

Outcomes Comparison: Conservative and Surgical Treatments for Early Recurrent Lumbar Disc Herniation

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Introduction: This study aimed to evaluate the outcomes of surgical and conservative treatments for early recurrent lumbar disc herniation, addressing a gap in current clinical understanding.

Materials and Methods: Patients who underwent single-level microdiscectomy between 2006 and 2023 and experienced recurrence within six months were retrospectively analyzed. They were divided into surgical and conservative treatment groups, and demographics, recurrence characteristics, and functional outcomes were assessed. Functional outcomes were measured using the Visual Analog Scale (VAS) and the Oswestry Disability Index (ODI).

Results: Of the 75 cases studied, 76% opted for repeat surgery, while 24% pursued conservative treatment. There were no significant differences in demographics or recurrence characteristics between groups ($p>0.05$). Initial VAS and ODI scores were significantly higher in the conservative treatment group compared to the surgical group ($p = 0.001$; $p<0.01$), but no significant differences were observed at the 6-month follow-up ($p>0.05$). Despite the earlier recovery experienced by patients undergoing surgery, there were no discernible differences in outcomes between surgical and conservative treatments in the later stages of recovery.

Conclusion: This study underscores the importance of considering both surgical and conservative approaches in managing early recurrent lumbar disc herniation, offering insights into treatment outcomes and recovery trajectories.

Keywords: Lumbar disc herniation, recurrence, reoperation

Introduction

Lumbar disc herniation surgery stands out as the most commonly performed spinal surgery. Recurrence is one of the critical complications influencing the outcomes of this surgery, with postoperative rates ranging from 7–24% depending on the technique employed (1). Depending on the method used (2,3), the time

to develop recurrence varies in days or even years after surgery. Recurrences within the initial six months are categorized as early recurrence and have been reported at a rate of 1.2% (4). The overall rate of unsatisfactory outcomes after discectomy ranges from 5% to 20%, and recurrent disc herniation is a significant contributor to surgical failure (5).

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There is a scarcity of studies addressing early recurrence, with most existing studies primarily focusing on risk factors (6-8). A limited number of studies have examined treatment strategies for early recurrence. There is no discussion on the criteria for deciding which patients should undergo conservative treatment and which should undergo surgery.

In the study, we compared the outcomes of surgical and conservative treatments in cases of early recurrence. Advantage and disadvantage of both approaches and long-term outcomes have been demonstrated. This study utilized a retrospective design to analyze the outcomes following surgical and conservative treatments for early recurrent lumbar disc herniation.

