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CASE REPORT

Uniportal video-assisted thoracoscopic left S4 anatomical segmentectomy

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Ground glass opacity (GGO); non-small cell lung cancer; segmentectomy; video-assisted thoracic surgery (VATS).

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Abstract

Uniportal video-assisted thoracic surgery (VATS) segmentectomy is a demanding technique but is safe and feasible in selected patients and confers favorable efficacy. It presents an acceptable alternative to conventional VATS. Lingulectomy is usually performed with left S4 + S5 segmentectomy. This report describes a case of uniportal VATS of left S4 anatomical segmentectomy alone.

Introduction

With the wide application of high-resolution computed tomography (HRCT), the diagnosis (prevalence) of small pulmonary lesions (SPLs) is increasing.[1] Some SPLs have been diagnosed as early-stage lung cancer after surgery,[2] and the five-year survival rate for adenocarcinoma in situ (AIS) and minimally invasive adenocarcinoma (MIA) is 100%.[3] Surgery is usually used to treat early-stage lung cancer[4] With the development of video-assisted thoracic surgery (VATS), segmentectomy has been employed for thoracoscopic sublobar lung resection, achieving an outcome equivalent to that of lobectomy in selected patients with stage IA non-small cell lung cancer (NSCLC).[1,5]

Studies of VATS segmentectomy have mainly focused on posterior, superior, dorsal, basal, and lingular segmentectomy.[6–8] Lingulectomy is performed with left S4 + S5 segmentectomy. To the best of our knowledge, left S4 segmentectomy alone has never been reported. This report describes a case of uniportal left S4 anatomical segmentectomy with VATS.

Case report

Ground glass opacity (GGO 1.0 cm × 1.0 cm) was detected on computed tomography (CT) in a 54-year old nonsmoking man. After follow-up of three months and a second chest CT that suggested no change, the patient was admitted, as early-stage lung cancer could not be excluded. There were no positive findings in medical history or comorbidities.

The lesion was located in the left S4 segment, in the internal 1/3 part of the fissure (Fig 1), thus wedge resection was infeasible. Uniportal VATS S4 segmentectomy was employed to treat the lesion.

The patient was administered general anesthesia with double-lumen endotracheal intubation and right lung ventilation and was placed in the right lateral decubitus position. His arms were extended to 90°, and a pillow was placed under the xiphoid to widen the intercostal spaces.

A 4 cm incision was made between the anterior and middle axillary lines in the fifth intercostal space, and a wound protective cover was placed in the single incision

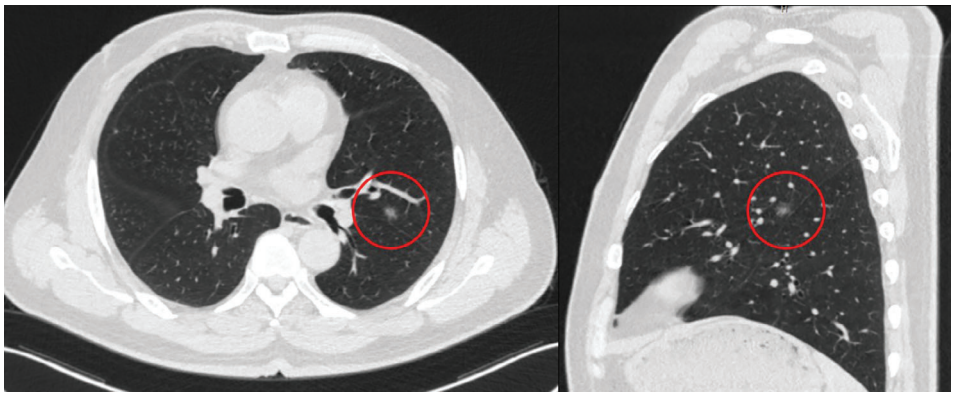

Figure 1 Ground glass opacity in the left lingular segment in the internal 1/3 part of the fissure.

