Editorial

Robotic resection of large anterior mediastinal masses

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From a surgical standpoint, the 21st century has been largely marked by the advancement of robotic surgery. Robotic surgery is more aptly described as computer-assisted operating with advantages of high definition 3-dimensional visualization, wristed instruments with seven degrees of motion tailored for precise and safe tissue handling, and improved ergonomics for the surgeon. Ashton *et al.* were the first to report successful robotic thymectomy for myasthenia gravis in a 28-year-old patient in 2003 (1). Since then, thoracic surgeons continue to apply this technology to increasingly complex thoracic surgeries. However, there has been a slower adoption for thymic malignancies due to concerns over tumor manipulation, capsular disruption, and incomplete resection (2).

Surgical treatment with complete resection is the standard of care in the management of thymic tumors. It is widely accepted that a complete R0 resection is the most important long-term prognostic factor for thymoma (3). Thymectomy via sternotomy was considered the predominant approach given the thymus' anatomic location in the anterior mediastinum. In 2015, the European Society of Medical Oncology (ESMO) published practice guidelines that recognized minimally invasive techniques as an option for presumed Masaoka-Koga stage I/II tumors "*in the hands of appropriately trained surgeons*" (4). In particular, the authors stated that "*robotic resection seems to provide a better visualization of the tumor when compared to VATS* (*video-assisted thoracoscopic surgery*)". For early stage thymic tumors, video-assisted and robotic-assisted thoracoscopic surgery seem to be oncologically equivalent to open trans-sternal surgery and even superior with regards to postoperative length of stay, complication rate, and reduced pain (4).

Historically, anterior mediastinal tumors >5 cm were considered inappropriate for minimally invasive surgery due to possible risk of incomplete resection or capsular disruption (5). However, a number of case series have demonstrated that tumor size should not be prohibitive to the benefits of minimally invasive surgery (2). Our case report, titled "*A 9 cm robotic thymectomy and pericardial repair case report*", demonstrates a successful *en bloc* resection of a large thymoma involving the right upper lobe lung and pericardium using the robotics platform. Our case highlights the feasibility of minimally invasive techniques even with large thymomas invading adjacent structures. Our patient was subsequently discharged home on postoperative day 3 with minimal pain and narcotic requirement due to our enhanced recovery protocol (6).

"*Robotic resection of anterior mediastinal masses >10 cm*: *a case series*" by Alqudah *et al.* challenges the conventional size limit of 5 cm tumors by demonstrating that thymomas >10 cm could achieve a R0 resection with robotic assistance (7). Case series have demonstrated that in expert hands, the robotic approach is not only safe, but also the oncologic equivalent to open surgery for large mediastinal

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tumors. It should be strongly emphasized that the type of approach should not compromise achieving a R0 resection. Inexperienced surgeons should not attempt a complex thymectomy robotically if there is risk of capsule disruption or performing an incomplete resection. The International Thymic Malignancy Interest Group (ITMIG) established a set of principles for minimally invasive thymectomy to avoid compromising oncologic outcomes (8). Thymomas must be always removed together with the surrounding normal thymus and fat in order to obtain adequate safety margins. A "no-touch" technique should be utilized. The perithymic and pericardial fat is used for grasping and tractioning the tumor in order to avoid rupture of the tumor capsule and the risk of pleural implantation. Ultimately, there should be no hesitation to convert to an open approach in order to perform the appropriate oncologic operation.

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