









Laparoscopic gastrectomy for gastric cancer: A single cancer center experience

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ABSTRACT

Objective: Laparoscopic gastrectomy (LG) was challenging to most surgeons due to the two-dimensional view, difficult manipulations of the instruments, ergonomic discomfort, and the associated muscular spasm and effort. Technological advances with improved surgical experience, have made LG a more feasible and favorable approach for gastric cancer (GC) patients.

Material and Methods: LG was performed in 44 patients with GC between July 2015 to June 2022, in the Department of Surgical Oncology, Oncology Center, Mansoura University, Egypt, and we assessed the surgical outcomes of this approach as an initial experience of a single cancer center.

Results: Twenty-seven patients underwent laparoscopic distal gastrectomy, and seventeen underwent laparoscopic total gastrectomy. Two cases had combined resection. Operative time was 339.2 ± 76.73 min, while blood loss was 153.86 ± 57.51 mL. The patients were ambulant on postoperative day 0, oral intake was started within three days (range 1-5 days) and the hospital stay was six days (range 3-9 days).

Conclusion: LG for GC is a feasible approach for both early and advanced GC patients as it allows for adequate diagnosis of the peritoneal disease, meticulous dissection, and identification of the lymph nodes with minimal blood loss and decrease surgery-related problems and encourage the early patients' discharge from hospital and return to daily life activities.

Keywords: Laparoscopic gastrectomy, gastric cancer, minimally invasive surgery

INTRODUCTION

Gastric cancer (GC) incidence is considered the sixth most common cancer worldwide and the third one regarding cancer mortality (1). Gastrectomy and D2 lymphadenectomy remain the main line of treatment of GC patients despite the progress in the investigations of the molecular nature of GC and the development of many targeted treatments (2). Laparoscopic gastrectomy (LG) for GC was first performed by Kitano et al. in 1994, and since then, this approach has been used worldwide due to its unique features (3). LG has numerous advantages including minimal blood loss, decrease in postoperative pain, early return of bowel function, and daily activity that leads to short hospital stay (4,5).

LG was challenging to most surgeons due to the two-dimensional view, difficult instrumental manipulations, ergonomic discomfort, and the associated muscular effort (6). The advances in the instruments and improved surgical experience have encouraged surgeons to practice LG in early GC patients (7). Many studies from Asia have reported LG with favorable surgical outcomes as there is a high incidence of early GC due to the well-established nationwide screening program (8). GC frequency in Western countries is less than in Asian countries, and it is diagnosed mostly at a locally advanced stage. Therefore, the reports on LG for GC in Western countries are very few (9,10).

There are randomized controlled trials from multiple Eastern centers that have reported the feasibility and efficacy of LG in early GC patients (11,12). Moreover, few Western randomized controlled trials compared laparoscopic and open gastrectomy (13). These clinical trials have reported the same long-term outcomes of both laparoscopic and open gastrectomy, which made LG a popular approach in the surgical treatment of GC patients (14). The present study aimed to demonstrate the surgical feasibility and the safety of LG as a minimally invasive technique for GC patients in a single cancer center.

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MATERIAL and METHODS

Study Design

Between July 2015 and June 2022, 44 patients with GC underwent LG in the Department of Surgical Oncology, Oncology Center, Mansoura University. This study was approved by the Institutional Review Board (IRB) of the Faculty of Medicine, Mansoura University with a code number (R.22.02.1613). The procedure and its possible complications were explained and instructed to all patients in this study, and written informed consent was obtained from them before surgery. We included, in this study, any patients with operable GC without preoperative evidence of abdominal or distant metastasis. At the same time, we excluded stage IV GC patients, those with previous gastric surgery, need emergent gastrectomy for bleeding or perforation, and unfit patients for general anesthesia or laparoscopic surgery. All patients had upper gastrointestinal endoscopy for tumor localization and pathological confirmation, a computed tomography scan for accurate tumor staging, and endoscopic ultrasound for primary tumor invasion and regional lymph node assessment. Neoadjuvant and adjuvant chemotherapy was offered to the patients according to National Comprehensive Cancer Network (NCCN) guidelines. The 8th edition of the American Joint Committee on Cancer TNM Staging System for GC was used for tumor staging (15). The patients' baseline criteria were reported including age, sex, body mass index, and the American Society of Anesthesiologists (ASA) score.

