

Original Research Article

Classical open lumbar laminectomy and discectomy for disc herniations among manual labourers in India

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ABSTRACT

Background: Lumbar disc herniations are most common at L4/5 and L5/S1 levels and this is most prevalent condition among manual laborers. The aim of the study to analyze the clinical presentation, age and sex distribution, immediate postoperative complications and long-term complications/recurrence of symptoms and to formulate recommendations to avoid complications and recurrence of symptoms.

Methods: This is a retrospective study which includes 250 patients operated for lumbar disc herniations at L4/5 and L5/S1 levels. A detailed history of presenting complaints, clinical examination and corresponding findings on imaging are correlated. In all these patients, there was severe symptomatology with failed conservative management which necessitated classical open lumbar laminectomy and discectomy. These patients were followed for a period of 5 to 10 years.

Results: Assessment of outcome was done using the modified Macnab criteria. The overall success rate was 96% in our series. Post operatively, 9.2% of them experienced localized low back pain which is mild to moderate and being treated with NSAIDs and exercises. 2.4% developed residual disc herniation or hypertrophic fibrotic scar at the operated site which needed surgical intervention. 2% developed spondylolysis and spondylolesthesis at the level of previous surgery, and 4.4% developed adjacent disc herniations.

Conclusions: The overall success rate was 96% in our series. In addition to removal of herniated disc other compressing elements like hypertrophied Ligamentum flavum, facet arthropathy and narrowed spinal canal diameter are also addressed with open procedure. To prevent later complications, these patients are supposed to avoid strenuous work, lifting weights, torsion and jerky movements, faulty posture at work and rest, gait training, crouching, sitting on the floor and haunches.

Keywords: Low back pain, Lower limb radiculopathy, Lumbar laminectomy and discectomy, Sciatica

INTRODUCTION

The symptoms of sciatica, pain beginning in the back and radiating into the buttock and leg were mentioned in ancient Greek and Roman texts. The intervertebral disc was first described by Vesalius in 1555.¹ Luschka observed at autopsy the degenerative process of the disc in 1858.² In 1929, Dandy described two cases of cauda equina syndrome that were thought to be due to material

derived from the intervertebral disc.³ In 1934, Mixte and Barr described 34 patients with sciatica due to degenerative disc that were amenable to surgical treatment.^{4,5} Now Lumbar Laminectomy and Discectomy is a commonly performed surgery.

The process of disc degeneration occurs in both at the annulus fibrosus and the nucleus pulposus. In younger ages, the disc has a substantial ability to expand, but the

annulus is strong enough to contain these forces. In 5/6/7th decades, despite a weakened annulus, the disc has lost most of its ability to expand, and thus the disc herniations are less common. In 3/4th decades, the disc still has the ability to expand and the annulus is becoming weaker so that the disc herniations are common in these age groups

Lumbar disc herniations are most common at L4/5 and L5/S1 levels and the present study of 250 patients deals with disc herniations at these levels. Lumbar intervertebral disc can undergo various stages of degeneration, depending on the person's age, occupation like manual laborers with or without history of any trivial injury while carrying out their strenuous work. In India, millions of people have jobs that involve a considerable amount of physical labor and sciatica is one of the major symptoms among laborers and compelling them to take rest from work, effects their daily earnings.

In vast majority cases, they get relief with conservative management and abstinence from strenuous work for few days. If symptoms have persisted, proper imaging is advised and when planning invasive therapy, it is of utmost importance that the results of imaging clinical symptoms and signs match logically.

Back pain is extremely common phenomenon, Nachemson estimated that 80% of the individuals will experience back pain at some time of their lives.⁶ Horal noted that 35% with low back pain develop sciatica.⁷ Hakelius reported that 75% of acute lumbar radiculopathy will experience improvement in 10-30 days with conservative management and less than 20% of these individuals will eventually become surgical candidates.⁸

The goal of the treatment is to decrease the pain and the restoration of the patients function with an early return to work. A short period of rest, classical analgesics like NSAIDS and epidural corticosteroid injections play a major role together with active physical exercise as soon as symptoms start to improve.

It is estimated that approximately 70-80% of patients with severe radiculopathy (posterior leg pain, positive straight leg raising test, muscle weakness) will improve with conservative treatment. The natural history of herniated nucleus pulposus as observed in MRI has shown that they tend to reduce in terms of size of protrusion into the canal over time. The indication for surgery is severe radiculopathy interrupting daily activities with failed conservative therapy.

