



## Laparoscopic gastric cancer surgery for 65 age and elderly patients: A single center experience

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### Abstract

Therapeutic modalities for elderly gastric cancer (GC) patients have enlarged with extended life expectancy. The aim of this study was to investigate the outcomes of surgical therapies for GC patients of age 65 and older with a single center experience. Eighty-eight patients who underwent laparoscopic surgery for GC were included in the study. The relationships between surgical methods and clinicopathological or prognostic features were analyzed. The median age of the patients was 72 (65-91) years. Sixty patients (75%) were male. The median BMI was 25 kg/m<sup>2</sup> (17.5-42). The most common ASA score was 2 (n=58, 72.5%) and tumors were mostly localized in the distal 1/3 of the stomach (n=39, 48.7%). The median CEA and CA19-9 levels were 1.94 ng/ml(0.07-93.8) and 10IU/ml (0.05-449.3), respectively. Eleven patients (13.8%) had previous abdominal surgery history. The most common operation type was subtotal gastrectomy (n=33, 41.3%). The median operation time was 300 min (45-720) and the median intraoperative blood loss was 100 ml (0-800). There were eleven conversion (13.8%). The median first time to oral intake was 2 days (1-10) and length of hospital stay was 7 days (1-48). Postoperative serious complications occurred in fourteen (17.5%) patients. The mean of retrieved lymph node was 30.27 ± 17.08. The most common pathological T stage was T4 (53.75%). The median time to chemotherapy was 41 days (6-220). Laparoscopic gastric surgery is a safe and feasible method that can be performed in elderly patients with appropriate oncological principles. The risk of surgery is substantially higher in elderly patients. Therefore, maximal attention should be paid to perioperative care for the prevention and treatment of perioperative complications.

**Keywords:** minimal invasive, elderly patient, geriatric, complication, conversion, mortality

### 1. Introduction

The proportion of the elderly with malignancy and comorbid diseases in the general population has increased with the increase in life expectancy (1). Approximately 60% of all cancers and 70% of cancer-related deaths occur in individuals over the age of 65 (2). Gastric cancer is one of the most common cancers in the world and surgery is the unique curative option for this problem, but surgery poses a problem for elderly patients (3). Minimally invasive surgical procedures should be considered in the first place for these patients(4).

The use of laparoscopy for gastric cancer surgery in elderly patients is gradually increasing (3). Elderly patients have severe comorbidities and poor functional capacities that do not allow them to withstand serious surgical trauma, unlike non-elderly patients (5). Prolonged operative time, prolonged exposure to anesthesia, the possibility that pneumoperitoneum (due to carbon dioxide) may adversely affect cardiovascular and pulmonary systems are major concerns of laparoscopic gastrectomy for elderly patients (6). It has been reported in

many studies that laparoscopic gastric cancer surgery (LGCS) is not a contraindication and can be performed safely in elderly patients (7). In this study, we aimed to present our experiences and results of LGCS in elderly (aged 65 and over) patients.

### 2. Materials and Methods

This study was approved by the local ethical committee (2021/1395). One-hundred and eighty-five patients underwent LGC between November 2014 and December 2020. The inclusion criteria were the age ≥65 years and had adenocarcinoma pathological results. One-hundred and five patients were excluded due to their age were <65 and had another pathological results except adenocarcinoma. Finally, eighty patients were included in the study. There was no special preoperative nutritional support for malnourished patients. Written informed consent was obtained from patients before surgery. The operations were performed by the senior surgeon or training surgeons under the supervision of the senior surgeon. The details of the surgical procedures have

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been reported in previous studies (8-11).

Appropriate postoperative chemotherapy regimen was decided by medical oncologists. Postoperative complications were defined as any complication that occurred during the hospital stay or in the first 30 days after surgery and were classified as Clavien-Dindo classification (12). Any complication grade 3 or higher was accepted as a serious complication. Age, gender, The American Society of Anesthesiologists classification (ASA), body mass index (BMI), previous abdominal surgery, tumor location, carcinoembryonic antigen (CEA) (normal value between 0-5.5 ng/ml) and carbohydrate antigen 19.9 (CA 19-9) (normal value between 0-35 IU/ml) levels, operative time, intraoperative blood loss, type of gastrectomy, specimen extraction technique, conversion rate, time to oral intake, length of hospital stays, pathological T stage and tumor size, number of retrieved and positive lymph nodes, postoperative complications, reoperation rates, 30-day and 90-day mortality, and time to adjuvant chemotherapy were analyzed.

We used the Shapiro-Wilk test to assess the normality of the distribution of continuous variables. Continuous variables were defined as mean  $\pm$  standard deviation or median (minimum-maximum) as appropriate. Categorical variables were defined as frequency (percentage). We used the IBM SPSS Statistics for Windows, version 25.0 (IBM Corp., Armonk, N.Y., USA) for statistical analyses.