Surgical Procedures

All patients were operated on in a supine position with slight head elevation (reverse Trendelenburg position) and legs

separated where the main operator stood. The assistant position was on the left side of the patient while the endoscopist position was on the right side of the patient. After pneumoperitoneum, a 30° rigid electro-laparoscope was inserted through a (10 mm) trocar in the supra or infra-umbilical region. Additional four trocars were inserted; a (10 mm) trocar was placed in the left side of the patient in the midclavicular line about 3 cm above the umbilicus level and a (5 mm) trocar was placed in the same location on the patient's right side. Two (5 mm) trocars were placed in the pre-axillary line on both sides below the costal margin by about 2 cm. An additional epigastric (10 mm) trocar for the liver retractor was applied (Figure 1).

Preoperative staging laparoscopy was done with peritoneal lavage for the assessment of presence of any tumor cells (CYT + was considered M1 disease). LG with D2 lymphadenectomy was done using the harmonic scalpel (by Ethicon™) or Ligasure (by Covidien™) as recommended by the Japanese Gastric Cancer Association (Figure 2) (16). Reconstruction was done in the form of Billroth type II gastrojejunostomy and entero-enterostomy or Roux-en-Y gastrojejunostomy in cases of laparoscopic distal gastrectomy (LDG) and functional side-to-side esophagojejunostomy in cases of laparoscopic total gastrectomy (LTG) using articulating laparoscopic linear stapler (Echelon® flex 60 mm).

Study Outcomes

Operative data including operative time, type of gastrectomy, methods of reconstruction, and estimated blood loss were collected. Short-term outcomes such as ambulation, oral intake, ICU, hospital stay, and associated postoperative complications were reported. Long-term outcomes were evaluated along with overall survival (OS) and disease-free survival (DFS).



Figure 1. Trocars placement with epigastric liver retractor.

