

VATS lobectomy program: the trainee perspective

Alberto Sandri, Pier Luigi Filosso, Paolo Olivo Lausi, Enrico Ruffini, Alberto Oliaro

Department of Thoracic Surgery, University of Torino, Torino, Italy

Correspondence to: Alberto Sandri. Department of Thoracic Surgery, University of Torino, San Giovanni Battista Hospital, Via Genova, 3-10126 Torino, Italy. Email: sandri.alberto@gmail.com.

Abstract: Due to its intrinsic characteristics, video assisted thoracic surgery (VATS) lobectomy is currently the recommended surgical approach for early stage lung cancer treatment. The importance of increasing the number of surgeons capable of performing VATS lobectomies is implicit and of utmost importance. In fact, the need of performing independently and routinely VATS lobectomies for early stage lung cancer will soon be a prerequisite to the new generation of thoracic surgeons. The feeling that VATS lobectomy teaching should be part of their training is strongly felt among trainees but, at the moment, a formal, uniform and certified process of learning VATS lobectomy is not available in all training centres. Perhaps, through the supervision, support and aid from national and European Thoracic Surgery Societies, programs of integration of recognized, standardized and certified teaching of VATS lobectomy could be planned and undertaken by the training centres, both at national as well as European level.

Keywords: Video assisted thoracic surgery (VATS) lobectomy; VATS training; trainees thoracic surgery; VATS simulation; VATS certification

Submitted Feb 16, 2016. Accepted for publication Mar 08, 2016.

doi: 10.21037/jtd.2016.03.82

View this article at: <http://dx.doi.org/10.21037/jtd.2016.03.82>

Introduction

The increasing use of video assisted thoracic surgery (VATS) lobectomy in the treatment of early stage lung cancer is due to its intrinsic characteristics. It has been described, in fact, that VATS lobectomy reduces postoperative morbidity and mortality, shortens the hospital stay and provides long-term prognosis, which is comparable to lobectomy by thoracotomy (1-5). Due to such reasons, VATS lobectomy is currently the recommended surgical approach for early stage lung cancer (6) and is considered beneficial to patients considered at high-risk for surgery (7).

The importance of increasing the number of surgeons performing VATS lobectomy is thus implicit, implying the necessity of teaching this procedure safely and correctly. However, despite its benefits, VATS lobectomy is generally considered to be technically more difficult compared to lobectomy by thoracotomy and inexperience may be cause of intraoperative complications and eventually mortality (8). Probably, this is one of the reasons why a formal and structured VATS lobectomy program is strongly felt among

thoracic surgery trainees during their training years. As a matter of fact, one of the most common training needs cited by trainees is “to train in Video Assisted Thoracoscopic Surgery lobectomy” (9). This is in contrast with the quite common experience of today’s senior surgeons who did not undergo a formal VATS lobectomy training, but instead were self-taught and gained experience and confidence over the years (10,11).

VATS training: feasibility and standards for vats lobectomy teaching

Ferguson and Coll. addressed the feasibility of developing a VATS lobectomy programme in a paper of 2005 (11). In their study, they demonstrated that a VATS lobectomy programme can be safely taught to senior trainees through an appropriate supervision, without affecting mortality, blood loss or postoperative stay and suggested a VATS training coordinated at UK national level.

Generally, in Europe, thoracic surgery training

(speciality) is performed in tertiary centres with big volumes of surgery, covering all fields of general thoracic surgery, granting a sufficient number of cases throughout the training. However, training programs differ a lot country-wise, not all centres are set to teach VATS lobectomies and the comparatively low number of surgeons performing VATS lobectomies (12) are the causes that lead trainees to pursue courses and observation periods in centres where VATS is routinely performed.

From a trainee point of view, besides feeling the need of a proper formal VATS lobectomy training, the following points could be of interest in setting-up a training program, with the aim of giving the trainee independence and self-confidence throughout the procedure:

- (I) Stepwise approach to VATS lobectomy and Standardization of teaching;
- (II) Off-theatre independent training;
- (III) Evaluation and certification.

