



# Evaluation of patterns and outcomes of surgically treated lumbar disc herniation

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## Abstract:

**Introduction:** Lumbar disc herniation is one of the most common diagnoses encountered in clinical spine practice. It is among the leading causes of chronic disability and functional incapacity in the working years.

**Aim of the study:** To assess the patterns and outcomes of surgically treated lumbar disc herniation among patients at Calcutta National Medical College & Hospital (CNMC&H) Kolkata.

**Material and Methods:** The present study was conducted in Department of neurosurgery and neurology, Calcutta National Medical College and Hospital (CNMC &H). Total 48 patients admitted with low back pain and sciatica in department of neurosurgery and neurology during the study period December 2015- December 2017 were included in present study. A complete clinical and detailed radiological and in few cases electrophysiological investigations will be done followed by operative management. The test for differences in the visual analogue (VAS) scale scores was also conducted using the sign rank test.

**Results:** The mean age was 47(SD: 9) years. Male and female participants in the age group of 40-50 years were highly represented (44%). The main presenting symptom was LBP and leg pain, present in 45 (94%) participants. 33(94.29%) patients with history of predominantly leg pain reported a favorable outcome to surgery. 28(96.55%) patients with L4 L5 PIVD pre operatively reported a favorable outcome to surgery. Out of 10 patients with complaints of low back pain, 6 were satisfied with the outcome of the operation (60%) (p value-0.0128 statistically significant).

**Conclusion:** It is found that most of the patients benefitted from lumbar discectomy surgery in terms of rapid reduction of pain. Discectomy has a high success rate for patients with HLDs who have failed a period of conservative management.

**Keywords:** Low back pain (LBP), Lumbar Disc Herniation (LDH), visual analogue scale (VAS)

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## Introduction:

Lumbar disc herniation is one of the most common diagnoses encountered in clinical spine practice. It is among the leading causes of chronic disability and functional incapacity in the working years. Over 200,000 lumbar discectomies are performed annually in the United States<sup>1</sup> Lumbar disc herniation is also believed to be a major contributor to the 60 – 80% lifetime incidence of low back pain in the general population.<sup>2,3</sup> The

years. Over 200,000 lumbar discectomies are performed annually in the United States<sup>1</sup> Lumbar disc herniation is also believed to be a major contributor to the 60 – 80% lifetime incidence of low back pain in the general population.<sup>2,3</sup> The

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lifetime prevalence for lumbar disc herniation (LDH) is about 1-2%<sup>1-2</sup>.

Low back pain (LBP) is believed to often be the first symptom of a Lumbar Disc Herniation (LDH) and may also possibly be the only symptom. Sciatica is the most classical symptom, characterized by radiating pain with a dermatomal distribution, typically affecting one nerve root in the lumbar or sacral spine.

The cauda equina syndrome is a special form of LDH where the herniated disc material occupies most of the space in the spinal canal. This serious condition involves sacral nerve roots and besides leading to unilateral or bilateral sciatic pain, can cause bowel and/or bladder disturbances, lowers extremity muscle weakness and loss of sensibility and perineal or saddle paraesthesia. This condition demands a more urgent attention compared to when a single nerve root is affected<sup>3-5</sup>.

Intervertebral disc prolapses, protrusion or extrusion accounts for less than 5%, of all low back problems, but are the most common causes of sciatica and surgical interventions in the lumbar region. The advantages of disc surgery over non-surgical treatments have been reported to be better leg pain relief and a faster return to work<sup>6-8</sup> and Surgical treatment of symptomatic LDH has been reported to have a high success rate (70-95%), evaluated by validated outcome scores and patients' satisfaction<sup>9</sup>.

Surgically treated patients have been demonstrated to experience a faster pain relief, improvement of function and satisfaction than non-surgical patients<sup>10-12</sup>. However Residual back- and leg pain and recurrent disc herniation remain the major postoperative problems<sup>13</sup>.

