



Analyzing intraoperative conversion of thoracoscopic lobectomy: acceptable outcome or failure?

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Video-assisted thoracoscopic surgery (VATS) lobectomy, which first emerged as a feasible technique in the 1990s, has been shown to be safe and effective for the treatment of early-stage lung cancer (1). Benefits over traditional thoracotomy include a decreased length of stay, decreased overall morbidity, decreased pulmonary complications, decreased atrial arrhythmias, decreased postoperative pain, and improved short-term quality of life and pulmonary function (2,3). The National Comprehensive Cancer Network recommended that “*VATS or minimally-invasive surgery should be strongly considered for patients with no anatomic or surgical contraindications...*” in its clinical guidelines for non-small cell lung cancer (4). The American College of Chest Physicians recommends that a minimally-invasive approach is preferred over thoracotomy in patients with clinical stage I non-small cell lung cancer (5).

Despite these advantages and recommendations from national bodies, the majority of lobectomies in the United States and Europe are still performed using an open approach. In a recent analysis of the National Cancer Database (NCDB), which captures 70% of cancer cases in the United States, only 33% of lobectomies for clinical stage I lung cancer were performed using a minimally-invasive approach (6). Another study using the NCDB revealed a wide variation among centers in the utilization of VATS for lobectomy, ranging from 0–93.4% (7). In the Society of Thoracic Surgeons (STS) Database, which is confined to dedicated cardiothoracic surgeons, the use of

VATS is higher at 55% (8). In Europe, the use of VATS also remains low at 15% in the European Society of Thoracic Surgeons Database (8).

The exact reasons for the underutilization of VATS lobectomy are not entirely clear. One potential reason is the concern over serious intraoperative complications and the potential poor outcomes associated with these complications. The need to convert to an open procedure is often associated with a negative connotation. In the manuscript by Fourdrain and colleagues, the authors report their series of patients who underwent VATS anatomic resection (segmentectomy, lobectomy or bilobectomy) with or without conversion versus resection via a standard thoracotomy for lung cancer (9). Their primary outcome was 90-day mortality with a secondary outcome of postoperative morbidity. The strengths of the study include the relative short and modern time period, a relatively large number and the use of propensity matching. A total of 253 patients underwent VATS resection, 56 underwent conversion to thoracotomy and 301 underwent a planned open resection. They had an 18% conversion rate. Over time, the use of a VATS approach increased and the conversion rate decreased. The learning period was included in this study and their initial conversion rate approached 60%.

The 30- and 90-day mortality did not differ statistically between the converted VATS group (1.8%, 5.4%) and the completed VATS group (1.2%, 2.8%) or between the

converted VATS group and the planned thoracotomy group (2.3%, 3.7%). However, despite the lack of statistical significance, the 90-day mortality in the converted VATS group is alarmingly high and almost double that of the completed VATS group. There was also no difference in morbidity after propensity matching between the converted group and the planned open group. The converted group did have an increased rate of pneumonia, arrhythmia and length of stay compared with the completed VATS group; however, these were not propensity matched. Urgent versus elective conversions were not differentiated and we might assume that the outcomes between these could differ.

Several groups have reported on the outcomes of VATS conversion for anatomic pulmonary resection. Most report no difference in mortality between converted VATS and completed VATS. Several report increased morbidity with converted compared to completed VATS, but comparable results between those patients converted to thoracotomy from a planned VATS procedure and those undergoing a planned open thoracotomy. Byan and colleagues reviewed their experience with 1,110 planned VATS lobectomies (10). Their conversion rate was 6.2% and these patients were randomly matched 1:3 with patients who underwent a completed VATS procedure. Converted patients had an increase operative time, increased estimated blood loss, increased ICU time and increased respiratory complications, but no difference in overall mortality. Puri and colleagues analyzed 1,227 patients undergoing VATS or open lobectomy for known or suspected lung cancer (11). Their conversion rate was 7% which decreased over time. Morbidity and length of stay were increased in the converted group compared to the VATS group, but similar to the planned open group. There was no difference in mortality between groups. Twenty-three percent of conversions were emergent. There was no difference in morbidity between emergent and elective conversions; however, there was increase in blood transfusion in the emergent group. Park and colleagues reviewed their experience with 738 attempted VATS lobectomies with a 4.6% conversion rate. Converted patients had an increased operative time, increased hospital stay, but no difference in complications (12).

In our early experience of 193 patients undergoing VATS lobectomy, conversion to thoracotomy was associated with increased operative time and blood loss, increased postoperative atrial arrhythmia, increased length of stay

and increased 30-day mortality compared to completed VATS lobectomy (13). Compared to planned thoracotomy patients, VATS conversion was associated with increased atrial arrhythmia, operative time, intraoperative blood loss and chest tube duration and was independently associated with increased length of stay and combined mortality/morbidity in multivariate analysis.

I completely agree with the authors' conclusion that conversion to thoracotomy is not a treatment failure and that fear of conversion should not dissuade one from performing VATS resections. However, we should not minimize the morbidity of conversion as discussed above. Moreover, elective conversion for lack of progress versus emergent/urgent conversion for bleeding may have different outcomes and is often not differentiated in the literature. Decaluwe and colleagues analyzed all VATS conversions across six experienced VATS centers in Europe (14). The overall conversion rate was 5.5% and decreased with increasing surgeon experience. In multivariate analysis, the only predictors of conversion were preoperative chemotherapy or radiation and surgeon experience of <10 cases. Major intraoperative complications occurred in 1.5% of cases; however, these cases accounted for 23% of in-hospital mortality. After a detailed analysis of major complications, a panel provided recommendations to maximize the safety of VATS lobectomy and minimize serious complications.

In conclusion, VATS lobectomy is a safe and effective treatment of early stage lung cancer and has many benefits over open lobectomy, but remains underutilized. The perceived difficulty and fear of complications from intraoperative complications may dissuade many from introducing VATS lobectomy into their practice, limiting the broader application of this technique. The learning curve for VATS lobectomy is reported to be at least 100 cases (15). However, we and others have shown that minimally-invasive lobectomy can be introduced safely into a practice (11,16). This should be done with a stepwise and thoughtful approach and one should analyze their outcomes on an ongoing basis. Conversion to an open approach should be undertaken before a serious intraoperative complication occurs, and as Dr. Fourdrain and colleagues state, should not be considered a treatment failure.

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Footnote

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

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