# The Rise of Video-Assisted Thoracoscopy

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**Key points:**

- Introduction
- Procedure and Equipment
- Clinical applications
- Limitations and Future Development

## Introduction

Video-Assisted Thoracoscopic Surgery (VATS) is an advanced surgical technique used to perform various thoracic procedures, offering advantages such as reduced postoperative pain, shorter hospital stays, and quicker recovery times compared to traditional open thoracotomy. This procedure involves a small incision through which the surgeon inserts a thoracoscope equipped with a camera to visualize and access the thoracic cavity. This allows precise surgical interventions and minimizes trauma to surrounding tissues. This is why VATS is increasingly replacing open thoracotomy for procedures such as lung resection, pleural biopsy, and esophageal surgery, offering patients improved outcomes and quicker recovery.[1]

## Procedure

The VATS procedure involves 3–4 small incisions arranged in a triangular configuration to insert the camera and surgical instruments. A double-lumen endotracheal tube is inserted along with a fiberoptic bronchoscope. Three or four ports are created: one for the utility incision, a camera port, and one in the mid-axillary region. The surgery is performed under video-assisted thoracoscopic guidance. At the end of the procedure, one or two pleural drains connected to an underwater seal are inserted. During the procedure, the patient is initially placed in the supine position for the induction of anesthesia and is later repositioned into the lateral decubitus position for the surgery.

## Equipment

The following equipment is used to perform a VATS:

- 5 or 10 mm high-resolution fiber-optic thoracoscope with a 0° or 30° lens
- A light source with a cable
- Video monitors
- Thoracoscopic instruments (scissors, hook or straight-blade cautery, biopsy forceps, grasper, and dissector)
- Endoscopic stapler if resection is planned
- Trocars
- Thoracotomy tray (to convert to open procedure if needed)
- Chest tubes and drainage devices
- Sterile gloves, gowns, and drapes
- Double-lumen endotracheal tube or single-lumen tube with bronchial blockers. [1]

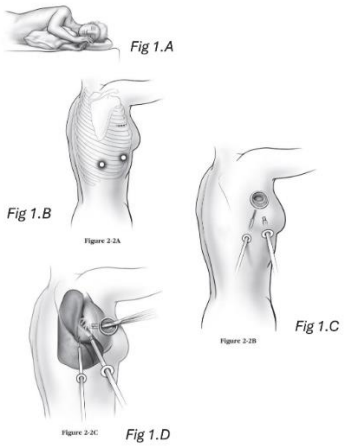



**Figure 1 A***: Surgical positioning during VATS.*
**Figure 1 B***: port placement during VATS.*
**Figure 1 C***: thoracoscopic visualization during VATS.*
.**Figure 1 D***: instrumental manipulation during VATS.* [2]

## Clinical Significance

Video-assisted thoracoscopic surgery holds significant clinical importance as it serves as a minimally invasive alternative to conventional open thoracotomy. Since VATS utilizes small incisions and endoscopic visualization to perform thoracic procedures, it offers improved perioperative outcomes while maintaining surgical effectiveness and reducing trauma to the chest wall. It has been clinically demonstrated that patients undergoing VATS experience lower postoperative morbidity, reduced intraoperative blood loss, and shorter hospital stays compared to those undergoing open thoracic surgery.[3] Additionally, minimally invasive techniques such as VATS allow for earlier chest tube removal and a quicker return to normal activities, contributing to improved postoperative pulmonary outcomes and faster functional recovery.[4] In oncological thoracic surgeries, particularly lung resections, VATS has shown comparable oncological efficacy to open procedures while maintaining the advantages of reduced complications and enhanced recovery.[5] These clinically proven benefits have resulted in a widespread shift from open procedures to VATS, thereby highlighting its growing importance in modern medicine by delivering improved patient outcomes through advanced thoracic surgical techniques.

## Limitations and Future Development

Despite the numerous benefits of VATS, it still presents certain limitations that may affect its widespread adoption in thoracic surgery. However, with continued technological advancements, many of these challenges are expected to be addressed in the near future. One of the major challenges is the steep learning curve and the requirement for highly specialized and skilled surgeons, which can limit the broader use of VATS. Furthermore, the cost of specialized equipment and the training required for VATS procedures may present economic challenges for certain institutions.[6] In addition, the thoracoscopic approach provides reduced tactile feedback and limited depth perception compared with traditional open surgery, making the management of large tumors and complex anatomical variations more difficult. In some situations, conversion to open thoracotomy is required to control uncontrolled bleeding or to improve anatomical visualization.[7] Nevertheless, continuous advancements in technology are addressing these limitations. Innovations such as uniportal VATS techniques, high-definition imaging systems, and, most importantly, robotic-assisted thoracic surgery represent the future of minimally invasive thoracic surgery. These developments suggest that future progress in technology and surgical training will likely enhance the safety, accessibility, and effectiveness of VATS in thoracic practice.[8]

## Conclusion

Video-assisted thoracoscopic surgery has significantly improved the management of thoracic diseases by providing a minimally invasive alternative to traditional open surgery. It offers multiple benefits, including reduced postoperative pain, reduced surgical trauma, faster recovery, and shorter hospital stays. Although it has certain limitations, such as the need for advanced

surgical expertise and specialized equipment, ongoing advancements in surgical techniques and technology continue to expand its applications. As VATS continues to evolve, it is expected to play an increasingly important role in thoracic surgery.

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