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## Spontaneous Regression of a Ruptured Lumbar Disc: A Case Report and Review of Literature

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### ABSTRACT

Lumbar disc rupture, particularly when associated with extrusion or sequestration, is often considered a surgical emergency due to the potential for persistent or progressive neurological deficits. However, recent studies have shown that spontaneous regression of ruptured discs is possible in carefully selected patients. We present the case of a 35-year-old male with a 6-month history of worsening low back pain radiating to the right leg, accompanied by numbness and tingling, who demonstrated significant improvement with conservative management. Magnetic resonance imaging (MRI) revealed a large ruptured disc at the L4-L5 level, with extrusion of the nucleus pulposus into the spinal canal, causing compression of the adjacent nerve root, as shown in Figure 1. Despite the severity of the MRI findings, the patient opted for non-surgical management, including non-steroidal anti-inflammatory drugs (NSAIDs), physical therapy, and activity modification. Over the following months, the patient's symptoms gradually improved, with a follow-up MRI showing a significant decrease in the size of the extruded disc fragment and near-complete resolution of nerve root compression, as seen in Figure 2. This case highlights the potential for spontaneous regression of a ruptured lumbar disc and supports the use of conservative therapy in patients without progressive neurological deficits. The growing body of literature suggests that surgical intervention may not be necessary in all cases of lumbar disc rupture, and appropriate selection of candidates for conservative management could reduce healthcare costs and avoid surgical risks. Further studies are needed to identify predictive factors for successful non-surgical outcomes in disc rupture cases and refine treatment guidelines for this condition.

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### INTRODUCTION

Lumbar disc rupture, a more advanced stage of intervertebral disc herniation, occurs when the annulus fibrosus and posterior longitudinal ligament are completely breached, allowing the nucleus pulposus to extrude or become sequestered into the spinal canal. This condition often results in significant mechanical and inflammatory irritation of adjacent nerve roots, leading to symptoms such as severe lower back pain, radiating leg pain (sciatica), numbness, tingling, and muscle weakness. In more serious cases, particularly when the ruptured disc compresses the cauda equina, patients may develop signs of cauda equina syndrome, including bowel or bladder dysfunction and saddle anesthesia, which constitutes a medical emergency. Traditionally, surgical decompression has been the mainstay of treatment to promptly relieve neural compression and prevent permanent neurological deficits. However, accumulating clinical evidence and imaging studies have shown that spontaneous resorption of herniated disc fragments is possible, especially in cases of extrusion and sequestration. As a result, conservative management, including physical therapy, pharmacologic pain control, and activity modification, may lead to substantial symptom improvement and radiological regression in selected patients, potentially avoiding the need for surgery. The pathophysiology of lumbar disc rupture is demonstrated in many studies, with MRI images providing clear evidence of extrusion and sequestration, as seen in **Figure 1**. Traditionally, surgical decompression has been the mainstay of treatment to promptly relieve neural compression and

prevent permanent neurological deficits. Recent case reports, such as that by Ahmadi et al., have highlighted the importance of accurate diagnosis and intraoperative neuromonitoring during surgical management of complex disc herniations that risk severe neurological compromise (Ahmadi et al., 2025).

### Case Presentation:

A 35-year-old man presented with a 6-month history of progressively worsening low back pain radiating to the right lower extremity, primarily along the posterior thigh and lateral calf, consistent with radicular distribution. The pain was described as sharp and shooting in nature, often accompanied by intermittent numbness and tingling in the same distribution. His symptoms were aggravated by prolonged sitting, forward bending, and lifting heavy objects, and were partially relieved by rest and lying in the supine position. He denied any recent or past history of trauma, systemic illness, fever, weight loss, or prior spinal surgery.

On physical examination, he exhibited an antalgic gait and preferred to lean slightly forward to alleviate pressure on the lower back. Neurological evaluation revealed decreased sensation in the right L5 dermatome, as well as mild weakness (Grade 4/5) in right ankle dorsiflexion, suggestive of L5 nerve root involvement. Straight leg raise (SLR) test was positive on the right side at 45 degrees. Deep tendon reflexes, including the patellar and Achilles reflexes, were symmetrical and preserved bilaterally. No signs of cauda equina syndrome, such as bladder or bowel dysfunction or saddle anesthesia, were noted.