Stepwise approach to VATS lobectomy and standardization of teaching

Major surgical approaches are usually entrusted in a stepwise manner to trainees, who gain experience over the training years. As a matter of fact, being it a major lung resection performed mini-invasively and with challenging complexity, enhanced by major surgical skills and dexterity, VATS lobectomy should be no less.

Several and disparate sets of teaching VATS lobectomy have been undertaken, which obviously differ from centre to centre worldwide. Commonly, prior being introduced to VATS lobectomy, trainees are made to gain experience through several minor procedures routinely performed in VATS, such as pneumothoraxes, pleural effusions, pleural biopsies, lung wedge resections, etc. This, in time, improves the trainees skills and creates the necessary confidence with the use of the camera (usually a 30°), orientation and movement coordination (dexterity), staplers and VATS basic instrumentation.

Usually, when it comes to VATS lobectomy, trainees are gradually involved in the procedure by firstly holding the camera and assisting the senior surgeon doing the lobectomy. Through observation and interaction with the senior surgeon who explains the steps of the procedure while performing it, the trainee gets accustomed with the VATS lobectomy technique. In time, trainees are then given the opportunity to advance in a stepwise manner through the procedure, starting from making the ports to

the pulmonary ligament dissection and hilum exposure. Once gained sufficient confidence, the next steps will include vessels and bronchus dissection and, lastly, lymphadenectomy, since more complex. Generally, when trainees proceed through the lobectomy, are guided by the senior surgeon and evidently are offered easy lobes first (lower lobectomies). This teaching methodology is perhaps the most widely used because it allows a gradual approach to VATS lobectomy, allowing the trainee to gain confidence. Nevertheless, unfortunately, what is lacking is the standardization of the step-by-step procedure, which instead is essential, at least in the eyes of the trainee. Regardless the way of teaching, standardization of the procedure and of the teaching is strategic and beneficial to the trainee. In fact, it offers a proper and uniform methodology that pays back in reduction or hopefully elimination of errors, which in turn means procedural safety, less intraoperative complication rates (conversions), improved efficiency, less time in completing the lobectomy and low postoperative morbidity.

Trainees involved in a VATS lobectomy programme are usually the senior ones, since have had a sufficient number of procedures performed in traditional open lobectomy and minor VATS, therefore more experienced. However, whether or not prefer teaching VATS lobectomies to senior trainees with or without experience in traditional open lobectomy has been matter of discussion in several papers (13-15). According to those papers, VATS lobectomy remains a safe procedure, even if performed despite limited experience in open lobectomy, and affirm that the previous surgical training has a minimal impact on operative and postoperative outcomes (surgery time, blood loss, conversion rate, chest tube duration, postoperative morbidity and mortality).

Some concerns have been raised regarding the effects of teaching a new surgical approach (VATS lobectomy) in a training centre on the possibility that the learning curve affects the quality standards of the Unit (14,16,17); however, if well organized and structured, the learning curve for video-assisted thoracoscopic lobectomy does not seem to be affected by prior experience in open lobectomy (16).

Off-theatre independent training

Apart the many benefits of performing lobectomies in VATS, one of the reasons of trainees' interest in VATS is its technologic involvement. In fact, in the recent years, the role and the impact of technology in thoracic surgery have been evidently dramatic. Nowadays basic technology

(e.g., computer, internet, videos), once unavailable to most of today's senior surgeons during their training period, offers a series of advantages. As an example, the opportunity to review the video of the performed VATS procedure in high definition, perhaps along with the senior surgeon, in order to critically analyse it and detect those steps that were troublesome at the time of the operation. Also, on-line videos and tutorials are easily available for interactive study, letting trainees follow eminent surgeons performing surgery from their computers.

How technology has impacted in our daily life and social behaviour is quite evident, and its impact on training surgeons who have grown with the technological development has been deducted, for example, on their endoscopic skills. In fact, the potential linkage between surgical skills and video games has been tackled by some Authors, with evidence of a correlation between video-games skills and surgical ones (9,18,19).

