

# Uniportal video-assisted thoracic surgery for left upper lobe: single-direction lobectomy with systematic lymphadenectomy

Mingxiang Feng, Miao Lin, Yaxin Shen, Hao Wang

Department of Thoracic Surgery, Zhongshan Hospital of Fudan University, Shanghai 200032, China

Correspondence to: Mingxiang Feng, MD. Department of Thoracic Surgery, Zhongshan Hospital of Fudan University, 180 Fenglin Road, Shanghai 200032, China. Email: feng.mingxiang@zs-hospital.sh.cn.

**Abstract:** A 62-year-old female was admitted to our hospital after computed tomography (CT) revealed a 2.5 cm × 2.1 cm mass in the left upper lobe. PET/CT scan diagnosed as malignant lesion with no signs of metastasis. Under general anesthesia, the patient was placed in right lateral decubitus position. A 4cm incision was made in the 4th intercostal space with plastic protector. The camera was placed in the upper part of the incision and the instruments were inserted below the camera. Left upper lobectomy along with systematic lymphadenectomy was performed. Total surgical time was 135 min and estimated blood loss was 70 mL. The chest tube was removed on the 2nd postoperative day and the patient was discharged on the 3rd postoperative day with no complication. This uniportal VATS single-direction lobectomy for the left upper lobe is feasible and amplifies the concept of thoracotomy-like minimally invasive surgery.

**Keywords:** Uniportal; lobectomy; systemic lymphadenectomy; ground glass opacity (GGO); lung cancer

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## Introduction

Since the first uniportal thoracoscopic wedge pulmonary resection was reported by Rocco in 2004 (1), this approach has been successfully used for pleural biopsy (2), pneumothorax (3), segmentectomy (4) and eventually lobectomy (5). With the accumulated experience reported by multiple centers (6,7), the safety and feasibility of the uniportal video-assisted thoracic surgery (VATS) major lung resection has been widely accepted. We performed uniportal VATS lobectomy since 2013 (8), until now we have accumulated more than 100 cases of uniportal VATS major lung resection. To further take advantage of a thoracotomy-like surgical vision of uniportal VATS, we combined the concept of single-direction thoracoscopic lobectomy (9) to achieve a thoracotomy-like operation of lobectomy. Here we present the primary case of uniportal VATS single-direction lobectomy with systematic lymphadenectomy.

## Clinical data

A 62-year-old female presented with an incidental finding

of a left upper lobe nodule on chest computed tomography (CT), a history of hypertension was reported. The CT scan showed a 2.5 cm × 2.1 cm mixed ground glass opacity (GGO). PET/CT scan indicated a malignant lesion with no signs of metastasis. The clinical diagnosis of this patient was Stage I primary lung cancer. There was no contraindication on the preoperative examination. Uniportal VATS single-direction left upper lobectomy was performed. The intraoperative frozen section confirmed as adenocarcinoma. Then systemic lymphadenectomy was performed. The total operative time was 135 min, and blood loss was about 70 mL. The chest tube was removed on the 2<sup>nd</sup> postoperative day and the patient was discharged on the 3<sup>rd</sup> postoperative day with no complication.

## Operative techniques

The patient received a combination of epidural and general anesthesia. Double lumen endotracheal intubation was achieved for single lung ventilation during the operation. The patient was placed in right lateral decubitus position.



**Figure 1** Uniportal VATS left upper lobectomy and systematic lymphadenectomy (10). VATS, video-assisted thoracic surgery. Available online: <http://www.asvide.com/articles/1112>

The surgeon and camera-holder stood on patient's abdominal side and the assistant stood on the opposite side. Usually the camera-holder stood on a foot-stool in terms of ergonomics (8). A 4 cm incision was made along the 4<sup>th</sup> intercostal space between anterior and median axillary line. A plastic protector was used. The high definition 30-degree 10 mm thoracoscope was placed in upper part of the incision and the instruments were inserted below the camera (*Figure 1*).

