



The Growing Popularity of MISS: A Focus on Endoscopic Surgery for the Cervical and Thoracic Spine

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This editorial article explores advances in the field of spinal surgery, focusing on minimally invasive spinal surgery (MISS) and its applications in treating cervical and thoracic spine conditions. MISS has gained popularity due to its reduced pain, minimal scarring, and shorter recovery times compared to traditional open surgery. Endoscopic surgery, the core of many MISS procedures, offers several advantages, such as reduced blood loss, minimal tissue damage, shorter hospital stays, and enhanced visualization. However, it is important to emphasize the need for sufficient experience in endoscopic surgery and the adoption of more delicate techniques when addressing cervical and thoracic spine disorders, as more serious complications can occur in these regions than in the lumbar spine. Various endoscopic techniques, including anterior cervical discectomy, posterior cervical foraminotomy, thoracic discectomy, and thoracic decompression, have been successfully employed to treat cervical and thoracic spine disorders. As the field of spinal surgery continues to advance, the use of endoscopic techniques in MISS is expected to become more widespread, benefiting patients and contributing to a more efficient and cost-effective healthcare system.

Key Words: Minimal invasive spinal surgery, Endoscopic surgery, Cervical spine, Thoracic spine

INTRODUCTION

The field of spinal surgery has seen significant advancements in recent years, primarily due to the rapid development of minimally invasive techniques. Among these, Minimal Invasive Spinal Surgery (MISS) has gained particular attention for its ability to treat patients with cervical and thoracic spine conditions with reduced pain, minimal scarring, and shorter recovery times [1-3]. This editorial article aims to provide an overview of MISS in the context of cervical and thoracic spine surgery, with a focus on endoscopic techniques as the cornerstone of these procedures. It is important to note that endoscopic cervical and thoracic spinal surgery requires sufficient experience in endoscopic surgery through lumbar surgery, and complications can

occur much more seriously than in the lumbar region, necessitating more delicate techniques [4,5].

1. The Need for MISS in Cervical and Thoracic Spine Surgery

Cervical and thoracic spine disorders can have a profound impact on an individual's quality of life, causing pain, disability, and limitations in daily activities. Traditional open spinal surgery can address these issues but often comes with a host of complications, including significant blood loss, muscle damage, and prolonged hospital stays [6-8]. As a result, the demand for MISS has grown exponentially as a more patient-friendlier alternative that can achieve similar, if not better, outcomes with

fewer risks and shorter recovery periods.

2. Endoscopic Surgery: The Core of MISS

Endoscopic spinal surgery, which utilizes an endoscope to access the spine through small incisions, is at the heart of many MISS procedures. The endoscope enables surgeons to visualize the surgical site without the need for large incisions, minimizing tissue damage and reducing postoperative pain [6-8].

There are several key advantages to endoscopic spinal surgery when compared to traditional open surgery, which contribute to the growing popularity of MISS in the treatment of cervical and thoracic spine disorders. However, it is essential to emphasize the need for sufficient experience in endoscopic surgery and the understanding that complications in the cervical and thoracic regions can be more severe than in the lumbar region [4,5].

1) Reduced Blood Loss and Pain

With the use of an endoscope, smaller incisions are required, leading to significantly less blood loss and postoperative pain. This not only makes the surgery itself more manageable for the patient but also leads to a faster recovery and reduced reliance on pain medications.

2) Minimal Tissue Damage

Open spinal surgery often involves the detachment of muscles and other soft tissues, resulting in increased postoperative pain and longer recovery times. Endoscopic surgery, on the other hand, preserves these tissues by creating a small, direct pathway to the spine. This results in less muscle and tissue damage, leading to a more rapid recovery.

3) Shorter Hospital Stays

Thanks to the minimal invasiveness of endoscopic spinal surgery, patients typically experience shorter hospital stays and a quicker return to normal activities. This not only benefits the patients but also reduces healthcare costs and hospital resource utilization.

4) Enhanced Visualization

The endoscope's camera allows for better visualization of the surgical site, providing real-time feedback to the surgeon.

This enhanced view enables more precise surgical techniques and increases the likelihood of a successful outcome. Again, it is crucial to emphasize that more delicate techniques are required when performing endoscopic surgery in the cervical and thoracic regions due to the potential for more serious complications.

3. Endoscopic Techniques for Cervical and Thoracic Spine Surgery

There are several endoscopic techniques that can be applied to MISS procedures for cervical and thoracic spine disorders.

Some of these techniques include:

1) Anterior Cervical Discectomy (ACD)

This endoscopic procedure is used to treat conditions such as cervical herniated discs. It involves the removal of the damaged disc through a small incision made in the front of the neck. While fusion of adjacent vertebrae can be performed in some cases to stabilize the spine, it is less common in endoscopic procedures due to the minimal invasiveness and the desire to preserve mobility [9,10].

2) Posterior Cervical Foraminotomy

This minimally invasive technique is employed to treat nerve compression caused by bone spurs or herniated discs in the cervical spine. The endoscope is used to access the affected area and remove the offending structures, relieving pressure on the nerves and reducing pain [11-13].

