Robotic thoracic surgery: left inferior lobectomy

Runsen Jin, Su Yang, Wei Guo, Yajie Zhang, Xingshi Chen, Han Wu, Hailei Du, Dingpei Han, Kai Chen, Jie Xiang, Hecheng Li

Department of Thoracic Surgery, Ruijin Hospital, Shanghai Jiao Tong University, School of Medicine, Shanghai 200025, China
Correspondence to: Hecheng Li, MD, PhD. Department of Thoracic Surgery, Ruijin Hospital, Shanghai Jiao Tong University, School of Medicine, 197 Ruijin Er Road, Shanghai 200025, China. Email: lihecheng2000@hotmail.com.

Abstract: Robotic-assisted surgery is now well established and has been introduced into the field of thoracic surgery. We are going to share the experience of robotic surgery for left inferior lobectomy. A 44-year-old patient was underwent robotic-assisted thoracic surgery for a pulmonary nodule. The patient was discharged on postoperative day 3 without any perioperative complications. The pathological stage was T1aN0M0 (stage IA). Our result showed the robotic-assisted thoracoscopic surgery was a safe and feasible surgical approach for lobectomy.

Keywords: Robotic-assisted thoracoscopic surgery; left inferior lobectomy

Clinical data

The patient was a 44-year-old woman admitted because of a pulmonary nodule detected by computed tomography (CT). She had seen a doctor because of chest pain 2 weeks previously. Chest CT scan revealed a nodule located in the left lower lobe. The patient had no other symptoms, such as cough, fever, or dyspnea. Three-dimensional (3D) reconstruction of the pulmonary nodules with high-resolution CT showed a mixed density nodules in the left lower lobe of the lung with irregular shape and borders, and spicules, which suggested a malignant lesion. There was no positive sign or supraclavicular lymph node enlargement on physical examination. The patient's cardiopulmonary function, blood gas analysis, and laboratory tests were normal. She had no medical history. Preoperative stage was cT1N0M0 (IA). The preoperative data suggested a malignant tumor in the left lower lobe of the lung; therefore, the left inferior lobectomy was performed.

Three-dimensional reconstruction CT shows a mixed density nodules on the left lower lobe of the lung (*Figure 1*). The lesion was irregular in shape, with spiculation, pleural traction, and multiple visible vessels, but no sign of vascular bundles or vacuoles. The plain scan CT value was about –216 Hu. The anteroposterior diameter of the nodule was 18.2 mm, left-right diameter was 14.8 mm, vertical diameter was 14 mm, and volume was about 507 mm³. The solid part was in the center of the lesion, accounting for nearly half of the nodule.

Operation steps

Anesthesia and body position (1)

After the induction of general anesthesia, the patient was placed in a right lateral decubitus position under double-lumen endotracheal intubation with single-lung (right) ventilation. With his hands placed in front of head, the patient was fixed in the jackknife position (*Figure 2*).

