Total Video-Assisted Thoracic Surgery Sleeve Lobectomy: Suture by Both Hands

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Abstract
Bronchoplastic procedures offer better long-term survival and quality of life with less morbidity and mortality than pneumonectomies. However, minimally invasive sleeve lobectomy is rarely reported, and the procedure requires more skill even for experienced hands. We report a total video-assisted thoracoscopic right upper sleeve lobectomy for a patient with centrally located lung cancer.

Keywords
► VATS
► sleeve lobectomy
► both hands suturing

Introduction
With the development of the techniques of minimally invasive surgery, video-assisted thoracic surgery (VATS) techniques have been increasingly applied to the treatment of lung cancer patients. Total thoracoscopic lobectomy has been performed worldwide, mainly in the lesions that are not centrally located. However, for centrally located lesions, the safety and efficacy of VATS procedures are yet to be determined. We performed a total VATS right upper sleeve lobectomy in a patient with centrally located lung cancer.

Case Report
A 60-year-old male smoker was referred to our department with “nonsqueezing” chest pain for 1 month. A computed tomographic scan showed a centrally located right upper lesion (►Fig. 1). A biopsy was made with a bronchoscope; the pathology confirmed a non–small cell lung cancer. Preoperative studies and lab results were not notable except for the lung mass.

Operative Technique
The patient was positioned in a typical left lateral decubitus position and selective intubation was used. The surgeon and the second assistant stood behind the patient. The first assistant stood in front of the patient.

Two 12-mm incisions were made: one in the eighth intercostal space in the midaxillary line, for the camera, and one just below the scapular vertex in the eighth intercostal space; a 5-cm-long anterior minithoracotomy was placed over the fifth intercostal space, without rib spreading, for the insertion of surgical instruments and dissection of vessels and bronchi. The trocar was only introduced to camera port. We used specially designed elongated instruments and endoscopic instruments.

At the beginning of the operation, after confirming the viability of the technique, mediastinal lymph nodes were systematically dissected. Then the lobectomy was performed. After stapling the vessels, the intermediate bronchus was opened and transected, which allowed direct view of the tumor (►Fig. 2). Then the right main bronchus was transected, thus completing the sleeve resection of the tumor including the right upper lobe. The lobe was removed in a glove through the 5-cm-wide incision. This step was performed under full endoscopic view with elongated scissors for open operation. This second specimen was removed in a glove and sent for frozen section, which confirmed free margins.

Bronchial anastomosis was performed in an end-to-end fashion with one running nonabsorbable 3–0 polypropylene (Prolene, Ethicon Inc., Somerville, New Jersey, United States).

The anastomoses started from the membranous portion (posteriorly) and extended to the cartilaginous portion (anteriorly). For the suture of the membranous portion, we used both hands: first the needle holder was placed by the right
hand through the 5-cm-wide incision to suture the proximal end from inside (► Fig. 3). Then to suture the distal end, the needle holder was transferred to the back incision in the eighth intercostal space, and the suture was placed in the distal end by the left hand from outside (► Fig. 4). After completing the posterior suture, the anterior was sutured through the main access port (the minithoracotomy) in traditional fashion. As the running suture was completed, we used the endoscopic coagulator to retract the suture to ensure the proper tension. After the suture was tied, the anastomosis was completed (► Fig. 5).

Finally, the anastomosis was sealed under saline, and 20 mm Hg ventilation positive end-expiratory pressure was set; no air leak was detected.

Intraoperative blood loss was minimal, and total operative time was 240 minutes, including 65 minutes for performing the anastomosis.

During the operation, the patient had onset atrial fibrillation. Amiodarone was deployed, and the heart rate was controlled immediately. The patient was extubated in the operating room and brought to recovery and eventually
moved to the regular floor. On third postoperative day, the
heart returned to sinus rhythm. The chest tube was removed
on the fourth postoperative day. The patient was discharged
on the 10th postoperative day.

The pathology confirmed a poorly differentiated squamous
lung cancer, with N1 lymph node positive (pT1apN1M0). The
patient received three cycles of adjuvant chemotherapy after
discharge. The patient remained in good health until
March 2013 when he received another VATS left upper lobec-
tomy for adenocarcinoma (pT1apN0M0). The patient tolerated
the second operation very well and was discharged on the fifth
postoperative day.

Discussion

Sleeve lobectomy was designed to treat low-grade lung
malignancy.

In current studies, without compromising the oncological
radicalty, bronchoplastic procedures offer better long-term
survival and quality of life with less morbidity and mortality
than pneumonectomies. The increasing number of clinical
series in the literature indicates that bronchoplastic proce-
dures have been widely adopted worldwide and should be
considered in any case of lung cancer that can be completely
resected using these procedures.1,2

However, the procedure requires skill, and minimally
invasive sleeve lobectomy is more challenging even for expe-
rienced hands. A few cases have been reported.3–5 Total VATS
sleeve lobectomy seems to be more cost-effective than a
hybrid procedure.

With increased experience with VATS, we performed this
operation. We realized VATS sleeve lobectomy is a very
different procedure, owning to the confined costal space for
surgical access. During the operation, the suture is conducted
endoscopically. Traditional hand–eye coordination is re-
placed by hand movements conducted by a two-dimensional
visual system; we found traditional way of suturing time-
consuming when obtaining a proper needle position. There-
fore, we modified the technique during suture of the mem-
branous part. The surgeon felt more comfortable about both
hands suturing, which accelerated the process of the
procedure.

The uncomplicated minimally invasive sleeve lobectomy
allowed this patient to tolerate the operation for the second
malignancy very well, which may not have been possible if
pneumonectomy or conventional procedure had been
performed.

In conclusion, minimally invasive sleeve lobectomy is safe
and feasible, with proper selection of potential candidates.
The suture technique under thoracoscopy may differ from
that in open surgery. Furthermore, a large case series may be
required to prove our results.

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