



# Invited editorial on “Intraoperative conversion during video-assisted thoracoscopy does not constitute a treatment failure”

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*Provenance:* This is an invited Editorial commissioned by the Section Editor Shuangjiang Li (Department of Thoracic Surgery and West China Medical Center, West China Hospital, Sichuan University, Chengdu, China).

*Comment on:* Fourdrain A, De Dominicis F, Iquille J, *et al.* Intraoperative conversion during video-assisted thoracoscopy does not constitute a treatment failure. *Eur J Cardiothorac Surg* 2019;55:660-5.

Submitted Jan 24, 2019. Accepted for publication Feb 23, 2019.

doi: 10.21037/jtd.2019.02.97

**View this article at:** <http://dx.doi.org/10.21037/jtd.2019.02.97>

Video-assisted thoracoscopic surgery (VATS) has advanced thoracic surgery (1,2). Compared with classic thoracotomy, patients who undergo VATS have less postoperative pain and faster recovery (3). In addition, postoperative complications, mortality, and oncologic concerns associated with VATS are not inferior to those of classic methods (4,5). For these reasons, VATS has become a major trend in many medical institutions that perform intensive thoracic surgery, and many thoracic operations have been replaced by thoracoscopic surgery (4).

Despite continued efforts by thoracic surgeons, it is not possible to perform all operations by thoracoscopy. Complicated operations such as vascular sleeve resections and extrapleural pneumonectomy are not amenable to VATS nor can VATS be performed in patients with contraindications such as inability to undergo single-lung ventilation (6). Moreover, conversion to thoracotomy is inevitable in some cases due to intraoperative problems such as severe adhesions, vascular malformations, anthracofibrotic lymph nodes, and absence of fissures or technical problems such as vessel rupture during dissection (7,8). Such unintentional conversions to thoracotomy may lead to a difficult patient recovery and guilt for the doctor (6,9). Therefore, many thoracic surgeons have studied the inevitable causes of conversion and have identified age, body surface area, pleural adhesions, and anthracofibrotic lymph nodes as risk factors

for conversion to thoracotomy (7-12).

Alex *et al.* studied one of the key aspects of conversion, namely, whether unintentional conversion to thoracotomy represents a truly negative outcome in lung cancer patients. The study population consisted of 919 lung cancer operations performed over a period of 5 years. In their study of 610 patients, which excluded benign tumors, metastases, and pneumonectomy, the authors compared 309 patients who underwent conventional thoracotomy with 301 patients for which there was an intention of VATS. Patients with VATS intention were subdivided into groups of 56 patients (18.1%) converted to thoracotomy and 253 patients treated with VATS. Compared with patients treated by VATS, patients who were converted had a statistically significantly higher rate of cardiac and respiratory comorbidities. In addition, propensity score matching between open and conversion showed worse outcomes in the conversion group for 90-day mortality (5.4% in conversion *vs.* 3.7% in open), pneumonia (28.6% *vs.* 26.9%), reintubation (7.1% *vs.* 5.7%), and arrhythmia (6% *vs.* 5%). However, the differences were not statistically significant, so the authors concluded that outcomes of conversion were not inferior. Multivariate logistic regression also analyzed that surgical technique was not a risk factor for 90-day mortality or postoperative pneumonia. The conclusions were that when in doubt, a VATS approach should be preferred to open surgery for anatomical resection of lung cancers.

This report encourages VATS, especially for doctors not expert in the VATS procedure. However, this study needs to be considered from the point of view of whether the comparison was appropriate, whether the outcomes were defined properly, and whether the conclusions were reasonable. In addressing the first point, the authors included patients operated on during a learning curve period. As stated earlier, the rate of VATS increased with increasing study duration, while thoracotomy rates sharply decreased, and conversion rates improved and then remained steady. In other words, medical environment including patients, surgical technique, and experience in the early period of the study had different characteristics from those in the later part of the study, making them unsuitable for comparison. In addition, Authors compared conversion, VATS and open group at the same time, but only conversion and open groups were considered for the conclusions. It would have been more appropriate to compare the VATS and conversion groups rather than open and conversion groups to determine the effect of conversion on clinical outcome. In addition, there was no change in number of patients in either group after propensity score matching. Usually the number of patients changes after matching. Although it was assumed that the matching was correct, it is hard to appropriate comparison was made because the number difference between groups is very large ( $n=56$  vs.  $n=301$ ). Thus, it is necessary to consider whether a proper comparison was made. Moreover, although the authors elaborated on the limitations of their study, data on operation time and blood loss were not included in their analysis. Inclusion of these important variables may have produced different results.

In addressing whether the study outcomes were defined properly, the authors did not include cosmetic perspectives, medical costs, and health-related quality of life in their clinical outcomes. While 90-day mortality and postoperative pneumonia are essential clinical outcomes, it is necessary to consider many values during procedure selection. Finally, the authors' conclusions that the VATS should be actively attempted and that surgeons should not be afraid of converting seem reasonable, since there is no difference in outcome between the open and conversion groups. However, since the clinical outcome of VATS is clearly better than that of conversion, it is more important not to convert after attempting VATS. It is also more economical, intuitive, and efficient to select open than VATS if a conversion is anticipated.

Alex *et al.* conducted a well-prepared study and their

results suggest that VATS conversion is not inferior to open thoracotomy. This is important because conversion to thoracotomy may be a big burden for surgeons. However, if authors excluded patients enrolled during the learning curve, only patients with stable VATS technology and indications were included in the study, which could have increased the homogeneity of the study subjects and allowed a more appropriate comparison.

In summary, operations for lung cancer must meet both the goals of long-term survival and promotion of health-related quality of life. VATS is a means, not a purpose, and it is thus undesirable to recommend VATS when conversion is anticipated. Especially because the negative effects of conversion are not fully understood. Regardless of VATS or thoracotomy, it is important to maintain the flexibility to choose the most appropriate approach under the correct indications.

## Acknowledgements

**Funding:** This research was supported by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Science, ICT & Future Planning (2017R1C1B5015969).

## Footnote

**Conflicts of Interest:** The author has no conflicts of interest to declare.

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**Cite this article as:** Kim D. Invited editorial on "Intraoperative conversion during video-assisted thoracoscopy does not constitute a treatment failure". *J Thorac Dis* 2019;11(Suppl 9):S1231-S1233. doi: 10.21037/jtd.2019.02.97