Ports

A 1.5-cm camera port (for a 12-mm trocar) was created in the 8th intercostal space (ICS) at the left mid axillary line, and three separate 1.0-cm working ports (for 8-mm trocars) were made in the 6th ICS (#1 arm) at the left anterior axillary line, the 8th ICS (#2 arm) at the left posterior axillary line, and the left 7th ICS (#3 arm), 2 cm from the spine. An auxiliary port (for a 12-mm trocar) was made in the 8th ICS near the costal arch (*Figure 3*).
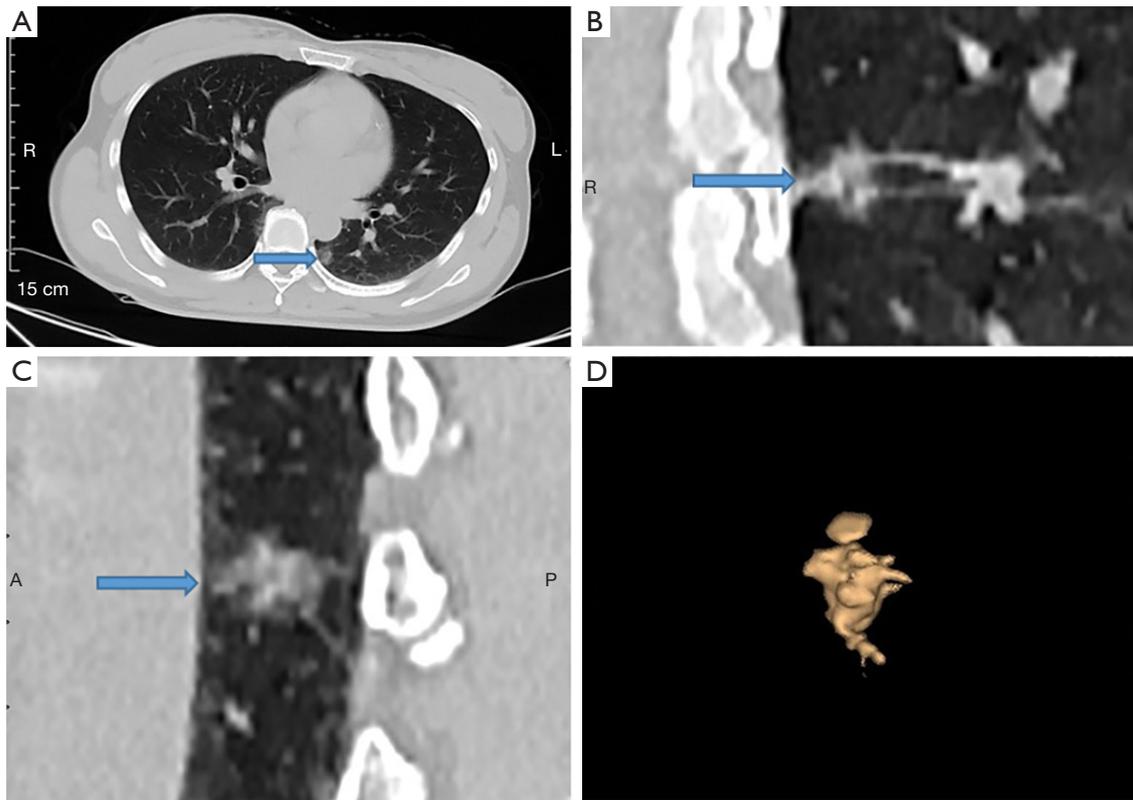
Figure 1 A nodule located in the left lower lobe. (A) Horizontal section; (B) coronal section; (C) sagittal section; (D) 3D-reconstruction.
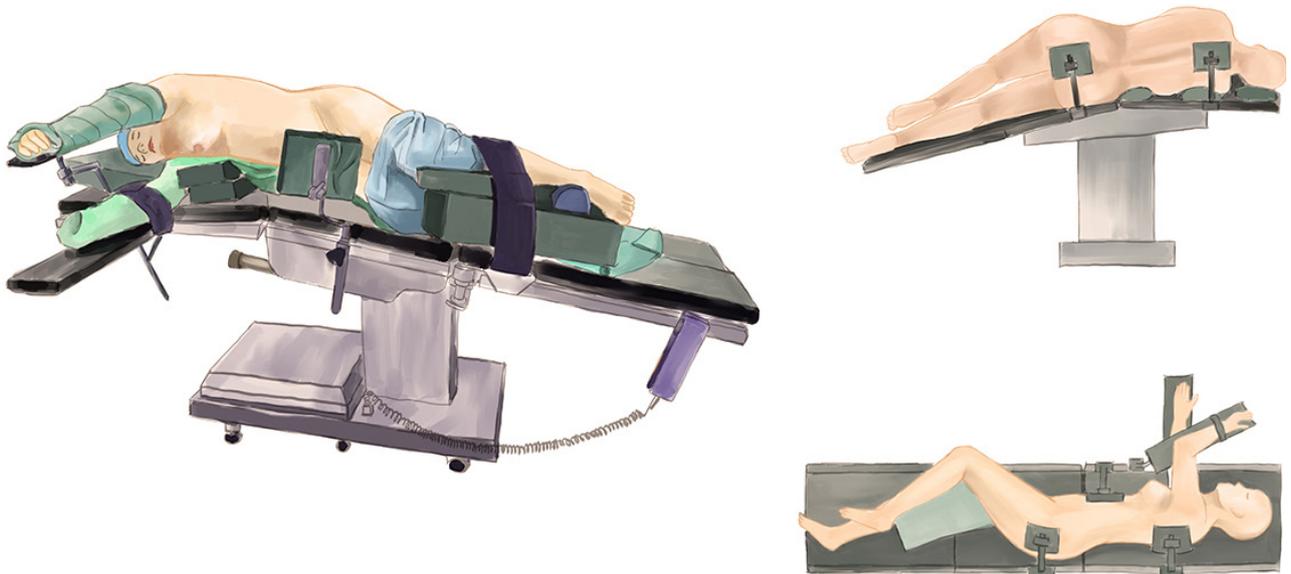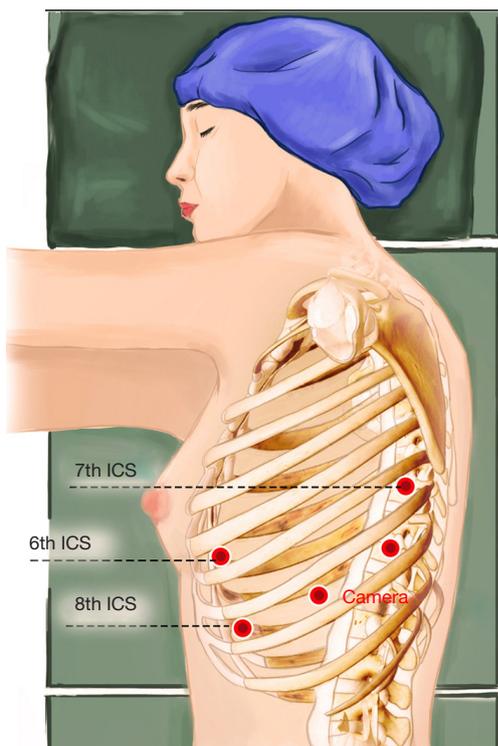

