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## Functional outcome of discectomy in lumbar disc prolapse

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### Abstract

**Background:** Sciatica resulting from a lumbar intervertebral disc prolapse is the most common cause of radicular leg pain in adult working population. It can be treated with both conservative and operative methods. In our study, we have chosen open discectomy as an appropriate mode of surgical treatment for lumbar intervertebral disc prolapse. We assessed the surgical outcomes of patients treated with discectomy in lumbar disc prolapse.

**Objectives:** To compare pre and post-operative back pain and leg pain using Visual Analogue Scale (VAS) and functional outcome using modified Oswestry Disability Index (ODI).

**Methods:** 30 patients were included in this study and were followed up for up to 6 months postoperatively. We assessed the functional outcome of each patient with ODI and VAS post-operatively and at 6 months.

**Results:** We found that males had higher incidence (60%) of disc prolapse. Majority of the patients presented with left sided radiculopathy (60%) and most commonly involving L4-L5 level (76.7%). The mean ODI and VAS score pre-operatively were  $59.40 \pm 6.07$  and 8 respectively, which improved to  $15.12 \pm 5.15$  and 1, respectively at 6 months post-operative follow-up. These were statistically highly significant.

**Conclusions:** Our study established that open discectomy has a satisfactory functional outcome and leads to a significant improvement in the patients' quality of life.

**Keywords:** Intervertebral disc prolapse, radiculopathy, discectomy

### Introduction

Humans have been suffering from back and leg pain since the beginning of recorded history. Back pain, is still, one of the unrewarding problems to deal with in clinical medicine. Low back pain is thought to occur in almost 80% of adults in some points in their life <sup>[1]</sup>. Among chronic conditions, back problems are the most frequent cause of limitations of activity in persons less than 45 years. Of the various forms of low back pain, only those associated with compression of the nerve roots or cauda equina syndrome, have comparatively well understood clinical presentation.

The life time prevalence of a herniated disc is about 2%. Disc herniation is a greater threat in younger population between the ages of 30 and 50 years, in whom the nucleus material has good turgor, in contrast to older population in whom the nucleus is desiccated and fibrotic. Lumbar discs diseases are responsible for well over 90% of all organic symptoms attributable to low backache.

Lumbar disc herniation is a multi-factorial problem and precise cause is still not understood. Patients with lumbar disc herniation are commonly seen in our day to day clinical practice and majority of patients respond to non-operative methods of management and do not require any forms of surgical intervention <sup>[2]</sup>. Surgical intervention should be limited to patients with a significant neurological deficit or to those patients who are unable to engage in the lifestyle they desire because of sciatica.

Discectomy is a common procedure carried out for treatment of lumbar disc prolapse. Open discectomy is the gold standard for operative intervention in patients with herniated disc where conservative treatment has failed <sup>[3]</sup>. In most reports the post-operative changes in neurological signs and functional recovery from pain has shown striking variations.

The purpose of this study is to evaluate the functional outcome of the surgical intervention i.e., discectomy at the affected level and to see the effectiveness of the procedure in terms of post-operative relief of symptoms and functional improvement.

### Material and Methods

**Study setting:** The study was conducted in dept. of Orthopaedics, KIMS Bangalore from 2018-2020.

**Subjects-** Patients Attending dept. of Orthopaedics, KIMS Bangalore.

**Study Population:** Patients of age 18-45 years were considered for the study.

**Type of study design:** Prospective study

**Sample size:** 30 patients (by using non-randomised purposive sampling we selected 30 patients in the study).

**Radiological Method:** MRI of Lumbar spine

#### Inclusion criteria

- Age 18-45 years
- Level of disc prolapse L4-5, L5-S1, L3-4.
- Failure to respond to conservative treatment.
- Severe pain with sciatica with or without Neurological deficits.

