(International Print/Online Journal)

SJIF IMPACT FACTOR: 6.829
PUBMED-National Library of Medicine ID-101739732

ISSN (Print): 2209-2870
ISSN (Online): 2209-2862

International Journal of Medical Science and Current Research (IJMSCR)
Available online at: www.ijmscr.com
Volume 8, Issue 6 , Page No: 96-100
November-December 2025

IJMSCR

Neurological Outcome In Patients Of PIVD With Neurological Deficit Undergoing Lumbar Microdiscectomy- A Prospective Cohort Study With 1 year Follow Up

[1]Dr. Vasu Jindal (FNB SPINE SURGERY, MS DNB ORTHOPAEDICS) , [2]Dr. Ashwarya Mehra (HOD NEUROSURGERY Amandeep hosital , MCH Neurosurgery)
[1]Clinical Fellow, Mbbs, Ms And Dnb Orthopaedics
[2]Hod Dept Of Neurosurgery, Mbbs, Ms General Surgery, Mch Neurosurgery
[2]Amandeep Hospital

***Corresponding Author:**
Dr. Vasu Jindal
Clinical Fellow, Mbbs, Ms And Dnb Orthopaedics

Type of Publication: Original Research Paper
Conflicts of Interest: Nil

Abstract

Study background- To Analyze the neurological outcome and its factors in patients having neurological deficit undergoing lumbar micro discectomy.

Study design- A prospective cohort study

Methods – A prospective cohort study was done on 590 patients who underwent lumbar micro discectomy (L3/L4 to L5/S1) with neurological deficits (</- 4/5) due to lumbar disc herniation. Follow up was performed at 6 and 12 months to note the recovery of motor deficits. Clinical and radiological parameters were compared between recovered and non-recovered groups.

Results- Among 590 patients, 380(64%) patients had completely recovered by 6 months. 10 patient showed delayed recovery at 12 month follow up. 200 (33%) patients showed no recovery at 1 year. Clinical radiological factors, severity of initial deficit (p 0.041), longer duration since initial symptoms (p 0.001), cauda equina syndrome with bilateral lower limb motor deficits were associated with a significant risk of poorer recovery. Age, sex, level/type /of disc herniation, disc dimension, diabetes mellitus, hypertension, smoking, alcohol did not affect neurological recovery (p> 0.005).

Conclusion- The overall neurological recovery rate in our study was 66%. Severity of initial deficit, longer duration since initial symptoms, cauda equina syndrome with bilateral lower limb motor deficits were associated with poor motor recovery.

Key Message - Severity of initial deficit and duration of symptoms are predictors of neurological recovery and Cauda equina syndrome with bilateral lower limb motor deficits has poor recovery outcomes

Keywords: Cauda equina, Microdiscectomy, Neurological deficits

Introduction

Lumbar disc herniation causes low back pain, sciatica but neurological deficit is the dreaded complication.[1] Surgery is reserved for progressive neurological deficits, refractory pain, cauda equina syndrome.[2] The available literature on recovery of neurological deficit following microdiscectomy for neurodeficit patients is limited to retrospective series. Balaji et al in their study observed that the recovery rate after surgical decompression is between 61% and 88%.[3] Lonne Greger et al observed that the severity of paresis was the only predictor for persistent motor deficit after microdiscectomy.[4] Our aim is to evaluate motor recovery after surgery and the factors predicting it.

Material and methods

In this prospective longitudinal follow up study, we evaluated 590 patients undergoing microdiscectomy for neurological deficit (including cauda equina syndrome) following lumbar disc herniation during the period June 2022 to September 2024. Written informed consent was taken from patients prior to study.