Atlas et al carried out a 10-year outcome study (The Maine Lumbar Spine Study), assessing the long-term outcomes of surgical and nonsurgical management of lumbar spinal stenosis. They noted that 71% of the patients who underwent surgery were satisfied with their outcome, while only 56% of the patients who were managed non- surgically were satisfied with their outcome<sup>14</sup>

Discectomy for lumbar disc herniation is the most commonly performed spinal surgery. The basic

principle of the various techniques is to relieve the nerve root compression induced by the herniation<sup>15</sup>. Hence, the present study to assess the patterns and outcomes of surgically treated lumbar disc herniation among patients at Calcutta National Medical College & Hospital (CNMC&H) Kolkata.

#### **Material & Methods:**

The present study was conducted in Department of neurosurgery and neurology, Calcutta National Medical College and Hospital (CNMC &H). The approval to conduct the study was obtained from Institutional Research Ethics Committee, before the study commenced Total 48 patients admitted with low back pain and sciatica in department of neurosurgery and neurology CNMC&H during the study period December 2015- December 2017 were included in present study. An informed written consent was obtained from each participant before enrolment and operation. The purpose and nature of the study was fully explained to the participants in a language they could fully understand.

Inclusion Criteria for the study was patients with age between 20-60 years single level lumbar disc on lumbosacral MRI will be taken who Failed to respond to conservative management or with progressive neurological deficits. Exclusion Criteria for the study Patients with gross cardiopulmonary disease or uncontrolled Diabetes and Hypertension. Patients not willing to give consent. Patients with < 20 years or > 60 years of age. Patients with history of previous back surgery. Patients with recurrent lumbar disc prolapse. Patients with multiple lumbar discs prolapse. Patients with systemic illness like fever, sepsis etc. Patients with spondylarthritis, spondylolisthesis of lumbosacral spine.

#### **STUDY TOOLS:**

A complete clinical and detailed radiological and in few cases electrophysiological investigations will be done followed by operative management.

#### **CLINICAL ASSESMENT AND INTERVENTION**

If sciatica persisted more than 2 months after conservative management open or microdiscectomy was offered. Increasing leg pain not responsive to medication or progressive



neurological deficit were reasons for performing surgery even earlier than at 2 months.

A detail history and examination would be carried out especially evaluating the socio – demographic patterns, and psychological factors Full neurological examination with necessary radiological including MRI Lumbosacral Spine and in few cases electrophysiological investigation was done. A detailed account of patient’s symptoms was recorded like low back pain, motor weakness, sensory loss, bladder bowel dysfunction.

Under either general or spinal anesthesia the symptomatic disk herniation was removed. The goal of surgery was to decompress the nerve root and reduce the risk of recurrent disk herniation by an annular fenestration, curettage and removal of loose degenerated disk material out of the disc space. The duration of hospitalization depended on the patient’s functional ability to mobilize. Normal care was provided according to the protocols of the participating surgical departments. At home the rehabilitation process was done by the patient’s attendants who used a standardized exercise protocol. Patients were advised to resume their regular jobs when able, depending on the nature of the work.

#### FOLLOW UP

The neurological status of the patients and any other complications was noted during follow up or up to end of study. Follow up of all patients were done at 2 weeks, 1 month and 6 months. Minimum duration of follow up was 6 months for each study subject. Surgical outcome assessed at the end of 6 month.

To avoid any bias, experienced neurosurgeon performed all the surgeries during the study period. Intra-operative and post-operative complications were recorded.

#### Data analysis

Data will be analyzed by simple proportions and presented in tables and graphs. Appropriate statistical tests were done to find out any significant association. Continuous variables that assumed normal distribution were summarized as mean and the corresponding standard deviation (SD). The test for association between the categorical variables was conducted using Fisher exact test while the association between continuous variables and the categorical variables was assessed using the two-sample Wilcoxon ranks sum test. The test for differences in the visual analogue (VAS) scale scores was conducted using the sign rank test.

