

Outcome analysis of fenestration discectomy in symptomatic young lumbar disc disease patients

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Abstract

Though low back pain is common only 4-6% have a significant sciatica and among these, most settle with conservation. It is commonly caused by intervertebral disc prolapsing into intervertebral foramina at L₄-L₅ and L₅-S₁ levels. In patients with unilateral symptoms where conservation fails and whose etiology was confirmed to be ruptured intervertebral disc protrusions, extradural removal of herniated disc helps. Operating microscope to visualize dural sac, nerve roots and other interspinal structures including disc is the gold standard for this. However, discectomy by interlaminar fenestration technique in lumbar disc prolapse is easily learned, cheaper and faster surgery. Here there is less blood loss, faster recovery, lesser amount of post-operative complications and it would not jeopardize the stability of the spine or cause arachnoiditis when compared to open laminectomy procedure. However there needs to be a little more retraction of paraspinal muscles than when using an operating microscope. We had 86.7% good results which is almost similar to that of microdiscectomy. Japanese Orthopedic Association low backache score was found to be useful both in selection of patients for disc surgery and evaluation of their recovery. If clinical presentation fits well with imaging studies Fenestration discectomy is cost effective treatment method, which results can be repeated in small peripheral institutions in developing countries by a young spinal surgeon who has good knowledge of spinal structure.

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I. Introduction

Low back pain is a nagging musculo-skeletal disability. The commonest of the causes in the young working class is the protruded lumbar disc. Though the lifetime incidence of low back pain is 50-70% only 4-6% have a significant sciatica requiring special attention. Degeneration of disc prolapse into intervertebral foramina especially into L₄-L₅ and L₅-S₁ level. When the etiology was correctly confirmed ruptured intervertebral disc and its protrusions causing sciatica and operated relief was obvious.¹ Shortly afterwards hemilaminectomy became the favorite procedure in cases with unilateral symptoms and extradural removal of herniated disc and devised interlaminar fenestration for treatment of lumbar disc prolapse.² More conservative surgical approach intervertebral disc needed operating microscope to visualize dural sac, nerve roots and other interspinal structures including disc. However, fenestration can achieve these with less cost.³ Discectomy by fenestration technique in lumbar disc prolapse faster surgery, with less blood loss, faster recovery, lesser amount of post-operative complications and would not jeopardize the stability of the spine or arachnoiditis membrane formation when compared to open laminectomy procedure.^{4,5,6,7} Even without a trial of conservative management in carefully selected patients⁴ there was a little more lifting of paraspinal muscles.⁷ It is cost effective and can be done in peripheral institutions where endoscopic instruments and other newer techniques were not available without affecting spinal stability.⁷ In another series after fenestration 'Back Pain Functional Score (BPFS)' of Stafford et al., PROLO rating scale to determine preoperative functional and economical status, found to have complete back and leg pain relief at end of six months had been satisfactory.⁸

II. Materials And Methodology

A prospective study conducted after ethical clearance in the Department of Orthopedics and Traumatology, Thanjavur medical college between April 2016 - September 2018. The subjects were adults of both sexes in age group of 20-55 years with low back ache of at least three months - more than 20 hours a day, with radiation of pain (radiculopathy) and neurologic deficit correlating with the level in MRI with failed

conservative management > 6 weeks were included in the study. Those low back ache patients with bladder and bowel involvement or cauda equina syndrome or with history of previous spinal trauma or a spine surgery (post spinal surgery syndrome) or pre-existing congenital and acquired spinal deformities or Spinal segmental instability (spondylolisthesis) and who had a CT finding of facet arthrosis and canal compromise were excluded from the study. Pre-operative neurological assessment. Also assessed preoperatively with Japanese Orthopedic Association low back ache score.¹²

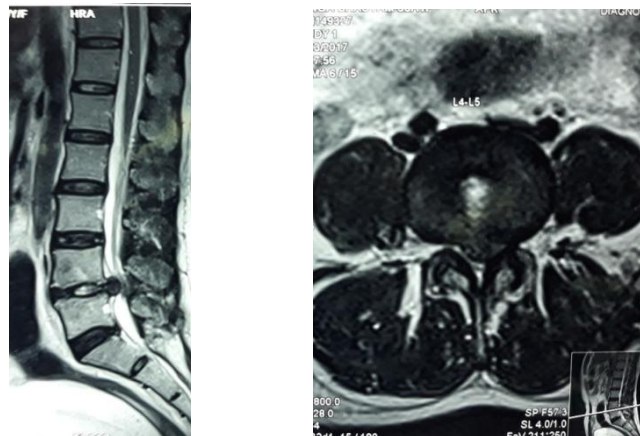


Figure 1: MRI of Lumbosacral spine sagittal and axial section-

Showing L4-L5 disc prolapse

Pre-operative investigations were done with hemoglobin, Blood sugar, Blood urea, Serum creatinine, Electrocardiogram, chest radiograph and radiograph and Magnetic resonance imaging of involved region-figure.1. Under general anesthesia patient in prone position in knee chest position in a bolster after catheterization.