Inclusion criteria

1) Patients with motor power <4/5 (MRC grading) in L2 to S1 myotomes

2) Cauda equina syndrome

Exclusion criteria

1) Recurrent lumbar disc herniation

2) Tandem cervical or thoracic stenosis

3) Isolated sensory deficits

4) Lumbar disc herniation with instability/ listhesis

Clinical assessment

Patient details regarding age, sex, presence of medical comorbidities, alcohol/smoking history were recorded. Complete neurological clinical examination was done preoperatively and postoperatively at 6 and 12 months follow up. During every visit, motor power was assessed by clinical examination based on Medical Research Council power grading system. The symptom duration was taken from the initial motor deficit to performance of microdiscectomy for the neurological deficit.

Radiological assessment

Plain radiographs with or without dynamic views done to rule out instability /listhesis. MRI was done to assess 1) Level of disc herniation; (2) Type of herniation (sequestrated, extruded, protruded); (3) Anteroposterior disc fragment dimension; (4) Location of disc herniation on axial section (central, par central, foraminal, poster lateral)

Surgical procedure

Microdiscectomy was done under general anesthesia by either unilateral fenestration or extended fenestration, midline laminectomy to approach the disc, depending on the size and location of disc.

Follow up and assessment

Patients were followed up at 6 and 12 months after surgery. Patients were divided into recovery and non-recovery groups based on neurological recovery pattern. MRC grade 5 was considered as motor recovery in the affected myotomes. A comparison was made between two groups clinically and radio logically preoperatively regarding the factors affecting recovery following microdiscectomy.

Statistical analysis

SPSS (Statistical Package for Social Sciences) version 21. (IBM SPASS statistics [IBM corporation: NY, USA]) was used to perform the statistical analysis

1. Data was entered in the excel spread sheet.
2. Descriptive statistics of the explanatory and outcome variables were calculated by mean, standard deviation for quantitative variables, frequency and proportions for qualitative variables.
3. Inferential statistics like

1. Chi-square test was applied for qualitative variables to find the association.
2. Independent sample t test was applied to compare the quantitative parameters between the groups.
3. Repeated measures ANOVA was applied to compare the Grades at different time intervals with post hoc Bonferroni test for comparison between subsequent time intervals.

The level of significance is set at 5%.

Results

Table 1 compares various demographic and clinical factors between patients who have neurologically recovered and those who have not. The analysis includes age, gender, onset of symptoms, level of spinal involvement, disc location, type of disc, associated comorbidities, habits, and anterior-posterior (AP) disc diameter.

Table 1: Comparsion Of The Baselne Characterstics

		Neurologically Recovered	p value

Volume 8, Issue 6; November-December 2025; Page No 96-100

		No	Yes	
Age		**43.80 ± 9.55**	**42.82 ± 6.48**	**0.643**
Age Groups	**24 to 35 yrs**	**40 (20%)**	**50 (12.8%)**	**0.29**
	36 to 45 yrs	**60 (30%)**	**220 (56.4%)**	
	46 to 55 yrs	**80 (40%)**	**100 (25.6%)**	
	56 to 66 yrs	**20(10%)**	**20 (5.12%)**	
Gender	**Females**	**70 (25%)**	**40(10.3%)**	**0.021***
	Males	**130(25%)**	**350(89.7%)**	
Onset (Days)		**41.60 ± 57.81**	**8.71 ± 5.12**	**0.001***
Level	**L3/L4**	**60(30%)**	**20(5.1%)**	**0.025**
	L4/L5	**120(60%)**	**230(59%)**	
	L5/S1	**20(10%)**	**130(33.3%)**	
Disc Location	**Central**	**70(35%)**	**90(23.1%)**	**0.329**
	Para central	**130(65%)**	**300(76.9%)**	
Type of Disc	**Extruded**	**110(55%)**	**210(53.8%)**	**0.261**
	Protruded	**30(15%)**	**120(30.8%)**	
	Sequestrated	**60(30%)**	**60(15.4%)**	
Associated Co-morbs/pathology	**Absent**	**90(45%)**	**250(64.1%)**	**0.16**
	Present	**110(55%)**	**140(35.9%)**	
Habits	**Absent**	**170(85%)**	**300(76.9%)**	**0.466**
	Present	**30(15%)**	**90(23.1%)**	
AP Disc diameter		**6.5 ± 1.169**	**6.93 ± 0.873**	**0.114**

