RESEARCH ARTICLE

Clinical Outcomes after Microdiscectomy for Recurrent Lumbar Disk Herniation: A Single-Center Study

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Abstract

Background: Revision discectomy is the principal procedure for recurrent lumbar disk herniation (RLDH). The clinical outcomes after this procedure are as good as or slightly poorer than those produced by primary discectomy. In this study, the clinical outcomes of patients treated with microsurgical discectomy for RLDH were analyzed.

Methods: We examined 179 patients undergoing lumbar microdiscectomy surgery for RLDH. The visual analogue scale (VAS), Prolo scoring system, and Oswestry Disability Index (ODI) were used for evaluating the improvement of symptoms and functional outcomes.

Results: Among 179 patients, 101 (56%) obtained good and excellent Prolo scores (group 1), while 78 (44%) obtained fair or poor results (group 2). There was no significant difference between the groups regarding age (*P=0.515*), gender (*P=0.545*), body mass index (*P=0.523*), diabetes mellitus (*P=0.074*), smoking (*P=0.100*), interval between primary and revision surgeries (*P=0.749*), and surgical outcomes (*P=0. 749*). However, significant improvements were achieved in VAS scores for back (*P=0.197*) and radicular pain (*P=0.606*), as well as ODI scores (*P= 0.000*). Based on the findings, only ODI scores showed a significant inter-group difference in the 12-month follow-up (*P=0.038*).

Conclusion: Limited microsurgical discectomy could be considered as the main surgical method in patients with RLDH without overt instabilities.

Level of evidence: IV

Keywords: Disc herniation, Lumbar, Outcome assessment, Recurrence, Revision surgery

Introduction

Researchers have proposed different definitions for recurrent lumbar disk herniation (RLDH). The usual definition is disk reherniation at the same level after surgery with the same or contralateral side pathology, causing radiculopathy after a minimum of 6 months without any pain complaints; however, this period is controversial (1-3). The incidence of RLDH is estimated to be 5–18% according to the follow-up duration (4-6). Surgical treatment is indicated in patients with continuous and severe pain, resistant to conservative treatment or cases with motor deficiencies (7).

Revision discectomy is the main therapeutic approach for RLDH. The clinical outcomes after this procedure

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are slightly poorer or as good as those after primary discectomy (8, 9). In this cohort study, the clinical outcomes of patients treated with microsurgical discectomy for RLDH were retrospectively analyzed, and the determinants of the outcomes were evaluated.

Materials and Methods

In this study, the clinical and radiological data of patients undergoing revision microdiscectomy for single-level RLDH were evaluated between March 2006 and August 2015. The consent forms were obtained from the subjects prior to the operation.

Among 208 patients undergoing microsurgical discectomy for RLDH, 179 (86%) were followed-up for at least 1 year. The senior author conducted all the procedures, using a microscopic technique, consisting of interlaminar fenestration extension, as needed and limited herniotomy.

Decision for surgery was made in accordance with the clinical presentation of sphincter dysfunction, significant motor impairment, low back pain and radicular pain with lack of response to medical treatment owing to RLDH at the same level, as indicated in the lumbosacral MRI after a minimum of 6 months without any complaints. MRI with and without contrast enhancement was used as the diagnostic imaging modality for LRDH in all patients; The results ruled out other probable causes such as fibrosis.

All the patients underwent dynamic radiographic evaluations, using posterolateral and lateral lumbosacral views (neutral, flexion, and extension) to exclude any transitional or rotational instability. The exclusion criteria consisted of: age<18 years; more than one recurrence; early recurrence (less than 6 months); lumbar disk herniation at another level; evidence of lateral stenosis or significant epidural fibrosis; evidence of instability on imaging before revision surgery; and undergoing primary surgery by a surgeon other than the senior author.

To evaluate back and leg pain, visual analogue scale (VAS) was applied to determine the severity of symptoms before and after primary revision surgeries, Oswestry disability index (ODI) and the Prolo scoring system were used to evaluate the perioperative functional outcomes (10, 11). Improvements in VAS and ODI scores were determined by measuring the difference in scores before and after revision surgery and after the follow-up (12 months). The participants were classified into four categories according to the Prolo scoring system: poor (2-4), moderate (5-6), good (7-8), and excellent (9-10). Excellent and good categories were considered as group 1 (successful), while fair and poor categories were classified as group 2 (failure).

Instability of the lumbosacral region on dynamic radiography was evaluated as described by Mullin et al (12). Based on the criteria introduced by Grogan and colleagues, the facet joint degeneration was examined on MRI images (13). Chi square and unpaired student t test were performed, using SPSS 16 (IBM Corp, Armonk, New York, USA). The significance level was defined as $P<0.05$.

Results

Among 179 patients, 103 (57.5%) were male and 76 (42.5%) were female (mean age, 51.39 years; range: 34-69 years). The mean interval between the primary and revision surgeries was 28.45±17.80 months (range: 74 months). Fifty-four patients (30%) were smokers, and 25 (14%) had diabetes mellitus (DM). Fifteen (8.3%) patients underwent accidental durotomy without any major complications after revision surgery (such as cerebrospinal fluid leak or infection). The RLDH level was L4–L5 in 105 (58.7%), L5–S1 in 59 (33.0%), and L3–L4 in 15 (8.4%) patients.

According to VAS and ODI scores, none of the subjects showed any signs of deterioration after revision surgery. According to the Prolo scoring system, 101 patients (56%) attained excellent or good results (group 1), while 78 (44%) attained fair or poor results (group 2).

