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EDITORIAL – THORACIC ONCOLOGY

Major Intraoperative Complications during Minimally Invasive Esophagectomy: Experience is a Hard Teacher

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Minimally invasive esophagectomy (MIE) appears to reduce the morbidity associated with open esophagectomy.[1–3] Despite advances in techniques, minimally invasive esophagectomy remains fraught with complications, including intraoperative complications, which are recognized and treated during surgery. Surgeon experience, as measured by surgical volume,[4] is clearly a key driver of improved outcomes in complex cancer surgery, including cystectomy, pancreaticoduodenectomy,[5] lung resection, and esophagectomy.[6,7] The role of surgeon experience in outcomes after minimally invasive esophagectomy was highlighted by a report from Dutch investigators, who performed the TIME trial randomizing patients between open and minimally invasive esophagectomy.[8] Investigators then looked at MIE outcomes in the Netherlands over an 8-year period subsequent to the trial, when MIE techniques were adopted by a wider group of less-experienced surgeons. They found that when performed outside of the TIME trial, MIE was associated with an increased risk of complications and reoperation.[9]

The association between surgeon volume and outcomes begs the fundamental question of why surgeon experience leads to better outcomes. As surgeons, our attention is divided between progressing the operation and avoiding misadventures. We examine the conduit staple line throughout its length to avoid a torsion, we handle the right gastroepiploic artery with great care because it is the life blood of the esophageal substitute, we avoid cautery near the mainstem bronchus to avoid a thermal injury, and we all know that the spleen cannot take a joke. When it comes to hazards in the operating room, experience is a powerful, although perhaps inefficient, teacher. The maxim "Experience is a hard teacher because she gives the test first, the lesson afterwards" is attributed to baseball player Vern Law and is never more true than in surgery. The value of this report is that it allows the reader to benefit from the extensive patient experience of this collection of centers and adds to the mental list that surgeons carry in their heads of the dangers that lurk in the operative field.

This work brings to mind the process improvement work in laparoscopic cholecystectomy, where the rapid adoption of minimally invasive techniques appeared to have doubled the rate of bile duct injury. An important initial step in process improvement was a recognition of the problem and the classification of type of injuries.[10] The next steps included an understanding of the perceptual and technical causes of bile duct injuries[11] and strategies to avoid these pitfalls.[12]

What is striking from this report is the relative rarity of these events. Among 2862 cases, there were only 101 reported intraoperative complications. Conversion to laparotomy or thoracotomy was common, as was reoperation within the next 5 days. Vascular injuries, although representing a minority of cases, had a median blood loss of more than a liter. A number of these complications also resulted in postoperative mortality. All this would suggest that if a surgeon encounters one of these complications, particularly a vascular injury, that expeditious conversion to open surgery and ensuring the availability of blood products are prudent first steps.

The relative rarity of this category of complication suggests that there are other factors that are less obvious that account for the association between surgeon experience and outcomes. This would suggest that those of us engaged in the training of cancer surgeons still have unfinished work ahead of us in reducing variability and improving outcomes in complex cancer surgery. One would hope that this report will be followed by others which outline granular data from

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large series to enhance our understanding of potential hazards in the operating room and how we can enhance the safety of our patients.

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