Conventional video-assisted thoracic surgery (VATS) *vs*. robot-assisted lobectomy: where is the money?

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The past 20 years have seen growing evidence for minimally invasive thoracic surgery, namely the widespread adoption of video-assisted thoracic surgery (VATS). The pinnacle of this procedure is the VATS lobectomy, which has thus far spawned multiple adaptations, such as robot-assisted, single-port and subxiphoidal approaches to mention only a few (1-3). Despite much higher adoption rate and more advanced technology, boundaries to conducting safe, efficient, reliably reproducible, minimally invasive surgery persist. Currently, the single-port approach offers no reported benefits over the conventional VATS lobectomy (4,5). Likewise, the robot-assisted VATS approach is reportedly non-inferior to that of conventional VATS (6). Debate about the rationality of the robot-assisted VATS approach is ongoing, as many surgeons feels the costs do not yet offset the benefits of this approach, as direct costs were significantly higher (robot-assisted surgery cost $25,040.70 *vs*. $20,476.60 for VATS) (7,8). Single-center reports have described higher incidence rates of laryngeal nerve palsy and chylothorax with robot-assisted VATS than with conventional VATS (9). These reports confirm that all of the approaches mentioned here are non-inferior to the conventional multiport VATS approach, and use of these alternative approaches remains the prerogative of the experienced surgeon.

In this study, Dr. Louie and colleagues (10) describe outcomes from the Society of Thoracic Surgeon (STS) database, comparing video-assisted thoracosopic surgery and the robot-assisted approach in stage I and II lobectomies for non-small cell lung cancer (NSCLC). The patients were collected from a 2009 to 2013 timeline. Selected patients underwent minimally invasive procedures. We excluded intended-to-treat (conversions) patients (n=719) as well as low-volume centers (n=1,656) and patients who received preoperative oncologic therapy (n=885). We analyzed the data submitted data from 128 centers, of which 22 used the robot-assisted approach. The study planning initially aimed to conduct propensity-matching analysis, but this was later abandoned due to time constraints. However, these groups shared similar preoperative characteristics, so patient selection should be free of any inherent bias.

As previously published papers show, the study demonstrated that robot-assisted surgery was non-inferior to that of conventional VATS. The results were quite similar to those of a previous report from the STS database (11). In this study, however, the suspected conversion rate for robot-assisted lobectomies was 25.5%, more than 2.4% higher than for conventional VATS. This is understandable, as high conversion rates were associated with the adaptation of the conventional VATS approach also (12). In addition, more robot-assisted surgery patients were preoperatively staged for mediastinal involvement than conventional VATS patients. As this was not the primary outcome for the patient, robot-assisted cases are clearly more likely in tertiary centers of excellence that adopted VATS early, as article discusses. Excluding these centers from the sub analysis could change these results, but the number of patients undergoing the robot-assisted approach would drop precipitously.

On the one hand, one can argue whether robotic

lobectomy is indeed a valid option over conventional VATS lobectomy given the higher operative cost and suspected high conversion rate. On the other hand, a similar debate about VATS versus open thoracotomy ensued a decade ago, and the surgical community now considers VATS lobectomy meaningful. As patient outcomes between conventional VATS and robot-assisted lobectomy are currently similar, organizing a prospective randomized study to show any benefit would be an enormous undertaking.

VATS continues to evolve with rapid the development of new technology and acquired experience. Compared to other approaches, robot-assisted surgery holds the greatest potential for the future. Robot-assisted surgery will likely see extraordinary advances over the next decade leading to superior patient outcomes than with conventional approaches. However, the potential of the robot-assisted approach/technique will encounter challenges, as current results for multiport VATS lobectomy are excellent. Time will tell which technique proves to be the most cost effective.

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