Technological advances such as black box and virtual reality simulators and anatomical VATS models (20,21) consent trainees to practice, improve and maintain dexterity without "learning on patients", offers plenty of surgical hours of training (22) in a safe and supportive educational climate, available at any time to fit curriculum needs and allows standardized experience for all residents repeatedly, with fidelity and reproducibility (23). Unfortunately, they are not available in all training centres, probably due to their cost, despite its usefulness.

Evaluation and certification

As an end point of any educational programme, also in surgery the need of evaluation and assessment of competences should be taken into consideration for the necessary feedback and certifications. However, assessment of surgical skills is not an easy task. Several problems are faced within surgical assessment of skills, including ethics (is it ethical to assess skills on a patient?), objective and structured judgment and standardization of evaluation.

An attempt to identify a proper tool for VATS surgical skills was made in 2012 by the Copenhagen group (24). The Authors developed an assessment tool that encompassed the judgment of unedited videos of the procedure by two examiners (senior surgeons) who assessed all procedures blinded and independently, according to predefined parameters in a five-point rating scale. Their tool's inter-rater reliability was found high for the specific procedure but low for the general items, meaning that specific

task were well assessed but examiners missed the global performance, yet they were able to avoid potential biases related to relationships through anonymity of the videos.

Other Authors suggested the need of assessing endoscopic surgery skills through simulation, since it provides a safe environment for trainees to evaluate their performance rigorously and reliably without patients' involvement (23). However, drawbacks of simulation evaluation include the rare availability of a simulator for each VATS training centre, which should be VATS specific, and the difficulty to predict levels of real life surgical skills and possible intraoperative complications (25).

In a proficiency based medical education, testing one's own skills is basilar to improvement; moreover, in a field like surgery, where surgical skills are related to patient safety and postoperative outcomes, with legal implications too, certifications should be seriously taken into account.

Conclusions

Trainees' interest in VATS lobectomy is rapidly growing and the need of performing independently and routinely VATS lobectomies for early stage lung cancer will soon be a prerequisite to the new generation of thoracic surgeons.

However, apart some exceptions, VATS lobectomy teaching is not formally set up in all training centres, while the need of formal and standardised educational programmes in such a field are strongly felt among trainees. Perhaps, through the supervision, support and aid from national and European Thoracic Surgery Societies, programs of integration of recognized, standardized and certified training of VATS lobectomy could be planned and undertaken by the training centres, both at national as well as European level.

Acknowledgements

None.

