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Uniportal robotic-assisted thoracic surgery for mediastinal tumors

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Clinical vignette

We present the case of a 52-year-old male patient with a smoking history, who presented with intermittent cough and progressive dyspnea. He was discovered to have thymic hyperplasia on computed tomography (CT) scan. After completing relevant investigations, he was proposed for a uniportal subxiphoid robotic assisted thymectomy.

Surgical technique

Preparation

We chose a uniportal robotic assisted subxiphoid approach for this case. The patient was placed in a supine position on the table with a roll placed under his back to better expose the chest. The surgery was performed under general anesthesia with selective intubation on the left in order to deflate the lung when needed.

Exposition

A single 3-cm longitudinal incision was performed under the xiphoid appendage, which was later resected. A nontraumatic ring wound protector was placed. For this technique a glove can be used to ensure the seal and insufflate CO₂. Once the robot was docked from the left side of the patient with targeting in the center of the wound, the trocars were inserted on the fingers of the glove

and sealed with tape or non-resorbable sutures. Arms one, two and three were activated, while arm four was excluded. The 30° camera was placed on arm three while placing the instruments.

For better visualization during surgery, the 30° camera can be interchanged with other instruments, either in the middle on arm two, or in the right corner of the wound on arm one. The other instruments (usually a fenestrated grasper and a Maryland bipolar dissector) follow on arm one and arm three, to the preference of the surgeon. Every instrument is placed under direct visualization of the camera. Usually, there is no need for another instrument, but when needed the cuff of the glove can be briefly detached to insert a subxiphoid long suction.

Operation

The mediastinal pleura was incised starting from down and the dissection continued substernally, detaching the mediastinal and pericardial fat tissue and the reflection of the pleura up to the mammary vessels. At this point the camera was placed in the middle, on arm two, for better visualization of both sides and maneuverability of the instruments. A thorough inspection of the chest cavity was performed, and the dissection was continued with the Vessel Sealer, an energy device which we found to be most suited for the mediastinum. At all points during this approach, both phrenic nerves were visible which makes for a safe

dissection by keeping boundaries clear and minimizing the risk of injury. The fat and thymic tissue were thoroughly dissected *en-bloc* from both sides moving upwards and the camera angle was changed to the right side, on to arm one, allowing for better visualization of the left innominate vein. Both the thymic and lower thyroid veins were dissected and cauterized with the Vessel Sealer, but clips can also be used safely. At this point the thymic tissue was pulled caudally and dissected from the pericardium. After completing the resection and confirming both poles were sealed and completely detached, the thymic tissue was extracted from the wound in an endobag. Proper haemostasis and satisfactory inflation of the lungs were achieved. A single chest tube was inserted, and the wound was closed.

Completion

The patient was extubated in the operating room, had an uneventful recovery and was discharged on the fourth postoperative day.

Comments

Clinical results

The final pathology was type A thymoma. No further treatment was indicated. Thirty-day follow-up showed normal postoperative status and a fully recovered patient.

Advantages

Robotic thoracic surgery is becoming more widely adopted worldwide. Although it presents numerous advantages it is still considered a niche surgery (1) due to its limited availability, accessibility, training of surgical teams, resources and objective available data regarding superiority to video-assisted thoracoscopic surgery (VATS) procedures, particularly uniportal VATS. We developed the uniportal robotic thoracic approach (2) as an alternative to multiport-robotic-assisted thoracoscopic surgery (RATS), which aims to minimize surgical trauma while still benefitting from the precise and safe dissection of the robotic endowrist instruments. The surgical approach of the mediastinum has seen numerous innovative options including the Da Vinci SP (3). We prefer the uniportal subxiphoid robotic-assisted approach for several reasons: first, it lessens postoperative trauma by limiting the incision to a minimal subxiphoid wound with better recovery times and lesser need for pain

medication. From a surgical standpoint, this approach allows for bilateral visualization throughout the surgery, exposing the left phrenic nerve, which is especially hard to identify on the right subcostal/intercostal approach. Use of endowrist instruments and the ability to swap the camera up or down for better visualization without the need to readjust the arms or ports translates into a safer and more time-effective procedure. Sure, it can present pitfalls depending on the size of the lesion, history of the patient and experience of the surgical team, but we find that adapting each case to this approach can improve the surgical time, precision of the dissection and postoperative recovery. However, it is important to stress that subxiphoid and robotic thoracic surgery experience is mandatory.

Caveats

In certain cases, a single intercostal approach can be an advisable option (video case 2); another option is adding an extra-subcostal/intercostal port to the subxiphoid approach for better instrumentation (video case 3). All rightful options depend on the experience of the surgical team and resources and the characteristics of the patient.

Innovation and surgical progress are related in all pioneering stages to the case selection, availability of the technology and accessibility to it, and can measure favorable outcomes when we consistently advance new uses of robotic platforms.

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Footnote

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

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