

# Spontaneous Resolution of an Extraforaminal Lumbar Disc Herniation; Report of a Case and Review of the Literature

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## Abstract

Extraforaminal lumbar disc herniations (ELDHs) are a relatively uncommon cause of lumbar radiculopathy. In the patients suffering this kind of disc herniation, severe intractable radiculopathy due to dorsal root ganglion compression usually leads to surgery. However, although the value of conservative strategy for spontaneous resolution of intracanal lumbar sequestered disc herniation is a well-known scenario, but it is not verified in extraforaminal disc herniation.

Herein, a 53-year-old man with severe left-sided femoral radiculopathy at the vicinity of L3 which was associated with decreased knee jerk is presented. MRI revealed a huge extraforaminal disc herniation at L3-L4 level on the right side. Surgery was recommended, but since the patient was reluctant to undergo surgery, a period of conservative treatment, with transforaminal block, combined with NSAID's prescription result in dramatic pain amelioration. Control MRI after 3 months showed relative hyperintensity of the corresponding disc. However, MRI at 9-months follow-up where the patient was completely pain free, revealed disappearance of the offending disc. To our knowledge, the scenario of spontaneous resolution of extraforaminal disc herniation has not been reported previously in the literature.

**Keywords:** Extraforaminal lumbar disc herniation; Far lateral approach; MRI; Spontaneous regression

## Introduction

Extraforaminal disc herniation was first reported by Macnab in 1971 who reported two cases of L5 radiculopathy caused by an extraforaminal protrusion of the L5/S1 disc after a failed exploration at L4-L5 level [1]. In 1974, this pathology was designated as extreme lateral disc herniation by Abdullah et al. [2].

Later, far lateral, extra-canalicular and extraforaminal disc herniation were the terminology used instead of extreme lateral [3-5]. Nowadays, with increased availability and use of MRI, more extraforaminal lumbar disc herniations are identified. According to large series, its incidence ranges from 0.24% to 4% of all lumbar disc herniations [6-8].

Because of severe and intractable pain caused by dorsal root ganglion compression, majority of the patients with extraforaminal lumbar disc herniation seek surgical intervention and prefer this mode of treatment to conservative treatment [5]. Survey of the literature shows that only a small number of the patients are managed conservatively. Unfortunately, the mechanism of regression has been not verified in those who recover with conservative treatment.

Herein, the scenario of spontaneous resolution of an extraforaminal lumbar disc herniation demonstrated in periodic MRI is described an adult male for the first time in the literature.

## Case Report

A 53-year-old man was admitted because of radicular pain over the anterior aspect of the right thigh for three weeks duration. The radiculopathy was of severe intensity at the beginning (VAS: 10) but had decreased gradually on admission to our institute (VAS: 7). His neurological examination revealed pain at L3 distribution and this was associated with decreased knee jerk and dysesthesia on the lower half of the right thigh. MRI which had performed a week after appearance of pain, in axial view showed a rather huge right-sided extraforaminal disc herniation at L3-L4 level (Figure 1a). Sagittal images showed the medial part of the extruded disc occupying a part of L3-L4 foramen (Figure 1b).

Surgery was suggested, but he preferred conservative treatment and refused even endoscopic intervention. In order to diminish pain, transforaminal nerve block was done. This with prescription of NSAIDs and pergabolin resulted in dramatic pain relief. At three months follow-up, T2 weighted MRI revealed relative hyperintensity of the corresponding disc, indicating that the process of liquefaction has started (Figure 2). At 9-month's follow-up, the patient was completely pain free and this was associated with complete resolution of the extraforaminal disc herniation demonstrated in MRI (Figure 3).

