



# Advocate the implementation of video-assisted thoracoscopic surgery lobectomy program for early stage lung cancer treatment: time to transfer from why to how

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Doctor Yang *et al.* (1) did a retrospective analysis of the National Cancer Data Base including a huge number of patients from thousands of hospitals in the United States receiving lobectomy for an early stage non-small cell lung cancer (NSCLC). As a national database, it essentially has an extraordinary multi-institutional spectrum, they compared patient characteristics, short-term and long-term 5 years survival results between the video-assisted thoracoscopic surgery (VATS) group and open thoracotomy group using the propensity score system to reduce the selection bias. The results not surprisingly showed that the VATS group had shorter length of stay after the surgery and noninferior long-term survival when compared with open lobectomy, which is consistent with Higuchi *et al.* and Kuritzky *et al.*'s former reports (2,3). The long-term follow-up data further strengthened the therapeutic value of VATS lobectomy in patients with early-stage NSCLC. As to the concern upon oncologic efficiency (4), the author's study did not show a significant difference in lymph node upstaging between the VATS group and the thoracotomy group, which is different from another report from Decaluwé *et al.* based on the same database. This is possibly due to the well-performed propensity score analysis that improved the comparability between the two groups. Besides, except for tumor size, tumor location (central versus peripheral) (5) might also be an important cofactor for clinical nodal-negative patients.

The application of VATS technique for lobectomy has

been spotlighted for above 26 years (6), a huge number of clinical observational studies have been undertaken since then. However, the debate started with the initiation of VATS in thoracic surgery, concerns mainly focused on the feasibility, safety, lymph node upstaging, perioperative comorbidity and mortality, oncologic result and the long-term follow-up results after the surgery. Several important studies including multi-institutional research and randomized controlled trials (RCTs) have supplied persuading evidence on most of them, except long-term results. Cancer and Leukemia Group B (CALGB) (7) study clearly defined the standard of VATS surgical technique, avoidance of the forcibly rib-spreading, incision shorter than 8 cm and indirect vision of the surgical field became the fundamental character of VATS. This study prospectively verified the technical feasibility and safety of VATS lobectomy for peripheral lung nodules  $\leq 3$  cm. Concerning the oncologic results, several studies consistently confirmed the efficacy of the video-assisted approach compared with the open thoracotomy approach (8,9), including RCTs. Scott *et al.* (10) reported fewer respiratory complications and shorter length of stay. Palade *et al.* (11) reported beneficial results of VATS approach in terms of performing mediastinal lymph node dissection, compared with open thoracotomy. The RCT of Bendixen *et al.* (12) reported less postoperative pain and better quality of life after VATS as compared to thoracotomy for

the first year after surgery". The VIOLET RCT Study (ISRCTN13472721: VATS versus conventional open lobectomy for lung cancer) has just finished and the results will supply more evidence on the superiority of VATS group's quality of life (QOL) 5 weeks after surgery. As to the long-term survival, available data with high-level evidence was limited, Sugi *et al.*'s (13) monocentric randomized study was the only RCT that evaluated long-term survival, and found similar 5-year survival rates between VATS and thoracotomy. The dispute upon this issue, however, persisted due to the small scale and monocentric nature of this clinical trial. The results from Yang *et al.*'s study added substantial evidence on this issue.

The application rate of VATS for lobectomy showed an overall growing trend in the last two decades but the growth rate is not as fast as expected (14), a European multinational database showed an application rate of 23% in 2013, and the average rate from 2007 to 2013 is merely 10.4% (15). Yang showed a rate of 21.7% for lobectomy performed by VATS in his article, which cannot be satisfying for the specialty of thoracic surgery. Besides, it's different from the Society of Thoracic Surgeons (STS) data (44.7%) investigated at the same time which is likely because different institutes contributed to these databases with different cohorts. Recently the STS themselves conducted a penetration study and different 30-day mortality rate have been seen between nonparticipants and STS participants (3.3% versus 1.6%,  $P < 0.001$ ) (16). Differences exist among different institutes also different thoracic surgery societies. Therefore, the generalisability still cannot be derived from Yang *et al.*'s study, and there might be more surgeons not preferring VATS lobectomy in clinical practice than the current database showing to us.

Why is the utilization rate of thoracoscopic lobectomy still so low after 27 years?

The reasons also changed over time. Cross-sectional Survey on Lobectomy Approach (X-SOLA) study (17) undertook an international survey on thoracic surgeons, there are still surgeons who were not ready to try VATS lobectomy, oncologic concerns persisted due to limited data on its long-term oncologic efficacy, thus 54% of them voted an RCT for VATS lobectomy versus Thoracotomy lobectomy. However, because of the seemingly obvious advantages of VATS, a randomized controlled multicenter project is difficult to ensure a blind principle without ethical issues. One imperfect but possible solution would be a well-designed real world study based on a strictly controlled prospective database.

Actually, the debate on the safety and efficacy of thoracoscopic lobectomy has gradually subsided. The latest NCCN guideline explicated minimally invasive surgery (MIS) including VATS or robotic-assisted approaches should be strongly considered with no anatomic or surgical contraindications, and VATS lobectomy for patients with resectable NSCLC have improved early outcomes and without compromise of cancer outcomes (18). The training of VATS lobectomy should be more widely available for thoracic surgeons. Among those surgeons have ever performed less complicated procedures through the VATS approach, 92% reported their willingness to try VATS lobectomy and half of them needed mentorship (17). The situation might be better for the new generation of thoracic surgeons who have more opportunities to attend the VATS lobectomy symposiums and to get individual instruction.