(Fig 2a). First, the oblique fissure was dissected and separated with a 6 cm Echelon Flex endostapler (Ethicon Endo-Surgery, Albuquerque, NM, USA). Once the oblique fissure was divided, the lymph nodes between the artery and bronchus were dissected. The lingular artery was then identified. In this patient the lingular artery had two branches: A4 and A5 (Fig 2b). A4 was dissected, separated, and ligated with a silk tie and a Click'a V Endoscopic Polymer Clip Appliers 45° (Grena 170 Ltd., Brentford, England) at the same time. A4 was then separated with a harmonic scalpel (Ethicon Endo-Surgery). Subsequently, the lingular bronchi were under the artery, and B4 was

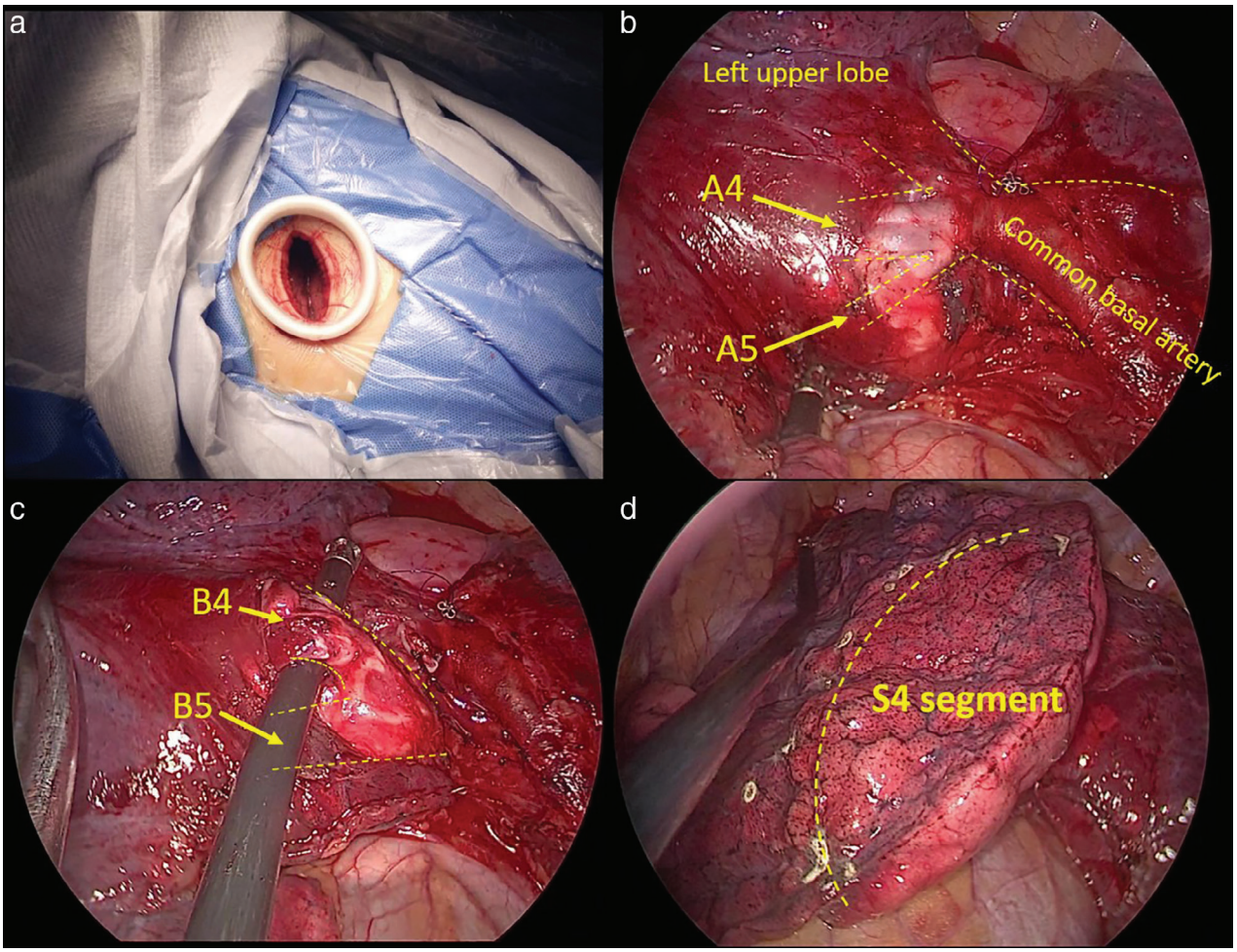

Figure 2 (**a**) The incision; (**b**) the lingular artery, A4 and A5; (**c**) the lingular bronchi, B4 and B5; and (**d**) the border of the S4 segment.

identified and dissected (Fig 2c). B4 was separated using the 6 cm Echelon Flex endostapler. The V4 behind the A5 was identified, dissected, ligated with a silk tie, and separated with a harmonic scalpel. The anesthetist was asked to ventilate the left lung fully and collapse it. After 30 minutes the S4 segment was expanded while other segments collapsed (Fig 2d). The intersegmental fissure was marked with a hook and completed with the 6 cm Echelon Flex endostapler. Finally, the specimen was removed with a bag. A water test was used to confirm that there was no air leakage from the bronchial stump. The intraoperative frozen section diagnosis was MIA; systematic mediastinal lymph node dissection was not performed. After surgery, a 32F chest tube was placed through the single incision.

Postoperative chest X-ray showed that the left lung re-expanded well. Antibiotics were administered for two days postoperatively. There were no complications and the patient was discharged three days postoperatively. Final pathology confirmed MIA, T1a (mi).

Discussion

