



Results in video-assisted thoracic surgery for lung cancer

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Abstract: Video-assisted thoracic surgery (VATS) lobectomies minimize complications, provide less pain and better quality of life, and offer faster recovery, better cosmetic results and better cost-effectiveness. Also, VATS lobectomies deliver long-term results at least equivalent to those observed on thoracotomy and become an exciting alternative to treat high-risk patients with a better risk-benefit ratio. The number of VATS lobectomy cases performed per year is increasing thanks to the growing experience with the technique and the development of dedicated surgical instruments and stapling devices. Development and further refinement of technique have allowed thoracic surgeons to perform a wide variety of complex procedures in a minimally invasive fashion.

Keywords: Lung cancer; video-assisted thoracic surgery (VATS); lobectomy

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Introduction

Video-assisted thoracic surgery (VATS) lobectomies minimise complications, provide less pain and better quality of life, and offer faster recovery, better cosmetic results and better cost-effectiveness. Also, VATS lobectomies deliver long-term results at least equivalent to those observed on thoracotomy and become an exciting alternative to treat high-risk patients in a better risk-benefit ratio (1). Thoracic surgery has profited more of the advent of minimally invasive approaches, because the postoperative pain has always been historically one of the most inconvenient consequences of thoracotomy, leading to higher risk of post-operative complications and compromising recovery and post-operative quality of life in a considerable number of patients, and the thoracic cavity, with its rigid wall, fits perfectly to video-assisted surgery principles. The number of VATS lobectomy cases performed per year is increasing thanks to the growing experience with the technique and the development of dedicated surgical instruments and

stapling devices.

VATS lobectomies for lung cancer

According to literature, VATS lobectomy has been already shown to have many potential advantages over thoracotomy. A vast number of publications provide substantial evidence that the minimally invasive approach is oncological equivalent to open surgery, with similar survival rates (2). A radical lymph node dissection can be achieved through VATS, regarding precisely the number of lymph nodes removed and the number of mediastinal lymph node stations dissected (3). VATS lobectomy is a safe procedure related to lower complication rates and better quality of life (4). VATS lobectomy represents a sustaining innovation and a revolutionary refinement of an existing treatment (5). Historically, VATS lobectomy for lung cancer was initially proposed only for early-stage disease. The American College of Chest Physicians Guideline for Lung Cancer management stated that VATS is the preferred approach to

lobectomy/segmentectomy for clinical stage I lung cancer in experienced centres (6). There is no right proportion of lobectomies that should be performed by VATS. If VATS is undoubtedly proper, it is likely that patients will drive higher penetration of VATS. The learning curve for VATS lobectomy differs from region and setting, and the achievement of a real comfort with VATS lobectomy is reached around 50 cases (7). The learning curve is a gradual evolution, although there is a clear demarcation between VATS for wedge and pleural disease and lobectomy. The learning process is more straightforward with a mentor who contributes to moving to smaller incisions, dissecting via VATS, converting to an open approach when needed (5). Nevertheless, some surgeons started to use the VATS to carry out extended major lung resections such as a bronchial sleeve, vascular sleeve, carinal, chest wall, and other *en-bloc* resections. Extended resections particularly sleeve and carinal resections are technically demanding and have a steep learning curve. These procedures must be done by highly skilled surgeons, with considerable experience in both VATS lung resections and open sleeve resections. However, the extended resections by VATS are the result of long-term accumulated experience (both in VATS and in thoracotomy). This level of experience and skill is an indispensable precondition to propose a VATS approach for a complex major resection (8). Nonetheless, these extended operations should be referred to high-volume surgeons in high-volume centres.

VATS lobectomy is a novel approach, not a new technique

Many surgeons who had initially trained solely in open pulmonary resection have taken these data and adapted their practices to VATS. Current thoracic surgery residents are gaining extensive experience with a wide variety of thoracoscopic procedures throughout their general thoracic surgery training. Combined, these have led to increasing the number of lobectomies performed via a VATS approach worldwide. In a recent review, it was found that 45% of lobectomies were performed with VATS techniques (9).

There is not a single standardised operative technique in performing a VATS lobectomy. The first published approach in VATS lobectomy was the posterior (10). The surgeon is positioned posteriorly to the patient. The utility incision is made in the sixth or seventh intercostal space anterior to latissimus dorsi muscle. The 0-degree camera port is in the auscultatory triangle. The dissection goes

from posterior to anterior; the oblique fissure is developed first to identify and isolate pulmonary arterial branches. The benefit of this approach is the excellent visualisation of the posterior aspect of the hilum with a more straightforward dissection of the bronchi and the pulmonary artery. The sequence of dissection varies in the posterior approach according to the lobe. Additionally, the instruments come towards the camera and are easily seen (11).

The anterior approach utilizes a three-port technique (12). The surgeon and assistant stand on the anterior side (surgeon cranially). The approach uses a 30° camera. The utility incision is placed between the nipple and the inferior angle of the scapula (fourth intercostal space anterior to latissimus dorsi muscle) and lays directly on the hilum and the major pulmonary vessels. This approach gives good access to the major vessels in case of significant bleeding. The sequence of dissection is the same for all lobes making it a more comfortable technique to teach since surgeons are on the same side. The first structures approached are the major vessels. To prevent air leaks, the handling or dissection of the fissure is minimal, and they are stapled remaining intact as a seal above the lung parenchyma. To facilitate a no-touch technique, the fissure stapling is performed after the management of the majority of the hilar structures (11).

The natural progression of VATS was to omit the posterior port resulting in a 2-port VATS technique, which consisted of a camera port and another utility port (13). Later, surgeons tried to place the camera directly into the utility port for better ergonomics and visualization, with the elimination of the camera port (14). Recently, uniportal VATS has become a mature surgical approach for early lung cancer surgery, which includes pulmonary wedge resection, segmentectomy, and lobectomy (15). The next step of this progression is the subxiphoid uniportal VATS, a variant of uniportal VATS, which is usually performed through single intercostal space, with the theoretical benefits of reducing chronic intercostal neuralgia (16).

Conclusions

Over the last 20 years, VATS lobectomy has become a safe and effective approach for lung cancer treatment. It was also found that VATS lobectomy is superior to thoracotomic lobectomy in many regards. Development and additional refinement of technique have allowed thoracic surgeons to perform a wide variety of complex procedures in a minimally invasive fashion. Nevertheless, VATS and open resection for lung cancer should be viewed

as complementary rather than competitive techniques.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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