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Magnetic Resonance Imaging (MRI) of the lumbar spine revealed a large ruptured intervertebral disc at the L4–L5 level. The imaging showed complete disruption of the annulus fibrosus with extrusion of nucleus pulposus material into the spinal canal, causing significant compression of the right L5 nerve root and indentation of the thecal sac (Figure 1). There was also mild disc desiccation noted at adjacent levels, but no evidence of spinal instability, spondylolisthesis, or spinal stenosis.

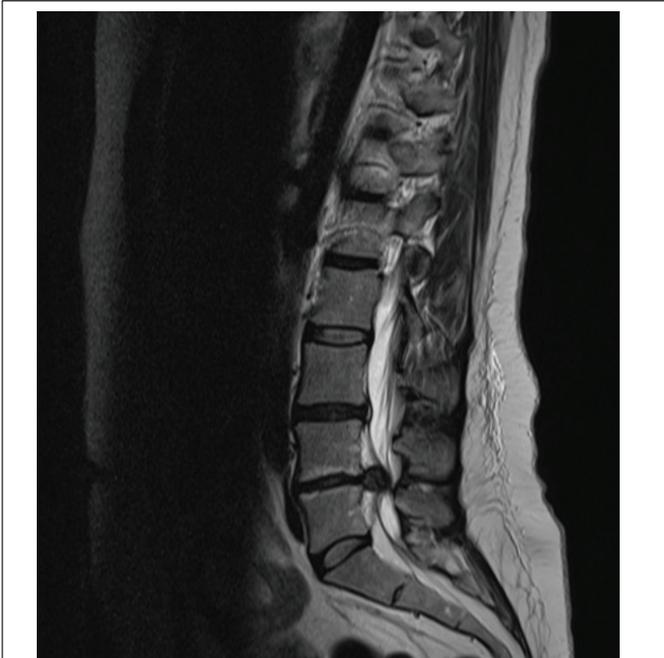


Figure 1: CInitial MRI showing the large ruptured disc at the L4–L5 level with extrusion of the nucleus pulposus and nerve root compression.

Despite the severity of the MRI findings, and after a thorough discussion of the potential risks and benefits of surgical versus non-surgical management, the patient elected to pursue a conservative approach. He was prescribed a regimen of non-steroidal anti-inflammatory drugs (NSAIDs) for pain control, in conjunction with a structured physical therapy program focusing on lumbar stabilization exercises, postural correction, and neural mobilization. He was also advised to modify his daily activities to minimize spinal loading and avoid provocative movements.

A summary of the patient’s clinical and radiological findings can be found in Table 1. As summarized in Table 1, the key clinical details and MRI findings correlate with previous literature on spontaneous disc resorption.

**Case Details Table:** A Table summarizing the patient’s key clinical data, including: **Patient demographics** (age, gender) **Presenting symptoms** (pain, radiculopathy, etc.); **MRI findings**; **Neurological status** (sensory deficits, motor weakness).

Table 1: Treatment plan and outcomes.

Category	Details
Patient Age	35 years old
Presenting Symptoms	6-month history of low back pain, radiating pain
Symptom Aggravation	Prolonged sitting, bending, lifting
MRI Findings	Large ruptured disc at L4-L5, extrusion, nerve compression
Treatment Plan	NSAIDs, physical therapy, activity modification
Follow-up Outcome	Significant symptom improvement, follow-up MRI shows resorption

Literature Review Table:

A table comparing this case with similar reported cases in literature regarding the spontaneous regression of ruptured lumbar discs.

