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# OUTCOME OF MANAGEMENT OF PROLAPSED LUMBAR INTERVERTEBRAL DISC (PLID) BY LAMINOTOMY AND DISCECTOMY

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## ABSTRACT

**Background:** Lumbar intervertebral disc prolapse is a common problem that is encountered by spinal surgeon. Medical treatment is usually the first line on management. Surgical approaches are preserved to cases with failure of conservative treatment or those with overt neurological deficits. There is no uniform agreement among surgeons about the optimal treatment. **Objective:** To evaluate the results of laminotomy and discectomy for the treatment of prolapsed lumbar intervertebral disc (PLID). **Materials and Methods:** This is a prospective observational study was conducted for two years at Dhaka Medical College Hospital, Dhaka between July 2016 to June 2018 with total number of twenty of prolapsed lumbar intervertebral disc (PLID) patients who underwent lumbar decompression by laminotomy and discectomy. Regular follow up was done for each patients at least 6 months after operation to assess the functional outcome by Macnab criteria, VAS and ODI. **Results**: The mean±SD age was 42.59±8.17 years, range 32-60 years, 79% male and 21% female patients. Maximum number of 48% of patients were in the age group between of 31 to 40 years. Majority (69%) of patients had disc prolapse at level L4/5 followed by 17.2% at L5/S1 level. Outcome, according to modified Macnab criteria, 79.3% of patients had excellent result, 13.8% good and 6.9% fair and no patient had poor outcome. **Conclusion:** This is study showed favorable outcome following laminotomy and discectomy for lumber disc prolapse.

**KEYWORDS:** Prolapsed lumbar, laminotomy, discectomy.

## INTRODUCTION

A disc herniation is the term given to any uneven out-pouching or bulging of posterior region (back region) of the intervertebral disc as seen on MRI. The bigger the lumber/sacral disc herniation, the more likely it is to cause back and/or leg pain-the latter of which is called sciatica.[1] A disc herniation occurs when the jell-like center of the intervertebral disc (nucleus pulposus) tears its way through the back –outer portion of the disc (annulus fibrosus) and invades the space (anterior epidural space in spinal canal) where the delicate nerve structures live. The four main classification of disc herniation are bulging, protrusion (contained herniation or sub-ligamentous herniation), extrusion (non-contained herniation or trans-ligamentous herniation), sequestrasion (free fragment).[2]

The neural symptoms are due to compression of the nerve root adjacent to the disc. When the herniated disc compresses the nerve root, it causes electric shooting pains down the leg. It can also cause numbness and weakness in the leg.

In extreme cases, herniated disc can encroach on groups of nerve bundles passing low in the spinal canal to cause "cauda equina syndrome"

When such conservative treatments failed to improve symptoms for a period at least three weeks, usually for more than six weeks, surgical treatments have to be considered.[3]

Since the first publication of intervertebral disc surgery by Mixter and Barr (1934) various techniques developed.[4] The techniques are- laminotomy and discectomy,

fenestration and discectomy, microdiscectomy, endoscopic discectomy, percutaneous discectomy, laser discectomy and chemonucleolysis.

In percutaneous lumber discectomy, it is difficult to ensure complete nerve root decompression and indication are also limited. Chemonucleolysis (intradiscal injection of chymopapain to dissolve most herniation) now it is not recommended because of its complications-anaphylaxis and transverse myelitis.

Although laser discectomy are being developed but no randomized trial have been published and it is not suitable for extruded sequestrated disc.

## MATERIAL AND METHODS

**Study design**: Prospective observational study.
**Place of the study**: Department of Orthopaedic Surgery, Dhaka Medical College Hospital, Dhaka.
**Duration of the study**: From July 2016 to June 2018.
**Ethical issue**: Protocol was approved by the ethical committee of the Dhaka Medical College.
**Study Population**: Patients with clinical and radiological evidence of prolapse lumbar intervertebral disc (PLID).
**Sample size**
Due to limitation of time and scarcity of patients final sample size was taken 29.
(Haque M, 2009)

**Sampling technique**: Purposive sampling (non-randomized) according to availability of the patients and strictly considering the inclusion and exclusion criteria.

