Case report - Thoracic oncologic
Single-port video-assisted thoracoscopic lobectomy

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Abstract
The video-assisted thoracoscopic surgery (VATS) approach to lobectomy for non-small cell lung cancer varies among hospitals. Although three to four incisions are usually made, the operation may be successfully carried out using only two incisions with similar results. We observed that for lower lobes the second incision could be eliminated in selected cases. We describe a case report of a 74-year-old female operated by a single-port approach for a lower-lobe VATS lobectomy.

Keywords: Thoracoscopy/video-assisted thoracoscopic surgery; Lobectomy; Lung cancer surgery

1. Introduction
Video-assisted thoracoscopic surgery (VATS) is an emerging technology in minimally-invasive surgery which provides painless surgery with short recovery time. This report describes a minimally-invasive technique for VATS lower lobectomies with a single-port approach.

2. Clinical summary
A 74-year-old female consulted for cough and hemoptysis. A computed tomography (CT)-scan revealed a mass in the lower lobe of the left lung with bronchiectasis. The bronchoscopy showed a mass in segments 8, 9 and 10 of the left bronchus. The biopsy revealed a carcinoid tumour. The patient was proposed for VATS lobectomy.

3. Surgical technique
The patient was placed in a right-lateral decubitus position. A 4-cm incision was made in the fifth intercostal space in the anterior position just inferior to the breast and pectoralis major. We introduced the 10-mm thoracoscope into the lower part of the incision and explored the chest cavity. A complete fissure was found. Digital palpation confirmed the presence of a mass in left lower lobe. We inserted the instruments through the upper part of the utility incision to start the dissection. The first step was to dissect the artery in the fissure, holding the lower lobe with a ring forceps positioned above the dissector. To staple the artery, we changed the camera to the upper part of the utility incision and inserted the staplers below the camera. For inferior pulmonary vein and bronchus the thoracoscope was placed again in the inferior part of the incision. This was the most common camera position during the operation (Fig. 1b) (Video 1).

We completed the lobectomy stapling the anterior fissure with the optic placed below the stapler. The lobe was removed in a protective bag and a systematic lymph node dissection finished the procedure (Video 2). A single chest tube was placed in the posterior part of the utility incision (Fig. 2). The total surgery time was 80 min.

The chest tube was removed on the second day and the patient was discharged home in 48 hours with no complications in the chest X-ray.

The pathological examination revealed a 3-cm typical carcinoid tumour with no lymph node involvement (a total of nine lymph nodes were studied).

4. Discussion
There is no standardized technique for the VATS approach, though most centres use a utility incision measuring about 3–5 cm and generally positioned in the anterior chest wall. Most surgeons then add two other ports (one for the optics and another at posterior level) [1].

We began performing VATS lobectomies in the department in June 2007. Up to September 2010, we undertook 209 major pulmonary resections by VATS. Since February 2009, we started to do VATS lobectomies using only two ports [2]. We used a double-port technique as described by Burfeind and D’Amico [3].

In our literature review, we have found no reports of lobectomies performed through a single incision. Since 2004, Rocco et al. have published different articles on the single-port VATS technique [4] for diagnostic and therapeutic procedures, though not including lobectomies.

This case shows the possibility to do a VATS lobectomy with only one incision. It is probably that this procedure
Video 1. VATS lower lobectomy. VATS, video-assisted thoracoscopic surgery.

Fig. 1. (a) Diagram and surgical image of the procedure for staple the artery in the fissure. (b) Diagram and surgical image of the procedure for exposure and staple the inferior pulmonary vein.

Video 2. Lymphadenectomy.

Fig. 2. Postoperative result with chest tube placed in the posterior portion of the utility incision.

A total of three cases have been performed at our institution with similar postoperative results and no prolonged surgical time. All the cases were left lower lobes. One of the patients had an incomplete fissure which made necessary stapling the fissure as the last step of the lobectomy. The other patient had severe adhesions to the aorta and the oesophagus (total surgical time 120 and 130 minutes, respectively). These issues do not contraindicate this approach or the need of adding extra ports.

We found no difficulties in performing a lymph node dissection by this approach and we have explored the subcarinal space, aortopulmonary window and hilar region in all the patients as we usually perform in the double-port technique.

In our experience, this technique is possible for lower lobes. For upper lobes, the hilar dissection is possible via one incision but there are difficulties stapling the upper vein, mediastinal trunk and the bronchus. Probably, the development of new technologies (angled optics, angled and curved staplers) will lead to single-port upper lobectomies becoming possible in experienced VATS groups.

References


eComment: Single-port video-assisted thoracic surgery resection: the Copernican revolution of a geometrical approach in thoracic surgery?

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We read with interest the article of Gonzalez et al. about a single-port approach for video-assisted thoracic surgery (VATS) lower lobectomies. According to previously published literature, single-port VATS resections are technically comparable to standard VATS, in terms of accuracy and efficacy. The potential advantages of a single-port VATS approach are the involvement of only one intercostal space with possible reduction of post-operative pain, and, thereby, speeding recovery and return to work. Along with surgical technique described by Gaetano Rocco, another possible advantage of single-port VATS resections is the translational approach of the thoroscope instruments 90° along a sagittal plane, bringing the operative instruments to address the target lesion from a vertical (cranium–caudal) perspective and realizing a projective plane. In the standard three-port approach VATS, the geometric configuration of a lozenge originates interference with the optical source, creating a new ‘optical’ plane with genesis of a dihedral or torsion angle that may not be favorable with the flat (two-dimensional) vision of VATS monitors. Indeed, as stated in the Euclid’s elements, a plane is any flat, two-dimensional surface. The single-port approach pretends that we look at that plane (from a position further out along the camera vision axis) and that there are two parallel lines drawn on the plane (the VATS surgical instruments). From where we are ‘standing’ (given our visual capabilities), we can see only a portion of the plane. If we ‘walk away’ from the plane along the axis, (still looking with a more far shot of thoracoscope camera), we can see more of the plane with an easy approach.

In conclusion, as long as we use two-dimensional monitors in VATS, it will be important to assess the different geometric VATS approach inside the chest realized by the location of ports.

References