



Uniportal fully robotic-assisted bronchovascular sleeve bilobectomy

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Clinical vignette

A 65-year-old female, active smoker was admitted to our hospital with the diagnosis of a 10 cm, centrally located adenosquamous carcinoma involving the right upper and middle lobe. A preoperative PET scan was positive only at the tumor site. The patient refused neoadjuvant chemotherapy; therefore, surgical resection was proposed using the uniportal robotic-assisted thoracic surgical (URATS) approach.

Surgical technique

Exposition

A 4 cm incision was placed in the 7th right intercostal space. Arm 1 of the DaVinci Xi robotic system was canceled, as per our usual protocol with a uniportal robotic right-sided approach. The camera was placed on arm 2 and was maintained on the posterior side of the incision. Arms 3 and 4 were placed in the center and most anterior part of the incision respectively (1). We used 8 mm trocars for camera and robotic instruments and a 12 mm trocar when robotic staplers were inserted.

Operation

Due to the large size of the tumor, the procedure was

performed in an inferior to superior manner. The posterior part of the fissure was opened using robotic staplers. After the completion of the anterior part of the fissure, a middle lobectomy was carried out in the usual fashion. The right upper lobe (RUL) vein and arterial branches were dissected and sectioned. Due to tumor involvement of the posterior ascending artery, the right pulmonary artery was controlled proximally and distally using bulldog clamps. The posterior ascending artery was cut with scissors and closed with a 5/0 prolene suture. After the RUL bronchus section, a systematic lymph node dissection was performed. The secondary carina was resected and the bronchus intermedius was anastomosed to the right main bronchus using a running 3/0 double needle 25 cm barbed suture (Filbloc, Assut Europe, Rome, Italy).

Completion

No postoperative complications were observed, and the chest drain was removed on the third postoperative day. The patient was discharged on the fifth postoperative day.

Comments

The clinical stage after pathological analysis was defined as T3N1M0 (6 cm adenosquamous cell tumor, 19 lymph nodes removed, one peribronchial was positive, 5 lymph

node stations explored) and adjuvant chemotherapy was administered. At eight months follow-up, the patient was leading a normal life, with no residual pain, and was under immunotherapy treatment with PET-CT control showing absence of pathological uptake.

Advantages

The rapid expansion of robotic-assisted thoracic surgery presents new challenges and motivation for thoracic surgeons. There are many questions to be asked before choosing the optimal surgical approach and offering the best possible treatment to our patients. In our experience, URATS with the DaVinci Xi is feasible even for complex surgical procedures, but extensive experience with both uniportal video-assisted thoracic surgery (VATS) and robotic surgery is an important requirement (1). Advanced procedures, such as the bronchial sleeve resection and even vascular sleeve resections performed by minimally invasive techniques are constantly reported in the literature (2). With the introduction of robotic platforms in thoracic surgery (RATS), more cases are being reported by using this technology. These systems are designed typically for a multiport approach, but the new robots can be adapted to a single incision approach. To our knowledge, this is the first case of a bronchovascular sleeve resection and reconstruction by fully robotic URATS.

The single incision approach has been proven to result in less pain and allows for a faster recovery back to normal life compared to the classic open and multiport approaches, especially for complex cases requiring sleeve resections (3). For centrally located tumors, the bronchovascular sleeve resection can be performed by a uniportal approach, avoiding the risk of a pneumonectomy and the comorbidities related to open procedures (4). The use of robotic surgery for sleeve resections has several advantages, such as intrinsic three-dimensional vision, seven-degrees of freedom of movement of the instruments, tremor filtering, better exposure, and the facility for tying inside the chest. Double needle, single thread barbed sutures allow for a faster, more precise, and safer anastomosis. The direct view in parallel with the instruments allows for a very good field for suturing with very little limitation (5). Clamping the main pulmonary artery and the distal end of the vessel with a Reliance™ Bulldog clamp is considered the most appropriate choice when the procedure is performed fully robotically. At the end of the anastomosis, we normally

inject heparin to fill the artery and prevent thrombus. The distal clamp should be released first to check distal flow and the possibility of bleeding.

Caveats

Due to the large size of the tumor and hilar location, the mobilization of the tumor is extremely difficult, therefore surgery had to be done in an inferior to superior manner. The role of the assistant is crucial in these kinds of cases in facilitating proper exposure. The lower location of the incision compared with UVATS makes the movements and the exposure for the assistant difficult, but lower placement of the incision is mandatory to allow for safe insertion of the staplers. Although docking time is quick in URATS, the surgical time during the bilobectomy was increased due to the complexity of the surgery and the assistant replacing one of the 8 mm trocars with one 12 mm, for the stapler insertion and readjustment of the arms each time.

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Footnote

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

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