



EFFICACY OF PERCUTANEOUS ENDOSCOPIC TRANSFORAMINAL LUMBAR DISCECTOMY FOR UNILATERAL SCIATICA DUE TO SINGLE LEVEL DISC HERNIATION

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ABSTRACT

Background: Open Microlumbar Discectomy is presently the gold standard modality of treatment for lumbar intervertebral disc herniation not responding to conservative modalities of treatment. Even though it is less invasive than open surgery and done through a small incision, it has inherent surgical disadvantages like muscle and ligament stripping, prolonged muscle retraction, bone resection of the lamina, facet resection, and nerve root and dural tube retraction with a potential to cause spinal instability and scarring around the sensitive nerve roots even in a technically perfect dissection. In recent few years Percutaneous Endoscopic Lumbar Discectomy (PELD) through the Transforaminal approach to access the herniated part of the disc has gained popularity. This modality of treatment is minimally invasive and offers several advantages over open surgical methods. Aim of this study is to evaluate the efficacy of Endoscopic Discectomy in Young Adults presenting with single level lumbar disc herniation.

Methods: In this prospective study Patients of Age between 30 to 45 Years presenting with unilateral leg pain with or without low back pain who are not responding to conservative modality of treatment and those who on Magnetic Resonance Imaging (MRI) had single level soft disc herniation were invited to participate in the study. We have excluded patients with multiple level disc prolapse, disc prolapse with spondylolisthesis/lysis, disc prolapse with canal stenosis, patients with bilateral lower leg pains. With this criteria 68 patients were enrolled for this prospective study conducted between August 2013 to June 2015. In all cases Percutaneous Endoscopic Lumbar Discectomy was performed through Transforaminal approach.

Results: All patients were followed up till 1 Year post operatively. 7 patients lost follow up. Therefore data of 61 patients was analysed for evaluation of treatment. 58 patients relieved completely and resumed their job 3 months post operatively. 3 patients had recurrence with pain of lesser intensity and all these 3 patients responded to conservative therapy.

Conclusion: Our study results demonstrated good to excellent results in Carefully selected Young Adult patients with single level disc herniation in Lumbar spine. It is a safe and effective technique to early recovery with almost negligible complications.

KEYWORDS : Endoscopic discectomy, Minimally invasive, Disc herniation.

Introduction:

Herniated intervertebral disc in Lumbar Spine is the common cause of low back pain radiating to lower limb in Young Adults.¹ Incidence of lumbar disc herniation in Adult population is 2 to 3%.² Most of these patients respond to conservative management.³⁻⁷ 6-8 % of these patients need surgical intervention.³ Microlumbar Discectomy is currently the gold standard modality of treatment.^{8,9,10} Though minimally invasive, this modality of treatment has inherent surgical disadvantages like muscle and ligament stripping, prolonged muscle retraction, bone resection of the lamina, facet resection, and nerve root and dural tube retraction with a potential to cause spinal instability and scarring around the sensitive nerve roots even in a technically perfect dissection.^{8,9,10}

In recent few years Percutaneous Endoscopic Lumbar Discectomy (PELD) through the Transforaminal approach to access the herniated part of the disc has been developed.¹¹ This modality of treatment is minimally invasive and offers several advantages over Microlumbar Discectomy like protection of posterior ligamentous and bony structures, lesser postoperative instability.^{9,10} Aim of this study is to evaluate the efficacy of endoscopic Discectomy in Young Adults presenting with single level lumbar disc herniation.

Materials and methods

Patients of Age between 30 to 45 Years presenting with low back pain radiating to one of the lower limb who are not responding to conservative modality of treatment and those who on Magnetic Resonance Imaging (MRI) had single level lumbar disc herniation were invited to participate in the study. We have excluded patients with

multiple level disc prolapse, disc prolapse with spondylolisthesis/lysis, disc prolapse with canal stenosis, patients with bilateral lower leg pains, patients with disc prolapse at L5-S1 level with anatomical constraints for Transforaminal approach, patients previously operated for any lumbar spine pathology and those patients who are not willing to participate in the study. With this criteria 68 patients were enrolled for this prospective study conducted between August 2013 to June 2015. The study was approved by the Institutional Review Board. Procedures followed are in accordance with the ethical guidelines laid down for Medical research on human participants. We obtained informed consent from all patients. Detail history was taken in all patients.

All patient underwent through clinical examination. The diagnosis was confirmed with MRI and dynamic Radiographs were done to rule out segmental instability. Anteroposterior and lateral Radiographs were obtained. Anteroposterior Radiographs were done to look for anatomical constraints such as high iliac crest, large size of transverse process, narrow foraminal space which may restrict access by Transforaminal route to the prolapsed disc. Lateral Radiographs were done to assess the size of foramen and look for any narrowing due to degenerative changes and hypertrophy of facet joints. Pre-operative MRI was done to confirm clinical diagnosis and locate the prolapsed disc and its abnormal position like central, paracentral, foraminal, extraforaminal. Sagittal and axial sections of MRI were used to determine whether the herniated fragment was low or high migrated (up or down). All routine blood investigations were done in all patients. Sensitivity testing for contrast material was done.

