MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.59218/makrjms.2024.4.266.270

Clinical Outcomes and Complications After Endoscopic Lumber Spine Surgery

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ABSTRACT
Lumbar foraminal stenosis in the extra foraminal zone is best directly visualized with the outside-in transformational endoscopic technique. The biportal endoscopic (BE) technique is a newly emerging minimally invasive spine surgical modality. This study evaluates the clinical outcome and complications of endoscopic trans-foraminal lumbar spinal surgery. A total of 50 patients who underwent trans-foraminal endoscopic lumbar surgery during the study period were enrolled. Data were prospectively collected and compiled. The position of the patients was prone and procedure is performed under local anesthesia under all aseptic precautions. All patients post operatively follow up for determine the any complications. The Mean age of the patients was 54.69 years, majority of them (66%) were male. The most affected disc levels were L4-L5 (62%). The mean ASA score was 1.84±0.36. Interlaminar approached (74%) was commonly used. The mean operation time was 50.86±94.45 minutes, average estimated blood loss was 94.63 ml and mean length of hospital stay was 4.41 days. VAS score was significantly differ before and after spine surgery ($p<0.05$). The common complications were reherniation (14%), incomplete decompression (6%) and dural tear in 4% cases. Post operative outcomes of the endoscopic spinal surgery were Spinal headaches (26%), Poor pain control (20%), Central and lateral recess stenosis (10%). Endoscopic spinal surgery is a novel method to lumbar spine stenosis. Common complications are reherniation, dural tear, spinal headache and pain. Clinical outcomes demonstrate the effectiveness and efficiency of surgery.

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Key Words
Endoscopic spinal surgery, disc herniation, lumbar spine, spinal stenosis

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Received: 22 January 2024
Accepted: 13 February 2024
Published: 25 February 2024

Citation: Ranjeet Kumar Jha and Kumar Deepak, 2024. Clinical Outcomes and Complications after Endoscopic Lumber Spine Surgery. Res. J. Med. Sci., 18: 266-270, doi: 10.59218/makrjms.2024.4.266.270

INTRODUCTION

Lumbar disc herniation is a common leading cause of low back pain and sciatica, especially in around 40 years of age. Spine surgery is the best treatment modality required in many lumbar disc herniation cases[1]. Endoscopic spine surgery potentially demonstrated for faster recovery, less postoperative pain and greater clinical outcomes as compared to open traditional surgery[2,3]. But endoscopic surgery also causes some common complications like other surgical procedures[4]. In lumbar spinal stenosis cases spinal decompression surgery by endoscopic method has become feasible due to technological advancements and is a preferred option is often recommended among Asian countries[5]. However, in the Americas and Europe the endoscopic spinal surgery remains mainstream of treatment, because it is clinically superior over the other open spinal decompression surgical techniques, it has not been substantiated in controlled trials[6]. Endoscopic spinal surgery has found power acceptance outside the Asian countries it could be due to poor training, cultural and/or reimbursement-related issues[7]. Endoscopic spinal surgeries are two types: Uniportal and Biportal, among that Biportal endoscopic (BE) technique is widely accepted worldwide because it is a minimally invasive spine surgery[8]. The common complications of endoscopic spinal surgery are Reherniation, dural tear, incomplete decompression and Spinal headaches may require revision of lumbar surgery. The most challenging technical problem in surgical procedure is dense epidural scarring[9].

The risk factors that discourage most of the surgeons from using a minimally invasive approach to treat recurrent lumbar herniations are nerve root injuries, higher incidences of dural lacerations and poorer long-term outcomes increased morbidity due to revision lumbar surgery.

Aims and Objectives: The objective of present study to determine the various complications and clinical outcomes of endoscopic spinal surgery in spinal stenosis cases.

MATERIALS AND METHODS

This cross sectional hospital based study carried out in the department of neurosurgery, in a tertiary care hospital, central India. A total of 50 patients required endoscopic lumbar spinal surgery during the study period were enrolled.

Inclusion criteria:

- Patients ≥18 years of age with both sexes
- Patients of decreased motor function, dysesthesias or symptomatic lumbar radiculopathy
- Foraminal or lateral recess stenosis sown in MRI and CT scans
- Refractory axial leg and back radicular pain not responded to conservative treatment
- Patients who provide written informed consent for the study

Exclusion criteria:

- Patients age less than <18 years
- Patients with Severe central stenosis or Metastatic disease or Infection
- Patients not willing for the study
- Diagnosis of lumber disc stenosis and herniation con rmed by MRI and positive nerve root tension test.

