

# Robotic-assisted thoracoscopic surgery: right inferior lobectomy

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**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 right inferior lobectomy. A 61-year-old patient underwent robotic-assisted thoracic surgery for a primary lung adenocarcinoma. The patient was discharged on postoperative day 6 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 non-small cell lung cancer (NSCLC).

**Keywords:** Robotic-assisted thoracoscopic surgery; right inferior lobectomy

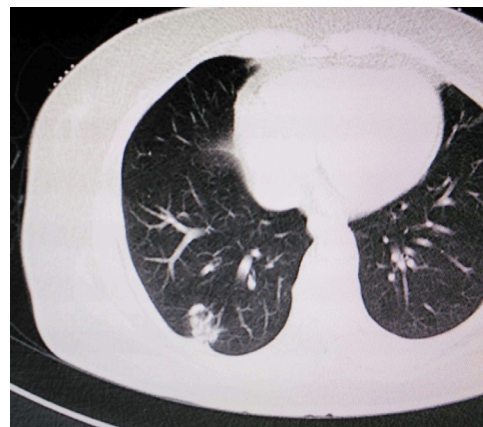
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## Clinical data

A 61-year old woman with chronic obstructive pulmonary disease but no history of smoking was found to have a right inferior lobe mass by computed tomography (CT) scan during health checkup. Adenocarcinoma was diagnosed by lung puncture. The right main and upper lobe bronchus were not involved. Positron emission tomography (PET)-CT and cerebral magnetic resonance imaging showed no distant metastasis. Preoperative blood analysis and tests of lung, cardiac, liver and renal function were normal. No superficial lymph node enlargement was detected on physical examination. The clinical stage was cT1N0M0. Informed consent for robotic-assisted thoracic lobectomy was obtained from patient before operation (*Figure 1*).



**Figure 1** Chest CT: the mass was located in the right inferior lobe.

## Procedure

### Anesthesia and body position

The patient received general anesthesia by double-lumen endotracheal intubation and was placed in the lateral decubitus position and in a jackknife position (*Figure 2*).

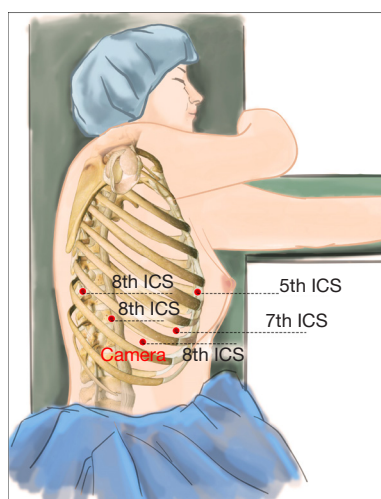
### The port positions

After the patient was prepped and draped in the usual

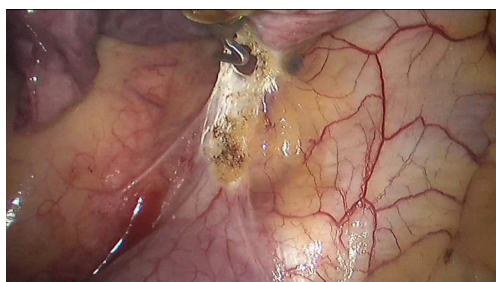
manner, we placed five ports as follows: a 12-mm camera port was placed in the 8<sup>th</sup> intercostal space (ICS) at the mid axillary line, and three 10-mm working ports were placed separately in the 5<sup>th</sup> ICS at anterior axillary line (#1 arm), 8<sup>th</sup> ICS at the right posterior axillary line (#2 arm), and the right 8<sup>th</sup> ICS which was 2 cm from the spine (#3 arm). Finally, an auxiliary port was created in the 7<sup>th</sup> ICS between the camera port and the right working port, about 8-cm far from the right working port (*Figure 3*).



