

Robotic-assisted left inferior lobectomy

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Clinical data

History

The patient, a 52-year-old woman, was admitted due to “space-occupying lesion in the inferior lobe of lung found during health check-up 3 weeks ago”.

The patient complained of an occasional cough but had no signs/symptoms such as fever, phlegm production, difficulty in breathing, chest tightness, shortness of breath, fatigue or night sweats. She had been treated with azithromycin and levofloxacin in a local hospital for 1 week, but the condition was not remarkably improved.

Physical examination

No bilateral supraclavicular lymph node enlargement was detected. Chest examination showed no positive sign.

Auxiliary examination

- (I) Chest CT showed a lobulated and spiculated dorsal high-density shadow sized 1.8 cm × 2.0 cm in the inferior lobe of left lung. It has uneven density and an enhancement was evident after contrast application. The bilateral pulmonary hilar and mediastinal lymph nodes were not remarkably swollen (*Figures 1,2*).
- (II) Metastasis was not detected on head CT, bone ECT, and abdominal ultrasonography.

Pre-operative preparation

Same as the conventional open thoracic surgery.

Surgical procedures

Anesthesia and body position

After the induction of general anesthesia, the patient was under double-lumen endotracheal intubation and underwent right-sided one-lung ventilation.

The patient was placed in the right lateral decubitus position and in a Jackknife position (*Figure 3*).

Procedures

- (I) Incisions: a 1.5-cm camera port was created in the 8th intercostal space at left posterior axillary line, and two 1.0-cm working ports were separately made in the 5th intercostal space at anterior axillary line and the 8th intercostal space at scapular line. A 4-cm auxiliary port was made in the 7th intercostal space at midaxillary line (*Figure 4*).
- (II) Connection of robot Patient cart. The robot Patient cart is positioned directly above the operating table and then connected. Its left hand was attached to bipolar cautery forceps, and its right hand was attached to a unipolar cautery hook. Incision protector was applied in the auxiliary port.
- (III) The inferior pulmonary ligament was dissociated using the unipolar cautery hook till the inferior pulmonary vein level (*Figure 5*).
- (IV) Remove the lymph nodes in the inferior pulmonary vein (*Figure 6*).
- (V) Dissociate the inferior pulmonary vein (*Figure 7*).
- (VI) Pull the inferior pulmonary vein elastic cuffs (*Figure 8*).
- (VII) Cut off the inferior pulmonary vein, and then the vein of the left inferior lobe of the lung was clamped



Figure 1 CT image: markings.

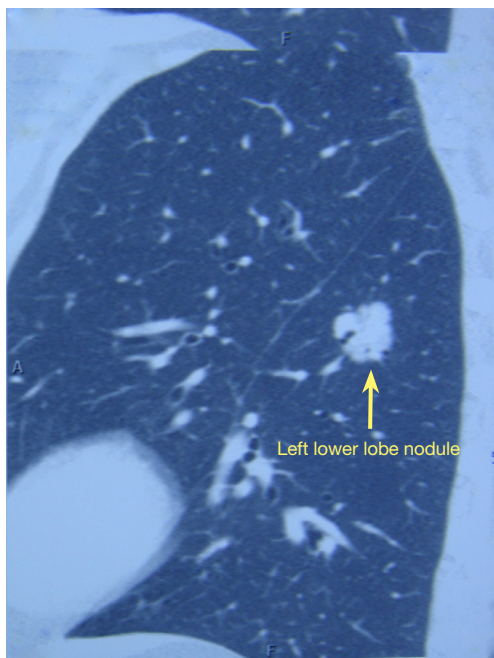


Figure 2 CT image 2: markings.



Figure 3 Surgical position.



Figure 4 Incisions.

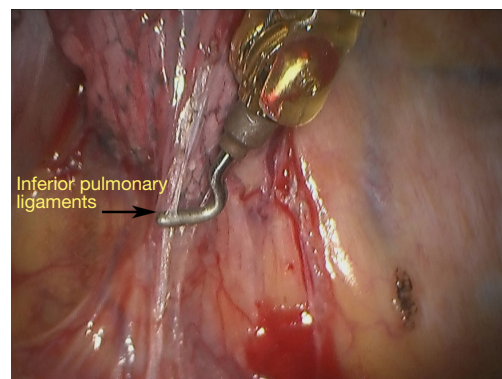


Figure 5 Dissociate the inferior pulmonary ligament.

and divided using the single-use endoscopic linear cutter/stapler (white reload) (Figures 9,10).

