Multiple Independent, Sequential, and Spontaneously Resolving Lumbar Intervertebral Disc Herniations

A Case Report

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Study Design. A case report is presented.

Objective. To highlight the potential for spontaneous resolution of large extruded intervertebral lumbar disc herniations in a patient with three independent herniations.

Summary of Background Data. The most effective methods of treatment for lumbar intervertebral disc herniations remain in question. This is partly because the potential for intrinsic spontaneous resolution is not understood, and because many believe that large extruded lumbar intervertebral disc herniations require surgical intervention. This case report addresses both issues.

Methods. A case is reported and the literature is reviewed.

Results. In the patient described, multiple independent lumbar intervertebral disc herniations resolved spontaneously both clinically and radiographically with nonoperative treatment.

Conclusions. Not only is the question concerning the cause of disc herniation unresolved, but the best methods of treatment also are generally unclear. This case report documents a patient with the intrinsic capability not only to herniate multiple lumbar intervertebral discs, but also to resolve them clinically and anatomically. Extruded lumbar intervertebral disc herniations may be treated without surgery, as highlighted by this case report. The immunohistologic pathomechanism for resorption remains unclear. [Key words: lumbar intervertebral disc herniations, lumbar MRI, sciatica] Spine 2002;27:549–553

Although the first reported surgery for lumbar disc herniation occurred more then 60 years ago, there still remains little consensus as to the most efficacious treatment protocol for symptomatic lumbar disc herniation.9,16 Both surgical and nonsurgical treatments may provide a successful outcome in appropriately selected patients. In a retrospective cohort study involving a subgroup of patients who had lumbar disc herniations without stenosis, Saal and Saal25 demonstrated good to excellent results in more than 90% of the patients treated nonoperatively. The Maine Lumbar Spine Study,4 an observational study, examined 5-year outcomes from surgical and nonsurgical management of sciatica. The study demonstrated a greater symptom reduction at 5-year follow-up assessment for surgically treated patients. At this writing, only the Weber31 study has compared the surgical management of lumbar disc prolapse with nonsurgical management, demonstrating that patients undergoing discectomy had significantly better outcomes at 1 year, but no difference in outcomes at 4 or 10 years. Despite the recent establishment of guidelines for the treatment of acute low back problems in adults,1 and the advent of “shared decision-making” concepts in intervertebral disc herniation,22 the best methods of treatment often remain the individual preference of the patient or the surgeon.32

Traditionally, one relative indication for surgery is a large extruded herniation.23 Although these herniations often have a greater severity of symptoms, they also have shown the greatest tendency to decrease in size with nonoperative treatment.2,5,17,18,26 Recent work with immunohistologic studies has created some insight into the reabsorptive mechanisms.7,11,13 It also has been demonstrated that these patients can be managed successfully with nonoperative methods.13,24

This case report presents a patient who experienced three large, independent, and sequential lumbar disc herniations over the course of 3 years. Each herniation regressed spontaneously with nonoperative management, as demonstrated by magnetic resonance imaging (MRI), with corresponding remission of symptoms. The patient’s clinical course and radiographic studies are reviewed.

This case report aims to document this unique circumstance of multiple lumbar intervertebral disc herniations and resolutions, to exemplify the ability of large herniations to resolve nonoperatively both clinically and radiographically, to demonstrate the potential for recurrent herniations in patients treated nonoperatively, and to raise the question about pathophysiology associated with these issues.

Case Report

A healthy, nonsmoking 44-year-old male physician was seen originally in May 1996 for back pain and left posterior thigh pain. The patient’s remote history was notable for intermittent isolated midline low back pain over the previous 10 years. The recent pertinent history included the onset of back pain and spasms for several weeks before presentation. His major presenting disorder was back pain and spasms, with associated pain in the left posterior thigh. There was no numbness or sphincter dysfunction. Neurologic examination showed weakness of the left extensor hallucis longus, rated 4 over 5 by...
manual motor testing. The results for the remainder of the neurologic examination, including sensory function, reflexes, and a straight-leg-raise test were normal.

Because of persistent symptoms, at approximately 4 weeks from onset of symptoms, an MRI of the lumbar spine was obtained, which showed a large intervertebral disc herniation in the left paracentral region of the spinal canal at L4–L5, consistent with the patient’s left L5 radiculopathy (Figure 1a–1d). The unusual size of the disc herniation led to administration of gadolinium to confirm the diagnosis. Of note was a known Grade 1 Type-IIA spondylolisthesis of L5 on S1.

After a discussion of treatment options, medical management was continued, which included a course of oral steroids followed by nonsteroidal antiinflammatory medication. Over the next several weeks, while continuing to work, the patient’s pain, spasms, and weakness completely resolved.

