

Original Research Article

Surgical versus conservative management in lumbar disc herniation with neurological deficit

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Received: 22 July 2025

Accepted: 18 August 2025

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ABSTRACT

Background: Lumbar disc herniation (LDH) with neurological deficit is a universal problem. Decision making between conservative or surgical treatment for LDH with neurological deficit remains still controversial. The objective of this study was to assess neurological outcomes for LDH with neurological deficit treated with surgical or conservative treatment.

Methods: Total 40 patients, 20 (50%) treated surgically and 20 (50%) conservatively, 18 to 55 years with neurological deficit due to LDH, irrespective of sex, established clinical symptoms, signs and radiologically evidenced (X-ray L/S spine and magnetic resonance imaging (MRI) of lumbar spine) were included and prospectively studied in Bangladesh medical University from August 2024 to June 2025. Outcomes were measured by visual analog scale (VAS) for back and leg pain and disability by Oswestry disability index (ODI) and satisfaction by modified Macnab criteria.

Results: 21 (52.5%) male and 19 (47.5%) female, 65% patients had right sided neurological deficit. At final follow up, VAS score for back and leg pain were significantly decline in both operative and conservative management and were 0.85 ± 0.66 , 1.00 ± 0.63 and $1.85 \pm .55$, 1.65 ± 0.67 respectively. Initially the ODI score for operative and conservatively treated patients were 62 ± 4.92 and 61.6 ± 2.86 and 6 months after these were 14.5 ± 6.30 and 20 ± 4.80 ($p=0.0036$). At final follow up, 90% of patients were satisfied with surgical treatment versus 55% treated conservatively ($p=0.035$).

Conclusions: Management of LDH with neurological deficit shows better outcome by surgically than conservatively treated patients at final follow up.

Keywords: Lumbar disc herniation, Conservative treatment, Operative treatment, VAS, ODI

INTRODUCTION

Lumbar disc herniation (LDH) with neurological deficit is called sciatica. Sciatica is one the most common complaints of patients seeking consultations about spinal problems and deformity.

LDH defined as the localized displacement of disc material beyond the margin of the inter vertebral disc space is considered to be the most common cause of lumbosacral

radiculopathy.^{1,2}

Sciatica due to lumbar disc herniation is a global problem with life time incidence from 13% to 40% and approximately 90% of instances of sciatica are attributed to lumbar disc herniation.³

Complete recovery from sciatica caused by lumbar disc herniation is uncommon, often leading to prolonged discomfort and significantly affecting the patient's quality

of life.⁴ If left unmanaged, sciatica may lead to complications such as muscle weakness, loss of tendon reflexes, sensory impairments, and in some cases, bladder dysfunction.³ While both short- and long-term outcomes of lumbar discectomy for LDH are generally favorable.⁵ There is also substantial evidence supporting the spontaneous resolution or notable reduction in the size of the herniated disc over time. Furthermore, some authors have shown that long term result after surgical or conservative treatment for LDH do not differ significantly.⁶ As a result conservative therapy is still an important treatment for LDH, although surgical treatment immediately alleviates severe pain. Surgical treatment is indicated for patients who do not attain significant improvement via conservative therapy, intolerable severe pain or severe progressive neurological deficit.⁷ Zentner et al reported that 2 weeks' period of Ito et al recommended surgical treatment when the symptoms persisted for 2 months or longer.^{6,8} McCulloch mentions that conservative therapy should not prolong for more than 3 months.⁹

Lumbar disc herniation with neurological deficit treatment options are conservative measures such as physical therapy and pharmacotherapy or surgical interventions including discectomy and decompression procedure.¹⁰ Conservative treatment of LDH sciatica can lead to up to 90% improvement in patients, while surgical treatment offers comparable result but is recommended only if symptoms persist following a trial of conservative treatment.^{4,9}

Spine outcome research trial (SPORT) reported that between operative and non-operative treatment groups, differences in improvement were in favor of surgery but were small and not statistically significant except for secondary outcome measures of sciatica severity.^{11,12}

Maine lumbar spine study (MLSS) reported that surgical treatment for disc herniation associated sciatica was faster and slightly more effective than conservative care.^{13,14}