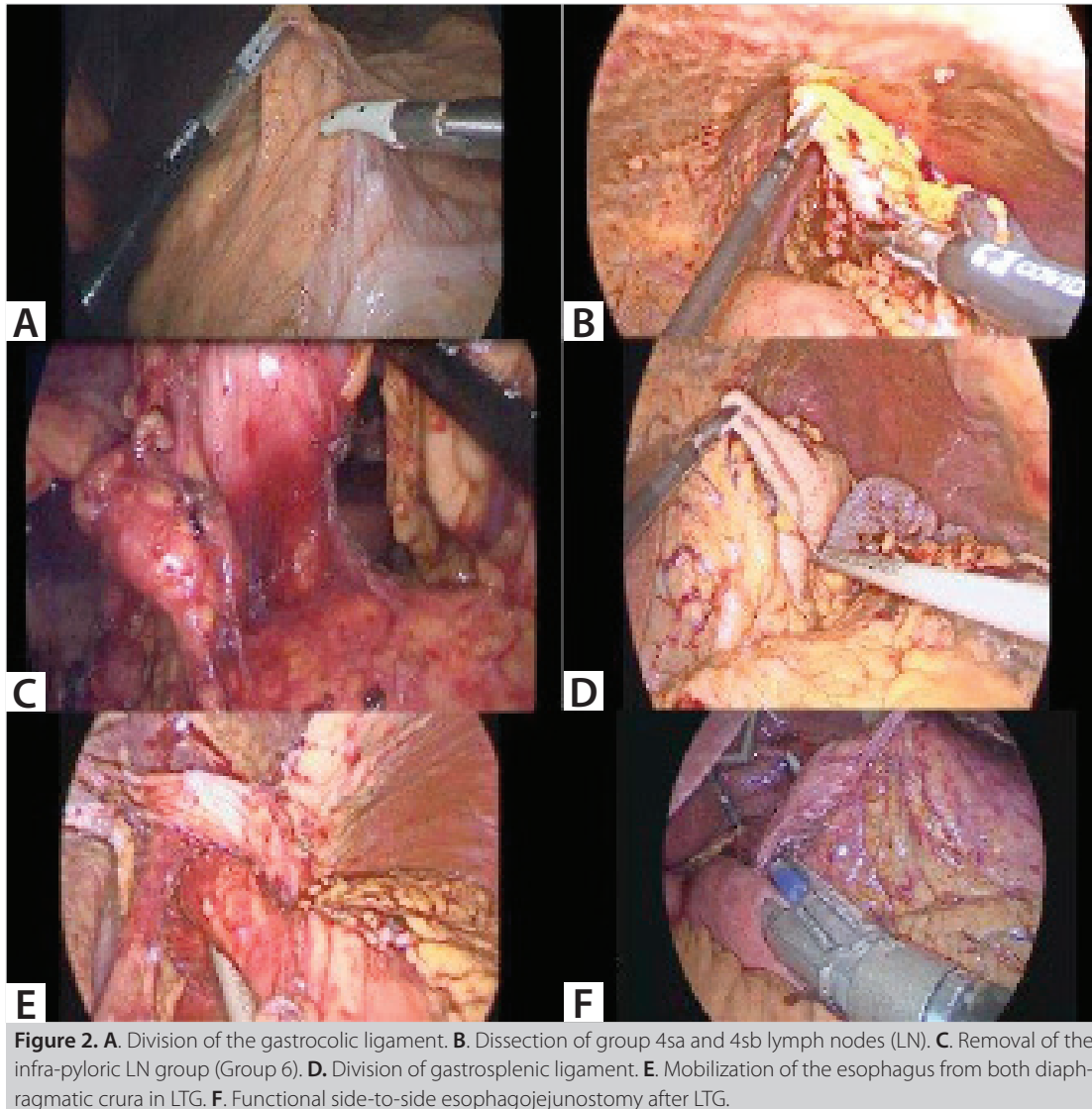


Figure 2. A. Division of the gastrocolic ligament. B. Dissection of group 4sa and 4sb lymph nodes (LN). C. Removal of the infra-pyloric LN group (Group 6). D. Division of gastrosplenic ligament. E. Mobilization of the esophagus from both diaphragmatic crura in LTG. F. Functional side-to-side esophagojejunostomy after LTG.

Statistical Analysis

The Statistical Package for Scientific Studies (SPSS) v26.0 (IBM Corp., Chicago, IL, USA) on MacOS v11.9 was used for data analysis. Qualitative data were described using numbers and percentages. Quantitative data were described using medians for non-parametric data and means and standard deviation (SD) for parametric data, after testing normality using the Kolmogorov-Smirnov test. Kaplan-Meier method was used for OS and DFS.

RESULTS

Clinicopathological Characteristics

The patients' mean age in the current study was 52.82 ± 12.59 years (Table 1), and the BMI had a mean of 32.82 ± 3.81 kg/m².

Female was the common sex (59.1%) and (79.5%) had an ASA score of I. Nine patients had comorbidities while 21 patients had previous abdominal surgeries. The lower part of the stomach was the most common tumor location in 28 patients, and it was of diffuse type in 34 patients. The gross appearance of the tumor was mostly type II according to Borrmann classification in (38.6%) of the patients and type III in (31.8%) of the patients, cT2, cT3, and cT4a were found in (22.7%, 27.3%, and 29.5%, respectively) and (47.7%) of the patients had a node-positive tumor. Neoadjuvant chemotherapy was given to 26 patients according to NCCN guidelines.

Table 1. Patients' demographics who underwent laparoscopic gastrectomy for gastric cancer

