

## SPONTANEOUS REGRESSION OF LUMBAR DISC HERNIATIONS

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## ABSTRACT

**Objective:** Lower back and back pain are among the most common disease symptoms. On the other hand, herniated nucleus pulposus (HNP) is a common condition that triggers radiculopathy or myelopathy. If radiculopathy affecting the foot occurs concurrently with back pain, the patient is very likely to have lumbar disc herniation. Medical treatment, bed rest and physical therapy are primarily recommended to patients with radicular pain. This study aimed to describe the factors associated with spontaneous disc regression.

**Materials and Methods:** Patients who were admitted to the outpatient clinic with lower back and leg pain were closely followed-up. After magnetic resonance imaging (MRI) scans revealed lumbar (HNP), a conservative medical treatment was recommended. When the patients' radicular pain disappeared or neurological exams became normal, control MRI scans were done. Then, we retrospectively reviewed these patients.

**Results:** We detected a total of 12 patients with lumbar disc regression, including six males and six females, in the last 3 years of follow-up. The mean age of the patients was 41.83±6.83. LHNP was present at the L4-5 space in five patients and at the L5-S1 space in seven patients. Eight (62.5%) of the patients had sequestered disc herniation, while four had subligamentous disc herniation. Four of the sequestered discs were up-migrated, and four of them were down-migrated. The mean time to pain disappearance of the patients was 2.33±1.23 months.

**Conclusion:** A conservative treatment and bedrest are primarily recommended to patients with lumbar disc herniation and pain complaints. Time should be given for the body to regress the lumbar disc herniation with an inflammatory response. Surgery is inevitable in cases of unbearable pain and emergency conditions.

**Keywords:** Lumbar disc herniation, radiculopathy, spontaneous regression

## INTRODUCTION

Lumbar disc herniation occurs due to posterior longitudinal ligament (PLL) rupture, and the symptoms of this condition begin with low back pain<sup>(1)</sup>. It can cause radiculopathy or myelopathy as a result of the nerve root inflammation, with a compression effect due to the disc material<sup>(2,3)</sup>.

Lumbar disc herniation affects approximately 9% of the world's population<sup>(4,5)</sup>, and it has been observed to increase with ageing. No specific causes can be found in 85% of lower back pain cases<sup>(6,7)</sup>. Of the patients with lumbar disc hernias, 30-40% are asymptomatic based on imaging<sup>(8)</sup>.

Lumbar herniated nucleus pulposus (LHNP) is most frequently observed at the L5-S1 level (45-50%), followed by the L4-5 level (40-45%) and the L3-4 level (3-10%), respectively<sup>(1)</sup>.

The Lasegue straight leg raising test is positive (+) in 83% of cases, and this test is sensitive, but not specific<sup>(1)</sup>.

Of all the patients with lumbar disc herniation, only 1-2% consult surgeons. Cauda syndrome occurs in approximately 0.0004% of all patients with lower back pain<sup>(1)</sup>.

## MATERIALS AND METHODS

Patients who were admitted to the outpatient clinic with lower back and leg pain were followed-up, and neurological exams were conducted. Patients who needed an emergency surgery were excluded. Medical treatment, painkillers, muscle relaxants, short-term steroids, bed rest and physical therapy were recommended to all the patients. Due to the possible complications of surgery, patients who did not agree to the surgery were advised to undergo a close clinical follow-up. We retrospectively reviewed these patients between March 2017 and March 2019. A total of 20,000 patients were admitted to all the neurosurgery outpatient clinics in the last 3 years, and the mean number of patients who underwent lumbar disc surgery in the last 3 years was 1,200. However, we detected regression only in 12 patients. We discussed the probable mechanisms and predictive factors of lumbar disc resorption. This article received ethical approval from Haseki Research and Training Hospital Ethics Committee (139-17/6/2019), and informed consent was obtained from all the patients.

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## Statistical Analysis

Statistical analysis was performed using SPSS v20.0 (SPSS Inc.). Descriptive data were expressed in terms of frequency, rate, arithmetic mean and standard deviation. Data were analysed using the Student's t-test. A p value of <0.05 was considered statistically significant.

