

## **Robotic versus Laparoscopic Surgery in Upper Gastrointestinal Procedures: A Narrative Review of Recent Literature**

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### **Abstract**

*Introduction:* Robotic-assisted surgery offers theoretical advantages over laparoscopy for upper gastrointestinal (UGI) procedures including three-dimensional visualization, enhanced dexterity, and improved ergonomics. However, its clinical impact remains debated given longer operative times and higher costs.

*Methods:* We conducted a narrative review searching PubMed/MEDLINE, Embase, Cochrane Library, and Web of Science for studies published between January 2020 and August 2025 comparing robotic versus laparoscopic or open surgery for gastroesophageal pathologies. Studies were included if they reported perioperative, oncological, or long-term outcomes in patients with gastric cancer, esophageal cancer, gastroesophageal reflux disease, or hiatal hernia. Sixteen studies were included comprising 3 randomized controlled trials, 6 meta-analyses, and 7 observational studies.

*Results:* For gastric cancer, robotic gastrectomy demonstrated reduced blood loss, lower conversion rates, enhanced lymph node retrieval, and decreased complications across meta-analyses of 68,755+ patients, with comparable oncological outcomes. Three-dimensional laparoscopy achieved similar results in several domains. For esophagectomy, robotic approaches showed substantial reductions in pulmonary complications, overall morbidity, and improved quality of life versus conventional minimally invasive and open surgery, with higher R0 resection rates. For functional foregut surgery, robotic Heller myotomy demonstrated fewer perforations and reinterventions, while fundoplication and hiatal hernia repair showed equivalent outcomes. All robotic procedures had longer operative times.

*Conclusions:* Robotic surgery offers measurable perioperative benefits in UGI procedures, strongest for

esophagectomy. For gastric cancer, advantages support selective use though three-dimensional laparoscopy narrows the gap. Benefits in foregut surgery are procedure-specific. Laparoscopy remains standard due to efficacy, accessibility, and cost. Further randomized trials with long-term follow-up and cost-effectiveness analyses are needed.

**Keywords:** robotic surgical procedures, laparoscopy, gastrectomy, esophagectomy, minimally invasive surgical procedures, upper gastrointestinal tract