Interestingly, thoracoscopic lobectomy was safer when performed by thoracic surgeons as compared to cardiac surgeons or general surgeons (19), which further demonstrates that professional training is the key to the successful implementation of a new surgical technique. Now our attention should transfer from why we should use this technology to how to widespread the VATS lobectomy training.

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## Footnote

*Conflicts of Interest:* The authors have no 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.

## References

1. Yang CJ, Kumar A, Klapper JA, et al. A National Analysis of Long-term Survival Following Thoracoscopic Versus Open Lobectomy for Stage I Non-small-cell Lung Cancer. *Ann Surg* 2019;269:163-71.
2. Higuchi M, Yaginuma H, Yonechi A, et al. Long-term outcomes after video-assisted thoracic surgery (VATS) lobectomy versus lobectomy via open thoracotomy for

- clinical stage IA non-small cell lung cancer. *J Cardiothorac Surg* 2014;9:88.
3. Kuritzky AM, Aswad BI, Jones RN, et al. Lobectomy by Video-Assisted Thoracic Surgery vs Muscle-Sparing Thoracotomy for Stage I Lung Cancer: A Critical Evaluation of Short- and Long-Term Outcomes. *J Am Coll Surg* 2015;220:1044-53.
  4. Medbery RL, Gillespie TW, Liu Y, et al. Nodal Upstaging Is More Common with Thoracotomy than with VATS During Lobectomy for Early-Stage Lung Cancer: An Analysis from the National Cancer Data Base. *J Thorac Oncol* 2016;11:222-33.
  5. Decaluwé H, Stanzi A, Dooms C, et al. Central tumour location should be considered when comparing N1 upstaging between thoracoscopic and open surgery for clinical stage I non-small-cell lung cancer. *Eur J Cardiothorac Surg* 2016;50:110-7.
  6. Kirby TJ, Rice TW. Thoracoscopic lobectomy. *Ann Thorac Surg* 1993;56:784-6.
  7. Swanson SJ, Herndon JE 2nd, 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.
  8. Sagawa M, Sato M, Sakurada A, et al. A prospective trial of systematic nodal dissection for lung cancer by video-assisted thoracic surgery: can it be perfect? *Ann Thorac Surg* 2002;73:900-4.
  9. Shapiro M, Kadakia S, Lim J, et al. Lobe-specific mediastinal nodal dissection is sufficient during lobectomy by video-assisted thoracic surgery or thoracotomy for early-stage lung cancer. *Chest* 2013;144:1615-21.
  10. Scott WJ, Allen MS, Darling G, et al. Video-assisted thoracic surgery versus open lobectomy for lung cancer: a secondary analysis of data from the American College of Surgeons Oncology Group Z0030 randomized clinical trial. *J Thorac Cardiovasc Surg* 2010;139:976-81; discussion 981-3.
  11. Palade E, Passlick B, Osei-Agyemang T, et al. Video-assisted vs open mediastinal lymphadenectomy for Stage I non-small-cell lung cancer: results of a prospective randomized trial. *Eur J Cardiothorac Surg* 2013;44:244-9; discussion 249.
  12. Bendixen M, Jørgensen OD, Kronborg C, et al. Postoperative pain and quality of life after lobectomy via video-assisted thoracoscopic surgery or anterolateral thoracotomy for early stage lung cancer: a randomised controlled trial. *Lancet Oncol* 2016;17:836-44.
  13. Sugi K, Kaneda Y, Esato K. Video-assisted thoracoscopic lobectomy achieves a satisfactory long-term prognosis in patients with clinical stage IA lung cancer. *World J Surg* 2000;24:27-30; discussion 30-1.
  14. Ceppa DP, Kosinski AS, Berry MF, et al. Thoracoscopic lobectomy has increasing benefit in patients with poor pulmonary function: a Society of Thoracic Surgeons Database analysis. *Ann Surg* 2012;256:487-93.
  15. Falcoz PE, Puyraveau M, Thomas PA, et al. Video-assisted thoracoscopic surgery versus open lobectomy for primary non-small-cell lung cancer: a propensity-matched analysis of outcome from the European Society of Thoracic Surgeon database. *Eur J Cardiothorac Surg* 2016;49:602-9.
  16. Tong BC, Kim S, Kosinski A, et al. Penetration, Completeness, and Representativeness of The Society of Thoracic Surgeons General Thoracic Surgery Database for Lobectomy. *Ann Thorac Surg* 2019;107:897-902.
  17. Cao C, Tian DH, Wolak K, et al. Cross-sectional survey on lobectomy approach (X-SOLA). *Chest* 2014;146:292-8.
  18. Network NCC. NSCLC (Version 2019.5). Accessed June 7, 2019. Available online: <https://www.nccn.org/>
  19. Boffa DJ, Gangadharan S, Kent M, et al. Self-perceived video-assisted thoracic surgery lobectomy proficiency by recent graduates of North American thoracic residencies. *Interact Cardiovasc Thorac Surg* 2012;14:797-800.

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