All patients' demographic data including age, gender, body mass index, smoking, and surgical history were recorded. Clinical symptoms and local examination was done. Preoperative data like vertebral level, side, direction and ASA score were assessed. Duration of surgery, blood loss and length of hospital stay was also recorded. Preoperative basic investigation like plain X-ray, CT, MRI and myelography were done in all subjects.

All data were prospectively collected and compiled. The endoscopic surgical procedure was performed by all aseptic precautions under local anesthesia in prone position. All patients post operatively follow up for determine the any complications.

Statistical Analyses: All data were analysed by using SSPS version 22. The chi-square test was used for analysis. A P value <0.05 was considered as significant

RESULTS

A total of 50 patients underwent endoscopic spine surgery were enrolled and analysed in this study.

The mean age of the patients was 54.69 years (ranging from 30 to 80 years). Majority of the patients (66%) were male and 34% were female. Most of them were obese (54%). The most affected disc levels were L4-L5 (62%), followed by L5-S1 (30%). Right side affected in 64% cases and left side in 36%. The mean ASA score was 1.84±0.36 (Table 1).

Table 1: Baseline patient characteristics of study participants

Baseline characteristics	Frequency (%)
Age (Mean±SD) 54.69±10.41 (30-80)	
Gender	
Male	33 (66%)
Female	17 (34%)
Body mass index (kg m^{-2})	
Underweight	8 (16%)
Normal weight	16 (32%)
Obese	26 (52%)
Vertebra level	
L3-4	4 (8%)
L4-5	31 (62%)
L5-S1	15 (30%)
Direction	
Right	32 (64%)
Left	18 (36%)
ASA score 1.84±0.36	

Table 2: Surgery related parameters among study subjects

Parameters	Frequency (%)
Technique used	
Uniportal endoscopy	25 (50%)
Biportal endoscopy	25 (50%)
Approach used	
Interlaminar	37 (74%)
Transforaminal	13 (26%)
Operative time (min)	50.86±94.45 (40-315)
Estimated blood loss (mL)	94.63±85.11 (5-300)
Length of hospital stay (day)	4.41±3.38 (1-18)
No. of level decompressed	
1 Level	35 (70%)
2 Level	13 (26%)
3 Level	2 (4%)

Table 3: Comparison of pain on visual analog scale before and after endoscopic spine surgery

Pain	Preoperative	Post-operative	p-value
VAS score			
1 month	5.42	5.82	< 0.001
3 month	4.00	3.81	
6 month	3.79	3.73	
12 month	3.67	3.45	

Table 4: Postoperative complications of endoscopic spine surgery

Complications	Number	Percentage
Dural tear	3	6
Superficial wound infection	1	2
Incomplete decompression	4	8
Epidural hematoma	2	4
Reherniation after discectomy for extruded disc fragment	7	14
Neural injury	1	0
Foot drop	1	0

Table 5: Postoperative sequelae, failure to cure, and outcomes of endoscopic spine surgery

Sequelae and outcomes	Number	Percentage
Extravasation of irrigation fluid	4	8
Spinal headaches	13	26
Ecchymosis	2	4
Dorsal root ganglion irritation	1	2
Contained disc herniation	2	4
Central and lateral recess stenosis	5	10
Poor pain control	10	20
Death	3	6

Half of the patients had uniportal endoscopic surgery and remaining half were biportal endoscopic surgery. Most of the subjects (74%) Interlaminar approached was used. The mean operation time was 50.86±94.45 minutes, average estimated blood loss was 94.63 mL and mean length of hospital stay was 4.41 days. About 70% of the patients had decompressed at level 1 (Table 2).

VAS score was significantly differ before and after spine surgery ($p<0.05$). Back pain was significantly reduces post operatively (Table 3).

The common complications during and after endoscopic spinal surgery were constituted by reherniation (14%) after discectomy for extruded disc fragment, incomplete decompression (6%) and dural tear in 4% cases. Details shown in Table 4.

Post operative outcomes of the endoscopic spinal surgery were Spinal headaches (26%), Poor pain control (20%), Central and lateral recess stenosis (10%) and Extravasation of irrigation fluid in 8% cases. Detailed description shown in Table 5.

DISCUSSION

Endoscopic spinal surgery is a most accurate and gold standard procedure for the treatment of foraminal stenosis or lumbar spinal stenosis and decompression in current scenario.