The GGO of this patient was 1.0 cm × 1.0 cm on CT, and the preoperative diagnosis was AIS or MIA on the basis of imaging findings. If it is located on the surface of the lung, VATS pulmonary wedge resection is feasible. In this patient, the GGO was located in the internal 1/3 part of the fissure, thus wedge resection was infeasible. VATS segmentectomy is particularly valuable for the lung-sparing resection of deeply located small nodules, as in this case, and thus it was employed as treatment for this patient.[9] In general, lingular (S4 + S5) segmentectomy is used for SPLs in the lingular segment.[7] Yamashita *et al.* reported the use of S3 + S4 segmentectomy and S3b + S4 segmentectomy for the treatment of tumors located between the upper division and lingular segment.[10] Left S4 anatomical segmentectomy was employed in this case, aiming to ensure complete excision of the lesion while preserving pulmonary function. During the procedure, the fissure was satisfactory, and thus the A4 and B4 were easily dissected. We speculate that complete pulmonary fissure is necessary for S4 anatomical segmentectomy alone.

Rocco *et al.* first reported uniportal VATS wedge pulmonary resection in 2004.[11] In 2011, Gonzalez-Rivas *et al.* reported the use of uniportal VATS lobectomy, which has since become popular worldwide.[6,12] We believe that uniportal VATS can achieve the same outcome as 2–3 portal VATS but is less invasive and thus more beneficial to patients. If uniportal VATS can ensure complete R0 resection of lung cancer, this method is a good option for both patients and surgeons.

Uniportal VATS segmentectomy is a demanding technique and is safe and feasible in selected patients, conferring a favorable outcome. Although technically complex, it presents an acceptable alternative to conventional VATS. Segmentectomy via a uniportal VATS approach requires a complete understanding of anatomic structures.[7] In our case, uniportal left S4 segmentectomy was performed to treat a GGO located deep in S4. The surgical procedure was smooth and postoperative recovery was favorable. Final pathology confirmed MIA, T1a(mi), suggesting the oncological nature. Thus, uniportal VATS left S4 segmentectomy is safe and feasible for a lung lesion located deep in the S4 segment, for which wedge resection is infeasible.

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Disclosure

No authors report any conflict of interest.

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