**Table 1.** Preoperative findings and demographic data of the patients

	Study group (n= 80)
Age (year)	72 (65-91)
Gender (male)	60 (75%)
BMI (kg/m <sup>2</sup> )	25 (17.5-42)
ASA	
1	3 (3.8%)
2	58 (72.5%)
3	19 (23.8%)
Previous abdominal surgery (yes)	11 (13.8%)
Distal subtotal gastrectomy	1
Gastroenterostomy	1
Laparoscopic gastric wedge resection	1
Cholecystectomy	1
Cholecystectomy and total abdominal hysterectomy	2
Total abdominal hysterectomy	1
Segmenter colectomy	2
Laparoscopic appendectomy	1
Appendectomy	
Location	
Proximal	33 (41.3%)
Middle	4 (5%)
Distal	39 (48.7%)
Linitis plastica	4 (5%)
CEA (ng/ml)	1.94 (0.07-93.8)
Ca 19-9 (IU/ml)	10 (0.05-449.3)

BMI: Body mass index, ASA: The American Society of Anesthesiologists classification, CEA: Carcinoembryonic antigen, Ca 19-9: Carbohydrate antigen 19.9

### 3. Results

#### 3.1. Patient characteristics

Table 1 shows the preoperative findings and demographic data of the patients. The median age of the patients was 72(65-91) years. Sixty patients (75%) were male. The median BMI was 25kg/m<sup>2</sup> (17.5-42). The most common ASA score was 2 (n=58, 72.5%) and tumors were mostly localized in the distal 1/3 of the stomach (n=39, 48.7%). The median CEA and CA19-9 levels were 1.94 ng/ml (0.07-93.8) and 10 IU/ml (0.05-449.3), respectively. Eleven patients (13.8%) had previous abdominal surgery history.

#### 3.2. Intraoperative outcomes

Intraoperative variables are summarized in Table 2. The most common operation type was subtotal gastrectomy (n=33, 41.3%). The median operation time was 300 min (45-720) and the median intraoperative blood loss was 100 ml (0-800). There were eleven conversion (13.8%). The reasons for conversion were the difficulty to get the tumor-free proximal margin laparoscopically in two patients and locally advanced gastric cancer for three patients. One patient with mesenteric injury and one patient with right iliac artery injury due to trocar access, the difficulty of performing the esophagojejunostomy due to adhesions in one patient, esophagojejunostomy leakage detected intraoperatively in one patient, suspicion of hepatoduodenal ligament invasion in one patient, and deep bradycardia for one patient were the other reasons. The specimen extraction techniques were transvaginal (n=3), transanal (n=1), and transabdominal (trocar site (n=2), suprapubic (n=54), upper midline laparotomy (n=11), upper midline minilaparotomy (n=3)). Since resection was not done, specimen extraction was not performed in six patients.

**Table 2.** Intraoperative variables.

	Study group (n= 80)
Operation type	
Proximal gastrectomy+esophagogastrotomy	3 (3.8%)
Subtotal gastrectomy+gastroenterostomy	33 (41.3%)
Total gastrectomy+ esophagoenterostomy	26 (32.5%)
Gastroenterostomy	4 (5%)
Peritoneal biopsy	5 (6.3%)
Feeding jejunostomy	1 (1.3%)
Peritoneal biopsy+Feeding jejunostomy	1 (1.3%)
Complementary gastrectomy	2 (2.5%)
Wedge resection	1 (1.3%)
Subtotal gastrectomy+jejunal interposition	3 (3.8%)
Diagnostic laparoscopy	1 (1.3%)
Operative time (min)	300 (45-720)
Intraoperative blood loss (ml)	100 (0-800)
Conversion	11 (13.8%)
Specimen extraction	
Transvaginal	3 (3.7%)
Transanal	1 (1.3%)
Trocar site	2 (2.5%)
Suprapubic	54 (67.5%)
Laparotomy	11 (13.8%)
Minilaparotomy	3 (3.7%)
No resection	6 (7.5%)

#### 3.3. Postoperative outcomes

Postoperative variables are summarized in Table 3. The median

first time to oral intake was 2 days (1-10) and length of hospital stay was 7 days (1-48). Postoperative serious complications occurred in fourteen (17.5%) patients. The patients with leakages (Two with duodenal stump leakage, one with both esophagojejunostomy and enteroenterostomy leakage, one with jejunogastrostomy leakage, one with gastroenterostomy leakage and evisceration), the patient with splenic artery bleeding, and the patient with stenosis in enteroenterostomy anastomosis were managed surgically. One patient with intraabdominal hemorrhage was taken operation again but no focus was detected in relaparotomy. A patient developed fascial dehiscence on the postoperative 9th day and was treated surgically. Mortality was observed in two patients during the hospital stays. One patient with enteroenterostomy leakage and brid ileus died due to sepsis. Another patient underwent repeated laparotomies due to intraabdominal hemorrhage. The bleeding focus could not be detected, multiple organ resections were performed due to intestinal ischemia. All efforts failed, and the patient died. Three patients were treated with interventional procedures (biloma was drained percutaneously in one patient, hydronephrosis was treated with double j catheter in one patient, and bladder injury due to cystofix placement was treated interventionally in one patient). One patient died due to unstable condition with advanced cancer and, one patient died due to with liver failure within postoperative 30-day. The mean of retrieved lymph node was  $30.27 \pm 17.08$ . The most common pathological T stage was T4 (53.75%). The median time to chemotherapy was 41 days (6-220).