In spite of many advantages, various complications may also occur in endoscopic spinal surgery. Endoscopic spinal surgery has various approaches like inter-laminar and trans-foraminal approach[10,11].

In this study mean age of the participants were 54.69±10.41 and majority of the patients were male, our finding comparable with the other studies conducted by Suvithayasiri *et al*.[12] and Sousa *et al*.[13].

The most affected vertebral disc levels were L4-L5 in the current study, in agreement to the Asano *et al*.[14] [14] and Chang *et al*.[15].

In the present study Interlaminar approached are most commonly used and biparital endoscopic lumbar spine surgery performed in half of the patients, concordance results observed by Kang *et al*.[16] and Haibier *et al*.[17].

Present study found endoscopic spinal surgeries significantly prolonged the operation time, but reduced the blood loss amount and length of hospital stay. Similar finding also reported by many other studies Guo *et al*.[18] and Kwon *et al*.[19].

In our study majority of the patients were obese, accordance with the Park *et al*.[20].

The common complications during and after endoscopic spinal surgery were constituted by reherniation after discectomy for extruded disc fragment in the current study, consistent with the lewandrowski *et al*.[21] and Kim *et al*.[22].

In the present study VAS score was significantly reduced postoperatively, our results correlate with the Zhu *et al*.[23] and Yeung *et al*.[24].

Other common complications found in this study were dural tear, inadequate decompressions, epidural hematomas, transient nerve root injuries and infections, similar results seen by Hoang *et al*.[25] and Asch *et al*.[26].

CONCLUSION

Endoscopic lumber discectomy through transforaminal approach is a gold standard, minimally invasive and effective method for the lumbar disc stenosis or herniation because it required less hospitalization, less complication rate and early recovery. The most common complication of endoscopic spinal surgery was Reherniation, Incomplete decompression and dural tear.