	Patients, n= 44 (%)
Age, years (mean \pm SD)	52.82 \pm 12.592
BMI, kg/m ² (mean \pm SD)	32.82 \pm 3.817
ASA score	
I	35 (79.5%)
II	9 (20.5%)
Sex	
Male	18 (40.9%)
Female	26 (59.1%)
Comorbidities	
None	35 (79.5%)
Hypertension	3 (6.8%)
Diabetes	1 (2.3%)
Hepatic	4 (9.1%)
Combined	1 (2.3%)
Complaint	
Dyspepsia	26 (59.1%)
Vomiting	10 (22.7%)
Bleeding	8 (18.2%)
Previous abdominal surgeries	
No	23 (52.3%)
Appendectomy	4 (9.1%)
Umbilical hernioplasty	3 (6.8)
Caesarean section	8 (18.2)
Cholecystectomy	2 (4.6)
Incisional hernia	1 (2.3%)
Exploration for perforated DU	1 (2.3%)
Ureteric stone extraction	2 (4.6%)
Tumor location	
Upper	8 (18.2%)
Middle	8 (18.2%)
Lower	28 (63.6%)
Tumor differentiation	
Moderate differentiated	24 (54.5%)
Poor differentiated	19 (43.2%)
Undifferentiated	1 (2.3%)
Lauren classification	
Diffuse	34 (77.3%)
Intestinal	10 (22.7%)
Borrmann classification	
I	5 (11.4%)
II	17 (38.6%)
III	14 (31.8%)
IV	8 (18.2%)

Table 1. Patients' demographics who underwent laparoscopic gastrectomy for gastric cancer (continue)

	Patients, n= 44 (%)
cT stage	
T1a	4 (9.1%)
T1b	4 (9.1%)
T2	10 (22.7%)
T3	12 (27.3%)
T4a	13 (29.5%)
T4b	1 (2.3%)
cN stage	
Negative	23 (52.3%)
Positive	21 (47.7%)
Neoadjuvant chemotherapy	
No	18 (40.9%)
Yes	26 (59.1%)
The regimens of neoadjuvant chemotherapy	
ECF	18 (69.2%)
FLOT	6 (23.1%)
Fluorouracil/Cisplatin	2 (7.7%)
Tumor size at diagnosis (cm; mean \pm SD)	3.08 \pm 1.460

BMI: Body mass index, ASA: American Society of Anesthesiology, ECF: Epirubicin/Cisplatin/Fluorouracil, FLOT: Fluorouracil/Leucovorin/Oxaliplatin/Docetaxel.

Surgical and Short-Term Outcomes

Twenty-seven patients had LDG with Billroth type II gastrojejunostomy and entero-enterostomy or Roux-en-Y gastrojejunostomy, and 17 patients had LTG with functional side-to-side esophagojejunostomy (Table 2). There was combined resection in two cases (one patient had a splenectomy and one patient had a splenectomy and distal pancreatectomy). Mean operative time was 339.2 \pm 76.73 min, estimated blood loss was 153.86 \pm 57.51 mL, and 12 patients needed intraoperative blood transfusion. We had three cases with intraoperative complications (two cases with intraoperative bleeding and one case with colonic injury). Conversion to laparotomy was done in the two cases of intraoperative bleeding. The patients were ambulant on postoperative (POD) zero, ICU stay had a median duration of 1.5 days (range 1-5 days), oral intake was started in a median duration of three days (range 1-5 days), and hospital stay was six days (range 3-9 days). In this study, 18 patients had grade II postoperative complications according to Clavien and Dindo (CD) classification (seven cases with total parenteral nutrition, six cases with blood transfusion, two cases with postoperative antibiotics, two cases with pneumonia, and one case with hypertension). Four cases had postoperative complication grade III (two cases with abdominal collection, one case with pleural effusion, and one case with the biliary leak which was treated conservatively). Regarding 30-day mortality, we had only one case due to atrial fibrillation on POD 5.

Histopathological Characteristics

Postoperative pathological tumor size was 4.59 \pm 2.14 cm while the mean number of lymph nodes (LN) dissected was 21.55 \pm 4.33 and the number of positive lymph nodes was 4.89 \pm 5.3. Most of the tumors in this study were poorly differentiated adenocarcinoma (56.8%) (Table 3). Lymphovascular and perineural invasion were found in 31.8% and 36.4%, respectively. Pathological T3 and T4a stages were the commonest and found in 43.2% vs 34.1% while the pathological N1, N2, and N3 stages were found in 31.8%, 20.5%, and 29.5% respectively. Omental infiltration was found in four cases, infiltrated proximal margin was in one case, and infiltrated distal margin was in two cases.