## RESULTS

We detected a total of 12 patients with lumbar disc regression, six males and six females, in the last 3 years of follow-up. LHNHP was present at the L4-5 space in five patients and at the L5-S1 space in seven patients. Six patients had pain in the right side, while six had pain in the left side (Table 1).

On physical examination, the Lasegue test was positive in all the patients, and six patients had a neurological deficit. The symptoms regressed after medical treatment. In addition, seven patients received physical therapy (Table 1).

Eight (62.5%) of the patients had sequestered disc herniation, while four had subligamentous disc herniation. Four of the sequestered discs were up-migrated, while four were down-migrated (Table 1) (Figure 1-12).

The mean age of the patients was  $41.83 \pm 6.84$  years. The mean time to pain disappearance of the patients was  $2.33 \pm 1.23$  months. The mean time until the control lumbar magnetic resonance imaging (MRI) was  $7.16 \pm 6.49$  months.

The independent t-test indicated no statistical significance between the sequestered disc herniation cases in terms of age, gender, side, pain disappearance time and time until the new MRI.

There was no significant correlation between receiving medical or physical therapy and age, gender, pain disappearance time, disc space and undergoing a second MRI.

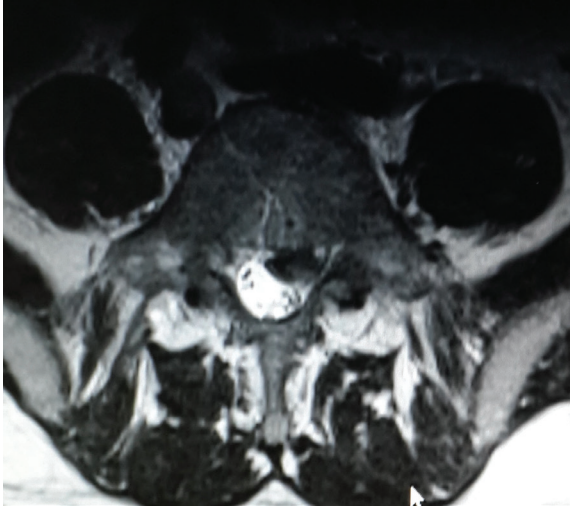


**Figure 1.** Sagittal T2-weighted MRI demonstrating a large sequestered disc fragment at the L4-5 level with a caudal migration (a 46-year-old female patient with lower back and leg pain)  
MRI: Magnetic resonance imaging

**Table 1.** Demographic data

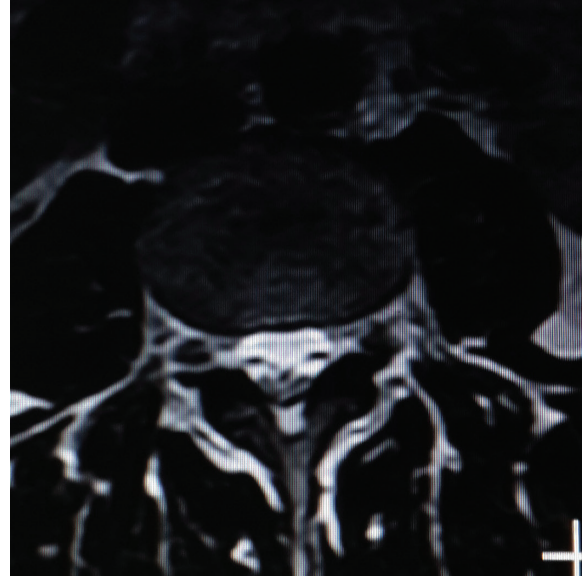
Age	Sex	Side	Level	SQ	Laseque	Neurologic deficit	MT	PT	MRI control time	Pain loss time
40	Male	R	L5-S1	-	+	-	+	+	3	3
23	Male	L	L5-S1	-	+	-	+	-	14	3
39	Male	R	L4-5	+	+	+	+	+	3	3
44	Female	L	L5-S1	+	+	-	+	-	3	2
50	male	R	L4-5	+	+	+	+	+	2	2
46	Female	L	L4-5	+	+	+	+	-	6	3
41	Male	R	L5-S1	+	+	-	+	+	3	1
43	Female	L	L5-S1	-	+	+	+	+	12	5
40	Female	R	L5-S1	-	+	+	+	-	6	1
48	Male	L	L4-5	+	+	+	+	+	24	1
46	Female	L	L4-5	+	+	-	+	+	4	1
42	Female	R	L5-S1	+	+	-	+	-	6	3