3) Thoracic Discectomy

This endoscopic procedure is used to treat herniated discs in the thoracic spine. The damaged disc is removed through a small incision, and the adjacent vertebrae may be fused if necessary to provide stability [14-16].

4) Thoracic Decompression

In cases of thoracic spinal stenosis due to ossification of ligamentum flavum (OLF) or bony spurs, endoscopic thoracic decompression can be performed to remove ligament and bony structures causing nerve compression. This technique can relieve pain and improve mobility without the need for fusion [17].

CONCLUSION

Minimal Invasive Spinal Surgery (MISS) has emerged as a powerful tool in the treatment of cervical and thoracic spine disorders. Endoscopic surgery, as the core of many MISS procedures, offers numerous advantages over traditional open surgery, including reduced blood loss, minimal tissue damage, shorter hospital stays, and lower risks of complications. As a result, patients can experience improved outcomes with faster recovery times and a quicker return to their daily activities.

As the field of spinal surgery continues to advance, it is likely that the use of endoscopic techniques in MISS will become even more widespread. This will not only benefit patients suffering from cervical and thoracic spine conditions but also contribute to a more efficient and cost-effective healthcare system. The future of spinal surgery lies in embracing these minimally invasive techniques, and endoscopic surgery is undoubtedly leading the charge. However, surgeons must recognize the importance of gaining sufficient experience in endoscopic surgery and adopting more delicate techniques when addressing cervical and thoracic spine disorders to minimize the risk of serious complications.

CONFLICT OF INTEREST

Ethical statements

Not applicable.

Conflict of interest

No potential conflict of interest relevant to this article.

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REFERENCES

- Ahn Y. The current state of cervical endoscopic spine surgery: an updated literature review and technical considerations. *Expert Rev Med Devices* 2020;17:1285–1292.
- Bucknall V, Gibson JA. Cervical endoscopic spinal surgery: a review of the current literature. *J Orthop Surg (Hong Kong)* 2018;26:2309499018758520.
- Rosenthal D. Endoscopic approaches to the thoracic spine. *Eur Spine J* 2000;9 Suppl 1:S8–S16.
- Ahn Y. Endoscopic spine discectomy: indications and outcomes. *Int Orthop* 2019;43:909–916.
- Ruetten S, Komp M, Merk H, Godolias G. Full-endoscopic cervical posterior foraminotomy for the operation of lateral disc herniations using 5.9-mm endoscopes: a prospective, randomized, controlled study. *Spine (Phila Pa 1976)* 2008;33:940–948.
- Kim M, Kim HS, Oh SW, Adsul NM, Singh R, Kashlan ON, et al. Evolution of spinal endoscopic surgery. *Neurospine* 2019;16:6–14.
- Sen RD, White-Dzuro G, Ruzevick J, Kim CW, Witt JP, Telfeian AE, et al. Intra- and perioperative complications associated with endoscopic spine surgery: a multi-institutional study. *World Neurosurg* 2018;120:e1054–e1060.
- Wu PH, Kim HS, Jang IT. A narrative review of development of full-endoscopic lumbar spine surgery. *Neurospine* 2020;17:S20–S33.
- Tan J, Zheng Y, Gong L, Liu X, Li J, Du W. Anterior cervical discectomy and interbody fusion by endoscopic approach: a preliminary report. *J Neurosurg Spine* 2008;8:17–21.
- Yao N, Wang C, Wang W, Wang L. Full-endoscopic technique for anterior cervical discectomy and interbody fusion: 5-year follow-up results of 67 cases. *Eur Spine J* 2011;20:899–904.
- O'Toole JE, Sheikh H, Eichholz KM, Fessler RG, Perez-Cruet MJ. Endoscopic posterior cervical foraminotomy and discectomy. *Neurosurg Clin N Am* 2006;17:411–422.
- Oertel JM, Philipps M, Burkhardt BW. Endoscopic posterior cervical foraminotomy as a treatment for osseous foraminal stenosis. *World Neurosurg* 2016;91:50–57.
- Song KS, Lee CW. The biportal endoscopic posterior cervical inclinatory foraminotomy for cervical radiculopathy: technical report and preliminary results. *Neurospine* 2020;17:S145–S153.
- Bae J, Chachan S, Shin SH, Lee SH. Percutaneous endoscopic thoracic discectomy in the upper and midthoracic spine: a technical note. *Neurospine* 2019;16:148–153.
- Choi KY, Eun SS, Lee SH, Lee HY. Percutaneous endoscopic thoracic discectomy; transforaminal approach. *Minim Invasive Neurosurg* 2010;53:25–28.

16. Johnson JP, Filler AG, Mc Bride DQ. Endoscopic thoracic discectomy. *Neurosurg Focus* 2000;9:e11.
17. Yang FK, Li PF, Dou CT, Yu RB, Chen B. Comparison of percutaneous endoscopic thoracic decompression and posterior thoracic laminectomy for treating thoracic ossification of the ligamentum flavum: a retrospective study. *BMC Surg* 2022;22:85.