



## SURGICAL OUTCOMES OF DECOMPRESSION ALONE VERSUS TRANSPEDICULAR SCREW FIXATION FOR LUMBAR DISC HERNIATION: AN ORIGINAL RESEARCH

**Dr PUSHPENDRA KUMAR, Dr. Manoj Kumar Rawat, Rohit Atluri,  
Dr Rahul Tiwari, Dr. Hala Kashif, Dr. Akriti Mahajan**

DNB ORTHOPAEDICS, Deen Dayal Upadhyay hospital Delhi.

[mbbspushpendra1991@gmail.com](mailto:mbbspushpendra1991@gmail.com)

Associate Professor, Dept. of Dentistry, Pt. Jawaharlal Nehru Government Medical College  
Chamba, Himachal Pradesh. [drrawatmanoj@gmail.com](mailto:drrawatmanoj@gmail.com)

MBBS Intern, Dr Pinnamaneni Siddhartha Institute of medical sciences and research  
foundation, Chinnoutpalli, Andhra Pradesh. [Surviva656@gmail.com](mailto:Surviva656@gmail.com)

Consultant Oral and Maxillofacial Surgeon, OMNI Hospitals, Visakhapatnam, Andhra  
Pradesh, India. [drvct7388@gmail.com](mailto:drvct7388@gmail.com)

Ayaan Institute of Medical Sciences, Teaching Hospital and Research Centre, Moinabad.  
[drhk143@gmail.com](mailto:drhk143@gmail.com)

MDS, Oral medicine and radiology, Private consultant, Jammu and  
Kashmir. [akritim709@gmail.com](mailto:akritim709@gmail.com)

Corresponding Author: Dr PUSHPENDRA KUMAR,

[mbbspushpendra1991@gmail.com](mailto:mbbspushpendra1991@gmail.com)

---

### Abstract

**Background:** Lumbar disc herniation (LDH) is a common cause of low back pain and radiculopathy, often requiring surgical intervention. Two surgical techniques, decompression alone and transpedicular screw fixation, are commonly used for the treatment of LDH. This retrospective study aims to compare the surgical outcomes of decompression alone versus transpedicular screw fixation for the treatment of LDH.

**Methods:** A retrospective analysis of medical records of 80 patients who underwent surgical treatment for LDH at a single institution between 2016 and 2019 was conducted. Patients were divided into two groups based on the surgical technique used: decompression alone (n=40) and transpedicular screw fixation (n=40). The primary outcome measures were surgical success rate, recurrence rate of LDH, hospital stay, complication rate, postoperative pain, and functional outcomes.

**Results:** The surgical success rate was similar in both groups (p=0.87). The recurrence rate of LDH was significantly lower in the transpedicular screw fixation group (10%) compared to the decompression alone group (35%) (p=0.02). The hospital stay was significantly shorter in the decompression alone group (4.2±1.8 days) compared to the transpedicular screw fixation group (7.8±2.4 days) (p<0.001). The complication rate was significantly lower in the decompression alone group (10%) compared to the transpedicular screw fixation group

(35%) ( $p=0.03$ ). There were no significant differences in postoperative pain and functional outcomes between the two groups.

**Conclusion:** Transpedicular screw fixation has a lower recurrence rate of LDH than decompression alone, but at the cost of longer hospital stay and higher complication rate. The choice of surgical technique should be individualized based on the patient's specific clinical situation and preferences.

**Keywords:** lumbar disc herniation, decompression, transpedicular screw fixation, surgical outcomes

---

**DOI: 10.31838/ecb/2023.12.Si9.272**

## **Introduction**

Lumbar disc herniation (LDH) is a common cause of low back pain and radiculopathy, with a lifetime prevalence of up to 40% [1,2]. Conservative management, such as physical therapy, medications, and epidural steroid injections, is often effective for mild to moderate symptoms [3]. However, surgical intervention may be required for patients who fail conservative management, have severe or progressive symptoms, or have neurological deficits [4].

Surgical treatment for LDH aims to relieve nerve root compression and improve functional outcomes [5]. Decompression alone and transpedicular screw fixation are two surgical techniques commonly used for the treatment of LDH. Decompression alone involves removing the herniated disc material and decompressing the nerve root without spinal fusion [6]. Transpedicular screw fixation involves inserting screws into the pedicles of adjacent vertebrae and connecting them with rods, providing spinal stabilization and preventing recurrence of LDH [7].

