Derleme|Review

International VATS Experiences: Thailand

Uluslararası VATS Deneyimleri: Tayland

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SUMMARY

Since the video-assisted thoracoscopic surgery (VATS) anatomic lobectomy has been developed for two decades, many centers have successfully performed this procedure around the world. However, various technique has been described starting from 1 to 4 incisions or subxiphoid approach as well as non-intubated VATS depending on surgeon preferences.

Keywords: *VATS lobectomy, thoracoscopic, minimal invasive surgery.*

ÖZET

Video yardımlı torakoskopik cerrahi (VATS) anatomik lobektomi yirmi yıldır geliştirilmektedir ve birçok merkez bu işlemi dünya çapında başarıyla gerçekleştirilmektedir. Bununla birlikte, cerrahın tercihine bağlı olarak VATS 1 ila 4 insizyon veya subksifoid yaklaşım ya da non-entübe VATS gibi farklı teknikler tarif edilmiştir.

Anahtar Kelimeler: *VATS lobektomi, torakoskopik, minimal invaziv cerrahi.*

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Introduction

Video-Assisted Thoracoscopic Surgery (VATS) lobectomy for non-small cell lung cancer (NSCLC) has been started for 20 years ago. Since then, it has become well established and could be performed everywhere around the world[1,2].

Various technique has been described in VATS starting from VATS assisted operation with some rib spreading to true VATS lobectomy (no rib spreading along with anatomical hilar dissection, individual ligation of lobar vessels and bronchus, mediastinal lymph node dissection or sampling, with only monitor based vision rather than looking through the utility port).

However, in 2007 the cancer and Leukemia Group B (CALGB) 39802 trial had established VATS lobectomy definition; no use of rib-spreading and totally endoscopic approach. They reported an outcome that VATS could reduce surgical trauma, improve surgical outcome and adhere to recognized oncological principles[3]. After Since, a large number of meta-analysis and systematic review have demonstrated that VATS procedure is at least not inferior to a resection via a open thoracotomy with perioperative safety and comparable long-term oncological outcomes and could be benefited in term of overall complications, and shorter hospitalization[4].

The technique of VATS lobectomy is various depended on surgeon skills and experiences. This article will explain how do we perform VATS lobectomy in our institution.

Pre-operative Consideration and Indication

VATS lobectomy is commonly performed for early stage NSCLC (Stage I and II) and usually reserved for patients with good reserve cardiopulmonary function. However, in our intuition we prefer to perform VATS starting from wedge resection, segmentectomy, lobectomy, sleeve lobectomy and pneumonectomy as a first surgical choice in both malignant and benign lung lesions. With our experience, we perform VATs lobectomy in majority of 90% of all cancer lobectomies.

At the present, we find these are following contraindication to perform VATS in our intuition.

1. Centrally placed tumors in the hilum and adherent to vessels and possible need to perform vascular sleeve resection.
2. Tumors visible in the main bronchus by bronchoscopy within 2 cm from carina and possible need to perform carinal resection.

For patients with previous cardiothoracic surgery and pulmonary infection and patients who have received preoperative chemo-radiotherapy are still considered as candidates for VATs lobectomy.

All our patients are routinely received a preoperative examination with pulmonary function test, PET/CT, bronchoscopy and EBUS for preoperative staging. For peripheral lesion less than 3 cm with negative mediastinal lymphadenopathy from CT scan (less than 1 cm in short axis diameter) or PET/CT, EBUS is not required). In some cases, with poor pulmonary function reserve, perfusion scanning and exercise testing may be required to assess for accurate pulmonary reserve. Patients who have very poor pulmonary function (e.g. Both FEV_1 and FVC < 35%), uncontrolled major comorbid diseases, or unfitted due to medical conditions will be declined for surgery. Cardiological assessment is depend on individual patients.

Anesthesia and Operative Room Set-Up

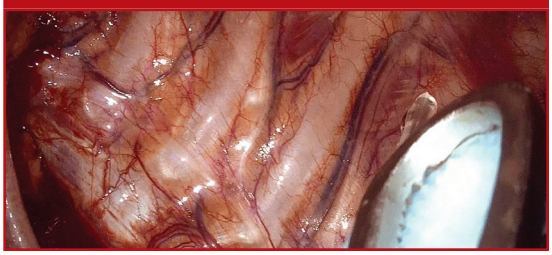
The anesthetic technique for VATS lobectomy is similar to other cases of pulmonary resection. Most of our patients were using a double lumen endotracheal tube for lung isolation in VATS lobectomy. However, in selected case such as early stage I-II lung cancer with good cardiopulmonary reserve, we start to perform non-intubated VATS lobectomy. We do not routinely use central venous lines, urinary catheters and arterial line but prefer only in complex cases such as sleeve resection. In Simple VATS lobectomy case, we prefer only large bore venous cannula.

