EDITORIAL

Are video-assisted thoracoscopic surgery (VATS) and robotic video-assisted thoracic surgery (RVATS) for pulmonary resection ready for prime time?

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Although video-assisted thoracoscopic surgery (VATS) was described twenty years ago, it only accounts for 2-5% of all pulmonary lobectomies performed in the United States and the United Kingdom (1). In addition, nearly 80% of VATS cases performed take place in specialty academic centers (2). The reasons for the lack of widespread acceptance are (I) the perceived complexity of the technique, (II) inadequate instrumentation and resources, and (III) concern regarding the potential compromise of safe surgical and oncologic principles, despite the reported benefits of perioperative pain, cosmesis, pulmonary complications, and length of stay (1). We recently reported the outcomes of a hybrid VATS technique in 1,170 cases in the community setting, the largest reported VATS series in the literature, which addressed those three concerns and demonstrated outcomes comparable to the conventional VATS technique (1,2). As we described, this hybrid technique, utilizing a 10 mm port site in the 8th inter-space and a 8-10 cm incision mini-thoracotomy in the 4th inter-space, provides the benefits of minimally invasive surgery while allowing the flexibility required for a solo-practitioner to perform safe and appropriate oncologic thoracic surgery in a community setting (1,2). Now the question is how good are the reported outcomes for VATS and robotic video-assisted thoracic surgery (RVATS) in specialized centers? Here, we will introduce two meta-analyses recently published that systemically review the outcomes (3,4).

The main criticism of the evidence in favor of VATS compared to open thoracotomy has been that the studies were biased because they were non-randomized observational retrospective studies and thus more favorable patients may have been selected for the new technique (3). To address this concern, the data of 7,739 unmatched non-small cell lung cancer (NSCLC) patients from 3 retrospective studies were analyzed, 5,636 open thoracotomy versus 2,094 VATS, as well as differences in propensity score matched patients in open thoracotomy versus VATS, 1,681 cases in each group (3). Mortality, prolonged airleak, and sepsis were significantly lower in the VATS unmatched comparison, but not significantly lower in the matched VATS comparison (3). Overall perioperative morbidity and length of hospital stay were consistently lower in VATS in both the matched and unmatched comparisons (3). While previous smaller studies have demonstrated the

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benefits of VATS compared to open thoracotomy, this review further contextualized those results for clinical practice (3).

Over the last decade there have been small reports of RVATS utilizing the $1 million US dollar master-slave robotic system (da Vinci, Intuitive Surgical, Sunnyvale, California), but there has been controversy regarding the actual benefits of this expensive technology (4). A systematic review of 941 patients (mostly NSCLC, some carcinoid and metastatic disease) from 12 institutions in 9 reports compared RVATS to VATS and open thoracotomy. They demonstrated equivalent oncologic outcomes to open thoracotomy, and the overall mortality ranged from 0-3.8%, overall morbidity from 0-39%, average operative time from 132-238 minutes, rates of conversion to open thoracotomy from 0-19%, average chest tube days from 1.5-7 days, and median length of hospital stay from 2-11 days. In contrast, our hybrid VATS series demonstrated an overall perioperative mortality of 4.3%, overall morbidity of 21.1%, mean operative time of 52 minutes, no conversions to open thoracotomy, mean chest tube days of 4.5 days, and mean length of hospital stay of 7 days (1). RVATS was on average $3,981 US dollars more expensive than VATS, but $3,988 US dollars cheaper than open thoracotomy (4). However, an extra $1,715 US dollars of amortized cost had to be accounted for utilizing the robot for each RVATS patient. Furthermore, although they demonstrated an improved quality of life score in the RVATS patients compared to open thoracotomy 3 weeks after operation, there was no difference at 4 months. Although they demonstrated the feasibility of this technology which has a well reported steep learning curve, the benefits of RVATS over VATS, especially considering the increased cost, have yet to be demonstrated.

Although the benefits for RVATS remain controversial, especially in the current economic environment where comparative-effectiveness and maximizing health care dollars are essential (4), there is further evidence that VATS is a feasible technology which provides benefits to patients. Although there is no large prospective randomized trial to definitively answer the question regarding the benefits of VATS compared to open thoracotomy, our reported hybrid VATS technique and large series demonstrated its benefits when performed outside of specialty academic centers and addressed the major concerns preventing widespread implementation (1,2). Although the meta-analysis demonstrated a possible element of bias in the retrospective comparisons of VATS to open thoracotomy reported in the literature vis-à-vis mortality, prolonged air leak, and sepsis, they still found a significant improvement in morbidity and length of stay even after propensity score matching (4). The results of these latest studies (3,4) taken together with our series (1,2) will hopefully lead to a greater adoption of VATS in pulmonary resection and provide the benefits of minimally invasive surgery to more patients in the future regardless of whether they are treated at specialty centers or in the community.

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