Editorial

Is it true that less is more in thoracic surgery?

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As reported in the study titled "*Uniportal thoracoscopic pulmonary segmentectomy provides good perioperative results and early postoperative recovery*" by Numajiri *et al.* (1), uniportal video-assisted thoracoscopic surgery (U-VATS) segmentectomy appears as safe and feasible as hybrid/multiportal video-assisted thoracoscopic surgery (H/M VATS) segmentectomy. They also stated that an experienced surgeon can make a smooth transition from H/M VATS to U-VATS.

Minimally invasive surgeries have been introduced and practiced worldwide. Minimally invasive thoracic surgery, which is less invasive than thoracotomy, generally has better outcomes (2). In fact, VATS has become a standard surgical procedure for the surgical treatment of lung cancer. Thereafter, procedures with fewer ports were introduced in VATS, and U-VATS were also developed (3). U-VATS was initially described by Rocco *et al.* in 2004 (4). U-VATS was initially used for minor procedures, such as bullectomy and wedge resection (4). It was first used in major pulmonary resections in the early 2010s (5). Currently, U-VATS has become a primary and standard procedure for pulmonary resection in certain Southeast Asian and European countries. It is employed by experienced surgeons to complete more complex procedures such as bronchial sleeves, vascular reconstruction, carinal resection, and even a range of non-intubated techniques (6).

In Japan, only 7.5% of the lung cancer surgeries were performed using VATS in 1998, but its use has been continuously increasing, and 73.0% of lung cancer surgeries were performed using VATS in 2017 (7). However, most of procedures are performed using M-VATS in Japan because of the lack of sufficient evidence to prove the superiority of U-VATS to M-VATS. Numajiri and colleagues reported their experiences of U-VATS segmentectomy and compared it with their early experiences of H/M VATS in this issue of the journal (1).

Currently, because of radiologic technologies such as thin-slice computed tomography (CT), small nodules are likely to be detected by chest CT (3,8). Sublobar resection has been performed for the diagnosis and treatment of these nodules. Furthermore, segmentectomy has widely been performed instead of lobectomy for peripheral small-sized non-small cell lung cancer (9). It is worth noting that a phase III randomized trial, Japan Clinical Oncology Group (JCOG) 0802/West Japan Clinical Oncology Group (WJOG) 4607L (JCOG0802/WJOG4607L), reported that patients benefit more from segmentectomy than lobectomy in terms of overall survival (10). Therefore, the use of pulmonary segmentectomy for small-sized non-small cell lung cancer would be expected to increase in the near future.

Multi-detector CT able to construct three-dimensional (3D) images has been developed and refined for its clinical use over time in the field of thoracic surgery (3). 3D images of the pulmonary vessels and the tracheobronchial tree have been widely used for preoperative and intraoperative surgical simulation as well as postoperative evaluation (8,11,12). Preoperative and intraoperative simulation using 3D images helps both inexperienced thoracic surgeons and even experts in performing a safe and accurate VATS segmentectomy. In recent years, a novel simulation system called resection process map has been developed, which generates dynamic images based on patient-specific CT data and reflects the intraoperative deformation of the lung

(13,14). These technological advances have contributed to the development of thoracic surgery in various aspects.

As Numajiri and colleagues mentioned in their discussion, there are a few important limitations to this study. Among them, several questions can be posed for future studies. Since U-VATS was introduced after the H/M VATS, we should consider the potential existence of the learning curve. Thus, in this institution, U-VATS was performed by experienced thoracic surgeons who could already perform H/M VATS, which should be considered when interpreting the results of this study. Furthermore, U-VATS is technique sensitive; however, it was associated with a significantly shorter operating time, postoperative drainage days, and postoperative hospital stays than in H/M VATS in the study. Nevertheless, the reason for this association was not discussed in detail in the discussion section.

Robot-assisted thoracic surgery (RATS) is also a minimally invasive technique. In Japan, RATS was first covered by government insurance for malignant pulmonary and mediastinal tumors in 2018 and its indication has since expanded to include segmentectomy for malignant pulmonary tumors. Nowadays, many thoracic surgeons have tended to use RATS as a minimally invasive method because a surgical robot supplements the disadvantages of conventional endoscopic surgery, such as markedly free movement of joint-equipped robotic forceps (3). There are various studies comparing RATS and VATS in terms of their safety and efficacy (15,16), but many thoracic surgeons believe that uniportal RATS could be the next promising procedure in thoracic surgery.

Lastly, Numajiri and colleagues are to be congratulated on their excellent clinical research about the recent successful transition from hybrid to M-VATS and subsequently to U-VATS in their institution. They also showed that U-VATS segmentectomy was performed without significant perioperative issues, including postoperative complication rates, even in cases requiring complex segmentectomy.

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