#### Results:

Data for a total of 48 participants was analyzed. The mean age was 47(SD: 9) years. The minimum and maximum age limits were 27 and 74 years respectively. The participants aged below 40 years were 10(21%), while those aged 40-50 years were 21(44%). Those aged above 50 years were 17(35%). Male and female participants in the age group of 40-50 years were highly represented (44%).

The main presenting symptom was LBP and leg pain, present in 45 (94%) participants. Mainly LBP was present in 10 (20.83%) participants; leg pain was present in 35 (72.92%) participants. Sensory deficits were present in 3 (6.25%) participants. This is shown in table 1.

Table 1: Main presenting symptoms leading to functional and occupational disability

Main presenting symptoms (n=48)	N (%)
LBP	10(20.83%)
Leg pain	35(72.92%)
Sensory deficits	3(6.25%)

The surgical options used were open discectomy and microdiscectomy. 40 (83.33%) patients

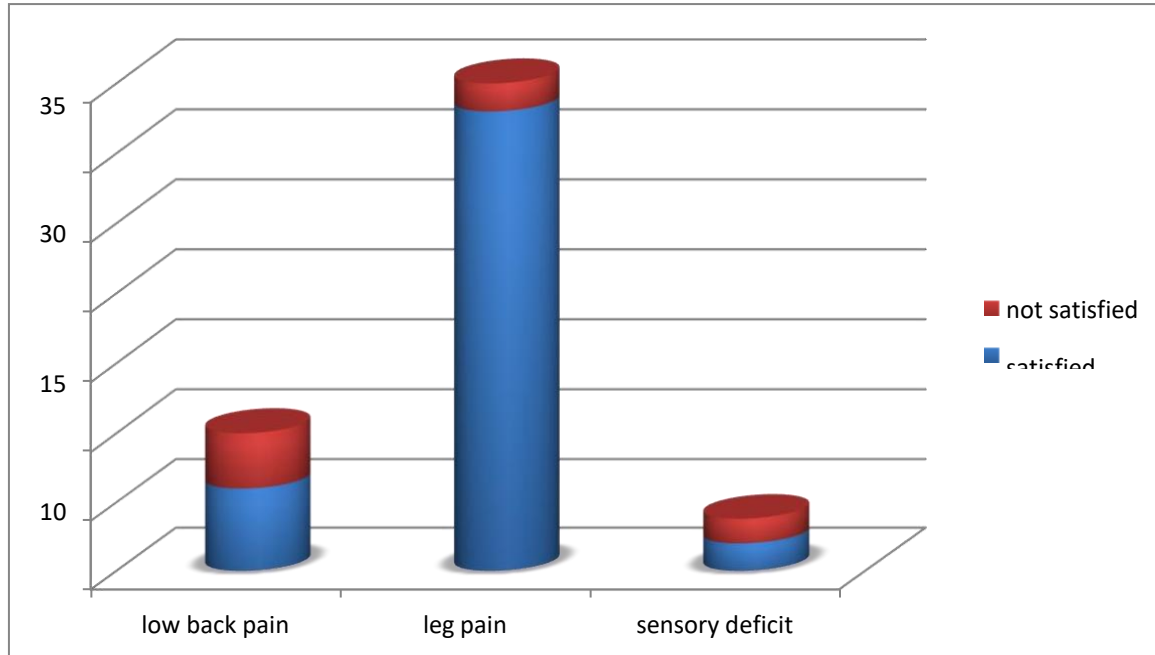
underwent open discectomy, while 8(16.67%) patients underwent microdiscectomy.



