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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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some cases, more advanced fluorescence technology. The ROBOT-2 study will compare MIE to RAMIE, but the head-to-head comparison is challenging. Surgeons who are experts in robotic MIE may not have the same expertise in laparoscopic/thoracoscopic MIE and vice versa. Both procedures have a steep learning curve, and it is likely that surgeons who become experts in 1 technique may lose the skills to perform the other. I suspect that the ROBOT-2 trial will fail to reveal substantial differences between the 2 techniques, but equivalency will be a positive finding. A previous small retrospective study did not show significant differences between MIE and RAMIE.¹¹ Another issue is that there are no studies looking into the cost of MIE and RAMIE. The robotic equipment cost is significant and will cause the cost of RAMIE to be higher than the cost of MIE. But if robotics allows the conversion of hesitant open surgeons to minimally invasive surgery, patients will benefit despite the higher cost.

In the current state of esophagectomy, it appears that both minimally invasive techniques (ie, MIE and RAMIE) offer similar advantages to patients. Perhaps more critical than laparoscopy/thoracoscopy versus robotic is converting hesitant surgeons who specialize in open surgeries to minimally invasive or robotic esophagectomy. Each surgeon should adopt the minimally invasive procedure he or she is comfortable performing. Robot or no robot, patients benefit.

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