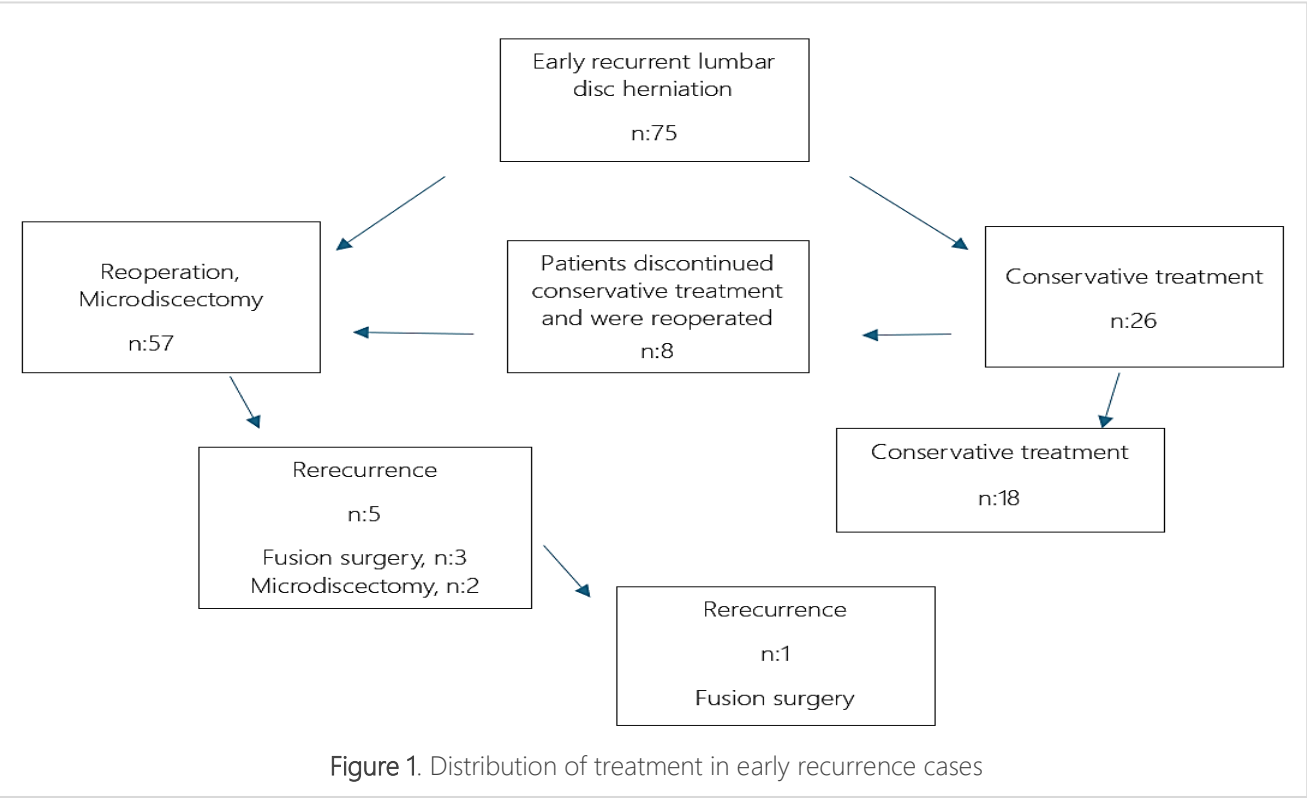
Materials and Methods

Ethical Statement & Study Design

This retrospective study was approved by the local ethics committee of our hospital (date: 15.02.2019, ID: 2019.02.2.02.010.r018). The study included patients who underwent single-level microdiscectomy surgery performed by the same surgeon between 2006 and 2023 and

subsequently experienced recurrence within the first six months. Patients who revisited the outpatient clinic due to low back and leg pain and were diagnosed with recurrent lumbar discopathy after assessments and gadolinium contrast-enhanced magnetic resonance (MR) imaging were retrospectively examined.

The patients were divided into two groups according to the treatment method: the conservative treatment group and the surgical treatment group. The decision regarding conservative or surgical treatment was reached through consultations between the doctor and the patient during their interview. Patients with unavailable clinical and radiologic data, those with spinal stenosis, and patients with multilevel or bilateral disc herniation were excluded from the study. Patients diagnosed with early recurrent lumbar discopathies, for whom the decision to undergo repeat surgery was made, underwent microdiscectomy using the same technique through the same fenestration site. Patients in the conservative treatment group were administered non-steroidal anti-



inflammatory drug, physical therapy, opiate-type medical therapies, and neuropathic pain medications. Age, gender, time to recurrence, level, localization, and side of lumbar disc herniation, as well as preoperative and postoperative evaluation scores obtained from the hospital records were analyzed.

The functional outcome was assessed using the Visual Analog Scale (VAS) and the Oswestry Disability Index (ODI). Patient charts, radiological data, and telephone survey responses were considered. Patients who were available for follow-up were assessed in the outpatient clinic. In contrast, those who were unavailable underwent evaluation over the phone, and the cases were followed up for at least two years.