Figure 2 Jackknife position.

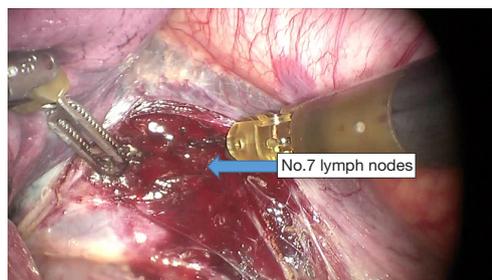Figure 3 Ports in the 6th, 7th , and 8th ICS. ICS, intercostal space.

Figure 4 The inferior ligament of left lung was cut, and the No. 9 lymph nodes were resected.

Installation of the surgical arms (1,2)

The robot patient cart is positioned directly above the operating table and then connected. The #2 arm was connected to a bipolar cautery forceps, and the #1 arm was connected to a unipolar cautery hook. An incision protector was used in the auxiliary port.

Surgical procedure (1-5)

See *Figures 4-17*.

Figure 5 The left mediastinal pleural was opened, the subcarinal lymph node (No. 7) was resected.
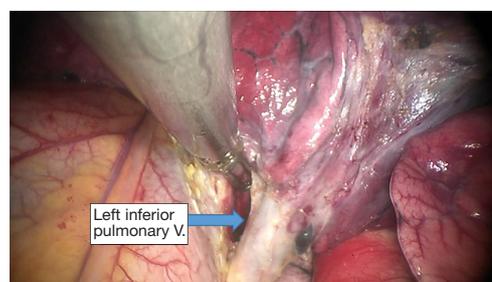
Figure 6 The left inferior pulmonary vein was dissected and skeletonized.

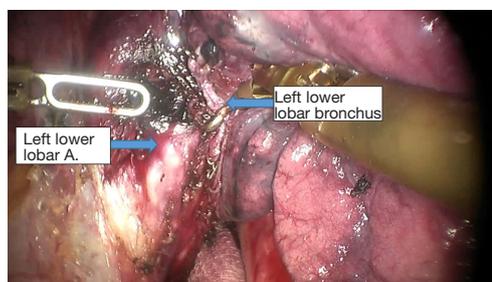Figure 7 The left inferior pulmonary vein was cut with Endo GIA (60 mm-2.5).

