

Why minimally invasive surgery for esophageal cancer is minimally invasive?

Minimally invasive surgery (MIS), first applied with cholecystectomy, is now applied in cases of esophageal cancer, as described by Dr Seto in the review article entitled "Essential Update 2018/2019: Essential Update for Esophageal Cancer Surgery." Laparoscopic MIS for esophageal cancer (MIE) is also being developed for robotic surgery.

Kitano et al¹ first introduced MIS for gastric cancer using a laparoscopic gastrectomy (LG) procedure, which was steadily progressed over time to safely expand the indications of LG. While many studies have explored the minimal therapeutic invasiveness in LG compared with conventional open gastrectomy, deriving the answer was never straightforward. Acute inflammatory cytokines such as TNF-alpha, IL-6, and IL-1 beta in the peripheral blood were often used to compare the invasiveness of MIS for gastrectomy with that of LG and open gastrectomy; however, no significant differences were identified.

The inflammatory response detected in tissues from the abdominal cavity is more representative of the surgical invasiveness than inflammation in the peripheral blood. To this end, Hiki et al² worked on the assumption that an open procedure often manipulates the intestinal tract during surgery, based on observed invasiveness in a pig animal model. Specifically, they showed that manual handling of the intestine during open gastrectomy is an important contributor to the molecular and humoral inflammatory response to surgery, and such handling does not occur in LG.

In addition to intestinal manipulation during gastric surgery, pancreatic compression and manipulation during LG also induced local inflammation of pancreatic tissue.³ Supra-pancreatic lymph-node dissection without compressing the pancreas was also shown to significantly improve short-term surgical outcomes based on less severe postoperative pancreatic fistula formation and intra-abdominal infectious complications.⁴ These studies suggest that touching or compressing an intraperitoneal organ that has not been touched since birth by intra-abdominal surgery substantially increases the invasiveness of gastrectomy. In turn, performing gastric cancer surgery with minimal contact to other organs in the abdominal cavity such as small intestine and pancreas could significantly reduce the invasiveness of surgery. Robot-assisted surgery is a convenient technique for achieving such touchless surgery.⁵

As Dr Seto described, MIE is associated with fewer postoperative morbidities than open esophagectomy, especially pneumonia,

and less surgery-related mortality based on a large cohort, but not in a randomized control study. In esophageal cancer surgery, it is not known whether not touching the organs in the thoracic cavity such as lung and recurrent laryngeal nerve will improve the short-term surgical outcomes. The longitudinal esophageal surgery reported less lung complication such as pneumonia due to avoiding contact with the lungs.⁶ Robot-assisted MIE also showed promising results for dissection along the recurrent laryngeal nerve, possibly due to the minimal retraction resulting in less functional injury of the nerve.

In summary, the potential for less internal injury using MIE, as indicated by LG, could reflect the value of organ-touchless surgery, and future clinical studies related to esophageal surgery are needed to test this hypothesis.

DISCLOSURE

Author declares no conflict of interests for this article.

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