Commentary

Minimally invasive lobectomy for early stage non-small cell lung cancer—it can be done without sacrificing oncologic outcomes

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The introduction of minimally invasive surgical techniques to perform lobectomy for non-small cell lung cancer (NSCLC) has significantly changed the practice of general thoracic surgery over the past two decades. Since the first reports of the use of video-assisted thoracic surgery (VATS) to perform lobectomy for NSCLC in the early 1990s (1), many more studies across a wide array of cohorts have reported on short-term and long-term outcomes. Initial studies focused on the feasibility and reproducibility of the procedure (2), and then subsequent studies demonstrated VATS lobectomy had less morbidity compared to thoracotomy (3). Over time, studies have shown that a minimally invasive approach may be particularly beneficial in those patients with higher peri-operative risk due to advanced age or poor pulmonary function (4,5). More recently, experience with robotic-assisted lobectomy has been increasingly reported and a robotic approach appears to provide similar advantages over thoracotomy as a VATS approach (6). Despite these demonstrated benefits, universal adoption of minimally invasive lobectomy for early-stage NSCLC has not occurred (4,7,8).

A valid concern that may be at least partially responsible for the relatively low utilization of minimally invasive approaches may be concern regarding compromises regarding the oncologic principles of anatomic resection and complete lymphadenectomy (9). Upstaging from clinical N0 to pathologic N1 or N2 has been shown to occur less often for VATS compared to thoracotomy in two national studies, one utilizing data from the Society of Thoracic Surgeons database and one using the Danish Lung Cancer Registry (10,11). These findings have spurred concerns that lymph node dissection in a VATS approach may be inherently limited by the approach, and this limitation may be compromising patients' long-term oncologic outcomes due to understaging and undertreatment (9). Proponents of the use of robotic techniques have suggested the use of wristed instruments provides better ability to dissect lymph nodes (12). However, robotic utilization remains relatively low, perhaps due to the cost and issues regarding access to the robotic platform (7).

Despite these concerns, evidence linking minimally invasive approaches to worse long-term NSCLC oncologic outcomes has not yet been published. The impact of approach on long-term survival has been most recently investigated by Yang and colleagues at Memorial Sloan Kettering (13). In this study, the authors drew on their vast experience with robotic, VATS, and open approaches for 2,389 patients who underwent lobectomy for clinical stage I NSCLC between the years 2002 and 2012. The authors were able to use this large cohort of patients to create a group of 470 relatively well matched patients between robotic, VATS, and open approaches using propensity scoring. Perioperative outcomes were outstanding as would be expected based on the excellent reputation of thoracic surgery at Memorial Sloan Kettering, with minimally invasive patients having a slightly shorter length of stay compared to open patients. There were no statistically significant differences in the rates of nodal upstaging between approaches, in contrast to the large multicenter national studies described above. Interestingly the absolute rates of nodal upstaging for both the VATS and robotic approaches were higher than that for thoracotomy. The median number of lymph node stations individually sampled during lobectomy was higher for the robotic patients (five stations) than the VATS patients (three stations) and the thoracotomy patients (four stations), though the authors do

not give any details on which specific lymph node stations may have been neglected more often in the VATS or thoracotomy patients. The study ultimately demonstrated in a convincing fashion using propensity score and multivariate analyses that there were no significant differences in long-term survival between the three approaches to lobectomy for clinical stage I NSCLC.

This study joins a host of other reports that have demonstrated that minimally invasive approaches do not compromise long-term NSCLC outcomes (7,14-17). These data overall are very reassuring that a minimally invasive approach is appropriate for patients with early-stage lung cancer. However, it must be stressed that all of these reports essentially demonstrate that a minimally invasive approach does not inherently compromise the oncologic principles of lobectomy for early-stage NSCLC. In the Society of Thoracic Surgeons database study mentioned above, the differences in nodal upstaging rates observed in the entire cohort were no longer present in a subset analysis that included only VATS-predominant centers (8). Several surgeons and centers have shown that minimally invasive techniques are appropriate for lung cancer resection, but all individual surgeons must ensure in every case that patients are appropriately selected and procedures are conducted such that oncologic principles and lymph node assessment are never compromised simply for the sake of keeping incisions small. Although all patients would desire the lower morbidity, shorter hospitalizations, and faster recovery associated with minimally invasive procedures, likely all would not choose those benefits over having the best chance of cure of their cancer as possible. These principles are critical to be remembered by surgeons, as the use of minimally invasive techniques are being expanded from small early stage cancers to larger and more locally advanced tumors (18), and minimally invasive approaches are also transitioning to uniportal approaches and even lobectomy for non-intubated patients (19,20). These newer approaches may ultimately prove to hold some of the same benefits shown for robotic and VATS lobectomy for early-stage disease, but surgeons that adopt new techniques must maintain the same care exhibited in the development of VATS and robotic approaches to lobectomy so that patients are appropriately selected and outcomes are not ultimately compromised.

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Footnote

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