

Outcome of laminotomy and discectomy in lumbar intervertebral disc prolapse

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Abstract

Background: Lumbar disc prolapse is one of the most common causes of low back and radicular pain. Discectomy is by far the most commonly done surgical procedure for treatment of prolapsed lumbar intervertebral disc (PIVD). Many techniques have been advocated for discectomy and all the techniques have their advantages and limitations.

Methods: Forty-five patients with clinical symptoms and signs of prolapsed lumbar intervertebral disc having radiological correlation by MRI were subjected to disc excision by laminotomy method.

Results: The assessment was done by Japanese Orthopaedics Association score during follow up. Twenty-eight patients (62%) had excellent outcome, sixteen patients (36%) had good outcome and only one patient had poor outcome. There was a significant change in JOA score pre-operative and post-operative period. Statistically value of Chi square test is 18.89, df = 6, P value = 0.004. There were only four complications reported (8.8%).

Conclusion: The laminotomy and discectomy is an effective surgical option for treatment of lumbar disc prolapse having good to excellent functional outcome with low complication rate.

Keywords: Lumbar prolapse intervertebral disc; sciatica; laminotomy; discectomy

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How to site this article: Singh V et al. Outcome of laminotomy and discectomy in lumbar intervertebral disc prolapse. OrthopJMPC 2018;24(1):36-41.

Introduction

Vertical loading of the spine results in a variety of low back problems affecting majority of the human population. The low back pain [LBP] is experienced by 80-90% of the population worldwide [1]. LBP is second only to headache as a frequent source of pain in the body. Back pain is now appearing as a modern international epidemic. Up to 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 [2].

Prolapsed intervertebral disc (PIVD) is a major cause for low back pain and A Vast array of techniques exists for surgical treatment of herniated disc [3]. Standard open discectomy is the most common surgical approach, who failed to respond to conservative treatment like NSAID's, epidural steroid injection and physical therapy [4].

In 1934, Mixter and Barr published their study and concluded that laminectomy with decompression and extraction of herniated lumbar disc could improve suffering caused by sciatic pain [5]. However, the outcome studies of lumbar disc surgery document a success rate of 51 to 89%, in spite of advances in investigations, operative

technique (Microscopic and Endoscopic discectomy) and postoperative care [1,2].

Surgery for Lumbar PIVD has changed time to time and a great number of surgeons have contributed to develop newer techniques to operate upon prolapsed disc.

In our study, instead of removing whole lamina, spinous process and interspinous ligament to reach prolapsed disc, we have done laminotomy by cutting inferior aspect of superior lamina and excision of ligamentum flavum.

Technique of sparing supraspinous and interspinous ligaments does help in earlier rehabilitations of the patients, fastens the recovery and thereby reducing problems related to it. Other advantages of laminotomy are less soft tissue dissection which leads to less blood loss, reduced duration of surgery, and consequent reduction in surgical site infection. Apart from this, laminotomy does not need sophisticated instruments and setup like how it is required in micro-endoscopic discectomy and can be carried out with minimum financial loss to patient, more so over there is a steep learning curve associated with using the endoscopic operation system efficiently and safety.

Materials and Methods

Forty five patients were assessed clinically. A detailed history from patient was obtained and subjected to a thorough clinical examination. The findings were noted in the proforma. Radiological investigations (plain x-ray and MRI) were carried out to confirm the diagnosis and know the level of the lesion.

All patients underwent conventional open laminotomy and discectomy in prone position under general anaesthesia. The level and type of disc herniation was again assessed intra-operatively. Postoperatively the patients were followed up in the immediate post-operative day, 2nd week,

1st month, 3rd month and 6 months after the surgery.

The Japanese Orthopaedic Association low backache score was used pre and postoperatively to assess the outcome analysis of functional status.

The outcome is designated as excellent- 75 to 100% improvement, good- 51 to 74% improvement and poor- below 50% improvement.

