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Original Research

Short and long-term outcomes of laparoscopic total gastrectomy for gastric cancer: A single-center experience (retrospective cohort study)

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ABSTRACT

Background: Limited studies have been designed to evaluate the short and long-term outcomes of laparoscopic total gastrectomy (LTG). The objective of this study was to evaluate the feasibility, safety, and oncological outcomes of LTG.

Methods: A total of 290 consecutive patients underwent radical gastrectomy for gastric cancer in our institution between 2010 and 2016, from which 110 were performed laparoscopically and included in the study. Short and long-term outcomes of LTG, such as operative results, postoperative courses, morbidities, and mortality, were investigated and compared with those of laparoscopy distal gastrectomy (LDG) patients.

Results: From the total of 110 patients who underwent LTG, no one underwent conversion. The mean operation time was 267 ± 88 min. The mean reconstruction time was 45.3 ± 15 min, and the mean intraoperative blood loss was 75.4 ± 20 ml. The time until the first flatus was 4 ± 1.5 days. The time to start soft diet was 7 ± 1.8 days. The length of postoperative hospital stay was 9 ± 2 days. The mean number of retrieved lymph nodes was 34.7 ± 9. Compared with the LDG group, the mean operation time, the mean reconstruction time, number of retrieved lymph nodes, and time of start soft diet were significantly longer in the LTG group ($P < 0.05$).The postoperative complication rates of the LTG group and LDG group were 10% and 8.3% ($P > 0.05$), respectively. The 3-year cumulative survival rates of the LTG group and LDG group were 53.8% and 56.6% ($P = 0.21$), respectively.

Conclusion: LTG for gastric cancer is a safe, reliable and minimally invasive procedure with short and long-term outcomes similar to those of LDG.

1. Introduction

China, Japan, South America, Eastern Europe and parts of the Middle East are reported with the highest incidence of gastric cancer [1]. Surgical resection using gastrectomy and proper perigastric lymphadenectomy is the only treatment option to enhance the survival rate of patients with gastric cancer. Over the past two decades, gastrectomy has evolved toward the use of small surgical incisions with reduced trauma to the patient and a faster postoperative recovery. Since the first reported laparoscopy assisted distal gastrectomy was performed for gastric disease in 1994 [2], for tumors relatively low in the stomach, interest for this surgical approach has continued to grow. Several studies have reported clinical advantages for laparoscopic gastrectomy, such as less pain, faster bowel recovery and shorter hospital stays [3,4]. However, laparoscopic total gastrectomy (LTG) remains a challenging procedure because of its technical difficulties and possible complications. To date, few reports have been issued on surgical outcomes and technical feasibility of LTG for advanced gastric cancer. In this study, we evaluated the surgical outcomes of LTG for advanced gastric cancer in comparison with laparoscopy distal gastrectomy (LDG) in terms of surgical results and survival rates.

2. Methods

The work has been reported in line with the STROCSS criteria [24]. From September 2010 to July 2016, a total of 110 consecutive patients with middle or upper gastric cancer underwent LTG that was performed by a single surgical team. All patients were discussed in a multidisciplinary tumor board and choice of surgical approach either by open or laparoscopic depended on the arbitrary referral of the patients to either a consistently laparoscopic or open surgeon at our institution. Informed consent forms were obtained from all patients in our study.

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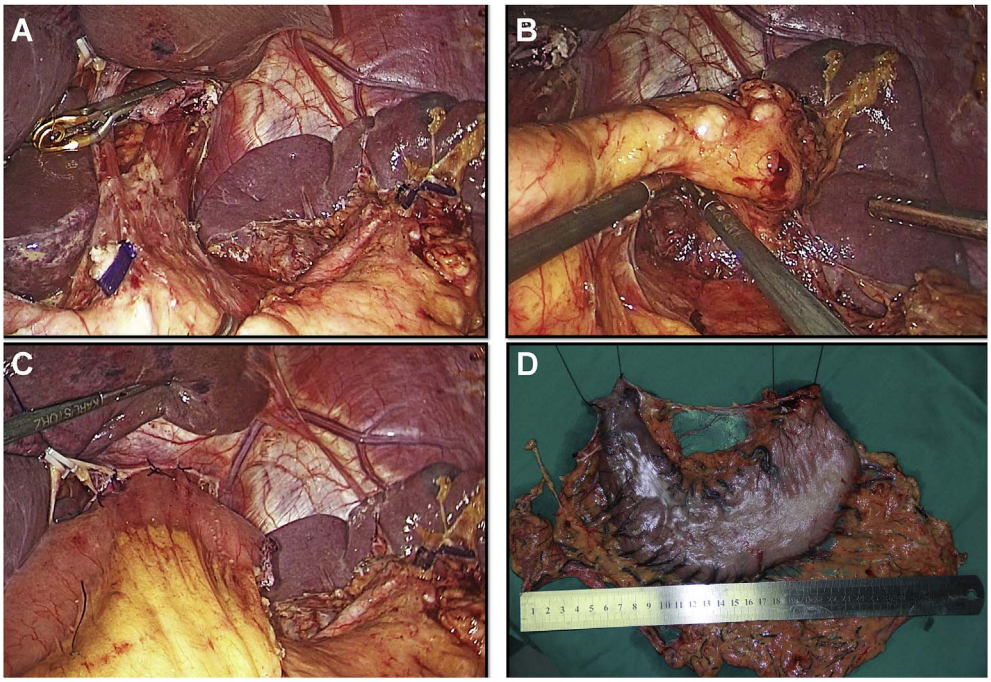

