Commentary: Thoracoscopic versus open pneumonectomy— Is the last minimally-invasive frontier living up to the hype?

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Since the early 1990s, minimally invasive surgery has progressively conquered nearly every procedure in the repertoire of thoracic surgeons, from simple lung wedge resections, to complex sleeve lobectomies, and even to esophagectomies. For many, however, thoracoscopic pneumonectomy remains the last frontier before the conquest of thoracic surgery by minimally invasive technology is complete. Although small case series including thoracoscopic pneumonectomies have been reported, only 2 single-institution studies directly have compared thoracoscopic versus open pneumonectomy, both with no demonstrable differences in perioperative morbidity or mortality.^{1,2}

In their publication in this issue of the *Journal*, however, Yang and colleagues³ report an impressive cohort of 124 patients who underwent thoracoscopic pneumonectomy from 2000 to 2016 at 1 of 5 major US thoracic centers. These patients were compared with a contemporary group of 235 patients undergoing open pneumonectomy at the same institutions. Importantly, thoracoscopic pneumonectomy was defined as surgery with “videoscopic guidance,” 1 to 3 ports, and 4- to 7-cm “access” incisions. The only real difference between thoracoscopic and open pneumonectomy was the absence of a “rib retractor.” Also significantly, 23 thoracoscopic procedures (nearly 1 in 5) required conversion to open procedures, with a substantial 30-day mortality of 17% in patients undergoing conversion. In the initial analysis, thoracoscopically treated patients were more likely to be female and to have a greater forced expiratory volume in 1 second, whereas open patients had a higher pathologic T stage and more squamous histologic type, likely reflecting larger hilar and central tumors requiring open surgery. Thoracoscopic pneumonectomy was associated with longer operative times and notable, albeit inexplicable, higher incidences of pneumonia and pericardial effusions. Although 318 resections (89%) were done by surgeons experienced in both thoracoscopic and open pneumonectomy, it is hard to explain the finding

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Central Message

The benefits of thoracoscopic relative to open pneumonectomy appear to be less pronounced than for lobectomy or segmentectomy.

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of more lymph nodes and N2 stations dissected in thoracoscopically treated patients. It is doubtful that surgeons performing open pneumonectomy simply passed up hilar and mediastinal lymph nodes in the operative field. Overall, however, the surgical and oncologic outcomes were identical.

In a subgroup of 50 propensity-matched patients from each group, Yang and colleagues³ noted similar findings, with equal surgical and oncologic outcomes, length of hospitalization, estimated blood loss, and perioperative complications. Persistent differences were observed in the number of lymph nodes and lymph node stations dissected, as well as earlier chest tube removal in favor of thoracoscopic pneumonectomy. Although the nodal differences again are improbably explained by better visualization somehow afforded by a camera, the difference in chest tube drainage is not likely clinically significant, particularly because the length of stay was identical, and many surgeons do not use postpneumonectomy chest drainage. Finally, the study did not address the significant issue of patient selection for each operation, nor the issue of pain.

Although Yang and colleagues³ are to be congratulated for expanding our knowledge regarding minimally invasive pneumonectomy, the compelling conclusion is not that thoracoscopic pneumonectomy is equivalent to open pneumonectomy but that thoracoscopic pneumonectomy in reality produces no true clinical advantages relative to standard open procedures. In the marathon to incorporate minimally invasive surgery into all facets of thoracic surgery, the

process, as it applies to pneumonectomy, may thus have “hit the wall.”

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