

Endoscopic and Conventional Microscopic Approaches in the Treatment of Lumbar Intervertebral Disc Herniation

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Abstract Lumbar disc herniation is one of the most common pathologies leading to neurological disorders, chronic pain, and reduced work capacity. Although conventional open and microscopic discectomy are effective, they have certain drawbacks, including extensive tissue damage, postoperative pain, and prolonged rehabilitation. Minimally invasive techniques, such as interlaminar and transforaminal endoscopic approaches, reduce tissue trauma, allow patients to return to active life more quickly, and provide comparable or even superior clinical outcomes. This literature integration, based on research studies, randomized controlled trials, systematic reviews, and meta-analyses, aims to evaluate the effectiveness, safety, and development of endoscopic and conventional surgical methods. The goal is to determine the clinical advantages of endoscopic techniques and identify future directions for research.

Keywords Lumbar disc herniation, Endoscopic discectomy, Microdiscectomy, Minimally invasive surgery, Spinal surgery

1. Introduction

Lumbar intervertebral disc herniation is one of the most common conditions leading to neurological disorders and chronic pain. Although conventional open and microscopic discectomy techniques are effective, they have several drawbacks, such as extensive tissue damage, postoperative pain, and prolonged rehabilitation [1,3].

Minimally invasive endoscopic techniques, including interlaminar and transforaminal approaches, reduce the impact on healthy tissues during surgery, accelerate the reduction of postoperative pain, and shorten recovery times [1,3,4]. Evaluating the effectiveness of these techniques, determining their safety, and identifying the preferred approaches for specific anatomical conditions remain pressing issues in modern neurosurgery and vertebral surgery.

Among minimally invasive and endoscopic techniques, interlaminar and transforaminal endoscopic discectomy are rapidly evolving. Ruetten et al. (2008) conducted a prospective randomized trial comparing endoscopic interlaminar and transforaminal techniques with conventional microscopic discectomy. The results showed similar clinical efficacy, but the endoscopic methods demonstrated superiority in faster recovery of patients' activity levels and reduced trauma to healthy tissues [1].

Ahn (2019) confirmed the advantages of endoscopic methods in various anatomical conditions, including the L5–S1 segment and highly migrated herniations, showing superiority over microdiscectomy. These methods provided faster pain relief and earlier resolution of neurological symptoms [3].

Kim et al. (2018) proposed a new endoscopic transforaminal technique — the “Suprapedicular Circumferential Opening Technique” — for highly caudally migrated disc herniations. This approach allows sufficient opening of the pedicular column to achieve complete removal of the herniation, leading to significant reduction in pain and neurological symptoms, as well as lower postoperative complication rates [2].

Micro-endoscopic discectomy and posterolateral endoscopic approaches were studied by Righesso et al. (2007), who compared open and micro-endoscopic discectomy. The micro-endoscopic technique was associated with less blood loss, reduced postoperative pain, and faster recovery [10]. However, Teli et al. (2010) indicated that micro-endoscopic methods may carry a higher risk of dural injuries and recurrence of herniation, emphasizing the importance of surgeon expertise and patient selection [11]. Yeung and Tsou (2002), in their analysis of posterolateral endoscopic discectomy in 307 patients, demonstrated the advantages of less tissue damage, reduced pain, and shorter recovery time [6].

Systematic reviews and meta-analyses have further contributed to the evidence base. Kim et al. (2018), through a meta-analysis comparing endoscopic lumbar discectomy

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with open lumbar discectomy, showed that the endoscopic approach accelerated postoperative recovery, while open lumbar discectomy in some cases reduced the risk of recurrence [12]. Chen *et al.* (2018) compared surgical and conservative management, finding that surgical treatment provided faster symptomatic relief and functional improvement, while conservative therapy remained effective for some patients [13]. Cong *et al.* (2016), in large-scale studies comparing endoscopic and open discectomy, concluded that endoscopic approaches reduced postoperative pain, accelerated recovery, and were considered safe in terms of complications [14]. Finally, Gibson and Waddell (2007), in a Cochrane Review, confirmed the efficacy and safety of minimally invasive techniques [7].

