lumbar disc was noted [Figure 3]. When the sequestered fragment was followed downward, it was clearly seen that the disc fragment was posteriorly and laterally compressing the L5 root from the axilla. The extruded disc fragment was gently removed without incising LF and L4–L5 interspace was explored. Histopathology confirmed the disc. Postoperative course was uneventful. Figure 4 shows postoperative CT scan of the patient.

### Discussion

In general, low back pain is one of the most common problems.<sup>[13-17]</sup> One of its causes is lumbar disc which may migrate superiorly, inferiorly, or laterally. Posterior migration of sequestered disc fragment is very uncommon,<sup>[7]</sup> but we first time report the perforation of LF by such a disc fragment. Our case should not be surprised because the intervertebral disc is the larger of two types of weight-bearing joints that make up the repeating vertebral motion segments in the spine.<sup>[18]</sup> Having broad knowledge of anatomy is essential for practicing neurosurgery. Certain anatomical structures call for detailed study due to their functional importance.<sup>[19-21]</sup>

One of this structures is LF from the axis to sacrum extending downward from the lamina of the respective anatomic segment.<sup>[22]</sup> The LF is thick and short and is symmetrical on both the left and right sides. On each side, the LF divides into a medial portion and lateral portion. The upper attachment of the medial portion is to the lower half of the ventral

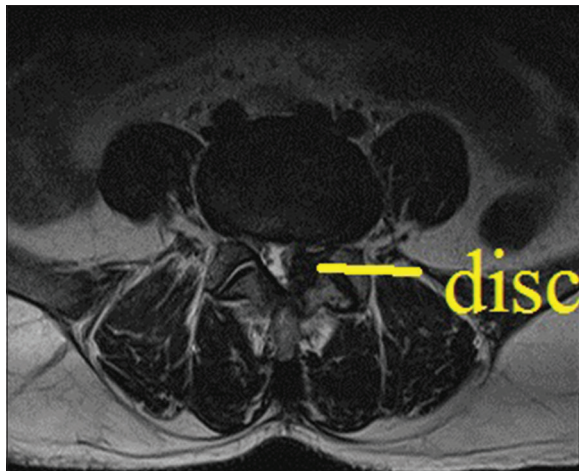


Figure 1: Axial magnetic resonance imaging sequestered posterior epidural lumbar disc



Figure 2: Sagittal images of the case

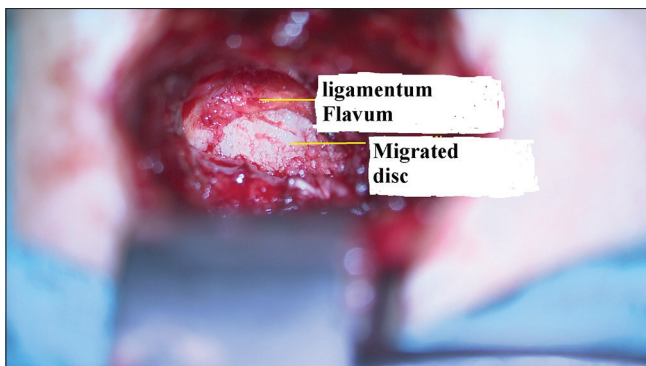


Figure 3: Operative picture shows the perforated ligamentum flavum by sequestered posterior lumbar disc fragment

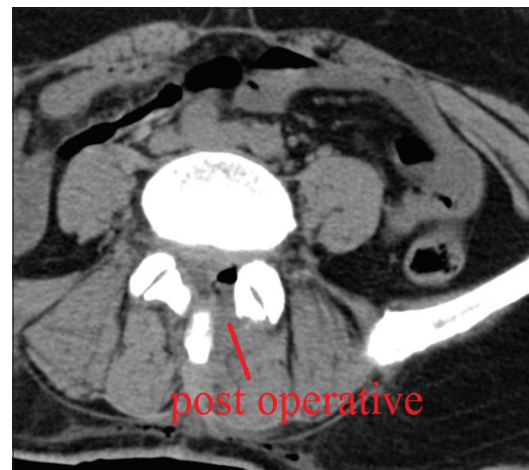


Figure 4: Postoperative computed tomography images of patient

surface of the lamina, and the attachment of the lateral portion is to the inferior aspect of the pedicle. The medial portion passes to the back of the next lower lamina and attaches to the upper quarter or so of the dorsal surface of that lamina. The lateral portion passes in front of the zygapophysial joint formed by the two vertebrae that the ligament connects.<sup>[23]</sup> The most lateral fibers extend along the root of the superior articular process as far as the next lower pedicle to which they are attached.<sup>[23]</sup> This part of the lateral portion of the LF has continuous fibrous connections with the synovium.<sup>[23]</sup> It attaches to the interspinous ligament medially and the facet capsule laterally. It contains the highest percentage of elastic fibers of any human tissue.<sup>[24]</sup> The only time, this structure slackens is during extreme extension of the spine.<sup>[24]</sup> However, our patient did not describe this kind of movement. LF has two layers. This two layer anatomy of ligamentum flavum may have for its perforation. For entering the epidural space, surgeon should remove the superficial layer of the LF, and dissect the deep layer from its attachment to the anterosuperior portion of the caudal lamina, which can best be accomplished with the use of a small angled curette alone or with a Kerrison rongeur. At each level, the LF extends laterally to blend with the facet capsule.<sup>[22]</sup> The ligamenta are thickest at the lumbar levels. However, our present case indicates that lateral part of flavum may not be as strong as medial part. To the best of our knowledge, this is the first case characterizing the perforation of LF by a lumbar disc fragment. LF undergoes slight fibrotic and chondrometaplastic changes with aging. No peculiar changes occur in patients with disc herniation.<sup>[25]</sup> This degenerative process is multifactorial, irreversible and may be associated with a mechanical dysfunction.<sup>[26]</sup> Our case is 46 years old, has no degenerative, spinal stenosis or age-related changes of her spine. In this case, the LF was perforated by sequestered disc at the left side. In literature, 61 cases have been reported. As in our case, most of the epidural migration of lumbar disc have occurred on the left side.<sup>[27]</sup> This point for epidural disc migration is interesting; we agree that this point should be investigated. Human body, which appears symmetrical along the midline grossly, is, in fact, asymmetrical both morphologically and physiologically. Low back pain has long been connected to postural and structural asymmetries.<sup>[3,5,28]</sup> While externally there is a difference in bilateral dimensions of various body parts and musculature, internally, it is due to asymmetrical positioning of viscera as well as variations in bilateral skeletal dimensions.<sup>[3,5,28]</sup> More stress and strain on the dominant side may cause differences between the sides, often referred to as directional asymmetry. Wolff's law says bone formation occurs along lines of stress the bones and muscles respond by growing more vigorously and increasing in density on

exposure to repeated high levels of mechanical loading.<sup>[5,28]</sup> Asymmetric changes occur in intervertebral disc under asymmetric loading.<sup>[3,28]</sup> Left-sided epidural disc herniations in reported human studies may be explained by this way. Asymmetric features of epidural disc migration, and should be investigated, because treatment of spine pathologies should consider anatomic rule.<sup>[29]</sup>

## Conclusion

Posterior epidural migrated lumbar disc fragments are an extremely rare disorder. To the best of our knowledge, there are no previously reported cases of perforation LF by a posterior epidural migrated sequester disc. We reported the first case in this paper. Our case is important if indeed one is the first to report something and that something is of value.<sup>[17,30]</sup>

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

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