**Figure 2** Jackknife position.



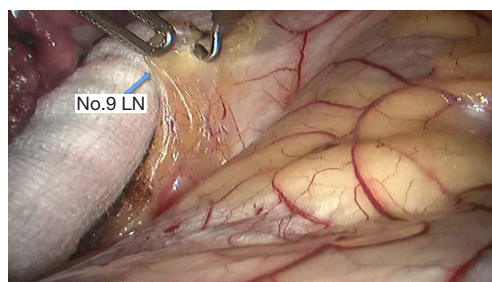
**Figure 3** Ports in the 5<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup> ICS. ICS, intercostal space.



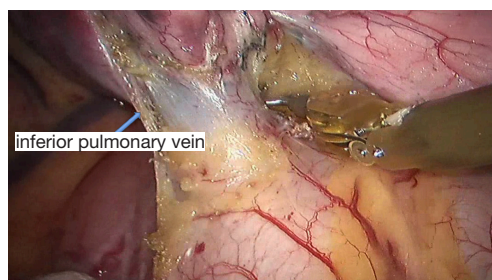
**Figure 4** The inferior pulmonary ligament was dissociated using the cautery hook to the inferior pulmonary vein level.

#### **Connection of robot patient cart**

The robot patient cart was positioned directly above the operating table. Two bipolar forceps and one unipolar cautery hook were attached to the arms. An incision



**Figure 5** The lymph nodes in the inferior pulmonary ligament (No. 9) were removed.



**Figure 6** The inferior pulmonary vein was dissociated.

protector was placed in the auxiliary port.

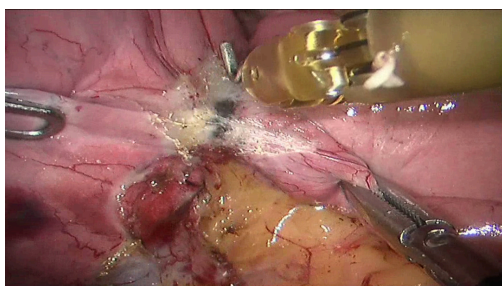
#### **Surgical procedure**

See Figures 4-22.

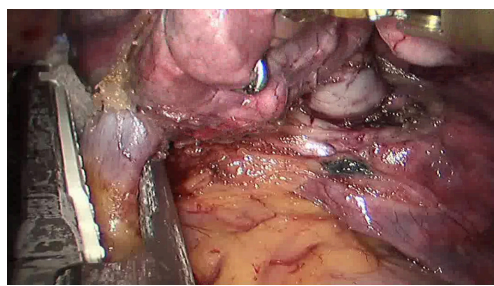
#### **Postoperative outcome**

The patient was routinely given anti-inflammatory and phlegm resolving treatment postoperatively. The chest tube was withdrawn after 2 days, and the patient was

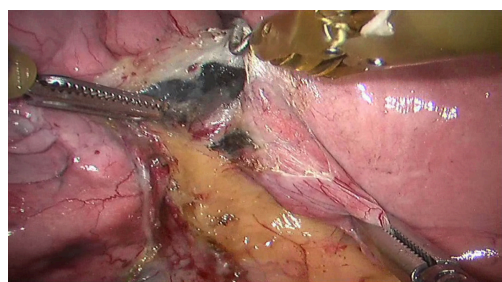




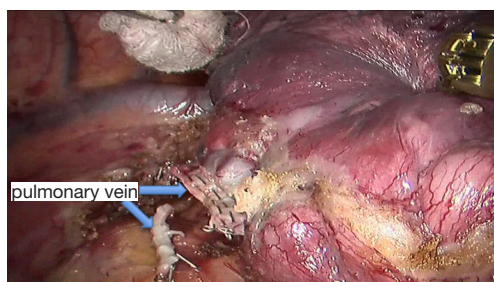
**Figure 7** The interlobar adhesion was dissected using the cautery hook.



