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Recurrent Lumbar Disc Herniation in Results of Revision Discectomy To Postoperative Status

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Abstract: **Background:** Recurrent lumbar disc herniation (RLDH) is one of the most common spinal disorders following dise surgery. It is a major disabling condition as it impairs significantly with daily activities. But the management of recurrent lumbar disc herniation remains still controversial. **Aim:** To evaluate the recurrent lumbar disc herniation in results of revision discectomy to postoperative status. **Methods:** This prospective interventional study was conducted in department of Orthopaedic Surgery, BSMMU, Dhaka from October 2017 to September 2019. A total of 22 cases of RLDH having the inclusion criteria were taken as sample after diagnosing clinically, radiologically and with MRI. Outcome of low back pain (LBP) and radicular pain was measured by visual analogue score (VAS) and overall clinical outcome by Japanese Orthopaedic Association (JOA) score. Statistical analysis was done by using statistical package for social science (SPSS-25). The results were expressed as frequency, percentage and mean ± SD. Level of significance was calculated at confidence interval of 95% and $p< 0.05$.

Results: Follow up period was at least 06 months. Age of patients ranges from 35-70 years with mean age 51.1±19.7 years; 68.2% were male and 31.8% were female. Heavy workers were 54.5%, light workers 18.2% and house wives 27.3% with L_4-L_5 level involvement in 54.5% patients and L_5-S_1 in 45.5% patients. 77.3% subjects had BMI >30 kg/m² and 22.7% had ≤30 kg/m² with mean BMI 31.2±1.5 kg/m². In this study, Tobacco, diabetes and hypertension were found highly associated with recurrent disc herniation. 14 (63.6%), 11 (50%) and 13 (59.1%) patients were found as tobacco users, diabetic and hypertensive. In this study, interval between primary discectomy and RLDH was 6-12 months in 8 (36.4%) patients, 13-24 months in 10(45.45%), 25-36 months in 3(13.64%) and >36 months in 1(4.55) patient with mean interval 17.18±8.47 months. Majority (77.3% and 54.5%) of the study subjects had preoperative VAS score 7-10 and postoperative VAS score was 1 to 3 respectively. Pre and postoperative mean (+ SD) VAS score was 7.86±1.36 and 2.77±1.86 respectively. This indicated a significant difference between the two groups. Majority (72.7% and 63.2%) of the study subjects had preoperative VAS score 7-10 and postoperative VAS score was 1 to 3 respectively. Pre and postoperative mean (+ SD) VAS score was 7.5911.64 and 1.95+1.65 respectively. This indicated a significant difference between the two groups. In this study, only 4 (18.18%) patients developed postoperative complications. Among them, 1(4.55%) patient developed postoperative instability, 1 (4.55%) patient developed dural tear & transient neurological deficit and 2 (9.09%) patients developed postoperative superficial wound infection.To determine the surgical outcome of the study, excellent and good grades were treated as satisfactory, fair and poor grades were treated as unsatisfactory. So, a total number of 20 (90.9%) patients were in the satisfactory group and only 2 (9.1%) patients were in the unsatisfactory group. **Conclusions:** After analyzing the results of present study, it can be concluded that revision discectomy is an effective procedure with very satisfactory functional results for management of patients with recurrent lumbar disc herniation.

Key words: Recurrent, Lumbar Disc Herniation, Revision Discectomy.

INTRODUCTION

Recurrent lumbar disc herniation (RLDH) is defined as disc herniation at a previously operated disc level in lumbar spine, regardless of ipsilateral or contralateral herniation, in patients who experienced a pain-free interval of at least 6 months after