Long Term Outcomes

Median duration of follow-up in this study was 42 months (range 9-86 months). Thirty-two patients in the current study received adjuvant chemotherapy and five patients received adjuvant radiotherapy (Table 4). Mean duration of DFS was 59.62 \pm 5.44 months (Figure 3), and tumor recurrence developed in 13 patients in the form of (four cases with a peritoneal disease, seven cases with hematogenous metastasis, one case with local recurrence and one case with port-site recurrence). Treatment of recurrent cases included (chemotherapy in 11 cases, radiotherapy in one case, and surgical resection in one case). Mean OS of the patients was 62.41 \pm 5.19 months (Figure 4).

Table 2. Surgical characteristics of the patients who underwent laparoscopic gastrectomy for gastric cancer

	Patients, n= 44 (%)
Type of gastrectomy	
Distal	27 (61.4%)
Total	17 (38.6%)
Combined resection	
No	42 (95.5%)
Yes	2 (4.5%)
Reconstruction	
Billroth type II and entero-enterostomy	9 (20.5%)
Roux-en-Y gastrojejunostomy	18 (40.9%)
Functional side-to-side esophagojejunostomy	17 (38.6%)
Conversion rate	
No	42 (95.5%)
Yes	2 (4.5%)
Operation time (min; mean \pm SD)	339.20 \pm 76.735
EBL (mL; mean \pm SD)	153.86 \pm 57.515
Blood transfusion	
No	32 (72.7%)
Yes	12 (27.3%)
Operative complications	
No	41 (93.2%)
Yes	3 (6.8%)
POP complications (CD classification)	
CD I	21 (47.7%)
CD II	18 (40.9%)
CD III	4 (9.1%)
30-day mortality	
No	43 (97.7%)
Yes	1 (2.3%)
Ambulation (days; median, range)	0 (0-3)
Oral intake (days; median, range)	3 (1-5)
ICU stay (days; median, range)	1.5 (1-5)
Hospital stay (days; median, range)	6 (3-9)
EBL: Estimated blood loss, POP: Postoperative, CD: Clavien-Dindo.	

DISCUSSION

LG for GC is considered a widely accepted therapeutic option due to its superiority in decreasing intraoperative blood loss, reducing postoperative pain, and complications that lead to short hospital stay (17,18). There is a meta-analysis that has demonstrated the advantages of LG compared to open gastrectomy regarding surgical and oncological outcomes (19,20). LG for GC has been recently used in multiple centers worldwide due to the improvement in surgical experience, innovation of the equipments, and promotion of laparoscopic surgeries by many academic organizations (21). We conducted

this approach in our center to evaluate the surgical and oncological outcomes of this minimally invasive approach to our patients with GC.

In the current study, the patients had a mean age of 52.82 years, and 59.1% were female, which was a statistical finding, not a selection criterion, while another study reported patients with a mean age of 61 years and were male in 62.6 % (22). The mean BMI of our patients was high 32.82 kg/m² and the patients had large and thick greater omentum that made infracolic omentectomy and the associated lymphadenectomy difficult, the BMI of patients in Inokuchi et al was 21.9 kg/m² (23).

Table 3. Histopathological characteristics of the gastric cancer resected

	Patients, n= 44 (%)
Tumor size (cm; mean \pm SD)	4.59 \pm 2.141
The mean number of LN dissected \pm SD	21.55 \pm 4.332
The mean number of positive LN \pm SD	4.89 \pm 5.306
Tumor Differentiation	
Well-differentiated	2 (4.5%)
Moderate differentiated	17 (38.6%)
Poorly differentiated	25 (56.8%)
Lymphovascular invasion	
Absence	30 (68.2%)
Present	14 (31.8%)
Perineural invasion	
Absence	28 (63.6%)
Present	16 (36.4%)
Omental infiltration	
Negative	40 (90.9%)
Positive	4 (9.1%)
Proximal margin	
Free	43 (97.7%)
Infiltrated	1 (2.3%)
Distal margin	
Free	42 (95.45%)
Infiltrated	2 (4.55%)
Pathological T stage	
pT2	9 (20.5%)
pT3	19 (43.2%)
pT4a	15 (34.1%)
pT4b	1 (2.3%)
Pathological N stage	
pN0	8 (18.2%)
pN1	14 (31.8%)
pN2	9 (20.5%)
pN3	13 (29.5%)

