Editorial

Video-assisted thoracoscopic lobectomy for the right side using a single-direction approach

Katsuhiro Okuda, Hiroshi Haneda, Keisuke Yokota, Tsutomu Tatematsu, Ryoichi Nakanishi

Department of Oncology, Immunology and Surgery, Nagoya City University Graduate School of Medical Sciences, Nagoya, Japan

Correspondence to: Katsuhiro Okuda, MD, PhD. Department of Oncology, Immunology and Surgery, Nagoya City University Graduate School of Medical Science, 1 Kawasumi, Mizuho-cho, Mizuho-ku, Nagoya 467-8601, Japan. Email: kokuda@med.nagoya-cu.ac.jp.

Comment on: Liao H, Liu C, Mei J, *et al.* Single-direction thoracoscopic lobectomy: right side. J Thorac Dis 2018;10:5935-8.

Submitted Jan 03, 2019. Accepted for publication Jan 03, 2019.
doi: 10.21037/jtd.2019.01.08
View this article at: http://dx.doi.org/10.21037/jtd.2019.01.08

In order to conduct safe, curative, and minimally invasive surgery for the treatment of lung cancer, thoracic surgeons have developed various approaches, including the single-port method, the multi-port method, and anterior and posterior approaches to reduce the rate of postoperative complications. Preoperative computed tomography (CT) is used to provide an understanding of the individual anatomy of each patient, especially the pulmonary artery, pulmonary vein and bronchi, and is an essential part of the safety management performed by a surgical team. The standardization of surgery is also desirable from the viewpoint of the operation time and safety management.

Traditional (classic) lobectomy is performed by dissection of the fissure followed by separation of the pulmonary artery. The pulmonary artery is exposed at the fissure by electrocautery, or blunt or sharp dissection (1). Patients with fused fissures who undergo this traditional approach sometimes suffer from postoperative air leakage (2,3). Gómez-Caro *et al.* reported that a fissureless technique by open thoracotomy appeared to be a superior approach for fused fissures, as it prevented persistent air leak and reduced the length of hospitalization (2). Regarding the fissureless approach by video-assisted thoracic surgery (VATS) lobectomy, Lin *et al.* reported a case in which VATS was performed for right lower lobectomy and concluded that it was especially feasible for patients with a poorly developed pulmonary fissure (4). Liao *et al.* reported the usefulness of single-direction thoracoscopic right lung lobectomy, including right upper, middle, and lower lobectomy (5). Several methods and techniques are used for VATS lobectomy. Two main approaches are applied in lobectomy: "transfissure" and "fissureless" techniques. The standardization of surgical procedures is important; however, since each surgical method has advantages and disadvantages, it should be possible to perform a surgical technique from various directions without being restricted to a single-direction surgical procedure.

Regarding the methods used for the treatment of incomplete or fused fissures, Decaluwe *et al.* reported on the use of a thoracoscopic tunnel technique for lobectomy (6). They made a tunnel between the bronchovascular structures and parenchyma, anteriorly to posteriorly, and opened the fissure completely with staplers at an early stage of lobectomy. This technique opens the fissure earlier in the operation and provides a superior thoracoscopic view of the hilar structures, while the use of staplers alone to divide the parenchyma avoids air leak. Although the risk of erroneous dissection, such as dissection of the pulmonary arterial branch, would be reduced, vascular injuries that occur at the time of tunneling are considered difficult to manage.

Regardless of whether thoracotomy or VATS is performed, it is safer to peel and secure the pulmonary artery first to reduce the fetal bleeding. For patients with a separated fissure, VATS lobectomy can be performed without the risk of dissecting incorrect blood vessels or bronchus in a wide field of view. It is necessary to change the surgical field during surgery; however, if we can confirm the interlobar pulmonary artery, traditional techniques would be safer than other surgical methods.

The operation field of the single-direction approach is narrow and deeper. Thus, when accidental bleeding from the pulmonary artery occurs, hemostasis can be difficult

to achieve because the pulmonary artery can only be approached from a single direction. The existence of the pulmonary artery on the dorsal side must be kept in mind when we peel the pulmonary vein and bronchus. Especially in advanced cases, since congestion of the lung progresses when the pulmonary vein is cut first, it is necessary to confirm whether there is any extra-nodal infiltration of the lymph nodes and to be able to encircle and cut the pulmonary artery without taking too much time. As the congestion of the lung progresses, the operation field under thoracoscopy is restricted, and it becomes difficult to separate the fissure. It will be necessary to expand the wound to just remove the lung outside. Thus, the pulmonary artery should be treated as soon after pulmonary vein dissection as possible.