- (VIII) Remove several subcarinal lymph nodes (Figure 11).
- (IX) Remove the interlobar lymph nodes (Figure 12).
- (X) Dissociate and transect the branches of the upper lobe artery (Figures 13,14).

- (XI) Dissociate the upper lobe bronchus. Then, the bronchus was clamped using the single-use endoscopic linear cutter/stapler (golden reload) for lung ventilation test, and was transected after the test (Figures 15,16).
- (XII) An extraction bag was inserted to harvest the

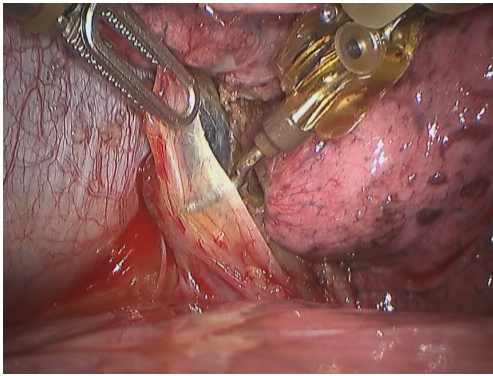


Figure 6 Remove the lymph nodes in the inferior pulmonary ligament.

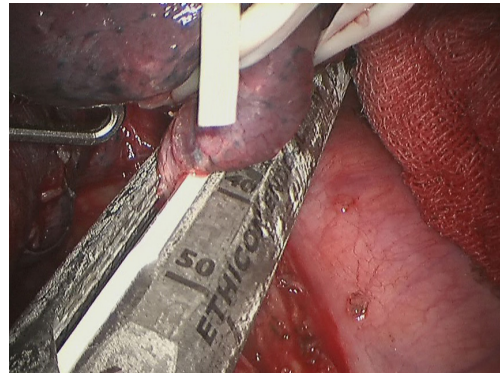


Figure 9 Transect the inferior pulmonary vein.

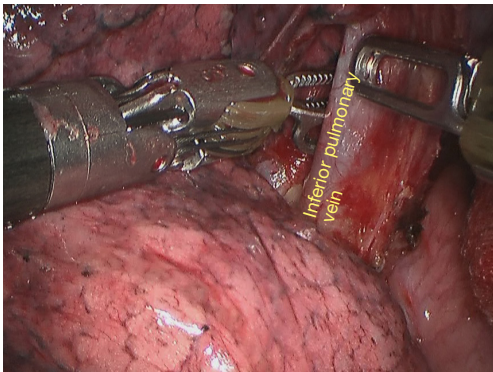


Figure 7 Sharply dissect the inferior pulmonary ligament: markings.

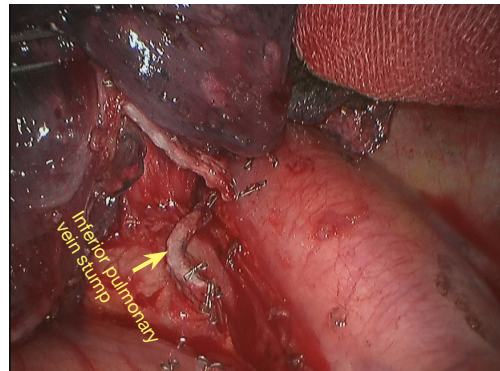


Figure 10 After the transection of the inferior pulmonary vein: marking.

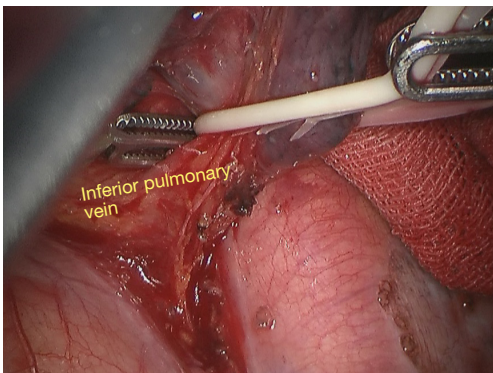


Figure 8 Pull the inferior pulmonary ligament using an elastic cuff: markings.