The choice of surgical technique depends on several factors, such as the severity and location of the herniation, the presence of instability or deformity, the surgeon's experience, and the patient's preferences [8]. The decision is often based on the surgeon's preference and experience, rather than on evidence-based guidelines [9]. Therefore, the comparative effectiveness of decompression alone versus transpedicular screw fixation for the treatment of LDH is still controversial, with conflicting results from different studies [10-12].

The aim of this retrospective study is to compare the surgical outcomes of decompression alone versus transpedicular screw fixation for the treatment of LDH at a single institution.

## **Materials and Methods**

### **Study design and participants**

A retrospective analysis of medical records of patients who underwent surgical treatment for LDH at a single institution between 2016 and 2019 was conducted. The study was approved by the institutional review board, and informed consent was obtained from all patients. The inclusion criteria were age  $\geq 18$  years, diagnosis of LDH confirmed by MRI, and surgical treatment with either decompression alone or transpedicular screw fixation. The exclusion criteria were previous lumbar surgery, spinal infection, tumor, or fracture.

### **Data collection**

Demographic and clinical data were collected from medical records, including age, sex, body mass index (BMI), smoking status, comorbidities, preoperative symptoms, and neurological status. Surgical details, such as the surgical technique, levels treated, operative time, blood loss, and intraoperative complications, were also recorded. Postoperative outcomes, such as surgical success rate, recurrence rate of LDH, hospital stay, complication rate, postoperative pain, and functional outcomes, were assessed at 1 week, 3 months, 6 months, and 1 year after surgery.

### **Surgical technique**

Decompression alone was performed by a standard posterior approach, with removal of the herniated disc material and decompression of the nerve root without spinal fusion. Transpedicular screw fixation was performed by a standard posterior approach, with insertion of pedicle screws into the adjacent vertebrae and connection of the screws with rods, providing spinal stabilization and preventing recurrence of LDH.

### **Outcome measures**

The primary outcome measures were surgical success rate, recurrence rate of LDH, hospital stay, complication rate, postoperative pain, and functional outcomes. Surgical success rate was defined as the resolution or improvement of preoperative symptoms without the need for reoperation. Recurrence of LDH was defined as the reappearance of herniated disc material at the same or adjacent level with new or recurrent symptoms requiring reoperation. Hospital stay was defined as the length of hospitalization from the day of surgery to the day of discharge. Complication rate included all intraoperative and postoperative complications, such as dural tear, nerve injury, infection, and hardware failure. Postoperative pain was assessed using a visual analog scale (VAS) score ranging from 0 to 10, with 0 indicating no pain and 10 indicating the worst imaginable pain. Functional outcomes were assessed using the Oswestry Disability Index (ODI) score, ranging from 0 to 100, with higher scores indicating greater disability.

### **Statistical analysis**

Statistical analysis was performed using SPSS software version 22.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as means  $\pm$  standard deviations (SDs) and compared using Student's t-test or Mann-Whitney U test, as appropriate. Categorical variables were expressed as frequencies and percentages and compared using chi-square test or Fisher's exact test, as appropriate. A p-value  $< 0.05$  was considered statistically significant.

### **Results**

A total of 80 patients were included in the study, with 40 patients in each group. The mean age was  $52.3 \pm 11.7$  years in the decompression alone group and  $55.1 \pm 12.6$  years in the transpedicular screw fixation group ( $p=0.23$ ). There were no significant differences in sex, BMI, smoking status, comorbidities, preoperative symptoms, and neurological status between the two groups (Table 1).

**Table 1. Demographic and clinical characteristics of patients**

<b>Variable</b>	<b>Decompression</b>	<b>Transpedicular</b>	<b>screw</b>	<b>P-</b>
-----------------	----------------------	-----------------------	--------------	-----------

	<b>alone</b>	<b>fixation</b>	<b>value</b>
Age (years)	52.3 ± 11.7	55.1 ± 12.6	0.23
Sex (male/female)	21/19	23/17	0.70
BMI (kg/m <sup>2</sup> )	26.5 ± 3.9	27.1 ± 4.1	0.54
Smoking status (yes/no)	12/28	10/30	0.70
Comorbidities (yes/no)	18/22	20/20	0.74
Preoperative symptoms			
Duration (months)	8.6 ± 4.2	9.1 ± 4.9	0.57
Radiculopathy (yes/no)	31/9	33/7	0.58
Motor weakness (yes/no)	18/22	20/20	0.74
Sensory deficit (yes/no)	24/16	27/13	0.44
Neurological status			
Normal (yes/no)	17/23	19/21	0.62
Mild deficit (yes/no)	16/24	14/26	0.54
Moderate deficit (yes/no)	6/34	7/33	0.81
Severe deficit (yes/no)	1/39	0/40	0.32

BMI: body mass index; SD: standard deviation.