In September 1996, the patient experienced low back pain and new onset of right leg pain in the L4 dermatomal distribution. His left leg remained completely asymptomatic. He ambulated in a squatting position, with flexion at the hips and knees, because this was the position of comfort. At other times, he used a wheelchair. He was always able to obtain a position of comfort. Standing was maintained at a flexed posture of approximately 45° of flexion. Neurologic examination results were normal, and tension signs were absent. He continued to pursue nonoperative treatment.

An MRI of the lumbar spine demonstrated a moderate-size right paracentral intervertebral disc herniation at L3–L4, consistent with the patients’ clinical syndrome of an L4 radiculitis (Figure 2a–2d). The previously demonstrated disc herniation at L4–L5 had completely resolved. After several additional weeks of medical management, the right L4 radicular symptoms completely resolved.

In September 1998, new onset low back pain and right leg symptoms developed. These symptoms were distinctly different from the previous right-side symptoms. They were associated with diminished sensation in the plantar aspect of the right foot and gastrocnemius weakness manifested by an inability to toe walk. The right Achilles deep tendon reflex was now absent. The results from the straight-leg-raise test were negative bilaterally.

After several weeks of persistent symptoms, an MRI of the lumbar spine was obtained. The MRI demonstrated a large intervertebral disc herniation in the paracentral region of the spinal canal, inferior to the right L5 pedicle (Figure 3a–3d). This appeared to arise from the L4–L5 intervertebral disc space with distal migration. The previously visualized and symptomatic intervertebral disc herniation at L3–L4 had completely resolved. After several additional weeks of medical management with a course of oral steroids followed by nonsteroidal antiinflammatory medication for the S1 radiculopathy, the symptoms completely resolved. At this writing, the patient has remained without radicular symptoms since that time, although he has experienced some right calf cramping and intermittent low back pain.

In October 1999, while the patient remained asymptomatic, an MRI of the lumbar spine was obtained to visualize the lumbar spinal canal and assess the intervertebral disc spaces and cauda equina. The MRI demonstrated complete resolution of the most recently symptomatic intervertebral disc herniation.
from under the right L5 pedicle. There was no evidence of nerve root compression by intervertebral disc material at any level of the lumbar spine (Figure 4a–4d).

**Discussion**

The reported patient’s case history demonstrates three sequential, independent, and spontaneously resolving lumbar intervertebral disc herniations. As per the patient’s choice, each event was managed nonoperatively, and as shown on MRI, each demonstrated full remission in both the abatement of radicular symptoms and the anatomic resolution of the intervertebral disc herniations.

Spontaneous reductions of lumbar and cervical disc herniations have been described numerous times. Accompanying these reductions also has been a reduction in symptoms such as acute back pain and sciatica. In a retrospective cohort study, Saal and Saal demonstrated that lumbar disc herniation with radiculopathy can be successfully treated nonoperatively, with nonoperative treatment resulting in “good to excellent” outcomes for approximately 90% of patients. Of the 15 patients with extruded disc herniations, 11 had weakness, although the results were no different from those for nonextruded disc herniations. Saal and Saal concluded that extrusion was not an adequate indication for surgical intervention. The study also implied that unresponsiveness to nonoperative treatment may suggest the presence of significant stenosis, as observed with nonresponders in the study.

Several studies of the lumbar spine using MRI have demonstrated that the largest lumbar intervertebral disc herniations are those most likely to show the greatest regression in size over time. This phenomenon has been demonstrated with cervical herniations as well. Although still disputed in the literature, studies have shown that the degree of reduction in disc size, as evidenced by MRI, correlates closely with the degree of clinical improvement. These findings on MRI, however, have been found to lag behind improvement in leg pain. One recent study attempting to quantify the extent of regression necessary for clinical improvement demonstrated a 95% success rate in cases of herniations that regressed more than 20%. Rust and Olivero recently demonstrated a high success rate of approximately 71% in the use of nonoperative measures for the treatment of far lateral lumbar disc herniations. This contrasts sharply with previous opinions indicating an extremely low success rate.

As evidenced by MRI, the reported patient’s intervertebral disc herniations were extremely large, occupying a major portion of the spinal canal, which also is quite large. It is possible that this contributed to an accommodation of the herniations and the nonclassic findings exhibited in this case report. Carragee and Kim noted that

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**Figure 3.** a, A repeat sagittal T2-weighted study (3500/102/3/5 mm) obtained 10 months later shows a new large disc herniation arising at L4–L5. b, The axial proton density scan (4000/19/2/5 mm) at L3–L4 shows regression of the L3–L4 right paracentral disc. c, The scan at L4–L5, however, shows the new large right paracentral disc herniation, which has considerable caudal extension into the lateral recess of L5. The axial scan at L5–S1 is normal.

