

Original Research Article

Clinical outcome of lumbar microdiscectomy in patients with prolapsed lumbar intervertebral disc

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ABSTRACT

Background: Prolapsed lumbar intervertebral disc (PLID) is a common cause of low back pain and radiculopathy, often requiring surgical intervention when conservative management fails. Lumbar microdiscectomy is a widely accepted minimally invasive procedure for symptomatic relief, yet long-term outcome data in Bangladeshi populations remain limited.

Methods: This retrospective observational study was conducted across multiple orthopedic centers in Rangpur City, Bangladesh, from January 2010 to December 2024. A total of 500 patients with clinically and radiologically confirmed PLID who underwent lumbar microdiscectomy were included. Demographic, clinical, radiological, operative and postoperative data were collected and analyzed using SPSS version 25. Outcomes assessed included pain relief, neurological recovery, complications and length of hospital stay.

Results: The mean age of patients was 45.1±9.3 years, with males predominating (63.4%). Manual laborers comprised the largest occupational group (36.6%). Low back pain and leg pain/radiculopathy were the most common presenting symptoms (100% and 93.6%, respectively), while sensory disturbances were reported in 61.4% and motor weakness in 27.8%. MRI showed L4-L5 as the most commonly affected level (57.4%), with disc extrusion predominating (51.8%). Unilateral microdiscectomy was performed in 90.4% of cases, with a mean operative time of 56.1±11.9 minutes and mean blood loss of 82.7±26.4 ml. Postoperatively, excellent and good pain relief was achieved in 69.4% and 22.6% of patients, respectively. Complete neurological recovery occurred in 75.4%, with a low complication rate. The mean hospital stay was 3.5±1.5 days.

Conclusions: Lumbar microdiscectomy is a safe and effective procedure for PLID, providing substantial pain relief and neurological improvement with minimal complications and short hospitalization.

Keywords: Lumbar microdiscectomy, Prolapsed intervertebral disc, Radiculopathy, Pain relief, Neurological recovery

INTRODUCTION

Prolapsed lumbar intervertebral disc (PLID) is one of the most common causes of low back pain and radiculopathy, significantly affecting the functional capacity and quality of life of affected individuals.¹ It primarily occurs due to

herniation of the nucleus pulposus through the annulus fibrosus, resulting in compression of the adjacent nerve roots.² The condition is most frequently seen in adults during their most productive years and is a major contributor to disability worldwide. While many patients improve with conservative treatments such as analgesics,

physical therapy and lifestyle modification, a considerable proportion continue to experience persistent pain, neurological deficits, or functional limitations that necessitate surgical intervention.^{3,4}

Lumbar microdiscectomy is widely regarded as the gold standard surgical approach for treating symptomatic PLID that fails to respond to non-operative measures.⁵ Introduced as a minimally invasive alternative to conventional discectomy, microdiscectomy uses magnification and smaller incisions to enhance visualization, reduce tissue damage and facilitate faster postoperative recovery.⁶ Numerous studies have demonstrated its effectiveness in relieving radicular pain, improving neurological function and enabling early return to normal activity.⁷ However, outcomes may vary depending on patient characteristics, level and type of disc prolapse, surgeon experience and perioperative management.⁸

PLID represents a substantial burden in orthopedic and spine surgery practices, especially in urban and semi-urban populations engaged in physically demanding occupations.⁹ Despite the increasing number of microdiscectomy procedures performed in different regions of the country, there is limited long-term data evaluating its clinical outcomes in local healthcare settings.¹⁰ Understanding postoperative results, complication rates and factors influencing recovery is essential for guiding clinical decision-making, counseling patients and improving surgical standards.¹¹

This research provides an opportunity to generate meaningful evidence regarding the effectiveness of microdiscectomy in real-world orthopedic practice. This study aimed to assess the clinical outcomes of lumbar microdiscectomy in patients with PLID treated in various hospitals of Rangpur City over a 14-year period. The findings are expected to contribute to the existing knowledge base and assist spine surgeons in optimizing management strategies for PLID in Bangladesh.

