# VATS right upper lobectomy

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**ABSTRACT** Standard thoracotomy has been considered as the classic approach and only choice for the diagnosis and treatment of certain thoracic diseases especially in patients with peripheral lung cancer. Video-assisted thoracic surgery (VATS) is a new minimally invasive thoracic surgery through small incisions in the intercostal muscle of chest wall by using modern camera technology, high-tech equipment and surgical instrument. Consequently, VATS has become the preferred main method for peripheral lung cancer in the last two decades. The aim of the present paper is to describe and discuss the operative techniques of VATS for right upper lobectomy (RUL).

**KEY WORDS** Video-assisted thoracic surgery (VATS); minimally invasive thoracic surgery; lobectomy

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## Introduction

In 1992, it was reported the utilization of video-assisted thoracic surgery (VATS) in the diagnosis and treatment of thoracic diseases (1-4). During the next 20 years, VATS technique has gradually been widely accepted and approved as, at least in part, a replacement of traditional thoracic surgical procedures. Compared with traditional open lobectomy, it is a minimally invasive procedure with advantages in tiny surgical trauma, little effect on pulmonary function, mitigated pains and fewer complications postoperatively (5). Nowadays, VATS is considered as the safe, effective and acceptable way in the treatment of early stage of lung cancer especially clinical stage I lung cancer, and it is not inferior to that of thoracotomy (6,7), and sometimes patients receive more benefits from VATS over thoracotomy (8,9). Our surgical team summarized some experiences during VATS operation procedures in recent years. In this paper, principal steps of VATS for right upper lobectomy (RUL) were described and discussed.

## Procedure steps

The patient underwent healthy side one-lung ventilation anesthesia, a 2.5 cm incision was made as the observing hole for the scope in the seventh intercostal space in the midaxillary line (Video 1). A second 4 cm incision was made as the primary operating hole for large instruments in the third intercostal space in the anterior axillary line. A third 2.5 cm incision was made as the assisted operating hole for small instruments in the ninth intercostal space in the posterior axillary line.

After a careful and complete intrathoracic exploration, a solid movable tumor sized 3 cm × 3 cm × 2 cm was detected in the posterior segment of right upper lobe with a depression on the visceral pleura surface. There was no adhesion or invasion existing between the tumor and surrounding tissues. The tumor was managed by nonanatomic wedge resection using stapler Echelon 60 3.5 mm (Ethicon Endo-Surgery Inc, Blue Ash, OH) and proved as a malignant disease by rapid intraoperative frozen section diagnosis. Therefore, combined radical lobectomy and lymph nodes excision were necessary.

Pulling the right upper lobe backward with an oval clamp, the anterior hilar was exposed. Upper lobe vein was the first structure of the anterior hilar. The vein was then dissected and dissociated carefully from surrounding tissues including vascular sheath. Dissociation from vascular sheath as long as possible was recommended. Stapler Echelon 60 2.5 mm was used for cutting the vein. Next, upper lobe branches of pulmonary artery were cut and ligated by stapler Echelon 60 2.5 mm, ultrasonic scalpel Harmonic Ace (Ethicon Endo-Surgery Inc, Blue Ash, OH) and silk thread. After the upper lobe bronchus was fully freed by right angle clamp, the bronchus was exposed and identified. Once the stapler Echelon 60 4.1 mm was seated satisfactorily at the position of upper lobe bronchus, which was proximal to the intermediate bronchus, the stapler pin was locked into position and the residual lung expansion test is examined, then the stapler

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**Video 1.** VATS right upper lobectomy.

was fired and removed. The fissures were completed by means of blunt dissection, cautery and stapler Echelon 60 3.5 mm. Occasionally, tiny inter lobe blood vessels existed in the fissure, these vessels could be cut by stapler simultaneously. The diseased lobe was finally removed from chest using a sterilized and manufactured glove bag. Systemic lymph nodes were sampled and excided in proper order by ultrasonic scalpel Harmonic Ace and lymph node biopsy clamp. The inferior lung ligament was freed so that the residual lung could get a well reexpansion. The thorax was irrigated with normal saline to confirm the security of the bronchial stump closure.

## Technical notes

RUL should be proficiently mastered because right upper lobe was the predilection site of lung cancer. However, the blood vessels variation was frequently detected in this lobe. Therefore, a thoracic surgeon should pay more attention to these anatomic abnormal blood vessels while exploration during VATS for RUL, otherwise serious surgical complications might occur. Angiography was a useful method for recognizing such anomalies preoperatively, and making a VATS lobectomy be safe (10).

Right middle lobe would occasionally suffer lobar torsion following VATS for RUL. Lobar torsion was such a rare but potentially serious complication with an extremely low incidence rate about 0.089-0.3% (11,12). The effective way to deal with this complication was carefully checking anatomical structures and correctly suturing the middle lobe to the consecutive lobe (11). Once this complication occurs, a second VATS or open exploration and affected right middle lobectomy sometimes should be performed (12).

VATS for RUL was one of the procedures which were prone to conversion. The most frequent reasons for the conversion, for example, were hilar lymphadenopathy and bleeding, followed by fused fissure. A thoracic surgeon should keep calm under these conditions because the safety of the conversion was actually acceptable (13). Systematic lymph node excision was an important and essential step following lung cancer resection. The total nodes especially station 7 lymph node sampling rate with thoracotomy were often higher than that of VATS for RUL (14). This difference directed us toward a more focused lymph node sampling with VATS.

In conclusion, this advanced VATS technique is now proficiently mastered by a large number of thoracic surgeons. Instead of traditional thoracotomy, it is an effective approach for the treatment of peripheral lung cancer.

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