A modified method using a two-port approach for accessing the hilar vasculature without transferring an endostapler from camera port to utility port during thoracoscopic right upper lobectomy

Jiao W, Zhao Y, Xuan Y, Wang M
Department of Thoracic Surgery, the Affiliated Hospital of Qingdao University, 16 Jiangsu Road, Qingdao, China 266003

Correspondence to: Dr. Wenjie Jiao, E-mail: xwkjiao@126.com

Abstract
For thoracoscopic upper lobectomies, most cutting endostaplers must be inserted through the camera port when using a two-port approach. Access to the hilar vasculature through only the utility port remains a challenge. In this study, we describe a procedure to access the hilar vasculature without transferring the endostapler site during a thoracoscopic right upper lobectomy. A 2.5-cm utility anterior incision was made in the fourth intercostal space. The posterior mediastinal visceral pleura were dissected to expose the posterior portion of the right upper bronchus and the anterior trunk of the right pulmonary artery. The pleura over the right hilar vasculature were then peeled with an electrocoagulation hook. The anterior trunk of the right pulmonary artery was then transected with a cutting endostapler through the utility port firstly. This crucial maneuver allowed the endostapler access to the right upper lobe pulmonary vein. The hilar structures were then easily handled in turn. This novel technique was performed successfully in 32 patients, with no perioperative deaths. The average operation time was 120.6 min (range 75–180 min). This novel technique permits effective control of the hilar vessels through the utility port, enabling simple, safe, quick and effective resection.

Key Words: Lobectomy, lung cancer, thoracoscopy

Introduction
Video-assisted thoracoscopic surgery (VATS) is appealing the alternative to thoracotomy due to its techniques minimize trauma and optimize patient recovery without compromising the surgical outcome.[1,2] At present, the lobectomy may be successfully carried out using only two-port.[3] For thorascopically upper lobectomies, most cutting endostaplers must be inserted through the camera port when using a two-port approach. Access to the hilar vasculature through the only utility port remains a challenge. In this study, we describe a procedure to the access hilar vasculature, which does not require transferring the endostapler site during thorascopically right upper lobectomy procedures.

Surgical Technique
Patients were placed in a typical left lateral decubitus position and were intubated with a double-lumen endotracheal tube. An initial 1-cm incision was made in the seventh intercostal space in the mid-axillary line and used to introduce a 10-mm 30° thoracoscope. A second incision, 2.5-cm long, was made in the fourth intercostal space in an anterior position just between the latissimus dorsi and pectoralis major muscles. The entire surgery was completed without visual access through the utility incision and without rib spreading.

First, the lung was retracted up and forthward using a ring clamp through the utility port. After the lung was adequately exposed, the inferior pulmonary ligament and posterior mediastinal visceral pleura were dissected to expose the posterior part of the right upper bronchus and anterior trunk of the right pulmonary artery. Subsequently, the anterior part of the right hilum was exposed, and the pleura over the right hilar vasculature were peeled with an electrocoagulation hook. The anterior trunk of the right pulmonary artery was transected with a cutting stapler from the utility port firstly [Figure 1]. This crucial maneuver allowed endostapler access to the right upper lobe pulmonary vein using the utility port access [Figure 2]. The posterior ascending branch of the pulmonary artery was then dissected and transected with a cutting stapler or ligated with 4-0 silk thread through the utility port. The surgery continued with dissection of level 11 lymph nodes, which is not only oncologically mandatory, but also facilitates the dissection of the lobar bronchus. The right upper lobe bronchus was then exposed and transected with a cutting stapler through the utility port. The remaining lung posterior fissure was transected with a cutting stapler. Mediastinal lymph node was then completely dissected thorascopically using the utility port.

From June 2012 to February 2013, we performed 32 thorascopically right upper lobectomies through the two-port approach using this novel technique was used. Surgical-pathological staging included stage IA (n = 9), IB (n = 19) and IIA (n = 4). Histological types included adenocarcinoma (n = 26) and squamous cell carcinoma (n = 6). The average surgical time by a two-port VATS was 120.6 min (range 75–180 min). The median chest tube duration was 3.5 days. The median length of stay in hospital was 6.5 days. There was no perioperative mortality.

Comment
Video-assisted thoracoscopic surgery lung resection has showed substantial advantages, including those of reduced postoperative pain, shorter drainage time, shorter hospital stays, better conservation of pulmonary function and lower inflammatory rate, faster return to activities of daily living and a rapid commencement of chemotherapy, compared with conventional open surgery. Most thoracic surgeons performed VATS lobectomies using three to four ports, including a utility incision measuring approximately 3–5 cm. However, a lobectomy may actually be performed successfully using only two ports.

Theoretically, fewer incisions, as in the two-port approach, may produce less pain and less immunological response.
compared with the conventional VATS approach due to the less invasive nature of this procedure. However, the camera and the endostaplers are often transferred from one incision to the other to accommodate anatomical resection of hilar structures due to lack of a posterior assistant port. In the lower and middle lobectomies, it is usually feasible to both dissect the hilar structure and insert the stapler using the utility port. For upper lobectomies through the two-port approach, it is almost essential to learn the technique in which the camera and the endostaplers are transferred from one port to the other for the resection of hilar structures in upper lobectomy.\(^4\) In three-port approaches, most endostaplers must be inserted through the posterior assistant port. The transfer technique is delicate and feasible and can resolve the problem of setting the staplers. However, the transfer procedure may increase the probability of chest wall muscle capillary hemorrhage and cause a negative impact on the fluency of the surgery. Therefore, we believe it will be more convenient if an alternative method is be established, which would eliminate the necessity of transferring the camera and the endostaplers between ports. The modified technique should be less invasive and facilitate a rapid and clear-cut operative procedure. This novel procedure is convenient and efficient for inserting instruments to access the anterior trunk of the right pulmonary artery and the right upper lobe pulmonary vein through the utility port because it overcomes the angular limitations. Moreover, hypoplastic lung fissures can be treated without difficulty using this novel technique.

Theoretically, this modified method is suitable for thoracoscopic right upper lobectomies through three-, two-and even single-port approaches with clear procedural steps, thus representing a valuable alternative to the already existing thoracoscopic techniques.

References


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