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An Analysis of Endoscopic Destandau Method versus Standard Open Discectomies for Lumbar Disc Herniations in a Semi-Urban area: A Prospective Study

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Abstract:

Background and Objective: Lumbar disc herniation is a common cause of low back with surgical intervention necessary in indicated cases. This prospective study is aimed to evaluate the efficacy, advantages, and complications associated with the Endoscopic Destandau Method (EDM) in comparison with standard open discectomies (SOD) for lumbar disc herniations in a semi-urban setup.

Methods: A total of 84 patients with lumbar disc herniations were enrolled in the study. Nineteen patients underwent discectomy by the EDM technique and 46 patients underwent SOD. The patients were followed up for a minimum of 18 months prospectively, and their pre-operative and post-operative clinical data were recorded.

Results: The mean operative time for EDM was 82 minutes and the mean hospital stay was 2.8 days, compared to 126 minutes and 8.5 days for that in SOD. The average blood loss was 30 ml for EDM and 180 ml for SOD. The outcome was excellent, good, fair, and poor in 68.4%, 21%, 5.3%, and 5.3%, respectively, for EDM, compared to 47.82%, 43.47%, 4.3%, and 4.3% for that in SOD.

Interpretation & **Conclusions:** The EDM technique is a novel, safe, and an effective and minimally invasive surgical approach for lumbar discectomy. It offers decreased blood loss, shorter operative time, shorter in-hospital stay, less immediate postoperative pain, better cosmesis, and early recovery to work compared with SOD. This technique could be a good alternative to SOD for lumbar disc herniations.

Keywords: Lumbar disc prolapse, open discectomy, destandau method, endoscopic discectomy.

INTRODUCTION

Low back pain is a prevalent condition affecting 80 out of 100 individuals at some point in their lifetime.[1] Lumbar disc herniation is a common cause of low back and sciatic pain, with the most frequent sites of occurrence being at L4-L5 and L5-S1. Patients might also experience numbness and weakness in the affected leg. Conservative management with rest, analgesics, anti-inflammatory drugs, and exercises is the initial remedial approach, but surgical intervention might be necessary in persistent cases. Emergency surgery may be required in cases of neurological deficits and cauda equina syndrome. The conventional surgical approach involves laminectomy and standard open discectomy (SOD). However, minimally invasive and endoscopic techniques have been developed in the past 15 years, including interlaminar, transforaminal, posterolateral, and trans-iliac procedures. Endoscopic Destandau's method (EDM) is a novel and potentially advantageous alternative to SOD. In this study, we aimed to evaluate the efficacy, benefits, and potential complications of EDM compared to SOD in patients with lumbar disc herniation in a semi-urban setting. We reported our experience and outcomes and compared our results to that of SOD.

Fig. 1- Instruments used in Endoscopic discectomy by Destandau method

METHODS

This study was a prospective analysis conducted at the Department of Neurosurgery, Mamata Medical College in Khammam, India from November 2022 to July 2023. A total of 84 patients were included, with 38 undergoing Endoscopic Destandau Method (EDM) and 46 undergoing Standard Open Discectomy (SOD). Patient information, including medical history, clinical examination, surgical procedure, and post-operative recovery, was recorded. The Visual Analogue Score (VAS) was also recorded pre-operatively, immediately post-operatively, and during follow-up visits that occurred a minimum of 18 months after surgery.

The surgical procedure was conducted under general anaesthesia, with patients undergoing SOD being placed in a prone position. Patients undergoing EDM were placed in a knee-chest position in eight cases and prone position in eleven cases. A para-median incision was made 5mm lateral to the spinous processes after identifying the appropriate level with the help of a marker tool and C-Arm. The paraspinal muscles were dissected with a chisel and pushed laterally, with the bipolar cautery used for hemostasis. A cotton patty was placed at the cranial and caudal aspects of the incision, and the DESTANDAU-ENDOSPINE system was inserted and placed against the lamina. A hemilaminectomy was performed on the superior vertebra, which provided access to the spinal canal. The ligamentum flavum was removed using Kerrison upcuts, and the dural sac and nerve root were retracted medially to locate the disc space. The posterior longitudinal ligament was cut to allow for discectomy. The herniated disc was identified and removed with pituitary forceps, with hemostasis achieved and the wound closed in two layers after instilling methylprednisolone over the root and infiltrating muscle with buprenorphine. The skin was closed with rapid vicryl.

