



An update in minimally invasive thoracic surgery for oncological disease

During the last three decades, there was a large diffusion of the minimally invasive surgery. Innovative procedures, expanded indications, introduction of new devices and instrumentations have brought to the increasing use of less invasive surgical thoracic techniques: video-assisted thoracic surgery (VATS) and robotic thoracic surgery have gained popularity and have been largely adopted for the treatment of both benign and oncological disease (1-5).

If compared with open surgery, both these two less invasive techniques have shown enormous advantages for the patient in terms of pain reduction, fewer intra- and post-operative complications (decrease rate of blood loss, blood transfusion, air leak, chest tube duration), shorter postoperative stay, and mortality compared with thoracotomy (6-8). However, controversy persists regarding the oncologic equivalence to open surgery (1-4).

From the oncological point of view, few retrospective studies have hitherto evaluated oncological outcomes in terms of long-term survival showing acceptable results compared with VATS and open surgery (8-13). However, to date no prospective, randomized study exists regarding whether oncologic data (overall survival, local recurrence rate, and disease-free survival) after VATS or robotic-assisted lobectomy are equivalent to those after open lobectomy among patients with early stage lung cancer. There is a need to start a randomized, prospective study that evaluates these important outcomes in order to definitively establish the role of minimally invasive surgery versus open surgery hoping not to fall into what happened in the gynecologic domain in which recent authoritative trials have shown the detrimental role of less invasive techniques compared to open surgery in the treatment of early cervical cancer (14,15).

Between VATS and robotic assisted surgery, some important differences exist: VATS has a limited field of view (two-dimensional imaging), a restricted freedom of movements, and a poor ergonomics making VATS lobectomy a demanding procedure with a potentially long-learning curve for surgeons.

Robotic approach offers comparable radicality and safety to VATS and open surgery. The high-definition three-dimensional vision, greater flexibility and a more intuitive movements overcome limitations of VATS and may encourage wider adoption of robotic surgery for the surgical treatment of lung cancer, above all cases with early stage disease.

Some limitations in the diffusion and adoption of robotic surgical techniques remain to be overcome: high capital and running costs, limited instruments availability, and a more longer operating time represents the main and important disadvantages (5,16). The entry of competitive alternatives into the marketplace should drive down costs allowing extending the use of robotic techniques and overcoming the cost limits.

This Special Issue of Minimally Invasive Thoracic Oncological Surgery (MITOS) attempts to point out some of most important topics in this field: history and development, technical aspects, innovations, oncological results and economic are presented and discussed by eminent experts in minimally invasive approaches.

Their large experience and acute observations will lead to a wider and clearer understanding of these techniques encouraging people who face on the surgical treatment of lung cancer to adopt them more and more in their daily surgical practice.

Acknowledgments

Funding: None.

Footnote

Provenance and Peer Review: This article was commissioned by the editorial office, *Shanghai Chest* for the series “Minimally Invasive Thoracic Oncological Surgery”. The article did not undergo external peer review.

Conflicts of Interest: Both authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/shc.2019.01.05>). The series “Minimally Invasive Thoracic Oncological Surgery” was commissioned by the editorial office without

any funding or sponsorship. LS served as the unpaid Guest Editor of the series and serves as an unpaid editorial board member of *Shanghai Chest* from Jul 2017 to Jun 2019. DG served as the unpaid Guest Editor of the series and serves as an unpaid editorial board member of *Shanghai Chest* from Jul 2017 to Jun 2019. The authors have no other conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Open Access Statement: This is an Open Access article distributed in accordance with the Creative Commons Attribution-NonCommercial-NoDerivs 4.0 International License (CC BY-NC-ND 4.0), which permits the non-commercial replication and distribution of the article with the strict proviso that no changes or edits are made and the original work is properly cited (including links to both the formal publication through the relevant DOI and the license). See: <https://creativecommons.org/licenses/by-nc-nd/4.0/>.

