



# From coexistence to dominance in lung cancer surgery

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All surgical procedures are accompanied by surgical damage to the diseased patient. The adverse effects of surgical damage can be caused by resection of target organs, surgical approaches, or perioperative interventions. Reducing surgical damage and enhancing early recovery of patients is an important issue in improving the quality of surgical treatments. The concept of minimally invasive surgery which results in minimum damage to tissue or organs of patients is not a new one at all. Video-assisted thoracic surgery (VATS) is a dominant form of minimally invasive surgery in lung cancer. It was introduced decades ago and is now a routine daily procedure in lung cancer surgery.

However, theory is not always reconciled with practice. Minimum damage to the chest wall cannot always guarantee a better surgical outcome. Lung cancer surgery is an operation comprised of complicated surgical procedures. If anatomical lung resection becomes more difficult in VATS, and surgical damage to intrathoracic organs is increased, the beneficial effect of VATS will be eliminated, and the net benefit will be zero. Many surgeons still favor thoracotomy because it is a well-established surgical approach ensuring safe anatomical lung resection with a favorable surgical outcome. Currently both VATS and thoracotomy have equal value in lung cancer surgery although VATS is preferred in treating early lung cancer.

The current situation allowing multiple surgical options in lung cancer surgery was derived from the absence of solid evidence for advantages of VATS. VATS had been expected to decrease postoperative complications and to improve the quality of life (QOL). In retrospective studies, VATS decreased postoperative complications in a multi-center

database study (1) and in high-risk patients (2), however it has not been proven in a randomized, controlled study. In terms of QOL, risk factors including age, extent of surgery, poor pulmonary function and disease recurrence are known to be related to QOL after surgery (3-8). However, the role of a surgical method in QOL is controversial. Systematic reviews of QOL reported decreased pain and improved QOL in the VATS group (3,5,9). However, a randomized, controlled study of this issue is very rare, and other studies have reported no difference between VATS and thoracotomy (7,10).

Bendixen and colleagues (11) recently published the results of a single center, randomized, controlled study comparing VATS and anterolateral thoracotomy in patients with stage I non-small cell lung cancer. The primary goal of the study was to compare postoperative pain and QOL between two groups. They analyzed 102 patients in the VATS group and 99 patients in the thoracotomy group. Follow-up was continued until 52 weeks postoperatively. The study results indicated that VATS was associated with less postoperative pain and a better QOL than anterolateral thoracotomy. Therefore they suggested that VATS should be the preferred surgical approach. Other findings were that postoperative mortality and complication rates were not different between the two groups. The study had several limitations: (I) it was not a multi-center study which weakens it for deriving generalizations; (II) anterolateral thoracotomy was used as a control group instead of the more popular posterolateral thoracotomy in lung cancer surgery; (III) it had a low return rate of QOL questionnaires (60%); (IV) quality of surgery indicators including R0 rate and

number of harvested lymph nodes were neither provided nor compared. However, in spite of these limitations, it is a very excellent study which has the potential to resolve controversial issues. It is one providing the best evidence of the superiority of VATS over thoracotomy in reduced postoperative pain and improved QOL.

We have traversed the waves of minimally invasive surgery for decades. Many surgeons were trained by open surgery and learned VATS during clinical practice. A balanced opinion comparing VATS and thoracotomy was possible, and a high-quality of evidence was necessary to move from thoracotomy to VATS. However, the next big waves will come more vigorously because the next generation of surgeons is being trained differently. They started lung cancer surgery using VATS, so that they are more familiar with VATS than thoracotomy. For young surgeons, thoracotomy would be a surgical option only when a benefit greater than VATS might be anticipated. This will be a substantial transformation in lung cancer surgery. The most important issue needing to be answered is oncological outcome. Long-term survival and recurrence should be evaluated by well-designed, randomized, controlled trials. These will finally answer the ongoing question as to whether VATS is beneficial or at least comparable to thoracotomy. However, VATS is already dominant in our clinical practices, and we have moved too far to return to the past era of open surgery.

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