**Table 3.** Postoperative variables

	Study group (n= 80)
<b>Time to oral intake (day)</b>	2 (1-10)
<b>Length of hospital stay (day)</b>	7 (1-48)
<b>Postoperative serious complication (Clavien-Dindo classification)</b>	14 (17.5%)
3a	3 (3.8%)
3b	9 (11.3%)
5	1 (1.3%)
<b>Reoperation</b>	10 (12,5%)
<b>30-day-mortality</b>	4 (5%)
<b>90-day-mortality</b>	8 (10%)
<b>Tumor size (cm)</b>	5.5 (0.6-20)
<b>Retrieved lymph nodes</b>	$30.27 \pm 17.08$
<b>Positive lymph nodes</b>	5 (0-59)
<b>T stage</b>	
Tinstu	1 (1.25%)
T1	10 (12.5%)
T2	2 (2.5 %)
T3	24 (30%)
T4	43 (53.75%)
<b>Time to adjuvant chemotherapy (day)</b>	41 (6-220)

#### 4. Discussion

Laparoscopic gastrectomy has advantages such as less intraoperative bleeding, shorter hospital stay, early return of bowel functions, and better cosmetic appearance compared to open gastrectomy (13). It is known that laparoscopic gastrectomy is not a risk factor for postoperative complications (6). However, elderly patients have a higher rate of

comorbidities compared to non-elderly patients (14). Previous studies have emphasized that comorbidities are important risk factors for postoperative complications in laparoscopic gastrectomy (4). Also, some studies stated that prolonged operation time and increased blood loss increase surgical stress and postoperative complications and are important risk factors for 30-day mortality (15-16). Huang et al. (14) reported that blood loss of more than 75 cc during laparoscopic gastrectomy was an independent risk factor for major complications. Therefore, more care should be taken in the decision of surgery for elderly patients.

In a meta-analysis, it was stated that the postoperative complication rate in elderly patients who underwent laparoscopic gastrectomy for gastric cancer was higher than in non-elderly patients. In the same study, it was also emphasized that surgical complications were similar, but the main difference was in non-surgical complications (5). In another study, no difference was found in terms of postoperative complications in elderly and non-elderly patients who underwent laparoscopic and open gastrectomy (17). Similarly, Sheng et al. (3) found a similar rate of major complications after laparoscopic total gastrectomy between patients younger than 70 years of age and older. In a study conducted on 2014 patients, the postoperative complication rate was 13.6% after laparoscopic gastrectomy (18). In our study, the rate of postoperative complications was 17.5% and was a little higher than the literature.

In a study investigating the safety of laparoscopic gastrectomy in elderly patients, it was concluded that the postoperative mortality rate, time to oral intake, and length of hospital stay were not affected by age (2). In another study, elderly patients were found to have a shorter operative time, similar intraoperative blood loss, and a longer hospital stay compared to non-elderly patients (5).

Some surgeons are reluctant to perform D2 lymph node dissection because they think it increases morbidity (6). Liang et al. (19) compared D1 and D2 lymph node dissections in patients over 70 years of age and found no significant survival difference. In a systematic review and meta-analysis by Yu Pan et al. (5), it was concluded that fewer lymph nodes were dissected in elderly patients in laparoscopic gastrectomy surgery. Shimada et al. (2) reported that the short-term effects of laparoscopic gastrectomy were the similar in elderly and non-elderly patients. In another study, no difference was found in terms of tumor recurrence, 5-year disease-free survival, and overall survival (3). We have achieved approximately 30 lymph nodes dissection and this was compatible to oncological principles.

The conversion rate in laparoscopic gastrectomy was reported from 0% to 20% in the literature which shows differences according to the patient's condition and surgical experience (20). In the study of Suematsu et al. (4) in which they examined the results of laparoscopic surgery in elderly

gastric cancer patients, the conversion rate (9%) was found to be higher in elderly patients than in non-elderly patients. All patients with conversion had a history of the previous laparotomy. The conversions were due to adhesions in two patients and major bleeding in one patient. We found a conversion rate of 13.8%. The most common cause of conversion was locally advanced gastric cancer.

The limitations of this study were that it was a retrospective, single arm study. No control group was included and the number of patients was limited.

Laparoscopic gastric cancer surgery is a safe and feasible method that can be performed in elderly patients with appropriate oncological principles. It is clear that the operative and postoperative risks are generally higher in elderly patients due to comorbidities. Therefore, maximal attention should be paid to perioperative care for the prevention and treatment of perioperative complications.

#### Conflict of interest

The authors have no conflicts of interest to declare that are relevant to the content of this article.

#### Acknowledgments

This study was approved by the local ethical committee (2021/1395). All procedures performed were in accordance with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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