R: Right side, L: Left side, SQ: Sequestration, MT: Medical therapy, PT: Physical therapy, L5-S1: Lumbar level (L), sacral (S)



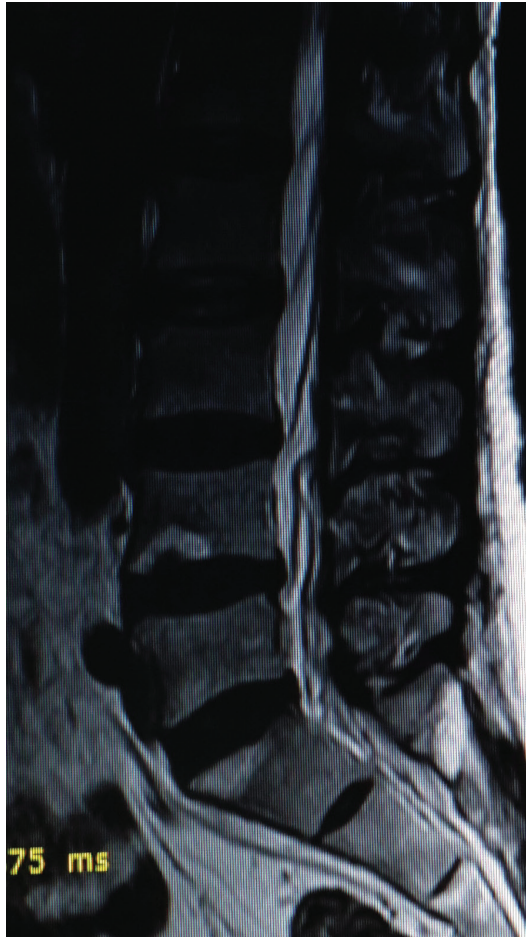
**Figure 2.** Axial T2-weighted MRI demonstrating a large sequestered left-sided paracentral disc fragment at the L4-5 level (pain relievers, muscle relaxants and bed rest were recommended to the patient)

MRI: Magnetic resonance imaging



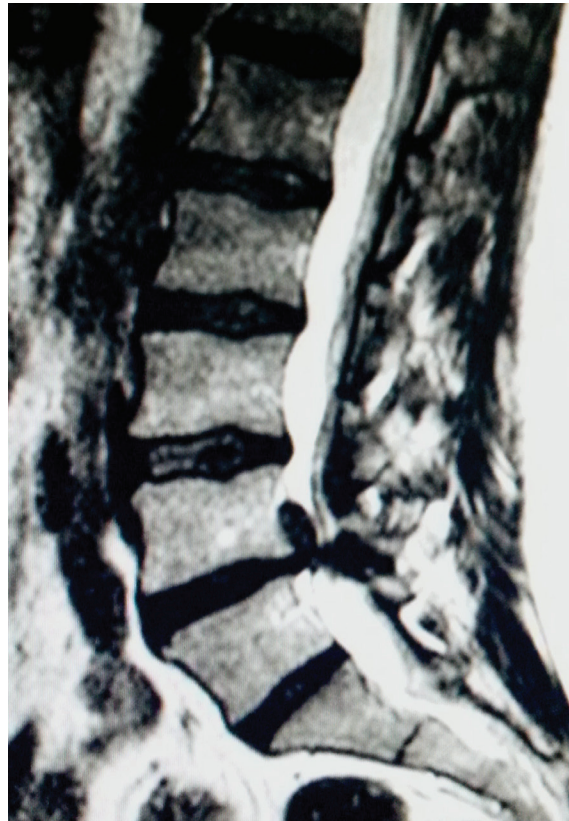
**Figure 4.** Axial T2-weighted second round MRI showed almost complete regression of the herniated nucleus pulposus at the L4-5 level without nerve root compression