In our study 6(60%) patients with history of predominantly low back pain reported a favorable outcome to surgery. P value was 0.0128 hence it was found to be statistically significant 33(94.29%) patients with history of predominantly leg pain reported a favorable outcome to surgery. P value

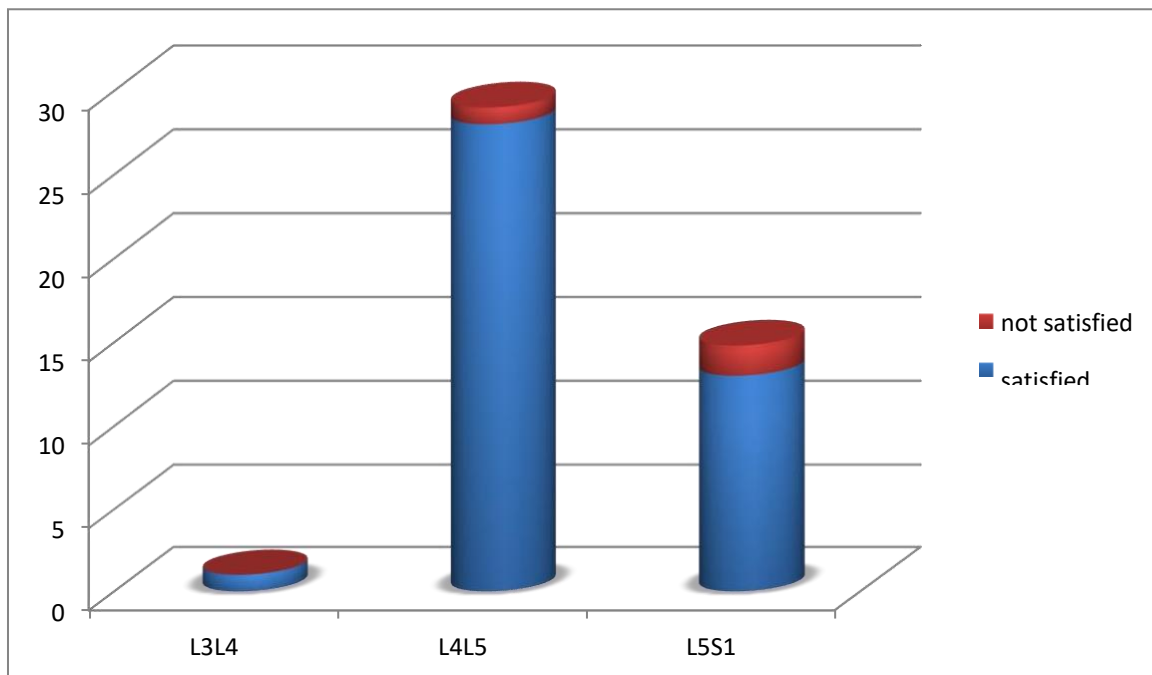
was 0.1147. It was not found to be statistically significant. 2(66.67%) patients with history of numbness reported a favorable outcome to surgery. Pvalue was 0.3363 hence it was not found to be statistically significant showed in figure 1.

Figure1: Distribution of Predominant presenting complaint



In our study 1 patient with L3 L4 disc prolapse pre operatively reported a favorable outcome to surgery. 28(96.55%) patients with L4 L5 PIVD pre operatively reported a favorable outcome to surgery while 1(3.45%) reported a non-favorable surgical outcome. P value was 0.0297 hence it was found to be statistically significant. 13(72.22%) patients with L5 S1 PIVD pre operatively reported a favorable outcome to surgery while 5(27.78%) reported a non-favorable surgical outcome. P value was 0.0225 hence it was found to be statistically significant. Shown in figure 2

Figure 2: Level of disc prolapse



Intra operative complications occurred in seven participants. Five (10.4%) of them had an incidental dural tear, one had excessive bleeding requiring transfusion, and another one had accidental root avulsion. Post operative complications occurred in two (4.2%) participants. One had Post operative discitis of the leg while the other had failure of pain relief.

Table 2: Test for improvement in VAS score in leg pain

VAS scores	Sample size	Median (IQR)
Pre operative	48	9 (8-9)
Post operative	48	1 (0-1.5)
Change in VAS	48	8

Out of 35 patients with complaints of leg pain, 32 were satisfied with the outcome of the operation (94.28%). (p value equals 0.1147-not significant) showed in table 2

Table 3: Test for improvement in VAS scores in LBP

VAS scores	Sample size	Median (IQR)
Pre operative	48	9 (8-9)
Post operative	48	2 (1-3)
Change in VAS	48	7

Out of 10 patients with complaints of low back pain, 6 were satisfied with the outcome of the operation (60%) (p value-0.0128 statistically significant) showed in table 3.