#### Exclusion criteria

- Failed back syndrome
- Associated vertebral fractures
- Infective causes of low back ache
- Malignancy

**Consent:** Prior to the examination of each patient, consent was taken.

**Data collection procedures:** All the patients coming to the department of Orthopaedics with lumbar disc prolapse.

**Plan of analysis:** All the patients were assessed clinically. A detailed history was obtained and they were subjected to a thorough clinical examination. The findings were noted in the proforma. Radiological investigations were carried out to confirm the diagnosis and know the level of the lesion. The patients were also assessed preoperatively and postoperatively with Visual Analogue Scale score (VAS) and Modified Oswestry Disability index score. All patients who met the inclusion criteria were included in the study. After the clinical and radiological diagnosis, patients were subjected to discectomy. After the procedure, the patients were followed up for 6 months for evaluation.

**Operative procedure:** Under general anaesthesia, the patient was placed prone on Relton and Hall frame. The abdomen was kept free, so as to keep the respiration free and prevent engorgement of the epidural veins and thus reduce bleeding. Affected level is marked with the help of c-arm, parts scrubbed, painted and draped. A mid-line vertical incision centring the affected interspace of 8-10cms is made, the incision is deepened to the subcutaneous tissue and deep fascia. The lumbodorsal fascia is incised and the supraspinous ligament is incised over the affected disc space. By subperiosteal dissection, strip the paraspinous muscles from the spines and laminae of the vertebrae on each side and self retaining retractors are applied.

The laminae are carefully nibbled and the ligamentum flavum is removed using a Kerrison rongeur. After the cord has been exposed adequately the dura is retracted medially and nerve root is inspected. The nerve root is retracted medially using a blunt dissector in order to visualize the underlying disc. It may be seen as an extruded fragment or a bulging posterior longitudinal ligament.

Cottonoid or neuro patties are used to tamponade the epidural veins once the root is retracted. If an extruded fragment is not seen the posterior longitudinal ligament is carefully examined for any defect or hole in the ligament, laterally. A stab incision is made over the bulging disc with extreme caution. Gently the disc fragments are removed using disc forceps until the bulge has been decompressed. Bleeding is controlled by suction and cottonoid or neuro patties. They are removed before closure. Gel foam is placed over the cord. The wound is closed in layers over a suction drain. Sterile dressing is applied.

### Results

This study consists of 30 cases of lumbar disc prolapse treated by fenestration and discectomy from 2018 to 2020. The follow up was for 6 months.

In the present study nearly 43.3% of them were between 31 to 40 years of age, 40.0% of them were more than 40 years of age and 16.7% of them were less than 30 years of age. The Mean age of the study population in the present study was 37.43 +6.52 Years of age ranging from 18 to 45 years.