METHODS

This retrospective observational study was conducted in the department of orthopedic surgery across several hospitals in Rangpur City, Bangladesh, over a 14-year period from January 2010 to December 2024. A total of 500 patients who underwent lumbar microdiscectomy for clinically and radiologically confirmed PLID were included. Patients were selected through review of medical records, operative notes and follow-up documents. Inclusion criteria were adults aged 18 years and above with single-level or multilevel lumbar disc prolapse confirmed by MRI, presenting with persistent radiculopathy, neurological deficits, or disabling low back pain unresponsive to conservative treatment for at least six weeks and who underwent standard lumbar microdiscectomy. Exclusion criteria were patients with previous lumbar spinal surgery, congenital spinal

anomalies, spinal trauma, infection or malignancy, cauda equina syndrome requiring emergency surgery, incomplete hospital records and those lost to follow-up within three months postoperatively. Data collected included demographic characteristics, clinical features, MRI findings, operative details, perioperative events and postoperative outcomes. Pain improvement was assessed using the visual analog scale (VAS), neurological recovery was evaluated clinically and postoperative complications were recorded from follow-up notes. All data were entered into a standardized data extraction sheet and analyzed using statistical package for the social sciences (SPSS) version 25. Descriptive statistics such as frequency, percentage, mean and standard deviation were used to summarize variables, while appropriate comparative analyses were performed where necessary. Findings were presented through tables and descriptive summaries to evaluate the overall clinical outcome of lumbar microdiscectomy among the study population.

RESULTS

Table 1 presents the socio-demographic characteristics of the 500 patients included in the study. The majority of patients were between 41-50 years of age (37.8%), followed by 31-40 years (26.6%), with a mean age of 45.1±9.3 years. Males constituted a higher proportion of the study population (63.4%) compared to females (36.6%). Regarding occupation, manual laborers formed the largest group (36.6%), followed by service holders (24.2%), individuals engaged in business (19.4%) and those in other occupations (19.8%).

Table 2 summarizes the clinical presentations of the 500 patients with PLID. All patients (100%) reported low back pain, making it the most universal symptom. A large majority (93.6%) experienced leg pain or radiculopathy, while numbness or tingling was present in 61.4% of cases. Motor weakness was observed in 27.8% of patients. A positive straight leg raise (SLR) test was recorded in 86.6% of individuals, indicating significant nerve root irritation. Only a small proportion (1.6%) had bladder or bowel dysfunction, reflecting the rarity of severe neurological compromise.

Table 3 illustrates the MRI findings of the 500 patients included in the study. The L4-L5 level was the most commonly affected site of disc prolapse, accounting for 57.4% of cases, followed by the L5-S1 level in 34.6% of patients. Higher-level involvement such as L3-L4 was less frequent (6.8%), while multilevel disc prolapse was observed in only 1.2% of cases. Regarding the type of herniation, extrusion was the predominant pattern, seen in 51.8% of patients, whereas protrusion occurred in 29.8% and sequestration in 18.4%.

Table 4 summarizes the operative and perioperative data of the 500 patients who underwent lumbar microdiscectomy. The majority of procedures were performed as unilateral microdiscectomy (90.4%), while

bilateral microdiscectomy was required in only 9.6% of cases. The mean operative time was 56.1±11.9 minutes and the mean intraoperative blood loss was 82.7±26.4 ml, indicating that the procedure was generally quick and associated with minimal bleeding. Intraoperative complications were relatively uncommon; dural tear occurred in 3.4% of patients and excessive bleeding was noted in 1.4% of cases.