#### **Discussion:**

This study investigated patterns and outcomes of surgically treated lumbar disc herniation among patients seen at Calcutta national medical college and hospital, Kolkata. The mean age of participants was 47±9 years. This is similar to Heliovaara et al<sup>16</sup> and Deyo et al<sup>17</sup> studies which reported the mean age of patients undergoing surgery for HLD at 40 and 43 years, respectively. Majority of the patients were in the 40 – 50 years age group. This was in keeping with the study of Deyo et al 1, in which it was reported that the majority of HLDs occurred in the age group of 30 – 50 years.

In this study, HLD occurred slightly more commonly in males (54%) than in females (46%) with the male: female ratio being 1.2:1. This is in keeping with the study findings of Maring et al<sup>18</sup> and Jachia et al<sup>19</sup>, who reported a male: female ratio of 2:1.

In our study, most common presenting symptom was LBP and leg pain, present in 45(94%) participants. Predominantly LBP was present in 10 (20.83%), leg pain in 35 (72.92%) participants. Sensory deficits were present in 3 (6.25%) participants. According to Frymoyer J. W et al<sup>93</sup>, LBP per se, is usually a minor component of sciatica (only 1% of patients with acute LBP have sciatica). Our findings are contrary to Blaauw G et al's study findings<sup>20</sup>. In his study of patients with radicular pain, 12% reported motor deficits, while 53% of patients reported sensory deficits. In Andrew J. Schoenfeld's study<sup>21</sup> it was noted that there is a lack of consensus regarding what constitutes a symptomatic herniation (i.e. back pain alone versus radicular pain versus back pain and radicular pain).

In our study 6(60%) patients with history of predominantly low back pain reported a favorable outcome to surgery. P value was 0.0128 hence it was found to be statistically significant. 33(94.29%) patients with history of predominantly leg pain reported a favorable outcome to surgery. P value was

0.1147. It was not found to be statistically significant. 2(66.67%) patients with history of numbness reported a favorable outcome to surgery. P value was 0.3363 hence it was not found to be statistically significant. Straight leg raising (SLR) was positive in 72.92% of the participants. This was consistent with Vroomen et al's<sup>22</sup> study, which showed that SLR was a consistently sensitive examination for sciatica due to disc herniation.

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In fact, there are many studies reporting that there was no significant difference depending on the affected level. In association with this, Manniche et al<sup>23</sup> & Lee et al<sup>24</sup> reported that there was no significant difference depending on the level. Weir<sup>132</sup> reported that L5-S1 lesion had better clinical outcomes for reducing postoperative low back pain and radiating pain as compared with L4-5 lesion.

There was more marked reduction in VAS score noted in the patient group with leg pain as the primary presenting complaint as compared to the group with primary complaint of low back pain (8 vs. 7 respectively)

The results of visual analog scale for both leg pain and back pain indicated that the severity of pain was less in the post-operative stages. Due to this most of the patients stopped taking painkillers, anxiolytic or other preparations like sleeping tablets in the post-operative period. The results coincide with the findings of literature where similar kinds of outcomes were reported by Hägg et al<sup>25</sup>.

**Conclusion:** From the above results it is found that most of the patients benefitted from

lumbar discectomy surgery in terms of rapid reduction of pain. Discectomy has a high success rate for patients with HLDs who have failed a period of conservative management. There was significant improvement in pain as evident from the pre and post-operative VAS scores. Assessing the functional outcome using MacNab's criteria, 87.5% patients had a good and excellent grade (satisfied with the surgical outcome) at six month post-operatively. The results after a discectomy established reduction of both leg and back pain, and improvement of quality of life as well as return to their normal daily work/employment.

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