

Video-assisted thoracic surgery for extended lung cancer disease: moving into the borderlands

In the last two decades, the minimally invasive surgical approach has slowly gained positions in thoracic surgery, and now progressively more patients ask for minimally invasive surgical procedures. This technological and scientific revolution in thoracic surgery advocates that almost every open procedure could be done in video-assisted thoracic surgery (VATS) (1).

Minimise the surgical aggressiveness in advanced stage lung cancer patients (where the immune system is weakened by the neoplasm or by neoadjuvant treatments) is a goal of minimally invasive surgical approaches and VATS represents the least aggressive form to operate lung cancer. Several papers in the medical literature suggest that the immune response is better preserved after VATS than thoracotomy. Given that immune function is a major factor in controlling tumour growth and recurrence, the reduced inflammatory response associated with VATS may be associated with improved long-term survival. However, the role of VATS for the treatment of advanced stages of lung cancer is not clear. Therefore, the indications and contraindications for lung cancer treatment have been changed over time. Initially, only early stages were considered for VATS approach, and advanced NSCLC tumours were seen as a contraindication for thoracoscopic surgery. Several alarms regarding the radicality of oncologic resection, technical challenges, and safety have reduced the combination of VATS for advanced lung cancer stages. In extended resections such as a vascular or bronchial sleeve, chest wall resection or tumours after high doses of induction chemoradiotherapy, the VATS approach is even less frequent. However, thoracoscopic major lung resection for advanced stage lung cancer is now gaining wide acceptance in well experienced VATS thoracic surgery units. Minimise the surgical aggression is particularly important given a large number of sick patients with advanced stage lung cancer who require multimodality therapy, sometimes being difficult to tolerate in older patients or patients with severe comorbidity (2). VATS approaches are safe and oncological sound with potential benefits in hospital recovery. Complication rates were similar between early stage and advanced stage patients. Therefore, VATS is feasible for advanced lung cancer disease (3).

A variety of concerns regarding the completeness of oncologic resection, technical challenges, and potential safety concerns has limited the utilisation of VATS approaches for more advanced stages of lung cancer. For patients requiring more extensive resection such as pneumonectomy and *en bloc* chest wall resection, VATS is even less common. VATS lobectomy, VATS pneumonectomy, and VATS assisted chest wall resection for advanced lung cancer can be safely performed with an acceptable mortality and morbidity rate. Also, VATS offer the benefit of increased tolerance for adjuvant therapy. The low morbidity of VATS reported for early stage lung carcinoma, not definitively proven for advanced stage NSCLC, will be expected as experience builds. This is particularly important given the significant number of frail patients with advanced stage disease who require multimodality therapy, which can be difficult to tolerate. Conversions are not associated with a significant change in short or long-term outcomes. Continued improvements in instrument technology and surgical technique will only continue to expand the possibilities for minimally invasive pulmonary resections, as well as those for primary chest wall tumours (4).

In conclusion, in appropriately selected patients with locally advanced NSCLC, VATS approaches in advance stages lung cancer are feasible and associated with comparable survival to that following thoracotomy (1). For this clinical and literature evidence, we thank the *Journal of Visualized Surgery (JOVS)* for the realisation of this special issue focused on the VATS approach in patients with lung cancer in advanced stages. Our aim will be to update the readers with papers and technical videos from international well-known leading surgeons.



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