



Essay

The Rationale for Endoscopic Spinal Surgery




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INTRODUCTION

While spinal endoscopy was first introduced several decades ago, limitations in surgical technique and equipment combined with a steep learning curve hindered its initial popularity amongst surgeons.¹⁻⁴ However, recent technological advancements have facilitated more widespread adoption of the technique. Surgeon and patient demand for less invasive procedures have further driven a global surge in interest in spinal endoscopy. Furthermore, with healthcare costs increasing at unsustainable rates, there has been increasing emphasis placed on the development of more cost-effective treatment strategies.⁵

Today, transforaminal, interlaminar, cervical, and thoracic approaches have all been described utilizing spinal endoscopy. While the most compelling evidence supports the role of spinal endoscopy in the treatment of lumbar disc herniations and spinal stenosis,⁶⁻¹⁰ more recently, surgical indications have further expanded to include spinal instrumentation and the management of tumors and infection.

THE LEAST INVASIVE OF ALL CURRENT SPINAL SURGICAL TECHNIQUES?

Similar to other minimally invasive spinal surgical (MISS) techniques, the main benefits of spinal endoscopy are related to its ability to substantially decrease bony and soft tissue disruption when compared to equivalent open surgeries. This appears to mitigate intraoperative blood loss, lessen postoperative pain, facilitating quicker postoperative mobilization and recovery.^{6,7,11-13} Additionally, advocates of spinal endoscopy believe that it allows for improved and more targeted visualization of pathology even when compared to more conventional MISS techniques—due to superior maneuverability of the spinal endoscope and the ability to use an angled lens. This enables the surgeon to inflict the least amount of iatrogenic damage to normal anatomy, further decreasing the theoretical risks of iatrogenic segmental destabilization and resultant adjacent segment degeneration. Furthermore, the use of continuous fluid inflow facilitates safer dissection of tissue planes, enhancing the safety profile of this MISS technique. Finally, as this can all be achieved through an incision that is less than 1 cm in length, spinal endoscopy may indeed represent the least invasive of all modern-day spinal surgical techniques.



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THE PRODUCT OF A SHIFTING SURGICAL LANDSCAPE

We are amidst a shifting surgical landscape that is becoming increasingly patient centric and cost-conscious. In this context, and as discussed earlier, there has been a consequent surge in interest in surgical techniques that maximally expedite the recovery process through the least invasive approaches. As surgeons across the globe continue to push the boundaries of spinal endoscopy and demonstrate that it may provide equivalent (or even superior) outcomes to more conventional techniques, spinal endoscopy may ultimately represent the next evolution of MISS techniques. In Asian countries, this evolution is progressing at a fairly rapid rate, from progressively smaller tubular-based surgeries to increasingly widespread usage of endoscopic techniques.

In the United States in particular, efforts to minimize health care expenditures are becoming increasingly important. As long inpatient stays are oftentimes associated with high facility fees, outpatient surgeries may reduce the overall cost associated with surgical episodes of care. Furthermore, outpatient spinal surgeries may be associated with superior short-term outcomes when compared to equivalent inpatient surgeries.¹⁴⁻¹⁶ Ultimately, in this context, health care economics are quickly pushing an increasing number of surgeons to adopt MISS techniques as they may enable the fastest recoveries.^{15,17} It therefore appears inevitable that spinal endoscopy will continue to gain traction, particularly in the United States, as many of these techniques can be very readily performed in an outpatient setting. Moreover, with spinal endoscopy now being effectively performed without the routine use of general anesthesia, spinal endoscopy may indeed become the ideal outpatient spinal surgical technique.^{13,18-20}

SPINAL ENDOSCOPY – IMPORTANT TO MAINTAIN PERSPECTIVE

While the potential benefits of spinal endoscopy are certainly quite alluring, it is important to put things into perspective and shed light on one of the significant barriers to technique adoption: the steep associated learning curve.¹⁻⁴ While this learning curve depends, to some degree, on the specific procedure being performed,^{2,21} surgeons must nonetheless exercise a sense of surgical restraint when first adopting these techniques. During the initial phase of skill development, the risk of complications is comparatively higher with spinal endoscopy when compared

to more conventional surgical techniques. Therefore, a slow progression of technique adoption through initial cadaveric dissections and expert mentorship is a must. Adherence to strict indications and a careful and graduated incorporation of endoscopic techniques into one's practice are all crucial during the early adoptive phase. Surgeons should start with only the simplest surgical cases. Fortunately, while an inverse relationship between surgeon experience and the risk of complications and rates of treatment failure appears to exist,^{22,23} it is nonetheless important for surgeons to maintain a healthy perspective on these latter realities during the early phases of technique adoption. Finally, self-awareness and humility are crucial, as a ceiling effect in surgical skill may ultimately limit a surgeon's ability to adopt the most advanced endoscopic techniques without compromising patient safety.

THE RATIONALE FOR SPINAL ENDOSCOPY

Patient demand for the least invasive procedures, surgeon desire to maximally shorten the postoperative recovery period, and a health care economy that demands the most cost-effective care, appear to be the driving forces behind the ongoing surgical evolution towards spinal endoscopy. While higher level evidence is much needed to support the clinical utility of the latest endoscopic techniques, current evidence supporting the efficacy of endoscopic discectomies and decompressions for the treatment of disc herniations and lumbar stenosis is very compelling.²⁴ The future of spinal endoscopy appears quite promising and it is becoming increasingly evident that spinal endoscopy is becoming a useful surgical tool for the modern-day spinal surgeon.

CONFLICT OF INTEREST

The authors have nothing to disclose.

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Title: Bullfight
Artist: Pablo Picasso
Year: 1934

More information <https://www.pablocicasso.org/girl-before-mirror.jsp>
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