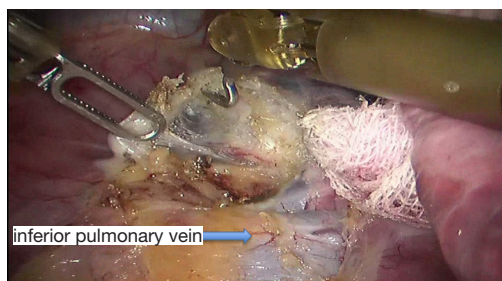
**Figure 11** The right inferior pulmonary vein was transected using the Endo GIA.



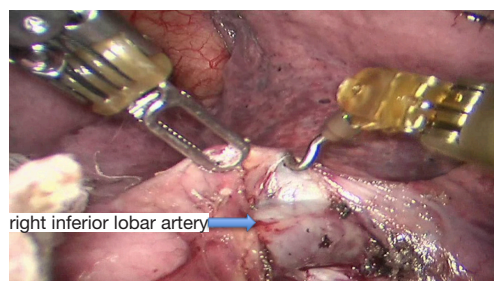
**Figure 8** The interlobar lymph nodes were removed.



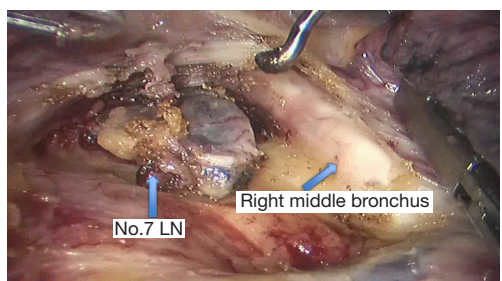
**Figure 12** The right inferior pulmonary vein was transected.



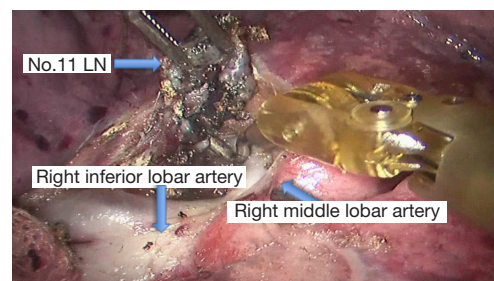
**Figure 9** The lung was pushed anteriorly and cut open the posterior pleura.



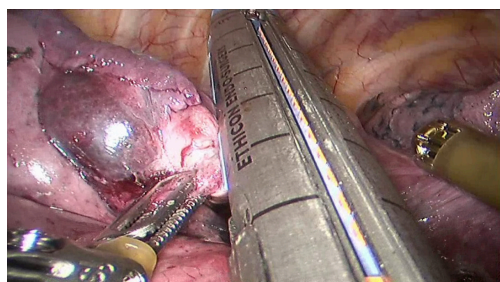
**Figure 13** The pulmonary artery to the inferior lobe was isolated.



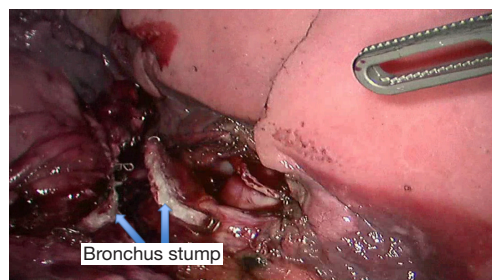
**Figure 10** The subcarinal lymph nodes (No.7) were exposed and removed.



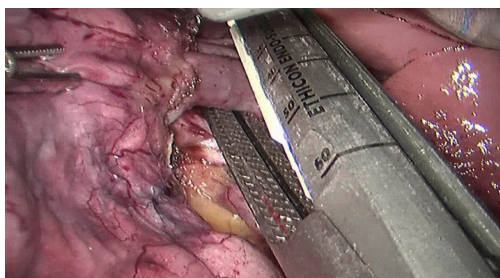
**Figure 14** The interlobar lymph nodes were removed.