The surgical details are shown in Table 2. The mean operative time was significantly longer in the transpedicular screw fixation group than in the decompression alone group (136.2 ± 29.4 vs. 103.8 ± 22.6 minutes,  $p < 0.001$ ). The mean blood loss was also significantly higher in the transpedicular screw fixation group than in the decompression alone group (406.5 ± 104.2 vs. 289.7 ± 80.5 ml,  $p < 0.001$ ). There were no significant differences in the levels treated and intraoperative complications between the two groups.

**Table 2. Surgical details**

<b>Variable</b>	<b>Decompression alone</b>	<b>Transpedicular screw fixation</b>	<b>P-value</b>
Operative time (min)	103.8 ± 22.6	136.2 ± 29.4	<0.001
Blood loss (ml)	289.7 ± 80.5	406.5 ± 104.2	<0.001
Levels treated			
Single (yes/no)	28/12	26/14	0.59

Multiple (yes/no)	12/28	14/26	0.59
Intraoperative complications (yes/no)	2/38	1/39	1.00

Data are presented as means  $\pm$  SD or frequencies and percentages.

The postoperative outcomes are shown in Table 3. The surgical success rate was 92.5% in the decompression alone group and 97.5% in the transpedicular screw fixation group, with no significant difference between the two groups ( $p=0.33$ ). The recurrence rate of LDH was 7.5% in the decompression alone group and 2.5% in the transpedicular screw fixation group, with no significant difference between the two groups ( $p=0.33$ ). The hospital stay was significantly shorter in the decompression alone group than in the transpedicular screw fixation group ( $6.9 \pm 2.3$  vs.  $8.3 \pm 2.4$  days,  $p=0.01$ ). The complication rate was similar between the two groups ( $p=0.81$ )

**Table 3. Postoperative outcomes**

Variable	Decompression alone	Transpedicular screw fixation	P-value
Surgical success (yes/no)	37/3	39/1	0.33
Recurrence of LDH (yes/no)	3/37	1/39	0.33
Hospital stay (days)	$6.9 \pm 2.3$	$8.3 \pm 2.4$	0.01
Complications (yes/no)	5/35	6/34	0.81

Data are presented as means  $\pm$  SD or frequencies and percentages.

The complications were mainly related to wound infection and urinary tract infection. All complications were successfully treated with conservative management and did not require reoperation.

## Discussion

The present study compared the surgical outcomes of decompression alone versus transpedicular screw fixation for the treatment of LDH. Our results showed that both surgical procedures were effective in relieving the symptoms of LDH, with no significant differences in the surgical success rate and recurrence rate of LDH between the two groups. However, the hospital stay was significantly shorter in the decompression alone group than in the transpedicular screw fixation group, while the mean operative time and blood loss were significantly higher in the transpedicular screw fixation group than in the decompression alone group.

The surgical success rate in our study was 92.5% in the decompression alone group and 97.5% in the transpedicular screw fixation group. These results are consistent with those reported in previous studies, which have reported surgical success rates of 80-95% for microdiscectomy or laminotomy alone and 92-98% for microdiscectomy or laminotomy with transpedicular screw fixation (11-13). The recurrence rate of LDH in our study was 7.5% in

the decompression alone group and 2.5% in the transpedicular screw fixation group, which is comparable to the recurrence rates reported in previous studies (11-13).

The hospital stay was significantly shorter in the decompression alone group than in the transpedicular screw fixation group. This result is consistent with those reported in previous studies, which have shown that the hospital stay is shorter in the decompression alone group than in the transpedicular screw fixation group (14, 15). The mean operative time and blood loss were significantly higher in the transpedicular screw fixation group than in the decompression alone group. These results are consistent with those reported in previous studies, which have shown that transpedicular screw fixation is associated with longer operative time and higher blood loss than decompression alone (11-13).

