Video-assisted thoracic surgery right upper lobectomy and lymph node dissection

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ABSTRACT We described a 55-year-old male smoking patient, who came to our institute with the diagnosis of a right upper lobe lesion. Computed tomographic (CT) guided biopsy confirmed a diagnosis of lung adenocarcinoma. The preoperative clinical diagnosis was stage I primary lung adenocarcinoma. The standard three-port video-assisted thoracoscopy surgery (VATS) was performed in this case. After the resection of the right upper lobe, the 2nd, 4th, and 7th groups of lymphatic nodes were removed with Harmonic scalpel. A closed drainage catheter was placed adjacent to the lateral chest wall through the port in the 7th intercostal space. Postoperative pathologic diagnosis was $T_{2a}N_0M_0$ adenocarcinoma.

KEY WORDS Video-assisted thoracoscopy surgery (VATS); three access thoracoscopy

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Introduction

Video-assisted thoracoscopic surgery (VATS) anatomic lung resection is rapidly gaining popularity around the world due to the minimally invasive nature of the procedure when compared to the traditional thoracotomy incision (1,2). Many retrospective studies and a few small randomized control trials have shown VATS lobectomy relates to benefits including reduced length of hospital stay, decreased blood loss, decreased pain, improved cosmesis, earlier return to normal activities and improved tolerance of chemotherapy (3-7). During the last two decades, VATS has been performed with increasing frequency for treating lung cancer (8). Although this surgery may be performed using one or two ports, most of surgeons use three incisions (9,10). The standard three-port VATS presented here is currently employed in the unit of thoracic surgery at our institute (Video 1).

Case report

A 55-year-old male presented with a right upper lobe lesion on computed tomographic (CT) was admitted in our institute on May 22, 2013. The subsequent CT guided biopsy confirmed a diagnosis of lung adenocarcinoma. The patient underwent preoperative staging and pulmonary function assessment. The preoperative workup was standardized for the staging and consisted of routine chest roentgenography, CT scanning of the thorax and the abdomen, CT scanning or magnetic resonance imaging of the brain, and bone scintigraphy. The preoperative clinical diagnosis was stage I primary lung adenocarcinoma. Lung function was assessed via formal spirometry with a FEV1 of 3.06 and a MVV of 106%.

Anaesthesia and positioning

The patient was placed in the lateral decubitus position with the arms extended to 90° and the elbows flexed to 90°. To protect the intercostal neurovascular bundles, the table was flexed to maximise the intercostal spaces. General anesthesia with selective lung ventilation was performed with the use of a double lumen endotracheal tube.

Operative technique

Three VATS ports were created to facilitate optimal views of the posterior hilum and placement of instruments. An incision (approx. 1.5 cm) was made in the 7th intercostal space adjacent to the mid axilliary line. A 30 degree 10 mm high definition video thoracoscope was temporarily placed through this port to allow safe completion of the anterior and posterior port sites. The anterior incision (approx. 3 cm, which can be extended later if necessary) was made in the 4th intercostal space adjacent to the anterior axilliary line. The posterior incision (approx. 2 cm)

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Video 1. Video-assisted thoracic surgery right upper lobectomy and lymph node dissection.

was made in the auscultatory triangle at the point nearest to the upper end of the oblique fissure.

The first step of the procedure was to confirm resectabilty and identify invasion of the chest wall, pleurae and hilar structures including the aorta, pulmonary artery and bronchus. Dissection was commenced in the anterior hilum with a combination of blunt and sharp incision of the mediastinal pleura. Lymph nodes and fat tissue adjacent to the anterior-superior hilum were removed by electrocautery and/or Harmonic scalpel (Ethicon Endo-Surgery Inc, Blue Ash, OH). Excision of these lymph node packets at this stage facilitated exposure of the superior pulmonary veins and anterior and posterior branch of the pulmonary artery sequentially. When exposure was adequate, stapler was used to transect the horizontal fissure. The superior pulmonary vein and anterior branch of the pulmonary artery were transected using a stapler passed through the posterior port. The final vessel remaining was the posterior branch of the pulmonary artery. A vascular clamp was passed through the anterior port and subsequently transected with the Harmonic scalpel. Attention was then turned to the right superior lobar bronchus, which was finally transected by a stapler. The exposure of the bronchus was achieved by removal of the lymph nodes and fat tissue through adopting of the Harmonic scalpel. Inferior ligamentum pulmonale was then transected. After the resection of the right upper lobe, the 2^{nd}, 4^{th}, and 7^{th} groups of lymphatic nodes were removed by Harmonic scalpel. A closed drainage catheter was placed adjacent to the lateral chest wall through the port in the 7^{th} intercostal space. Postoperative pathologic diagnosis was $T_{2a}N_0M_0$ adenocarcinoma.

Post-operative management

The patient underwent a routine post-operative chest X-ray whilst in the recovery room. Analgesia, antibiotics and anti-coagulation were administered routinely in accordance with local guidelines.

Comments

In our institution, the principles of VATS performing include: only for lesions that can be widely removed; converting to thoracotomy for definitive or extensive cancer operation; and using meticulous technique for the extraction of specimens from the pleural space. In addition to that, a careful preoperative evaluation of the anatomy, including the presence of any possible vascular and/or bronchial anomalies, was necessary. A conversion into an open procedure must immediately be undertaken if any anatomical structures cannot be determined intraoperatively.

Although thoracic surgeons still use instruments that were adapted from conventional thoracic surgeries, several inline instruments were developed and Harmonic scalpel was a new device. It could have functions as electric knife, pliers and gripper at the same time. The adoption of Harmonic scalpel effectively avoided time waste and operating bleeding. We summarized from our experience several principles of the usage of Harmonic scalpel: proper tension of the vessel should always be maintained during the dissociation process and the knife should be put longitudinal parallel to the vessel; the lymphnodes near pulmonary artery wall could be removed by putting ultrasonic knife close to the artery wall. Because the vessel wall was comparatively thick and the temperature of ultrasonic scalpel temperature was only about 100 centidegrees, which was not high enough to breakdown vessel wall; and the bronchus wall can be stripped as the same way. The advantages of adoption of Harmonic scalpel in the dissection of lymph nodes include closing lymphatic vessels effectively and reducing postoperative drainage significantly.

A common criticism of VATS was that the surgeon may not be able to achieve the same completeness of lymph node sampling or dissection for staging compared to open surgery (3). However, this case presented here performed in accordance with current guidelines from the European Society of Thoracic Surgeons showed that the VATS approach resulted in a similar total number of lymph nodes removed and a similar percentage of complete resections, indicating that the oncologic surgical principles were maintained.

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