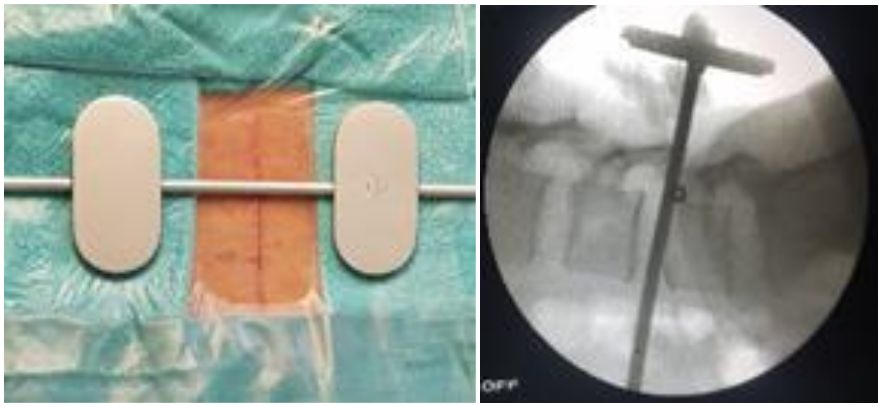

Fig 2: Localizer tool and identification of L4-L5 space

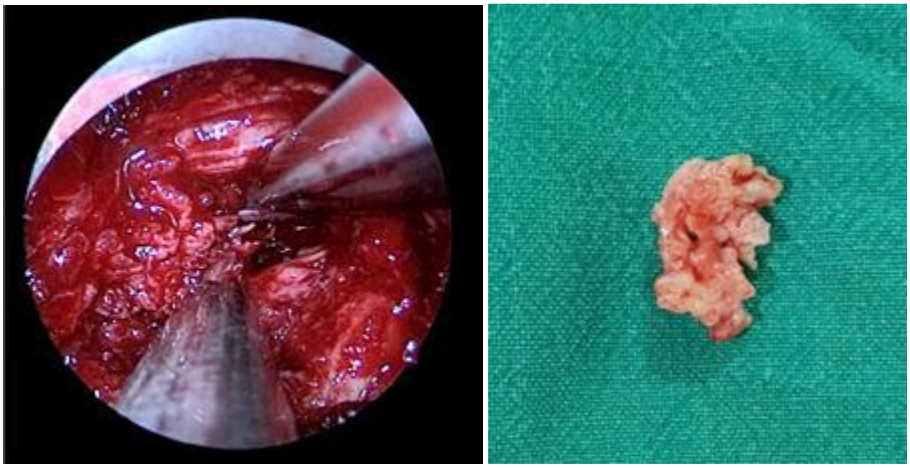

Fig 3: Intra-operative discectomy by Destandau technique and the excised specimen(IVD)

RESULTS

A total of 84 patients, including 34 males and 50 females, were enrolled in this study. Among them, 40 patients were aged between 31-40 years, followed by 24 patients aged 41-50 years, 18 patients aged 51-60 years, and 2 patients aged 61-70 years. 46 patients had disc prolapse at the L4-L5 level, followed by 34 patients at the L3-L4 level and 4 patients at the L5-S1 level.

The mean operative time for the Endoscopic Destandau Method (EDM) group was 82 minutes, and the mean hospital stay was 2.8 days, compared with 126 minutes and 8.5 days, respectively, for the SOD group. The average blood loss was 30 ml in the EDM group and 180 ml in the SOD group. Two patients in the EDM group had a dural tear that was managed with a muscle patch plugged into the defect. Two patients in the EDM group developed traction neuritis, which improved with conservative treatment. 2 patients in the EDM group required conversion to an open procedure owing to torrential epidural bleeding, which occurred during the early phase of the learning curve. The mean time taken to return to work was less in the EDM group (21 days) compared to 93 days in the SOD group. The mean preoperative Visual Analogue Scale (VAS) score was 8.7 and the mean postoperative VAS scores at postoperative day 7 and at 6 months were 2.25 and 1.12, respectively, in the EDM group. In the SOD group, 1 patient had a superficial surgical site infection. The modified MacNab criteria were used to evaluate outcomes, with 47.82%, 43.47%, 4.3%, and 4.3% of patients having excellent, good, fair, and poor outcomes in the SOD group, respectively. In the EDM group, 68.4%, 21%, 5.3%, and 5.3% of patients had excellent, good, fair, and poor outcomes, respectively.