Footnote

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

References

1. McKenna RJ Jr, Houck W, Fuller CB. Video-assisted thoracic surgery lobectomy: experience with 1,100 cases.

- Ann Thorac Surg 2006;81:421-5; discussion 425-6.
2. Walker WS, Codispoti M, Soon SY, et al. Long-term outcomes following VATS lobectomy for non-small cell bronchogenic carcinoma. *Eur J Cardiothorac Surg* 2003;23:397-402.
 3. Roviario G, Varoli F, Vergani C, et al. Long-term survival after videothoracoscopic lobectomy for stage I lung cancer. *Chest* 2004;126:725-32.
 4. McKenna RJ Jr, Wolf RK, Brenner M, et al. Is lobectomy by video-assisted thoracic surgery an adequate cancer operation? *Ann Thorac Surg* 1998;66:1903-8.
 5. Iwasaki A, Shirakusa T, Shiraishi T, et al. Results of video-assisted thoracic surgery for stage I/II non-small cell lung cancer. *Eur J Cardiothorac Surg* 2004;26:158-64.
 6. Howington JA, Blum MG, Chang AC, et al. Treatment of stage I and II non-small cell lung cancer: Diagnosis and management of lung cancer, 3rd ed: American College of Chest Physicians evidence-based clinical practice guidelines. *Chest* 2013;143:e278S-313S.
 7. Sandri A, Papagiannopoulos K, Milton R, et al. High-risk patients and postoperative complications following video-assisted thoracic surgery lobectomy: a case-matched comparison with lower-risk counterparts†. *Interact Cardiovasc Thorac Surg* 2015;21:761-5.
 8. Decaluwe H, Petersen RH, Hansen H, et al. Major intraoperative complications during video-assisted thoracoscopic anatomical lung resections: an intention-to-treat analysis. *Eur J Cardiothorac Surg* 2015;48:588-98; discussion 599.
 9. McElnay PJ, Lim E. Training for single port video assisted thoracoscopic surgery lung resections. *Ann Transl Med* 2015;3:319.
 10. Wan IY, Thung KH, Hsin MK, et al. Video-assisted thoracic surgery major lung resection can be safely taught to trainees. *Ann Thorac Surg* 2008;85:416-9.
 11. Ferguson J, Walker W. Developing a VATS lobectomy programme--can VATS lobectomy be taught? *Eur J Cardiothorac Surg* 2006;29:806-9.
 12. Society of Cardiothoracic Surgery of Great Britain and Ireland, Thoracic Audit. Available online: http://www.scts.org/professionals/audit_outcomes/thoracic.aspx
 13. Yu WS, Lee CY, Lee S, et al. Trainees Can Safely Learn Video-Assisted Thoracic Surgery Lobectomy despite Limited Experience in Open Lobectomy. *Korean J Thorac Cardiovasc Surg* 2015;48:105-11.
 14. Billè A, Okiror L, Harrison-Phipps K, et al. Does Previous Surgical Training Impact the Learning Curve in Video-Assisted Thoracic Surgery Lobectomy for Trainees? *Thorac Cardiovasc Surg*. 2014. [Epub ahead of print].
 15. Konge L, Petersen RH, Hansen HJ, et al. No extensive experience in open procedures is needed to learn lobectomy by video-assisted thoracic surgery. *Interact Cardiovasc Thorac Surg* 2012;15:961-5.
 16. Okyere S, Attia R, Toufektzian L, et al. Is the learning curve for video-assisted thoracoscopic lobectomy affected by prior experience in open lobectomy? *Interact Cardiovasc Thorac Surg* 2015;21:108-12.
 17. Billè A, Okiror L, Karenovics W, et al. Thoracoscopic lobectomy: is a training program feasible with low postoperative morbidity? *Gen Thorac Cardiovasc Surg* 2013;61:409-13.
 18. Rosser JC Jr, Lynch PJ, Cuddihy L, et al. The impact of video games on training surgeons in the 21st century. *Arch Surg* 2007;142:181-6; discussion 186.
 19. Schlickum MK, Hedman L, Enochsson L, et al. Systematic video game training in surgical novices improves performance in virtual reality endoscopic surgical simulators: a prospective randomized study. *World J Surg* 2009;33:2360-7.
 20. Obuchi T, Imakiire T, Miyahara S, et al. Off-the-job training for VATS employing anatomically correct lung models. *Surg Today* 2012;42:303-5.
 21. Iwasaki A, Okabayashi K, Shirakusa T, et al. A model to assist training in thoracoscopic surgery. *Interact Cardiovasc Thorac Surg* 2003;2:697-701.
 22. Jensen K, Ringsted C, Hansen HJ, et al. Simulation-based training for thoracoscopic lobectomy: a randomized controlled trial: virtual-reality versus black-box simulation. *Surg Endosc* 2014;28:1821-9.
 23. Tavakol M, Mohagheghi MA, Dennick R. Assessing the skills of surgical residents using simulation. *J Surg Educ* 2008;65:77-83.
 24. Konge L, Lehnert P, Hansen HJ, et al. Reliable and valid assessment of performance in thoracoscopy. *Surg Endosc* 2012;26:1624-8.
 25. Thijssen AS, Schijven MP. Contemporary virtual reality laparoscopy simulators: quicksand or solid grounds for assessing surgical trainees? *Am J Surg* 2010;199:529-41.

Cite this article as: Sandri A, Filosso PL, Lausi PO, Ruffini E, Oliario A. VATS lobectomy program: the trainee perspective. *J Thorac Dis* 2016;8(Suppl 4):S427-S430. doi: 10.21037/jtd.2016.03.82