1. Age: The mean age of patients who did not recover neurologically is 43.80 ± 9.55 years, while for those who recovered, it is 42.82 ± 6.48 years. The difference is not statistically significant (p = 0.643) When stratified into age groups, the distribution does not show a significant association with neurological recovery (p = 0.29).
2. Gender: A significantly higher proportion of males (89.7%) were neurologically recovered compared to females (10.3%), with a p-value of 0.021, indicating statistical significance.
3. Onset (Days): The average onset of symptoms was significantly shorter in the neurologically recovered group (8.71 ± 5.12 days) compared to the non-recovered group (41.60 ± 57.81 days) (p = 0.001).
4. Level of Spinal Involvement: There is a significant association between the level of spinal involvement and recovery (p = 0.025). Specifically, patients with involvement at L3/L4 level were less likely to recover neurologically compared to those with involvement at other levels. But the sample size was less
5. Disc Location: No significant difference was found in the location of the disc (central vs. Para central) between the two groups (p = 0.329).
6. Type of Disc: The type of disc (extruded, protruded, or sequestrated) also did not show a

Volume 8, Issue 6; November-December 2025; Page No 96-100

significant association with neurological recovery (p = 0.261).

7. Associated Comorbidities/Pathology: While there appears to be a higher percentage of absence of comorbidities (Diabetes, HTN) in the recovered group (64.1% vs. 45%), this difference was not statistically significant (p = 0.16). The presence of habits (smoking/alcoholic) did not significantly differ between the groups (p = 0.466).
8. AP Disc Diameter: The average AP disc diameter was slightly higher in the neurologically recovered group (6.93 ± 0.873 mm) compared to the non-recovered group (6.5 ± 1.169 mm), but this difference was not statistically significant (p = 0.114).
9. Cauda equina syndrome: Out of 70 patients, 50 patients with B/L and 10 patient with U/L lower limb motor deficits did not show complete neurological recovery and 10 patient with U/L lower limb deficit show neurological recovery

Discussion

There is an insufficient data about the prospective study in the existing literature regarding the neurological outcome after micro discectomy. There is a variability in the recovery rates for neurological outcome. This variability can be due to nature of pathology, influence of factors on recovery, variability in follow up duration*. Age, initial severity of motor deficit, duration of motor deficit, delay in micro discectomy/ surgical decompression, associated comorbidities have been observed to influence the recovery of neurological deficit*. The present study is to analyse the neurological outcome and the factors associated with it following micro discectomy for neurodeficit patients. This may help us to forecast neurological recovery following micro discectomy.

Postacchini et al* in their study reviewed 116 patients with 76% had complete recovery, 16% had persistent weakness who had mild pre-operative deficit and 39% with severe weakness (MRC grade <3/5).[5] Lonne G et al*prospectively studied 91 patients with 75% patients recovered after 1 year follow up.[4] Ghahreman et al* reviewed 56 patients with ankle dorsiflexion weakness, showed overall recovery rate of 41% with maximum recovery in the first 6 weeks. 68% showed recovery among patients with MRC >3/5 grade compared to 27% patients with MRC <3/5 grade showed no recovery.[6] Our study noted that among 590 patients, 380(64%) patients had completely recovered by 6 months. 10 patient showed delayed recovery at 12 month follow up. Although it is not common to recover beyond initial 2 months, there is still possibility of such a recovery even up to 12 months.

Postacchini et al*observed that patients with severe deficit, undergone surgery within a month of onset of motor deficit had complete recovery, whereas who underwent surgery after 70 days had incomplete recovery.[5] Our study noted that the longer the time interval from initial symptom to surgical decompression, lessen the chance of neurological recovery (41.6+/- 57.8 days among neurologically not recovered patients compared to 8.7+/-5.12 days among neurologically recovered patients). However, we could not find any cut off in duration of motor deficit that would indicate good or poor prognosis for recovery

Experimental studies have shown that acute and severe compression of nerve root had more damage to neural tissue than mild or slow compression*. Lonne G* in their study concluded that the severity of paresis preoperatively was the only predictor for persistent paresis [4]. In Our study, 60 patients with </= 2/5 MRC grading had no recovery even after 1 year follow up. These findings suggest an inverse relationship between both duration of initial symptom, severity of paresis pre operatively and ability to recover complete motor function.

