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Outcome analysis of fenestration discectomy for lumbar disc prolapse

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Abstract

Background: Various retrospective and some prospective review of fenestration disc Surgeries are available. The results of these series vary greatly with good results ranging from 46-97% and re operation rate of 9%. The need for this study is to evaluate the results of fenestration discectomy for Lumbar disc prolapse, with regard to patients post-operative subjective evaluation of low back pain and radicular symptoms, the objective physical findings and the complications.

Method: Thirty cases of lumbar disc prolapse treated with fenestration and discectomy satisfying inclusion and exclusion criteria treated in P.E.S. Institute of Medical Sciences and Research, Kuppam, Andhra Pradesh were studied. Japanese Orthopaedic Association Low Backache score was used to assess the outcome, pre-operative and post-operative scores were taken and the rate of improvement in terms of percentage was calculated.

Results: In our study we achieved 86% excellent to good results, 10% of fair results with a complication rate of 3.3% only. The results were comparable to other studies.

Conclusion: There are many new techniques for treatment of lumbar disc prolapse but conventional standard discectomy through a fenestration is still the most acceptable method today. Various studies have shown 91% of patients had excellent, good and satisfactory outcome. 9% of patients had moderate and poor categories of outcome.

Keywords: fenestration, discectomy, lumbar disc prolapse

Introduction

Humans have been plagued by back pain since the beginning of recorded history. Back pain is now appearing as a modern international epidemic. Upto 80 % of people are affected by this symptom at some time in their lives. Impairments of the back and spine are ranked as the most frequent cause of limitation of activity in people younger than 45 years by the national center for health statistics. Intervertebral disc disease and disc herniation are most prominent in otherwise healthy people in the 3rd and 4th decades of life, it accounts for a majority of cases of low backache seen by an orthopaedician in clinical practice and is a major contributor of functional disability.

Methodology

Cases satisfying the inclusion and exclusion criteria in P.E.S. Institute of Medical Sciences and Research, Kuppam, India were studied. We included patients aged 18 to 55 years of both sexes, those who failed to respond to conservative management for 6 weeks, had positive root tension signs with or without neurological deficits and showed disc prolapse on magnetic resonance imaging (MRI). We excluded patients with a prior lumbar spine surgery, vertebral fracture and with a radiological evidence of facet joint arthritis.

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.

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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 2008-11. The mean follow-up was 8.2 months ranging from 6 to 13 months.

The age of these patients range from 24 to 66 years with an average of 44.9 years, female patients were aged between 32 and 66 years with an average of 47.1 years, males were aged between 24 years and 64 years with an average of 43.2 years. Events which precipitated the onset of pain were analyzed. History of lifting heavy weights was present in 40% (12 cases), insidious onset was present in 40% (12 cases) and bending activity in 10% (6 cases). Average duration of symptoms before surgery was 9.4 months, ranging from 3 months to 48 months. 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. Multiple level disc prolapse were seen in 13.3% (4 cases). 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. 6 out of 9 females had good outcomes, 20 out of the 21 males had good outcome, and 1 of the females had a poor outcome. This difference in outcome between male and female patients was not statistically significant ($\chi^2=4.85$, $p=0.088$). 14 cases of less than 6 months duration had good outcome, 12 cases with more than 6 months duration of symptoms had good outcome. There was no statistically significant difference between the two groups ($\chi^2=4.16$, $p=0.15$). 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 disability^[1]. One must recognize that lowback pain is a symptom that has many causes, the commonest being a protruded 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 excision^[2]. However the results of good outcome after lumbar disc excision varies in literature from 51 to 89%^[3, 4, 5, 6]. 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^[3, 4, 7].

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 management⁸. Lumbar disc herniation shows a favorable response to conservative treatment even in the presence of some neurological deficit^[9].

Hence any surgical intervention without appropriate conservative therapy leads to unnecessary surgery and also to poor outcome^[10]. 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 outcome^[6]. 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^[11]. Results of lumbar disc surgery are excellent when there is agreement 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 70% of the cases were males and 30% 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. (3,4) 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 86.6% good outcomes and 10% 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 there was a low incidence of complications (10%), with one case of superficial wound infection, one case of dural rupture and one case of discitis (Table 4).

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 outcomes [9]. One case with poor outcome was seen in patient >40 years of age in our study. However, the outcome of patients >40 years of age was statistically not significantly different from the other group. Matti Hurme *et al* found that age older than 40 years was associated with poor outcome [12]. Weber found that age was not predictive of outcome [9]. 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 surgery [6]. 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%	70%
Female	39%	36%	30%

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
L1-2	0.2%0.	-	-	-
L2-3	0.9%	2%	-	-
L3-4	4.4%	9%	-	-
L4-5	46.7%	49%	35.2%	73.3%
L5-S1	47%	40%	22.3%	13.3%
Multiple level	0.8%	-	44.5%	13.3%

Table 3: Outcome in various studies

Outcome	Richard Davis <i>et al</i>	Pappas <i>et al</i>	Present study
Good	89%	77.3%	86.6%
Fair	7.7%	15.5%	10%
Poor	3.3%	6.4%	3.4%

Table 4: Complications in various studies

Complications	Richard Davis <i>et al</i>	Pappas <i>et al</i>	Present study
Wound infection	25(2.1%)	45(1.8%)	1(3.3%)
Dural tear	6	6	1(3.3%)
Discitis	-	3	1(3.3%)
Paraplegia	4	-	-
Pseudomeningocele	-	3	-
Arterial injuries	-	2	-
Small intestine injury	-	1	-
Pulmonary	-	6	-
Paralytic ileus	5	-	-

Table 5: Comparison of fenestration with various microdiscectomy studies

Authors	Good	Fair	Poor
Ebeling <i>et al</i> (Microdiscectomy)	73%	19%	9%
R.Silvers (Microdiscectomy)	95.5%	3%	1.5%
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)	86.6%	10%	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.

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