

Despite the encouraging results highlighting the feasibility of VATS sleeve lobectomy presented here, the generalizability of this study to VATS sleeve lobectomies performed at other centers remains in question. Minimally invasive approaches to sleeve lobectomies are often described and are generally considered options that should be performed at an experienced, high-volume, academic center. Many centers have a limited volume of patients requiring sleeve lobectomy and/or surgeons that may deem large central tumors unresectable and thus direct patients to definitive therapies with no attempt at resection. In addition, many surgeons who have adopted VATS lobectomy as their standard practice will opt to perform thoracotomy when tasked with a sleeve resection, owing to their limited experience performing advanced resections with VATS, the increased technical demands of bronchoplastic work, or the greater potential for complications. Therefore, although the study by Xie and colleagues is a worthwhile addition to the growing body of literature confirming the feasibility of VATS sleeve lobectomy, realistically,

minimally invasive approaches for sleeve resections likely will not be adopted as the standard of care in the near future and will remain an option at select centers.

### References

1. Deslauriers J, Gregoire J, Jacques LF, Piraux M, Guojin L, Lacasse Y. Sleeve lobectomy versus pneumonectomy for lung cancer: a comparative analysis of survival and sites of recurrences. *Ann Thorac Surg*. 2004;77:1152-6; discussion 1156.
2. Ludwig C, Stoelben E, Olschewski M, Hasse J. Comparison of morbidity, 30-day mortality, and long-term survival after pneumonectomy and sleeve lobectomy for non-small-cell lung carcinoma. *Ann Thorac Surg*. 2005;79:968-73.
3. Caso R, Watson TJ, Khaitan PG, Marshall MB. Outcomes of minimally invasive sleeve resection. *J Thorac Dis*. 2018;10:6653-9.
4. Mahtabifard A, Fuller CB, McKenna RJ Jr. Video-assisted thoracic surgery sleeve lobectomy: a case series. *Ann Thorac Surg*. 2008;85:S729-32.
5. Zhou S, Pei G, Han Y, Yu D, Song X, Li Y, et al. Sleeve lobectomy by video-assisted thoracic surgery versus thoracotomy for non-small-cell lung cancer. *J Cardiothorac Surg*. 2015;10:116.
6. Gao HJ, Jiang ZH, Gong L, Ma K, Ren P, Yu ZT, et al. Video-assisted vs thoracotomy sleeve lobectomy for lung cancer: a propensity-matched analysis. *Ann Thorac Surg*. 2019;108:1072-9.
7. Xie D, Deng J, Gonzalez-Rivas D, Zhu Y, Jiang L, Jiang G, et al. Comparison of video-assisted thoracoscopic surgery with thoracotomy in bronchial sleeve lobectomy for centrally located non-small-cell lung cancer. *J Thorac Cardiovasc Surg*. 2021;161:403-13.e2.

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## Commentary: Minimally invasive sleeve lobectomy: Time to roll up our “sleeves” and learn something new?

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Sleeve lobectomy has long been recognized as a reliable procedure for the management of centrally located lung cancers.<sup>1</sup> Several studies have demonstrated long-term survival with this lung-preserving operation comparable with that of pneumonectomy.<sup>2,3</sup> Although bronchial

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### CENTRAL MESSAGE

Thoracoscopic sleeve lobectomy can be performed with comparable morbidity, mortality, and survival to thoracotomy in appropriately selected patients when performed by experienced surgeons.

reconstruction adds to the level of complexity, increased experience with sleeve lobectomy over time has naturally led to the incorporation of techniques of minimally invasive

surgery. In this issue of the *Journal*, Xie and colleagues<sup>4</sup> compare postoperative outcomes and survival after sleeve lobectomy via thoracotomy and video-assisted thoracoscopic surgery (VATS) using a propensity-matched analysis.

The investigators identified 363 consecutive patients undergoing sleeve lobectomy at their institution between 2013 and 2017. Thoracoscopic resection was performed in 112 cases and thoracotomy in 251. Following propensity matching for age, sex, Charlson Comorbidity Index, pulmonary function, smoking history, tumor histologic subtype, lobar location, surgeon, and pathologic stage, 116 patients undergoing thoracotomy and 72 patients undergoing VATS were compared. Significant advantages of VATS following matching included reduced blood loss, postoperative intensive care unit and total hospital stay, and chest tube duration.