The standard operations include laminectomy either partial or complete and discectomy. Open classical laminectomy and discectomy is widely accepted surgical procedure for lumbar disc prolapse. The minimally invasive techniques which have been used to treat contained lumbar disc prolapse and discogenic back

include chemonucleolysis with papain, various modifications of percutaneous discectomy, percutaneous laser discectomy, percutaneous endoscopic discectomy and intradiscal electrotherapy. However, they are mainly intradiscal procedures with a posterolateral approach to intervertebral disc and cannot be used for extruded disc fragments.

The aim of the study is Classical Open Lumbar Laminectomy and Discectomy in Manual Laborers, as these are prone for these degenerative disc herniations and even after surgery most of them carry on with the same strenuous manual work to earn their livelihood. So, the aim of the study is to analyze the clinical presentation, age of occurrence, sex distribution, immediate postop and long-term complications with recurrence of complaints and to formulate recommendations to avoid complications and recurrence of symptoms.

METHODS

This retrospective study includes 250 patients, who are unskilled manual laborers who have come to King George Hospital, Andhra Medical College, Visakhapatnam, Andhra Pradesh during the period of 2007 to 2012. All these patients had severe radiculopathy with or without motor deficit and autonomic dysfunction. In most of these cases, conservative management was tried with variable duration ranging from days to weeks. Persistent severity of the symptomatology was the indication for surgery in cases who failed to improve after conservative management.

As the inclusion criteria in the present study, the patients whose occupation is manual laborers between ages of 20 to 50 years are included as these are the group who normally return back to their previous work after surgery.

Exclusion criteria

- Ages below 20 and above 50 are excluded,
- Patients with significant trauma are excluded,
- More than one level is excluded,
- Higher lumbar levels are excluded,
- Patients with associated cervical, dorsal and other lumbar degenerative diseases are excluded.

Detailed history taken with regard to their nature of work, duration of such strenuous work, symptoms and their duration and conservative treatment history. In all the patients thorough, clinical examination was done to make sure that the levels and side of the radiculopathy correlates. Routine surgical profile with haematological examination and for comorbid conditions was performed. X-Ray LS spine with AP and lateral with flexion and extension views were taken. Spinal instability was assessed using flexion and extension lateral radiographs using Posner's criteria and such patients with spinal instability were excluded from the present study.⁹ MRI of

LS Spine with screening of entire spine was done. These were subjected for open Lumbar laminectomy and Discectomy. The operative findings were noted. Any events in immediate postoperative period and any symptoms during their subsequent follow-ups for 5 to 10 years are recorded and analyzed. Improvement, persistence or recurrence of symptomology like radicular pain which is unilateral or bilateral, motor deficit, neurogenic claudication, bladder, bowel and sexual dysfunction are analyzed.

RESULTS

250 manual strenuous laborers subjected to L4/5 or L5/S1 classical open laminectomy and discectomy were studied.

All the patients are operated in prone position under general anesthesia after confirmation of the level that is to be operated with X ray imaging. The average time for the surgical procedure is 60 minutes. Postoperative antibiotics were given for 72 hours. The patients were ambulated on first post-operative day and were discharged after suture removal. Outcome assessment was done using the modified Macnab criteria.¹⁰

Modified macnab criteria to assess clinical outcome following Laminectomy and Discectomy

Excellent

- Free of pain,
- No restriction of mobility,
- Able to return to normal work and activities.

Good

- Occasional nonradicular pain,
- Relief of presenting symptoms,
- Able to return to modified work.

Fair

- Some improved functional capacity,
- Still handicapped and/or unemployed.

Poor

- Continued objective symptoms of root involvement,
- Additional operative intervention needed at the index level,
- Irrespective of repeat or length of post-operative follow up.

Assessment of outcome was done for 250 patients using the modified Macnab criteria.¹⁰ 223 patients had excellent outcome, 21 patients had a good outcome, 5 had a fair outcome while 1 patients had a poor outcome. Thus, overall success rate was 96% in our series. The mean operative time was 60 minutes.

The age distribution in our study revealed that maximum patients suffering from L4/5 or L5/S1 level disc herniations are between age groups of 20 to 40 years with 90.4% and it is 9.6% in age group of 40-50 years. This clearly shows that this problem is most common among people who earn their livelihood by doing strenuous work. The details are shown in table 1.

Table 1: Age distribution.

Age group (years)	Number of patients	(%)
20-30	78	31.2
30-40	148	59.2
40-50	24	9.6

The sex distribution in our study is Males predominant than females. Among 250, 167 are male with 66.8% and 83 are females with 33.2%. The details are shown in table 2.

Table 2: Sex distribution.

