УДК [61+615.1] (043.2)
ББК 5+52.81
А 43
ISBN 978-985-21-1864-4

Swapnil Kumar, Snehal Mohile

EVOLUTION AND CURRENT STATE OF MINIMALLY INVASIVE MEDIASTINAL SURGERY: FROM VATS TO ROBOTIC SYSTEMS

Tutor: PhD, associate professor Nosik A.V.
Department of Surgery and Transplantology with Advanced Training Course and Retraining
Belarusian State Medical University, Minsk

Minimally invasive approaches to mediastinal surgery have revolutionized the field of thoracic surgery since the early 1990s, offering significant advantages over traditional open surgical methods. The evolution from video-assisted thoracic surgery (VATS) to robotic-assisted surgical systems has addressed critical limitations in mediastinal access while maintaining surgical precision and patient outcomes.

This study aims to evaluate the safety, efficacy, and outcomes of minimally invasive approaches in mediastinal surgery, specifically comparing VATS and robotic-assisted techniques with traditional open surgical methods for various mediastinal pathologies.

The study analyzed both VATS and robotic-assisted surgical approaches, particularly utilizing the da Vinci Surgical System, which provides high-definition 3D vision, tremor filtration, and 7-degree articulation of instruments. Applications included thymectomy for myasthenia gravis (MG) and thymomatous disease, posterior mediastinal lesion resection, and ectopic mediastinal parathyroid adenoma removal. Outcome measures encompassed operative times, conversion rates, morbidity and mortality rates, neurological outcomes, and oncological results.

VATS demonstrated reduced operative trauma, lower morbidity, and shorter hospital stays compared to transsternal approaches. Unilateral VATS showed equivalent long-term neurological outcomes to bilateral VATS, with conversion rates ranging from 0-3.6% and operative times between 90-198 minutes. Robotic thymectomy exhibited improved neurological outcomes compared to thoracoscopic approaches, with morbidity rates as low as 2.7%. For thymomatous disease, VATS showed a local recurrence rate of 3.4%, while robotic approaches demonstrated excellent visualization and no disease recurrence in several series. In posterior mediastinal lesion resections, robotic systems achieved superior outcomes with no mortality and a 7.2% morbidity rate. The enhanced precision and visualization provided by robotic systems proved particularly advantageous in confined spaces and complex dissections.

Minimally invasive mediastinal surgery, particularly robotic-assisted approaches, offers comparable or superior outcomes to traditional methods while reducing surgical trauma and improving recovery times. The evidence supports the safety and efficacy of these techniques for various mediastinal pathologies, especially in thymectomy for MG and early-stage thymomas. However, further validation through randomized controlled trials is necessary to establish long-term oncological and neurological outcomes. The continued evolution of minimally invasive techniques, supported by technological advancements, positions these approaches as the preferred choice for mediastinal surgery in suitable.