Surgical treatment is effective for patients with lumbar disc herniation. Lumbar discectomy is the standard surgical procedure for patients, several other less-invasive surgical techniques are now available secondary to technological developments.^{15,16} Spontaneous regression of herniated disc tissue can definitely occur in most patients, and approximately 60%-90% of patients with lumbar disc herniation can be treated with conservative strategies.^{17,18}

METHODS

This prospective study was carried out at Bangladesh Medical University (BMU), Dhaka during the period of August 2024 to June 2025 on patients with lumbar disc herniation with neurological deficit undergoing surgical and conservative management. A total number of 40 (forty) patients with lumbar disc herniation with neurological deficit were included in the study. The

patients were simply randomized (lottery) into two groups. Patients with lumbar disc herniation with neurological deficit, 20 patients treated operatively and 20 patients treated conservatively. Purposive sampling was followed as per inclusion and exclusion criteria. The diagnosis of lumbar disc herniation with neurological deficits were done from the history, clinical findings, neurological examinations and radiological imaging (X-ray L/S spine and magnetic resonance imaging (MRI) of lumbar spine). The patients for the study were selected on the basis of following inclusion and exclusion criteria.

Inclusion criteria

Patients with dominant leg pain than back pain, restricted straight leg raising test, signs of root compression-motor, sensory, reflex- change in the lower limb, positive radiology-MRI of lumbosacral spine, LDH at one or two level, unilateral or bilateral and patients of both sex-male and female were included.

Exclusion criteria

Patients with LDH due to direct trauma with fracture-dislocation of vertebra, LDH associated with other spinal pathology (e.g- infection, neoplasm), repeat lumbar disc surgery due to recurrence of symptoms, LDH more than 2 level, cauda equina syndrome, were excluded.

The surgery was a standard open discectomy with examination of the involved nerve root.

The conservative protocol was recommended to include active physical therapy, education non-steroidal anti-inflammatory drugs, narcotic analgesics, muscle relaxant, ultrasound therapy, pelvic traction and use of lumbar corset. Conservative treatments were individualized for each patient and tracked prospectively. Forty patients fulfilling the section criteria were identified. 20 among them were randomly selected for standard open discectomy and 20 were kept solely on conservative treatment. The demographic profile (i.e. age, sex) were noted, clinical examination was performed and X-ray and MRI of lumbosacral spine were taken. Patients who were treated only by conservative method were follow up in outpatient department and pain was rated using VAS and disability were rated by Oswestry disability index (ODI) and clinical outcome was measured by modified Macnab criteria. Outcomes of the study were evaluated during a period of 6-12 months with a minimum 6 months follow up. All this information was collected through specially designed proforma.

All relevant clinical and radiological data were systematically recorded using a pre-designed structured proforma. Data included demographic details, clinical findings, imaging results, treatment modality (surgical or conservative), and outcome scores such as the VAS for pain, ODI for functional disability, and modified Macnab criteria for clinical outcome. Patients were evaluated at

baseline and at follow-up visits (6 weeks, 12 weeks, and 6 months). Collected data were entered and analyzed using statistical package for social sciences (SPSS) version 25. Descriptive statistics were used to summarize the data, and comparisons between groups were made using appropriate statistical tests such as the Chi-square test for categorical variables and independent samples t-test for continuous variables. A p value <0.05 was considered statistically significant.

RESULTS

This prospective study, 40 patients mean age 38.5 years more involvement in right side. Surgically treated patients shows better outcomes at final follow up.

As shown in Table 1, the majority of patients in both groups were between 31–40 years of age. There was no statistically significant difference in age distribution between the groups (p=0.531).

Table 1: Age distribution of the patients (n=40).

Age group (years)	Operative (n=20) (%)	Conservative (n=20) (%)	P value
<30	4 (20)	2 (10)	0.531
31–40	9 (45)	12 (60)	
41–50	4 (20)	5 (25)	
>50	3 (15)	1 (5)	
Total	20 (100)	20 (100)	

Table 2 shows a significant difference in sex distribution between the two groups, with females predominating in the operative group and males in the conservative group (p=0.011).

Table 2: Sex distribution of the patients (n=40).