Sex	Number of patients	(%)
Male	167	66.8
Female	83	33.2

The presenting clinical symptoms and findings are severe radiating pain which was unilateral in 174 patients and bilateral in 76 with 69.6% and 30.4% respectively. This shows lateral or far lateral disc herniations are most common. Motor Deficits of various degree was seen in 31 patients, the most common being EHL weakness and mild foot drop. Neurogenic claudication was seen in 14 patients i.e., 5.6%. Bladder and bowel involvement was seen in 11 patients with 4.4% and two male patients with sexual dysfunction with 0.8%. Latter three clinical presentations are mostly associated with central and excluded disc herniations.

The average time interval from onset of significant symptoms to subjecting them to surgery is 9 weeks. In 20% of cases, the decision for surgery was less than 3 weeks of conservative therapy as these were having severe unilateral or bilateral radiculopathy and in patients with significant motor deficit and with autonomic dysfunction surgery was performed immediately which accounts for 11% of the cases. The details are shown in Table 3.

Table 3: Clinical presentation.

Symptom	Number of patients	(%)
Radicular pain	Unilateral	174
	Bilateral	76
Motor deficit	31	12.4
Claudication	14	5.6
Bladder and bowel involvement	11	4.0
Sexual dysfunction	2	0.8

Disc herniation findings preoperatively in correlation with MRI findings are in 74% of the cases, the disc herniation was lateral or far lateral and these were presented with ipsilateral radiculopathy in 94% of the lateral or far lateral cases, bilateral in 3% of the cases and radiculopathy is more severe on the contra lateral side as compared to ipsilateral side in 1% of the cases. In these cases where the contra lateral side radiculopathy is seen, it is postulated that the disc bulge pushed the thecal sac and exiting root against the other side osseous boundary parts resulting in irritation of other side root. In 10.4% of the cases, the disc herniation was diffuse and in 7.6% of the cases it was mostly central with bilateral radiculopathy and claudication. Autonomic dysfunction was seen in few. The sequestered disc material 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. The details are shown in table 4.

Table 4: Disc herniation findings preoperatively.

Finding of herniation	Number of patients	(%)
Lateral / far lateral	185	74
Diffuse	26	10.4
Mostly central	19	7.6
Sequestered	11	4.4
Migrated	9	3.6

In our study, 171 patients (68.4%) had disc herniation at L4-L5 and 79 patients (31.6%) had disc herniation at L5-S1. The details are shown in Table 5.

Table 5: Levels of herniated disc noted in patients.

Level of disc involved	No. of patients	(%)
L4-L5	171	68.4
L5-s1	79	31.6

The amount of laminectomy which is enough to reach the herniated disc is performed in all 250 patients with open approach after confirmation of the level. The medial facet has to be addressed, which is overlying the herniated disc either at the axilla or shoulder of the exiting root in the form of medial facetectomy in 9.2% of the cases. Ligamentum flavum hypertrophy or buckling are noticed in 11% of the cases. Facet arthropathy noticed in 6% of the cases. Concomitant congenital narrowing of spinal canal was noticed in 5% of the cases.

The outcome in the present study of 250 patients using the modified Macnab criteria is excellent in 223 patients, good in 21 patients, fair outcome in 5 patients and 1 patient had a poor outcome.¹⁰

Straight leg raising test-64% of patients had straight leg raising positive around 30° and 32% patients had between 30° and 70°, but postoperatively all patients had normal straight leg raising test. Sensations were diminished in L4 dermatome in 71 patients, L5 dermatome in 154 patients

and S1 dermatome in 79 patients. More than one dermatome were involved in 59 patients. Overall 62% of patients had shown sensory disturbance preoperatively, but postoperatively 96% of these patients recovered normal sensory function.

DISCUSSION

Relationship between lumbar disc herniation and the syndrome of lumbago/sciatica has been well recognized since the 1930's. Since then it has been a constant endeavor to achieve the decompression of the offending nerve root. In 1934, Mixter and Barr described 34 patients with sciatica due to degenerative disc that were amicable to surgical treatment.^{4,5} Now Lumbar Laminectomy and Discectomy is a commonly performed surgery.