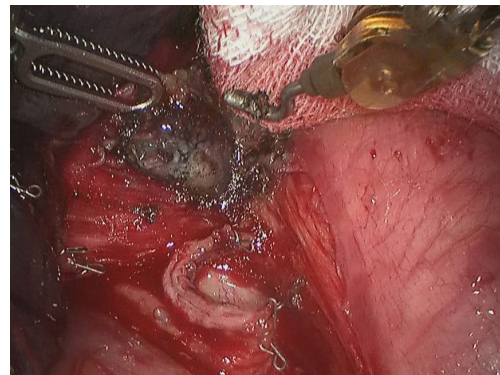


Figure 11 Remove the subcarinal lymph nodes.

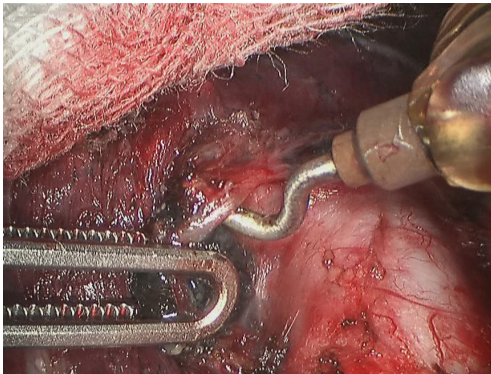


Figure 12 Remove the interlobar lymph nodes.

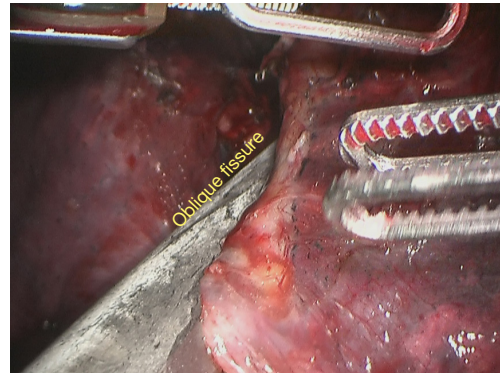


Figure 15 Clamp the lower lobe bronchus and part of undifferentiated lobar fissures: markings.

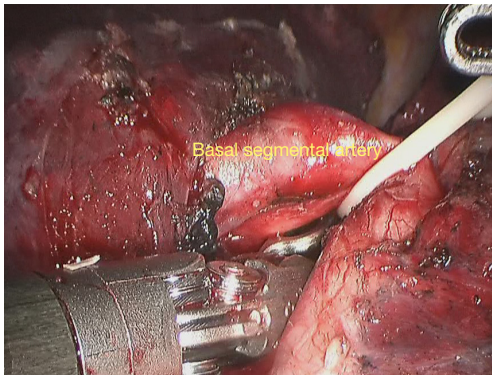


Figure 13 Dissociate the arteries in the basal and dorsal segments of lower lobe: markings.

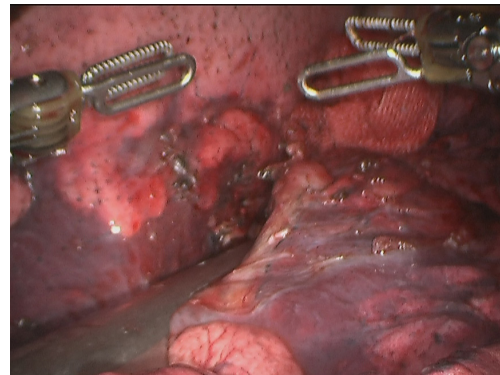


Figure 16 Transect the bronchus after the full ventilation of the upper lobe.