Sex	Operative (n=20) (%)	Conservative (n=20) (%)	P value
Female	14 (70)	5 (25)	0.011
Male	6 (30)	15 (75)	
Total	20 (100)	20 (100)	

As shown in Table 3, right-sided neurological involvement was more common in both groups, with no significant difference between them (p=0.74).

Table 3: Side of neurological involvement (n=40).

Side involved	Operative (n=20) (%)	Conservative (n=20) (%)	P value
Right	14 (70)	12 (60)	0.74
Left	6 (30)	8 (40)	
Total	20 (100)	20 (100)	

Table 4 shows that the most commonly involved level was L4–L5 in both groups. However, the difference in level of

involvement between the groups was not statistically significant (p=0.527).

Table 4: Level of disc involvement among patients (n=40).

Level involved	Operative (n=20) (%)	Conservative (n=20) (%)	P value
L4–L5	12 (60)	10 (50)	0.527
L5–S1	8 (40)	10 (50)	
Total	20 (100)	20 (100)	

As presented in Table 5, back pain measured by VAS significantly improved in both groups over time. However, the surgical group experienced a greater and statistically significant reduction at all follow-up points (p<0.05).

Table 5: Back pain according to VAS score (n=40).

Time point	Operative (n=20)	Conservative (n=20)	P value
Baseline	7.10±0.45	6.55±0.51	0.0003
After 6 weeks	2.50±0.89	3.45±0.94	0.0022
After 12 weeks	1.65±0.49	2.15±0.74	0.0104

Table 6 shows a significant reduction in leg pain (VAS score) in both groups, with the operative group showing greater and more sustained improvement, especially at 6 weeks and 6 months (p<0.05).

Table 6: Leg pain according to VAS score (n=40).

Time point	Operative (n=20)	Conservative (n=20)	P value
Baseline	6.7±0.57	6.1±1.10	0.011
After 6 weeks	1.5±0.83	2.35±0.91	0.0002
After 12 weeks	1.6±0.60	1.95±0.64	0.8
After 6 months	1.0±0.63	1.65±0.67	0.0029

Table 7: Disability according to Oswestry disability index (ODI) (n=40).

Time point	Operative (n=20)	Conservative (n=20)	P value
Preoperative	62±4.92	61.6±2.86	0.755
After 6 weeks	29.60±4.64	38.5±4.50	0.001
After 12 weeks	20±3.31	30±4.68	0.001
After 6 months	14.5±6.33	20±4.80	0.0036

As shown in Table 7, both groups showed progressive improvement in disability scores over time. However, patients treated surgically demonstrated significantly greater functional improvement than those managed conservatively at all follow-up points ($p < 0.01$).

Table 8 shows that patient satisfaction, based on the modified Macnab criteria, was consistently higher in the operative group across all follow-up points. Surgical treatment was associated with significantly better clinical outcomes compared to conservative management ($p < 0.05$).

Table 8: Clinical outcome according to modified Macnab criteria (n=40).

Time point and outcome	Operative (n=20) (%)	Conservative (n=20) (%)	P value
After 6 weeks			
Satisfactory	12 (60)	4 (20)	0.011
Unsatisfactory	8 (40)	16 (80)	
After 12 weeks			
Satisfactory	16 (80)	10 (50)	0.041
Unsatisfactory	4 (20)	10 (50)	
After 6 months			
Satisfactory	18 (90)	11 (55)	0.034
Unsatisfactory	2 (10)	9 (45)	

DISCUSSION

Our study prospectively followed patients with LDH with neurological deficit treated either surgically or conservatively over 6 months, patients treated surgically in this study had more severe baseline symptoms and worse functional status than those treated conservatively but had better 6 months outcomes. These findings are more or less similar with the study of Steven et al.¹⁹

In our study age ranged from 18-55 years and mean age 38.25 ± 10.45 and 38.35 ± 7.87 in surgical and conservatively treated patients maximum patients suffering from LDH with neurological deficit in third and fourth decade of life. In a study reported by Atlas et al, the mean age was 43.2 years in surgical and 42.6 years in conservatively treated patient.¹³

In our study most common disc prolapse at L_4-L_5 (55%) level and then L_5-S_1 level (45%). Due to present of sacralization most of the movement of the lumbar spine occurs at L_4-L_5 disc level and for this reason disc herniation occurs more frequently at L_4-L_5 disc space. In a study McMorland et al, shows that LDH occurs L_4-L_5 level 65% and L_4-S_1 (55%).²⁰ In another study Abd-Elaal et al, LDH occurs at L_4-L_5 (58%).²¹ In study done by Soleimani et al, shows that L_4-L_5 level is the most commonly affected (56%).²²