surgery. Recurrent disc herniation is a significant problem, as scar formation may lead to increased morbidity after traditional posterior reoperation. Furthermore, persistent low back pain or re-recurrent sciatica may develop in some cases after repeated surgery [1,2,3]. Recurrent lumbar disc herniation may occur in 5% to 15% with overall unsatisfactory outcome after primary lumbar discectomy is 5% to 20%[1,4]. and so RLDH is a major contributor to debilitating pain, disability and reoperation following primary surgery. It is therefore an important factor in determining postoperative success. This type of complication also is a significant burden on the health care system. The clinical feature of patients with RLDH was almost same with those of primary disc prolapse and the typical sciatic pain was often the major complaint of the patients. Some patients develop both sciatic pain and intermittent claudication [5]. Several important prognostic factors are influencing the outcome of discectomy. These included herniation level, technique and amount of discectomy, smoking, revision surgery, obesity, Lasegue's test, duration of sciatica, anxiety and depression [6]. It seems that factors such as age, gender and severity of preoperative muscular weakness have no significant effect on prognosis [7]. Diagnosis of the cause of recurrent back pain is still difficult. Many causes of recurrence of back pain after surgery have been recorded; recurrent disc herniation and postoperative fibrosis are the two major ones. It is important to distinguish these two entities as disc herniation may require re-operation, whereas postoperative fibrosis does not. MRI imaging appeared to be the examination of choice in the investigations of spine and disc diseases especially in recurrent disc prolapse. MRI with contrast (Gadolinium enhanced MRI) may differentiate post operative fibrosis from recurrent herniation [8]. However, the study population included associated pathologies such as epidural fibrosis, foraminal stenosis, herniation at different levels and instability that may have confounded the results [8, 9]. Cinotti et al [10] found that revision discectomies were similar to those following primary discectomies. Suk et al [1] also found no significant differences in pain-free interval, length of stay or clinical improvement between the 2 procedures, but an increase in length of surgery for revisions. More recently, Papadopoulos et al (2006)[8] found that those undergoing revision surgeries had similar postoperative satisfaction (80% vs 85% reporting definite improvement, respectively) despite significant differences in residual leg numbness and frequency of back pain. Patel et al [9] also reported significant improvements in outcome scores for both primary and revision surgeries and that there was no significant difference between the 2 procedures. As such, many authors advocate that repeat discectomies can be used as an effective treatment for recurrent disc herniation.

Materials and Methods

Study design: Prospective study.

Types of study: Interventional study.

Study period: October 2017 to September 2019.

Place of study: This study was carried out in the Department of Orthopaedic Surgery at BSMMU, Shahbag, Dhaka, Bangladesh.

Sample: Patient with recurrent lumbar disc herniation.

Sample size: So, finally sample size was = 22.

Study population: Patients attended at the department of Orthopaedic Surgery at BSMMU, Shahbag, Dhaka for the treatment of recurrent Iumbar disc herniation by revision discectomy within the defined period.

Inclusion criteria:

1. Patients with recurrent low back pain at previously operated disc level with radiculopathy, 6 months after surgery with positive MRI findings.
2. Patients with recurrent low back pain at previously operated disc level with neurological deficit, 6 months after surgery with positive MRI findings.

Exclusion criteria:

1. Patient with recurrent disc prolapse at levels other than L_4 to S_1
2. Patients with spondylolysthesis.
3. Reoperation for infections, discitis.
4. Patients with low back pain without radiation in legs.
5. Patients with inflammatory diseases, prior fracture in spines at same level, deformity due to generalized disc degeneration or other structural deformity, extensive myofascial pain and herniation at a different level.
6. Patients with prior records of surgery in spine other than those with primary discectomy at the same level and with surgery due to multilevel herniation.
7. Patients with other pathology such as infection, tumor.

Methodology

This prospective interventional study was carried out at the Department of Orthopaedic Surgery at BSMMU, Shahbag, Dhaka within the defined period with complains of recurrent lumbar disc herniation. These patients were operated previously by different surgeons in different hospitals. The patients were selected on the basis of the inclusion and exclusion criteria. The patients were diagnosed clinically and radiologically. After taking informed consent, detail history and physical examination of each patient was performed. Plain radiographs and MRI of lumbo- sacral spine was performed in all patients. MRI with contrast was performed in suspected cases of fibrosis. All necessary investigations for surgery were performed before operation. A structured case record form (Appendix IV) was used to interview and collect data. Patients were interviewed and case record form was filled up by the interviewer. Outcome of low back pain and radicular pain after revision surgery was measured and compared by using visual analogue score (VAS) (Appendix V) and overall clinical outcome by Japanese Orthopaedic Association (JOA) score (Appendix VI). These results were classified into a four grade scale: Excellent ≥90%, good 75- 89%, fair 50-74%, and poor ≤49% [11]. All the data was compiled and sorted properly and the quantitative data was analyzed statistically by using Statistical Package for Social Science (SPSS-25). The results were expressed as frequency, percentage and mean ± SD and level of significance was calculated at confidence interval of 95% and $p<0.05$.Paired Student's t-test was performed to compare continuous variables between the groups and Z proportion test was performed to compare the proportion between the groups.

Post-operative data collection: The patients were followed up at 1" to 4th POD, at 1, 3 and 6 months. Pain evaluation was measured and compared with preoperative status by VAS. Clinical symptoms and signs were evaluated postoperatively by using the criteria of the JOA score. These results were classified into a four grade scale: Excellent improvement ≥90%, good 75-89%, fair 50-74%, and poor ≤ 49% [11].

Statistical analysis: All the data were compiled and sorted properly and the quantitative data were analyzed statistically by using Statistical Package for Social Science (SPSS-25). The results were expressed as frequency, percentage and mean ± SD and level of significance was calculated at confidence interval of 95% and p<0.05.Paired Student's t-test was performed to compare continuous variables between the groups and Z proportion test was performed to compare the proportion between the groups.

