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Editorial

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There Is No Spine Surgery Without the Risk of Complications: A Deep Dive Into the Realm of Minimally Invasive and Endoscopic Spine Surgery

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The concept of minimally invasive surgical techniques arose from the development of smart technologies with a fundamental objective of reducing surgical trauma. Enhancements in microsurgery, tubular retractor, endoscopy, and various percutaneous techniques, as well as improvement of implant materials, have proven to be milestones. The specialty of spine surgery has seen groundbreaking progress over the years, with endoscopic spine surgery (ESS) and minimally invasive surgery (MIS) using tubular retractor playing a pivotal role in this evolution [1-3]. Yet, as is the case with any surgical procedure, ESS is not without its challenges. This special issue, "The complications and essential surgical techniques in minimally invasive spine surgery and endoscopic spine surgery," delves into the depth of these challenges, providing comprehensive insight into the realm of minimally invasive spine surgery and ESS.

Since its introduction by Foley and Smith in 1997, the tubular retractor has revolutionized and changed the paradigm of spine surgery [3]. MIS using tubular retractors allows the surgeon to treat focal compressive and unstable lesions without disturbing the normal osteo-ligamentous structures and the surrounding muscles. It combines the advantage of endoscopic surgical technique with the remarkability of 3-dimensional anatomical visualization by the operating microscope. Initially pioneered for lumbar discectomy, the tube has gradually witnessed its applications in a plethora of commonly seen spinal pathologies; most degenerative, infective, traumatic neurosurgical etiologies as well as in spinal tumors. The tubular retractor has time and again demonstrated equivalent surgical results as the conventional techniques with the obvious benefits of faster recovery, less blood loss, and reduced infection rates and the tubular retractor has served as a catalyst for the activation of MIS in spine surgery [3,4]. In addition, the innovation of endoscopic techniques has significantly revolutionized spine surgery by minimizing invasiveness, reducing postoperative pain, and expediting patient recovery [5,6]. Among these, full endoscopic spine surgery (FESS) and unilateral biportal endoscopic spine surgery (UBE) have stood out, each presenting its own unique set of advantages and potential complications [7,8]. While FESS offers minimal tissue damage and improved patient comfort, it also bears the risk of complications such as dural tears or nerve injuries [5]. On the other hand, UBE provides a wider surgical view but presents its own set of challenges including access-related difficulties

and unintended facet joint violations [9]. The saying, "There is no spine surgery without complications," reflects the inherent complexity and challenges of spine surgeries, where every procedure is an intricate dance between precision and potential risks. In the continually evolving world of spinal surgery, ESS—comprising FESS and UBE—has emerged as a beacon of innovation [1,2]. However, these pioneering techniques come with their set of potential complications [9].

Tubular retractor and ESS promise less invasiveness than traditional open spine surgeries, resulting in reduced postoperative pain and quicker recovery. Yet, this revolution brings along the need for exceptional surgical proficiency due to the limited visual field and workspace, which, coupled with the wide-ranging spinal pathologies, presents a complex scenario. The ability to predict, prevent, and manage potential complications becomes as crucial as the primary surgical skill itself. For instance, FESS, while offering remarkable advantages like minimized tissue damage and enhanced patient comfort, can be fraught with complications such as dural tears or nerve injuries [10]. UBE, with its dual portal approach, improves the surgeon's field of view but simultaneously introduces the possibility of access-related challenges and inadvertent facet joint violations [11].

In-depth understanding and anticipation of these complications begin with thorough preoperative planning, incorporating detailed patient history, accurate diagnostic imaging, and careful consideration of the operative technique. The surgeon's skill and experience play a pivotal role in selecting among tubular retractor, FESS and UBE, guided by the specific pathology, patient's overall health, and projected postoperative recovery. Despite meticulous precautions, complications can occur, emphasizing the necessity of immediate recognition and appropriate management strategies. For instance, a dural tear, if identified intraoperatively, could necessitate a switch to a traditional open surgical approach, underscoring the need for flexibility in surgical planning [12,13].

This special issue focuses on shedding light on the complexities of MIS and ESS, encapsulating a broad spectrum of potential complications and their management. It discusses essential surgical techniques, pitfalls, and bail-out strategies during MIS and ESS, delving into various case scenarios across different spine sections—cervical, thoracic, and lumbar [1]. The goal is to create a comprehensive manual that not only discusses the challenges but also emphasizes the significance of preoperative planning, intraoperative vigilance, and postoperative care. By intertwining clinical experience, latest research, and real-world case studies, we aim to enhance surgeons' understanding of these advanced techniques, helping them navigate the myriad challenges they might encounter.

Our aim with this special issue is to equip spinal surgeons, both budding and experienced, with an in-depth understanding of these groundbreaking surgical procedures. By fostering a deeper comprehension of the technicalities and potential challenges of MIS, FESS and UBE, we hope to contribute to safer, more effective patient care in the rapidly evolving realm of spinal surgery. This issue stands as a comprehensive guide, providing surgeons with valuable insights, accrued from extensive clinical practice and rigorous academic research, to help them navigate the complexities of these procedures. "There is no spine surgery without complications" is not a deterrent but a reminder of the evolving challenges and the continuous learning required in the field of spine surgery. As we stride towards innovation, let's do so with a comprehensive understanding of the potential risks and the preparedness to address them effectively, thus pushing the boundaries of what is possible in ESS.

NOTES

Conflicts of Interest

The authors have nothing to disclose.

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