The surgeon held a Curved Suction with left hand and an Electrocautery Hook or Harmonic Shear with the right. The assistant pushed the left upper lobe backwards. After exploring the left thoracic cavity, the mediastinal pleural was cut open from hilum to the carina. After dissecting part of 5<sup>th</sup> station lymph nodes (LNs) above the pulmonary artery, the anterior segmental artery was exposed and divided with Endo-stapler firstly. Then it was easy to divide the superior pulmonary vein with improved firing angle for Endo-stapler. Once the recurrent branch from left main pulmonary artery was divided, the left upper bronchus was transected with Endo-stapler. Then the posterior and lingular segmental artery was dissected together with one stapler. The last step of the lobectomy was transecting the fissure, followed by removing specimen with a protective bag.

Systematic mediastinal LN dissection was performed with removal of Station 4L, 5, 7, 8 and 9. While dissecting the 4<sup>th</sup> station LN, we exposed the left recurrent laryngeal nerve for further protection. With the help of Curved Suction and Oval Clamp to expose the left lateral wall of lower trachea, the 4L station LN was resected. While the lower lobe was pushed forward by the assistant, the inferior pulmonary ligation was divided and the station 8

and 9 LN was dissected. With the help of a traction belt along the inferior pulmonary vein, the station 7 LN was en bloc dissected, and bilateral main bronchus were exposed. After air leak checking, a 28-F chest tube was placed in the posterior part of the incision.

Total surgical time was 135 min and estimated blood loss was 70 mL. The chest tube was removed on the 2<sup>nd</sup> postoperative day and the patient was discharged on the 3<sup>rd</sup> postoperative day with no complication.

## Comments

Uniportal VATS major lung resection was firstly reported five years ago (5). With the increased experience of lower lobectomy, Gonzalez *et al.*, managed to perform a uniportal VATS left upper lobectomy. Until then, there have been booming reports on this technique, mainly focused on two aspects, which are complex sleeve lobectomy (11-13) and perioperative advantages (7,8,14). This case, however, attempted to refine this technique for left upper lobectomy.

After considerable reserve of multi-port VATS experience, we first introduced uniportal VATS lobectomy into our practice in 2013. In the primary stage, it has been difficult to switch from four ports VATS directly to uniportal VATS lobectomy. We gradually introduced several technical refinements to facilitate this procedure. Initially, new surgical instruments were invented, including a tiny curved suction and a long double joint forceps with angle. These instruments enabled better mobilization with less movement. Secondly, we also use plastic wound protector during the operation. This protector kept the wound from iatrogenic contamination and excessive extension, which may lead to less postoperative pain. And more importantly, the press from protector controlled wound effusion dripping down the camera, which allowed continuity of the operation. At last, with the advantage of thoracotomy-like surgical vision of uniportal VATS lobectomy, this approach has become a routine procedure in our team (8).

Generally, left upper lobe lobectomy is a more complicated procedure for multi-port VATS compared with lower lobectomy. In this case, however, uniportal VATS technique reverse the difficulty with the advantage of thoracotomy-like vision. And given the fact that most thoracic surgeons have more experience in thoracotomy than in VATS, this anterolateral incision allowed the single-direction lobectomy, which amplified the concept of thoracotomy-like procedure and achieved less invasive procedure simultaneously. Additionally, the initial stage

would be different from multi-ports VATS left upper lobectomy, as the upper pulmonary vein was usually dissected first. In the uniportal VATS single-direction lobectomy, however, it was difficult and dangerous to place the Endo-stapler through the superior pulmonary vein firstly.

In conclusion, this uniportal VATS single-direction lobectomy for the left upper lobe is feasible and amplifies the concept of thoracotomy-like minimally invasive surgery. This combination gives VATS surgeons an alternative option for left upper lobectomy and increases open thoracic surgeons' confidence of switching to VATS.

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### Footnote

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

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