**Data Collection Procedure**: Data will be collected with pre-tested structured questionnaire containing history, clinical examination, laboratory Investigations, pre-operative, post-operative follow up findings and complications.

**Selection criteria for the subject**
**Inclusion Criteria**

- Adult age (30-60) years
- Both male and female.
- Sign of root compression- involvement of sensory, motor and reflexs.
- Deteriorating signs and symptoms of patient of PLID where leg pain is dominant than back pain.
- Restricted SLR (straight leg rising) test with positive MRI findings (showing compressive central stenosis with or without lateral recess stenosis) refractory to 3 weeks of conservative treatment.
- PLID with more than one level, unilateral or bilateral.
- PLID with stenosis (Central, Lateral or Foraminal)
- PLID with larged or extruded disc.
- PLID with cauda equina syndrome.

**Exclusion Criteria**

- Previous laminotomy and discectomy or any other modalities.
- PLID due to direct trauma with fracture-dislocation of vertebrae.
- PLID associated with other spinal pathology i.e., spinal tumour, active infection or serious underlying disease, auto- immune affection.

**Statistical analysis**
Statistical analysis was carried out using the SPSS (Version 22) statistical package. Categorical variables were expressed as frequency and percentage. Continuous variables were expressed as mean±SD and compared by Paired t-test. A significance level at $p < 0.05$ was used in all statistical analysis at 95% confidence interval.

## RESULTS

**Table I: Age of the study subjects (n=29)**

| Age group (in year) | Frequency | Percentage (%) |
|---|---|---|
| 31-40 | 14 | 48.3 |
| 41-50 | 10 | 34.5 |
| 51-60 | 5 | 17.2 |
| Total | 29 | 100.0 |
| Mean±SD | 42.59±8.17 | |
| Range (min-max) | (32-60) | |

The mean age of the patients, was 42.59±8.17 years ranging from 32-60 years. Data indicated that maximum number of the patients was in age group 31-40 years (48.3%) followed by 34.5% in the age group 41-50 years and 17.2% were in the age above 50 years.

**Gender of the study subjects**

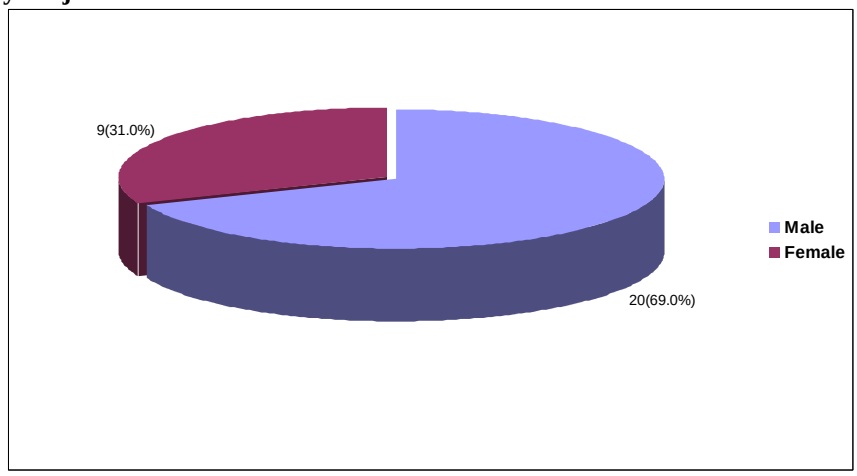


**Figure 1: Gender of the study subjects (n=29)**

Among 29 patients 20(69.0%) were male and 9(31.0%) were female.

**Table-II: Occupation of the study subjects (n=29)**

| Occupation | Number of cases | Percentage |
|---|---|---|
| Manual worker | 14 | 48.3 |
| Sedentary worker | 6 | 20.7 |
| Housewife | 9 | 30.0 |
| Total | 29 | 100.0 |

In this study 23(79.3%) patients belonged to manual working and 6(20.7%) belonged to the sedentary population and 30.0% patients were housewife.