Statistical Analysis

The data were subjected to statistical analysis using SPSS 26 (Statistical Package for the Social Sciences). Quantitative variables in the study were presented as mean, standard deviation, median, minimum, and maximum values, while descriptive statistics for qualitative variables included frequency and %. The conformity of the data to normal distribution was assessed using the Shapiro-Wilks and Box Plot graphs. The Mann-Whitney U test was employed to evaluate variables that did not exhibit normal distribution between the two groups, and the Friedman was used for intragroup assessments. The chi-square, Fisher's Exact, and Fisher-Freeman-Halton tests were applied to compare qualitative data. Results were assessed at a 95% confidence interval, and significance was determined at the $p < 0.05$.

Results

There were 75 cases, with 64% ($n=48$) male and 36% ($n=27$) female. The ages of the patients ranged between 30-80 years, with a mean age of 51.09 ± 11.24 . Of these, 77.3% ($n=58$) were aged 30–60 years, and 22.7% ($n=17$) were >60 years (Table 1). The time to recurrence ranged from 7 days to 6 months, with a mean duration

of 3.32 ± 4.1 months. Of the cases, 76% ($n=57$) underwent reoperation, while 24% ($n=18$) were treated conservatively (Figure 1).

Among all the patients, two underwent microdiscectomy with a diagnosis of recurrent lumbar disc herniation, whereas 73 underwent microdiscectomy surgery for the first time with a diagnosis of recurrent lumbar disc herniation and subsequently developed early recurrent lumbar disc herniation. Primary and recurrent localizations and migration of disc herniation are presented in Table 2.

No differences were observed in terms of gender, age, side, level, and time to recurrence (Table 3). Although conservative treatment was initiated in eight patients, the treatment was discontinued, and surgical intervention was performed (Fig-1). No difference was observed between the pre-treatment and 6-month VAS scores of the groups (Table 4). However, the 1st-month VAS score of the conservative treatment group was significantly higher than those of the surgical treatment group ($p=0.001$; $p<0.01$) (Figure 2).

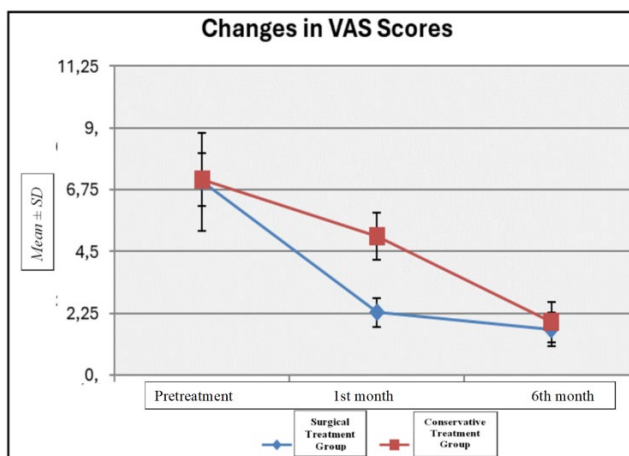


Figure 2. Changes in VAS scores in groups (VAS: Visual Analogue Score)

There was no difference in the pre-treatment and 6th-month ODI scores between the groups ($p > 0.05$) (Table 5). The 1st-month ODI score of the conservative treatment group was higher than those of the surgical treatment group ($p=0.001$; $p<0.01$) (Figure 3).

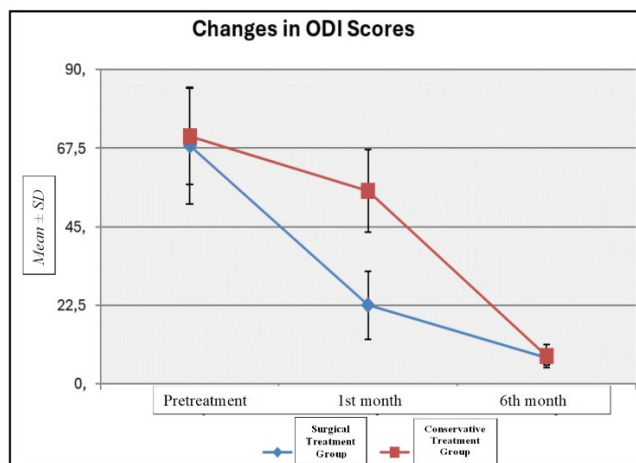


Figure 3. Changes in ODI scores of the groups (ODI: Oswestry Disability Index)

