

Functional outcome of single level lumbar intervertebral disc prolapse treated with fenestration discectomy - A prospective study

Subhash Patil¹, Kanaka Chalapathi^{2*}

¹Associate Professor, ²Assistant Professor, Department of Orthopaedics, RIMS, Raichur, INDIA.

Email: drkcp01@yahoo.com

Abstract

Background: Low back pain affects every population and is one of world's foremost debilitating conditions. Authors have mentioned lifetime incidence of low back pain in range of 50-70% including sciatica among 40%, but clinically significant sciatica requiring special attention accounts for only 4-6% cases. Major cause of low back pain leading to severe morbidity throughout the world affecting mainly the young working class population is lumbar disc prolapse. Various retrospective and some prospective review of fenestration disc surgeries vary greatly with good results ranging from 46-97% and re operation rate of 9%. Present study was conducted to determine extent of functional recovery i.e. pain relief and return to work in patients with lumbar disc prolapse treated by fenestration technique. **Method:** From Dec 2017 to Dec2018 thirty cases of lumbar disc prolapse treated with fenestration and discectomy satisfying inclusion and exclusion criteria, treated in Raichur Institute of Medical Sciences, Raichur were studied. **Results:** Out of 30 patients Majority of 18 (60%) patients showed good outcome followed by excellent in 09 (30%) patients, 02 (06.6%) patients had fair outcome and 01 (03.3%) patient had poor outcome. **Conclusion:** By considering all aspects fenestration and discectomy is a better technique with the advantage of less tissue injury, good spinal function, smooth patient recovery, improve working status with early rehabilitation and maintain clinical efficacy.

Key Words: fenestration, discectomy, lumbar disc prolapse

*Address for Correspondence:

Dr Kanaka chalapathi, Assistant Professor, Department of Orthopaedics, RIMS, Raichur, INDIA.

Email: drkcp01@yahoo.com

Received Date: 04/07/2020 Revised Date: 09/08/2020 Accepted Date: 18/09/2020

DOI: <https://doi.org/10.26611/1031624>

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	Accessed Date: 23 November 2020

INTRODUCTION

Prolapsed lumbar intervertebral disc is one of the most common problems encountered in medical practice¹. In orthopaedic practice patients having lesions of lumbosacral region causing low back pain with sciatica are not uncommon since the beginning of recorded history. Hippocrates (460- 370 BC) was probable the first to

mention sciatica and low-back pain. A.G. Smith was the first to perform a successful laminectomy in 1829 in the United States². Majority of cases the backache is associated with degeneration of the intervertebral discs in the lower lumbar spine. This is an age-related phenomenon that occurs in over 80 percent of people who live for more than 50 years and in most cases it is asymptomatic. Overall, degeneration of the lumbosacral discs correlates closely with age. This process begins surprisingly early in life and increases gradually with age³. Disc prolapse at the L4-5 level has been shown to be the most commonly herniated disc, resulting in L5 radiculopathy and at L5-S1 level is second in frequency of herniation⁴. Approximately 70% - 80% people have experienced low back pain at some point in their life⁵. Disc excision by fenestration technique has superiority over laminectomy in respect of tissue damage, neurological decompression, early postoperative mobilization, early return to work and low incidence of backache. It is safe, effective and reliable surgical

How to site this article: Subhash Patil, Kanaka Chalapathi. Functional outcome of single level lumbar intervertebral disc prolapse treated with fenestration discectomy - A prospective study. *MedPulse International Journal of Orthopedics*. November 2020; 16(2): 27-31.

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technique for treating properly selected patients with the herniated disc. The technique is free from spinal instability. The most recent techniques such as percutaneous lumbar disc decompression (PLDD), percutaneous endoscopic lumbar discectomy (PELD), young endoscopic spine system (YESS), percutaneous laser disc decompression need lots of expertise, experience and it is expensive too⁶. In an open discectomy, a skin incision is made in the posterior midline of back over the affected level between two spinous processes. The length of the incision depends on how many discectomies will be performed. A single level incision is about 1 to 2 inches long. The back muscles are retracted on one side to expose the lamina⁷.