REFERENCES

1. Ahn, Y., S.H. Lee, W.M. Park, H.Y. Lee, S.W. Shin and H.Y. Kang, 2004. Percutaneous endoscopic lumbar discectomy for recurrent disc herniation: Surgical technique, outcome, and prognostic factors of 43 consecutive cases. Phila Pa 1976, 29: 326-332.
2. Hur, J.W., S. Lee, B.J. Kim and S.H. Kim, 2023. The growing popularity of miss: A focus on endoscopic surgery for the cervical and thoracic spine. J. Minimally Invasive Spine Surg. Tech., 8: 5-8.
3. Gibson, J.N.A. and G. Waddell, 2007. Surgical interventions for lumbar disc prolapse. Spine (Phila Pa 1976), 32: 1735-1747.
4. Wu, P.H., H.S. Kim, D.J. Choi and Y.H.T. Gamaliel, 2021. Overview of tips in overcoming learning curve in uniportal and biportal endoscopic spine surgery. J. Minimally Invasive Spine Surg. Tech., 6.
5. Choi, G., 2019. Small is beautiful, less is better. Neurospine, Vol. 16, No. 3.
6. Butler, A.J., M. Alam, K. Wiley, A. Ghasem, A.J.R. III and J.C. Wang, 2019. Endoscopic lumbar surgery: The state of the art in 2019. Neurospine, 16: 15-23.
7. Kim, J.S., 2018. A bibliometric study in the field of percutaneous full-endoscopic spine surgery since 1997. Annual NASS Meeting 2018, Los Angeles. After Hours: Endoscopic Spine Surgery: Current Trends and Evidence of Spinal Endoscopic Procedures, Thursday, September 27, 2018.
8. Park, S.M., J. Park, H.S. Jang, Y.W. Heo and H. Han *et al*., 2020. Biportal endoscopic versus microscopic lumbar decompressive laminectomy in patients with spinal stenosis: A randomized controlled trial. Spine J., 20: 156-165.
9. Connolly, E.S., 1993. Management of persistent or recurrent symptoms and signs in the postoperative lumbar disc patient. Neurosurg Clin. N Am., 4: 161-166.
10. Caspar, W., 1977. Management of persistent or recurrent symptoms and signs in the postoperative lumbar disc patient. Proceedings of the 27th Annual Meeting of the Deutsche Gesellschaft für Neurochirurgie, Springer, Berlin, September 12-15, pp: 74-80.
11. Bombieri, F.F., R. Shafafy and S. Elsayed, 2022. Complications associated with lumbar discectomy surgical techniques: A systematic review. J. Spine Surg., 8: 377-389.
12. Suvithayasiri, S., Y.J. Kim, Y. Liu, W. Trathitephun and A. Asawasaksaku *et al*., 2023. The role and clinical outcomes of endoscopic spine surgery of treating spinal metastases; outcomes of 29 cases from 8 countries. Neurospine, 20: 608-619.
13. Sousa, J.M., H. Ribeiro, J.L. Silva, P. Nogueira and J.G. Consciência, 2022. Clinical outcomes, complications and fusion rates in endoscopic assisted intraforaminal lumbar interbody fusion (iLIF) versus minimally invasive transforaminal lumbar interbody fusion (MI-TLIF): Systematic review and meta-analysis. Sci. Rep., Vol. 12, No. 2101 .10.1038/s41598-022-05988-0.
14. Asano, L.Y.J., J.P.M. Bergamaschi, Á. Dowling and L.M.R. Rodrigues, 2020. Discectomia endoscópica transforaminal lombar: Resultados clínicos e complicações. Rev. Bras. Ortopedia, 55: 048-053.
15. Ju, C.I. and S.M. Lee, 2023. Complications and management of endoscopic spinal surgery. Neurospine, 20: 56-77.
16. Kang, M.S., J.H. Hwang, D.J. Choi, H.J. Chung, J.H. Lee, H.N. Kim and H.J. Park, 2020. Clinical outcome of biportal endoscopic revisional lumbar discectomy for recurrent lumbar disc herniation. J. Orthop. Surg. Res., Vol. 15, No. 55. 10.1186/s13018-020-02087-6.
17. Haibier, A., A. Yusufu, L. Hang and T. Abudurexiti, 2024. Comparison of clinical outcomes and complications between endoscopic and minimally invasive transforaminal lumbar interbody fusion for lumbar degenerative diseases: A systematic review and meta-analysis. J. Orthop. Surg. Res., Vol. 19, No. 92 .10.1186/s13018-024-04549-7.
18. Guo, H., Y. Song, R. Weng, H. Tian, J. Yuan and Y. Li, 2022. Comparison of clinical outcomes and complications between endoscopic and minimally invasive transforaminal lumbar interbody fusion for lumbar degenerative diseases: A systematic review and meta-analysis. Global Spine J., 13: 1394-1404.
19. Kwon, W.K. and J.W. Hur, 2023. Overview and prevention of complications during fully endoscopic lumbar spine surgery. J. Minimally Invasive Spine Surg. Tech., 8: 136-144.
20. Park, H.J., J.Y. Choi, K.H. You, M.S. Kang, W.M. Lee, J.T. Hyun and S.M. Park, 2022. Clinical and radiologic outcomes of biportal endoscopic lumbar discectomy in obese patients: A retrospective case-control study. BMC Musculoskeletal Disord., Vol. 23, No. 1117 .10.1186/s12891-022-06082-2.
21. Lewandrowski, K.U., A.E. Telfeian, S. Hellinger, J.F.R. León and P.S.T. de Carvalho *et al*., 2021. Difficulties, challenges, and the learning curve of avoiding complications in lumbar endoscopic spine surgery. Int. J. Spine Surg., 15.
22. Kim, H.S., S. Sharma, P. Wu, H. Raorane, N. Adsul, R. Singh and I.T. Jang, 2020. Complications and limitations of endoscopic spine surgery and percutaneous instrumentation. Indian Spine J., 3: 78-85.

23. Zhu, B., Y. Jiang, L. Shang, M. Yan, H.J. Ma, D.J. Ren and X.G. Liu, 2017. Complications of percutaneous endoscopic lumbar discectomy: Experiences and literature review. J. Spine, Vol. 6, No. 402. 10.4172/2165-7939.1000402.
24. Yeung, A., A. Roberts, L. Zhu, L. Qi, J. Zhang and K.U. Lewandrowski, 2019. Treatment of soft tissue and bony spinal stenosis by a visualized endoscopic transforaminal technique under local anesthesia. Neurospine, 16: 52-62.
25. Le, H., F.A. Sandhu and R.G. Fessler, 2003. Clinical outcomes after minimal-access surgery for recurrent lumbar disc herniation. Neurosurgical Focus, 15: 1-4.
26. Asch, H.L., P.J. Lewis, D.B. Moreland, J.G. Egnatchik, Y.J. Yu, D.E. Clabeaux and A.H. Hyland, 2002. Prospective multiple outcomes study of outpatient lumbar microdiscectomy: Should 75 to 80% success rates be the norm? J. Neurosurg.: Spine, 96: 34-44.