A novel technique for pulmonary artery retraction during uniportal video-assisted bronchial sleeve lobectomy of left upper lobe

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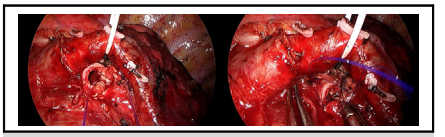


During the anastomosis, the bronchial structures are well exposed.

CENTRAL MESSAGE

The method of pulmonary artery retraction with a central venous catheter during the uniportal VATS left upper lobe sleeve lobectomy is an easy, safe, and effective method.

Video clip is available online.

With the development of the technique of video-assisted thoracic surgery (VATS) and the advances in instrumentation, sleeve lobectomy via VATS has been widely accepted as a reliable and safe procedure to allow complete resection of locally advanced lung carcinoma, which offers better short-term recovery outcomes and equal long-term survival outcomes than pneumonectomy.[1,2] The minimally invasive sleeve lobectomy may improved the survival outcomes compared with conventional thoracotomy.[3] Uniportal VATS is an optional procedure for minimally invasive thoracic surgery, especially for complicated procedures, such as sleeve lobectomy for central lesions of the lung.[4]

However, during bronchial sleeve lobectomy of left upper lobe, the left main pulmonary artery compromises exposure of bronchial structures, which causes obstacles for anastomosis. We developed a safe and effective method for pulmonary retraction for the anastomosis during uniportal VATS bronchial sleeve lobectomy of left upper lobe. The study was reviewed and approved by the ethics committee of Shanghai Pulmonary Hospital (K22-209, June 16, 2022). The need for informed consent was waived by the institutional review board.

SURGICAL TECHNIQUE

With double-lumen tube intubation, the patient was placed in a lateral position with a foam pad rolled under the chest. After a 3-cm incision in the fourth intercostal space between the anterior and middle axillary line was made, an incision protector was placed in the wound for retracting soft tissue.

After exploration of the pleural cavity, hilum exposure was achieved to perform the dissection of superior pulmonary vein and anterior pulmonary trunk. An endoscopic linear stapler (Covidien) or ligating clip (0301-03 ML, Click'aV; Grena) was used to divided the branches of the pulmonary artery and pulmonary veins. The left main bronchus and bronchus of lower lobe were opened with scissors. The specimen was removed within a bag to avoid contamination. Proximal and distal section of bronchus was performed, and specimen was sent for frozen section analysis. Systematic lymphadenectomy of the stations 5, 6, 7, 8, 9, and 10 was performed.

Left main pulmonary artery was dissected for further management. A central venous catheter (ARROW, CS-24706-E,14GA; Teleflex Medical) was inserted into the thoracic cavity through the fourth intercostal space with the guidance of the guidewire (Figure 1, *A*). After the catheter was placed around the pulmonary artery trunk (Figure 1, *B*), a ligating clip (0301-03 ML; Grena) was

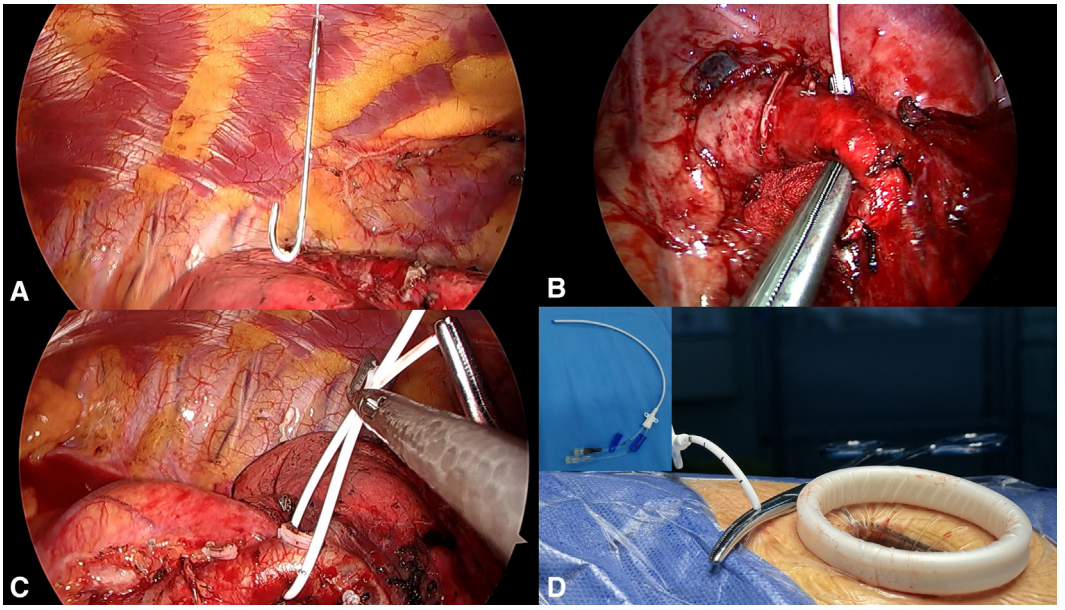


FIGURE 1. A, A guidewire was inserted into the thoracic cavity with a puncture needle. B, The catheter was placed around the pulmonary artery trunk. C, A ligating clip was used to make a catheter loop for a better retraction of the pulmonary artery trunk. D, The central catheter used and the external stabilization of the catheter with a clamp.