For perioperative analgesia, epidural catheter was commonly performed in open thoracotomy. In VATS lobectomy, we use 0.25% bupivacaine for local anesthesia and intercostal nerve block from 3rd-8th intercostal nerve or at least one above and one below the level of thoracic incision (for single port used) under thoracoscopic guidance at the end of the procedure (Figure 1). In some cases, such as central or endobronchial tumor or any suspect variations in anatomy, we perform bronchoscopy prior operation to confirm anatomy.

Positioning

After induction of anesthesia, the patient is routinely positioned in the lateral decubitus position. A standard set-up is with one monitor placed on each side of the table in front of the surgeons and assisted. The surgeon and camera assistant are positioned on anterior side (abdominal) of the patients. The scrub nurse and first assistant are on opposite site. This basic principle is the same as left or right procedure.

Figure 1. Demonstrate intercostal nerve block under thoracoscopic guidance.



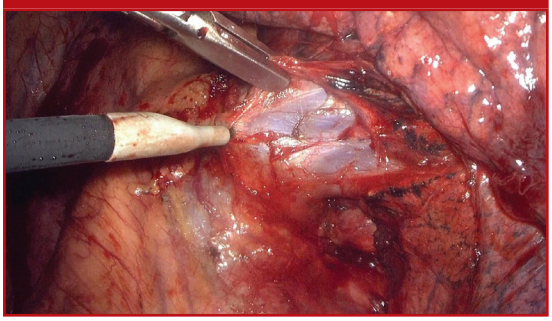
Instrument

All VATS lobectomies are performed with a 10 mm, 30-degree 3D STORZ video-thoracoscope. We performed either 2D-VATS or 3D-VATS, however we recommend 3D VATS due to it has more advantage in realistic depth perception and precision during vascular dissection or advance technical maneuver such as sleeve lobectomy. Endoscopic instrument such as ring-type sponge holding forceps or L-hook shape and Node grasper were commonly used intra-operatively. Hem-o-lock were used to ligate small vessels while large vessels and lung parenchyma are divided using endoscopic stapling device to ensure hemostasis.

Operative Techniques

Currently, we usually perform uniportal VATS with 4 cm, single port incision at anterior axillary line. We prefer to go through incision in the fourth intercostal space for upper lobectomy and the fifth intercostal space for middle and lower lobe surgery. The wound is protected by a plastic soft tissue retractor kept in place by a ring in the chest cavity and one outside the skin (SurgiSleeve, Applied Medical USA). However, in some difficulty case such as large tumor or severe adhesion, additional port may be required during operation. In case of a conversion to open procedure such as bleeding, this incision can be expanded to 10-15 cm with or without muscle sparring thoracotomy.

Figure 2. Illustrate L-hook dissection at left upper pulmonary vein.