In the surgical treatment group, 17 patients (29.82%) exhibited motor deficits, and 44 (77.19%) experienced sensory changes. Among the 17 patients with motor deficits, 3 (17.64%) fully recovered, 5 (29.41%) partially recovered, and 9 (52.94%) showed no improvement after revision microdiscectomy. In these 9 cases, the deficit was present before the primary surgery. Sensory complaints improved in 32 out of 44 cases (72.72%), whereas sensory complaints were already present in 12 cases before the primary surgery. The motor deficit worsened in three patients (5.26%) postoperatively, but improvement was observed within weeks after physical therapy was initiated. Neuropathic pain persisted postoperatively in 12 (21.05%) patients who were treated with gabapentin for four weeks to six months. At the end of this period, no symptoms or mild neuropathic pain were observed in any patient. Superficial infection occurred in three patients, and they recovered with ten days of antibiotic treatment and wound care. Perioperative dural tears occurred in two patients but were successfully repaired with primary sutures, and no subsequent problems were reported. Recurrence occurred in five patients between 3-15 months postoperatively. Two of these patients underwent surgery using the same microsurgical technique, while the other three patients underwent posterior

short-segment pedicle screw placement and posterolateral fusion in addition to microdiscectomy. Recurrence occurred in one of the two patients who underwent revision surgery with microdiscectomy, and fusion surgery was performed during the 4th operation (Figure 1).

No cases presenting with newly developed motor deficits attributed to early recurrent lumbar disc herniation were incorporated into the conservative treatment cohort. Medical therapy for early recurrent lumbar disc herniation consisted of NSAIDs, neuropathic pain medications, muscle relaxants, and opioid analgesics. The type and dosage of drugs were individualized based on each patient's clinical condition, as determined by both the physician and the patient. Additionally, neuropathic pain medications were administered for a longer duration of up to six months in some cases. (n=11, 61.11%) Physical therapy interventions were conducted for four to six weeks and were tailored to each patient's clinical status. Specifically, physical therapy included 20 minutes of hot pack application, 20 minutes of conventional TENS application, and 5 minutes each of 1 W/cm², 1 MHz, and continuous ultrasound application. These interventions aimed to provide comprehensive management of symptoms and promote functional recovery. Notably, no recurrence was observed in patients who underwent conservative treatment during the follow-up period.

Discussion

In early recurrent disc herniation treatment, 24% underwent conservative treatment, while 76% underwent revision microdiscectomy. There was no significant difference in outcomes between surgical and conservative treatment groups in the late period. Pain reduction occurred more rapidly in cases who underwent surgical treatment during the 1st month, but this difference disappeared after six months. Although patients in the surgical treatment group reported a less physical limitation at the

Table 1. Distribution of descriptive characteristics of early recurrence cases

Gender	Male	48 (64)
	Female	27 (36)
Age	Mean $\pm$ SD	51,09 $\pm$ 11.24
	Median (Min–Max)	49 (30–80)
	30–60 years	58 (77.3)
	> 60 years	17 (22.7)
Side	Left	43 (57.3)
	Right	32 (42.7)
Level	L3-L4	3 (4)
	L4-L5	42 (56)
	L5-S1	30 (40)
Recurrence time (months)	Mean $\pm$ SD	3.32 $\pm$ 4.10
	Median (Min–Max)	2 (0.25–25)
Treatment	Reoperation	57 (76)
	Conservative	18 (24)

Table 2. Localization and migration distribution of primary and recurrent lumbar disc herniations

