

## Symptomatic improvement and functional outcome of discectomy in Prolapsed Lumbar Intervertebral Disc

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### ABSTRACT

**INTRODUCTION:** Herniated lumbar disc is one of the common causes of back pain and sciatica in our clinical practice. Discectomy provides rapid relief of back pain and radicular pain. Few studies have been done in our setting to look for the outcome of discectomy. The purpose of this study was to assess the outcome of discectomy.

**METHODS:** This prospective observational study was carried out in Tribhuvan University Teaching Hospital, Kathmandu, from January 2018 to June 2019. Total of 31 patients with prolapsed disc underwent minimal invasive open lumbar discectomy. They were followed for six months and outcomes evaluated with Visual analogous scale score and Modified Oswestry disability index questionnaire and the overall response for surgery was evaluated with Modified Macnab's criteria.

**RESULTS:** Out of 31 patients, 19 were male and 12 were females, with mean age of 35 years. Preoperative mean VAS for leg pain and back pain was  $7.32 \pm 1.14$  and  $7.29 \pm 1.13$  respectively improving subsequently in later follow up at 2 weeks and 3 months. At 6 months, mean Visual analogous scale was  $0.45 \pm 0.57$  and  $0.48 \pm 0.57$  ( $P < 0.001$ ) respectively for leg pain and back pain. Mean preoperative Oswestry disability index score was  $53.28 \pm 12.18$  that improved to  $23.15 \pm 8.02$  and  $9.15 \pm 5.0$  ( $P < 0.001$ ) at 3 months and 6 months follow up respectively. At final follow up the Modified Macnab's Criteria was excellent in 13 cases, good in 16 cases and fair in 2 cases.

**CONCLUSION:** Excision of the offending herniated disc to decompress the nerve root provides rapid relief of symptoms and improved quality of life.

**KEYWORDS:** Back pain, herniated disc, oswestry disability index, visual analogous scale

### INTRODUCTION

Low back pain is one of the most common complaints in clinical practice with life time prevalence ranging from 65-80%.<sup>1</sup> Lumbar disc herniation is the cause for less than 5 % of back pain problems but is the most common cause of sciatica.<sup>2</sup> Absolute indication for surgery includes cauda equine syndrome and progressive neurological weakness.<sup>1</sup> More often, surgery is done to provide more rapid pain relief and disability in those patients whose recovery is unacceptably low with non-operative treatment.

There are various studies which show favourable outcome of lumbar discectomy for leg pain but only few studies regarding improvement in back

pain. In this study we assessed the outcome regarding leg pain and back pain following Minimally Invasive Open Lumbar Discectomy (MIOLD) surgery for lumbar disc herniation. We evaluated the patient disability in every day's activity and quality of life on the basis of Visual Analog Score (VAS) score, Oswestry Disability Index (ODI) and Modified Macnab's criteria.

### METHODS

This study was a hospital-based prospective observational study conducted in Department of Orthopaedics and Trauma Surgery (Spine Unit), Maharajgunj Medicine Campus, Institute of Medicine, Tribhuvan University Teaching

Hospital, Kathmandu from January 2018 to June 2019. The study was done after approval from institutional review committee of Institute of Medicine. Patients between 20 - 60 years of age, with low back pain and leg pain who failed conservative treatment for 6 weeks having VAS scores of at least 6 with or without neurological deficits were included in the study. Patients with history of previous spine surgery, cauda equina syndrome, spondylolisthesis greater than grade 1, spinal cord tumour, pregnancy, discitis were excluded. A convenience sampling method was used for sample selection. Thirty one patients with features of Prolapsed Intervertebral Disc (PIVD) of more than six weeks duration diagnosed both clinically and radiologically underwent minimal invasive open lumbar discectomy (MIOLD).

Detailed history regarding age, duration of symptoms, level of spinal tenderness, side of radiculopathy, weakness or any disturbance of bowel or bladder habits were noted. Physical examination was done for any obvious spinal deformity or sciatic list, Straight leg raising test (SLRT) and lower limb neurology were recorded. Severity of pain was evaluated as visual analog score and the Modified Oswestry Disability Index (mODI). The questionnaire was filled either in English or Nepali whichever was applicable in context of better understanding to alleviate the language barrier. Patients were treated surgically with MIOLD technique and the offending prolapsed disc was removed by consultant orthopaedic spine surgeons under general anaesthesia in prone position.