MRI: Magnetic resonance imaging



**Figure 3.** Sagittal T2-weighted second round MRI showed almost complete regression of the herniated nucleus pulposus at the L4-5 level (her complaints were resolved 12 weeks later)

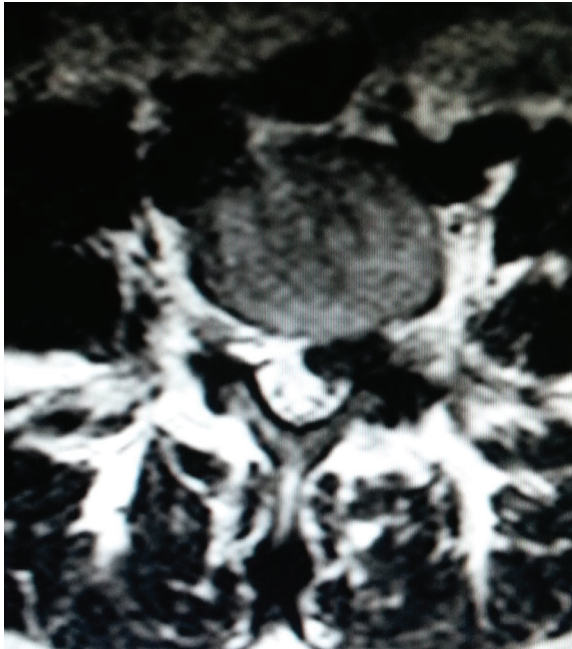
MRI: Magnetic resonance imaging



**Figure 5.** Sagittal T2-weighted MRI showed cranial migration of the herniated nucleus pulposus at the L4-5 level (a 48-year-old male patient with complaints of lower back pain and left-sided sciatalgia)

MRI: Magnetic resonance imaging

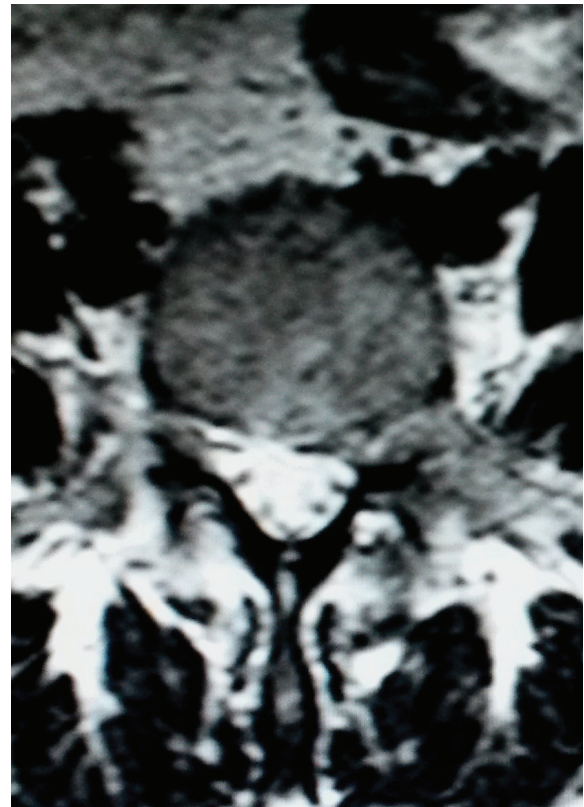




**Figure 6.** Axial T2-weighted MRI showed left-sided posterolateral extruded disc fragment at the L4-5 level (a 48-year-old male with axial sign; physical therapy was recommended after medical treatment)  
MRI: Magnetic resonance imaging