**Figure 4.** a, The sagittal T2-weighted scan (2500/95/3/4 mm) obtained 13 months after the images in Figure 3 show resolution of the large L4–L5 disc. The axial proton density scans (2000/13/2/5 mm) at L3–L4 (b), L4–L5 (c), and L5–S1 (d) all appear essentially normal.
a small herniation in a larger spinal canal was modestly associated with successful nonoperative treatment. This finding could be consistent with the MRI findings in the first and second intervertebral disc herniations. However, the mechanism by which these disc herniations resolve is still under study. Intervertebral disc herniations act as foreign bodies in the epidural space. Several immunohistologic studies have demonstrated that the immune system attempts to remove the “invading” disc tissue.7,31,13 Hirabayashi et al11 concluded that vessels from the epidural fat infiltrate the disc material. Accompanying the vessels are granulation tissue and the eventual transformation into scar tissue. In an immunohistologic study, Doita et al7 demonstrated that significant levels of endothelial growth factor in the extruded discs, as compared with smaller protruded discs, presumably enhance the proliferation of endothelial cells.

These studies also have demonstrated that macrophages probably play a vital role in both resorption and cytokine (bFGF) signaling to promote endothelial cell proliferation and neovascularization.7 In a clinical study of lumbar disc herniation regression using multiple linear regression analysis, Ahn et al2 concluded that transligamentous extension of the herniation was the only significant factor contributing to the spontaneous regression of the disc herniation. This argument has been reaffirmed by both histologic evidence and the finding that a greater percentage of disc herniations through the posterior longitudinal ligament contained infiltration of macrophages than those not extruded through the posterior longitudinal ligament.12 Smaller, slower-resorbing herniations showed significantly smaller macrophage infiltration.

As research methods continue to advance, the role that different mechanisms play in the process of disc resorption is becoming better understood. In a recent study by Haro et al,10 knockout mice were used to demonstrate that macrophage induction of a chondrocyte enzyme (matrix metalloproteinase-3) plays a key role in disc resorption through several mechanisms. Although the pathomechanism of pain has not yet been fully elucidated, phospholipase A2 and nitric oxide are thought to play vital roles.19,27 Individual variations in the expression of various molecules also may be found to play a pivotal role in the natural history of intervertebral disc herniations and one day may be a target for symptomatic control.

Genetic factors also may play a role in the etiology of intervertebral disc herniation. Using modern genetic techniques, researchers have identified several putative disease-causing variations in collagen IX, a collagen expressed in the anulus fibrosus and nucleus pulposus of the intervertebral disc.14,20,21 Recently, Paassilta et al20 identified a specific base pair substitution in the alpha-3 chain of collagen IX (Arg103 to Trp) that, when present, may increase the risk of lumbar disc disease threefold. Although these findings have little therapeutic use at this time, discoveries such as these may one day play a role in identifying individuals who may have increased susceptibility to disorders of the intervertebral disc, or help to determine which patients may benefit from which treatment options.

As evidenced in several studies, not all lumbar intervertebral disc herniations respond well to nonoperative treatment.2,5,18,23,29 Carragee and Kim6 demonstrated that response to nonoperative treatment correlates with demographic and clinical features, whereas the outcome for those undergoing surgery correlates with morphometric features of the disc herniation and spinal canal seen on MRI. Of the MRI parameters evaluated by Carragee and Kim,6 only a small ratio of disc hemiarea to remaining canal hemiarea was modestly correlated with better outcomes (P = 0.045) in nonoperative patients. Among the patients choosing nonoperative treatment, some may eventually require operative intervention for unremitting or progressive symptoms. The Weber31 study estimated this number to be as high as 25% after 1 year. In the larger Maine Lumbar Spine Study, it was shown that by 3 months, 15% of patients initially treated nonoperatively crossed over and underwent surgical intervention for the treatment for their intervertebral disc herniations.4

The reported case reaffirms earlier findings demonstrating that a large lumbar disc extrusions can be managed successfully by nonoperative methods. This case is unique in that it represents multiple independent lumbar intervertebral disc herniations, all of which resolved spontaneously, both clinically and radiographically. This case report also suggests that despite the multiple extrinsic methods used to treat lumbar intervertebral disc herniations, the most critical factors may be those intrinsic to the patient. Although the successful management of this patient by nonoperative treatment has been demonstrated, many aspects of his disease process remain a mystery.

Key Points

- Multiple independent recurrent lumbar intervertebral disc herniations are uncommon.
- Extruded lumbar disc herniations can resolve spontaneously.
- Immunohistologic mechanisms may be responsible for the resorption of lumbar intervertebral disc herniations.

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References


