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

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SURGICAL TECHNIQUE

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. The minimally invasive sleeve lobectomy may improved the survival outcomes compared with conventional thoracotomy. 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.

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.

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.

During the anastomosis, the bronchial structures are well exposed.

Video clip is available online.
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. 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 $27.6 \pm 7.8$ 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
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.

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