**Figure 7.** Control sagittal T2-weighted MRI showed almost complete regression of the herniated nucleus pulposus at the L4-5 level (his pain disappeared after a month; he came for control 24 months later)  
MRI: Magnetic resonance imaging



**Figure 8.** Control axial T2-Weighted MRI showed almost complete regression of the herniated nucleus pulposus at the L4-5 level  
MRI: Magnetic resonance imaging

## DISCUSSION

Over 90% of lumbar disc patients who develop acute radiculopathy can recover without the need for any surgical intervention. The painful phase can be made more tolerable with adequate pain relievers, muscle relaxants, short-term steroids and bed rest during the recovery period<sup>(1,6,9)</sup>.

Partial or complete regression of lumbar disc herniation has been reported in the literature. The most frequently affected space is the L4-5 space<sup>(10)</sup>.

The regression is accelerated young patients, and the recovery rate is the fastest between the ages of 41 and 50<sup>(10)</sup>.

Protruded and sequestered discs show rapid regressions. Large and sequestered discs tend to regress more easily than smaller and protruded discs, if they are laterally located with a craniocaudal migration<sup>(2,6,10-14)</sup>.

The mechanism of spontaneous disc herniation has many uncertain factors. These factors include the age of the patient, dehydration of the nucleus pulposus, resorption of a hematoma, revascularisation, HNP, PLL, cartilage and annulus fibrosus<sup>(2,4,6,11)</sup>. There are several mechanisms of spontaneous disc herniation. The disc material is reduced with dehydration and shrinkage as observed by MRI<sup>(15,16)</sup>. The PLL retracts the herniated disc back<sup>(4)</sup>. The enzymatic effect, inflammation, neovascularisation and phagocytosis stand out in preclinical and clinical evidence<sup>(12-14)</sup>.





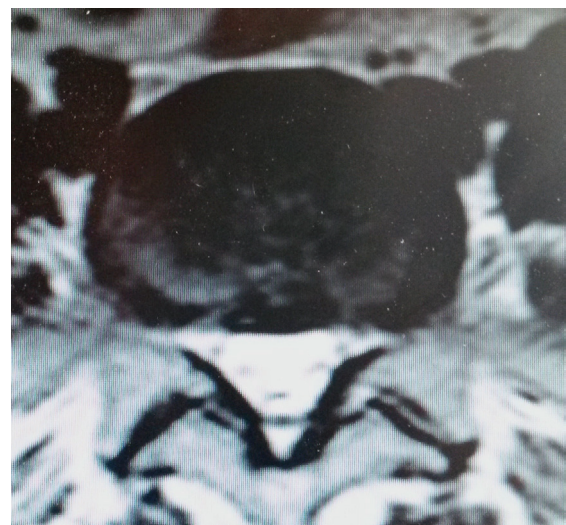
**Figure 9.** Sagittal T2-weighted MRI showed signs of a caudal migrated disc fragment at the L5-S1 level (a 41-year-old male with right leg pain)  
MRI: Magnetic resonance imaging



**Figure 11.** Sagittal T2-weighted MRI showed signs of complete regression of the herniated nucleus pulposus (in the third month, his neurological examination was normal, his muscle strength was full in the outpatient control visit in our neurosurgery department and the disc was observed to have regressed on the control MRI in the third month control visit)  
MRI: Magnetic resonance imaging



**Figure 10.** Axial T2-weighted MRI showed signs of right paracentral side disc fragment at the L5-S1 level (a 41-year old)  
MRI: Magnetic resonance imaging



**Figure 12.** Axial T2-weighted MRI showed signs of complete regression of the herniated nucleus pulposus (the patient's third month control axial sign)  
MRI: Magnetic resonance imaging

