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Clinical Study

# Comparison of lumbar discectomy alone and lumbar discectomy with direct repair of pars defect for patients with disc herniation and spondylolysis at the nearby lumbar segment

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**Abstract**

**BACKGROUND CONTEXT:** It is unknown whether direct repair (DR) of pars defect after lumbar discectomy (LD) for patients with lumbar disc herniation (LDH) and spondylolysis leads to better outcomes than LD alone.

**PURPOSE:** The aim was to compare two surgical methods, LD alone and LD with DR, for LDH patients with spondylolysis at a nearby lumbar segment.

**STUDY DESIGN:** This was a retrospective comparative study.

**PATIENT SAMPLE:** This study enrolled 89 patients who were diagnosed with LDH and spondylolysis at the same or adjacent lumbar segment and were followed up for at least 1 year.

**OUTCOME MEASURE:** The primary outcome was pain intensity of the lower back and lower extremities as measured with visual analog scale. Secondary outcomes included clinical outcomes as assessed with the Oswestry Disability Index and the 12-item short form health survey, radiologic outcomes as assessed with the gap distance and the union rate at the pars defect, surgical outcomes, and complications.

**METHODS:** Enrolled patients were classified into two groups: LD alone (Group A, 48 patients) and LD with DR (Group B, 41 patients).

**RESULTS:** Pain intensity of the lower back and lower extremities and clinical outcomes were significantly improved 1 year after surgery compared with preoperative scores. However, the scores in the group receiving LD alone steadily worsened during follow-up, whereas the scores in the group receiving LD with DR did not deteriorate over time. The difference in the gap distance of the pars defect between baseline and 1 year after surgery was significantly different between the groups. The fusion rate of the pars defect was 59% (24/41). With the exception of surgical time, which was longer in Group B, surgical outcomes and complications did not differ significantly between the groups.

**CONCLUSIONS:** At the 1-year follow-up, DR after LD was associated with better outcomes for LDH with spondylolysis than LD alone. 

*Keywords:* Lumbar disc herniation; Spondylolysis; Lumbar spine; Lumbar discectomy; Direct repair; Pars defect

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## Introduction

Lumbar disc herniation (LDH) is a relatively common condition associated with several complaints, including lower back pain (LBP) and radiating pain to the lower extremities [1]. Fortunately, most patients with LDH can be managed conservatively, but some do not respond to conservative treatment and eventually require surgical treatment, such as lumbar discectomy (LD) [1–3]. Although LD has been considered a standard surgical option for LDH, some patients who undergo LD experience persistent LBP, aggravating radiating pain, and recurrent disc herniation after the operation [1–7]. Previous studies have documented risk factors for these complications, including the type of disc herniation, degree of disc degeneration, invasiveness of the surgical technique, and coexistent pathologies [1–8].

Among the risk factors for postoperative complications, some studies have reported that hypermobility at the affected segment or adjacent segments due to certain pathologies such as spondylolysis may be a factor leading to poor postoperative outcomes after LD [2,4,7]; however, its impact on the outcomes of LD for LDH has not been well studied. Most spondylolysis is asymptomatic, but some cases are associated with LBP, segmental instability, nerve root compression due to mass formation of a pars defect with segmental instability and radiating pain to the lower extremities, and isthmic spondylolisthesis and related clinical manifestations [9,10]. In LD, which involves muscle detachment from the posterior bony arch and partial resection of posterior arch, the affected lumbar segment may be destabilized until the injured tissues are restored to their original condition. In particular, LD performed at the spondylolytic or adjacent segment can result in greater destabilization than LD without spondylolysis, resulting in an exacerbation of postoperative pain intensity and poor clinical and radiologic outcomes. However, as far as we know, it is unknown whether performing additional direct repair (DR) surgery for pars defects after LD in LDH patients with spondylolysis at the same or adjacent lumbar segment leads to better outcomes than LD alone.

In this retrospective comparison study, we evaluated the clinical and radiologic outcomes of additional fixation surgery for the pars defect with DR using the Buck technique after LD for LDH patients with spondylolysis at the same or adjacent lumbar segment and compared the outcomes to those of LD alone. To our knowledge, this is the first study to compare LD with or without additional DR in patients with LDH and spondylolysis.

## Methods

### *Participants*

This is a retrospective comparative study of the clinical and radiologic outcomes of LD with or without DR for patients with LDH and spondylolysis at the same or adjacent lumbar segment. Between January 2007 and November 2013, 913 patients with LDH were surgically treated with one of the two surgical techniques. Until May 2011, LD alone was performed for LDH and spondylolysis. However, from June 2011 onward, the corresponding author performed DR after LD as the preferred technique for LDH patients with spondylolysis because of the authors' hypothesis that DR with LD might lead to better outcomes for patients with LDH and spondylolysis. This hypothesis was based on favorable reports in the literature and the corresponding author's experience with DR.

Lumbar disc herniation was diagnosed with the following criteria: suspected clinical manifestations of LDH, including LBP and radiating pain to the lower extremities, and imaging studies with lumbar spine radiographs and magnetic resonance images (MRI) revealing definite pathologic lesions of LDH; and clinical manifestations were consistent with disc herniation on the lumbar spine MRI in terms of the side of the herniated disc (left vs. right) and the level of the compressed nerve root.

Spondylolysis of the lumbar spine was confirmed as follows: all patients had simple radiographs of the lumbar spine (anteroposterior, lateral, and both oblique views)

EVIDENCE & METHODS

**Context**
The authors sought to evaluate whether lumbar discectomy performed with a pars repair was more advantageous than lumbar discectomy alone in patients with spondylolysis.

**Contribution**
The authors found that lumber discectomy in conjunction with pars repair had superior outcomes as compared to lumbar discectomy alone at the time of final follow-up. This was attributed to declining outcomes observed over time in those patients who were treated with discectomy alone.

**Implications**
The results presented here address a rare clinical entity (symptomatic disc herniation associated with spondylolysis) in a series of 89 patients treated at a single center. As a retrospective review, there is the clear potential for selection and indication bias to confound the results presented in this analysis. That, as well as differences in the clinical and socio-demographic contexts, may impair the capacity for broad generalization of this study's findings.

*—The Editors*