A Novel technique for Pulmonary Artery retraction During Uni-portal Video-assisted Bronchial Sleeve Lobectomy of Left Upper Lobe

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PII: S2666-2507(24)00050-6
DOI: https://doi.org/10.1016/j.xjtc.2024.01.022
Reference: XJTC 1610

To appear in: JTCVS Techniques

Received Date: 8 January 2024
Revised Date: 12 January 2024
Accepted Date: 24 January 2024

Please cite this article as: Ning Y, Zhang L, Deng J, Li Q, He W, A Novel technique for Pulmonary Artery retraction During Uni-portal Video-assisted Bronchial Sleeve Lobectomy of Left Upper Lobe, JTCVS Techniques (2024), doi: https://doi.org/10.1016/j.xjtc.2024.01.022.

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Upper Lobe

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CONFLICT OF INTEREST STATEMENT
The authors declared no conflict of interest.

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No conflicts of interest for all authors

No funding was provided

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Key words: Bronchial sleeve lobectomy; Novel technique; Pulmonary artery retraction

Central Message

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

Central Picture Legend

During the anastomosis, the well-exposure of the bronchial structures

Glossary of Abbreviations

Video-assisted thoracic surgery (VATS)
With the development of the technique of video-assisted thoracic surgery (VATS) and the advances of the instruments, 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 minimal invasive sleeve lobectomy may have some efforts in the improvement of the survival outcomes compared with conventional thoracotomy. [3] Uni-portal VATS is an optional procedure for minimal 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, left main pulmonary artery compromises the exposure of bronchial structures, which causes the obstacles for anastomosis. We developed a safe and effective method for pulmonary retraction for the anastomosis during uni-portal VATS bronchial sleeve lobectomy of left upper lobe.
ETHICAL STATEMENT

The study was reviewed and approved by the ethics committee of Shanghai Pulmonary Hospital (K22-209, 6/16/2022). The need for informed consent was waived by the IRB.
SURGICAL TECHNIQUE

With double-lumen tube intubation, the patient was placed in a lateral position with a tissue rolled under the chest. After a 3-cm incision in the 4th intercostal space between the anterior and middle axillary line was made, an incision protector was placed in the wound for retracting the soft tissue.

After exploring pleural cavity, hilum exposure was achieved to perform the dissection of superior pulmonary vein and anterior pulmonary trunk. The endoscopic linear stapler (Covidien®, Mansfield, MA, USA) or ligating clip (GRENA®, 0301-03ML, Click’a, UK) was used to divided the branches of the pulmonary artery and pulmonary veins.

The left main bronchus and bronchus of lower lobe was 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 station 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, USA) was inserted into the thoracic cavity through the 4th intercostal space with the guidance of the guide wire. (Figure 1 A) After the catheter was placed around the pulmonary artery trunk (Figure 1 B), a ligating clip (GRENA®, 0301-03ML, Click’a, UK) was used to make a catheter loop for a better retraction of the pulmonary artery trunk to provide a good vision of the bronchial structures (Figure 1C). A clamp was placed on the other side of the catheter outside of the cavity to adjust the tension (Figure 1D). 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 had been described in our former literature.[5] During the procedure, the 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.

From Jan. 2019 to Dec. 2022, we applied this technique in 20 patients who received a left upper sleeve lobectomy. No intro-operative 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, Chest computed tomography and bronchoscopy suggested no bronchopleural fistula or anastomotic stenosis occurred.
DISCUSSION

With the advances of the technology and the instruments of the VATS, sleeve lobectomy had become a wildly accepted procedure for both tumor resection and pulmonary preservation. Uni-portal VATS sleeve lobectomy had been performed in our institution for decades. We found that vascular structures sometimes may compromise the exposure of the bronchial structures which may cause some troubles in the anastomosis, especially for the complicated cases.

In this article, we presented our experiences of 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 guiding wire which was put into the thoracic cavity with a puncture needle. It is a minimal 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 helped to reduce the time and improve the quality of the anastomosis.
CONCLUSIONS

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


A: guide wire 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 clap

Figure 2. During the anastomosis, the well-exposure of the bronchial structures

Video 1. Demonstrated the technique of the retraction of the pulmonary artery trunk with a catheter and the process of the anastomosis of the bronchial structures.