

ORIGINAL RESEARCH

A study to assess the surgical outcome of treating lumbar disc prolapse (LDP): An observational study

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Abstract

Aim: The present study aimed to assess the surgical outcome of treating Lumbar Disc Prolapse (LDP).

Methods: The prospective study was conducted in the Department of Orthopaedics during a 2-year period. Out of 110 cases selected for the study, 100 were included since they were viable, while the remaining 10 were lost during follow-up. Male and female patients aged 18-70 with a prolapsed lumbar intervertebral disc admitted to the Department of Orthopaedics.

Results: The patients ranged in age from 19 to 65 years, with an average of 40.8 ± 12.0 years. Male patients averaged 37.3 years old with a standard deviation of 12.8, whereas female patients were 38.7 years old with 15.5. The mean age of female patients was slightly higher than males, but not significantly ($p > 0.05$). Patients were most likely to be over 40 (39%), followed by 21-30 (27%), 31-40 (25%), and under 20 (9%). Clinical assessment showed that 49% of patients had L5 sensory impairment and 19% had S1 sensory loss. 32 people (32%) retained sensory function. Out of 100 patients, 54% had disc prolapse at L4-L5, 32% at L5-S1, 6% at both, and 8% at L4-L5 and L3-L4.

Conclusion: The study determined that treating prolapsed lumbar intervertebral disc with laminotomy and discectomy is an effective therapeutic strategy that decreases complications and improves the likelihood of a successful outcome.

Keywords: Outcome, Surgical Management, Lumber Disc Prolapse

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Introduction

About 7.5% of the world's population suffers from lower back pain (LBP), making it a significant public health concern.¹ Lumbar intervertebral disc abnormalities, such as radiculopathy, spinal stenosis, or herniations, are present in more than half of the people who experience lower back discomfort.² Lower back pain (LBP) is common due to herniated discs in the spine, which affect 2% to 3% of the population and often require decompressive surgeries.³

The spinal nerves exit the body of the vertebrae below their respective lumbar vertebrae via intervertebral discs and five bodies of vertebrae. The back pain condition known as lumbar disc herniation (LDH) happens when the nucleus pulposus (NP) protrudes through the annulus fibrosus and presses on and irritates the spinal nerve roots.⁴ A person's pain threshold may be raised if physical compression

increases the likelihood of blood clot formation and decreases blood flow.⁵ Inflammation of the nerves and cell injury can result from the generation of proinflammatory chemokines. A decrease in neural conduction velocities can result from intraneuroledeoma damaging nerve fibres in either case.⁶

The development of both non-surgical and surgical treatment options for LDH has been spurred by research into the link between LDH and sciatica. Intradiscal injections are a non-invasive way to alleviate sciatica symptoms.⁷⁻⁹ In order to alleviate nerve compression, surgical procedures seek to either remove the LDH or increase the intervertebral space.¹⁰ Surgery, with its variety of techniques, is the only alternative for these patients if conservative treatment fails. Discectomy surgery, including microdiscectomy, endoscopic discectomy, and laser discectomy, is prevalent in developed nations. While

most cases of prolapsed intervertebral discs occur in healthy adults aged 20-45, they can also afflict younger people and the elderly. Intervertebral disc prolapse is more common in men. Trauma accounts for about 80% of cases of protrusion; this is typically the consequence of abrupt, intense strain while carrying large objects or performing jobs that need resisting flexion tension, such packers, firefighters, porters, etc.¹¹

The standard procedure for disc removal included a transdural approach, total laminectomy, and subsequent disc removal. Under local anaesthesia, Semmes developed a new technique in 1939 for removing a ruptured intervertebral disc. This procedure involved partial laminectomy and retraction of the dural sac to reach the damaged disc.¹² The underlying premise that spinal ageing and the onset of degenerative processes related to or exacerbated by ageing are critical components in disc disease has been established by anatomical dissections and clinical observations.¹³ Lumbar Disc Prolapse (LDP) surgery results were the focus of this investigation.

Methods

The orthopaedics department conducted the prospective study over the course of two years. Only 100 of the 110 cases that were considered were really eligible for inclusion in the study; the other 10 were lost to follow-up. The Orthopaedics Department admits male and female patients with prolapsed lumbar intervertebral discs ranging in age from 18 to 70 years.