When considering the development of endoscopic spinal surgery, Kim *et al.* (2019) analyzed the historical evolution of endoscopic neurosurgery. These techniques have progressed from transforaminal to interlaminar approaches, foraminoplasty, and endoscopic fusion, thereby enabling the treatment of complex disc herniations and spinal stenosis [9]. Choi *et al.* (2013) compared transforaminal and interlaminar approaches for L5–S1 disc herniations, contributing to the identification of clinical indications [8]. Wang and Grossman (2016) demonstrated that endoscopic TLIF performed under local anesthesia improved pain and function while showing a low rate of complications [5].

2. Discussion

Endoscopic discectomy has been confirmed as a clinically effective, safe, and minimally invasive technique. Its main advantages include reduced tissue trauma, decreased postoperative pain, and faster recovery, which demonstrate its superiority in patient outcomes. At the same time, surgeon expertise, patient selection, and anatomical features play a crucial role in optimizing results [1,2,3,6,10,11]. The integration of randomized trials, systematic reviews, and meta-analyses provides a solid scientific basis for the selection of endoscopic approaches. Novel techniques, such as the Suprapedicular Circumferential Opening Technique and endoscopic TLIF, have opened new opportunities for the surgical management of complex disc herniations [2,5].

3. Conclusions

Endoscopic techniques represent an effective, safe, and minimally invasive option for the surgical treatment of lumbar disc herniations. They provide clinical outcomes comparable to or superior to conventional microscopic discectomy, with the advantages of reduced postoperative pain and accelerated recovery. Future research should focus on long-term outcomes, surgical optimization, and expanding clinical indications.

REFERENCES

- [1] Ruetten S., Komp M., Merk H., Godolias G. Full-endoscopic interlaminar and transforaminal lumbar discectomy versus conventional microsurgical technique: a prospective, randomized, controlled study. *Spine (Phila Pa 1976)*. 2008; 33(9): 931-939.
- [2] Kim H.S., *et al.* Suprapedicular Circumferential Opening Technique of Percutaneous Endoscopic Transforaminal Lumbar Discectomy for High Grade Inferiorly Migrated Lumbar Disc Herniation. *Biomed Res Int*. 2018; 2018: 5349680.
- [3] Ahn Y. Endoscopic spine discectomy: indications and outcomes. *Int Orthop*. 2019; 43(4): 909-916.
- [4] Christie S.D., Song J.K. Minimally invasive lumbar discectomy and foraminotomy. *Neurosurg Clin N Am*. 2006; 17(4): 459-466.
- [5] Wang M.Y., Grossman J. Endoscopic minimally invasive transforaminal interbody fusion without general anesthesia: initial clinical experience with 1-year follow-up. *Neurosurg Focus*. 2016; 40(2): E13.
- [6] Yeung A.T., Tsou P.M. Posterolateral endoscopic excision for lumbar disc herniation: Surgical technique, outcome, and complications in 307 consecutive cases. *Spine (Phila Pa 1976)*. 2002; 27(7): 722-731.
- [7] Gibson J.N., Waddell G. Surgical interventions for lumbar disc prolapse: updated Cochrane Review. *Spine (Phila Pa 1976)*. 2007; 32(16): 1735-1747.
- [8] Choi K.C., *et al.* Percutaneous endoscopic lumbar discectomy for L5-S1 disc herniation: transforaminal versus interlaminar approach. *Pain Physician*. 2013; 16(6): 547-556.
- [9] Kim M., *et al.* Evolution of Spinal Endoscopic Surgery. *Neurospine*. 2019; 16(1): 6-14.
- [10] Righesso O., Falavigna A., Avanzi O. Comparison of open discectomy with microendoscopic discectomy in lumbar disc herniations: results of a randomized controlled trial. *Neurosurgery*. 2007; 61(3): 545-549; discussion 549.
- [11] Teli M., *et al.* Higher risk of dural tears and recurrent herniation with lumbar micro-endoscopic discectomy. *Eur Spine J*. 2010; 19(3): 443-450.
- [12] Kim M., *et al.* A Comparison of Percutaneous Endoscopic Lumbar Discectomy and Open Lumbar Microdiscectomy for Lumbar Disc Herniation in the Korean: A Meta-Analysis. 2018; 2018: 9073460.
- [13] Chen B.L., *et al.* Surgical versus non-operative treatment for lumbar disc herniation: a systematic review and meta-analysis. *Clin Rehabil*. 2018; 32(2): 146-160.
- [14] Cong L., Zhu Y., Tu G. A meta-analysis of endoscopic discectomy versus open discectomy for symptomatic lumbar disk herniation. *Eur Spine J*. 2016; 25(1): 134-143.