Post-operative reassessment was done regarding intensity of leg pain and back pain with VAS score after operation at 2 weeks, 3 months and 6 months, and with Modified Oswestry Questionnaire at 3 months and 6 months. Patients were also evaluated for the functional improvement with Modified Macnab's Criteria at the end of 6 month.

Relief of back pain and leg pain preoperatively and postoperatively on the basis of VAS and ODI was statistically compared using paired "t" test

taking p value <0.005 as statistically significant. The association of outcome compared on the age group, sex, lifestyle of patients, smoking was done with ANOVA test. SSPS version 24 was used for statistical analysis.

## RESULTS

Mean age of the patients was 35± 8.65 years. There is an overall male preponderance and maximum incidence of lumbar disc herniation occurred in the 3<sup>rd</sup> and 4<sup>th</sup> decades of life. (Table 1)

	20-29	30-39	40-49	50-60
male	4	10	4	1
female	3	7	0	2
total	7	17	4	3

Table 1: Frequency of patients in different age groups

Among 31 patients 8 patients were smokers and 23 patients were non-smokers. The outcome regarding back pain and leg pain was not significant in relation to smoking.(p=0.324 for leg pain;p=0.127 for back pain).

All the patients included in the study had back pain and leg pain. In most of the cases back pain was predominant and preceded leg pain. The average duration of leg pain was 10 ±12.92 months and back pain was 11.81±15.56 months. We found no difference in relief of symptoms after surgery regarding duration of presentation.

Majority, 16 patients (51.6%) had disc herniation at L4-L5 level and 14 patients (45.2%) at L5-S1 level. Only one patient (3.2%) had disc herniation at L3-L4 level, There was one case of two level disc prolapsed (L4-L5, L5-S1) but since only one level (L4-L5) in which symptom was predominant was operated, so it was considered under the same level as described. Right side radiculopathy was seen in 16 patients (51.6%) and left sided disc herniation was in 15 patients (48.4%).

Preoperative mean VAS for leg pain and back pain was 7.32±1.14 and 7.29±1.13 respectively. At 2 weeks, 3 months and 6 months follow up after

surgery, mean VAS for leg pain was  $3.58 \pm 1.36$  (t value: 14.99, p value  $< 0.001$ ),  $1.61 \pm 0.85$  (t value: 25.57, p value  $< 0.001$ ) and  $0.45 \pm 0.57$  (t value: 34.22, p value  $< 0.001$ ) respectively

Similarly mean VAS for back pain at 2 weeks, 3 months and 6 months follow up after surgery was  $3.52 \pm 1.34$  (t value: 14.69, p  $< 0.001$ ),  $1.61 \pm 0.88$  (t value: 24.79, p  $< 0.001$ ) and  $0.48 \pm 0.57$  (t value: 31.71, p  $< 0.001$ ) respectively (Figure 1)

Preoperative mean ODI score was  $53.28 \pm 12.18$ .

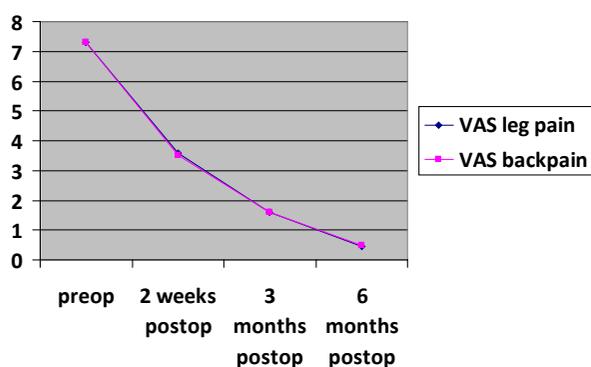


Figure 1: Mean VAS score on different occasions

The mean ODI score at 3 months and 6 months postoperative follow up was  $23.15 \pm 8.02$  (t value: 13.96, p  $< 0.001$ ) and  $9.15 \pm 5.0$  (t value: 17.82, p  $< 0.001$ ) respectively.