Results

Table-1: Demographic characteristics of the study population (n=22)

Age (Years)	Percentage n (%)
35-45	8 (36.4%)
46-55	8 (36.4%)
56-65	4 (18.2%)
66-70	2 (9.1%)
Mean±SD	51.1±9.7
Sex	
Male	15(68.2%)
Female	7(31.8%)
Occupation	
Hard work	12(54.5%)
Medium strenuous worker	6(27.3%)
Light worker	4(18.2%)
Level of Involvement	
L4-5	10(45.5%)
L5, S1	12(54.5%)
Time interval	
6-12 months	8 (36.40%)
13-24 months	10 (45.45%)
25-36 months	3 (13.64%)
>36 months	1 (4.55%)
Mean+SD	17.18±8.47
BMI (kg/m²)	
≤30	5 (22.7%)
>30	17 (77.3%)
Mean±SD	31.2±1.5

Results were expressed as frequency, percentage and mean ± SD.

In this study, out of 22 patients 8 (36.4%) were 35-45 years of age, 8 (36.4%) were 46- 55years, 4 (18.2%) were 56-65 years and 2 (9.1%) were 66-70 years old. The mean (± SD) age of the patients was 51.1±9.7 years and the youngest and the oldest patients were 35 and 70 years respectively. Among 22 subjects, majority of the study subjects 15 (68.2%) were male and only 7 (31.8%) were female. Among 22 subjects, Heavy workers were 12 (54.5%), light workers 4 (18.2%) and house wives 6 (27.3%). In this study, 12 (54.5%) subjects had recurrent lumbar disc herniation between L_4 and L_5 spine and 10 (45.5%) subjects had recurrent lumbar disc herniation between L_5 and S_1 spine. In this study, interval between primary discectomy and RLDH was 6-12 months in 8 (36.4%) patients, 13-24 months in 10(45.45%), 25-36 months in 3(13.64%) and >36 months in 1(4.55) patient with mean interval 17.18±8.47 months. Majority of the study subjects 17 (77.3%) had BMI >30 kg/m² and only 5 (22.7%) had BMI ≤30 kg/m². The mean (±SD) BMI of the study subjects was 31.2 (±1.5).

Table 2: Distribution of study population according to highly associated factor (n=22)

Associated factors		Study subject n (%)	p value
Tobacco user	No	8 (36.4%)	0.07
	Yes	14 (63.6%)	
DM	No	11 (50%)	1.00
	Yes	11 (50%)	
HTN	No	9 (40.9%)	0.23
	Yes	13 (59.1%)	

Results were expressed as frequency, percentage and mean±SD. Z proportion test was performed to compare proportion between the groups and p value <0.05 was accepted as level of significant. In this study, Tobacco, diabetes and hypertension were found highly associated with recurrent disc herniation. 14 (63.6%), 11 (50%) and 13 (59.1%) patients were found as tobacco users, diabetic and hypertensive.

Table 3: Distribution of study population according to VAS score for Low back pain (n=22)

VAS score	Preoperative	Postoperative	p value
0 (no pain)	0 (0%)	3 (13.6%)	

1 to 3 (mild pain)	0 (0%)	12(54.5%)	
4 to 6 (moderate pain)	5 (22.7%)	7 (31.8%)	
7 to 10 (severe pain)	17 (77.3%)	0 (0%)	
Mean ± SD	7.86±1.36	2.77 ±1.86	<0.001

Results were expressed as mean ± SD. Paired Student's 't' test were performed to compare pre and final postoperative follow-up. Level of significance was calculated at p value <0.05. n= study subjects.

Majority (77.3% and 54.5%) of the study subjects had preoperative VAS score 7-10 and postoperative VAS score was 1 to 3 respectively. Pre and postoperative mean (± SD) VAS score was 7.86±1.36 and 2.77±1.86 respectively. This indicated a significant difference between the two groups.

Table 4: Distribution of study population according to VAS score for radicular pain (n=22)

VAS score	Preoperative	Postoperative	p value
0 (no pain)	0 (0%)	4 (18.2%)	
1 to 3 (mild pain)	0 (0%)	14(63.6%)	
4 to 6 (moderate pain)	6 (27.3%)	4 (18.2%)	
7 to 10 (severe pain)	16 (72.7%)	0 (0%)	
Mean±SD	7.59±1.64	1.95± 1.65	<0.001

Majority (72.7% and 63.2%) of the study subjects had preoperative VAS score 7-10 and postoperative VAS score was 1 to 3 respectively. Pre and postoperative mean (+ SD) VAS score was 7.5911.64 and 1.95+1.65 respectively. This indicated a significant difference between the two groups.