## Discussion

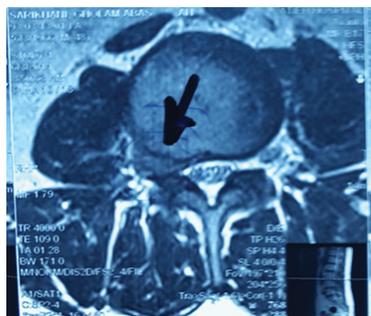
Extraforaminal lumbar disc herniations are relatively uncommon cause of lower extremity radiculopathy [5-7]. It typically includes a monoradiculopathy which affects the exiting nerve root of the same level [5-8]. This is in contrast to classic posterolateral disc herniation which affects the nerve root leaving at the level below. The specific clinical feature of sequestered extraforaminal lumbar disc herniation is severe pain from direct dorsal root ganglion compression (DRG) [6,7]. Majority of far lateral disc herniations are sequestered free fragments with tendency to migrate superiorly and laterally. These kind of lumbar disc herniation most commonly occur at the L3-L4 and L4-L5 intervertebral levels, hence cause femoral radiculopathy in 75% of the patients [8-12]. Femoral nerve traction test is often positive in the discs of these locations and the corresponding knee jerk is often diminished or is absent [5-7]. Extraforaminal disc herniation seldom affects L5-S1 level and if this occurs will result in severe L5 radiculopathy associated

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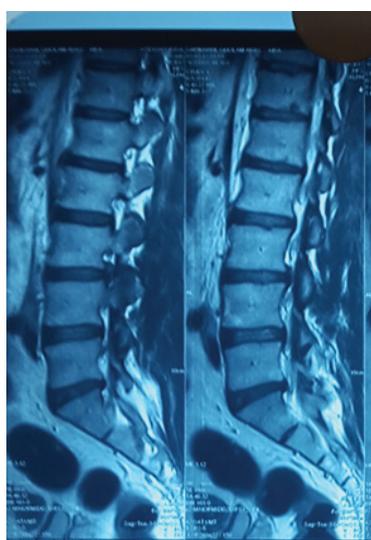
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**Figure 1a:** T2-weighted MRI, a week after appearance of pain showing a huge disc at L3-L4 on the right side.



**Figure 1b:** Sagittal image showing partial obstruction of right L3-L4 foramen. Obviously, if parasagittal slices were taken, whole of the sequestered disc could be clearly seen.



**Figure 2:** T2-weighted MRI, axial view showing relative hyperintensity of the corresponding disc, indicating that the process of liquefaction has started After 5 months.

with weakness of the dorsiflexion of the foot [1]. Preoperative sensory disturbances are seen in one half to two third of the patients. Low back pain in this type of lumbar disc herniation is relatively mild or absent [5-7].

The precise location of an extraforaminal disc can be best a determined by MRI. MRI with standard axial and para-sagittal views

is the diagnostic tool of choice for visualizing the extraforaminal disc herniations [9-11]. Recently, Bakar and Tekkok, in 2015, have proposed the idea of using coronal MRI to better delineate lumbar far lateral disc herniations [12].

In contrast to intracanal lumbar disc herniations where both surgery and conservative treatment are accepted modes in their management, in ELDH, with consideration of intractable pain, majority of the patients seek surgical intervention soon or later [3-7]. Both conventional open far lateral and endoscopic extraforaminal approaches have been described as the accepted surgical modes in extraforaminal disc herniation where the choice of surgery depends on the expertise of the surgeon [13-24].

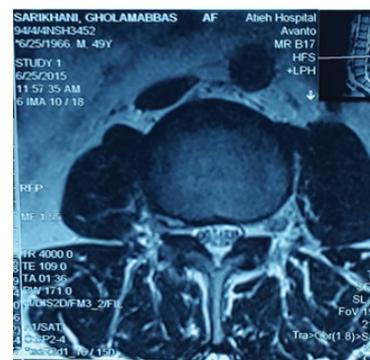
Overall success rate of surgery in far lateral lumbar disc herniation varies from 68% to 96% [14,20,21,24,25].

However, low morbidity, reduced denervation of the musculature, reduced perineural fibrosis, preservation of spinal stability, and a more rapid recovery are the advantages of endoscopic technique over conventional open discectomy [20-24].

Although, there have been many discussions as to the most suitable surgical approach to an extraforaminal lumbar disc herniation, the value of conservative treatment has been not well appreciated in this kind of disc herniation [13-24]. Furthermore, neither the pathophysiologic mechanism of pain amelioration nor the natural course and the behavior of the offending disc have been verified in the patients suffering from far lateral disc herniation.

