The application of a single-direction strategy in VATS segmentectomy: left S3 segmentectomy

Yunke Zhu, Jiandong Mei, Lunxu Liu

Department of Thoracic Surgery, West China Hospital, Sichuan University, Chengdu 610041, China

Correspondence to: Lunxu Liu, MD, PhD, FRCS. Department of Thoracic Surgery, West China Hospital, Sichuan University, No. 37, Guoxue Alley, Chengdu 610041, China. Email: lunxu_liu@aliyun.com.

Abstract: A video-assisted thoracoscopic surgery (VATS) segmentectomy is a technical challenge. This is due to the sophisticated anatomical variations in the segmental bronchus and vessels as well as an obscure surgical demarcation(s). For some, a segmentectomy procedure can be regarded as a lobectomy in the situations of the absence of lung fissures. Thus, the strategy of single-direction VATS lobectomy was applied in our VATS segmentectomy practice. After the introduction of this strategy, we presented the single-direction VATS left S3 segmentectomy as an example to introduce the technical characteristics of the single-direction segmentectomy.

Keywords: Video-assisted thoracoscopic surgery (VATS); segmentectomy; single direction

Submitted Sep 07, 2018. Accepted for publication Sep 21, 2018.
doi: 10.21037/atm.2018.09.64
View this article at: http://dx.doi.org/10.21037/atm.2018.09.64

Introduction

When compared with a lobectomy, a segmentectomy has been associated with the advantages of preserving the pulmonary functions (1) as well as having equivalent oncologic outcomes in the early stages of non-small cell lung cancer (NSCLC) (2-4). It has also been frequently used for stage IA NSCLC patients, as well as patients who are not lobectomy candidates. Due to the newer developments for a video-assisted thoracoscopic surgery (VATS) in the past few decades, thoracoscopic segmentectomy has become a safe and effective surgical approach. However, given that there are sophisticated anatomical variations in the segmental bronchus and vessels between the patients and obscure surgical demarcation, thoracoscopic segmentectomy is still a technical challenge. Consider that from others' point of view, a segmentectomy can be regarded as a lobectomy in the situation of an absence of lung fissures. The strategy of a single-direction VATS lobectomy, which overcomes the difficulty in the manipulation of a hypoplastic lung fissure (5), was applied in our VATS segmentectomy practice. This paper presented the single-direction VATS left S3 segmentectomy using a video demonstration (*Figure 1*).

Operative techniques

The operation was performed using a general anesthesia and a double-lumen intubation. The patient was placed in a full lateral decubitus position. A 30° thoracoscope was placed at the 7th intercostal space (ICS) at the midaxillary line. The other two surgical ports were made in the 3rd (utility incision) and 9th ICS (assistant thoracoport) on the anterior axillary line and behind the posterior axillary line with the lengths of 2.5 and 2 cm, respectively.

The tumor location was confirmed by a finger palpation, and marked with a suture. The right upper lung lobe was gripped and tucked dorsally by an endoscopic ring clamp, which was introduced through the assistant thoracoport. First, we opened the front of the left hilus to isolate the branches of the left superior pulmonary vein. After that, there was a careful identification process of the pulmonary venous tributary to the left upper lobe, the intrasegmental vein (V3b+c) was ligated and divided, and the intersegmental vein (V3a) was preserved. Then the intrapulmonary lymph nodes near the pulmonary trunk was dissected, and sent for a frozen section test. Then, the anterior segmental pulmonary artery was exposed and

Figure 1 In this video, we performed a single-direction VATS left S3 segmentectomy. The target structures were transected in sequence. The most superficial segmental veins were dissected and transected first, followed by the deep artery and deeper bronchi, and the intersegmental plane was treated last (6). VATS, video-assisted thoracoscopic surgery.