Table-5: Distribution of study population according to postoperative complications (m=22)

Parameters	Study subjects n (%)
No complications	18 (81.82%)
Postoperative instability	1 (4.55%)
Dural tear & transient neurological deficit	1 (4.55%)
Superficial wound infection	2 (9.09%)
satisfactory	20 (90.9%)
unsatisfactory	2 (9.1%)

Results were expressed as frequency and percentage.

In this study, only 4 (18.18%) patients developed postoperative complications. Among them, 1(4.55%) patient developed postoperative instability, 1 (4.55%) patient developed dural tear & transient neurological deficit and 2 (9.09%) patients developed postoperative superficial wound infection. To determine the surgical outcome of the study, excellent and good grades were treated as satisfactory, fair and poor grades were treated as unsatisfactory. So, a total number of 20 (90.9%) patients were in the satisfactory group and only 2 (9.1%) patients were in the unsatisfactory group.

Discussion

The results of current study demonstrate that mean (±SD) age of the patients was 51.1 (9.7) years with the youngest and the oldest patients were 35 and 70 years of age respectively. The recurrent lumbar disc herniation occurs in adult aged population. Almost similar to the findings observed by the various investigators from different countries [5, 12]. Majority of the study subjects 15 (68.2%) were male and only 7(31.8%) were female which was similar to the findings of Khayat et al and Mashhadinezhad et al [5,13]. Occupational categorization was done according to Heavy workers (such as Farmers, day laborers and heavy weight lifters); Medium strenous workers (as in house hold works and house wives) and Light weight workers (as in sedentary worker with sitting and constant postures). among 22 subjects, Heavy workers were 12 (54.5%), light workers 4 (18.2%) and house wives 6 (27.3%) which were similar to the findings of Shimia et al and Khayat et al [4,5] who explained repeated weight lifting, and heavy works as predictors for RLDH. In this study, 12 (54.5%) subjects had recurrent lumbar disc herniation at L4-L5 spine and 10 (45.5%) at L_5-S_1 spine. Khayat et al [5] found that L4-L5 was the most affected level for recurrent lumbar disc herniation which is similar to my findings. As sharp change of direction of curvature of spine at L_4-L_5, no hooking effect as in L_5-S_1 and when sacralization present, it is the last most mobile segment; which explains the cause of commonest occurrence at this level. 14 (63.6%), 11 (50%) and 13 (59.1%) patients were found as tobacco users, diabetic and hypertensive accordingly and were found to be highly associated with recurrent disc herniation in my study. Meredith et al [14] found that obesity had a strong correlation with recurrent herniation of nucleus pulposus (HNP). Individuals in the study with a body mass index (BMI) ≥30 were 12 times more likely to sustain recurrent HNP and 30 times more likely to require reoperation compared with non-obese individual. Mobbs et al [15] reported higher rates of LDH recurrence and reoperation in diabetics (28%) compared with controls (3.5%). Miwa et al [16] found that current smokers had a postsurgical herniation recurrence rate of 18.5% versus nonsmokers. Their findings are consistent with my study and also with other studies that have suggested that smoking is a predictive factor for recurrent herniation. Shimia et al [4] mentioned that hypertension is significantly associated with LDH and occlusion of small caliber vessels arising from distal aorta. Considering these facts they hypothesized that hypertension could affect RLDH which is an agreement to my findings. Regarding recurrence time of herniation to primary surgery, mean recurrence period was 17.18±8.47 months which was almost similar to the findings of El Shazly et al [3]; Mashhadinezhad et al [13] and many other authors. In present study, final outcome was determined by excellent and good

according to recovery rate assessing from JOA score and treated as satisfactory, while fair and poor grade was treated as unsatisfactory. Majority (90.9%) of the study population was found as satisfactory group at the end of the final follow-up period which is almost similar to the findings observed by the various researchers of different countries [5,13,17,18,19].

Conclusions

After analyzing the results of present study, it can be concluded that revision discectomy is an effective procedure with satisfactory functional results for management of patients with recurrent lumbar disc herniation.

Limitations

Although optimal care had been tried by the researcher in every steps of the study, but there were some limitations:

- Study was conducted in a selected hospital. So, the study population might not represent the whole community.
- The sample was taken purposively. So, there may be chance of bias which can influence the results.
- The study and follow-up period was short in comparison to other studies.

Recommendations

To make more conclusive results the following recommendations are proposed for further studies:

- Similar type of study can be done with large sample size and long period of follow-up.
- A comparative study can be done with other surgical procedure to compare the safety and satisfactory outcome of recurrent lumber disc herniation.
- Multicentre based study can be done.

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