Clinical outcome on the basis of Modified Macnab's criteria was excellent in 13 cases, good in 16 cases, and fair in 2 cases (figure:4)

There was no per-operative and post-operative complications of the surgery except one case (3.2%) of superficial skin infection which was treated by regular dressing and antibiotics.

## DISCUSSION

Prolapsed lumbar intervertebral disc is one of the common causes of low back pain. Compression of the nerve roots and accompanying inflammation by the offending disc causes radicular pain. Local inflammation induced by herniated disc, pressure effects and stimulation of the outer layers of annulus due to tears is likely to cause back pain which are innervated by the sinuvertebral nerve.<sup>3</sup> Irritation of the traversing nerve root at the level of disc

herniation cause radicular pain in the leg. Most of the PLIVD patients improve spontaneously.<sup>4</sup> Symptomatic patients can be successfully treated conservatively with medication, physical therapy and epidural or selective nerve root blocks.<sup>5</sup> Patients who do not respond to conservative measures are treated with surgical intervention. There are different techniques of surgical treatment of lumbar disc herniation.<sup>6</sup> Minimal Invasive Open Lumbar Discectomy (MIOLD) is an efficacious and safe surgical technique and being practiced in our hospital. Not much studies have been done in past in our setting to see the results in relation to the back and leg pain improvement and the functional outcome of this surgical intervention.

In our study the mean age of the patient was  $35 \pm 8.65$  years with slight male predominance (61.3%), which supports that the PLIVD is common in physically active people and during the 3<sup>rd</sup> and 4<sup>th</sup> decade of life. Two previous studies in south Asian population by Wankhade UG et al<sup>7</sup> in Indian and by Ahsan et al<sup>8</sup> in Bangladeshi also have similar findings. Similar to the findings of a study by Lee J C et al<sup>9</sup> done in Korean population in our study also there was no significant difference in outcome among smokers and non-smokers.

In this study, all patients presented with leg pain and back pain and in most of the cases back pain preceded leg pain. The average duration of leg pain before surgery was  $10 \pm 12.9$  months and back pain was  $11.81 \pm 15.56$  months. In a study done by Ahsan M et al,<sup>8</sup> the mean duration of back pain was 5.57 months and mean duration of leg pain was 4.24 months which was less than our study. Our cases had had longer period of the trial of conservative measures like medication, physiotherapy and other non-surgical treatment methods.

In our study, prolapsed lumbar intervertebral disc occurred at L3-L4 level in 1 patient (3.2%), L4-L5 level in 16 patients (51.6%) and L5-S1 level in 14 patients (45.2%). Combined herniation at L4-L5 and L5-S1 level was found in 96.8%. The findings were similar to those

in studies by Ahsan et al<sup>8</sup> Ahsan K et al<sup>10</sup> and Tomoaki et al.<sup>11</sup> In our study, improvement in VAS for leg pain and back pain was noted after surgery. The preoperative VAS leg pain and back pain was  $7.31 \pm 1.14$  and  $7.29 \pm 1.13$  respectively and significant improvement was seen in VAS at 2 weeks, 3 months and six months. Postoperatively at the end of 6 months VAS score was  $0.45 \pm 0.57$  for leg pain and  $0.48 \pm 0.57$  for back pain which is similar to the study done by Ahsan M et al,<sup>8</sup> Ahsan K et al<sup>10</sup> and Tomoaki et al.<sup>11</sup>

In this study, improvement in objective symptoms was measured with ODI questionnaire. Improvement was significant at 3 months and six months durations post operatively. The preoperative ODI score was  $53.28 \pm 12.88$  and changed to  $23.15 \pm 8.02$  at 3 months and  $9.15 \pm 5.0$  at six months ( $p < 0.001$ ). There was around 50 % improvement in symptoms at around 3 months which improved more at 6 months. This outcome was seen consistent with the study done by Ahsan M et al<sup>8</sup> and Ahsan K et al.<sup>10</sup> In a study done by Arja Hakkinen et al,<sup>12</sup> there was 88% improvement in females and 80 % improvement in males in Oswestry Disability Index (ODI) during the initial 6 weeks, there after the changes were minor.