Results

Table 1: Age and Gender distribution

Age in years	N%	Mean±SD
<20 years	9 (9)	40.8±12.0
21-30 years	27 (27)	
31-40 years	25 (25)	
>40 years	39 (39)	
Gender		
Male	72 (72)	37.3±12.8
Female	28 (28)	38.7±15.5

The patients' ages ranged from 19 to 65 years old, with a mean age of 40.8±12.0 years. The average age of the male and female patients was 37.3±12.8 and 38.7±15.5 years, respectively. The mean age difference between the male and female patients was not statistically significant ($p>0.05$), despite the

Furthermore, the following variables were examined for clinical assessment. Level of participation, role, X-ray of lumbar spine, MRI of lumbar spine, Relief of radiculopathy, gait, straight leg raising (SLR), muscle power, sensory deficit. Complications: Root damage, dural rupture, discitis. Functional outcome factors include pain status, alleviation of symptoms, spine mobility, return to work, and activity level.

Data were gathered, organised, and arranged based on essential variables. The various variables were analysed using normal statistical methods in SPSS version 20. 50 patients with prolapsed lumbar intervertebral disc had surgery and were regularly monitored.

Inclusion criteria

- Signs of root compression-Sensory, Motor, Reflex.
- Deteriorating signs and symptoms of patients of PLID where leg pain is dominant than back pain
- Restricted straight leg raising test with Positive MRI findings refractory to 2-3 weeks of conservative treatment.

Exclusion criteria

- PLID associated with other spinal pathology e.g. spinal tumor, infection, inflammation etc.
- Repeat lumbar disc surgery due to recurrence of symptoms
- PLID due to direct trauma with fracture-dislocation of vertebra.
- PLID with Cauda-equina Syndrome

female patients' somewhat greater mean age. The data showed that the age group with the highest percentage of patients (39%) was over 40 years old, followed by 21-30 years old (27%), 31-40 years old (25%), and <20 years old (9%).

Table 2: Sensory deficit and level of disc herniation among patients

Sensory deficit	N%
Sensory deficit at the level of L5	49 (49)
Sensory deficit at the level of S1	19 (19)
Intact sensory function	32 (32)
Level of disc herniation	
Disc prolapse	
L4-L5	54 (54)

L5-S1	32 (32)
L4-L5 and L5-S1	6 (6)
Disc herniation	
L4-L5 and L3-L4.	8 (8)

On clinical evaluation, 49 patients (49%) had L5 sensory impairment and 19 (19%) had S1 sensory loss. 32% of patients retained sensory function. In a

100-patient sample, 54% had L4-L5 disc prolapse, 32% L5-S1, 6% both, and 8% L3-L4.

Table 3: Repeated measure of analysis of variance of pain score in different visits

Stage	Pain score	Mean±SD	P value
Pre-operative	Absent (0)	3.00±0.0	
1 st visit	Occasional (1)	1.79±0.62	0.001
2 nd visit	Mild (2)	1.07±0.84	0.001
3 rd visit	Moderate (3)	0.24±0.64	0.001

The mean pain score was 3.0±0.0 preoperatively, 1.79±0.62 at the initial visit, 1.07±0.84 at the second visit, and 0.24±0.64 at the third appointment. An analysis of variance showed a significant reduction in

pain from before surgery to the first appointment ($p<0.001$), and a significant decrease from the first visit to the second and subsequent visits ($p<0.005$), based on the estimated mean score.

Table 4: SLR and Distribution of the patients by subjective assessment of functional outcome

SLR	Mean±SD
Preoperatively	42.6±6.3
1 st visit	50.8±4.5
2 nd visit	60.55±5.5
3 rd visit	89.3±2.6
Subjective assessment of functional outcome	
N%	
Excellent	75 (75)
Good	13 (13)
Fair	9 (9)
Poor	3 (3)

The SLR angle measured preoperatively was 42.6±6.3 degrees. After the operation, the SLR dramatically improved from a baseline of 89.3±2.6 at the 3rd visit. The subjective assessment of patients showed that 75% had an outstanding functional outcome, 13% had a good functional outcome, and 9% had a fair outcome. Nevertheless, 3% of patients experienced a poor functional result.