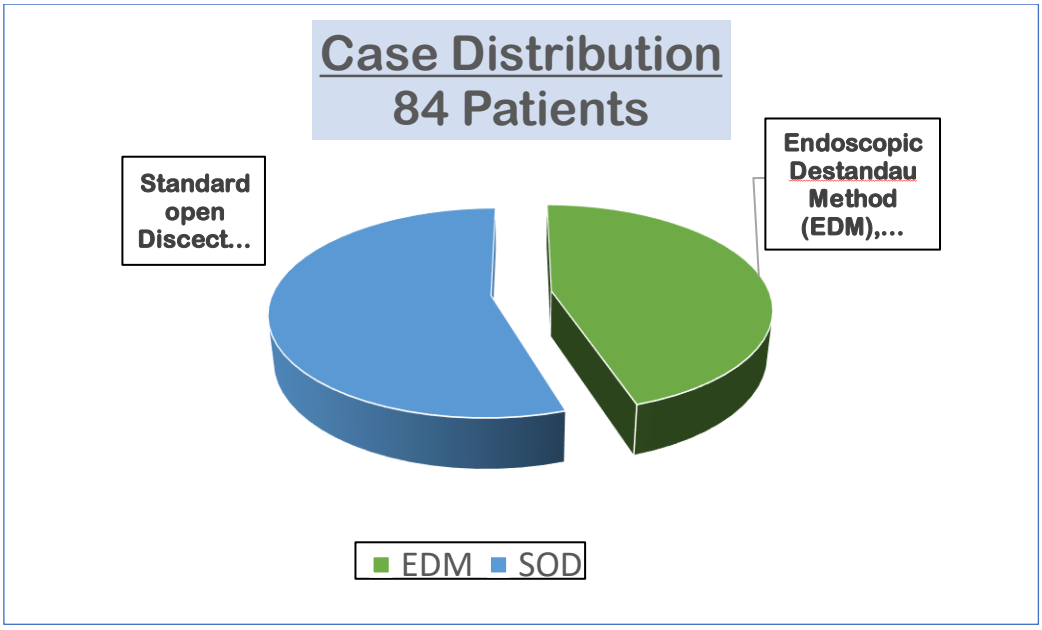

Fig. 4: Case Distribution

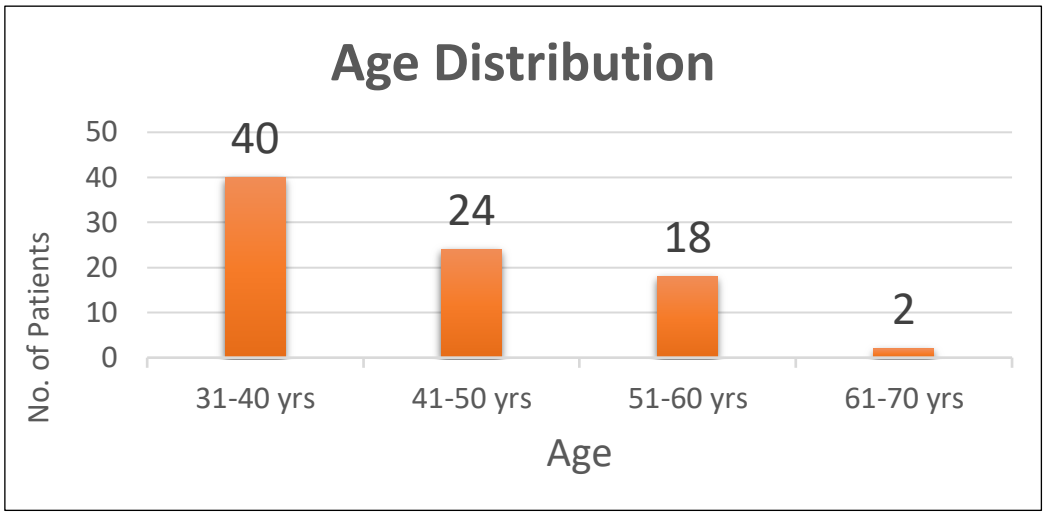

Fig. 5: Age Distribution

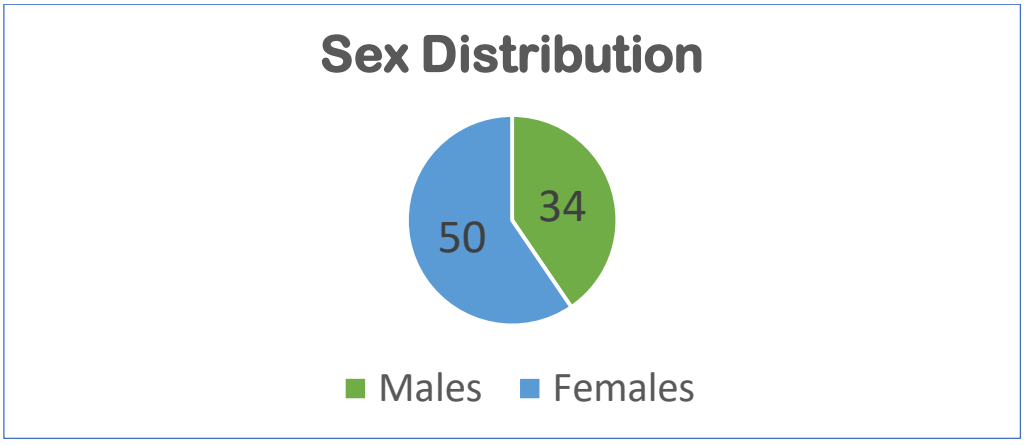

Fig.6: Sex Distribution

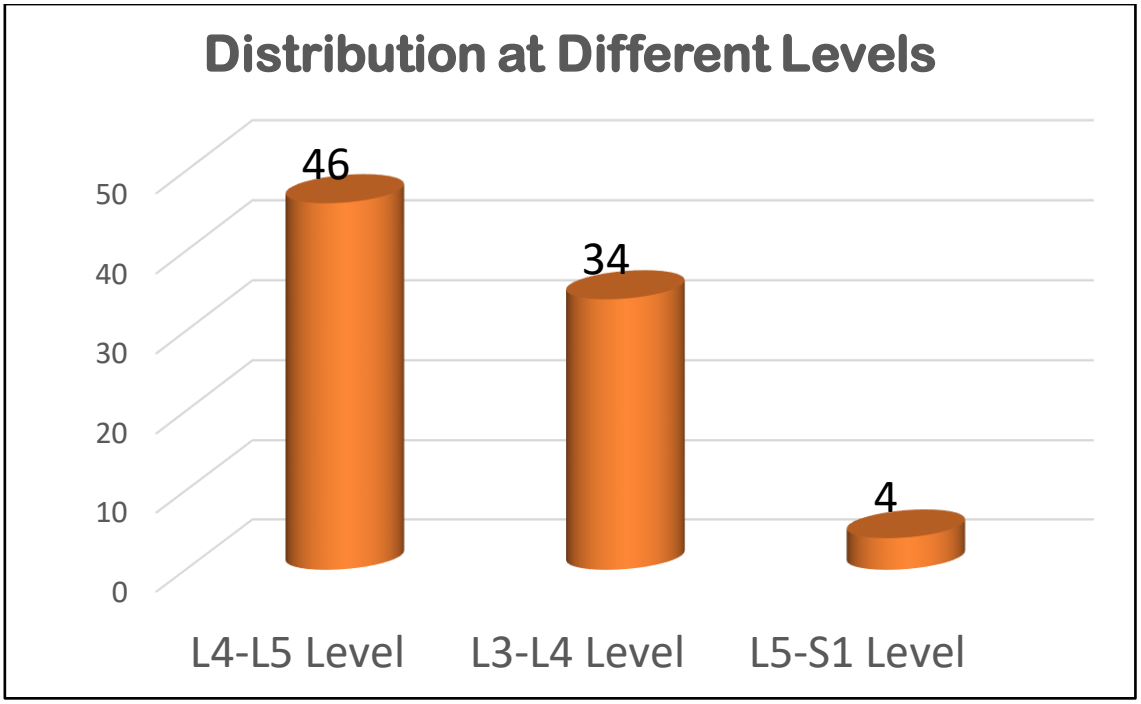

Fig 7: Distribution at Different Levels

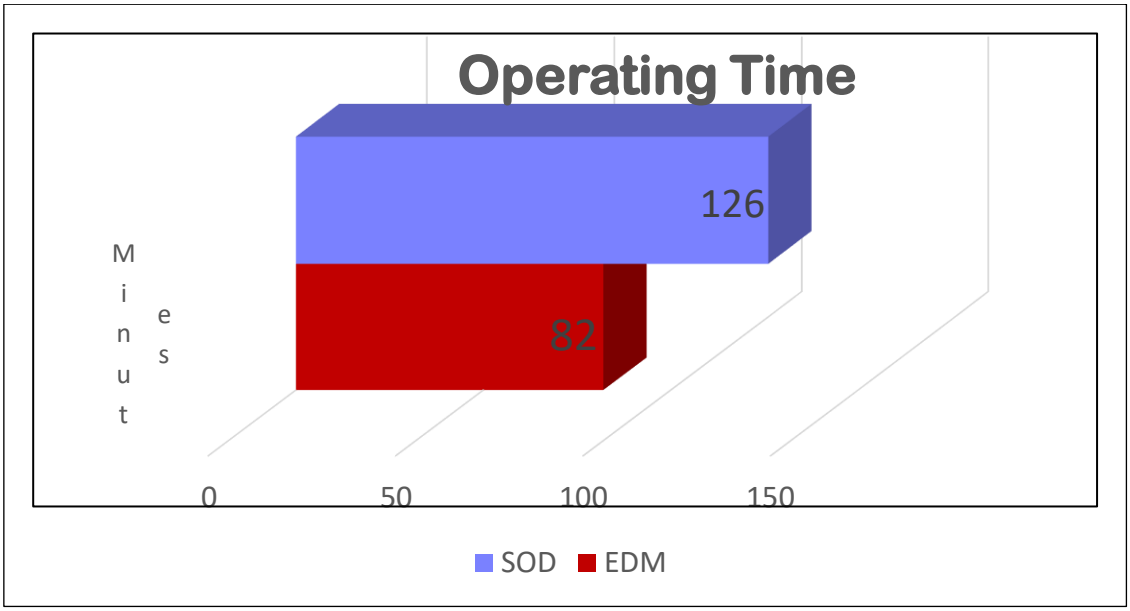

Fig 8: Operating Time

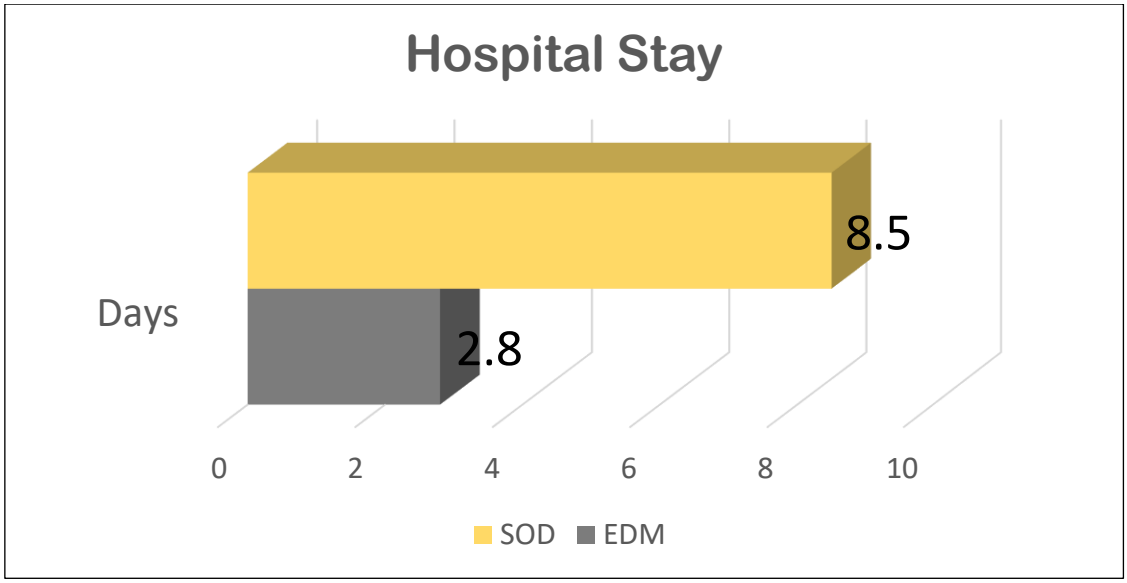

Fig 9: Hospital Stay

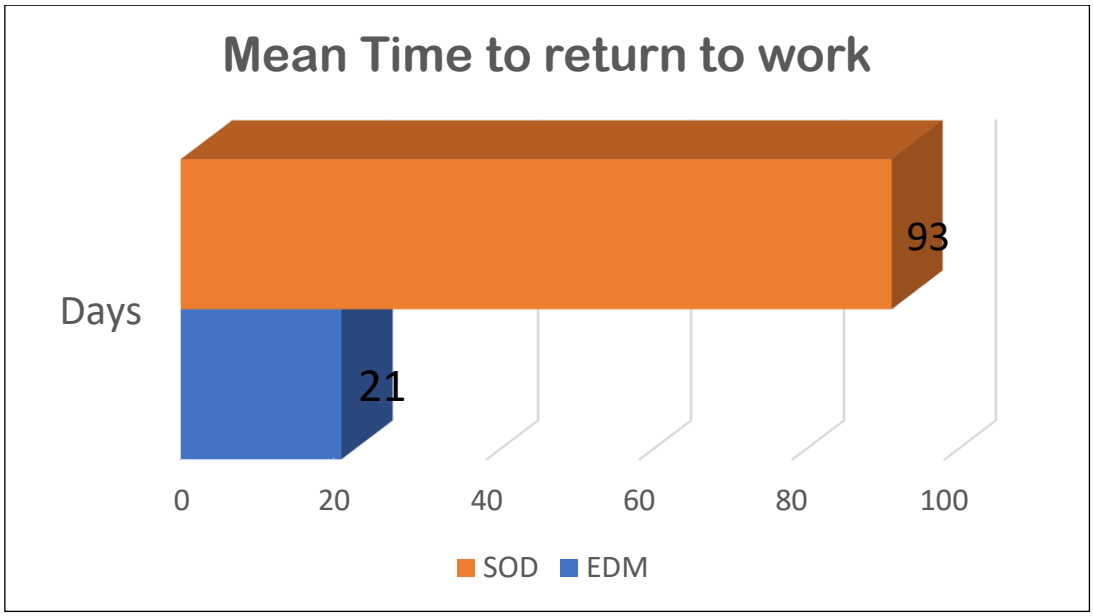

Fig 10: Mean Time to return to work

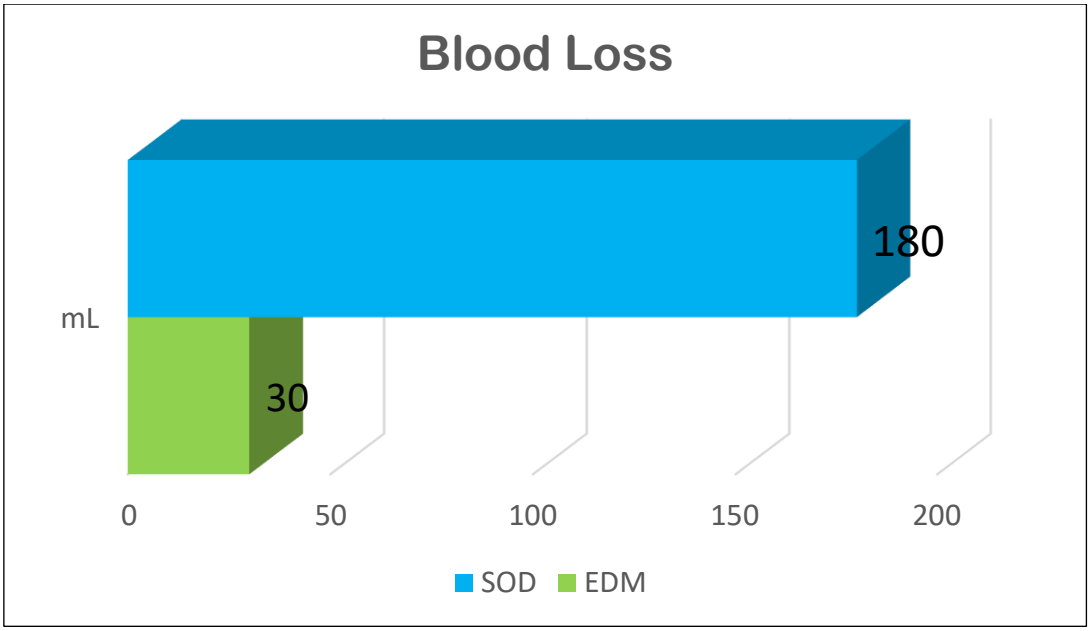

Fig 11: Blood Loss

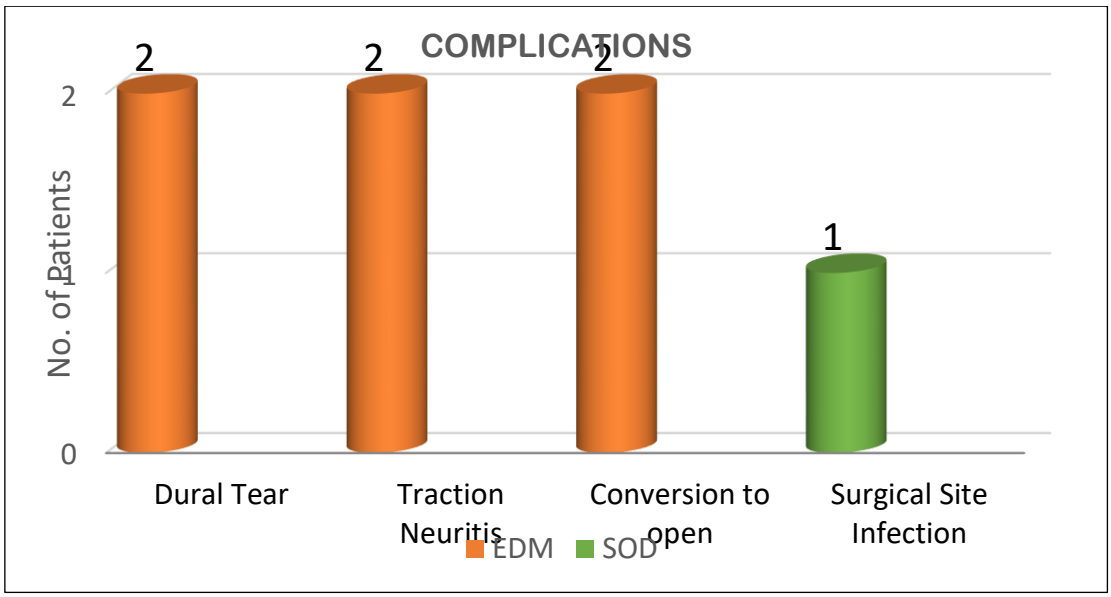

Fig 12: COMPLICATIONS

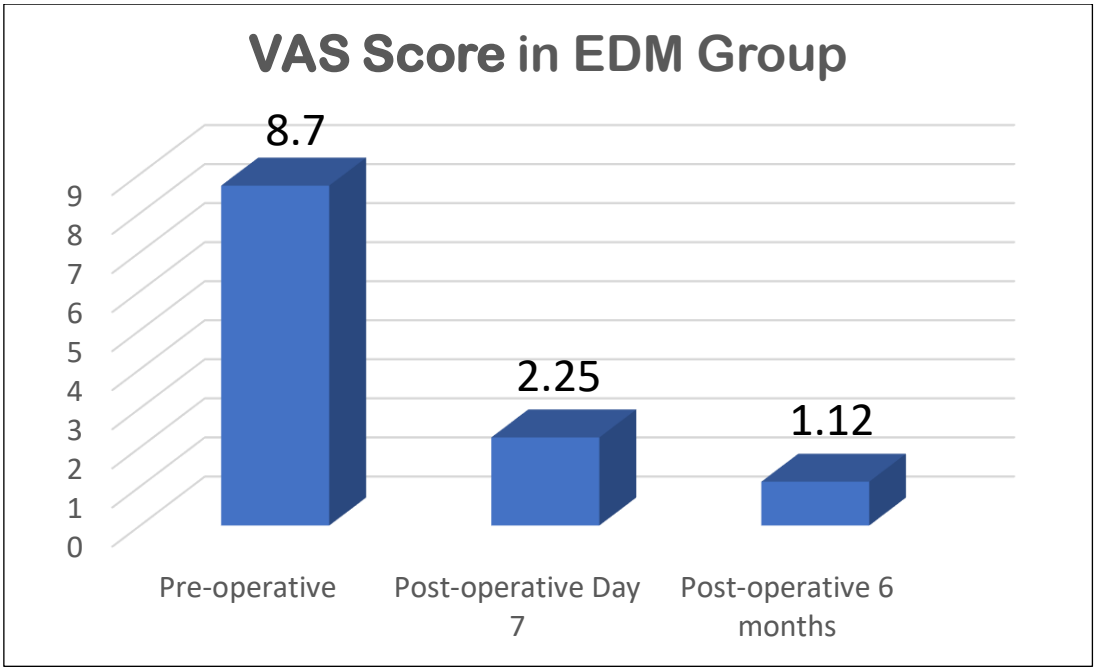