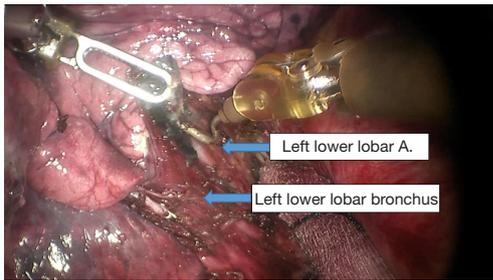Figure 8 The left lower lobe bronchus and artery were dissected and separated.

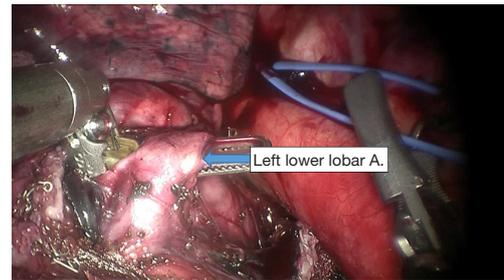**Figure 9** The lymph nodes around the left lower lobar bronchus (No. 11) were resected.
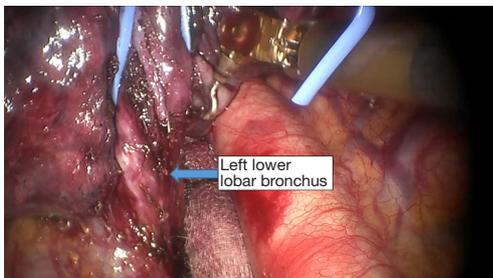

Figure 10 The left lower lobe bronchus was isolated and suspended with a rubber band.

Figure 11 The left lower lobe bronchus was cut with Endo GIA (60 mm-4.8).

Figure 12 The left lower lobar artery and nearby lymph nodes around (No. 11) were resected.

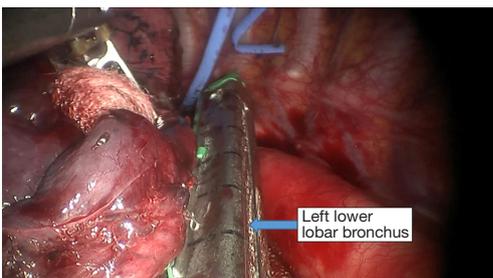**Figure 13** The left lower lobar artery was isolated.

Figure 14 The left lower lobar artery was cut with Endo GIA (60 mm-2.5).
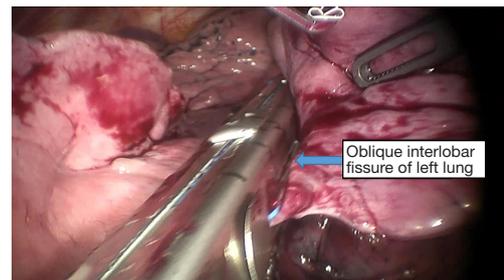
Figure 15 The interlobar fissure was separated with Endo GIA (60 mm-3.5×3, and 45 mm-3.5×1).
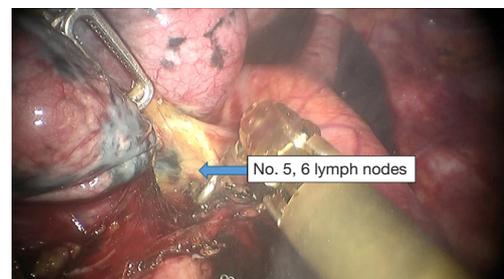

Figure 16 Lymph nodes No. 5 and 6 were resected.

Figure 17 The lung was inflated under water to ensure that there was no air leak. The chest drainage tube was placed in the 8th ICS, and pigtail tube was placed in the 10th ICS. ICS, intercostal space.

Postoperative condition

Postoperative treatments included anti-inflammatory and phlegm-resolving treatment. The thoracic drainage tube was withdrawn 1 day after surgery, and the patient was discharged 3 days after surgery. No complications were observed during hospitalization.

Pathologic diagnosis was invasive adenocarcinoma of the left lower lobe. All lymph nodes were negative. Postoperative pathological stage was pT1N0M0 (stage IA adenocarcinoma).

Acknowledgements

Footnote

Conflicts of Interest: The authors have completed the ICMJE uniform disclosure form (available at http://dx.doi.org/10.21037/amj.2017.01.09). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images.

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