Editorial

Making a decision of conversation is always difficult, but should be done in a timely manner

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Levi *et al.* introduced video-assisted thoracoscopic surgery (VATS) in 1990 (1). VATS has become an alternative technique, especially for benign diseases (2,3). After the accumulation of surgical experience for benign diseases, VATS technique has been gradually applied for lung cancer surgery. Roviaro *et al.* first reported the VATS lobectomy for lung cancer. Since then, many investigators have evaluated and reported the efficacy of VATS for lung cancer (4). VATS is considered to be superior to a thoracotomy in terms of perioperative pain and cosmesis. However, several issues needed to be confirmed, the most important of which are the adequacy of VATS for cancer operations and its safety.

Oncological feasibility of VATS

As the first step in applying VATS to the treatment of lung cancer, VATS has been applied in patients with early lung cancer. There are many retrospective studies but only two prospective randomized trials were conducted so far. Sugi *et al.* conducted a randomized control study between VATS and thoracotomy in 100 patients with stage IA non-small cell lung cancer (NSCLC) and compared the outcomes of lymph node dissection, rate of recurrence and 5-year survival rate (5). They reported that there were no significant differences between the two groups; the numbers of resected lymph nodes were 21.2 in the VATS group and 21.8 in the thoracotomy group, the rates of recurrence were 10% in the VATS group and 17% in the thoracotomy group, and the 5-year survival rates were 90% in the VATS group and 85% in the thoracotomy group. They concluded that VATS with lymph node dissection achieved the outcomes that were comparable to those in the thoracotomy group in patients with stage IA lung cancer.

There are several meta-analyses which compared outcomes of VATS and thoracotomy in patients with early lung cancer. Yan *et al.* performed a meta-analysis which included the two randomized studies described above and 19 observational cohort studies and evaluated the outcomes of VATS compared to those of thoracotomy (6). They reported that the 5-year mortality rate for VATS was better than that for thoracotomy (relative risk =0.72, P=0.04), while no difference in locoregional recurrence was observed. Taioli *et al.* also conducted a meta-analysis from among 20 observational cohort studies (7). They reported that the superiority of VATS in survival compared to thoracotomy. Thus, the two randomized trial and these meta-analyses similarly demonstrated the superiority of VATS over thoracotomy in terms of survival in patients with early lung cancer.

Based on the accumulation of experience performing VATS for early lung cancer, VATS is now gradually being performed for advanced lung cancer. However, less evidence is available regarding the utility of VATS for the treatment of advanced lung cancer, compared with its use for early lung cancer. Only a few studies have examined the outcomes of VATS in patients with advanced lung cancer. Chen *et al.* included 250 patients treated with VATS and 161 patients treated with a thoracotomy and compared the perioperative outcomes survival between the two groups in patients with stage II-IIIA disease (8). Furthermore they performed a propensity-matched analysis to remove patient bias. They

reported that the disease-free survival and overall survival outcomes were similar between the two groups.

Based on these results, the oncological outcomes after VATS appear to be comparable to those after a thoracotomy, and VATS is now considered a feasible procedure for cancer surgery.

Safety of VATS for lung cancer

The safety of VATS is another critical issue that needs to be discussed. Yan *et al.* also evaluated the safety of VATS in their meta-analysis (6). They reported that there were no significant statistical differences between VATS and thoracotomy in terms of postoperative complications and mortality. The reported total perioperative complication rate of VATS was reported to be 8.1%, which was lower than that of thoracotomy. Chen *et al.* also compared the safety of VATS in patients with advanced lung cancer. The perioperative complication rate was 25% for VATS and 28.3% for thoracotomy, with no significant difference between the two groups, while the numbers of resected lymph nodes and the perioperative complication rates were similar between the two groups. Furthermore, they evaluated cases of conversion from VATS to thoracotomy. They reported that 12% of the patients who initially started operation with VATS required conversion to thoracotomy due to unexpected bleeding, difficulty in lymph node dissection, a large tumor size, insufficient margins that needed to be extended resection, or failed fissure dissociation. According to these results, the perioperative complication rate of VATS is likely to be comparable to that of thoracotomy in patients with advanced lung cancer as well.

Agzarian *et al.* focused on cases requiring a conversion from VATS to a thoracotomy and reviewed several articles in detail. The reported conversion rates ranged from 2% to 23%, and the conversion rate gradually decreased over time, thanks to the accumulation of surgical experience. Furthermore, they evaluated the causes of conversion and divided them into three factors: bleeding or inadvertent stapling of a vessel, anatomical problems, and oncological conditions.

Bleeding

The most frequent cause of conversion is unexpected bleeding, mostly from the pulmonary artery. Pulmonary artery is fragile and easily teared by rough maneuver during dissection or excessive tension during retraction. Stapler malfunction can be a cause of conversion, but such events are thought to be rare nowadays. Bleeding accounts for 21.2–58% of all events leading to conversion.

Anatomical problems

Anatomical problems that can complicate the VATS procedure include a fused fissure, calcified lymph nodes, and dense pleural adhesions. Anatomical problems account for an estimated 37–41% of all events leading to conversion.

Oncological conditions

Oncological conditions are another major reason for conversion. If the surgeon is not satisfied with the clearance of a lymph node dissection or the curability after VATS in patients with locally advanced tumors, conversion to a thoracotomy should be considered. However, decisions regarding conversion rely heavily on the surgeon's experience and comfort, and no definitive indications for conversion presently exist.

Even if an operation is performed with thoracotomy, a longer operation time and potential for a serious complication can occur in such a case requiring conversion from VATS to a thoracotomy. Once a problem occurs, however, additional time is required for repair and the short- and/or long-term outcomes can be compromised. It should be important that the decision to convert to a thoracotomy must be made in a timely manner before a complication occurs. "*More haste, less speed*" and "*slow and steady wins the race*" are two proverbs that are applicable to this situation.

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Footnote

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