Fig 13: VAS Score in EDM Group

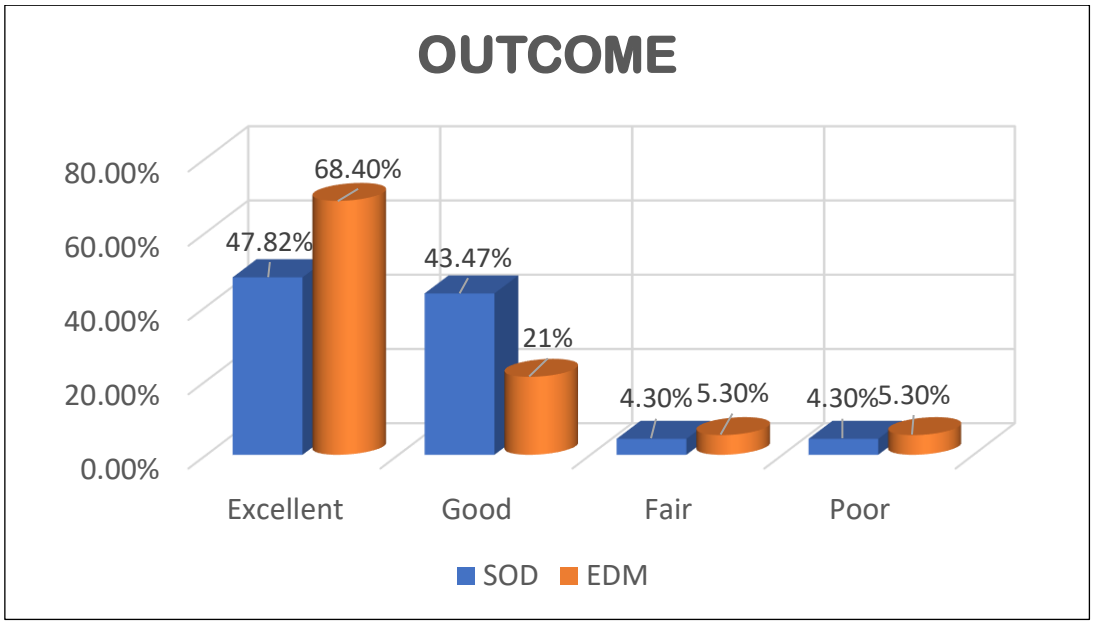

Fig 14: OUTCOME

DISCUSSION

The treatment of intervertebral disc prolapse (IVDP) has evolved over time, with laminectomy and discectomy being first suggested by Mixter and Barr.[7] Various studies have

reported a success rate ranging from 68-95%.[8] With the development of operative microscopes and microsurgical techniques by Yasargil and Krayenbuhl,[9] spinal surgery has been redefined. Microdiscectomy, considered the gold standard for lumbar disc prolapse surgery, has a success rate of 85 to 98%.[10] Katayama et al. compared the results of open and gold standard microdiscectomy and observed no difference between the surgical outcomes in both groups.