Primary localization	Far lateral	2 (2.7)
	Foraminal	4 (5.3)
	Median	15 (20)
	Paramedian	53 (72)
Primary migration	At disc level	55 (73.3)
	Caudal	17 (22.7)
	Cranial	3 (4)
Localization of recurrence	Far lateral	2 (2.7)
	Foraminal	2 (2.7)
	Median	9 (12)
	Paramedian	62 (82.7)
Recurrence migration.	At disc level	64 (85.3)
	Caudal	7 (9.3)
	Cranial	4 (5.3)

Table 3. Comparison of descriptive characteristics of groups

Variables		Reoperation group (n=57)	Conservative treatment group (n=18)	P value
Gender	Male	40 (70.2)	8 (44.4)	^a 0.056
	Female	17 (29.8)	10 (55.6)	
Age	30–60 years	44 (77.2)	14 (77.8)	^b 1.000
	> 60 years	13 (22.8)	4 (22.2)	
Side	Left	32 (56.1)	11 (61.1)	^a 0.710
	Right	25 (43.9)	7 (38.9)	
Level	L3-L4	1 (1.8)	2 (11.1)	^c 0.248
	L4-L5	33 (57.9)	9 (50)	
	L5-S1	23 (40.4)	7 (38.9)	
Time to recurrence (months)	Mean $\pm$ SD	2.86 $\pm$ 2.01	4.74 $\pm$ 7.5	^d 0.969
	Median (Min–Max)	2.5 (0.25–6)	2 (0.66–25)	

^aPearson's Chi-Square Test ^bFisher's Exact Test ^cFisher-Freeman-Halton Test ^dMann-Whitney U Test

Table 4. Comparison of VAS scores between the surgical and conservative treatment groups

VAS		Reoperation group (n=57)	Conservative treatment group (n=18)	Total	^d p value
Pre-treatment	Mean±SD	7.04±1.78	7.11±0.96	7.05±1.62	0.820
	Median (Min–Max)	7 (3–10)	7 (5–8)	7 (3–10)	
1 st month	Mean±SD	2.28±0.53	5.06±0.87	2.95±1.34	0.001**
	Median (Min–Max)	2 (1–3)	5 (3–6)	2 (1–6)	
6 th Month	Mean±SD	1.67±0.61	1.94±0.73	1.73±0.64	0.141
	Median (Min–Max)	2 (1–3)	2 (1–3)	2 (1–3)	
^e p value		0.001**	0.001**		
Change Δ					
Pre-treatment – 1 st Month	Mean±SD	–4.75±1.73	–2.06±0.80	–4.11 ±1.94	0.001**
	^e p value	0.001**	0.001**		
Pre-treatment – 6 th Month	Mean±SD	–5.37±1.71	–5.17±0.99	–5.32 ±1.56	0.492
	^e p value	0.001**	0.001**		
1 st month– 6 th month	Mean±SD	–0.61±0.59	–3.11±1.02	–1.21 ±1.29	0.001**
	^e p value	0.006**	0.008**		

VAS: Visual Analogue Score ; ^dMann-Whitney-U Test; ^eFriedman Test & Wilcoxon Corrected Signed Rank; **p<0.01

Table 5. Comparison of ODI between the surgical and conservative treatment groups

ODI		Reoperation group (n=57)	Conservative treatment group (n=18)	Total	^d p value
Pre-treatment	Mean±SD	68.26±16.68	70.89±13.86	68.89±16	0.530
	Median (Min–Max)	68 (50–100)	79 (50–86)	70 (50–100)	
1 st Month	Mean±SD	22.56±9,76	55.22±11,78	30.4±17.35	0.001**
	Median (Min–Max)	22 (12–40)	55.5 (38–76)	25 (12–76)	
6 th Month	Mean±SD	7.44±2.04	8±3.25	7.57±2.38	0.884
	Median (Min–Max)	7 (5–12)	6.5 (6–18)	7 (5–18)	
^e p value		0.001**	0.001**		
Change Δ					
Pre-treatment – 1 st month	Mean±SD	–45.7±20.18	–15.67±10.09	–38.49±22.32	0.001**
	^e p value	0.001**	0.008**		
Pre-treatment – 6 th month	Mean±SD	–60.82±16.88	–62.89±14.84	–61.32±16.34	0.494
	^e p value	0.001**	0.001**		
1 st month – 6 th month	Mean±SD	–15.12±10,09	–47.22±12,37	–22.83±17.4	0.001**
	^e p value	0.001**	0,008**		