METHODOLOGY

Cases admitted at dept of orthopaedics ,rims, raichur satisfying the inclusion and exclusion criteria were studied. We included patients aged 20 to 50 years of both sexes with single level lumbar disc lesion those who failed to respond to conservative management for 6 weeks, had unilateral radiculopathy signs with or without neurological deficits and showed disc prolapse on magnetic resonance imaging (MRI). We excluded patients with canal stenosis, multiple disc lesions and cauda equine syndrome. All the patients were assessed clinically. A detailed history was obtained and they were subjected to a thorough clinical examination. Radiological investigations (plain x-ray and MRI) were carried out to confirm the diagnosis and know the level of the lesion. The patients were also assessed preoperatively and postoperatively with the Japanese orthopaedic association low backache score. All patients underwent conventional open fenestration and discectomy surgery in the prone position. The level and type of disc protrusion was observed intraoperatively Postoperatively the patients were followed up in the immediate post-operative period, 1 month and 6 months after the surgery. The Japanese Orthopaedic Association low backache score was used pre and post-operatively to assess the outcome analysis of functional status. The outcome was designated as good (75 to 100% improvement), fair (50 to 74% improvement) and poor (below 49% improvement). The improvement in pain and neurological deficit were recorded. Peri and postoperative complications if any were noted. Statistical significance of postoperative changes were assessed by the Chi-square test.

RESULTS

This study consists of 30 cases of lumbar disc prolapse treated by fenestration and discectomy in 2017-18. The mean followup was 8.3months ranging from 6 to 14months. The age of these patients range from 24 to 48

years with an average of 35.6 years, female patients were aged between 32 and 48 years with an average of 37.1 years, males were aged between 24years and 46years with an average of 35.2 years. Events which precipitated the onset of pain were analyzed. History of lifting heavy weights was present in 50% (15 cases), insidious onset was present in 40% (12 cases) and bending activity in 10% (6 cases). Average duration of symptoms before surgery was 9.2 months, ranging from 3 months to 36months. Majority of cases came with complaints of low backache and radicular pain. All patients had received a trial of conservative treatment in the form of bed rest and physiotherapy with no significant improvement. On examination a positive SLRT was the most common finding followed by restricted spinal movements and neurological deficits. All patients had undergone MRI scan to know the level of the lesion. L4-5 disc prolapse was the commonest in our study, followed by L5- S1. Average duration of hospital stay was 10.3 days ranging from 6 days to 24 days. 18 out of 20 patients with motor deficits before surgery had improved power post operatively. Out of 15 patients who had sensory deficit 13 improved. 2 patients had persistent sensory deficit post operatively. The outcome according to the JOA score was correlated and analyzed with respect to sex, age, duration of symptoms and neurological deficit. 9 out of 10 females had good outcomes, 20 out of the 20 males had good outcome, and 1 of the females had a poor outcome. 14 cases of less than 6months duration had good outcome, 12 cases with more than 6months duration of symptoms had good outcome. One patient with poor outcome had neurological deficit, there were no poor outcomes among those who had no neurological deficits. The difference between the two groups was however not statistically significant ($\chi^2=2.08$, $p=0.3539$).

DISCUSSION

What low back pain lacks in lethality it certainly makes up for in the wholesome misery it causes in modern industrial societies. Lowback disorders have become the most common musculo skeletal disorder, with a major impact on the costs of health care and are a major source of disability⁸. One must recognize that lowback pain is a symptom that has many causes, the commonest being a prolapsed disc. The origins of disc related sciatica with its clear morphologic and clinical neurologic findings were not recognized until the 20th century. After Mixter and Barr in 1934 described disc protrusions and showed the effectiveness of surgery in its management, there has been an increasing enthusiasm to solve sciatica problems surgically by disc excision⁹. However the results of good outcome after lumbar disc excision varies in literature from 51 to 89%^{10,11,12,13}. There are a considerable number of

failed back surgeries too which may require revision surgery. The recurrence rate for lumbar disc excision varies from 6% to 11% in various studies^{10,11,14}. This implies that there are many factors which influence the outcome of lumbar disc surgery. Therefore emphasis should be laid on proper patient selection. For a great majority of patients with sciatica due to disc prolapse conservative treatment provides satisfactory relief from symptoms. In evaluating disc disease, the natural history should be taken into account which reveals that surgery plays only a palliative role in its management¹⁵. Lumbar disc herniation shows a favorable response to conservative treatment even in the presence of some neurological deficit¹⁶. Hence any surgical intervention without appropriate conservative therapy leads to unnecessary surgery and also to poor outcome¹⁷. However a protracted conservative regimen in the presence of severe radicular symptoms should be avoided since this increases morbidity and reduces the chances of a successful outcome. A longer preoperative interval in patients with chronic sciatica was associated with a less predictable outcome¹³. It is therefore the clinician's task to properly select for surgery, the patients with appropriate indications, who are expected to have symptomatic relief from the surgery with limited risk and least possible expense. Better investigative modalities (myelography/CT/MRI) have led to more accurate diagnosis of disc lesions. They have revolutionized the diagnosis of spinal disease by the accurate visualization of all structures within the neural canal. In addition, it offers the opportunity to outline the neural foramen and extraforaminal areas and thus guides the surgeon in planning a precise surgical correction, preventing unnecessary exploration of uninvolved levels.¹⁸ Results of lumbar disc surgery are excellent when there is clear correlation between clinical presentation and imaging studies. In our study we used the Japanese Orthopaedic Association low backache score to evaluate our results. This score was used as it is simple which assess the patient's outcome both subjectively and objectively. It also helps in correlating the results to various factors that may