References

- Swanson SJ, Herndon JE II, D'Amico TA, et al. Video-assisted thoracic surgery lobectomy: report of CALGB 39802-a prospective, multi-institution feasibility study. *J Clin Oncol* 2007;25:4993-7.
- Boffa DJ, Kosinski AS, Paul S, et al. Lymph-node evaluation by open or video-assisted approaches in 11,500 anatomic lung resections. *Ann Thorac Surg* 2012;94:347-53; discussion 353.
- Licht PB, Jorgensen OD, Ladegaard L, et al. A national study of nodal upstaging after thoracoscopic versus open lobectomy for clinical stage I lung cancer. *Ann Thorac Surg* 2013;96:943-9; discussion 949-50.
- Withson BA, D'Cunha J, Andre RS, et al. Thoracoscopic versus thoracotomy approaches to lobectomy: differential impairment of cellular immunity. *Ann Thorac Surg* 2008;86:1735-44.
- Park BJ, Flores RM. Cost comparison of robotic, video-assisted thoracic surgery and thoracotomy approaches to pulmonary lobectomy. *Thorac Surg Clin* 2008;18:297-300, vii.
- Adams RD, Bolton WD, Stephenson JE, et al. Initial multicenter community robotic lobectomy experience: comparisons to a national database. *Ann Thorac Surg* 2014;97:1893-8; discussion 1899-900.
- Louie BE, Wilson JL, KIM S, et al. Comparison of video-assisted thoracoscopic surgery and robotic approaches for clinical stage I and stage II non-small cell lung cancer using the Society of Thoracic Surgeons database. *Ann Thorac Surg* 2016;102:917-24.
- Kent M, Want T, Whyte R, et al. Open, Video-assisted thoracic surgery, and robotic lobectomy: review of a national database. *Ann Thorac Surg* 2014;97:236-42; discussion 242-4.
- Cerfolio RJ, Bryant AS, Skylizard L, et al. Initial consecutive experience of completely portal of robotic pulmonary resection with 4 arms. *J Thorac Cardiovasc Surg* 2011;142:740-6.
- Veronesi G, Galetta D, Maisonneuve P, et al. Four-arm robotic lobectomy for the treatment of early stage lung cancer. *J Thorac Cardiovasc Surg* 2010;140:19-25.
- Park BJ, Melfi F, Mussi A, et al. Robotic lobectomy for non-small cell lung cancer(NSCLC): long-term oncological results: *J Thorac Cardiovasc Surg* 2012;143:383-9.
- Toosi L, Velez-Cubian FO, Glover J, et al. Upstaging and survival after robotic-assisted thoracoscopic lobectomy for non-small cell lung cancer. *Surgery* 2016;160:1211-8.
- Casiraghi M, Galetta D, Borri A, et al. Ten years' experience in robotic-assisted thoracic surgery for early stage lung cancer. *Thorac Cardiovasc Surg* 2018. [Epub ahead of print].
- Ramirez PT, Frumovitz M, Pareja R, et al. Minimally invasive versus abdominal radical hysterectomy for cervical cancer. *N Engl J Med* 2018;379:1895-904.
- Melamed A, Margul DJ, Chen L, et al. Survival after Minimally Invasive Radical Hysterectomy for Early-Stage Cervical Cancer. *N Engl J Med* 2018;379:1905-14.
- Deen SA, Wilson JL, Wilshire CL, et al. Defining the cost of care for lobectomy and segmentectomy: a comparison of open, video-assisted thoracoscopic, and robotic approaches. *Ann Thorac Surg* 2014;97:1000-7.



Lorenzo Spaggiari



Domenico Galetta

Lorenzo Spaggiari^{1,2}

(Email: lorenzo.spaggiari@ieo.it)

Domenico Galetta²

(Email: domenico.galetta@ieo.it)

¹Department of Oncology and Hematology-Oncology-DIPO, University of Milan, Milan, Italy;

²Division of Thoracic Surgery, European Institute of Oncology, IRCCS, Milan, Italy

Received: 20 January 2019; Accepted: 30 January 2019; Published: 14 February 2019.

doi: 10.21037/shc.2019.01.05

View this article at: <http://dx.doi.org/10.21037/shc.2019.01.05>

doi: 10.21037/shc.2019.01.05

Cite this article as: Spaggiari L, Galetta D. An update in minimally invasive thoracic surgery for oncological disease. Shanghai Chest 2019;3:10.