Vishwanathan VK et al* in their study had observed that diabetes mellitus was associated with delayed recovery with 38% patients with motor deficit had no recovery compared to 12.2% patients with recovery.[7] However, in our study 12% patients among non-recovered group and 35% patients among recovered group had diabetes, observed no statistical significance. Also, level of disc herniation, type of disc herniation (protrusion, extrusion, sequestration), location of disc on axial (central, Para central), AP disc dimension which was compromising the canal did not affect the neurological outcome. But out of 70 patients, 50 patients (10%) with cauda equina syndrome involving bilateral motor deficit (20 patients had some recovery in the single limb) and 10 patient with unilateral deficit had no complete recovery, however further study has to be done on more cauda

Volume 8, Issue 6; November-December 2025; Page No 96-100

equina syndrome with bilateral lower limb deficits due to relatively small sample size.

The limitations of this study are the sample size which was small. Secondly the durations of symptoms and time of motor deficit might not be accurate, due to recall bias. Thirdly there was a delay in surgery due to lack of patient awareness/ knowledge about surgery, delay in referral. We believe that our study provide insight in to radiological and clinical factors that influence neurological recovery and hence help us in assessing outcome following micro discectomy.

Conclusion

The overall neurological recovery rate in our study was 66%. Severity of initial deficit, longer duration since initial symptoms, cauda equina syndrome with bilateral lower limb motor deficits were associated with poor motor recovery. Age, sex, level/type /of disc herniation, disc dimension, diabetes mellitus, hypertension, smoking, alcohol did not affect neurological recovery

References

1. Trager, R. J. (2015). Lumbosacral radiculopathy: Causes and mimics of sciatica and low back nerve root disorders. Integrated Clinics, LLC.
2. Ahn, U. M., Ahn, N. U., Buchowski, J. M., Garrett, E. S., Sieber, A. N., & Kostuik, J. P. (2000). Cauda equina syndrome secondary to lumbar disc herniation: a meta-analysis of surgical outcomes. Spine, 25(12), 1515-1522.
3. Balaji, V. R., Chin, K. F., Tucker, S., Wilson, L. F., & Casey, A. T. (2014). Recovery of severe motor deficit secondary to herniated lumbar disc prolapse: is surgical intervention important? A systematic review. European Spine Journal, 23(9), 1968-1977.
4. Lønne, G., Solberg, T. K., Sjaavik, K., & Nygaard, Ø. P. (2012). Recovery of muscle strength after microdiscectomy for lumbar disc herniation: a prospective cohort study with 1-year follow-up. European Spine Journal, 21(4), 655-659.
5. Postacchini, F., Giannicola, G., & Cinotti, G. (2002). Recovery of motor deficits after microdiscectomy for lumbar disc herniation. The Journal of Bone & Joint Surgery British Volume, 84(7), 1040-1045.
6. Ghahreman A, Ferch RD, Rao P, Chandran N, Shadbolt B. Recovery of ankle dorsiflexion weakness following lumbar decompressive surgery. J Clin Neurosci. 2009 Aug;16(8):1024-7. doi: 10.1016/j.jocn.2008.10.017. Epub 2009 May 9. PMID: 19428255.
7. Viswanathan, V. K., Shanmuganathan, R., Aiyer, S. N., Kanna, R., & Shetty, A. P. (2018). Factors affecting early and 1-year motor recovery following lumbar microdiscectomy in patients with lumbar disc herniation: a prospective cohort review. Asian Spine Journal, 13(1), 135.

Volume 8, Issue 6; November-December 2025; Page No 96-100