

Robotic-assisted left upper lobectomy: facing the challenge head-on

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Left upper lobectomy is the most challenging pulmonary lobar resection for thoracic surgeons. The anatomy of the pulmonary artery and its relation to other hilar structures put it at risk of injury, more so than during any other lobectomy. It is, therefore, not surprising that multiple techniques for resection of the left upper lobe have been developed, via both open and minimally invasive approaches. Different techniques call for a specific order in which the hilar structures should be divided, all aiming to accomplish the same thing: a safe, efficient and oncologically optimal removal of the left upper lobe and its associated lymph nodes.

Xiang *et al.* (1) provide an excellent description of just such an approach to robotic left upper lobectomy. As the authors note, robotic surgery has gained significant penetrance in the field of thoracic surgery and is now a routinely applied technique for minimally invasive lobectomy. While the patient described in this case had a clinical stage I lung cancer, robotic technology can be applied to a wide range of clinical presentations. In fact, the enhanced dexterity and optics offered by the robotic platform make it especially useful in locally advanced disease, post-induction therapy cases and when sub-lobar resection is warranted (2). Robotic lobectomy may also offer decreased pain and shortened length of stay compared to other approaches, though evidence of superiority over non-robotic thoracoscopy is limited (3). From an educational standpoint, robotics offers the ability for robust simulation training and the availability of a second “teaching” console in the operating room allows

for easy integration of trainees into all steps of the procedure according to their skill level (4). Disadvantages of robotic lobectomy include cost and the lack of lung palpation (5).

The authors describe what many will recognize as a standard set up with regard to patient positioning and port placement. The use of an access incision, as described, allows easy access by the bedside assistant for suctioning and most importantly for the placement of a sponge-stick for compression of bleeding if a vascular injury occurs. The alternative to this approach is to use a closed system with CO₂ insufflation, which allows for more working room, better visualization and improved mediastinal stability. The hilar dissection described by the authors involves the division of the arterial branches of the left upper lobe first, followed by the left upper lobe bronchus and lastly the superior pulmonary vein. This technique has the advantage of dealing with the arterial branches early on in order to avoid injury to the artery while dissecting the other hilar structures. However, as described, this approach does mandate dissection within the fissure, which may predispose to air leaks. Our preferred approach is to divide the vein first, then the bronchus, saving the artery for last. This allows the artery to be fully visualized once the other hilar structures are divided, and can be done in a completely fissure-less manner. However, this approach does mandate blind dissection behind the bronchus, which can put arterial branches at risk of injury if not done with appropriate care. In our experience, performing first a meticulous intralobar nodal dissection allows complete

exposure of the bronchial and arterial branches and frees up the planes in between these structures, so that they can be encircled and divided with clear visualization. Regardless of the order in which structures are divided, the goal of any technique is a complete resection of all disease and proper staging. Xiang *et al.* provide an excellent description of a proper oncologic resection, with a thorough lymph node dissection, including mediastinal, hilar and intrapulmonary stations. This node dissection is one of the most important aspects of any lobectomy for lung cancer and should not be overlooked. The enhanced ability to dissect these nodes is one of the major advantages of the robotic platform.

Surgeons should be aware of multiple approaches to any operation, especially one as potentially challenging as left upper lobectomy. Thoracotomy, thoracoscopy and robotic approaches all have their place, as do a variety of sequences of controlling each of the hilar structures. Depending on the anatomy of the hilum, the fissure, the chest wall and the tumor, one's standard approach may not always be the best approach and knowledge and flexibility about other techniques might help get the job done in a safe manner. The advantages and disadvantages of each option must be weighed in each unique patient. In describing their preferred technique for robotic left upper lobectomy, Xiang *et al.* provide a useful contribution to the surgical literature.

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Footnote

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