**Table-III: Motor weakness and level of sensory deficit of the study subjects (n=29)**

| Variables | Number of cases | Percentage |
|---|---|---|
| Motor weakness | | |
| Extensor hallusis longus | 19 | 65.5 |
| Flexor hallusis longus | 7 | 24.1 |
| None | 3 | 10.3 |
| Level of sensory deficit | | |
| L3,L5,S1 | 1 | 3.4 |
| L5 | 19 | 65.5 |
| L5 and S1 | 3 | 10.3 |
| S1 | 4 | 13.8 |
| None | 2 | 6.9 |
| Total | 29 | 100.0 |

Clinical examination of the patients indicated that 19(65.5%) had extensor hallusis longus weakness and 7(24.1%) had flexor hallusis longus weakness. However, 2(6.9%) had normal motor function. On the contrary 19(65.5%) had sensory deficit along the L5 root distribution, 4(13.8%) of patients had sensory deficit along S1 root distribution and 3(10.3%) patients had sensory deficit along both L5 and S1 root distribution. However, 2(6.9%) had intact sensory function.

**Operative findings**

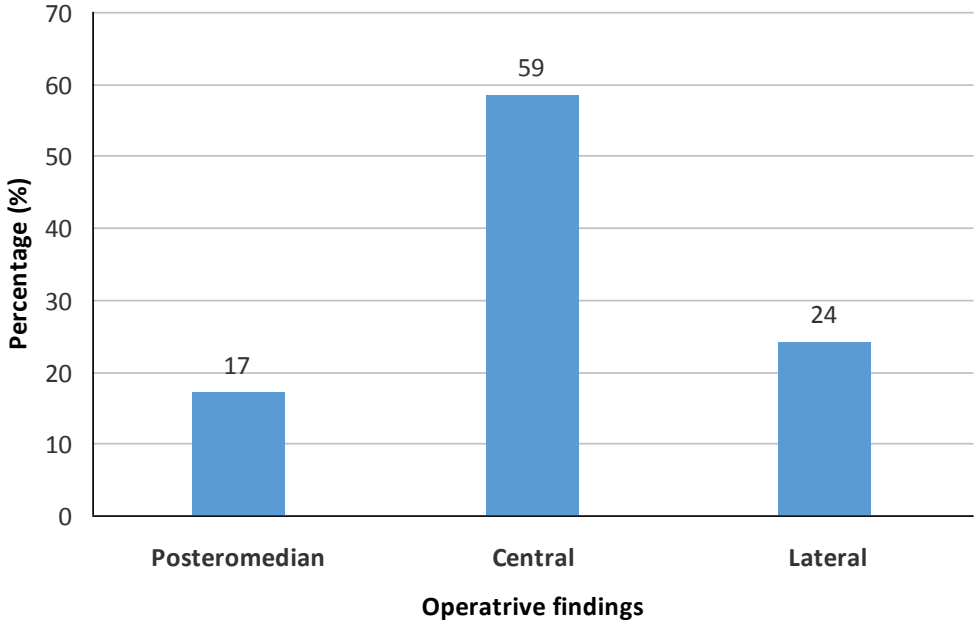


**Figure 2: Operative findings (n=29)**

This figure 5.4 showed that most of patients had central disc prolapse 59% followed by 24% had lateral disc prolapse and 17% posterlateral disc proplaspe.

**Follow up and observation**
**Pain (Assessed by VAS)**
**Table IV: Pain in different visit (n=29)**

| Pain score | Preoperative | | 1st visit | | 2nd visit | | 3rd visit | |
|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | | n |
| Absent (0) | 0 | 0.00 | 0 | 0.00 | 16 | 55.5 | 27 | 93.1 |
| Occasional (1) | 0 | 0.00 | 3 | 10.3 | 5 | 17.2 | 0 | 0.00 |
| Mild (2) | 0 | 0.00 | 25 | 86.2 | 8 | 27.6 | 2 | 6.9 |
| Moderate (3) | 29 | 100.0 | 1 | 3.4 | 0 | 0.00 | 0 | 0.0 |

The patients were followed at least 3 follow up visit following discharge from the hospital. The pain was scored as absent as '0', occasional '1' mild '2' and moderate '3'. Data analysis found that preoperatively, all the patients had pain. However, following operation pain subsided significantly. 55.5% of the patients observed no pain at 2nd visit and it increased to 93.1% at 3rd visit. Repeated measure one way analysis of variance showing that pain significantly decreased from preoperative to 1st visit ($p<0.001$) and also decreased significantly from 1st visit to 2nd visit and subsequent visit ($p<0.005$) shown as marginal estimated mean score.