used to make a catheter loop for a better retraction of the pulmonary artery trunk to provide good visualization of the bronchial structures (Figure 1, *C*). A clamp was placed on the other side of the catheter outside of the cavity to adjust the tension (Figure 1, *D*). After the retraction of the pulmonary artery trunk was completed, the end-to-end anastomosis of the left main bronchus and the bronchus of the lower lobe was performed, which has been described in our previous work.[5] During the procedure, better dissection of the bronchial structures made the anastomosis easier to perform (Figure 2). When the anastomosis was completed, the catheter was cut and the pulmonary artery trunk was released with no injury (Video 1).

From January 2019 to December 2022, we applied this technique in 20 patients who received a left upper sleeve lobectomy. No intraoperative complications or conversion to the open procedures occurred. The time for the anastomosis was 27.6 ± 7.8 minutes. All patients were followed up for at least 3 months. Computed tomography of the chest and bronchoscopy suggested no bronchopleural fistula or anastomotic stenosis occurred.

DISCUSSION

With the advances in the technology and instrumentation for VATS, sleeve lobectomy has become a widely accepted procedure for both tumor resection and pulmonary preservation. Uniportal VATS sleeve lobectomy has been performed in our institution for decades. We find that vascular structures sometimes compromise exposure of the bronchial structures, which may cause some trouble in the anastomosis, especially in complicated cases.

In this article, we present our experiences with a novel method to retract the pulmonary artery by suspending it with a central venous catheter, which is an easy, safe, and effective method. It is an effective method for the exposure of the bronchial structures for left upper sleeve lobectomy. The catheter was inserted with a guidewire, which was placed into the thoracic cavity with a puncture needle. It

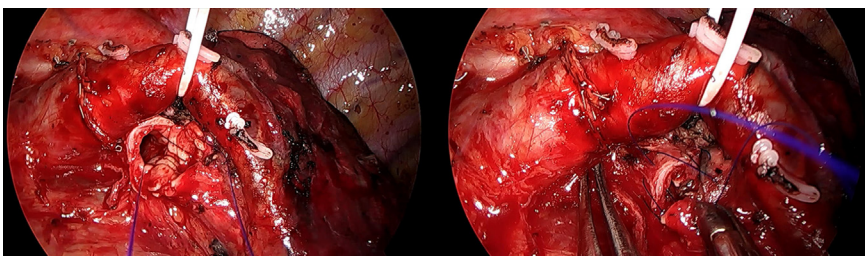
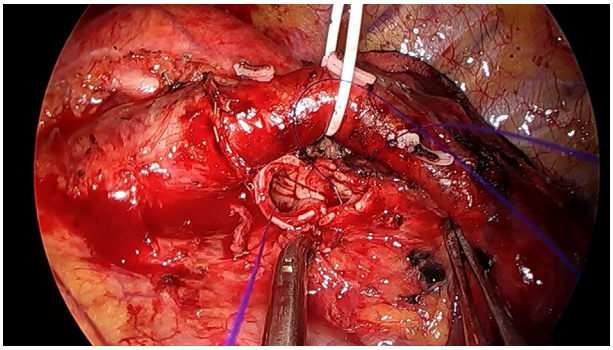


FIGURE 2. During the anastomosis, the bronchial structures are well exposed.



VIDEO 1. Demonstrated is the technique of the retraction of the pulmonary artery trunk with a catheter and the process of the anastomosis of the bronchial structures. Video available at: https://www.jtcvs.org/article/S2666-2507(24)00050-6/fulltext.

is a minimally invasive procedure, since the catheter can be removed after the surgery with only a puncture wound. With the pulmonary artery retraction of the catheter, a sufficient exposure of the left main bronchus and the bronchus of the lower lobe was achieved and it helped surgeons to perform the anastomosis. The angle of the retraction and the degree of the tightness can be adjusted according to the actual situation during the surgeries. No intraoperative complications occurred, such as artery injury or chest wall bleeding. It also helped to reduce the operation time and improve the quality of the anastomosis.

CONCLUSIONS

The method of pulmonary artery retraction with a central venous catheter during the uniportal VATS left upper lobe sleeve lobectomy is an easy, safe, and effective method, especially for complicated cases.

Conflict of Interest Statement

The authors reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

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