In our study leg pain of surgical and conservatively managed patients at baseline were 6.7 ± 0.57 and 6.1 ± 1.10

respectively, and gradually decrease after 6 months of treatment which become 1.0 ± 0.63 and 1.65 ± 0.67 for leg pain in surgical and conservatively treated patient. Bailey et al, shows that leg pain at time of enrollment 7.7 ± 2.0 and 8.0 ± 1.8 in surgical and conservatively treated patient and which gradually decrease after 6 months of management and 2.8 ± 0.4 and 5.2 ± 0.4 respectively.²³

In our study, back pain both surgical and conservatively managed patient significantly reduce. VAS score in surgically managed patients at baseline 7.10 ± 0.45 and reduced to 0.85 ± 0.66 after 6 months and in conservatively managed patient 6.55 ± 0.54 and 1.85 ± 0.55 at the end of 6 months.

Bailey et al stated that back pain at baseline in surgical and conservatively treated patients was 6.7 ± 2.6 and 6.5 ± 2.8 respectively and gradually decrease in both group at 6 months were 3.0 ± 0.3 and 4.9 ± 0.3 respectively.²³

In study done by Soleimani et al, shows that VAS score 7.1 ± 1.43 initially which significantly reduce after 6 months of conservative treatment and become 3.11 ± 1.83 .²²

In our study disability is significantly reduce both surgical and conservatively treated group (ODI 62 ± 4.92 , 14.5 ± 6.33 and 61.6 ± 2.86 , 20.4 ± 4.80). In a study Weinstein et al, shows that ODI at base 51.2 ± 21 VS 41.5 ± 20.8 reduce at 6 months operative 30 and conservative around 25.¹²

Soleimani et al shows baseline ODI score 53.56 ± 17.66 which significantly reduce of with conservative treatment and after 6 months it becomes 25.88 ± 16.99 .²²

In a study for conservative management by Dai et al, ODI at baseline 40.19 ± 6.59 and at 6 months 8.83 ± 3.27 .²⁴ Bailey et al, ODI at baseline for surgery and conservative treated patient 50.2 ± 15.9 and after six month of treatment 22.8 ± 2.3 in surgical treated patient and 33.7 ± 2.3 in conservatively treated patient.²³

Gerszten et al, the baseline ODI-43.3 and 34 in surgical and conservatively treated patient which gradually decrease and become 26.6 and 17 after 6 months of treatment respectively.²⁵

The results of the study by Aljallad et al in 2023 study showed that in patients with chronic low back pain and radiculopathy caused by lumbar disc herniation, the likelihood of success of six months outcomes was significantly influenced by younger age and better coronal radiographic lumbar spine alignment.²⁶

In our study surgically management patients were satisfied with 90% and only 10% patients unsatisfied% due to complication of surgery. In conservatively treated patient up to 55% patient satisfied with their treatment and 45% patient dissatisfied due to persistence of back and leg pain and disability.

Bailey et al, satisfaction with surgical treatment 92% and 71.4±6.3 percent patient satisfied with conservative management.²³

Limitations

This study had a relatively small sample size and was conducted at a single center, which may limit the generalizability of the findings. The follow-up period was short-term (6–12 months), so long-term outcomes could not be assessed. Additionally, variations in adherence to conservative treatment protocols and potential observer bias in outcome assessment may have influenced the results.

CONCLUSION

Patients with sciatica due to LDH should be encouraged to be patient and submit to conservative treatment methods initially. In the presence of clinical progress, even very large disc herniations can be left to resolve naturally. Early access to surgeons and diagnostic imaging may result in unnecessary operative treatment. Patients with severe pain and greater disability due to LDH with neurological deficit, surgical treatment gives excellent result for short term.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Hoque SMS, Islam MA, Ahsan MK, Setu KMRI, Khan MSI, Sarker SK, et al. Surgical versus conservative management in lumbar disc herniation with neurological deficit. *Int J Res Orthop* 2025;11:979-84.