**Table-V: Repeated measure of analysis of variance of pain score in different visits (n=29)**

| Stage | Pain score Mean ±SD | P value |
|---|---|---|
| Pre operative | 3.00±0.0 | |
| Postoperative 1st visit | 1.79±0.62 | 0.001s |
| Postoperative 2nd visit | 1.07±0.84 | 0.001s |
| Postoperative 3rd visit | 0.24±0.64 | 0.001s |

p-value reached from Paired t-test, s= significant

The mean VAS score was 3.0±0.0 preoperatively, 1.79±0.62 during 1st visit, 1.07±0.84 during 2nd visit and 0.24±0.64 during 3rd visit. Repeated measure one way analysis of variance showing that pain significantly decreased from preoperative to 1st visit ($p<0.001$) and also decreased significantly from 1st visit to 2nd visit and subsequent visit ($p<0.005$) shown as marginal estimated mean score.

**Table VI: Mobility in different visit (n=29)**

| Mobility | Preoperative | 1st visit | 2nd visit | 3rd visit |
|---|---|---|---|---|
| **Restricted (0)** | 29(100.0%) | 29(100.0%) | 8(27.6%) | 2(6.9%) |
| **Normal (1)** | 0(0.0%) | 25(86.2%) | 21(72.4%) | 27(93.1%) |

Similar to muscle spasm it was found that all of the patients 29(100.0%) had restricted mobility of the spine. However, following 1st and subsequent visit, it significantly improved. 29(100%) restricted in preoperative and 1st visit, 8(27.6%) in second visit and 2(6.9%) patients had mobility restriction in 3rd visit.

**Table VII: Mean of straight leg raising in different visit (n=29)**

| SLR | Preoperative | 1st visit | 2nd visit | 3rd visit |
|---|---|---|---|---|
| **Mean±SD** | 42.6±6.3 | 74.8±5.7 | 83.1±5.4 | 89.3±2.6 |
| **Range** | 20-60 | 70-90 | 70-90 | 80-90 |

All the patients were examined for straight leg raising (SLR) on supine position. Preoperatively, all patients had mean SLR was 42.6±6.3 degree. However, following operation the SLR significantly improved from baseline to 89.3±2.6 (all patients) at 3rd visit.

**Table-VIII: Comparison of preoperative and postoperative ODI (Appendix-XII) (n=29)**

| | Pre operative (n=29) Mean±SD | Post operative (n=29) Mean±SD | p value |
|---|---|---|---|
| ODI | 30.1±4.10 | 16.9±2.82 | <0.001* |

Data were expressed as mean±SD
P value reached from paired t-test, * = significant

Table-VIII shows the comparison of preoperative and postoperative ODI. Mean preoperative ODI 30.1±4.10 and postoperative ODI 16.9±2.82. Mean difference preoperative to postoperative ODI were statistically significant.

**Table-IX: Comparison of preoperative and postoperative VAS (n=29)**

| | Pre operative (n=29) Mean±SD | Post operative (n=29) Mean±SD | p value |
|---|---|---|---|
| VAS | 3.0±0.0 | 0.21±0.41 | <0.001* |

Data were expressed as mean±SD
P value reached from paired t-test, * = significant
Table-IX shows the comparison of preoperative and postoperative VAS score. Mean preoperative VAS 3.0±0.0 and postoperative VAS 0.21±0.41. Mean difference preoperative to postoperative VAS score were statistically significant

## DISCUSSION

Low back pain commonly affected the adult population all over the world. It is of prime importance that the cause of low back pain is diagnosed in its early stage since not all cases are innocent. The syndrome where the diagnosis is not in doubt is when root pain extends below the knee (radiculopathy). The commonest cause of radicular pain is lumbar disc prolapse. Prior to embarking on surgery for a lumbar disc prolapse it should be recalled that the long-term natural history for such a patient is likely to be good and that many radiologically proven discs may become or remain asymptomatic.[5,6]

Moreover, when Hakelius (1970), compared the outcome of surgical therapy for lumbar disc prolapse as compared to conservative therapy, he found that at six months there was no statistical difference between the two groups.[7] By seven years follow up the surgically treated group had faired better, only in that they had less episodes of low back .pain and had lost less time from work. In a similar study, Weber (1983), found that at one year the surgical group had faired much better with 92% good results as compared with 60% in the non-surgical group.[8]

The key to good results in disc surgery is appropriate patient selection. In this study of 29 cases, those patients were selected who fulfilled the criteria for surgical treatment as in other national and international series.