influence the outcome such as age, sex, duration of symptoms etc. In our study 66.6% of the cases were males and 33.4% females (Table 1). Males were affected more commonly than females which were in accordance with studies by Pappas and Richard Davis who also had male preponderance^{10,11}. Study by Richard Davis *et al*, had a mean age of 42 years range from 16 to 77 years and in Pappas *et al*, mean age was 42 years, ranging from 15 to 83 years. The event or precipitating factor that accounted for most of the cases was inappropriate lifting of weight (40%). 10% had a history of fall. In Pappas *et al*, study, lifting weight was the event in 31.4% of cases followed by falls (10%), sports injuries (10%) and automobile accidents (6.1%). L4-5 was the most commonly involved one in our study (Table 2). In our study we achieved 90% good outcomes and 6.6% fair outcomes. We had 3.4% of poor outcome as compared to Pappas *et al*, and Davis *et al*, who had 6.4% and 3.3% poor results respective (Table 3). In our study we found that there was no significant correlation between outcome and sex. Weber in his study found that the female sex was associated with poor outcomes¹⁶. One case with poor outcome was seen in patient >40 years of age in our study. However, the outcome of patients >40years of age was statistically not significantly different from the other group. Matti Hurme *et al*, found that age /age was not predictive of outcome¹⁶. Furthermore, one case which had a poor outcome had a preoperative duration of symptoms of < 6 months. The statistical difference was however not significant between those with less than 6 months and more than 6 months duration of symptoms. A. Naylor in his study found that a longer preoperative duration of symptoms was associated with less favorable outcome following surgery¹³. Surgical outcome was not significantly affected with absence or presence of neurological deficit in our study. Overall in our study we had a favorable outcome following fenestration and discectomy for lumbar disc prolapse. A comparison of our results to those of microdiscectomy is given below (Table 5).

Table 1: Sex Distribution

Sex	Pappas <i>et al</i> ,	Davis <i>et al</i> ,	Present study
Male	61%	64%	66.6%
Female	39%	36%	33.3%

Table 2: Level of Disc prolapse

Level of prolapse	Richard Davis <i>et al</i> ,	Pappas <i>et al</i> ,	Guptha <i>et al</i> ,	Present study
L1-I2	0.2%	-	-	-
L2-I3	0.9%	2%	-	-
L3-I4	4.4%	9%	-	3.3%
L4-I5	46.7%	49%	35.2%	60%
L5-s1	47%	40%	22.3%	36.6%
Multiple level	0.8%	-	44.5%	-

Table 3: Outcome in various studies

Outcome	Richard davis <i>et al</i> ,	Pappas <i>et al</i> ,	Present study
Good	89%	77.3%	90%
Fair	7.7%	15.5%	6.6%
Poor	3.3%	6.4%	3.4%

Table 4: Comparison of Fenestration with various Microdiscectomy studies

Authors	Good	fair	Poor
Ebeling <i>et al</i> ,(microdiscectomy)	73%	19%	9%
Caspar <i>et al</i> ,(microdiscectomy)	74%	18.1%	7.9%
Nagi <i>et al</i> ,(fenestration)	93.3%	5%	1.7%
Present study(fenestration)	90%	6.6%	3.4%

CONCLUSION

Several conclusions can be drawn from our study. The fenestration and discectomy is an extremely useful and effective surgery for treatment of lumbar disc prolapse. Consistently good results (86.6%) in our study could be attributed to proper selection of cases and a meticulous surgical protocol. The results of lumbar discectomy are good when there is agreement between clinical presentation and imaging studies as was seen in our study. All our patients had radicular pain at presentation. The variables which were found to have no correlation with outcome were age, sex, duration of symptoms and neurological deficits. The Japanese Orthopaedic Association low backache score appears to be an useful tool for evaluation of disc surgery. Widespread use of this score will allow different studies and procedures to be compared more objectively to improve the outcome of disc surgery. In addition to the postoperative score, change of the postoperative score as compared to the preoperative score is also a useful indicator of outcome. The only limitation of this study was a small sample size. In our study we 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 must understand the demands, requirements, and limitations of this technique. It also has a long learning curve and is technically a more demanding procedure in terms of surgical skills of the surgeon and equipment required and thus is available only in multispecialty hospitals. Also fenestration and discectomy is more cost effective than microdiscectomy. Fenestration discectomy as a surgical procedure is less time consuming, with lesser blood loss, lesser post-operative complications and does not compromise with stability of spine when compared to laminectomy.

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Source of Support: None Declared
Conflict of Interest: None Declared

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