

# Comparison of surgery techniques for recurrent lumbar disc herniation: Total and parsiyel laminectomy

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## Abstract

**Aim:** The purpose of this study was to compare different surgical methods; hemi-laminectomy versus facet protective total laminectomy in recurrence lumbar discal hernia (rLDH) patients.

**Materials and Methods:** The patients were categorized into 2 groups: 34 patients underwent total laminectomy formed the group 1, and 31 patients underwent hemi-laminectomy formed group 2. Patients were compared in terms of age, sex, body mass index (BMI), duration of surgery, length of hospital stay and complications. After 3 years, visual analogue scale for leg and back pain (VAS<sub>lp, bp</sub>), Oswestry disability index (ODI) scores and presence of spinal instability were evaluated.

**Results:** There were no significant differences about age, sex, BMI, operation segment, mean operative time and length of hospital stay. Significant improvement was observed in both groups in terms of VAS and ODI values. Dural tear was observed in 8 patients in group 1 and 1 patient in group 2. Superficial wound infection was seen in 1 patient in group 2. Postop spinal instability was observed in 1 patient in group 2.

**Conclusion:** Total laminectomy increased the duration of the operation, but significantly reduced the complication rates. In recurrent disc hernias, facet protective total laminectomy may be used especially in patients without evidence of spinal instability.

**Keywords:** Hemilaminectomy; recurrent disc; total laminectomy

## INTRODUCTION

Recurrent lumbar disc herniation (rLDH) has been reported in widely varying incidences between 5% and 18% of the patients who had been operated due to LDH (1-5). So rLDH remains the major source of the failure of LDH surgery (6). Although various factors are effective at failure of lumbar disc surgery, without doubt this complication, rLDH, is undesirable for both the surgeon and the patient. Because of both clinical and radiological results of revision surgery, surgery may not be as promising as primary surgery. Many previous studies reported that surgical management of rLDH had been controversial (7-9). Also revision surgery has been reported to have a higher complication rate than the first surgery, and poor clinical results and the percentage of dura lacerations were reported higher in the revision surgeries (8,10). In the previous studies the rate of epidural fibrosis formation after microdiscectomy has been reported from 10% to 70% (11,12). Especially epidural fibrosis, which makes revision surgery exhausting, is a serious complication for surgeons to cope with. Because dissecting the epidural fibrotic tissues from dura mater and neural structures

may cause damage at dura mater and neural structures. So it is important to choose the right surgical technique for rLDH. In the previous studies there have been many studies on the management of rLDH but which method is the most effective treatment method is still a mystery (13). The purpose of this study was to compare the clinical outcomes of surgical treatment of rLDH by two different surgical methods; parsiyel laminectomy versus facet protective total laminectomy. The main hypothesis in this study is that in recurrent disc hernia surgery, facet protective total laminectomy may provide access to neural structures with fewer complications. To our knowledge, in the literature, there is no study which compares the outcomes of these surgical techniques.

## MATERIAL and METHODS

### Patient Characteristics

After obtaining approval from the Adiyaman University Medical Faculty ethics committee (2019/21/7), data of the 65 patients underwent reoperation due to single-level recurrent discal herniation in the Department of Neurosurgery of Adiyaman University Education and

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Research Hospital were collected retrospectively. All patients underwent magnetic resonance imaging within preoperative 6 months. All patients were managed with conservative treatments such as physical therapy (passive modalities and aerobic exercises) and anti-inflammatory drugs for at least 3 months. However, those who did not respond to these treatments were recommended surgical treatment. Exclusion criteria were; presence of spinal stenosis at any segment, adjacent segment discal hernia, spondylolisthesis, presence of spinal malignancy. 65 patients met the study criteria and the patients were categorized into 2 groups: 31 patients who underwent hemiparsial laminectomy+microdiscectomy formed the group 1 and 34 patients who underwent total laminectomy+microdiscectomy formed the group 2. Patients were compared in terms of age, sex, body mass index (BMI), duration of surgery, length of hospital stay, discharge status and complications such as dural tear, superficial wound infection. And after 3 years of follow-up, visual analogue scale for leg pain (VASlp), visual analogue scale for back pain (VASbp), oswestry disability index (ODI) scores and presence of spinal instability were evaluated.