Author (Year)	Patient Characteristics	Treatment Approach	Outcome
Liu et al. (2021)	50-year-old male, L4-L5 herniation	Conservative (NSAIDs, PT)	Full recovery, no surgery
Fan et al. (2023)	40-year-old female, large prolapsed disc	Conservative therapy	Significant reduction in pain
Zhou et al. (2024)	60-year-old male, L5-S1 extrusion	Conservative therapy	MRI regression, symptom relief

Over the next four months, the patient reported gradual but steady improvement in symptoms, with a marked reduction in both pain intensity and frequency of radicular symptoms. He regained full strength in the affected limb and reported improved functional capacity in daily activities. At the 6-month follow-up, repeat MRI showed a significant reduction in the size of the extruded disc material, consistent with spontaneous disc resorption, and near-complete resolution of nerve root compression (Figure 3). The patient remained neurologically intact and continued to improve with ongoing conservative care.

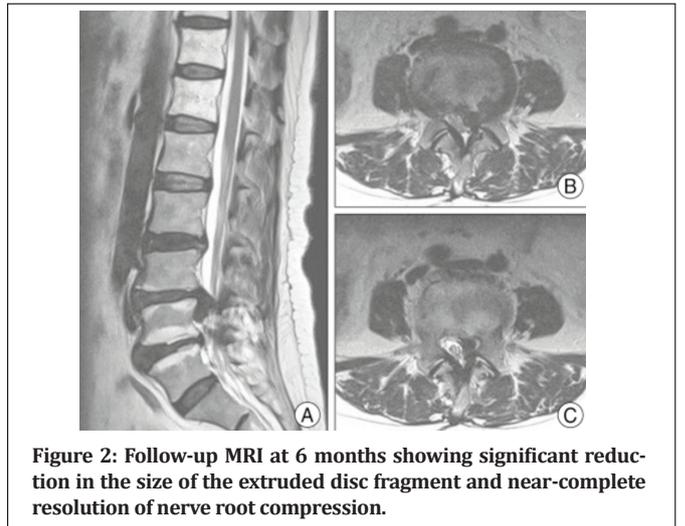


Figure 2: Follow-up MRI at 6 months showing significant reduction in the size of the extruded disc fragment and near-complete resolution of nerve root compression.

**Lumbar Spine MRI (six months prior):** A: Sagittal T2-weighted image demonstrates a large herniated disc at the L4–L5 level with caudal migration; B and C: Axial T2-weighted images reveal a left posterolateral extruded disc fragment and associated lateral recess stenosis at the L4–L5 level.

- MRI images revealed a large ruptured intervertebral disc at the L4–L5 level, as shown in Figure 1.
- The follow-up MRI at 6 months showed significant disc resorption, near-complete resolution of nerve root compression, as seen in Figure 3.

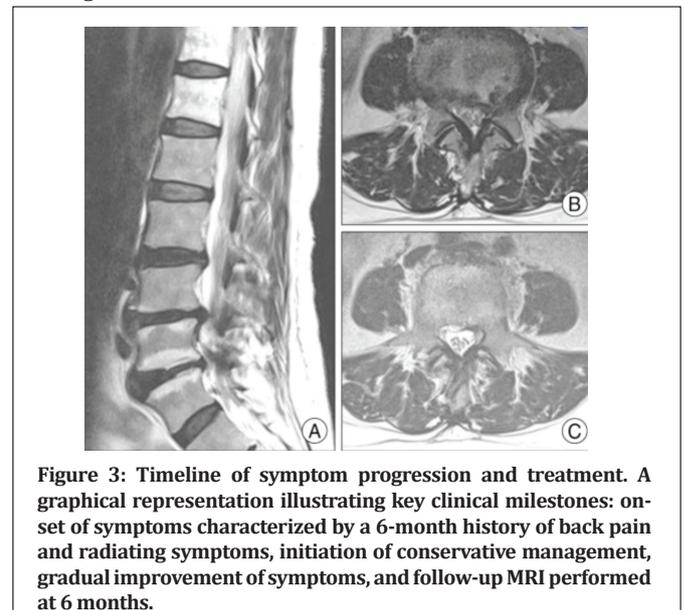
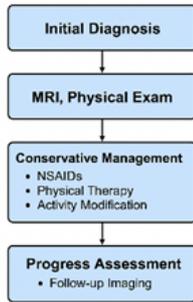