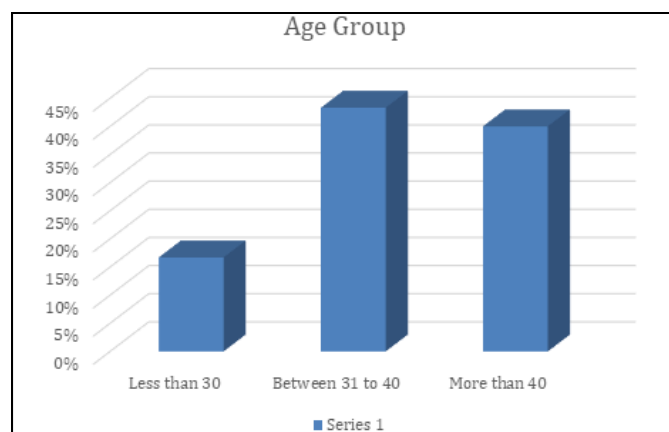


Fig 1: Age wise distribution of patients

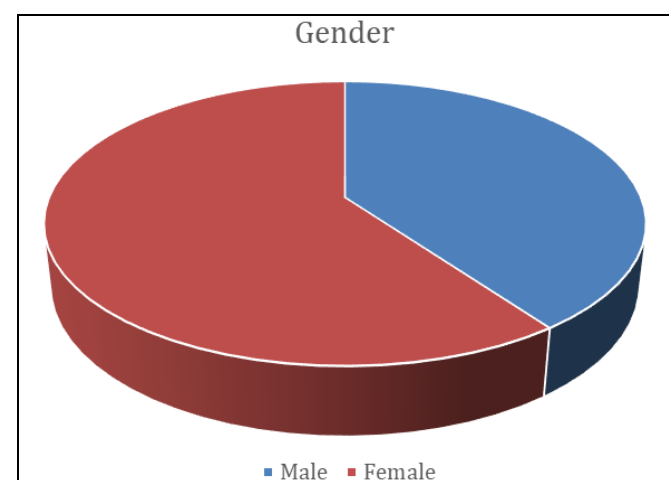
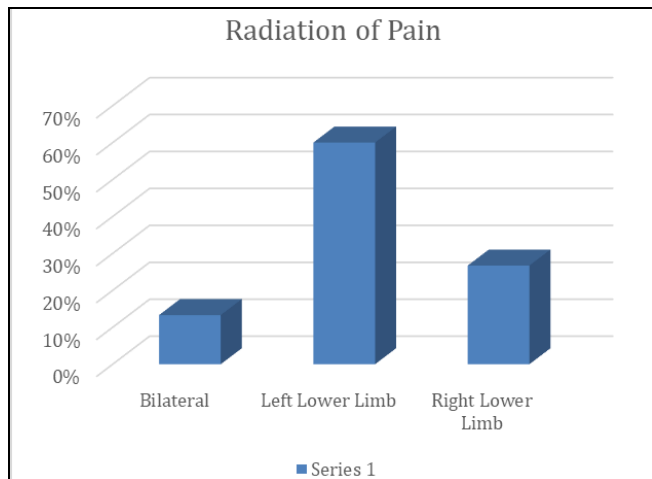
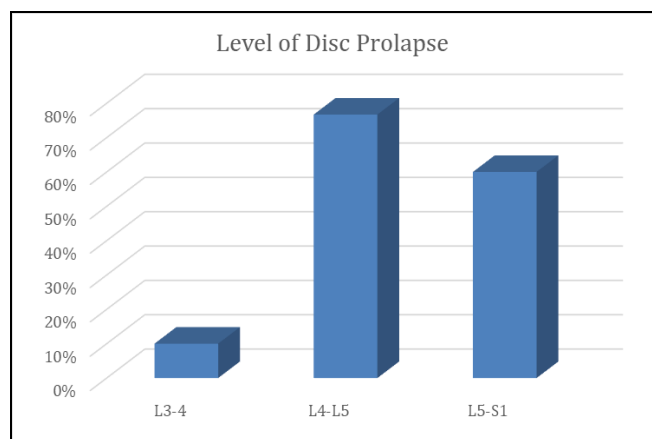


Fig 2: Gender wise distribution of patients

In the present study nearly 60% of the study subjects were male and 40% were Female.



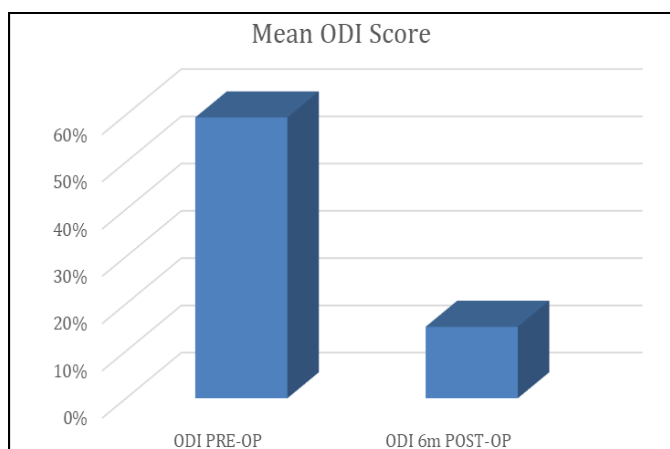
**Fig 3:** Distribution of patients according to radiation of pain. In this study most of the patients had left sided radiculopathy.