Weber found that the short term outcome after discectomy is better than the conservative therapy alone. In his controlled prospective randomized trial he found statistically significant improvement in pain at one year in which surgery was performed but at a longer follow up of 4-10 years it had no significant difference.<sup>13</sup> Our study also had similar short term outcome after discectomy.

According to Modified Macnab's Criteria results were excellent in 13 cases (41.9%), good in 16 cases (51.6%), fair in 2 cases (6.5%) and none had poor results, which is similar to the findings of the study by Ahsan M et al.<sup>8</sup>

In a similar retrospective study done in the Chinese population in 2019 by Ren Z et al<sup>14</sup>, 93.8% (92/98) of the patients showed excellent or good results, and 3.1% (3/98) fair. Three

(3.1%) patients were rated poor because they required subsequent fusion surgery within the 5-year follow-up period.

In a retrospective observational study conducted at Fauji foundation hospital, Pakistan by Bakhsh A<sup>15</sup> reviewed medical records of 68 patients who underwent lumbar disc surgery for sciatic pain during the period 1995–2004. Lumbar disc surgery yielded complete pain relief in 79.41% of the cases. In 14.7% of the cases surgery failed to give any pain relief, and in 5.88% it yielded partial pain relief. At up to 10 years postoperatively, 27.77% of patients remained absolutely pain free. They concluded that surgery provided immediate pain relief in 79.41% of cases, but the long-term outcome of lumbar disc surgery was not satisfactory.

In the series performed in Nepal by Devkota et al<sup>16</sup>, 98.33 % of patients had an improvement in the radicular pain and ambulation was commenced from the first post-operative day after MIOLD surgery. At 6 months, 97.5% had good to excellent (grade 4, or 5) results reaching the pre-morbid states in the Prolo Functional and Economic Scale. They reported that as per the rates of complication, long term rates of reoperation and outcome assessment, their results were on a par with the results of Maroon's series<sup>17</sup> of microlumbar discectomy cases.

In another series on patients who underwent microdiscectomy, and performed by Shrestha D et al<sup>18</sup> in Nepal, male, non alcoholic, low level of education, numbness as a predominant symptom and disc at L4-L5 were found to be significantly associated with better ODI at final follow up after. For ODI score interpretation, gender, smoking habit, presence of leg pain as a predominant symptom were statistically significant factors whereas smoking and drinking habit, level of education, occupation, back pain and numbness as predominant pre-operative symptom, types of disc in MRI were significantly related to Macnab outcome.

Regarding complication we had only one

patient (3.2%) with superficial skin infection after surgery in the tenure of six months follow up which was resolved after proper antibiotic treatment. No cases of iatrogenic nerve damage, dural tear, vascular injuries, surgical site infection, or thrombosis were observed in a similar study by Ren Z et al<sup>14</sup> in 2019.

In a study by Ahsan K et al<sup>10</sup> complications included foot drop (n=1), dural tear (n=3), and superficial wound infection (n=1). In the study by Devkota et al,<sup>16</sup> there were three instances of inadvertent dural tear without fascicle injury, and one instance of residual disc requiring reoperation among 120 cases, they included in the study. In the study by Shrestha et al<sup>18</sup>, there was 9.5% peri- or post-operative complications among 34 patients they included in the study, and recurrence in seven patients.

The decreased incidence of complication in our cases might be due to surgical expertise of the operating surgeon and the improved sterile work environment.

## CONCLUSION

This study reveals that there is immediate improvement in both leg pain and back pain following surgery with further improvement in consequent follow up (3 months and 6 months). Recovery as measured with VAS and Modified Oswestry Questionnaire showed more than 50% improvement in immediate postoperative period. The Modified Macnab's criteria showed good functional outcome. This study suggest that lumbar disc herniation is one of the common cause for back and leg pain which can be effectively treated with surgery(MIOLD).

Conflict of interest:none

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