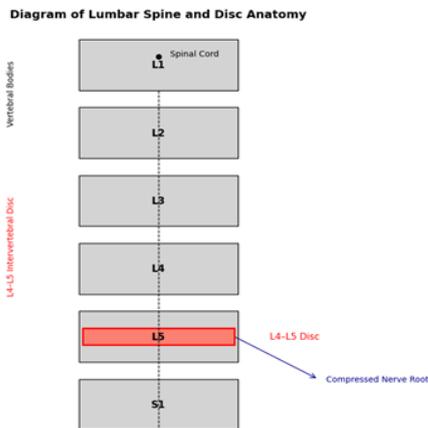
Figure 3: Timeline of symptom progression and treatment. A graphical representation illustrating key clinical milestones: onset of symptoms characterized by a 6-month history of back pain and radiating symptoms, initiation of conservative management, gradual improvement of symptoms, and follow-up MRI performed at 6 months.



**Flowchart of Conservative Management Plan:** A flowchart outlining the treatment strategy, showing the steps from initial diagnosis (MRI, physical exam) to conservative management (NSAIDs, physical therapy, activity modification), and progress assessment with follow-up imaging.



**Diagram of Lumbar Spine and Disc Anatomy:** A labeled diagram of the lumbar spine showing the location of the L4-L5 disc and the affected nerve roots. This helps readers unfamiliar with anatomy to visualize the clinical findings.



**Discussion**

Ruptured lumbar discs, particularly those with extrusion or sequestration, are often considered surgical cases due to the high risk of persistent or progressive neurological symptoms, such as persistent pain, motor weakness, or sensory deficits. Surgical decompression is commonly recommended when conservative management fails or when progressive neurological deficits are evident. However, accumulating evidence from recent studies suggests that spontaneous regression of ruptured or even sequestered discs is not only possible but relatively common in carefully selected patients (Zhou, *et al.*, 2024). This challenges the traditional approach of early surgical intervention for these cases, highlighting the importance of conservative management in appropriate circumstances.

The underlying mechanisms that contribute to the spontaneous resorption of ruptured discs are multifactorial. These include inflammatory phagocytosis, where immune cells gradually remove the extruded disc material, neovascularization, which promotes healing and facilitates the absorption of disc fragments through the formation of new blood vessels, and dehydration and enzymatic degradation of the nucleus pulposus, which reduce the volume of the disc material. These mechanisms collectively contribute to the gradual shrinkage or even complete resolution of the disc fragment (Fan, *et al.*, 2023; Zhou, *et al.*, 2024).



**Figure 4:** Excised disc material following discectomy. Two irregular fragments of herniated nucleus pulposus tissue are shown placed on sterile gauze for measurement. The specimens measure approximately 4 cm and 7 cm in length, respectively, and are displayed adjacent to a sterile surgical ruler for scale.

The degree of spontaneous regression appears to correlate with the extent of extrusion or sequestration. Extruded and sequestered discs are more likely to undergo regression compared to contained herniations due to their increased exposure to the vascularized epidural space, which enhances the resorption process. The heightened inflammatory response and subsequent tissue remodeling play an important role in the gradual reduction of the disc material over time. Studies such as those by Liu, *et al.* (2021) suggest that the location and size of the herniated material influence the likelihood of spontaneous recovery, with larger or more severely extruded discs having a higher chance of regressing.

While cases of spontaneous regression of disc herniation have been well-documented, few reports have described similar outcomes in clear disc rupture cases, such as the patient in this study. The improvement observed in this patient without the need for surgical intervention supports the findings by Fan, *et al.* (2023) and Liu, *et al.* (2021), who demonstrated that conservative management can be both safe and effective, even in cases of large or ruptured discs. These cases suggest that surgical intervention should not be the first line of treatment for all ruptured lumbar discs, particularly when there are no signs of acute neurological compromise, and careful monitoring can be an effective approach.