**Fig 4:** Distribution of patients based on the level of Disc prolapse

In the present study the involvement at the level of L4-L5 was maximum involving 76.7% of the study subjects, 60% of them had L5-S1 Involved and 10% had L3-L4 Involved.

The mean Pain Score (VAS Score) was found to be 8 among the study subjects before the Intervention and the Pain score was reduced to 1 after the intervention. The Pain Score was found to be statistically significant between before and after the Intervention.



**Fig 5:** Comparison of Mean ODI Score of patients before and after the Operation

The mean ODI Score among the patients before the intervention was 59.40% and after the intervention the mean score was 15.12%. This difference of ODI Score before and

after the intervention was found to be statistically significant.

**Discussion**

Low back disorders have become the most common musculoskeletal disorder, with a major impact on the costs of health care and are a major source of disability [3]. One must understand that lower back pain is a symptom that has many causes, the commonest being a herniated disc. The origin of disc related sciatica with its clear morphologic and clinical neurologic findings were not recognized until the 20<sup>th</sup> century. After Mixter and Barr [4] in 1934 described disc herniations and showed the effectiveness of surgery in its management, there has been an increasing interest to solve sciatica surgically by disc excision.

Lumbar disc prolapse is known to occur around 42 years of age with a male preponderance. The Mean age of the study population in the present study is 37.43 Years, with 18 males (60%) and 12 females (40%) comparable to Spangfort's [5] study which had an average age at presentation of 40.8 years with males almost twice the number as females. Average age at presentation in Pople and Griffith's [6] study of 100 patients was 42 years with 52 men and 48 women. Kerr's [7] study had an average age of 40 years.

Low back pain and radicular pain was the most common symptom with which patients presented (100%) comparable to the study conducted by Singh H *et al.* [8], where all of the patients (100%) presented with low back pain and radiculopathy.

By definition, for a patient to have sciatica, they must describe pain in the distribution of sciatic nerve. All the patients in this series described such pain of which majority of the patients in this study had pain radiating to left lower limb accounting to 60% of the patients and 26.7% of patients had pain radiating to right lower limb while 13.3% of patients had radiation to bilateral lower limb, in contrary to the study conducted by Hegde D *et al* [9]., where 57% of patients had radiation of pain to the right lower limb, and 43% of patients had to the left lower limb.

Comparable to the study conducted by Arvind Kumar K *et al.* [10], 11 (36.67%) participants have left, 8 (26.67%) participants have right, and 11 (36.67%) have bilateral radiculopathy. In agreement with the study conducted by Singh H *et al.* where left side was mostly involved (42.5%) followed by right side radiculopathy and bilateral involvement.

**Table 1:** Comparison of radiculopathy with other studies

Sciatica	Hegde D <i>et al.</i>	Arvind Kumar K <i>et al.</i>	Singh H <i>et al.</i>	Present study
Right	57%	26.67%	28.75%	26.7%
Left	43%	36.67%	42.5%	60%
Bilateral	-	36.67%	28.75%	13.3%

In the present study, majority of the patients had L4-L5 disc prolapse accounting to (23) 76.7%, (18) 60% of them had L5-S1 involved and (3) 10% had L3-L4 involved comparable to study conducted by Ujjwal Gowardhan Wankhade *et al.* [11] where most of cases were L4-L5 prolapse i.e. 42 (84%) patients, 7 (14%) patients had L5-S1 prolapse and 1 (2%) had L3-4 prolapse. Comparable to the study conducted by Arvind Kumar K *et al.* where majority, with 80% of the participants have disc prolapse at L4-L5, 40% have at L5-S1 and 16.67% participants have disc prolapse at L3-L4. In accordance with study conducted by Singh H *et al.*, where L4-5 level was most commonly involved level (72.5%). In contrary to the study by

Kovacevic *et al.*,<sup>[12]</sup> where the most common level of disc herniation at the level of L5/S1.