Available online: http://www.asvide.com/article/view/27910

ligated. In this step, we should pay attention to the arterial variations of the mediastinal lingual artery. The trisegmental bronchus was exposed. We divided the anterior segmental bronchus with an endo stapler, sparing the apicoposterior segmental bronchus. After the gentle reventilation, which was performed for the demarcation of the intersegmental plane between the resected and preserved segments, the left anterior segment was identified and divided along the plane with endo staplers. The resected specimen was then wrapped into a glove, and retrieved through the utility incision. A lobe-specific lymph node dissection was performed after the diagnosis of adenocarcinoma was confirmed.

Comments

This VATS left S3 segmentectomy was proceeded progressively in a single direction from a superficial to a deep structure, in which the target structures were transected in a sequence. The most superficial segmental veins were then dissected and transected first, then the same with the deep artery and deeper bronchi, and finally moved onto the intersegmental plane. We were able to complete the segmentectomy in the same manner as a lobectomy through the single-direction strategy. This approach not only enabled us to avoid turning over the pulmonary lobe repeatedly, but it also enabled us to manipulate the invisible intersegmental plane.

It is necessary to recognize the targeted vessels and segmental bronchus preoperatively according to the images of the high resolution computed tomography (CT) or three-dimensional computed tomography bronchography and angiography (3D-CTBA) scans. Intraoperative we should follow the principles of reserving uncertain veins, especially the intersegmental veins. For the identification of the segmental bronchus, clamping it and inflating the lobe before a transection procedure, it is a common method for confirming the accuracy of the targeted bronchus, versus the segmental arteries, which are usually accompanied by the segmental bronchi. Moreover, we need to be vigilant about the arterial variation of the mediastinal lingual artery when performing left upper segmentectomy. Meanwhile, identifying the intersegmental plane is another challenge which is encountered in a VATS segmentectomy. Except in preoperative CT reconstruction and intraoperative reventilation of the lung, the root of the preserved intersegmental veins is often used as a landmark for the identification of the intersegmental plane. In addition, ensuring a safe surgical margin of the tumor is mandatory. Sometimes it has to encompass some parenchyma of the adjacent segment to ensure a resection margin that is at least equivalent to the diameter of the tumor.

In summary, the VATS left S3 segmentectomy could be performed successfully using the single-direction strategy.

Acknowledgements

Funding: This study was supported by the Key Science and Technology Program of Sichuan Province, People's Republic of China (2016FZ0118 to Dr. L Liu).

Footnote

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

Informed Consent: Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images.

References

1. Wisnivesky JP, Henschke CI, Swanson S, et al. Limited resection for the treatment of patients with stage IA lung cancer. Ann Surg 2010;251:550-4.
2. Okada M, Koike T, Higashiyama M, et al. Radical

sublobar resection for small-sized non-small cell lung cancer: a multicenter study. J Thorac Cardiovasc Surg 2006;132:769-75.
3. Shapiro M, Weiser TS, Wisnivesky JP, et al. Thoracoscopic segmentectomy compares favorably with thoracoscopic lobectomy for patients with small stage I lung cancer. J Thorac Cardiovasc Surg 2009;137:1388-93.
4. Koike T, Yamato Y, Yoshiya K, et al. Intentional limited pulmonary resection for peripheral T1 N0 M0 small-sized lung cancer. J Thorac Cardiovasc Surg 2003;125:924-8.
5. Liu L, Che G, Pu Q, et al. A new concept of endoscopic lung cancer resection: Single-direction thoracoscopic lobectomy. Surg Oncol 2010;19:e71-7.
6. Zhu Y, Mei J, Liu L. In this video, we performed a single-direction VATS left S3 segmentectomy. The target structures were transected in sequence. The most superficial segmental veins were dissected and transected first, followed by the deep artery and deeper bronchi, and the intersegmental plane was treated last. Asvide 2018;5:824. Available online: http://www.asvide.com/article/view/27910

(English Language Editor: Jeremy Dean Chapnick, AME Publishing Company)

Cite this article as: Zhu Y, Mei J, Liu L. The application of a single-direction strategy in VATS segmentectomy: left S3 segmentectomy. Ann Transl Med 2018;6(20):410. doi: 10.21037/atm.2018.09.64