However, it is essential to recognize that not all ruptured discs will undergo spontaneous regression or resolve with conservative treatment. In some rare instances, complications such as intradural rupture can occur, leading to conditions that mimic tumors or result in acute cauda equina syndrome, both of which require urgent surgical intervention (Chen, *et al.*, 2023; Ge, *et al.*, 2019). Such complications are a clear indication for surgery, and therefore, serial imaging and close neurological monitoring are paramount. Early detection of any deterioration in neurological function is critical to preventing irreversible damage, and ensuring that appropriate measures are taken should the need for surgery arise.

- "The MRI findings in **Figure 1** illustrate the initial presentation, while **Figure 2** shows significant improvement, supporting the idea of spontaneous disc regression."
- "Studies have documented spontaneous resorption of extruded discs, as we observed in this case, which is reflected in the MRI changes shown in **Figure 3**."

**Conclusion**

This case highlights the potential for spontaneous regression in ruptured lumbar discs and underscores the value of a conservative approach in carefully selected patients, particularly when there are no signs of progressive neurological deficits or cauda equina syndrome. The fact that the patient experienced significant improvement without the need for surgery suggests that non-surgical management should be considered as a reasonable first-line treatment option for many patients with ruptured discs. This approach is especially promising for patients who do not exhibit signs of acute neurological compromise, as demonstrated by this patient's resolution of symptoms with rest, physical therapy, and pharmacologic management.

The role of conservative therapy in managing lumbar disc rupture has gained increasing recognition over the past few decades, particularly

given the potential for spontaneous resorption of extruded disc material. As more patients experience positive outcomes through conservative management, there is an emerging focus on identifying which specific factors contribute to the success of this approach. Such factors may include the size and location of the rupture, the presence or absence of significant neurological impairment, and patient-specific factors such as age, overall health, and compliance with recommended non-surgical therapies.

Recognizing which patients are appropriate candidates for conservative management not only helps reduce the number of unnecessary surgeries but also holds significant potential for decreasing healthcare costs. Spinal surgeries are complex and carry risks of complications, such as infection, bleeding, and the potential for nerve damage. Avoiding surgery when possible can help mitigate these risks and contribute to a more cost-effective healthcare model. Furthermore, for patients who are able to recover with conservative measures, the psychological and physical strain of undergoing surgery and the subsequent recovery period can be avoided, improving overall quality of life.

However, it is important to acknowledge that conservative therapy is not suitable for all patients. The decision to pursue non-surgical treatment must be individualized, taking into account the severity of symptoms, MRI findings, and the patient's response to initial interventions. In cases where there is a rapid progression of neurological deficits, signs of cauda equina syndrome, or other indications of nerve root compression, surgery remains the gold standard treatment. Timely intervention is critical in these situations to prevent permanent damage and ensure optimal recovery.

While this case supports the potential benefits of non-surgical management, further prospective studies are needed to identify predictors of successful non-surgical outcomes in disc rupture cases. These studies should focus on evaluating the clinical characteristics that best predict favorable responses to conservative treatment, such as the duration of symptoms, MRI characteristics, patient demographics, and specific therapeutic interventions. Such research would help to refine clinical decision-making processes and provide evidence-based guidelines for managing ruptured lumbar discs conservatively. Additionally, long-term follow-up studies are necessary to evaluate the sustainability of conservative outcomes and assess the risk of recurrence or long-term disability in patients who initially recover without surgery.

- "This case highlights the successful conservative treatment of a ruptured lumbar disc, with significant improvements observed, as shown in **Figure 2**."

In conclusion, this case provides strong evidence that spontaneous regression of ruptured lumbar discs can occur and that conservative management should be considered a viable treatment option for patients without significant neurological deficits. By carefully selecting patients who are appropriate candidates for non-surgical treatment, healthcare providers can potentially reduce the burden of unnecessary surgeries and improve patient outcomes while minimizing the associated risks and costs. Future research into the predictors of successful non-surgical treatment will be essential in advancing this approach and providing more targeted, personalized care for patients with lumbar disc rupture.

**Conflict of interest:** None

**Ethical Consideration:** None

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