In present series 48.3% of patients were in the age group 31 to 40 years, 34.5% of patients were in the age group of 41 to 50 years and 17.2% patients were in the age group 51 to 60 years. The lowest incidence in the present series was 30 years and highest was 60 years (Table-I).

Prolapsed disc usually occurs in the adult population, both among the young and old. In Shanon and Paul's (1979) series, it was between 20-50 years, while in Nabi, Iskander and Chowdhury (1982) series, all the 13 cases were in the range of 30-60 years of age.[9,10] In Khan et al. (1991) series 91.21% of patients were aged between 21-50 years.[11]

In this study there were 69.0% male, 31% female and male female ratio was 2.2:1. The low incidence of female patients in Khan et al (1991), Nabi, Iskander and Chowdhury (1982) and the present series is probably due to conservative life style of the female population in our country.[10,11] Brown and Pont (1963) in their series found 72% of patients were male and 28%female.[12] There were 20% female and 80% male in the Raff, Portland and Oregon. (1959) series.[13] In this study 79.3% patients belonged to the manual worker group and 20.7% belonged to sedentary population and 30.0% patients were housewife. Manual workers are affected more as they are subjected to sprain and strain which may cause trauma to spine and predispose to prolapse of disc. (Table-II). In the present series it was found that 16(55.2%) was prolapsed found on central, 7(24.1%) on right side and 6(20.7%) patients had left side. Left sided lesion is more frequent in all the mentioned studies, but in this series central lesion is more frequent (Figure 5.3). Brown and Pont (1963) reported that 36.49% of cases had right sided herniation, 40.17% had left sided herniation and 25.4% had a central type of herniation. In another study, Khan et al (1991) observed 36.29% cases with right sided lesion, 49.27% left sided and 14.49% central disc prolapse.[11]

In present series per operatively shows 59% and 24% disc found central and lateral respectively (Figure-5.4). Chellarapu, Kadali, and Raman (2017) reported was seen in 4.4% of the cases lying on the symptomatic side of the root and thecal sac. Migrated disc was seen in 3.6% of the cases predominantly caudal migration in 90% of the migrated cases.[14]

In present series out of 29 patients, only 2(6.9%) patients had developed superficial wound infection which is managed by antibiotic coverage and dressing, 1(3.4%) patients had dural tear which has no need of repair and managed by prone and head down position and 1(3.4%) patients had recurrence which is managed by re-operation.

In present study, postoperative pain score, muscle spasm mobility of the spine, SLR were assessed. Each of the parameter was assessed at least for 3 visit. In the final visit absent of pain was 93.1% of patients, mild pain was 6.9% and moderate pain was not found. But in the preoperative assessment all patients had moderate pain. Muscle spasm was absent in all patients after operation and 6.9% patients had restriction of mobility of the spine. Preoperatively mean (±SD) of SLR was 42.6±6.3 degrees. But at the final visit mean (±SD) of straight leg raising was 89.3±2.6 degrees. Various retrospective studies and some prospective studies showed good results range from 46% to 97%. Several points considered in the analysis of the results of lumbar disc surgery. Patient selection appear to be extremely important.

Ali (1995) showed in their series there was complete relief of symptoms after operation in 66.66% cases and partial relief o symptoms in 28.88% cases; i.e 95.55% cases were either cured or benefited from surgery.[15] Chellarapu, Kadali, and Raman (2017) reported in recent study out of 250 patients- Excellent in 223(89.2%) cases, Good in 21(8.4%) cases, Fair in 5(2.0%) cases, and 1(0.4%) cases had poor outcome.[14]

## CONCLUSION

From this study it reveals that management of prolapsed lumbar intervertebral disc by laminotomy and discectomy is an effective method of treatment. It reduced the complications, early return to home and increase the chances of successful outcome. Overall in our study we had a favorable outcome following laminotomy and discectomy for lumber disc prolapse.

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