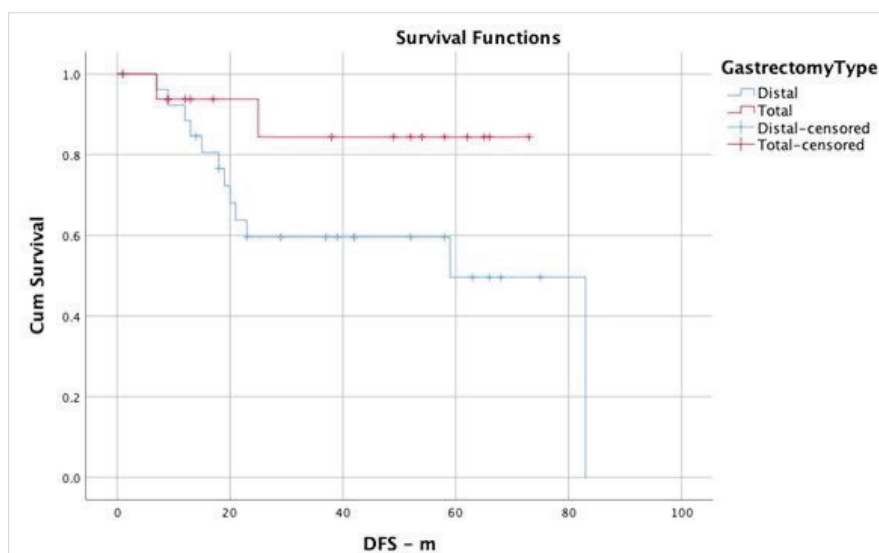
LN: Lymph node.

Tumor location in our study was commonly in the distal part of the stomach and that was comparable to another study (63.6% vs. 62.7%), so most of the patients underwent distal gastrectomy (24). Approximately 81.8% of the patients in this study had cT staging $>cT1$, and 47.7% of the patients had node-positive tumors. Therefore, 59.1% of the patients received neoadjuvant chemotherapy according to NCCN guidelines for improving surgical and oncological outcomes. Another study reported cT staging $>cT1$ in 93.1%, and 43.5% had node-positive tumors, so preoperative treatment was delivered in 67% of their patients (25). Of the 44 patients; 27 patients had distal gastrectomy with

Billroth type II gastrojejunostomy and entero-enterostomy or Roux-en-Y gastrojejunostomy, and 17 patients had total gastrectomy with functional side-to-side esophagojejunostomy as it was a more familiar method for reconstruction in our center. Combined organ resection in the form of splenectomy in one case and splenectomy with distal pancreatectomy in another case were due to the associated lymphadenectomy in the former case and tumor infiltration in the latter one. Another literature has reported associated splenectomy in nine cases (23).

Table 4. The patients' follow-up data

	Patients, n= 44 (%)
Adjuvant chemotherapy	
No	12 (27.3%)
Yes	32 (72.7%)
Adjuvant radiotherapy	
No	39 (88.63%)
Yes	5 (11.36%)
Overall survival (months; mean \pm SD)	62.41 \pm 5.194
Disease-free survival (months; mean \pm SD)	59.62 \pm 5.449
Tumor recurrence	
No	31 (70.5%)
Yes	13 (31.8%)
Type of recurrence	
No	31 (70.5%)
Peritoneal	4 (9.1%)
Hematogenous	7 (15.9%)
Local	1 (2.3%)
Port-site	1 (2.3%)
Treatment of recurrence	
Chemotherapy	11 (25%)
Radiotherapy	1 (2.3%)
Surgical resection	1 (2.3%)

**Figure 3.** Kaplan-Meier curve of DFS of patients who underwent LG for GC.

Operative duration in this study was 339.2 min, with about 153.86 mL as EBL, another study had a shorter operative time of about 237 min with an EBL of 36.9 mL (26). This was because they had only four cases of LTG while we had 17 cases who underwent total gastrectomy besides the BMI of our patients was high with prolonged duration of the omentectomy and lymphadenectomy, and 21 patients in this study had previous

abdominal surgeries with extensive adhesions. At the beginning of this case series, we tried to improve the learning curve of this approach, therefore the operative time was decreased in the subsequent cases. We experienced a conversion to open gastrectomy due to uncontrolled bleeding in two cases with hepatic diseases with large omental varices. Similarly, Obama et al. had reported conversion to open gastrectomy in one case