Table 5 presents the postoperative outcomes of the 500 patients who underwent lumbar microdiscectomy. Pain relief, assessed by improvement in the VAS, was excellent in 69.4% of patients and good in 22.6%, indicating that more than 90% experienced substantial symptomatic improvement. Fair pain relief was observed in 5.6% of cases, while only 2.4% reported poor improvement. Neurological recovery was also favorable, with 75.4% achieving complete recovery and 20.6% showing partial improvement. Only 4% of patients had no neurological improvement following surgery.

Table 6 shows the distribution of postoperative complications among the 500 patients who underwent lumbar microdiscectomy. Overall complication rates were low. Persistent radiculopathy was the most common complication, occurring in 5.8% of patients, followed by recurrent disc herniation in 4.6%. Epidural fibrosis was identified in 3.4% of cases, while superficial wound infection occurred in 2.6%. Cerebrospinal fluid (CSF) leak was the least frequent complication, observed in 1.8% of patients.

Table 7 presents the length of hospital stay following lumbar microdiscectomy among the 500 patients. More than half of the patients (51.8%) stayed for 3-4 days, while 31.4% were discharged within 1-2 days. A smaller proportion (14.2%) required hospitalization for 5-7 days and only 2.6% remained admitted for more than 7 days. The mean duration of hospital stay was 3.5±1.5 days.

Table 1: Socio-demographic characteristics of the study patients, (n=500).

Variables	N	Percentage (%)
Age group (in years)		
21-30	47	9.4
31-40	133	26.6
41-50	189	37.8
51-60	96	19.2
>60	35	7
Mean±SD	45.1±9.3	
Sex		
Male	317	63.4
Female	183	36.6
Occupation		
Manual laborer	183	36.6
Service holder	121	24.2
Business	97	19.4
Others	99	19.8

Table 2: Clinical presentation, (n=500).

Clinical features	N	Percentage (%)
Low back pain	500	100
Leg pain/radiculopathy	468	93.6
Numbness/tingling	307	61.4
Motor weakness	139	27.8
Positive SLR test	433	86.6
Bladder/bowel dysfunction	8	1.6

Table 3: MRI findings, (n=500).

Variables	N	Percentage (%)
Level of disc prolapse		
L4-L5	287	57.4
L5-S1	173	34.6
L3-L4	34	6.8
Multiple levels	6	1.2
Type of herniation		
Protrusion	149	29.8
Extrusion	259	51.8
Sequestration	92	18.4

Table 4: Operative and perioperative data, (n=500).

Variables	N	Percentage (%)
Unilateral microdiscectomy	452	90.4
Bilateral microdiscectomy	48	9.6
Mean operative time (min)	56.1±11.9	
Mean blood loss (ml)	82.7±26.4	
Intraoperative complications		
Dural tear	17	3.4
Excessive bleeding	7	1.4

Table 5: Postoperative outcomes, (n=500).

Outcomes	N	Percentage (%)
Pain relief (VAS improvement)		
Excellent (≥80%)	347	69.4
Good (50-79%)	113	22.6
Fair (20-49%)	28	5.6
Poor (<20%)	12	2.4
Neurological recovery		
Complete	377	75.4
Partial	103	20.6
No improvement	20	4

Table 6: Postoperative complications, (n=500).

Complications	N	Percent (%)
Superficial wound infection	13	2.6
Recurrent disc herniation	23	4.6
Persistent radiculopathy	29	5.8
CSF leak	9	1.8
Epidural fibrosis	17	3.4

Table 7: Length of hospital stay, (n=500).

