Single-port video-assisted thoracoscopic right upper lobectomy using a flexible videoscope

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Abstract

Single-port video-assisted thoracoscopic surgery (VATS) has recently been proposed as an innovative minimally invasive alternative to the standard three-port VATS for lobectomies, most of which are performed using a conventional rigid thoracoscope. Here, we report a single-port VATS approach for right upper lobectomy and systematic lymph node dissection using a flexible endoscope. A 61-year-old male smoker presented with a pulmonary nodule. A single-port VATS procedure was performed through a 4-cm intercostal incision using a flexible laparo-thoraco videoscope. Right upper lobectomy and systematic lymph node dissection were performed. The total operating time was 106 min. The procedure was successful and the recovery uneventful. The patient’s chest tube was removed on the third day, and he was discharged home on the fourth. The use of a flexible videoscope facilitated the single-port VATS procedure by avoiding interference between the videoscope and other operating instruments and providing ample space for the surgeon.

Keywords: Video-assisted thoracoscopic surgery • Lung cancer • Lobectomy • Surgery/incisions/technique

INTRODUCTION

Single-port video-assisted thoracoscopic surgery (VATS) was first used in pulmonary wedge resection [1]. A limited number of centres have also applied it to lobectomy, segmentectomy, bronchial sleeve lobectomy and other technically demanding procedures [2, 3]. Here, we present the principal steps necessary to perform a single-port VATS right upper lobectomy using a flexible videoscope, which we believe will render the single-port approach more widely applicable.

CLINICAL SUMMARY

A 61-year-old male smoker with a 2.5-cm mass in the upper lobe of the right lung was admitted to our hospital. After thorough evaluation, we proposed a single-port VATS lobectomy and obtained approval from our Institutional Review Board to perform the procedure.

SURGICAL TECHNIQUE

The patient received general anaesthesia and double-lumen endotracheal intubation. With the patient in the left lateral decubitus position, we performed the VATS procedure by making a 4-cm single incision in the fourth intercostal space at the right posterior axillary line. This single port represented the inlet for the optical source and all other operating instruments (Fig. 1A). We then introduced a 5.4-mm diameter flexible videoscope (Olympus EndoEYE™ LTF-VP laparo-thoraco videoscope; Olympus, Tokyo, Japan) into the upper part of the incision and explored the chest cavity. A lesion was detected by digital palpation in the lateral portion of the right upper lobe, but initially too deep to perform wedge resection.

The superior pulmonary vein was dissected from the overlying pleura via the single port, and the phrenic nerve was then swept gently down onto the pericardium. The junction between the middle and upper lobe veins was identified and developed, with the right upper lobe vein then exposed and divided with a stapler (60-mm Echelon Endopath Stapler, Ethicon Endo-Surgery, Cincinnati, OH, USA) (Fig. 2A). The next step was the dissection and transection of the apical anterior trunk (Fig. 2B), after which the right upper bronchus was dissected and divided again using the stapler (Fig. 2C). This procedure was followed by dissecting and stapling the posterior artery (Fig. 2D). The final step of the lobectomy was to staple the fissure in an anterior-to-posterior fashion. All hilar structures were transected using 60-mm Echelon Endopath staplers.

The right upper lobe was removed with a protective bag. Then, the procedure concluded with the systematic lymph node dissection of the right upper paratracheal, right lower paratracheal, subcarinal, paracardial, pulmonary ligament, hilar and interlobar space, and a single chest tube was placed in the posterior part of the utility incision (Fig. 1B). The surgery took 106 min, and the estimated blood loss was 100 ml.

The patient’s chest tube was removed on the third day, and he was discharged home on the fourth day with no complications. Subsequent pathological examination revealed a 2.5-cm peripheral, poorly differentiated adenocarcinoma with no lymph node involvement (13 lymph nodes were examined).
Single-port VATS for lobectomy has been performed in a limited number of centres since its first use in pulmonary wedge resections in patients affected by pneumothorax and interstitial lung disease in 2004 [1]. In 2011, Gonzalez performed the first successful lobectomy using the single-port VATS technique [2]. In the following 2 years, Gonzalez performed segmentectomy, sleeve lobectomy and other difficult pulmonary resections via single-port VATS [2-4]. With the exception of the Gonzalez team, very few centres have reported the single-port procedure [5]. Furthermore, although a previous study demonstrated that the use of a flexible videoscope is feasible in multiple-port VATS lobectomies, and may render the procedure easier to perform compared with the use of a rigid thoracoscope [6], all single-port VATS lobectomies reported to date have been performed using a rigid videoscope. In the case reported here, we used a flexible videoscope to facilitate the procedure. It afforded excellent visualization of all parts of the pleural space and the vital hilar structures to be dissected, and there was no interference between the videoscope and the other instruments. In addition, a flexible videoscope can be held by a camera assistant across from the surgeon, thereby offering the surgeon considerably more space in which to carry out the operation. However, as Licht et al. point out, a flexible scope is somewhat unstable because the surgical instruments used for dissection may strike the flexible tip of the videoscope, resulting in quick movements on the video monitor [7]. The surgeon must make a concerted effort to keep the instruments away from the flexible tip.

Single-port VATS for upper lobectomy is quite technically demanding owing to the difficulties of stapling hilar structures [2]. We used a Foley catheter to allow the stapling of the upper lobe vein. If a rigid stapler was unavailable, then a flexible stapler could be used to facilitate the transection. Vascular clips could also be used in cases in which a stapler was inapplicable [4].

The use of a flexible videoscope can facilitate the performance of single-port VATS lobectomy and also offers an alternative to single-port VATS pulmonary surgery. We believe that the single-port VATS technique holds great promise owing to its minimally invasive attributes, although more angulated staplers and other instruments suitable for single-port VATS need to be developed to render the procedure easier to perform.

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**REFERENCES**