The improvement in pain and neurological condition was recorded. Perioperative and postoperative complications, if any were noted.

Results

The mean follow up was 6.1 months ranging from 1 to 13 months. Low back pain and radicular pain was the most common symptom with which patients presented. Other complaints were tingling and numbness (paresthesia), weakness over lower limb and difficulty in walking and posture. Four patients presented to us with cauda equina. On examination a positive straight leg raising test (SLRT) was the most common finding followed by restricted spinal movements and neurological deficits. Left side was most commonly involved. 23 patients had unilateral left side complaint and 4 patients had complaint on both sides, whereas 18 patients had complaint in right side.

Average duration of surgery in our study was 107 minutes, ranging between 45-180 minutes. Average hospital stay in our study was 8.5 days ranging between 5-12 days. Average blood loss was 110 ml ranging between 80-250 ml.

Thirteen out of 45 patients (29%) had pre operative JOA score of 1-5 and 32 patients (71.1%) had between 6-9. No patient presented with JOA score between 10-15. There was dramatic change in JOA score post operatively, where 36 patients (80%) had score between 13-15, seven patients

(16%) had score between 10-12 and only 2 patients (4.4%) had it between 6-9.

Observations of pre operative score were compared with results of surgical outcome which showed Chi square value of 18.89 and the P value was 0.004. This signifies that there was a statistically significant change in patient's symptom post operatively. Statistically value of Chi square test is, χ^2 (Chi square test) = 18.89, df = 6, P value = 0.004 i.e. $P < 0.05$ which shows that the result is statistically significant. Twenty eight patients (62%) had excellent outcome and improvement rate $>75\%$, 16 patients (36%) had good result and improvement rate between 50-75% and only 1 patient (2%) had poor result. four out of 41 with motor weakness and one patient with cauda equina syndrome did not improve post operatively.

Complication rate in our study of 45 patients was only 8.8 % out of which 2 patients (4.4%) had surgical site infection, 2 patients (4.4%) had dural tear. Fourty patients were without any complications. Out of 45 patients who had low back pain and radicular pain had no complaint post operatively, where as two patients out of 42 with paresthesia.

Events which precipitated the onset of pain were analyzed. History of doing heavy manual work was present in 73% (33 cases) which includes labour, farmer driver and coolie. Insidious onset was present in 27% (12 cases) which includes housewives and students.

Discussion

What low back pain lacks in lethality it certainly makes up for in the wholesome misery it causes in modern industrial societies. 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 disability⁶. The origins of disc related sciatica with its

clear morphologic and clinical neurologic findings were not recognized until the 20th century. Literature says there is a considerable number of failed back surgeries also which may require revision surgery. The recurrence rate for lumbar disc excision varies from 6% to 11% in various studies 8, 9, 11, 12. This implies that there are many factors which influence the outcome of lumbar disc surgery. Therefore emphasis should be laid on proper patient selection.

In our study male were aged between 23-60 yrs with a mean of 39.28 and females were aged between 25-59 yrs with mean of 41.31yrs. Similar age group was seen in study conducted by K. N. Acharya¹⁸ et al, J. Weinstein¹⁷ et al and Sangwan¹³ et al. In our study we found that patients with age group less than 40 yrs had better outcome than those with age group more than 40 yrs.

In our study 33 patients (73.44%) were heavy manual worker and 12 patients (26.66%) were medium strenuous worker including house wives and students which were of younger age group. Irrespective of the work group good to excellent result was seen, one patient with poor result was a farmer. Globally it is seen that patient indulged in strenuous work are vulnerable to disc prolapse. J. Weinstein¹⁷ et al in his study on 71 patient found that 85% (60) patients were labourer as profession and 15% (11) patients were non-labourer. S.S Sangwan¹³ et al also observed that only 3 out of 28 patients were sedentary worker and remaining 25 patients were labourer. Another study by S. K. Mishra¹⁶ et al on 67 patients found that 40 (60%) were involved in heavy work.