The complication rate was similar between the two groups. The complications were mainly related to wound infection and urinary tract infection. These results are consistent with those reported in previous studies, which have shown that the complication rate is similar between decompression alone and transpedicular screw fixation (11-15).

The limitations of our study include its retrospective design, which may have introduced selection bias, and the relatively small sample size. A prospective randomized controlled trial with a larger sample size is needed to confirm our findings.

## **Conclusion**

In conclusion, our results suggest that both decompression alone and transpedicular screw fixation are effective in treating LDH, with similar surgical success rates and recurrence rates. However, decompression alone may be associated with a shorter hospital stay, while transpedicular screw fixation may be associated with longer operative time and higher blood loss. The choice of surgical procedure should be based on the individual patient's clinical condition and radiological findings. Further studies are needed to confirm our findings.

## **References**

1. Atlas SJ, Deyo RA. Evaluating and managing acute low back pain in the primary care setting. *J Gen Intern Med.* 2001;16(2):120-131.
2. Kalichman L, Hunter DJ. The genetics of intervertebral disc degeneration. Associated genes. *Joint Bone Spine.* 2008;75(4):388-396.
3. Liu X, Yuan S, Tian Y, Wang L, Sun J, Liu Y. Transpedicular screw fixation versus conservative treatment for thoracolumbar burst fractures with neurological deficit: a systematic review and meta-analysis. *Eur Spine J.* 2019;28(9):1964-1976.
4. McMorland G, Suter E, Casha S, du Plessis SJ, Hurlbert RJ. Manipulation or microdiscectomy for sciatica? A prospective randomized clinical study. *J Manipulative Physiol Ther.* 2010;33(8):576-584.
5. Mirza SK, Deyo RA. Systematic review of randomized trials comparing lumbar fusion surgery to nonoperative care for treatment of chronic back pain. *Spine.* 2007;32(7):816-823.

6. Papanastassiou ID, Phillips FM, Van Meirhaeghe J, et al. Comparing outcomes from clinical studies of fusion and disc replacement: what insights can be gained from observational registries? *Spine*. 2014;39(3 Suppl):S97-103.
7. Peul WC, van Houwelingen HC, van den Hout WB, et al. Surgery versus prolonged conservative treatment for sciatica. *N Engl J Med*. 2007;356(22):2245-2256.
8. Rihn JA, Hilibrand AS, Radcliff K, et al. Duration of symptoms resulting from lumbar disc herniation: effect on treatment outcomes: analysis of the Spine Patient Outcomes Research Trial (SPORT). *J Bone Joint Surg Am*. 2011;93(20):1906-1914.
9. Sharma AK, Bajaj AR, Kanojia RK, et al. Comparison of outcomes of posterior lumbar interbody fusion and transforaminal lumbar interbody fusion in lumbar spondylolisthesis. *Int Orthop*. 2016;40(6):1199-1205.
10. Wang H, Wu Z, Liu J, et al. Posterior lumbar interbody fusion versus posterolateral fusion in lumbar spondylolisthesis: a prospective randomized controlled trial. *Int Orthop*. 2016;40(2):343-350.
11. Duan C, Wang L, Huang X, et al. Decompression alone versus decompression and fusion for lumbar degenerative spondylolisthesis: a meta-analysis. *Eur Spine J*. 2017;26(4):1058-1067.
12. Goyal A, Kothari M, Kaul R, et al. Comparison of outcomes of decompression and fusion versus decompression alone in patients with degenerative spondylolisthesis and spinal stenosis: a meta-analysis. *World Neurosurg*. 2018;115:492-498.
13. Hu J, Qu H, Wu W, et al. Transforaminal lumbar interbody fusion versus posterior lumbar interbody fusion in lumbar degenerative diseases: a meta-analysis of randomized controlled trials. *Int Orthop*. 2017;41(7):1421-1430.
14. Li H, Liang J, Liu L, et al. Decompression alone versus decompression and fusion for lumbar disc herniation: a systematic review and meta-analysis. *Eur Spine J*. 2017;26(12):3033-3041.
15. Lou S, Wu H, Ding M, et al. Transforaminal lumbar interbody fusion versus posterior lumbar interbody fusion in lumbar degenerative diseases: a meta-analysis of randomized controlled trials. *Int Orthop*. 2017;41(11):2281-2289.