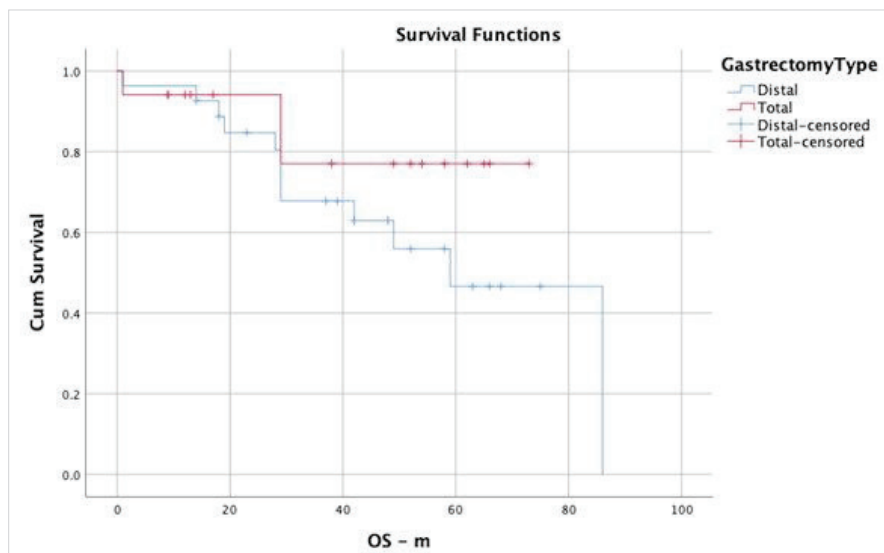


Figure 4. Kaplan-Meier curve of OS of patients who underwent LG for GC.

due to intraoperative bleeding (24). The patients in the current study were ambulant in POD zero, and we started oral intake early with a median duration of three days as an enhanced recovery after surgery (ERAS) protocol. Eighteen patients had CD grade II morbidities, four patients had CD grade III morbidities; two cases with an abdominal collection that was radiologically drained, one case with pleural effusion that needed chest tube insertion, and one case with biliary leakage treated conservatively for nine days, so the hospital stay had a median duration of six days. There was one case with in-hospital 30-day mortality due to atrial fibrillation and was admitted to ICU for five days. Omori et al. reported the oral intake in POD 2 and they had minor complications (seven cases with wound infection, two cases with delayed gastric emptying, and one case with intraperitoneal fluid collection), and the hospital stay in their study was seven days with no in-hospital mortality (27). A meta-analysis has demonstrated both approaches of laparoscopic and open gastrectomy and concluded that postoperative complications were significantly less by LG especially wound-related problems and pneumonia (28).

The pathological tumor size in this study was 4.59 cm and we harvested about 21 lymph nodes, which was more than recommended by the American Joint Committee on Cancer and the NCCN guidelines which recommend retrieving and examining at least 15 nodes. The mean number of positive lymph nodes in this study was 4.89. Wu et al. had a comparable tumor size of 4.19 cm and they had more harvested lymph nodes by 30.9 but the positive lymph node number was 2.9. Regarding, pathological staging; pT3 staging in our study was found in 43.2% and pT4a in 34.1%, while pN1 staging was in 31.8%, pN2 was in 20.5%, and pN3 in 29.5%. These stages were more advanced than that reported by Wu et al. as they had pT1

in 36.5% of the patients and pN0 in 57.1% of them due to their well-established screening programs for GC and tumors were presented in early stages (29). LG for advanced GC has been practiced by several centers in Asia with a high volume of GC patients, and they have reported favorable surgical outcomes (30). Moreover, oncologic outcome was superior when performed by experienced laparoscopic surgeons.