All the procedures were performed under conscious sedation and local anesthesia. The patients were positioned prone over bolsters. Target disc levels were marked using fluoroscopic localization. In all cases percutaneous endoscopic lumbar discectomy was performed through transforaminal approach.

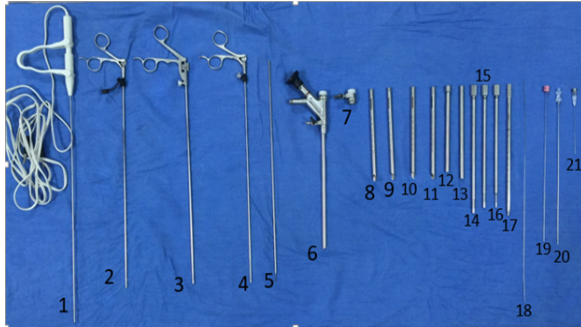


Figure 1: Instruments

1- trigger flex bipolar cautery handle, 2-3-Rongeurs, 4-Micro-punch, 5-Dissector, 6-endoscope, 7-Luer-Lock Adaptor, 8-11-Working cannula, 12-Extension sleeve, 13-14 to 16-Dilators, 17-obturator, 18-guide wire, 19 to 20 -18 gauge long spinal needle, 21-spinal needle

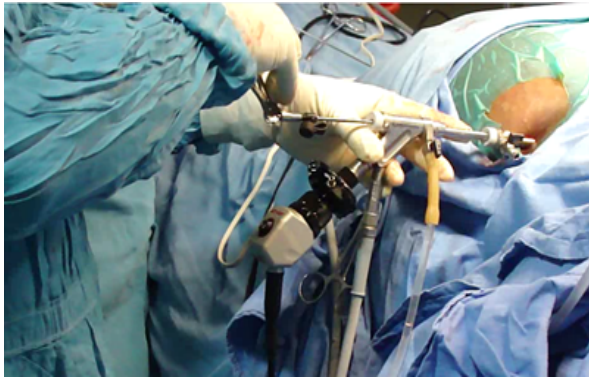
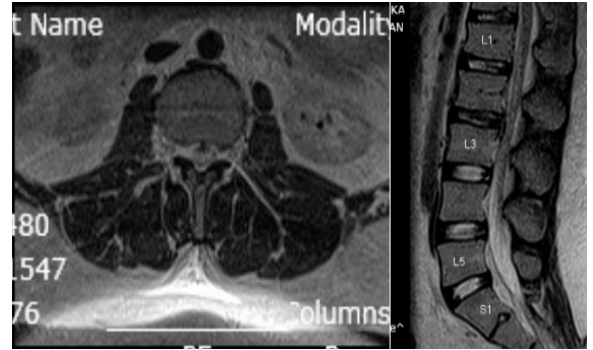


Figure 2: Endoscope placed

The patients were discharged on the next day after 1st postoperative evaluation and were given oral analgesics. Post op MRI was done to confirm the adequacy of the decompression. All the patients were given physiotherapy in the form of McKenzie's exercises, core stability and hamstring stretching exercises, after a duration of three weeks following surgery. All patients were analyzed for relief of back pain and leg pain by Visual Analogue Scale(VAS) and Oswestry Disability Index (ODI). This analysis was done in following sequence, pre operatively, immediate post-operative day (24 hrs. post-operative), 1 month, 3 month, 6 month and 12 month (1 year) post-operatively. The comparison between pre-operative and post-operative data was analyzed by using paired t-test and Chi square test. Statistical significance was considered if $p < 0.05$. Statistical analysis was done using SPSS 16.0 software for windows.



3A



3B

Figure 3A: Preoperative axial and sagittal MRI showing left central disc herniation at L₄-L₅ level. 3B: Postoperative axial and sagittal MRI showing adequate removal of herniated disc.