Additionally, we investigated age, gender, smoking, BMI, diabetes mellitus (DM), and the interval between the primary and revision surgeries. These variables showed no significant difference in the outcomes ($P=0.749$) [Table 1]. Based on the VAS scores decreases in the back and radicular pain after revision surgery were 5.25±1.70 ($P=0.197$) and 7.56±1.12 ($P=0.606$), respectively. Also, ODI scores decreased to 45.04±19.97 in all patients [Table 2]. In the follow-up, a significant

Table 1. Demographics of microsurgical discectomy for Recurrent Lumbar Disc Herniation

	Group 1	Group 2	*P value*
Age	51.09± 7.24	51.78± 6.78	0.515
Sex (F/M)	45/56	31/47	0.545
BMI	27.68±3.48	27.36 ±3.18	0.523
DM	10	15`	0.074
Smoking	25	29	0.100
Symptoms duration	28.82 ± 17.930	27.96 ± 17.727	0.749

F/M: Female/Male ratio, BMI: Body Mass Index, DM: Diabetes Mellitus

Table 2. Oswestry Disability Index (ODI), Visual Analogue Scale (VAS) after one-year follow up

	Group 1	Groupe2	*P value*
Preoperative Back VAS	7.22 ± 1.439	7.12 ± 1.441	0.638
Postoperative Back VAS	1.86 ± 0.762	2.00 ± 0.822	0.245
Back VAS Difference	5.35 ± 1.76	5.11 ± 0.98	0.35
Preoperative Leg VAS	9.27 ± 0.948	9.24 ± 0.948	0.87
Postoperative Leg VAS	1.73 ± 0.598	1.64 ± 0.664	0.334
Leg VAS Difference	7.53 ± 1.19	7.60 ± 1.06	0.689
Preoperative ODI	78.44 ± 10.925	77.17 ± 11.53	0.453
Postoperative ODI	30.55 ± 17.11	35.79 ± 23.31	0.098
ODI Difference	47.88 ± 16.63	41.37 ± 23.22	0.038

Table 3. Radiologic characteristic of microsurgical discectomy for Recurrent Lumbar Disc Herniation before revision surgery

	Group 1	Group 2	*P value*
Level			
L3-L4	7	8	0.70
L4-L5	61	44	
L5-S1	33	26	
Facet hypertrophy	34	44	0.04
Modic change			
No modic	24	32	0.04
Type1	1	1	
Type2	22	26	
Type 3	43	19	
Rotational translation	6.25 ± 1.982	6.44 ± 2.283	0.56
Disc height	9.56 ± 1.389	9.53 ± 1.192	0.84

difference in ODI scores was seen between the two groups (*P=0.038*).

The association of radiological characteristics and functional outcomes is presented in Table 3. There were no significant difference in facet hypertrophy (*P=0.040*) and modic changes (*P=0.040*) between the two groups.

Discussion

This study assessed patients undergoing microsurgical discectomy for RLDH at the same level. We aimed to evaluate the clinical results and the probable determinants with respect to Prolo scores and changes in ODI and VAS scores. Although open standard discectomy, microsurgical or endoscopic discectomy, and discectomy with fusion are the accepted treatment methods for RLDH after failure of medical treatment or significant neurological deficits, the optimal management strategy remains controversial (14, 15).

In recent years, researchers have introduced less invasive strategies for surgical treatment of RLDH (16-18). Microsurgical discectomy can be considered as an acceptable technique for RLDH in patients without overt clinical and radiological evidence of instability.

In this study, 56% of patients obtained excellent or good results, while 44% had fair or poor outcomes. Compared with the outcomes of those who had undergone revision surgery for the first time, the outcomes of our patients were compatible with those reported by Buchmann et al. (good and excellent outcomes, 55%), Ibramin et al., and Baba et al. (good and excellent outcomes, 64%) (7, 16, 19). However, Gue et al. and Ozgen et al. reported more successful results (70% and 80%, respectively) than the present study (20, 21).

In our study, improvement in back and leg VAS scores was significant, with postoperative scores of 1.9 and 1.69, respectively. A few studies have reported changes in VAS or ODI scores after revision surgery. In our

review, the improvement in VAS scores was better than the results of other open revision surgeries; however, it was similar to that of endoscopic or microsurgical lumbar discectomy (as a surgical method for revision surgery with limited discectomy) (3, 7, 22, 23).

This study demonstrated that limited microscopic discectomy without aggressive curettage of the disk space showed greater improvement in postoperative pain. As some researchers have shown, radical discectomy can augment the severity of postoperative back pain by inducing hypermobility at the involved level (2, 7, 24).

In clinical practice, fixation of the involved level is mostly considered in the treatment of second or third RLDH, while some scholars believe that stabilization is an acceptable method after first-time RLDH to reduce the severity of back pain after revision surgery (24). Nevertheless, Guan et al. demonstrated that pain reduction and functional outcomes were similar in patients with first-time RLDH who underwent repeated discectomy or instrumentation with discectomy (18). These findings are similar to those reported in some previous studies, especially for back pain improvement (3, 25). Our review showed that microsurgical discectomy produced favorable outcomes in most patients with first-time RLDH, who had no overt instability in the preoperative evaluation. Therefore, we do not recommend instrumentation for the first revision surgery.

One of the limitations of the present study was the retrospective design, with no consideration of other outcome rating systems (such as SF-36 or Japanese Orthopedic Association scoring system). Also, patients' occupation, workers' compensation claims, and psychosocial status might have negatively affected the functional outcomes after surgery.

This retrospective study demonstrated that limited microsurgical discectomy could be considered as the main surgical method in patients with RLDH without overt instability. Although satisfactory outcomes could be achieved in most patients, the outcomes are less favorable than primary discectomy.

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