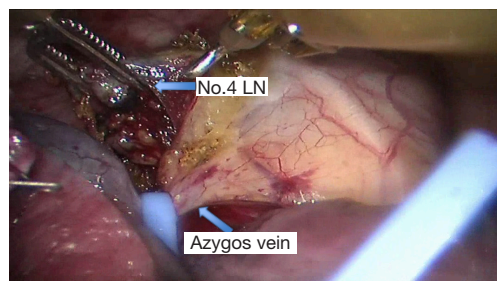
**Figure 15** The oblique fissure was dissected using the Endo GIA.



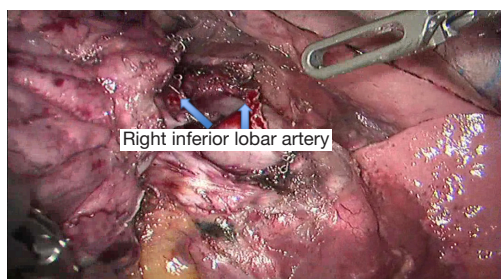
**Figure 19** The inferior pulmonary bronchus was transected.



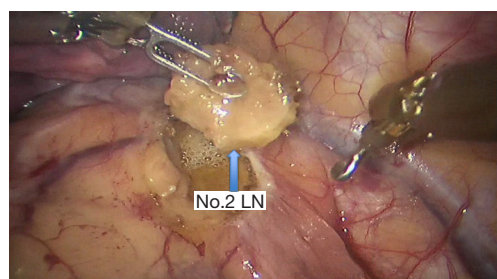
**Figure 16** The pulmonary artery of the inferior lobe was transected using the Endo GIA.



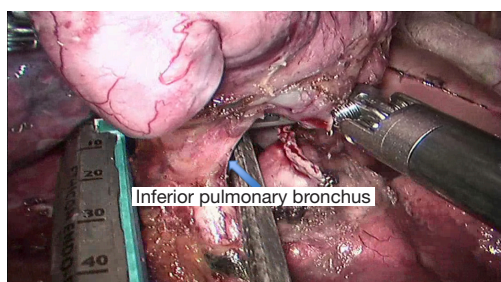
**Figure 20** The azygos vein was pulled with elastic line, and the lymph nodes near the trachea were removed.



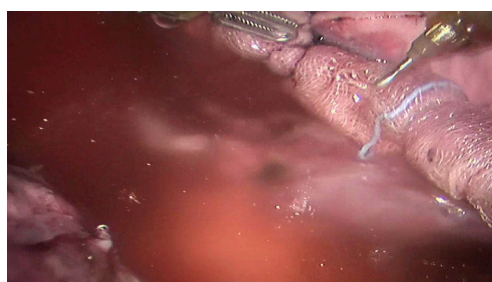
**Figure 17** The pulmonary artery of the inferior lobe was transected.



**Figure 21** The lymph nodes in front of the trachea (No.2) were removed.



**Figure 18** The inferior pulmonary bronchus was transected using the Endo GIA.



**Figure 22** The bronchial stump leak test was negative.



discharged 6 days later after surgery. No complications were occurred during hospitalization. The pathological stage was T1aN0M0 (stage IA).

## Comment

Currently in our institution, the 3- or 4-arm method is mainly used. When the patient has a small physique, the 3-arm method may reduce interference between arms. However, the 4-arm method become more popular, because the visual field can be set at any angle in the thoracic cavity. Therefore, the position of each port is important. Nakamura *et al.* suggested a 9-cm distance should be set between ports to reduce interference between surgical arms (1). In our experience, a distance of 8–10 cm effectively reduces the interference between arms. Cerfolio *et al.* described a complete robotic lobectomy setting all the ports concentrating in the 7th ICS (2,3), and this method was considered applicable for all lobectomies (1).

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## Footnote

*Conflicts of Interest:* The authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/amj.2017.01.05>). 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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