### Surgical Procedures

All patients were given 2.0 g of cefazolin half an hour prior to surgery. After general anesthesia patients were positioned prone on the abdomen and chest-supported rolls. Firstly, the skin incision of the previous surgery was slightly enlarged approximately 1-2 cm in all the patients. The posterior thoracolumbar fascia was cut with cautery; paravertebral muscles were detached from the spinous processes and retracted laterally. The epidural scar tissue was separated from the margin of the residual lamina and partially resected. Exposure was carried out laterally, so that the lateral edge of the nerve root was visualized. The nerve root was then mobilized gently and retracted medially to expose the disc fragment, and discectomy was performed. But in group 2 facets preserving total laminectomy was performed after the paravertebral muscles were stripped bilaterally. Exposure of the neural structures with total resection of the ligamentum flavum was performed. In this form of surgery a wider and safer decompression was performed on the dural sac than group 1. And extensive discectomy was performed.

### Statistical Analysis

Pearson's chi-squared and t-test was used for statistical analysis. Statistical significance was defined as a p value of less than 0.05. Results were reported as means and standard deviations for numerical variables, and as percentages for categorical data.

## RESULTS

36 of the patients were male, 29 were female and the mean age was 44.2±3.1 years (20-59 y). The mean time between the primary operation and revision was 12 months (1 to 31 months). 35 cases had rLDH at the L4-L5 level and 30 cases had at the L5-S1 level. The location of recurrent disc herniation was at the ipsilateral side in all of the cases.

Between the groups there was no significant differences about age, sex, BMI and operation segment (Table 1).

**Table 1. Comparison of patient characteristics**

|                          | Group 1     | Group 2     | p value      |
|--------------------------|-------------|-------------|--------------|
| <b>n</b>                 | 31          | 34          |              |
| <b>Age mean</b>          | 41.7(27-59) | 44.8(31-52) | <b>0.110</b> |
| <b>Sex</b>               |             |             |              |
| Male                     | 17          | 19          | 0.507        |
| Female                   | 14          | 15          |              |
| <b>BMI</b>               | 27.3        | 31.8        | 0.235        |
| <b>Operation segment</b> |             |             |              |
| L4-L5                    | 18          | 17          | 0.457        |
| L5-S1                    | 13          | 17          |              |

There was no significant differences between the groups about mean operative time and length of postoperative hospital stay (p=0.191; p=0.568, respectively).

In the group 1 VASlp decreased from 8.4 (range from 10 to 6) to 3.8 (range from 4 to 1) and in the group 2 it decreased from 8.3 (range from 10 to 6) to 2.7 (range from 3 to 1). Significant improvement in VASlp values were found in both groups (p<0.05, p<0.05, respectively) and there was no significant difference between the groups in terms of improvement in VASlp values (p=0.071).

In the group 1 VASbp decreased from 9.1 (range from 10 to 7) to 2.9 (range from 3 to 1) and in the group 2 it decreased from 8.7 (range from 10 to 6) to 3.3 (range from 5 to 1). Significant improvement in VASbp values were found in both groups (p<0.05, p<0.05, respectively). There was no significant difference between the groups in terms of improvement in VASbp values (p=0.124).

In the group 1 ODI decreased from 60.1±3.2 to 26.2±2.9 and in the group 2 it decreased from 65.2±3.1 to 31.2±1.8. Significant improvement in ODI values were found in both groups (p<0.05, p<0.05, respectively). There was no significant difference between the groups in terms of improvement in VAS values (p=0.220) (Table 2).

**Table 2. Comparison of patient groups about peroperative and postoperative findings**

|                                      | Group 1   | Group 2   | p value |
|--------------------------------------|-----------|-----------|---------|
| <b>Mean operative time(min.)</b>     | 139±14.5  | 151±2.9   | 0.191   |
| <b>Length of hospital stay (day)</b> | 5±0.6     | 4±1.1     | 0.568   |
| <b>VASlp (preop-postop)</b>          | 8.4-3.8   | 8.3-2.7   | 0.071   |
| <b>VASbp (preop-postop)</b>          | 9.1-2.9   | 8.7-3.3   | 0.124   |
| <b>ODI score (preop-postop)</b>      | 60.1-26.2 | 65.2-31.2 | 0.220   |

In the first group, 8 patients had dural tear during the operation (25.8%). In the second group, dural tear occurred in only 1 patient (2.9%). The probability of dural tear was significantly higher in the first group (p<0.05).

