

SURGICAL TECHNIQUE

Video-assisted thoracoscopic surgery (VATS) right upper lobectomy and systematic lymph node dissection for lung cancer

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ABSTRACT

Video-assisted thoracoscopic surgery (VATS) represents a new trend in the development of minimally invasive thoracic surgery. When applied in lung cancer surgeries, VATS can be used for both pulmonary lobectomy and regional lymph node dissection. Currently the main concerns are focused on the completeness of lymph node dissection for lung cancer and the safety of surgery. The lymph node dissection includes two parts: (I) dissection of interlobar and hilar lymph nodes; and (II) dissection of mediastinal lymph nodes. The demonstrated surgical procedures are featured by: (I) the interlobar and hilar lymph nodes are not removed separately; rather, they are taken out en bloc with the pulmonary lobes during the surgery; and (II) systematic lymph node dissection, instead of systematic sampling, is applied for the removal of mediastinal lymph nodes. Also, during the fully anatomical resection, each blood vessel and bronchus underwent anatomical dissociation, indicating that this surgery is safe.

KEY WORDS

Lobectomy; lung cancer; video-assisted thoracic surgery (VATS); systematic lymph node dissection

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Introduction

Video-assisted thoracoscopic surgery (VATS) represents a new trend in the development of minimally invasive thoracic surgery. Currently the main concerns are focused on the completeness of lymph node dissection for lung cancer and the safety of surgery. This video (Video 1) demonstrates the radical treatment of a right upper lung cancer (pre-operative diagnosis: upper right lung adenocarcinoma, CT2N0M0), with an attempt to address these two issues.

Procedures

A 4-port approach was adopted, with the camera port located at the 7th intercostal space on the anterior axillary line. The main operation port was located at the 4th intercostal space on the anterior axillary line, the auxiliary operation port at the 9th intercostal space on the posterior axillary line, and the fourth port for the first assistant to maintain traction at the 7th

intercostal space on the posterior axillary line. The operator stands at the abdominal side of the patient.

After the device entered the thoracic cavity, dissociated the pleural adhesions. Exploration showed that a tumor was located at the right upper lung. The tumor was 2.5 cm in size, with a relatively good movement. The hilar and mediastinal lymph nodes were not swollen, and no obvious tumor dissemination was seen inside the pleural cavity. Because the patient had been confirmed to be with upper right lung adenocarcinoma

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Video 1. VATS right upper lobectomy and systematic lymph node dissection for lung cancer.

(CT2N0M0) before the surgery, right upper lobectomy plus mediastinal lymph node dissection was performed.

The mediastinal pleura around the right upper lobe was dissected, which is useful to reduce the risk of the damage to the blood vessels and bronchi during their dissociation). And then the first assistant pulled the right upper lung backward to expose the anterior structures at the hilum. The right superior pulmonary vein was dissociated firstly and then transected with ENDO GIA™ (Covidien, Dublin, Ireland), during which any damage to the right middle pulmonary vein should be avoided. Then the apical and anterior branches behind the right superior pulmonary vein as well as the posterior ascending artery were dissociated and transected, during which the tunica adventitia of vessel must be cut open to avoid any unnecessary damage to vessels. The interlobar lymph nodes and hilar lymph nodes around the vessels should not be removed separately; rather, they should be dissociated to the distal end of the vessel and then removed en bloc with the right upper pulmonary lobe. This is more consistent with the principles of surgical oncology. Then, the right upper lobe bronchus was dissociated and transected with an ENDO GIA™. Again, the lymph nodes at the second carina should not be removed separately; instead, they should be dissociated to the distal end of the bronchus, and then removed en bloc with the right upper pulmonary lobe. Finally, the posterior halves of the oblique and horizontal fissures were divided using an ENDO GIA™, and then the right upper lung tissues were removed using a specimen bag.

Mediastinal lymph node dissection was performed after the resection of the right upper lobe of the lung. The lymph nodes were dissected upwards and backwards. The lymph node stations 9, 3a, 2/4, 3P, and 7 were dissected in order. Systematic lymph

node dissection, instead of systematic sampling, is applied for the removal of mediastinal lymph nodes.

Comments and discussion

The strength and weakness of the 3- and 4-port VATS

The strength of the 4-port VATS is that the device can enter via each port into the thoracic cavity at any time, and thus effectively avoids the unexpected damage to the organs/tissues when two devices enter the cavity via the same incision. Meanwhile, it enables better exposure and avoids frequent turn-over of the lung lobes during the lobectomy and lymph node dissection. The weakness of the 4-port VATS is that there is an additional incision sized 2 cm.

Dissection of lymph nodes

During the resection of pulmonary lobes, the interlobar and hilar lymph nodes are not removed separately; rather, they are dissociated to the distal end of a vessel or bronchus and then taken out en bloc with the pulmonary lobes. Also, systematic lymph node dissection, instead of systematic sampling, is applied for the removal of mediastinal lymph nodes. This is more consistent with the principles of surgical oncology.

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