In single-direction thoracoscopic lobectomy, each lobe requires specific considerations. In right upper lobectomy, it is necessary to avoid damaging the posterior ascending artery when treating the superior pulmonary vein. Furthermore, we must be careful not to mistakenly cut or damage segment 6 or the middle lobe artery because the operation is performed with a field of view in single-direction without confirming the interlobar pulmonary artery brunch.

In right middle lobectomy, it is important to avoid damaging the interlobar pulmonary artery, especially the middle lobe artery, when treating the middle lobe pulmonary vein. If the interlobar pulmonary artery is damaged in single-direction thoracoscopic lobectomy, hemostasis is extremely difficult to achieve under VATS due to the limited narrow field of view. The middle lobe bronchus and middle lobe artery often run in parallel and it is necessary to pay careful attention to avoid damaging the pulmonary artery, even during the treatment of the middle lobe bronchus.

In right lower lobectomy, it is necessary to remove the pulmonary parenchyma to the head side during treatment of the inferior pulmonary vein. Since treatment is performed with a view of the distal side, we must be careful not to cut the middle lobe bronchus off at the center and must avoid handling the bronchus in the periphery of segment 6. Of course, care must be taken to avoid damaging the interlobar pulmonary artery during treatment of inferior bronchus.

At our institute, we regularly try to confirm the interlobar pulmonary artery first and to secure the pulmonary artery so that we can cut them at any time. We then peel off the pulmonary vein and cut it, followed by the pulmonary artery. If it is difficult to confirm the interlobar pulmonary artery because of a poorly developed pulmonary fissure, we change to the hilum-first approach.

Single-direction thoracoscopic lobectomy is a useful surgical method, especially for heavy smokers and patients with pulmonary emphysema who are likely to have postoperative air leakage. CT may aid in identifying patients with a high risk of postoperative air leakage (7). However, in lobectomy it is important to understand the anatomy in multiple directions and to master various surgical techniques, so that they can be flexibly applied according to the patient, as Abdelsattar *et al.* described (8). In all cases, imaging should be confirmed preoperatively, and the actual anatomical structure should be recognized during surgery. This will facilitate the performance of safe ad optimal surgery.

Acknowledgements

None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

References

1. Temes RT, Willms CD, Endara SA, et al. Fissureless lobectomy. Ann Thorac Surg 1998;65:282-4.
2. Gómez-Caro A, Calvo MJ, Lanzas JT, et al. The approach of fused fissures with fissureless technique decreases the incidence of persistent air leak after lobectomy. Eur J Cardiothorac Surg 2007;31:203-8.
3. Nomori H, Ohtsuka T, Horio H, et al. Thoracoscopic lobectomy for lung cancer with a largely fused fissure. Chest 2003;123:619-22.
4. Lin XM, Yang Y, Chi C, et al. Video-assisted thoracoscopic lobectomy: single-direction thoracoscopic lobectomy. J Thorac Dis 2013;5:716-20.
5. Liao H, Liu C, Mei J, et al. Single-direction thoracoscopic lobectomy: right side. J Thorac Dis 2018;10:5935-8.
6. Decaluwe H, Sokolow Y, Derych F, et al. Thoracoscopic tunnel technique for anatomical lung resections: a 'fissure first, hilum last' approach with staplers in the fissureless patient. Interact Cardiovasc Thorac Surg 2015;21:2-7.
7. Ueda K, Kaneda Y, Sudo M, et al. Quantitative computed

tomography versus spirometry in predicting air leak duration after major lung resection for cancer. Ann Thorac Surg 2005;80:1853-8.

8. Abdelsattar ZM, Blackmon SH. Video-assisted thoracoscopic surgery lobectomy: pulled in many directions. J Thorac Dis 2019;11:29.

Cite this article as: Okuda K, Haneda H, Yokota K, Tatematsu T, Nakanishi R. Video-assisted thoracoscopic lobectomy for the right side using a single-direction approach. J Thorac Dis 2019;11(1):65-67. doi: 10.21037/jtd.2019.01.08