Generally, where dehydration and shrinkage have been mentioned as the major contributors in size reduction of protrusions and complete extruded sub-ligamentous intracanal disc herniation, a biochemical enzymatic scenario has been found responsible in gradual resolution of sequestered disc material [26,27]. Although, the enzymatic process responsible for spontaneous resolution of a sequestered disc material is a well-known entity which has been described in cervical, thoracic and intracanal epidural lumbar herniations. But, this scenario has been not demonstrated in sequestered extraforaminal disc herniations.

In this enzymatic scenario, the outer most layer of sequestered fragment is initially surrounded by neovascularization originated from the local fat tissues and subsequent infiltration of this newly formed network with inflammatory cells resulting in biochemical products which promote the process of spontaneous resolution [28-32]. First of all, the granulation tissue surrounding a sequestered disc material produces enzymes that attract and activate macrophages. These enzymes are known as Monocyte Chemoattractant Protein-1(MCP-1)



**Figure 3:** T2-weight MRI, axial view demonstrates the resorption of more than 90% of the disc material.

and Interlukin-8 [32]. Later, interaction of these inflammatory macrophages and neovascularization around the disc leads to generation and secretion of new molecules of inflammatory cytokines mainly interleukin1, necessary for degrading the disc [33]. Released interleukine-1 around the disc fragment results in the production of tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ) [32]. On the other hand, it has been demonstrated that a degenerated disc itself, spontaneously produces high level of Matrix Metallo-Proteinases (MMPs) [34]. Such MMPs belong to the family of zinc-dependent proteases known to degrade cartilaginous tissues [34-37]. In fact, TNF $\alpha$  upregulates the expression of MMP1, MMP-3 and MMP-7 which already existed at the scene and newly produced ones [35,37,38]. The different types of these fortified MMP enzymes are a very potent proteoglycanase (proteinase) which can degrade the matrix of the disc tissue [34-37]. With their actions, the proteoglycan chains of the chondrocytes present in the disc material undergo autolysis with loss of their hydrophilic capacity, a process that is called chondrolysis [38]. This will ultimately result in desiccation of disc fragment and their gradual disappearance in an autocrine fashion [29,39]. The process of resolution is usually completed within 4 to 9 months after extrusion of a sequestered disc material.

In these events, exposure of the disc material to systemic blood circulation within the rich vascular environment is the most significant independent determinant of spontaneous resolution [28,36,37,39]. Large disc fragments are more likely predicted to regress than small ones probably because of more exposure to inflammatory cells and extended neovascularized granulation tissue. In extraforaminal region, presence of capillaries, fat tissue and the surrounding connective network provide optimal situation for the enzymatic process necessary for spontaneous resolution. However not all far lateral disc herniation are sequestered. Probably, in extraforaminal contained discs, dehydration and contraction of the annulus should be responsible in their size reduction.

Hopefully, with application of the contrasted MRI, one can easily differentiate between a sequestered and contained disc. Since, neovascularization around the outer layer of the disc is exclusively seen in sequestered ones, rim enhancement is only seen in the GD enhanced MRI of the former. Therefore, with demonstration of rim enhancement in MRI, within a month or two after appearance of radiculopathy, the responsible physician can assure the patient that spontaneous resolution will happen with high accuracy.

In conclusion, although severe and intractable pain in sequestered extraforaminal disc herniation usually leads to surgical intervention, but conservative treatment with consideration of the possibility of spontaneous resolution of the offending disc might be thought and discussed to the patient as an alternative option. Extraforaminal injection of corticosteroids plus local anesthetics has positive effect on the amelioration process of pain intensity hence preparing the patient to accept conservative strategy. The sequestered disc in the process of spontaneous resolution is liquefied which is shown as hyperintensity in T2-weighted MRI. Furthermore, ring enhancement demonstrated around the outer layer of the herniated disc in GD enhanced MRI is a strong clue that the disc is a sequestered free fragment with high possibility of spontaneous resolution [40-42].

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