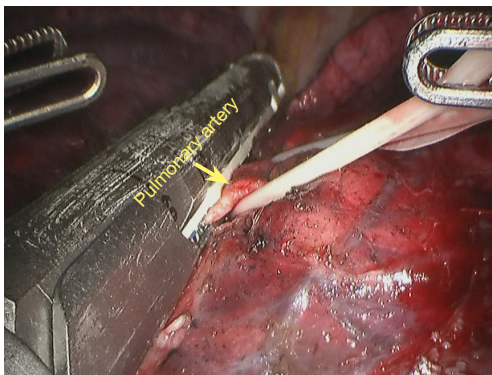


Figure 14 Transect the branches of lower lobe artery: markings.

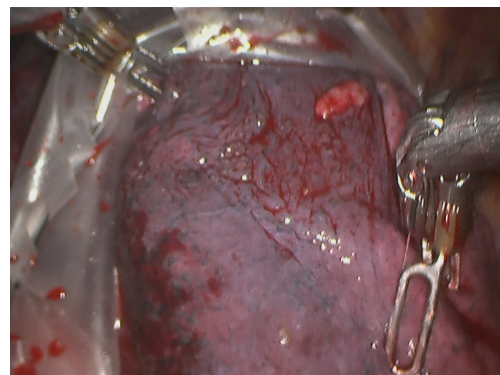


Figure 17 An extraction bag was inserted to harvest the completely resected lobe via the incision.

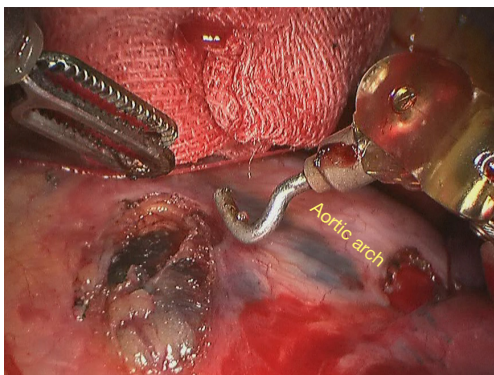


Figure 18 Remove the lymph nodes under the aortic arch: markings.

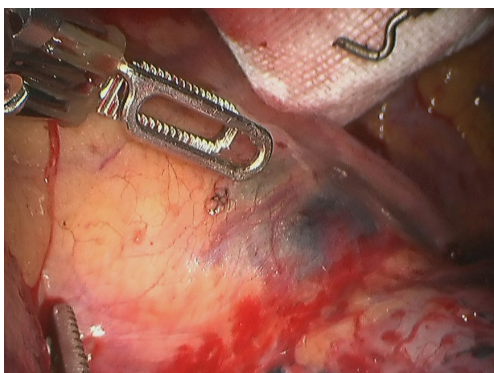


Figure 19 Remove the lymph nodes near the ascending aorta.

completely resected left inferior lobe via the incision (Figure 17).

- (XIII) Remove the lymph nodes under the aortic arch (Figure 18).
- (XIV) Remove the lymph nodes near the ascending aorta (Figure 19).
- (XV) Saline is then injected to expand the lungs to identify potential leakage of the bronchial stumps (Figure 20).
- (XVI) Wash the thoracic cavity with warm saline. The robotic arms were withdrawn after the bleeding was

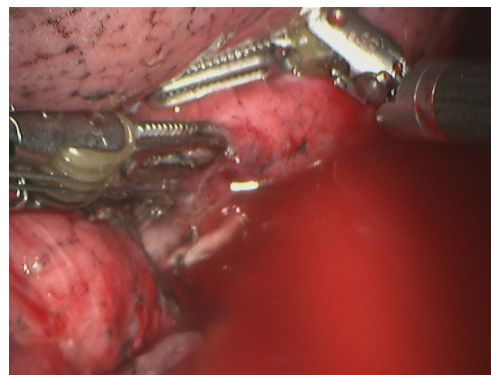


Figure 20 Bronchial stump leak test showed negative result.

stopped. Close the chest after a closed chest drainage tube was placed at the camera port.

Postoperative treatment

Postoperative treatment was similar to that after the conventional open lobectomy.

Pathological diagnosis

A moderately-well differentiated adenocarcinoma sized 2.0 cm × 1.5 cm × 1.0 cm in the lower lobe of the left lung. No metastasis was seen at the bronchial stump or the sampled lymph nodes. Postoperative pathologic staging: pT₁N₀M₀.

Acknowledgements

None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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