**Table 2:** Comparison of level of disc prolapse with other studies

Level of Disc Prolapse	Wankhade <i>et al.</i>	Arvind Kumar <i>et al.</i>	Present study
L4-L5	84%	80%	76.7%
L5-S1	14%	40%	60%
L3-L4	2%	16.67%	10%

The mean Pain Score (VAS Score) was found to be 8 among the study subjects before the intervention that is pre operative and the Pain score was reduced to 1 after the intervention that is at the end of 6 months post operatively, which is statistically significant.

**Table 3:** Comparison of mean VAS with other studies

Mean VAS	Hegde D <i>et al.</i>	Singh H <i>et al.</i>	Chakrabarty <i>et al.</i> <sup>[13]</sup>	Present study
Pre-operative	8 ± 0.93	7.73±0.88	8.8±0.816	8
6 months Post-operative	5 ± 0.73	1.35±1.00	2.96±1.02	1

In our study we used the modified ODI questionnaire for evaluation of functional outcome in our patients. The mean modified ODI Score among the Study subjects pre operatively was 59.40±6.07% and 6 months post operatively the mean score was improved to 15.12±5.15%. This difference of ODI Score before and after the intervention was found to be statistically significant.

**Table 4:** Comparison of mean ODI with other studies

	ODI Pre-operative	ODI 6m Post-operative
Hegde D <i>et al.</i>	75 ± 11.8	36 ± 8.6
Arvind Kumar K <i>et al.</i>	73.67 ± 7.54	16 ± 3.28
Singh H <i>et al.</i>	26.85±4.20	5.23±2.72
Shrestha <i>et al.</i> <sup>[14]</sup>	37.87±8.76	7.78±7.7
Jaiswal <i>et al.</i> <sup>[15]</sup>	26.5±4.2	11.4±3.9
Present study	59.40±6.07	15.12±5.15

According to the criteria for minimal significant change, decrease in ODI score by ten was considered a successful outcome. Our study ascertains that conventional open discectomy has excellent functional outcome in most of the patients. There were statistically significant changes in ODI and, VAS scores with excellent as outcome in most of the patients.

In the present study nearly 86.7% of them did not have any kind of complications, while dural puncture was seen in 6.7% of the subjects which was repaired during the surgery and 6.7% had Post Operative Foot Drop on Left side and Superficial surgical site infection was seen in 3.3% of the subjects respectively. Post operative deficit was improved at the end of 9 months while surgical site infection was subsided with thorough debridement and appropriate intravenous antibiotics. In accordance with the study conducted by Ujjwal Gowardhan Wankhade *et al.* where complications were noted in 4 (08%) cases, among them 1 had dural tear which was primarily repaired at a time of surgery while 3 (6%) cases had superficial wound infection which was treated well with debridement and intravenous antibiotics.

## Conclusion

Back pain with radiation to legs is commonest presentation.

Males are more prone to disc prolapse. Pathology of disc degeneration is occurring more commonly between 3<sup>rd</sup> to 5<sup>th</sup> decade. Strenuous activities and occupation influence the occurrence of disc prolapse. SLRT is constant reliable sign of nerve root irritation.

Pre treatment MRI is essential tool for confirmation and planning of treatment and should always be correlated clinically. L4-L5 disc prolapse is commonest presentation in lumbar disc herniation. Patients undergoing surgery for lumbar disc herniation achieved greater improvement than conservatively treated ones. The long term outcomes of surgery and conservative management though sometimes considered similar, but in short term, surgery provides quicker relief, which helps improve the quality of living and lessen the burden economically. In our study, we have achieved results comparable to that achieved with microdiscectomy. Microsurgical techniques may have some advantages in terms of a less invasive approach; shorter hospital stay etc., but one should know the demands, requirements, and limitations of this technique. It also has a comparatively long learning curve and is technically a more demanding procedure in terms of surgical skills of the surgeon and equipment required and thus is not available in all hospitals. Also fenestration and discectomy is more cost effective than microdiscectomy.

Thus our study results conclude that fenestration discectomy for a herniated lumbar disc is the preferred treatment. Limitations include small sample size and relatively short-term follow-up. It is recommended to follow up for longer periods and a large study group to analyze the overall functional outcome.

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