The intervertebral disc region is the largest avascular organ and an immune-privileged site of the body. Fas ligand belongs to the apoptosis group of the tumour necrosis factor (TNF) family and is affected by cytotoxic T cells and natural killer cells<sup>(15-17)</sup>. Macrophages are the key players. They induce phagocytosis by releasing enzymes from their lysosomes<sup>(18,19)</sup>. The exact role of monocytes in the intervertebral disc has not yet been elucidated. Monocyte chemoattractant protein-1 (MCP-1) allows macrophages to infiltrate the disc<sup>(4,20,21)</sup>. Immune mediators in the intervertebral disc are interleukin (IL)-6, 8, 4 and 12; NO; prostaglandin E<sub>2</sub>; matrix metalloproteinase-2,3,7 and 9; interferon- $\alpha$  and  $\gamma$  and MCP-1<sup>(19,20,22-25)</sup>. They appear with matrix remodelling and angiogenesis in the neovascularisation and inflammation cascade<sup>(4)</sup>. CD 68 (+), macrophages and B lymphocytes are involved in the disc herniation. TNF- $\alpha$  and IL-1  $\beta$  are released on the first day, while MCP-1 is released on the third day<sup>(4)</sup>. Disc regression is caused by pulsation of the cerebrospinal fluid to the herniated parts<sup>(11,26,27)</sup>.

PLL rupture is more important than the disc size. The subligamentous, transligamentous and sequestered disc regression rates can be 17%, 48% and 82%, respectively<sup>(4,26,28,29)</sup>. Three percent of all discs are sequestered, and sequestered discs are more likely to be regressed compared to other discs. These discs are up-migrated by 65%. Of the cases with regressed lumbar discs, 37.7% are sequestered. Sequestered discs are most frequently seen at the L4-5 space (58.3%), followed by the L5-S1 (25%) and the L3-4 spaces (12.5%)<sup>(10,28-34)</sup>.

As for our cases, L4-5 HNP was observed in seven lumbar discs, while L5-S1 HNP was observed in five lumbar discs.

The L4-5 space was affected in five of the sequestered disc patients, while the L5-S1 space was affected in four of them. In addition, the L4-5 space was affected more in our patient group. Discs were superiorly migrated in four cases and caudally migrated in four cases (50%).

A sequestered disc was separated from the main disc material in the lumbar region. An intraspinal mass can be observed as a cyst, abscess or hematoma, and should also be considered in the differential diagnosis<sup>(10)</sup>.

Sequestered disc dehydration and shrinkage are seen radiologically at a faster improvement rate. Like a free fragment, a sequestered disc rapidly increases inflammation and activates vascularity and the immune system<sup>(4,10)</sup>.

In the literature, pain occurring among cases with regressed lumbar disc herniation has been reported to disappear after  $1.33 \pm 1.34$  months, and radiological recovery was achieved in  $9.27 \pm 13.32$  months. In our series, the mean time to pain disappearance of the patients was  $2.33 \pm 1.23$  months, while the mean time until the control lumbar MRI was  $7.16 \pm 6.49$  months.

### Study Limitations

On the other hand, this study has limitations such as the small sample size, short follow-up period and retrospectively design.

In addition, none of the patients could be randomised to a treatment, and there were no control subjects.

Surgical intervention is the preferred method of treatment in patients with larger herniated discs imaged on MRI and associated with radiculopathy, myelopathy or both. Emergency surgery is planned in cases of persistent pain, conditions that negatively affect social life, foot drop, urinary and stool incontinence or cauda conditions.

## CONCLUSION

Bed rest and conservative treatment are primarily recommended to patients with lumbar disc herniation. Time should be given for the body to regress the lumbar disc herniation with an inflammatory response. Surgery is inevitable in cases of unbearable pain and emergency conditions.

### Ethics

**Ethics Committee Approval:** Ethical approval has taken for the retrospective study from Haseki Research and Training Hospital Ethics Committee (139-17/6/2019).

**Informed Consent:** Informed consent was obtained from the patients.

**Peer-review:** Internally peer-reviewed.

### Authorship Contributions

Concept: A.A., N.A., B.M.K., Design: A.A., N.A., Data Collection or Processing: A.A., N.A., B.M.K., Analysis or Interpretation: A.A., M.K., Literature Search: A.A., M.K., Writing: A.A.

**Conflict of Interest:** No conflict of interest was declared by the authors.

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