[11] However, microdiscectomy group had better visualization of the pathological site and magnification which resulted in reduced tissue trauma owing to dissection and smaller incisions. In 1993, Jean Destandau from France performed endoscopic discectomy by the posterior approach using ENDOSPINE Karl Storz system. Since then, the same surgery has been performed in more than 10,000 patients with encouraging results. The present study aimed to compare the results of endoscopic discectomy in 38 patients with four other studies.[5,6,12,13] The most common location of disc herniation seen in the present study was L4-L5 disc (40.04%), which is similar to other studies.[5,6,12,13] Intraoperative complications, such as dural tear, were also similar in all the studies. The conversion rate to open surgery was also comparable among the studies. In the present study, 68.4%, 21%, 5.3%, and 5.3% of patients had excellent, good, fair, and poor outcomes, respectively. In the study by Roshan et al., the results were excellent in 17 patients (80.95%), good in 3 patients (14.28%), and fair in 1 patient (4.78%), with no patients having poor results. Destandau 1999 series had excellent results in 78 patients (85.71%), good in 9 patients (9.89%), and poor in 4 patients (4.39%), with none having fair results. The results of Destandau 2004 series were excellent in 130 patients (90.27%), good in 1 patient (0.69%), and poor in 13 patients (9.02%), with none having fair results. In conclusion, endoscopic discectomy by the posterior approach using the ENDOSPINE Karl Storz system is a safe and effective alternative to open surgery for the treatment of IVDP. The results of this study are comparable with those of other studies, and the use of the operative microscope and

microsurgical techniques has resulted in better outcomes for patients. Further studies with larger sample sizes are required to validate these findings.

CONCLUSION

To conclude, the Endoscopic discectomy by Destandau method (EDM) is a safe and effective surgical treatment for lumbar disc herniation, even in a semi-urban setup. This technique offers several advantages, such as faster recovery, minimal muscle dissection, shorter hospital stay, and quicker return to work. The results of this study demonstrate that the surgical outcomes of EDM are comparable withthat of SOD. Therefore, EDM can be considered as a feasible alternative to SOD in the surgical management of lumbar disc herniation.

Acknowledgments:

Conflict of interest: None

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