ODI: Oswestry Disability Index; ^dMann-Whitney-U Test; ^eFriedman Test & Wilcoxon Corrected Signed Rank; **p<0.01

1st-month follow-up, this difference did not persist in the subsequent evaluation. The surgical treatment is not more effective than conservative treatment in alleviating neurogenic symptoms or improving overall quality of life. However, surgical intervention was performed in 28% (n=8) of the patients who did not benefit from conservative therapy.

There is a lack of consensus on the definition of recurrent lumbar disc herniation, and there are varying perspectives on what constitutes true recurrence. Oh et al. suggest that cases presenting symptoms before six months should be deemed residual rather than accurate recurrences (5). Leven et al. set a shorter threshold of six weeks (9). Wang et al. classified

a pain-free period of <2 weeks after complete endoscopic discectomy as early recurrence and >two weeks as recurrence (10). In their study, Lønne et al. performed lumbar microdiscectomy on 279 patients, of whom 37 cases underwent revision microdiscectomy surgery within 90 days, reported as the reason for reoperation being residual (11). However, Shin BJ et al. argued that such time restrictions are arbitrary, asserting only conditions emerging after a pain-free period should be considered sufficient for recurrence (12). This study defined early recurrence as sudden and severe pain after a pain-free week.

Studies in the literature have explored risk factors for early recurrence. Guo J. et al. identified a significant statistical relationship between early herniated disc relapses and facet orientation, disc space height, and Modic changes (7). Eren B. et al. reported that short stature, smoking, limited discectomy, and low disc height are risk factors for early herniated disc relapses (6). In a more extensive series published by Samuel AM et al., which analyzed 62,690 patients undergoing lumbar discectomy surgery, the researchers reported that specific subpopulations, including individuals with obesity, those undergoing multilevel surgery, females, and those undergoing revision discectomies, exhibited higher rates of early failure (8). In the present study, a higher early recurrence rate was observed in males in the 30–60 age group.

According to Eren et al., early recurrence was observed in the following localizations: 52% for paramedian, 19.3% for central, 19.3% for foraminal, and 2.3% for lateral (6). In our series, the results were similar, with 72.0% being paramedian, 20% median, 5.3% foraminal, and 2.7% for lateral. Recurrent localization tended to be relatively more paracentral at almost the exact locations. Migration was also more common, especially at the disc level, and also recurrence tended to occur at the disc level.

Conservative treatment is the primary choice for the management of lumbar disc herniation in appropriate cases. This approach includes rest, medication, and other treatments such as ultrasound, massage and subcutaneous electrical stimulation. Physical rehabilitation enhances the patient's muscle strength and stability, improves spinal mobility, and facilitates the overall functional recovery. Furthermore, incorporating proper posture and stretching training aids in maintaining spinal health and preventing future problems. This comprehensive treatment approach proves effective in symptom management and supports natural healing process of lumbar disc herniation, obviating the need for surgical intervention (13).

Although conservative treatment may reduce the indications for surgery, surgical intervention is unavoidable in certain situations. However, given the invasive nature of surgical treatment, it comes with potential complications (14). Consequently, this factor significantly influences the decision-making process for the surgeon and the patient when choosing between conservative and surgical approaches. Along with perioperative complications, the possibility of recurrence is also a negative factor in the patient decision-making process. Early recurrences, in particular, hold significance among these recurrence scenarios (6-8,4,10). Early recurrence not only delays the return of patients to their daily activities and work but may also affect the outcome of surgical treatment by inducing psychological effects related to a second surgery within a short period. Furthermore, in a study of 55 cases, Cunha et al. reported a higher risk of new recurrences in cases of early recurrent lumbar discopathy (15).

