

# Video-assisted thoracoscopic segmentectomy of lingual segment of the left upper pulmonary lobe for chronic focal bronchiectasis

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**Abstract:** A 46-year-old male patient was admitted into the hospital due to repeated hemoptysis for more than seven months. Bronchiectasis of the left upper lobe was considered based on the symptoms, signs, and imaging findings. Thoracoscopic resection of lingual segment of the left upper pulmonary lobe was finally performed in the order of the lingual segmental vein, the lingual segmental bronchus, the lingual segmental artery, and the pulmonary tissues of the lingual segment. Total surgery time was 60 min and blood loss was 40 mL. The chest tube was removed on the 4th postoperative day. The patient was discharged home on the 8<sup>th</sup> postoperative day.

**Keywords:** Video-assisted thoracic surgery; segmentectomy; bronchiectasis

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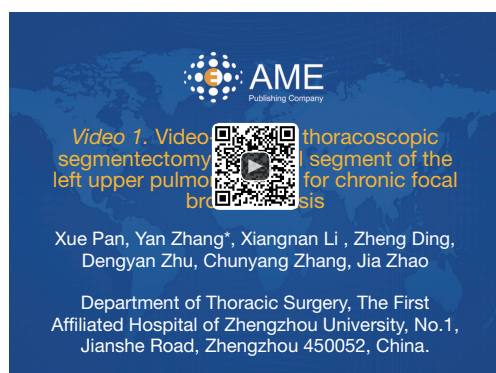
## Introduction

Video-assisted thoracoscopic segmentectomy is excision of one or more bronchopulmonary segments, with ligation and division of the bronchi and vessels serving those segments (1). Thoracoscopic segmentectomy has become established surgical techniques for the treatment of early stage lung cancer (2). Numerous reports have documented the safety and efficacy of a thoracoscopic approach, with equivalent oncologic outcomes compared with open thoracotomy (3). Less morbidity, better functional status, and the improved ability to deliver subsequent medical therapy have all been reported with minimally invasive procedures (4). In addition, shorter hospital stays and possible cost savings have also been associated with thoracoscopic techniques. Despite these advantages, much less is known about the use of these techniques in the setting of benign lung disease, and specifically infectious lung disease (5). In theory, patients with focal bronchiectasis that meet indications for surgical resection would be excellent candidates for a minimally invasive approach. In this video (*Figure 1*), we will present our operative techniques of video-assisted thoracoscopic

left upper lingual segmentectomy for the treatment of a 46-year-old male patient with chronic focal bronchiectasis.

## Case presentation

The 46-year-old male patient was admitted into the hospital due to repeated hemoptysis for more than seven months. The patient began to cough up blood about 7 months ago. The blood was bright red in color, and the patient spit about 5 times during each attack. He spit up fresh blood 10 days ago and received anti-inflammatory and hemostasis treatment in a local hospital. At the local hospital before admission, he underwent high-resolution computed tomography of the chest to assess the extent of the parenchymal lung disease. The computed tomography revealed that the lingular bronchus of left upper lobe showed cystic and cylindrical dilatation, along with thickened walls and patchy intensities were visible around it. Then, he visited our hospital for further management. Auscultation revealed slightly harsh breath sounds in the left upper lung field. However, no dry or wet rales or pleural friction rubs were heard. No other positive sign



**Figure 1** Video-assisted thoroscopic segmentectomy of lingual segment of the left upper pulmonary lobe for chronic focal bronchiectasis (6).

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was detected. The results of the laboratory investigations, including a complete blood count, liver and renal function tests and coagulation studies, were within the normal range. Pulmonary function tests showed that percentage of predicted vital capacity was 86%, and the percentage of predicted forced expiratory volume in 1 second was 79.1%. Bronchoscopy was performed, primarily for diagnostic purposes and to rule out concomitant endobronchial disease. The bronchoscopy did not show visible lesions. So, bronchiectasis of the left upper lobe was considered based on the symptoms, signs, and imaging findings. The symptoms were remarkably alleviated after medical treatment. However, a clear lesion persisted and was confined to the lingular bronchus.

Considering preoperative auxiliary examinations, thoroscopic resection of lingual segment of the left upper pulmonary lobe was finally performed in the order of the lingual segmental vein, the lingual segmental bronchus, the lingual segmental artery, and the pulmonary tissues of the lingual segment.

### Surgical technique

The patient was positioned in the right lateral decubitus position with the bed flexed to increase the intercostal space. Under combined intravenous general anesthesia, double-lumen endotracheal intubation and contralateral one-lung ventilation were performed. Double-lumen endotracheal intubation was essential for smooth thoroscopic surgery. The lung tissue at the operating side should be fully collapsed so that the surgery could be successfully

performed. An incision of about 1.5 cm was made as the thoroscopic observation hole in the 7<sup>th</sup> intercostal space of the median axillary line. Then, an incision of about 2.0 cm was made as the main operation hole in the 4<sup>th</sup> intercostal space on the left anterior axillary line. Finally, an incision of about 1.5 cm was made as the auxiliary operation role in the 9<sup>th</sup> intercostal space on the left posterior axillary line. The surgeon stood at the ventral side of the patient and performed the surgery with a thoracoscopy device under the monitor.

