

Rationale of Endoscopic Spine Surgery: A New Paradigm Shift In Spine Surgery From Patient's benefits to Public Interest In This New Era of Pandemic

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Advancement of technology and surgical skills act in synergy to lead to exploration of new solutions in spine surgery. One of the key areas of spine innovation is endoscopic spine surgery and its application to a broader spectrum of conditions with the aim of reducing perioperative morbidities, soft tissue and bony conservation and yet achieving long term target outcomes of gold standard traditional open spine surgery. Twenty first century marks the new century of opportunities and challenges, in the face of threat of Coronavirus pandemic and difficult circumstances in hospital bed management and limitation in medical resources, minimally invasiveness is evolving from individual patients' benefits to public interest.

Key Words: Endoscopic Spine Surgery, Uniportal Endoscopic Spine Surgery, Biportal Endoscopic Spine Surgery, Unilateral Biportal Endoscopy

INTRODUCTION

The year of 2020 as a dawn of a new century presented new challenges in the world of medicine. The emergence of Coronavirus-19 (COVID-19) had led to new perspective in the treatment of patients. Many countries went into various versions of locked down or limitation of social interactions restrictions order in different period of the year 2020, health care institutions and hospitals are overwhelmed with patients requiring medical attention for Coronavirus. Many chronic and degenerative surgical conditions treatment are placed on the lower priority in the hospital administration point of view. Elective spine surgeries are postponed or cancelled for sustained period of time. Day surgeries are preferred to surgeries requiring hospital stay unless it is an emergency. Inpatient beds are prioritized for treatment of patients who are in respiratory distress, reserve beds are also kept empty to preserve space in preparation for a spike in Coronavirus situation. As the countries are preparing themselves for the new normal, spine surgery has to keep up in innovation, technical development and protocol generation for the new era of preservation of hospital resources. Endoscopic Spine Surgery has undergone several generations of development and has replaced many of the open surgeries as a treatment for patient with degenerative spinal conditions in some of the surgeons' practice¹⁰.

The key objectives of endoscopic spine surgery is favorable to the treatment of spinal conditions in this era of Coronavirus pandemic¹⁶. They are minimizing pain and early mobilization, minimizing the number of personnel and surgical assistants, reducing resources on respiratory support equipment during anesthesia, reduce usage of intensive care unit and high dependency and yet achieving target clinical outcome with minimally invasive benefits. In this editorial we discuss the rationale of endoscopic spine surgery and how it has evolved from just benefiting the patients to public interest in this new era of pandemic. In this special endoscopic spine surgery edition, we collated a series of articles which provides perspective on how endoscopic spine surgery is a new paradigm shift for spine surgery practice especially in this era of pandemic (Figure 1).

1. Minimize Pain and Early Mobilization

The key feature for day surgery is minimizing postoperative pain, soft tissue preservation and small wound size for easy wound care. Lee et al showed there is decreased soft tissue and muscle injury in endoscopic as compared to microscopic surgery with low creatinine kinase as marker of soft tissue injury postoperatively¹¹. Similar findings were found in Heo et al showing promising better pain relief, preservation of soft tissue and achieve similar good clinical outcomes as microscopic surgery in biportal

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Figure 1. Editorial Team for journal of minimally invasive spine surgery and technique endoscopic spine surgery edition: A new paradigm in spine surgery.

and uniportal endoscopic surgery⁴⁾.

2. Minimize Personnel in Operating Theatre

In a typical case of uniportal and biportal and endoscopic surgery, the need for assistant surgeon is optional rather than essential. As there is only one incision in uniportal endoscopic surgery, there is no role in assistant surgeon in the operation as it is performed by a single surgeon only. In biportal surgery, although there are 2 incisions and some surgeons have a preference for a surgical assistant to assist in osteotomy and holding of retractor, the need for assistant is optional rather than essential. As there are working portal retractor designed for the purpose of keeping working portal opened. There are few trays of instruments required for either uniportal and biportal surgery, hence there is less demand on nursing staff as well. A typical of endoscopic spine surgery is performed with one operating surgeon, one scrubbed nurse, one radiographer, one circulating nurse and an anesthetist. Other operating personnel re optional. The advantage of decreasing the need for assistant surgeon and nursing support in endoscopic surgery: (1) decrease manpower

cost as part of operational cost for hospital administration, (2) decrease cross infection risk among patient - healthcare workers and healthcare workers - healthcare workers during COVID-19 pandemic, (3) decrease wound infection risk and (4) privacy for patients.