Figure 2: Knee-Chest position of our patient

The correct interspace is marked using C-arm. A midline incision followed by unilateral subperiosteal dissection of muscles from spinous processes and laminae was performed. Through interlaminar fenestration ligamentum flavum was excised till dura and a small laminotomy of affected side decided by the side of pain and the side of lesion in MRI was carried out, if needed to expose outer part of nerve root compressed by disc fragments. Once root was retracted, the bulging annulus was identified and incised in a cruciate fashion and discectomy was done. The target root and inter-space were explored to ensure complete decompression of thecal sac and root sleeve. Wound closed in layers. Removed disc material sent for histopathological examination.



Figure 3: Skin incision made centering the marked level

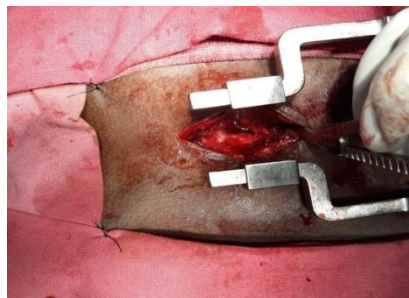


Figure 4: A Micro Lumbar Discectomy Distractor retracts soft tissues exposing lamina and interlaminar space



Figure 5: Root canal decompression by doing laminotomy



Figure 4: Showing (A) Exiting nerve root (B) Traversing nerve root

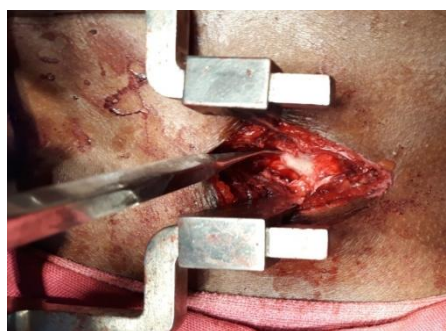


Figure 5: Root canal decompression checked by using probe

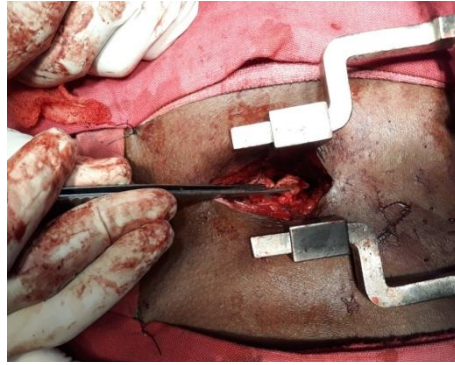


Figure 6: Extruded disc identified



Figure 7: Subcutaneous and Skin closure

Postoperatively patient was allowed to turn in bed in immediately and allowed to ambulate after 24 hours Pain relief with injectable and oral NSAIDS. Postoperative antibiotic was administered. Neurological function was monitored closely. Sutures were removed after 10 to 12 days. Gradual walking encouraged but lifting weight, bending, stooping, prohibited for 6 weeks. Long travels were discouraged for 3 months. Patients with jobs requiring prolonged sitting and minimal lifting allowed to return to work after 6 to 8 weeks and those with jobs requiring heavy laborer were advised to work only after the 12th week also advised to modify duty or were asked to modify their occupation permanently. Post-operative spinal extension exercise program and core strengthening were started after 3 weeks. Follow up at regular intervals of 6 weeks, 3 months, 6 months. The Japanese Orthopedic Association low backache score was used pre and postoperatively to assess the outcome analysis of functional status.¹²