Length of stay	N	Percentage (%)
1-2 days	157	31.4
3-4 days	259	51.8
5-7 days	71	14.2
>7 days	13	2.6
Mean±SD	3.5±1.5	

DISCUSSION

In this study, we evaluated the clinical outcomes of 500 patients undergoing lumbar microdiscectomy for PLID over a 14-year period. The demographic and clinical profiles of our patients closely resemble findings from other Bangladeshi and international studies. The mean age of 45.1 years and male predominance (63.4%) are consistent with the observations of Dutta et al and Hasan et al who reported that symptomatic lumbar disc herniation commonly affects middle-aged, physically active individuals.^{12,13} The high proportion of manual laborers (36.6%) in our series also supports the association between strenuous occupational activities and disc degeneration reported by Ahmed et al.¹⁴

Low back pain and radiculopathy were the most frequent presenting symptoms in our patients (100% and 93.6%, respectively), which aligns with earlier findings from Islam et al and Sarkar et al who reported radiculopathy as the hallmark of prolapsed disc.^{15,16} A positive SLR test in 86.6% of cases in our study further reinforces typical clinical patterns seen in PLID patients. MRI findings revealed L4-L5 as the most commonly affected level (57.4%), similar to studies by Karim et al and Bhatia et al who noted that this segment is biomechanically most vulnerable to herniation.^{17,18} The predominance of extruded discs (51.8%) in our series is also consistent with earlier literature demonstrating higher surgical rates in extrusion-type herniations.^{19,20}

The majority of our procedures were unilateral microdiscectomies (90.4%), with a mean operative time of 56.1 minutes and blood loss of 82.7 ml. These values correspond well with benchmarks reported by Liu et al and Wu et al where microdiscectomy was shown to be efficient with minimal blood loss compared to traditional open procedures.^{21,22} Intraoperative complications in our study were low (dural tear 3.4%, bleeding 1.4%), which is consistent with the complication rates reported in the systematic review by Shriver et al indicating that microdiscectomy remains a safe procedure with predictable intraoperative risks.²³

Postoperative outcomes in our cohort were highly favorable. Excellent and good pain relief was achieved in 69.4% and 22.6% of patients, respectively, mirroring the findings of Hasan et al and Islam et al who reported significant postoperative VAS improvement following microdiscectomy.^{13,15} Neurological recovery was complete in 75.4% of cases and partial in 20.6%, which

aligns with the recovery patterns described by Shrestha et al.²⁴ Our recurrence rate of 4.6% is comparable to those reported in previous microdiscectomy studies, including the meta-analysis by Barber et al which showed recurrence rates ranging from 3% to 7% across different techniques.²⁵ Persistent radiculopathy occurred in 5.8% of cases, closely matching observations by Parker et al who attributed residual symptoms to nerve root inflammation or epidural fibrosis rather than recurrent herniation.²⁶

Hospital stay was short, with a mean duration of 3.5±1.5 days and more than half of patients discharged within 3-4 days. This reflects the typical recovery trajectory after minimally invasive spine surgery, consistent with findings from Vangen-Lønne et al and Overvest et al who reported rapid postoperative mobilization and early discharge after microdiscectomy.^{27,28}

Compared with endoscopic or tubular discectomy techniques, microdiscectomy in our study demonstrated comparable or superior pain and neurological outcomes, as supported by the comparative studies of Gadhradj et al and Choi et al.^{20,29} While full-endoscopic procedures offer smaller incisions and even shorter stays, microdiscectomy maintains an advantage in terms of surgical visibility and lower technical complexity, especially in lower-resource settings such as Bangladesh.

Limitations

This study was retrospective and relied on medical records, which may have introduced selection and documentation bias. Additionally, the follow-up period varied among patients, limiting the assessment of long-term recurrence and functional outcomes. The study was also conducted in multiple hospitals within a single city, which may reduce the generalizability of the findings to other regions or healthcare settings. Finally, factors such as lifestyle, body mass index and preoperative pain duration were not analyzed in detail, which could influence surgical outcomes.

CONCLUSION

Lumbar microdiscectomy is a safe and effective procedure for patients with PLID, providing substantial pain relief and neurological improvement with minimal complications. In this cohort, the majority of patients experienced excellent postoperative outcomes and a short hospital stay, highlighting the procedure's efficiency and reliability. These findings support the continued use of microdiscectomy as a standard surgical approach for symptomatic lumbar disc herniation in Bangladesh and similar clinical settings.

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