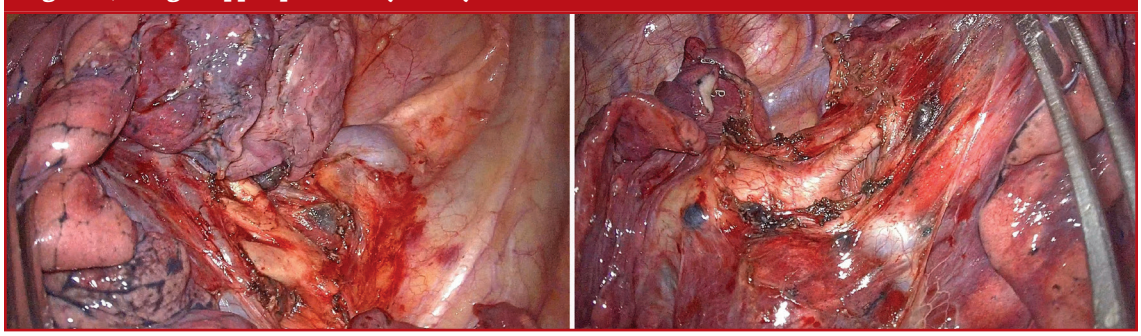


We prefer uniport approach because the coordination between direction of dissection and camera is on the same orientation. During dissection of the hilar structures, we prefer to use L-hook for dissected starting from vein, artery and bronchus (Figure 2). It is important to dissected all adventitial or tissue around pulmonary vascular vessels freely. This will create space when endoscopic staplers were introduced to divide vascular or bronchus and prevent injury during insertion. The sequence of dividing the pulmonary vessels or bronchus is depended on the location of tumor, pulmonary fissure, or the anatomy which were evaluated intra-operatively.

In cases of malignancy, systematic nodal dissection will be routinely performed after completion of the pulmonary resection. However, in case of incidental finding single N2 disease or localized pleural seeding, proved by intraoperative frozen section, we prefer to go on operation and given an adjuvant chemotherapy after operation. Right upper lobectomy (Figure 3,4.)

We prefer fissure-less technique. The dissection starts from the anterior to posterior structures with dividing the involved fissured last. The benefit of this technique is to decrease an incidence of postoperative air-leak, especially in the incomplete fissure cases. We recommend to identify both superior segmental

Figure 3,4. Right upper pulmonary artery after dissected.



pulmonary artery and middle lobe artery before divided fissure. The sequence follows; artery, vein bronchus and fissure.

Left Upper Lobectomy (Figure 5)

This is the most difficult lobectomy. We recommend to dissect the arterial trunks before the vein. It is very important to dissect pulmonary vein as distal as possible to improve the angle for insertion of the staple. Another key point for left upper lobectomy is bronchus. Most of our cases we commonly keep it last after divided artery and vein. In some case, we use scissors to cut bronchus for exposing pulmonary and close it later.

Right Middle Lobectomy (RML)

This lobe is easiest lobe for thoracoscopic approach. We recommend dissecting start from major fissure area and then identify pulmonary artery both medial basilar segments of right lower lobe and middle lobe artery before dividing RML pulmonary artery because of anatomical variation in this area. After we identify all structure, we routinely divided RML vein, artery, bronchus and minor fissure, respectively.

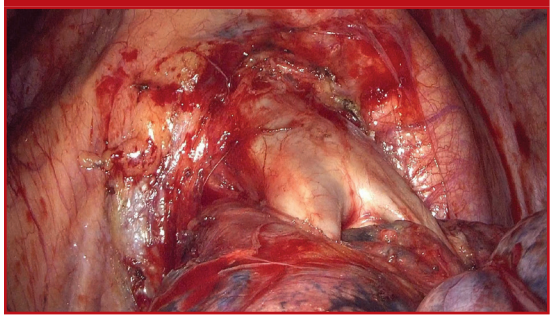
Lower Lobectomy (RLL, LLL)

We usually identify pulmonary artery first. In cases of incomplete fissure, we start on dividing the anterior portion of the fissure from the hilum first then identified lower lobe pulmonary artery. The sequence follows; fissure, artery, vein and bronchus.

Mediastinal Lymph Node Dissection

We routinely perform systematic lymph node dissection in all cases. The mediastinal lymph node mapping used is according to the International Association Study of Lung Cancer (IASLC) classification[5]. For right side, lymph node station 2R-4R, 7-10 were dissected. For left side, lymph node station 4L, 5-10 were dissected. Some of intrapulmonary lymph node (station 11-14) were dissected and some of them were left in the lobectomy specimen.

Figure 5. Left upper pulmonary vein and artery after dissected.



Closure and Perioperative Management

After pulmonary resection and reassure of hemostasis, we routinely use a single chest tube. Absorbable suture such as polyglactin 1-0 is used for the muscle layers and soft tissues without intercostal sutures.

In the postoperative setting, we enhance patients to ambulate as early as possible. We routinely remove chest drain once there was no air leak and pleural fluid less than 200 mL per day. We recommend following the ERAS (Enhanced recovery after surgery) protocol[6]. In our intuition, rate of conversion from VATs to open surgery were 2% which could comparable to other study[7].

Conclusion

With advance technology, minimal invasive surgery has become an important part in thoracic surgery. VATs lobectomy has shown to be benefit with less complication, shorter hospital stays, improve functional outcome compared with a traditional thoracotomy and equivalent oncological outcome.

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