Review Article

Indication of uniportal video-assisted thoracoscopic surgery

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Abstract: Uniportal video-assisted thoracoscopic surgery (U-VATS) has been recognized as a one of minimally invasive surgery among thoracic surgeons. For some diseases such as some benign inflammatory diseases, mediastinal tumor, metastatic lung tumor, and lung cancer in thoracic surgery, U-VATS has already been applied. There is no definite indication of U-VATS even in lung cancer. According to the surgeon's ability at the institute, indication of U-VATS for the lesion that is benign or malignant is determined at this moment. The clarification of indication of U-VATS is also essential for doing safe surgery. On the other hand, prognosis of U-VATS anatomical lung resection for early lung cancer remains still unclear in detail. Recently, U-VATS has been started to perform even in advanced lung cancer. In spite of the vague surgical outcomes of U-VATS, it is certain that indication of U-VATS has gradually expanded. Oncologically, there is a room to argue on U-VATS anatomical lung resection for lung cancer still more. Additionally, the application of U-VATS for advanced lung cancer possesses a little unreliable due to possibility of incomplete lymph node dissection. Because the unfavorable outcomes for the patients with lung cancer such as local recurrence and severe troubles during surgery causes, the clarification of indication of U-VATS is an urgent issue. Based on our experience, we reviewed the indication of U-VATS for lung cancer.

Keywords: Uniportal video-assisted thoracoscopic surgery (U-VATS); multiportal VATS (M-VATS); indication

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Introduction

There are several reports of the beneficial effects of U-VATS so far (1-5). Generally, most surgeons perform U-VATS via intercostal approach for thoracic diseases, but some surgeons introduce U-VATS via the subxiphoid approach, especially for anterior mediastinal disease (6). In general, as the skills of U-VATS surgeons improves, the indication of this procedure has been expanded. However, even in early lung cancer there is still insufficient data to verify the validity of the oncological outcomes of U-VATS lobectomy.

Efficacy of U-VATS

There are some favorable points for patients in U-VATS lobectomy. Compared to multiportal VATS (M-VATS), several clinical outcomes such as the reduction of wound pain, shortening of lobectomy time (7) and the decrease of blood loss (8) have been pointed out in U-VATS lobectomy. As for wound pain, the Visual Analogue Score and morphine use in the first 24 h were almost the same as patients undergoing either U-VATS or M-VATS lobectomy (9). However, the most beneficial outcome is that U-VATS reduce the occurrence of post thoracotomy pain syndrome

(PTPS) (10). PTPS is a troublesome event and decreases the activity of daily life after surgery. As is well known, PTPS occurred in patients undergoing M-VATS to some degree (11). In terms of a faster recovery after surgery, Al-Ameri *et al.* have recently reported that patients undergoing U-VATS lobectomy for lung cancer left hospital directly to home to a higher extent than M-VATS patients (12). A faster recovery leads to the reduction of complications and the medical cost.

According to systemic review and meta-analysis on lobectomy for lung cancer undergoing by M-VATS and U-VATS, U-VATS may be relevant to lower adverse events and wound pain after surgery (13,14).

Indication of U-VATS

In the consensus report from the Uniportal VATS Interest Group (UVIG) of the European Society of Thoracic Surgeons (ESTS), indication and method of U-VATS for lobectomy were shown (15). The size of incision in U-VATS was within 4 cm and the incision was mainly placed on the anterior axillary or middle-anterior axillary line. Additionally, 65% of the surgeons considered T1 and T2b stages to be suitable for U-VATS and only 7% of them considered N0 to be a contraindication for U-VATS. Only 3% of them considered that U-VATS should be contraindicated for patients at high risk of adhesion such as those with a history of pleurisy. Oncological outcomes of U-VATS for lung cancer have been still unknown even for early lung cancer. In recent Korean report of comparison of U-VATS versus M-VATS lobectomy for lung cancer, the 5-year overall survival for clinical stage I lung cancer was 90.4% in U-VATS and 89.9% in M-VATS (16). In Japan, the 5-years overall survival and 5-year disease free survival of U-VATS lobectomy for clinical stage I lung cancer was 80.1% and 78.5%, respectively (17). As for at least clinical stage I lung cancer, currently, it is likely that these data were within permissible range.

As for limitation of U-VATS, it seems that fixed calcificated lymph node to pulmonary artery, unexpected hemorrhage and anatomical issues such as adhesion, tumor size and fissure statement were accounted for conversion to M-VATS or thoracotomy in U-VATS (18). Depending on the individual skills of surgeons, further analysis on consensus reports of the cause of conversion will be essential.

In the future, the indication of U-VATS will expand for advanced lung cancer and salvage surgery by U-VATS after chemoradiation or immunotherapy will be verified Difficult operative procedures such as bronchoplasty or angioplasty in U-VATS was firstly performed by Dr. Gonzalez-Rivas (19,20). Recently, the detailed techniques of double sleeve broncho vascular reconstruction by U-VATS and short-term outcomes have been introduced (21). The use of tourniquets for vascular control and running suture technique in U-VATS are demonstrated in this literature. Whether these surgical procedures can be acceptable among the general thoracic surgeons still needs to be discussed.

In cases invading tumors located around the diaphragm, it is difficult to take a visual development and to handle the surgical instruments. Naturally, if the tumor has invaded the great vessels, such as the superior vena cava or aorta or chest wall including the ribs, U-VATS is inappropriate. In case that the tumor is large (more than 5 cm in diameter) or fragile with necrotic changes, the surgeon should avoid the U-VATS approach. U-VATS is considered to be appropriate for treating small lesions and early-stage lung cancer without lymph node metastasis. If the procedure of U-VATS improves in the future, it might also be available for operating advanced malignant tumors, even in salvage surgery. At all events, further oncological outcomes of U-VATS are needed for the expanded indication of U-VATS

Conclusions

The prognosis of U-VATS anatomical lung resection for early lung cancer (16,17) has already been reported, however these data were from single institute. Oncological outcomes from multicenter study are expected in the near future. Furthermore, in view of prognosis and complication rate after surgery, the expanded indication of U-VATS for advanced lung cancer needs to be discussed.

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Footnote

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