Discussion

A disc herniation refers to an asymmetrical protrusion or bulging of the rear region of the intervertebral disc as observed on an MRI. Larger lumbar/sacral disc herniations are more likely to result in back and/or leg pain, with the leg pain specifically referred to as sciatica.¹⁴ Lumbar disc prolapse is the most common cause of radicular discomfort. Before undergoing surgery for a lumbar disc prolapse, it's important to remember that the long-term outlook for such patients is often positive, as many discs shown on imaging may not cause symptoms or may improve on their own.¹⁵⁻¹⁷ Furthermore, the results of surgical treatment for lumbar disc prolapse were compared to conservative treatment, and after six months, there was no statistically significant difference between the two groups.¹⁸

The average age of the patients was 40.8±12.0 years, with a range from 19 to 65 years. The average age of male patients was 37.3 years with a standard deviation of 12.8, while for female patients it was 38.7 years with a standard deviation of 15.5. The mean age of female patients was slightly greater than that of males, although the difference was not statistically significant ($p>0.05$). The data showed that the highest percentage of patients were over 40 years old (39%), followed by 27% in the 21-30 age group, 25% in the 31-40 age group, and 9% in the under 20 age group. Upon clinical evaluation, it was shown that 49% of patients had sensory deficiency at the L5 level, whereas 19% showed sensory deficit at the S1 level. 32 individuals, or 32%, maintained preserved sensory function. Among 100 patients, 54% had disc prolapse at the L4-L5 level, 32% at L5-S1, 6% at both L4-L5 and L5-S1 levels, and 8% at L4-L5 and L3-L4 levels. Studies found that 49% of patients had a small disc space at the L5/S1 level, and surgical exploration confirmed a prolapsed disc at that level.¹⁸ 35% of cases showed a limited disc gap at the L4/5 level in X-ray, but prolapse was seen in only 14% of cases.¹⁹ In their study, Nabiet *al.* (1982) noted a 38.57% thin disc space.²⁰ 27.6% of patients in the current series had reduced disc space. Studies have shown that 65.2% of

patients experienced prolapse at the L4/5 level, 22.4% at the L5/S1 level, and 12.4% at the L3/4 level.²¹In their study, Khan *et al.* (1991) found that 57.25% of patients had prolapse at the L4/5 level, 34.78% at the L4/5 level, and 7.97% at the L3/4 level.²²

The average pain score was 3.0 ± 0.0 before the surgery, 1.79 ± 0.62 at the first visit, 1.07 ± 0.84 during the second visit, and 0.24 ± 0.64 during the third appointment. A repeated measures one-way analysis of variance revealed a substantial decrease in pain from preoperative to the 1st visit ($p < 0.00s1$) and from the 1st visit to future visits ($p < 0.005$), as indicated by the marginal estimated mean score. Lumbar disc prolapse frequently occurs at the L4/5 level in this and other documented series. The L5 vertebra connects with the S1 portion of the immobile sacrum. Most movement in the lumbar spine occurs at the L4/5-disc level, potentially contributing to the high prevalence of prolapsed discs at this level. O'Connell *et al.* found that 3.0% of patients experienced wound infection, 2.0% had haematoma formation, 1% suffered from pulmonary embolism, and 1.6% complained surgical pain in the back and groin.²³

Brown and Pont documented 2 post-operative fatalities, 6 postoperative superficial infections, and 5 additional problems in their study of 570 cases. These complications included lung infection, thrombophlebitis, CSF leak, and wound disruption.²¹In the current series, there were two cases of per-operative dural tear and one incidence of post-operative disc space infection. The infection may have occurred due to sharing surgical procedures in a shared operating room because a separate spinal surgery theatre was not available. The subjective assessment of patients showed that 75% had outstanding functional outcomes, 13% had good outcomes, and 9% had fair outcomes. 3% of patients experienced a poor functional result.

Conclusion

The study indicated that laminotomy and discectomy for prolapsed lumbar intervertebral discs reduce complications and enhance outcomes. The study followed 100 participants for 6-12 months. To clarify results, more study with a larger sample size and longer follow-up is needed.

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