Results:

A total of 68 patients were included in our study and followed up according to standard protocol pre-operatively 24 hrs. Post operatively, 1 month, 3 month, 6month, 12 month. 2 patients lost follow up at 6 month and 5 more patients lost follow up at 12 months examination. Hence total 7 patients lost follow up. Therefore data of 61 patients was analysed for evaluation of treatment. 47 (77%) patients had herniated intervertebral disc at L4-L5 level, 9 (14.7%) patients had herniated intervertebral disc at L5-S1 level and 4 (6.5%) patients had herniated intervertebral disc at L3-L4 level and 1 (1.8%) patient had herniated intervertebral disc at L2-L3. Out of all the patients in the study a total of 43 (70.4%) were males and 1 (29.6%) were females. The mean age of patients was 36.33(SD ±8.93 years with a minimum age of 30 and a maximum age of 45. 31 showed the paramedian disc herniation and showed excellent post-operative outcomes. 12 patients diagnosed with central disc herniation, out of which 11 patients showed excellent functional outcomes post-surgery and one patient showed recurrence leg pain after 6 month post-operative. Central disc herniation with down migrated disc was diagnosed in 6 patients, out of which 2 patients diagnosed with high grade down migration both these patients showed recurrence and remaining 4 patients had low grade down migration, showed excellent post-operative functional outcomes. 9 patients diagnosed with foraminal lumbar disc herniation and showed excellent postoperative functional outcomes. 4 patients showed extraforaminal lumbar disc herniation with excellent post-operative outcomes. Foraminal with down migrated disc was seen in 3 patients with excellent post-operative functional outcomes.

In the preoperative assessment, the patients were evaluated for their leg pain on a Visual Analogue Scale (VAS) ^{12, 13} from pre-operative period to 1 year post-operative period. Pre-operative leg pain VAS score was mean VAS= 9.37(SD±0.95). There was an initial rapid decrease in the leg pain scores from 9.37 in the pre-operative period to 0.91(SD±0.74) 24 hrs after surgery. This rapid decrease in leg pain VAS scores was significant ($p < 0.0001$).

The disability due to backache and leg pain secondary to herniated intervertebral disc was assessed using the Oswestry Disability index. (ODI)¹⁴ The mean ODI in pre-operative period was 75.31 (±15.04) and At 24 hrs ODI was reduced to 14.57 (±7.61) and to 8.10 (±7.38) at 1 month follow up. Mean ODI was 5.34 (±11.99) at 3 months and at six month mean ODI was 2.08 (±4.42) one year follow up mean ODI was 1.38 (±3.86). Thus, at the end of one year follow up there was significant improvement noted in the functional outcome in all patients. At the end of 3 month patients had better functional outcomes hence resumed their original jobs.

There was no case of superficial or deep infection in the series of surgeries, nor were there any cases or dural leak or iohexol induced seizures. 58 patients (95.1%) relieved completely and resumed their job 3 months post operatively. 3 patients (4.9%) had recurrence with pain in lower back not radiating to lower limb, pain was of lesser intensity and all these 3 patients responded to conservative therapy.

DISCUSSION:

Microlumbar Discectomy is currently the gold standard modality of treatment.^{8,9,10} Though minimally invasive, this modality of treatment

has inherent surgical disadvantages like muscle and ligament stripping, prolonged muscle retraction, bone resection of the lamina, facet resection, and nerve root and dural tube retraction with a potential to cause spinal instability and scarring around the sensitive nerve roots even in a technically perfect dissection.^{8,9,10}

In recent few years Percutaneous Endoscopic Lumbar Discectomy (PELD) through the Transforaminal approach to access the herniated part of the disc has been developed.¹¹ This modality of treatment is minimally invasive and offers several advantages over Microlumbar Discectomy like protection of posterior ligamentous and bony structures, lesser postoperative instability.^{9,10,11-14}

Percutaneous Endoscopic Lumbar Discectomy (PELD) offers several advantages like-

- Minimally invasive approach done under local anaesthesia. The patient is conscious during the procedure and The Operating Surgeon can directly ask patient regarding any abnormal sensation in back or lower limb. Therefore there is no need of intraoperative Neuromonitoring which is required in open surgical laminectomy and discectomy.
- It is a day care procedure.
- Requires less hospital stay.
- Less postoperative pain.
- Less blood loss.
- Better cosmetic results. (small scar)
- Early mobilization.
- protection of posterior ligamentous and bony structures.
- lesser postoperative instability.

This procedure has several disadvantages like-

- This procedure cannot be done in patients with multiple level disc prolapse, disc prolapse associated with any other pathology like spondylolisthesis and canal stenosis.
- This procedure cannot be done in anatomical constraints like L5S1 disc prolapse in patients with high iliac crest, thick transverse process, and hypertrophied facet joints.¹⁵
- It is technically demanding and difficult surgery.
- There is a steep learning curve. (123)
- Expensive equipment needed.
- High-canal compromise more than 50%.¹¹
- High-grade migration.¹¹
- Calcified disc fragments.
- Central disc herniations with migrated disc fragments.¹¹

Our study observations shows sufficient decompression under visual control is possible using the posterolateral Transforaminal Percutaneous Endoscopic Technique achieving good to excellent results.

Conclusions:

Our study results demonstrated good to excellent results in Carefully selected Young Adult patients with single level disc herniation in Lumbar spine. It is a safe and effective technique to early recovery with almost negligible complications.

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