Masters of Cardiothoracic Surgery

Uniportal robotic-assisted thoracoscopic surgery: resection of the first rib

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Clinical vignette

A 39-year-old female patient presented with venous and neurogenic thoracic outlet syndrome, manifesting in positional pain and deep vein thrombosis (DVT) in the right upper extremity, accompanied by vascular redistribution. Her medical history was significant for surgical intervention for palmar hyperhidrosis (via a thoracoscopic approach) 15 years ago and second DVT in the right upper extremity in 2010, for which she received only limited anticoagulant treatment. She re-presented with symptoms suggestive of another DVT in the same region, meriting further investigation and management. Computed tomography (CT) angiography showed a decrease in the costoclavicular space in abduction (5.8 mm) when compared with the anatomical position (8.8 mm). Magnetic resonance (MR) angiography reported marked stenosis of the right subclavian vein in the costoclavicular space with forced arm-abduction maneuvers, completely reversed at rest. A non-pathological electromyogram (EMG) and magnetic resonance imaging (MRI) of the upper extremity showed a decrease in the lumen of the right subclavian vein up to 70–80%. After unsuccessful symptomatic treatment, physiotherapy, and rehabilitation, and given the recurrence of DVT after 15 years, a decision was made to operate to alleviate the thoracic outlet syndrome.

Surgical techniques

The patient underwent general anesthesia with a double lumen tube and was placed in the left lateral decubitus position. An ultrasound-guided serratus plane block was performed before surgery. A single incision, of about 4 cm, was made through the fifth intercostal space between the posterior and anterior axillary lines.

Three robotic trocars of 8 mm were placed through the single port. A hook monopolar cautery and a pair of Maryland forceps were used for dissection and coagulation, and a pair of Stille-Giertz bone cutting forceps were used to cut the first rib. There were abundant pleuropulmonary adhesions because of the previous surgery. The first right rib was dissected and separated from the costosternal junction with scissors and electrocoagulation. The right subclavian neurovascular bundle was identified and detached from the bone. Afterwards, the rib was subluxated and cut with the bone cutting forceps, through the incision. Finally, a 28-Fr chest-tube was placed and the ostomy was closed with an intradermal suture. The patient was discharged on the third postoperative day, with good pain control. The prophylactic anticoagulant regimen was discontinued at a follow-up appointment, after the first postoperative month.

Comments

Patients affected by thoracic outlet syndrome who have failed conservative therapy can be considered for surgical decompression (1). Video-assisted thoracoscopic surgery (VATS) has demonstrated certain advantages when compared with an open approach, such as an enlarged view along the first rib and better identification of the neurovascular bundle (2). Robotic resection of the first rib in patients with thoracic outlet syndrome was described in 2011 (3). Robotic-assisted thoracoscopic surgery (RATS) facilitates a rapid dissection of narrow spaces, with improved maneuverability and three-dimensional (3D) visualization,

in contrast to conventional VATS. RATS was first performed with four ports (4), but gradually, improvements in robotic technique have reduced the number of ports required for resection of the first rib. However, this is the first case in the world in which surgical treatment of thoracic outlet syndrome has been carried out using a single port (or uniportal) RATS (uRATS). This enabled a combination of the ergonomic advantages of the robot with less tissue damage when performing the approach through a single intercostal space, which in turn translates into better postoperative results and less morbidity.

The most difficult step in this technique was placement of the arms through the small incision and working in parallel with the target (5). It should be mentioned that, when compared with conventional RATS, in uRATS, one must change the way with which the instruments are moved within the patient. There is less maneuverability, and one should hence use the wristed instruments that move like a human hand, but with a greater range of motion. On the other hand, it gives you the advantage of being able to work with VATS surgical instruments, with trained surgeons in the relevant field. In our case, we did not have access to specific minimally invasive surgical materials, so we employed traditional, open materials instead.

Our objective is to improve this surgical technique for this benign pathology, such that affected patients can benefit from a less invasive surgery with excellent results and safety. It is important to advocate for the development of minimally invasive approaches when treating pleuro-pulmonary diseases, to allow for surgeons to treat patients with fewer resources, but attain even better results.

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Footnote

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

References

1. Li N, Dierks G, Vervaeke HE, et al. Thoracic Outlet Syndrome: A Narrative Review. J Clin Med 2021;10:962.
2. Loscertales J, Congregado M, Jiménez Merchán R. First rib resection using videothorascopy for the treatment of thoracic outlet syndrome. Arch Bronconeumol 2011;47:204-7.
3. Gharagozloo F, Atiquzzaman N, Meyer M, et al. Robotic first rib resection for thoracic outlet syndrome. J Thorac Dis 2021;13:6141-54.
4. Gkikas A, Lampridis S, Patrini D, et al. Thoracic Outlet Syndrome: Single Center Experience on Robotic Assisted First Rib Resection and Literature Review. Front Surg 2022;9:848972.
5. Gonzalez-Rivas D, Manolache V, Bosinceanu ML, et al. Uniportal pure robotic-assisted thoracic surgery—technical aspects, tips and tricks. Ann Transl Med 2022. doi: 10.21037/atm-22-1866.