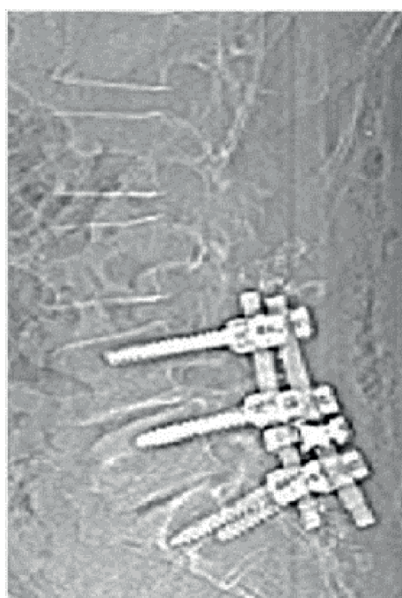
Superficial wound infection was seen in 1 patient only in the group 2 and the patient was treated successfully, and postop spinal instability was observed in 1 patient only in the group 2 (Table 3). The patient was followed conservatively for about 6 months. But due to persistent low back and leg pain, posterior transpedicular stabilization was performed and the patient was discharged with healing (Figure 1,2).

**Table 3. Comparison of complications**

|                                 | Group 1 | Group 2 | p value |
|---------------------------------|---------|---------|---------|
| Dural tear (n/%)                | 8/25.8  | 1/2.9   | <0.05   |
| Superficial wound infection (n) | 0       | 1       | 0.105   |
| Spinal instability (n)          | 0       | 1       | 0.105   |



**Figure 1.** CT image of the patient developed spondylolisthesis



**Figure 2.** X-ray image of the patient after underwent posterior transpedicular stabilization due to spondylolisthesis

## DISCUSSION

rLDH is one of the frequent complications of LDH surgery and often causes more severe radicular pain than the primary disc herniation (14). Unfortunately the surgical options for the treatment of rLDH have not been standardized. Suk et al. (5) stated that surgical intervention should be performed in the treatment of recurrent disc hernia causing radicular pain more than 3 months. In their study they found that there were no significant differences between revision and previous surgery in terms of hospital stay or clinical improvement rates. Fandino et al. (15) reported just about 62% success rates in patients underwent recurrence microdiscectomy. And they found that 43% of the patients had epidural scarring, and half of these had poor results after surgical treatment. Naturally increased rates of complications at surgery make management of recurrent disc herniation difficult. In the literature, considerable controversy exists regarding the most effective operative techniques (16-19). Epstein et al. (20) reported 81% and Connolly et al. (19) reported 74% good results at repeat microdiscectomy after about 2 years of follow-up. Despite finding longer operative times, Suket al.(5) found comparable clinical improvement between revision and primary discectomy patients. In our study, we compared the two surgical techniques; hemi-laminectomy versus facet protective total laminectomy at the patients underwent repeat lumbar discectomy. In other words, we tried to reach the recurrence disk fragment from a safer epidural region by performing a total laminectomy. And we found that this technique was safer against perop complications. Also the rate of recovery in patients was not less than that of hemilaminectomy patients. In our study only in one patient (2.8%) who underwent facet protective total laminectomy, spinal instability which was required posterior fusion was seen after 3 years follow-up. The patient had no signs of spinal instability preoperatively. In the literature, spinal instability due to total laminectomy has not been reported frequently and some criteria have been mentioned for instability. Evidence of preoperatively spinal instability has been believed one of the causes of instability (21). Cauchoix et al. (22) reported a fusion requirement of 1.7% for the patients underwent facet protective total laminectomy in their follow-up from 1 to 20 years.

And in our study, in the total laminectomy group, dural tear was seen less frequently. In the previous study the complication rate had been reported between 10% and 34.6% for surgical treatment of rLDH with dural tear being the most common complication (17,18,23). Palma et al.(8) mentioned that the most significant difference between rLDH surgery and primary microdiscectomy was the increased risk of dural tear and prolonged operation time. Also in the previous studies it had been stated that the duration of hospitalization of patients with dural tear was undoubtedly longer and more troublesome (8,23-25).

## CONCLUSION

In the surgical treatment of rLDH, total laminectomy increased the duration of the operation, but significantly reduced the complication rates. In recurrent disc hernias, facet protective total laminectomy may be used, especially in patients without evidence of preop spinal instability.

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