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Commentary: Minimally invasive esophagectomy: Steady progress

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Minimally invasive approaches to thoracic surgery have steadily progressed over time. Clearly, thoracoscopic lobectomy has become widely accepted as providing an improvement in value over open lobectomy.^{1,2} The question remains whether minimally invasive approaches to more complex operations with greater physiologic insult are equally beneficial. The review article by Groth and Burt³ in this issue of the *Journal* nicely summarizes the state of the art for minimally invasive esophagectomy (MIE) and concludes that the field is moving toward establishing MIE as an approach with improved value over traditional approaches. However, as the authors admit, many important questions remain unanswered.

Value is defined as quality over cost. Addressing quality first, the most important measure of MIE is oncologic efficacy. Both prospective randomized and observational data have demonstrated no difference between MIE and open approaches in terms of lymphadenectomy, rate of R0 resection, and disease-free survival at 3 years. Given improved optics and technological improvements, it is entirely feasible that ability to perform similar oncologic operations minimally invasively will continue to progress. However, morbidity rates remain high despite minimally invasive approaches. Although both prospective randomized trials demonstrated reduced rates of pneumonia in the minimally invasive groups, leak rates were higher.^{4,5} Whether the studies were sufficiently powered for these rates to be statistically significant is a matter of debate. Of note, cervical anastomoses were performed in the TIME trial, and open thoracic anastomoses were performed in both groups in the MIRO trial. Larger national observational studies have shown similar pneumonia rates between open and MIE groups.^{6,7} One of these demonstrated an overall higher

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CENTRAL MESSAGE

Minimally invasive esophagectomy is safe and effective. Analysis of its value is progressing.

leak rate in MIE patients,⁷ and the other found a higher leak rate in transthoracic MIE patients but not in transhiatal MIE patients.⁶ As the cervical anastomosis is performed “open” whether or not the chest and abdomen are performed minimally invasively, differences in leak rates with open and minimally invasive transthoracic anastomosis must be carefully watched. Careful reporting of type and level of transthoracic anastomosis is a must.

The other component of value is cost. The authors emphasize the costs associated with anastomotic leak; however, the cost improvements with thoracoscopic lobectomy track directly with decreased length of stay (LOS). As the field transitions to MIE (either with or without robotic assistance), it will be important to document healthcare savings to offset the increased equipment costs. In the United States, MIE Ivor Lewis is associated with decreased LOS, but MIE transhiatal surgery is associated with increased LOS.⁶ The latter may be related to a previous inability to account for minimally invasive McKeown in the database, but LOS based on approach and level of anastomosis will be important to track.

All in all, this is an exciting time to be an esophageal surgeon. Technological advances may make a significantly morbid operation more tolerable for our patients. We must continue to insist that MIE is adding value.

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Commentary: Robot or no robot? That is not the question

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It is impressive that less than 20 years since Luketich and colleagues¹ first large series on laparoscopic/thoracoscopic minimally invasive esophagectomy (MIE), the number of MIEs surpassed the number of open esophagectomy procedures performed in the United States.² More important, different from the literature for video-assisted thoracoscopic surgery lobectomy and robotic lobectomy, MIE and robotic-assisted minimally invasive esophagectomy (RAMIE) generated 3 randomized trials showing the superiority of MIE and RAMIE over open esophagectomy. The Traditional Invasive Versus Minimally Invasive (TIME) study³ showed improved quality of life and fewer complications with MIE. Although some argue that the control group performed poorly with a high incidence of pulmonary infections, it is hard to ignore the findings of improved quality of life. The MIRO trial⁴ randomized patients to open esophagectomy or to laparoscopy and open thoracotomy esophagectomy and also found advantages in the minimally invasive technique. Finally, the ROBOT

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CENTRAL MESSAGE

Minimally invasive esophagectomy offers advantages to patients over open esophagectomy. The robot can help convert hesitant surgeons to minimally invasive techniques, benefitting patients.

trial⁵ randomized patients to robotic esophagectomy or open esophagectomy and found significant benefits for the minimally invasive approach. In between Luketich and colleagues' initial description and the 3 randomized trials described above, several other authors deserve mention in describing and improving the technique of robotic esophagectomies,^{6,7} the intrathoracic anastomosis,^{6,8} and carefully reporting on the steep learning curve for the procedure.⁹

Groth and Burt¹⁰ review MIE and suggest a general direction toward robotic esophagectomy. The robotic platform offers several advantages to surgeons besides comfort and improved dexterity. The surgeon maintains full control of the camera with less reliance on an assistant. There is the added benefit of firefly fluorescence technology that allows for ascertaining the gastric conduit's perfusion, although several laparoscopic sets currently offer similar and, in

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