The treatment strategies for recurrent discopathies, especially early recurrences, have not been comprehensively evaluated. In the study conducted by Andre M. Samuel et al., which examined 62,690 lumbar discectomy

cases, early recurrence occurred in 599 cases (0.8%) within 1st 30-days. Revision discectomy was performed in 511 cases, while fusion surgery was performed in 88 (0.1%) (8). Vinas-Rios JM reported 115 (1.2%) early recurrences occurred after 9,310 lumbar discectomy operations. Revision surgery was performed in these cases, and 20 patients (17.6%) had dural tears (4).

Wang et al. reported early recurrence in 13 cases following surgical treatment out of 68 cases with recurrent lumbar disc herniation using the full endoscopic method. The 13 cases with early recurrence were treated using the same surgical technique. According to the modified MacNab criteria, 88.23% of patients showed excellent or good outcomes. However, recurrence occurred in three cases after three months, necessitating fusion surgery. They highlighted increased scar tissue in recurrent cases occurring after two weeks led to an increased rate of complications such as dural rupture, infection, and nerve damage (10).

Table 3 compares descriptive characteristics between the reoperation group (n=57) and the conservative treatment group (n=18) for early recurrent lumbar disc herniation. The gender distribution shows a trend towards a higher proportion of males in the reoperation than the conservative treatment (70.2% vs. 44.4%, $p=0.056$), suggesting a potential influence of gender on treatment choice. However, this did not reach any significance. Age distribution between the groups showed no difference, with most patients aged between 30 and 60 years. Regarding the side of disc herniation, there was a higher prevalence of left-sided herniation in both groups, although this difference was not significant. Analysis of the level of disc herniation revealed a higher frequency at the L4-L5 and L5-S1 levels in both groups, with no differences observed between them.

Additionally, the mean time to recurrence did not significantly differ between the groups (2.86 ± 2.01 months for the reoperation group vs.

4.74 ± 7.5 months for the conservative treatment group, $p=0.969$), indicating similar intervals between initial surgery and recurrence. Overall, while trends suggested potential factors influencing treatment choice, such as gender, the distribution of descriptive characteristics did not show differences between the reoperation and conservative treatment groups. Further investigation into the reasons behind treatment decisions, such as potential concerns regarding male work productivity, may provide additional insights into treatment preferences. In the literature, surgical treatment is preferred for managing early recurrent lumbar discopathy, and no studies about conservative treatment or comparative studies have been encountered. This is the first article in the literature regarding treatment strategies for early recurrent lumbar disc herniations. Additionally, it compares conservative and surgical treatments involved in the management of early recurrent lumbar disc herniations.

The initial clinical results of this study suggest that revision microdiscectomy is an effective procedure for alleviating early recurrent lumbar disc herniation that does not respond to the described treatment options. Nevertheless, this study has certain limitations. Patients in the groups were not randomized and ultimately selected based on surgeon and patient orientations. Adopting a rigorous approach with appropriate comparison groups is essential to obtain reliable findings. This was a single-center, retrospective study based on a single surgeon's experience and a more extensive prospective study should be conducted. Additionally, the limitations of our study include the potential impact of patient compliance with conservative treatment regimens and physical therapy on treatment outcomes. Furthermore, individual biases, fears or lack of confidence in conservative or surgical treatment modalities may have influenced treatment decisions and subsequent outcomes.

Conclusion

Early recurrent lumbar disc herniations are a rare but significant complication of surgical treatment for lumbar disc herniation. Revision microdiscectomy is a safe surgical technique for addressing early recurrent disc herniation, and a substantial proportion can be successfully treated through conservative approaches.

Conflict of Interest

The author declares no conflict of interest.

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