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Outcomes in video-assisted thoracoscopic surgery lobectomies: challenging preconceived notions

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ABSTRACT

Background: Most thoracic surgical procedures in the United States are being performed by general surgeons (GSs) without any advanced training. With the recent approval of computed tomography screening for lung malignancy in high-risk populations, the number of thoracic oncologic resections is expected to rise. Previous literature has demonstrated consistently worsened outcomes for patients undergoing thoracic surgical procedure when done by nonthoracic fellowship–trained surgeons. Using the American College of Surgeons National Surgical Quality Improvement Project database, we examined short-term outcomes in patients undergoing video-assisted thoracoscopic surgery (VATS) lobectomy for malignancy.

Materials and methods: Data were obtained from the American College of Surgeons National Surgical Quality Improvement Project from 2010-2015. We identified patients who had an International Classification of Disease 9 diagnosis of lung cancer (162) who underwent VATS lobectomy (current procedural terminology 32663). We included only adults (≥18y) and elective cases. We excluded patients who had preoperative diagnosis of sepsis, contaminated wound class, or those patients with missing American Society of Anesthesiologists classification, morbid obesity, functional status, length of stay (LOS), or sex, and race information. We identified two groups by specialty: GS *versus* cardiothoracic (CT) surgeon. We then performed univariate analysis. We then performed propensity score analysis using a 1:3 ratio of general surgery patients to CT patients. Outcomes of interest included 30-d postoperative mortality, 30-d postoperative morbidity, and LOS.

Results: A total of 4105 patients were identified, 607 performed by GSs, 3508 performed by CT surgeons. The mean age for patients who underwent lobectomies by GSs was 68.6 *versus* 67.8 in the CT surgeon group ($P < 0.05$). The majority were female (58.09% GS *versus* 57.74% CT surgeon). There was a statistically significant difference in race between groups; patients were more likely to be African American in the CT surgeon group. Operative time was lower

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in the GS group as opposed to the CT surgeon group 179 min *versus* 196 ($P < 0.01$). Univariate analysis (mortality <0.1 CT surgeon and GS) and 1:3 propensity score matched analysis (0.08 GS% *versus* 0.08% CT surgeon) failed to demonstrate a significant difference in mortality. There was a statistically significant difference in median LOS between groups (6.2 GS *versus* 5.1 CT surgeon). Univariate and propensity matched analyses of pneumonia, sepsis, wound infection, deep vein thrombosis, transfusion requirement, myocardial infarction stroke, postoperative renal insufficiency, failure to wean, pulmonary embolism, reintubation, and deep organ space infection all failed to demonstrate a statistically significant difference between our groups of interest. Urinary tract infection was noted to be higher in the GS group operating room 2.29 as compared to the CT surgeon group (P value 0.02).

Conclusions: In this large observational study, we found that VATS lobectomies performed by GS compared to the matched CT surgeon cohort had shorter operative time, and there was no difference in major postoperative morbidity or mortality. However, LOS was higher and there was increased risk of urinary tract infection in the GS compared to matched CT surgeon cohort.

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Introduction

As surgeons face increased scrutiny in the climate of outcomes-based reimbursement, the question of which procedures should be performed by which surgeons has become increasingly important. There is a large body of evidence supporting the notion that high surgical volume is associated with improved outcomes.[1-3] As such, there has been support for the creation of high volume referral centers that specialize in specific procedures.[4]

However, a large portion of thoracic surgery performed in the United States is performed by general surgeons (GSs).[5,6] There has been conflicting research in differences in outcomes between GSs and cardiothoracic (CT) surgeons when performing thoracic procedures. Some studies have demonstrated improved outcomes among fellowship-trained thoracic surgeons performing procedures such as pneumonectomies, lobectomies, limited lung resections, and decortications, even accounting for case volume.[5-8] Other studies focusing on esophagectomies failed to demonstrate a significant difference in outcomes between the two specialties, even when adjusting for surgeon and institution volume.[6,9,10]

However, these data were primarily conducted in the era of open surgery. Minimally invasive surgery and video-assisted thoracoscopic surgery (VATS) have become the modalities of choice for performing what were traditionally open procedures. Yet, there have been no studies comparing outcomes of these procedures when performed by GSs versus CT surgeons since the era of VATS began.[11,12]

Therefore, the objective of this study was to evaluate short-term outcomes between GSs and thoracic surgeons performing VATS lobectomies in the setting of lung cancer to determine if previously reported differences in morbidity and mortality based on surgeon specialty holds true in the current era of widespread adoption of minimally invasive surgical techniques.

Methods

Patient selection and data

We obtained our data from American College of Surgeons National Surgical Quality Improvement Project (ACS NSQIP), which is a multispecialty and multi-institutional clinical database that includes approximately 30% of the operative volume of the United States.[13] The 2010-2015 ACS NSQIP participant use files were used as the data source for the analysis. We identified adult patients who underwent a non-emergent thoracoscopic lobectomy of a single lobe (current procedural terminology code 32,663) by either a GS or CT surgeon with a postoperative diagnosis of lung cancer via the International Classification of Disease 9 codes 162.2, 162.3, 162.4, 162.5, 162.8, 162.9. We excluded patients who were older than 90 y, were morbidly obese, had preoperative sepsis, and had an intraoperative wound classification contaminated or dirty as these conditions represented potentially significant confounding etiologies for postoperative complications. We also excluded cases that had missing sex, race, functional status, American Society of Anesthesiologists (ASA) classification, and length of stay (LOS) data. Our study was reviewed by the SUNY Downstate Institutional Review Board and granted an exemption.

Outcomes

Primary outcomes of interests were total LOS and death. Secondary outcomes of interest included operative time, postoperative superficial/deep/organ space infections, pneumonia, unplanned intubation, pulmonary embolism, deep vein thrombosis, ventilator dependence >48 h, urinary tract infection (UTI), stroke with neurological deficit, myocardial infarction, cardiac arrest requiring cardiopulmonary resuscitation, intraoperative/postoperative transfusion within 72 h of surgery, sepsis, septic shock, and return to the operating room.

Statistical analysis

Statistical analysis was performed by conducting a propensity score analysis. We matched over 16 patient characteristics including age, sex, race, functional status, smoking status, presence of dyspnea, diabetes, hypertension, acute renal failure, dialysis dependence, steroid use, bleedings disorders, history of chronic obstructive pulmonary disease, congestive heart failure, weight loss, and ASA classification. We then performed nearest-neighbor matching without replacement