In our study single most commonly involved level was L4-5 level. Next most commonly involved level was L5-S1 level. J. Shi¹² et al in his study on 60 patients reported less satisfactory outcome in L4-5 level discectomy, though no other study has

shown bad result with same level. Cauda equine syndrome is seen more in L4-5 level due to compression over traversing roots. J. N. Weinstein¹⁷ et al in his study reported L5-S1 as most commonly involved level. S. S. Sangwan¹³ et al reported most common level involvement as L5-S1 level followed by L4-5 level. Whereas K.N.Acharya¹⁸ et al, Barbara¹⁵ M. et al and Gupta²⁴ et al in their study found L4-5 most commonly involved level followed by L5-S1.

In our study we found protruded disc was more common. Twenty six patients (57%) presented to us with protruded disc, extruded disc was found in seventeen patients (38%) and only two patients (4.4%) presented with sequestered disc. S. S. Sangwan¹³ et al in his study found that protrusion was most common type of herniation followed by extrusion. None of the patients in his study had sequestration. Bhavuk Garg²³ et al mentioned that contained disc was common finding in his study. He also mentioned that contained disc or protruded disc has better outcome compared to extruded or sequestered disc prolapse.

Patients who presented to us within 6 months of commencement of their complaint had better post operative outcome than those who presented to us after 6 months. Rotheorl¹⁹ et al distinguished operatively treated patients according to time of presentation to surgery. Patients with symptom duration more than 2 months had a statistically significant worse outcome than patients operated within 2 months¹⁹. Likewise Hurme and Alaranta found the best results in patients operated within 2 months of the onset of disabling sciatica²⁰. Nygaard et al reported worse result in patients with leg pain for 8 months or more²¹. Sorenson et al found that symptom duration greater than 16 months was predictive of poor results, but this was highly influenced by patient personality and social factors²².

In our study we found excellent result in 28 patients (62.2%), good result in 16 patients (35.6%) and poor result in only one patient. Low back pain and radicular pain was cured in all the patients but two patients had persistent sensory weakness and four patients had persistent motor weakness. Overall result in our study was excellent. Bhavuk Garg et al²³ in comparative study between microendoscopic discectomy and laminotomy with discectomy found near similar surgical outcome in both the groups (95% in MED group and 90% in laminotomy group) at the end of six months and one year, but he emphasized that there were more complications with MED group. Chances of recurrent herniation at same level were found to be with MED group. Sangwan¹³ et al had excellent result in 17 patients, good result in 6 patients and fair result in 2 patients with fenestration and laminotomy procedure. James N. Weinstein¹⁷ in his study on 719 patients, with open discectomy had 90% good to excellent result. O. N. Nagi²⁵ et al in their study on sixty patients found 93% good to excellent result with fenestration and laminotomy technique. Ebeling²⁶ et al., Caspar¹⁴ et al and R. Silvers³ published their study with micro endoscopic technique and found good outcome in 73%, 74% and 95% respectively, whereas newer studies with micro endoscopic technique has yielded more than 90% good result. S. K. Mishra¹⁶ et al in a study comparing results of wide Laminectomy and interlaminar fenestration. The study found 90% satisfactory outcome in fenestration group and 80% in Laminectomy group, there was less incidence of post operative back pain with fenestration group.

Conclusion

Laminotomy and discectomy is an effective surgery for treatment of lumbar disc prolapse. Consistently good to excellent results (96%) 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 it was seen in our study.

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 and less blood loss, but one must understand the demands, requirements, and

limitations of this technique. It requires a steep learning curve and it is a technically demanding procedure in terms of surgical skills of the surgeon and equipment required and thus is available only in multispeciality hospitals.

Unlike laminectomy this procedure is less destructive, spinal stability is maintained, duration of surgery is less hence there is less blood loss and chances of infection is less, laminotomy and discectomy is more cost effective than microdiscectomy.

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