The anterior mediastinal pleura was cut open to dissociate the lingular branch of the upper lobe pulmonary vein. Lingual segmental vein was the most subordinate branch of the left superior pulmonary vein. Pulled back the pulmonary lobes, exposed the lingual segmental vein, freed it, and cut it off with a vascular (white cartridge) 60 mm long endostapler (ECR60W, JJMC, USA). Then, cut open the oblique fissure to dissociate the lingular branch of the upper lobe pulmonary bronchus. Lingual segmental bronchus started from the bronchial bifurcation of the upper pulmonary lobe. Freed the lingual segmental bronchus, then clamped it with a thick tissular (green cartridge) 60 mm long endostapler (ECR60G, JJMC, USA). An anesthesiologist was asked to suction sputum and ventilate the operated lung. After the proper segments of the upper lobe were found to be well ventilated, the lingular segmental bronchus was dissected. Lingual segmental truncus arteriosus mainly supplied the blood for the lingual segment, which was the most anterior branches of the posterior lingual segmental artery. Lingual segmental artery started from the front side of the pulmonary artery in the pulmonary fissure, and divided into two pulmonary segmental branches. During the surgery, the frontal segment of the oblique fissure was first opened, the start of the lingual segmental artery was found, then the oblique fissure was opened to the hilum of the lung, the trunk of the pulmonary artery between the lobes was exposed, the vascular sheath was opened and the lingual segmental artery was clamped with hem-o-lok clip applicators and cut off with the Harmonic scalpel. Finally, the inter-segmental gap was separated using a tissular (golden cartridge) 60 mm long endostapler (ECR60D, JJMC, USA) and three standard tissular (blue cartridge) 60 mm long endostaplers (ECR60B, JJMC, USA), and thus the lingual segment was removed. A specimen bag was inserted via the auxiliary port to harvest the specimen. Washed the thoracic cavity and the residual lungs were well dilated, without air leakage. One 26F chest tube was placed, and the incisions were closed. Total surgery

time was 60 min and blood loss was 40 mL. The chest tube was removed on the 4th postoperative day. The patient was discharged home on the 8<sup>th</sup> postoperative day.

## Discussion

Video-assisted thoracoscopic segmentectomy is currently one of the most minimally invasive lung surgeries. However, it remains to be established whether segmentectomy is an appropriate procedure for patients who can tolerate lobectomy. The potential advantage of segmentectomy compared with lobectomy is the preservation of pulmonary function (7). The procedure also has some drawbacks: it is technically demanding, and it is difficult to comprehend the anatomical relations among the bronchus, pulmonary arteries and pulmonary veins (5). In our surgery, surgeons should familiarize with the three-dimensional relationships among bronchus, artery and vein, and pay particular attention to the arterial anatomic variations, of which the most common variation is that two corresponding arteries supply blood to the same pulmonary segment. Therefore, we should pay attention to whether there is another variant arterial branch when pulmonary segmental arteries are dissected. The most reliable way of determining pulmonary segmental variation is to determine the bronchus of appropriate pulmonary segment because pulmonary segmental bronchus seldom has variation (2).

Achieving anatomical segmental resection requires a deep knowledge of the bronchovascular structure. In addition, identification of the intersegmental plane in peripheral lung parenchyma is important for segmental resection. It is important issue which remained segments are inflated for the identification of the intersegmental plane. Differential inflation of segments to be retained has been performed to help demarcate the diseased segment.

In this case, sequential dissection was applied to avoid frequent turn-over of the lung lobes and shift of visual angle during the procedures. The Harmonic scalpel or the electric hook used in this surgery enables careful dissection and dissociation, with clear visual field and small blood loss.

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## Footnote

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

## References

1. Leshnower BG, Miller DL, Fernandez FG, et al. Video-assisted thoracoscopic surgery segmentectomy: a safe and effective procedure. *Ann Thorac Surg* 2010;89:1571-6.
2. Zhong C, Fang W, Mao T, et al. Comparison of thoracoscopic segmentectomy and thoracoscopic lobectomy for small-sized stage IA lung cancer. *Ann Thorac Surg* 2012;94:362-7.
3. Linden D, Linden K, Oparka J. In patients with resectable non-small-cell lung cancer, is video-assisted thoracoscopic segmentectomy a suitable alternative to thoracotomy and segmentectomy in terms of morbidity and equivalence of resection? *Interact Cardiovasc Thorac Surg* 2014;19:107-10.
4. Fan J, Chang Z, Ye C, et al. Video-assisted thoracoscopic superior segmentectomy of the right lower lobe. *J Thorac Dis* 2013;5 Suppl 3:S287-8.
5. Mitchell JD, Yu JA, Bishop A, et al. Thoracoscopic lobectomy and segmentectomy for infectious lung disease. *Ann Thorac Surg* 2012;93:1033-9; discussion 1039-40.
6. Pan X, Zhang Y, Li X, et al. Video-assisted thoracoscopic segmentectomy of lingual segment of the left upper pulmonary lobe for chronic focal bronchiectasis. *Asvide* 2016;3:162. Available online: <http://www.asvide.com/articles/928>
7. Ma L, Liu C, Liu L. Video-assisted thoracoscopic surgery right upper posterior segmentectomy with systemic mediastinal lymph node dissection. *J Thorac Dis* 2014;6:1819-21.

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