The superiority of robot in surgery of mediastinal diseases

Since 2001, when robotic technology was first approved by the US Food and Drug Administration (FDA) (1) and then introduced in clinical practice, the best targets for cardio-thoracic surgery were considered all those procedures requiring operating in tiny and/or difficult to reach spaces, where an extreme dexterity an precision of instruments are required (2). In the last two decades a progressive and exponential increase in utilization and acceptance of robotic approach was observed, leading to successfully perform the majority of thoracic surgical procedures by using the robotic technology (3). These procedures include anatomical lung resections (4,5), excision of benign and malignant mediastinal masses (6-8), diaphragmatic plication or resection (9), oesophagectomy for malignant tumours and treatment of benign oesophageal diseases (10). It is undoubted that the diseases of mediastinum represent the best application of robotic technology in thoracic surgery such as underlined by several authors (11,12).

The success and the widespread acceptance and utilization of robotic technology stems from several reasons: (I) technical with the easy manoeuvrability and dexterity of instruments with 7 degrees of freedom, that allow difficult dissections in narrow fields, the 3-dimensional view with high-quality and magnification of operative field, the tremor filtering system (6-Hz motion filter) able to avoid any physiological instability in the instrument manipulation, and the easy standardization and reproducibility; (II) oncological with comparable if not superior results obtained both in the field of lung and mediastinal tumours; (III) anatomical with the mediastinum representing a surgical area with tiny spaces, sometimes difficult to reach, with major vessels and nerves where the manipulation may be at risk, thus requiring a very precise dissection; (IV) learning curve and teaching facilities, in fact the enhanced technology, with better visualization, the intuitive system and the recently introduced dual consoles make training in robotic surgery an excellent tool with an easier and faster learning curve (13).

The major limitation is still represented by the high fixed cost of the robotic system and the availability of only one system (da Vinci robotic platform, Intuitive Surgical, Inc., Sunnyvale, CA, USA); however, on the wave of success of robotic technology in the last years, several Companies are working on new and maybe more complex systems that could be introduced in the clinical practice in the next future.

This special issue on “Robotic Mediastinal Surgery” aims to give us an overview of the state of the art, the most innovative applications of robotic technology and the tips and tricks in the majority of operations for mediastinal diseases. The high qualification and experience of contributing authors, certainly will add a significant improvement in the field of robotic thoracic surgery stimulating the readers to increase their skill.

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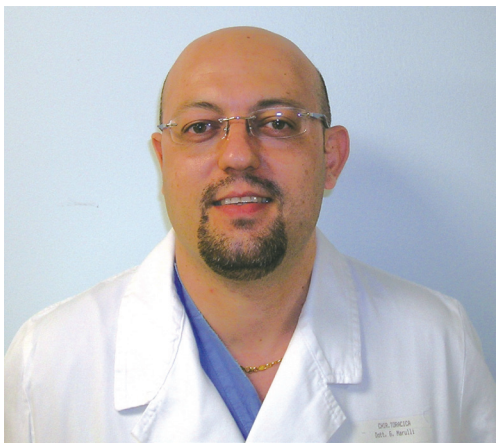
References

1. Robotic device cleared for heart surgery. FDA Consum 2004;38:6.
2. Augustin F, Schmid T, Bodner J. The robotic approach for mediastinal lesions. Int J Med Robot 2006;2:262-70.
3. Lanfranco AR, Castellanos AE, Desai JP, et al. Robotic surgery: a current perspective. Ann Surg 2004;239:14-21.
4. Cerfolio RJ. Total port approach for robotic lobectomy. Thorac Surg Clin 2014;24:151-6.
5. Dylewski MR, Ohaeto AC, Pereira JF. Pulmonary resection using a total endoscopic robotic video-assisted approach. Semin Thorac Cardiovasc Surg 2011;23:36-42.
6. Radkani P, Joshi D, Barot T, et al. Robotic video-assisted thoracoscopy: minimally invasive approach for management of mediastinal tumors. J Robot Surg 2018;12:75-9.
7. Rueckert J, Swierzy M, Badakhshi H, et al. Robotic-assisted thymectomy: surgical procedure and results. Thorac Cardiovasc Surg 2015;63:194-200.
8. Marulli G, Rea F, Melfi F, et al. Robot-aided thoracoscopic thymectomy for early-stage thymoma: a multicenter European study.

J Thorac Cardiovasc Surg 2012;144:1125-30.
9. Kwak T, Lazzaro R, Pournik H, et al. Robotic thoracoscopic plication for symptomatic diaphragm paralysis. J Robot Surg 2012;6:345-8.x
10. Ruurda JP, van der Sluis PC, van der Horst S, et al. Robot-assisted minimally invasive esophagectomy for esophageal cancer: A systematic review. J Surg Oncol 2015;112:257-65.
11. Weissenbacher A, Bodner J. Robotic surgery of the mediastinum. Thorac Surg Clin 2010;20:331-9.
12. Zirafa CC, Melfi F. Robot-assisted surgery for posterior mediastinal mass. J Thorac Dis 2017;9:4929-31.
13. Linsky PL, Wei B. Training in robotic thoracic surgery. J Vis Surg 2018;4:1.



Giuseppe Marulli

Giuseppe Marulli, MD, PhD
Thoracic Surgery Unit, Department of Emergency and Organ Transplantation, University Hospital of Bari, Bari, Italy. (Email: giuseppe.marulli@uniba.it or beppemarulli@libero.it)
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