Median duration of follow-up in the current study was 42 months. Short postoperative recovery period has an impact on oncological outcomes as the patients with LG alleviate wound complications and other systemic morbidities that may delay their adjuvant therapy. A recent randomized controlled trial on patients who received neoadjuvant chemotherapy for advanced GC and then had LG reported less surgical trauma and the patients completed their adjuvant chemotherapy with minimal adverse effects (31). The mean duration of DFS was 59.62 months, and hematogenous metastasis was the most common in seven patients followed by peritoneal disease in four patients and local recurrence and port-site recurrence occurred in two cases. The peritoneal recurrence may be attributed to that we had 16 patients with pT4 tumors since there is no evidence that correlates between LG and the high risk of peritoneal and port-site metastasis. Moreover, these results are consistent with studies that were applied to advanced GC patients (32). Treatment options for these recurrent cases were variables and included chemotherapy in 11 cases with visceral and peritoneal recurrence, radiotherapy in one case with bony metastasis, and surgical resection in the case with port site recurrence as the patient did not have any local disease or distant metastasis. Long et al. reported the recurrence rate in 49.1% of cases; peritoneal recurrence in 21.9%, port site recurrence in 0.3%, hematogenous in 5.7%,

locoregional in 4.5%, distant lymph node in 4.8% and mixed type in 12% (33). This study has limitations in that it was a single-center experience designed in a retrospective pattern. The number of patients was relatively small as the study was conducted in a low-volume center for GC patients. Another limitation was the inclusion of both early and advanced GC patients with different tumor locations, that underwent distal and total gastrectomy.

CONCLUSION

LG for GC is a feasible approach for both early and advanced GC patients as it allows adequate diagnosis of the peritoneal disease without laparotomy, meticulous dissection, and identification of the lymph nodes with minimal blood loss and decreases surgery-related problems that may delay the adjuvant therapy and encourage the early patient discharge from hospital and return to daily life activities.

Ethics Committee Approval: This study was approved by the Institutional Review Board (IRB) of the Faculty of Medicine, Mansoura University with a code number (R.22.02.1613). A written informed consent was signed by all the patients before inclusion in this study.

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Conflict of Interest: The authors have no conflicts of interest to declare.

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Gastrik kanser için laparoskopik gastrektomi: Tek bir kanser merkezi deneyimi

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ÖZET

Giriş ve Amaç: Laparoskopik gastrektomi (LG), iki boyutlu görünüm, aletlerin zor manipülasyonu, ergonomik rahatsızlık ve buna bağlı kas spazmı ve efor nedeniyle çoğu cerrah için zorlayıcıydı. Gelişen cerrahi deneyimle birlikte teknolojik ilerlemeler, LG mide kanseri hastaları için daha uygulanabilir ve uygun bir yaklaşım haline getirmiştir.

Gereç ve Yöntem: Mısır Mansoura Üniversitesi, Onkoloji Merkezi, Cerrahi Onkoloji Bölümünde Temmuz 2015-Haziran 2022 tarihleri arasında 44 gastrik kanserli hastaya LG uygulandı ve bu yaklaşımın cerrahi sonuçları tek bir kanser merkezinin ilk deneyimi olarak değerlendirildi.

Bulgular: Yirmi yedi hastaya laparoskopik distal gastrektomi ve on yedi hastaya laparoskopik total gastrektomi uygulandı. İki olguda kombine rezeksiyon uygulandı. Ameliyat süresi $339,2 \pm 76,73$ dakika, kan kaybı ise $153,86 \pm 57,51$ mL idi. Hastalar ameliyat sonrası 0. günde ayakta, oral alım üç gün içinde başladı (aralık 1-5 gün) ve hastanede kalış süresi altı gündü (aralık 3-9 gün).

Sonuç: Gastrik kanser için laparoskopik gastrektomi (LG), peritoneal hastalığın yeterli tanısına, titiz diseksiyona ve lenf nodlarının minimal kan kaybı ile tanımlanmasına izin verdiği ve cerrahiye bağlı sorunları azalttığı ve hastaların hastaneden erken taburcu edilmesini ve günlük yaşam aktivitelerine dönmesini teşvik ettiği için hem erken hem de ileri gastrik kanser hastaları için uygulanabilir bir yaklaşımdır.

Anahtar Kelimeler: Laparoskopik gastrektomi, gastrik kanser, minimal invaziv cerrahi

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