



Indications and timing of conversion to thoracotomy during video-assisted lung resection

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The definition of video-assisted thoracic surgery (VATS) lobectomy relies on at least three basic concepts: a monitor-based procedure; full anatomic hilar dissection and selective stapling of vascular and bronchial structures; no need for rib spreading (1).

Although VATS lobectomy was first described more than twenty years ago (2), the procedure only gained popularity more recently, due to several oncologic concerns about its radicality and the technical difficulties and risky situations that may arise in some settings (3). Nowadays, however, several societies and guidelines recommend VATS lobectomy for stage I non-small cell lung cancer as the preferred approach, in particular to reduce chronic pain, postoperative complications and loss of pulmonary function (4,5).

Many different approaches and techniques to perform VATS lobectomy have been described during the last 25 years, focusing on the number of thoracic ports required, the extent and site of the utility incision, the positions of the operating surgeons, monitors and cameras, and the sequence of selective vascular and bronchial staplings (6-8).

Although several experienced centers have demonstrated that even very extended and complex procedures can be effectively performed by VATS (9), common contraindications to VATS resections currently include T4 tumors and neoplastic lesions larger than 8 cm. While bronchial or vascular sleeve resections are no longer formally considered a contraindication, the common feeling

is to reserve VATS for early stage diseases (10). Salvage surgery procedures, multiple resections for metastatic lesions and hyper-extended resections are widely considered unsuitable for VATS (11-14).

With regard to the learning curve associated with VATS lobectomy, it has been demonstrated that the procedure can be safely taught to trainees and younger surgeons, without a significant increase in postoperative morbidity, mortality or post-operative length of stay and intraoperative blood loss, although a significant increase in operating time is required (15).

If there is a need to convert to thoracotomy, the utility incision is extended from the anterior limit of the latissimus dorsi muscle along the fibers of the serratus anterior muscle, thereby allowing a total muscle sparing approach without a significant time delay (1). Although VATS allows perioperative surgical problems to be dealt with in many cases, major bleeding complications or unexpected time-consuming situations may require conversion to thoracotomy which should not be considered a failure (1).

Mori *et al.* retrospectively reviewed 176 thoracoscopic lung resections performed at their center. They focused on procedures requiring a longer operative time, to assess whether patients benefit from VATS or conversion to thoracotomy in case of procedures lasting longer than 360 minutes (16). They concluded that complex cases—requiring an operative time longer than 360 minutes—have

poorer perioperative outcomes than surgical procedures shorter than 360 minutes. In the light of this result, surgeons should decide during the procedure whether to continue with the VATS approach rather than switching to open thoracotomy. The take-home message is that conversion to thoracotomy should be considered in difficult cases requiring a longer operative time, in order to avoid further delay.

I fully agree with Mori *et al.*'s conclusion and would like to emphasize some pathophysiologic and clinical aspects. VATS lobectomy requires one-lung ventilation almost throughout the procedure. This specific technique radically modifies respiratory mechanics and physiology including reduced end-expiratory lung volume, changes in ventilation-perfusion matching in the ventilated lung, with many potential causes of alveolar damage compared with surgery not requiring one-lung ventilation (17).

Although many protective ventilation techniques have been developed, based mainly on tidal volume reduction and higher PEEP after lung exclusion (18), extensive one-lung ventilation is in itself one of the major causes of postoperative pulmonary complications. For this reason, persisting in a difficult VATS procedure and thereby prolonging one-lung ventilation time would eventually result in the opposite of what VATS lobectomy is designed to obtain.

Keeping to the specific indications for VATS lobectomy combined with adequate experience of a minimally invasive approach complete the correct paradigm to offer the patient the most appropriate treatment.

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Footnote

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