Reduce Resources On Respiratory Support Equipment and Reduce Usage Of Intensive Care Unit And High Dependency

Many of the endoscopic procedures can be performed with local anesthesia and sedation^{7,22,23)}, or as epidural anesthesia⁵⁾, this decrease the need for respiratory support equipment used for endotracheal intubation for general anesthesia. During the critical period with high case load in COVID-19, there is shortage of protective personal equipment and respiratory support equipment. The ability to perform surgery without the use of general anesthesia and hence decreasing the possible need of intensive care unit and high dependency contributes in preservation of the supplies of these limited resources.

Reduce Hospital Inpatient Requirement: Demands For Day Surgery Procedures.

Recently some of the hospitals in the world has developed protocols in order to streamline the work processes in order

to achieve high percentage of day surgeries their spine surgery practice. Wu et al highlighted that as a response for COVID-19 pandemic, their team set up a "Lumbar Endoscopic Awake Discectomy Surgery (LEADS)" protocol which consisted of 3 components: using moderate sedation and local anaesthesia to perform transforaminal endoscopic lumbar discectomy, same-day discharge for all patients who had undergone transforaminal endoscopic lumbar discectomy, and telemedicine communication at first week for follow-up with in-person visits 6 weeks after surgery. With the use of zoom and other tools for teleconsult/telemedicine, patients who had undergone endoscopic spine surgery can minimize visits to hospital. As the wound in his series are closed with tissue glues and no removal of stitches are required, many of the patients do not require physical consult and hence minimize risk of cross transmission of diseases and virus in hospital¹⁶. While day surgery is not limited to endoscopic spine surgery alone, with typically one to two 1 cm scar in endoscopic spine surgery, less wound care related hospital visits would help in reducing cost, providing convenience and optimization of social distancing in this time of pandemic.

3. Target Clinical Outcome Achieved with Minimally Invasive Technology

Several endoscopic surgeons have gradually broaden the indications for endoscopic spine surgeries and hence replacing a large portion of their open surgical load with endoscopic spine surgery^{2,10}. Comparison among microscopic tubular, uniportal and biportal endoscopic surgeries showed favorable perioperative outcomes, facet conservation and less muscular damages in endoscopic surgeries^{4,11}. There is increase in the benefit zone in endoscopic spine surgery to include more complex spinal procedures evolving from discectomy and decompression to fusion procedures^{1,3,17}. Posterior and anterior cervical decompression procedures have produced comparable good results with gold standard anterior cervical discectomy and fusion in some of the series published^{9,14,20,21}. Expansion of indication to spinal cord level degenerative pathologies in cervical and thoracic spine had led to potential decrease in perioperative morbidities of these high risk surgeries^{12,13,18}. Expansion of indications to include patients with mild scoliosis and narrow foramen involving endoscopic fusion has provided good clinical outcomes and achieve the benefits of minimally invasive surgery^{6,19}. Endoscopic fusion can be performed without general anesthesia with good clinical outcomes¹⁵. While we are closely monitoring the long term outcomes of these new endoscopic expansion of indications, the potential benefits of this branch of sub specialization of spine surgery is promising^{8,17}.

CONCLUSION

As part of medical fraternity, spine surgeons do our part in the fight against COVID-19, endoscopic spine surgery has inherent potential to be surgery of choice not only for patients' benefits but for public interests to decrease risk of spread of COVID-19,

conservation of respiratory equipment and maintaining elective surgery service for patients who needed spine surgery during this era of pandemic and for the future.

CONFLICT OF INTEREST

Dr. HS Kim is an editorial board member of the journal but was not involved in the peer reviewer selection, evaluation, or decision process of this article. There are no other potential conflicts of interest relevant to this article to declare.

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