Although these perioperative benefits are clearly important, outcome measures such as morbidity and mortality, both procedural and oncologic, are of the utmost concern. In both the matched and unmatched cohorts, excellent outcomes were achieved. Overall morbidity in the matched groups was 9.0%, and there were no statistically significant differences between VATS and thoracotomy for overall complications or mortality. In regard to bronchial anastomosis, there were 2 bronchopleural fistulas among 112 patients in the minimally invasive cohort (1.8%), compared with 1 among 251 patients in the thoracotomy cohort (0.4%). Although the demonstration of statistical significance in such rare events would be challenging, their infrequent nature is reassuring.

There were no positive resection margins, and Kaplan–Meier analysis demonstrated no statistically significant differences in overall survival or recurrence-free survival between the groups at 2 years of follow-up. The authors conclude that thoracoscopic sleeve lobectomy was safe and oncologically sound in their cohort.

Importantly, patient selection and surgeon experience are acknowledged in this study as both factors intrinsically relate to outcomes. This study included 363 patients who underwent sleeve lobectomy over a 4-year period. The excellent outcomes underscore the benefits of surgery at a high-volume center such as the authors', which performs nearly 100 sleeve lobectomies per year. All operations were performed by 8 surgeons, who performed both open

and VATS procedures. Of note, 1 surgeon performed nearly one half (49.1%) of the minimally invasive resections. It is also notable that the authors were significantly along their learning curve before operating on the patients in this study. The first VATS sleeve lobectomy performed at the authors' institution was in 2010, and 56 such procedures were performed before the study's inclusion period. However, it is unclear how many operations each of the 8 surgeons performed before contributing patients to the study.

Finally, it is worthwhile to note the slight technical differences between the 2 procedures. The open anastomosis was performed with interrupted VICRYL suture, whereas the minimally invasive version incorporated an anastomosis with running PROLENE suture. Similarly, although the manuscript states that anastomoses were buttressed following induction chemotherapy, flap coverage was twice as frequent in open cases than VATS cases (36% vs 17%) despite comparable numbers of postinduction patients in each group. The excellent outcomes in the VATS group raise the possibility that the open procedure can be safely modified in a similar fashion.

As new techniques are incorporated into surgical practice, experience is required to overcome the learning curve.<sup>5,6</sup> The data presented here are further evidence that, after appropriate training and preparation, even complicated resections can be performed in a minimally invasive manner in selected patients. Perhaps the challenge here will be disseminating this skill set to the larger thoracic surgical community while ensuring outstanding outcomes.

## References

1. Weisel RD, Cooper JD, Delarue NC, Theman TE, Todd TR, Pearson FG. Sleeve lobectomy for carcinoma of the lung. *J Thorac Cardiovasc Surg.* 1979;78:839-49.
2. Deslauriers J, Gregoire J, Jacques LF, Piraux M, Guojin L, Lacasse Y. Sleeve lobectomy versus pneumonectomy for lung cancer: a comparative analysis of survival and sites or recurrences. *Ann Thorac Surg.* 2004;77:1152-6.
3. Li Z, Chen W, Xia M, Liu H, Liu Y, Inci I, et al. Sleeve lobectomy compared with pneumonectomy for operable centrally located non-small cell lung cancer: a meta-analysis. *Trans Lung Cancer Res.* 2019;8:775-86.
4. Xie D, Deng J, Gonzalez-Rivas D, Zhu Y, Jiang L, Jiang G, et al. Comparison of video-assisted thoracoscopic surgery with thoracotomy in bronchial sleeve lobectomy for centrally located non-small cell lung cancer. *J Thorac Cardiovasc Surg.* 2021;161:403-13.e2.
5. McKenna RJ Jr. Complications and learning curves for video-assisted thoracic surgery lobectomy. *Thorac Surg Clin.* 2008;18:275-80.
6. Petersen RH, Hansen HJ. Learning curve associated with VATS lobectomy. *Ann Cardiothorac Surg.* 2012;1:47-50.