The outcome designation of

- Good 75 to 100% Improvement,
- Fair 50 to 74% Improvement.
- Poor. 49% Below



Figure 8: Removed disc material



Figure 9: Remnants of disc material from affected disc space

Table showing all the cases and their outcome

| Age& sex | Duration of symptom In months | LBA | Radicular symptom& side | SLRT | Sensory deficit | Motor deficit | Level of lesion | JOA score Pre op | JOA score Post op | Surgical Outcome | Complication |
|----------|-------------------------------|-----|-------------------------|------|-----------------|---------------|-----------------|------------------|-------------------|------------------|--------------|
| 29/M | 4 | + | +(L) | 30* | N | N | L5-S1 | 7 | 14 | Good | Nil |
| 46/F | 8 | + | +(L) | 40* | N | N | L5-S1 | 6 | 12 | Fair | Nil |
| 49/M | 5 | + | +(R) | 50* | Y | N | L4-L5 | 7 | 13 | Good | Nil |
| 38/M | 3 | + | +(L) | 40* | N | Y | L4-L5 | 6 | 13 | Good | Nil |
| 43/M | 6 | - | +(L) | 50* | N | N | L5-S1 | 8 | 14 | Good | Nil |
| 35/M | 4 | - | +(R) | 50* | N | N | L4-L5 | 7 | 13 | Good | Nil |
| 20/F | 4 | - | +(R) | 40* | N | N | L4-L5 | 8 | 14 | Good | Nil |
| 42/M | 6 | + | +(R) | 50* | N | Y | L4-L5 | 7 | 13 | Fair | Nil |
| 38/F | 8 | + | +(L) | 40* | Y | N | L4-L5 | 5 | 13 | Good | Nil |
| 52/M | 16 | + | +(R) | 60* | N | Y | L4-L5 | 6 | 14 | Good | Superficial |
| 48/M | 3 | + | +(L) | 50* | N | N | L4-L5 | 6 | 13 | Good | Nil |
| 30/M | 5 | + | +(R) | 50* | Y | N | L5-S1 | 5 | 13 | Good | Nil |
| 50/M | 6 | + | +(R) | 40* | N | N | L4-L5 | 6 | 13 | Good | Nil |
| 48/F | 18 | + | +(L) | 30* | Y | N | L4-L5 | 6 | 12 | Fair | Nil |
| 38/M | 4 | + | +(R) | 50* | N | N | L5-S1 | 8 | 14 | Good | Superficial |



Fig 10: Immediate post op image

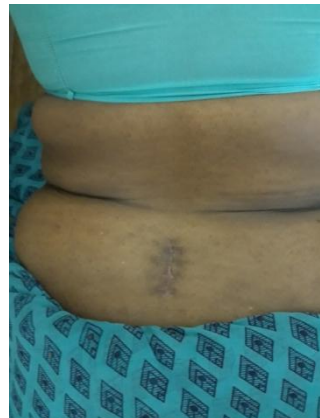


Fig 11: During follow up at 3 months.

III. Discussion

Initially the disc related sciatica and neurology followed by disc excision by laminectomy⁸ was done for herniated lumbar disc. This was a long surgery with more blood loss resulting in a delayed convalescence period. There is also post-operative arachnoiditis and adhesions and mechanical instability of the spine. The need is a less damaging procedure to the stability of the spine with a shorter surgical time, less blood loss, lesser incidence of post-operative complications and ultimately has a shorter convalescence period would be more beneficial. Discectomy by fenestration method when started² and perfected³ is the preferred method as only inter-laminar space is utilized without removal of any part of the lamina, the cord is exposed, retracted and the extradural discectomy done.

Most sciatica due to disc prolapse settles with rest and conservative treatment. Lumbar disc herniation shows a favorable response to conservative treatment even in the presence of some neurological deficit. Natural history should be taken into account which reveals that surgery plays only a palliative role in its management. So surgical intervention without appropriate conservative therapy causes unnecessary surgery and also to poor outcome.

But chronic sciatica with long conservative regimen in the presence of severe radicular symptoms increases morbidity and reduces the chances of a successful outcome. This is due to scarring.

One need to properly select patients for surgery for symptomatic relief from the surgery with limited risk. This study analyses the results of this surgical technique on the basis of the clinical and functional outcome of the patient. In this prospective study, majority (70%) were male patients and most patient was in the age group of 40-55 years. The most common symptom was radicular pain and most common sign was positive SLRT. Majority (86.7%) had pre-operative JOA score of 6-10¹². In the MRI the most common level was L4-L5. Japanese Orthopedic Association low backache score (appendix ii) to evaluate our results. This score was used as it is simple which assess the patient's outcome both subjectively and objectively showed 86.7% good

outcomes and 13.3% fair outcomes. The post operative JOA score improved to 11-15 with 86.7% cases had good outcome. Eight patients with neurological impairment, six improved post operatively. Two cases did not improve because of late presentation. Overall, in our study we had a favorable outcome following fenestration and discectomy for lumbar disc prolapse. The results are comparable to those of microdiscectomy^{9, 10, 11} and fenestration⁴. The only complication was superficial wound infection in two cases.

IV. Conclusion

Japanese Orthopedic Association low backache score was found to be useful both in selection of patients for disc surgery and evaluation of their recovery. Microsurgical techniques are costly and difficult to learn but is less invasive requiring shorter hospital stay. Fenestration discectomy is easily learned and cheaper. If clinical presentation fits well with imaging studies It also offers direct visualization of offending disc and nerve roots and its path and loose fragments if any. In this study on a small sample size we had 86.7% good results which is almost similar to that of microdiscectomy. Fenestration discectomy is cost effective treatment method, which results can be repeated in small peripheral institutions in developing countries by a young spinal surgeon who has good knowledge of spinal structure.

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