Fig. 1. A: dissected splenic hilar lymph nodes above the splenic artery; B: dissected splenic hilar lymph nodes below the splenic artery; C: Complete esophagojejunostomy; D: stomach of the specimen.

All patients were preoperatively examined by esophagogastroduodenoscopy, abdominal and pelvic computed tomography (CT), chest radiography, electrocardiography, and basic blood testing. Endoscopic ultrasonography (EUS), liver magnetic resonance imaging (MRI), or chest CT was selectively performed as appropriate.

Descriptive data were collected. Preoperative variables included age, gender, American Society of Anesthesiologists (ASA) score and body mass index (BMI). Patients were observed for 30 days after surgery and short-term surgical outcomes were recorded, including operative time, estimated blood loss, postoperative complications, length of postoperative hospital stay, and number of dissected lymph nodes. Pathological and clinical staging was determined based on the American Joint Committee on Cancer (the 7th edition) and the tumor-node-metastasis (TNM) classification scheme.

During the study period, LDG was performed on 180 patients with distal gastric cancer. To evaluate differences in surgical outcomes between the LTG and LDG groups, they were compared with respect to perioperative outcomes.

Postoperative follow-up was performed every 3 months for 2 years and then every 6 months from years 3–5. Most patients' routine follow-up appointments included a physical examination, laboratory tests, abdominal and pelvic computed tomography.

2.1. Operative technique

The patient was placed in the supine position under general anesthesia. The surgeon and the scopiststood on the right side of the patient while the first assistant stood on the left side of the patient. Five major trocars were inserted in a routine V shaped arrangement. A carbon dioxide pneumoperitoneum was set at 12–15 mmHg. After completing D2 lymph node dissection, the esophagus was sectioned with an ultrasound scalpel or scissor between two Endo Bulldog Clamps®, and then we obtained the resection margin (Fig. 1). After negative margin was identified by frozen section, the end-to-side Roux-en-Y reconstruction was performed.

The jejunum was transected 20–25 cm from the Treitz ligament with the endoscopic linear stapler. The Roux limb and the dorsal wall of distal esophageal stump were sutured with interrupted suture in a retrocolic way. Then a matched enterotomy was created 5 cm distal to the stapler line on the antimesenteric side of the Roux limb. Two hand-sewn continuous sutures were performed including posterior wall closure and anterior wall closure with barbed sutures and both of them were started from the left side to the right (Fig. 2). A knotting was tied after two sutures joined at the right. An intraoperative test with methylene blue solution irrigation through a naso-gastric tube was routinely performed to verify esophagojejunal anastomosis integrity. One abdominal drainage was placed close to esophagojejunal anastomose.

2.2. Statistical analysis

All results are expressed as median and range values. Continuous variables were analyzed using Mann–Whitney *U* test, whereas

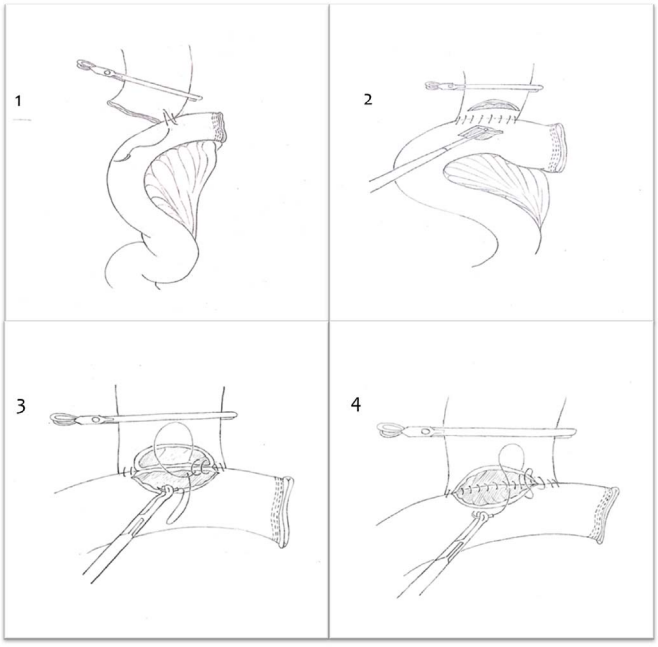

Fig. 2. The diagram of esophagojejunostomy.