In the present study group, the most common level of PIVD was observed at the L4/5 level with 68.4% and with 31.6% at L5/S1. This finding was similar to the other studies included in the literature review that also confirmed that the most common involved vertebral levels are L4/5, L5/S1, indicating that these levels are affected more frequently. This is attributed to the ability of the disc to expand and weaker annulus due to strenuous work in these age groups. Males are predominantly affected with 66.8% over females with 33.2 mechanical stress. Most of the patients are in the age group of 20-40 years accounting to 90.4%. Most common clinical presentation is unilateral radicular pain seen in 69.6% with finding of lateral disc herniation in 74% of the cases. The survey of the clinical examination of the present sample showed a host of clinical symptoms with paucity of clinical signs. Unilateral radicular pain is seen in 174 with 69.6% and bilateral in 76 patients with 30.4%. Motor deficit is seen 31 patients i.e. 12.4%, EHL weakness is the most common. Neurogenic claudication is seen in 14 patients i.e. 5.6%. Bladder and bowel involvement is seen in 11 patients with 4.4%. Sexual dysfunction is seen in 2 patients with 0.8%.

Having subjected these patients for open lumbar laminectomy and discectomy, the symptomatic relief in radiculopathy is seen in more than 96% of the cases and this is almost similar to the results reported by Depalma and Rothman study where they reported >90% improvement in symptoms after surgery in postop period.¹¹ The postoperative discitis was noticed in 4 patients, 3 out of these 4 improved with rest, NSAIDs and antibiotics. 1 patient needed spinal fusion procedure along with evacuation of peridural collection.

Ganz et al. reported almost similar result showing 86% good outcome in their series of 33 patients treated by surgery.¹² Similar findings were observed in the study of Herron et al. with average leg pain improvement of 82% and average back pain improvement of 71%.¹³ None of the patients in our series had poor result. This could be due to the fact that all patients underwent at least a 6-12

weeks trial of adequate conservative treatment and were only operated after clinicoradiological correlation of their symptoms with imaging was confirmed.

There were no patients involved in compensation or litigation in our study. According to Waddell and Colleagues who found some individuals who substantially do worse after surgery with persistent pain and some of them were also subjected to repeated studies throughout their lives.¹⁴ Workmen compensation claims as described by Davis in his study are not seen in our present study.¹⁵

During the follow up from discharge date to 5 to 10 years period with a mean of 7.2 years, localized low back pain was seen in 23 patients requiring NSAIDS and assurance with no significant finding for this on MRI. Recurrence was seen at the same level in 6 patients. During repeat surgery for this, dense scar tissue with residual disc material was seen. In the study published by Davis, long term results are good in more than 90% of the cases and 6% recurrence at 10.8 years follow up period.¹⁵ Out of these 1/3rd of the patients were operated in the first year of surgery. Herrav in his study noticed recurrent disc herniation in 5% who required surgery. Spondylosis and spondylolesthesis was noticed in 5 patients in our study at the same operated level. Spondylosis and spondylolesthesis at the same level following extensive laminectomy and medial fascetectomy as described by Kobrine A, Byey PC.¹⁶ Adjacent level disc herniations are seen in 11 patients in our study on long term follow up and discectomy surgery was done without any fusion procedure.

CONCLUSION

The present study concludes that lumbar intervertebral disc herniations at L4/5 & L5/S1 with severe radiculopathy with or without associated motor or autonomic dysfunction is common among manual laborers. This is predominantly seen in young male earning members who do strenuous work.

Even after the surgery, they continued to do the same strenuous work after a period of rest for 2-3 months post operatively. 9.2% of them exposed localized low back pain which is mild to moderate and being treated with NSAIDS and exercises. 2.4% developed residual disc herniation or hypertrophic fibrotic scar at the operated site which needed surgical intervention. These patients are treated with excision of compressing element and no fusion procedure was required. 2% developed spondylosis and spondylolesthesis at the level of previous surgery, required fusion and 4.4% developed adjacent disc herniations which required laminectomy and discectomy without fusion.

These patients are supposed to avoid strenuous work, lifting weights, torsion and jerky movements, faulty

posture at work and rest, crouching, sitting on floor and haunches.

Evolution of surgical techniques like microscopic lumbar discectomy, percutaneous endoscopic discectomy, transforaminal endoscopic discectomy, chemonucleolysis (described by Smith L, Brown JE), percutaneous laser assisted discectomy (described by Choy DS, Ascher PW, Ranu HS, Saddekni S, Alkatis D, Leibler W, et al) (Onik G, Helms CA, Ginsberg L, Hoaglund FT, Morris J) etc which are minimally invasive have to be performed whenever possible to decrease the morbidity and to avoid long term complications.¹⁷⁻¹⁹ The advantages cited for these techniques have been surgery under local anesthesia, early mobilization, non-disturbance of posterior structures such as laminae, facet and ligamentum flavum, less manipulation in the intraspinal space thus reducing the possibility of epidural fibrosis.

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