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Evaluation of Preliminary Results Of Laparoscopic and Open Surgery in Gastrectomy For Gastric Cancer: Single-Center Experience

Mide Kanseri İçin Yapılan Gastrektomide Laparoskopik ve Açık Cerrahinin Erken Sonuçlarının Değerlendirilmesi: Tek Merkez Deneyimi

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Abstract

Aim: This study aims to compare the early results of laparoscopic and open surgery of gastric cancer, which is the sixth most common cancer in all age groups and both genders.

Material and Method: Patients who were diagnosed with locally advanced gastric cancer and operated on between May 2018 and October 2021 were retrospectively screened. The data of patients who underwent laparoscopic and open surgery were collected and short-term results were compared.

Results: The results of 140 patients included in the study were analyzed. In laparoscopic surgery, the length of stay in the intensive care unit was shorter and the number of lymph nodes removed was found to be higher. Length of hospital stay and postoperative complications were similar. The operation time was longer in laparoscopic surgeries.

Conclusion: Considering the results of this study, in which we compared our short-term results, we can predict that laparoscopic gastric resection can be safely performed by experienced surgeons in appropriate centers. As surgical experience increases, we believe that laparoscopy, which is the gold standard in surgeries such as gallbladder, appendectomy, and prostatectomy, may become the gold standard in gastric cancer surgery in the future.

Keywords: Gastric cancer, laparoscopic surgery, preliminary results

Öz

Amaç: Bu çalışmamızın amacı tüm yaş gruplarında ve her iki cinsiyette en sık görülen altıncı kanser olan mide kanserinin, laparoskopik ve açık cerrahi erken sonuçlarının karşılaştırılmasıdır.

Gereç ve Yöntem: Mayıs 2018-Ekim 2021 tarihleri arasında lokal ileri mide kanseri tanısı alan ve ameliyat edilen hastalar geriye dönük olarak tarandı. Laparoskopik ve açık cerrahi uygulanan hastaların verileri toplandı ve kısa dönem sonuçları karşılaştırıldı.

Bulgular: Çalışmaya dahil edilen 140 hastanın sonuçları incelendi. Laparoskopik cerrahide yoğun bakımda kalma süresi daha az ve çıkarılan lenf nodu sayıları daha fazla olarak bulundu. Hastanede yatış süresi ve postoperatif komplikasyonlar benzerdi. Operasyon süresi laparoskopik cerrahilerde daha uzundu.

Sonuç: Kısa dönem sonuçlarımızı karşılaştırdığımız bu çalışmanın sonuçlarına bakıldığında, laparoskopik gastrik rezeksiyonun deneyimli cerrahlar tarafından uygun merkezlerde güvenle yapılabileceğini öngörebiliriz. Cerrahi deneyim arttıkça safra kesesi, apendektomi, prostatektomi gibi ameliyatlarda altın standart olan laproskopinin ilerleyen dönemlerde gastrik kanser cerrahisinde de altın standart olabileceği kanaatindeyiz.

Anahtar Sözcükler: Mide kanseri, laparoskopik cerrahi, erken dönem sonuç

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INTRODUCTION

The sixth most common cancer in the world, gastric cancer affects people of all ages and genders. It is also the fourth leading cause of death from cancer.[1] Despite recent medical advances, the risk of developing gastric cancer rises as one gets older, as life expectancy rises in most countries.[2,3] Total and distal gastrectomy with D2 lymph node dissection is the recommended surgical procedure for patients with resectable (curable) gastric cancer (GC).[4] Until Kitano et al.[5] conducted a laparoscopic gastrectomy (LG) for early-stage gastric cancer(EGC) in 1994, conventional open gastrectomy (OG) was the usual surgical treatment for gastric cancer. Widespread use of laparoscopic gastric surgery (LGS) over the past decade has been shown to improve better short-term outcomes and quality of life compared to standard techniques.[6] It has gained acceptance as a viable alternative to EGC management, particularly in Japan and Korea.[6,7]

According to studies evaluating the early and long-term results of the LG technique applied in EGC, it has been shown that minimally invasive gastrectomy procedures have faster postoperative recovery, shorter hospital stay, fewer postoperative complications, less intraoperative blood loss, and similar oncological results compared to OG.[8-11]

The application of laparoscopic procedures in advanced gastric cancers (AGC) is more difficult due to the wide lymph node dissection area. This problem has been resolved with the increase in the experience of laparoscopic surgeons.[9,10,13,14]

There was no significant difference in disease-free survival and overall survival rates in recent prospective randomized clinical studies.[9,14-16] However, laparoscopic surgeries have disadvantages such as a long learning curve, higher costs, and longer operations compared to open surgeries.[17]

The purpose of this study was to add to the literature by comparing the short-term postoperative clinical findings after LG and AG procedures conducted at our center.

MATERIAL AND METHOD

After obtaining the approval of the ethics committee of Hitit University non-interventional studies (date: 09/11/2021, no: 2021-81), patients who were diagnosed with locally advanced gastric cancer and operated on between May 2018 and October 2021 were retrospectively screened. The study comprised a total of 147 individuals with locally advanced gastric cancer. All patients were diagnosed with gastric cancer histopathologically by preoperative endoscopic biopsy. Oral and intravenous contrast-enhanced thoracic and abdominal computed tomography was performed on all patients to determine the extent of the disease. Diagnostic examination with endoscopic ultrasound and PET-CT was performed in selected patients. The study was carried out by the Declaration of Helsinki Principles. An informed consent form was approved by all individuals included in the study.

Patients aged 18-75 years were analyzed according to demographic findings and preoperative clinical findings. These findings included gender, age, American Association of Anesthesiologists (ASA) score, pathological tumor size-lymph node metastasis-metastasis (pTNM) stage, tumor location, and histological differentiation. Exclusion criteria were endoscopic mucosal resection, endoscopic submucosal dissection, previous gastric surgery, presence of other malignant disease, complications such as bleeding, perforation, and obstruction caused by gastric cancer, and patients with metastasis according to preoperative imaging and intraoperative findings.

Gender, age, concomitant diseases, ASA scores, whether or not he received adjuvant therapy for gastric cancer, surgical techniques (laparoscopic/open surgery, total/distal gastrectomy), anastomosis type (intracorporeal, extracorporeal), operation time, intraoperative and postoperative complications, length of stay duration, tumor localization, and histological type, number of lymph nodes removed, pathology stage of the tumor were obtained from computer records and patient files.

Tumor localization was evaluated as upper, middle, and lower parts according to the Japanese gastric carcinoma classification (JCGC)(18). Intraoperative complications were classified as bleeding, vascular injury, and organ injuries. The Clavien-Dindo Classification (CDC) system was used to grade postoperative problems. Grades 1-2 were used to classify minor issues, and grades 3a-3b were used to classify serious complications (19).

Statistical Analysis

SPSS for Windows 22.0(IBM SPSS program, USA) program was used for statistical analysis. Age was given as mean±standard deviation and amount and percentage(%) from descriptive analyses. To see if the distribution between groups was normally distributed, the Kolmogorov-Smirnov test was utilized. The mean standard deviation (SD) or median (minimum-maximum) values were used to depict the continuous data. The Student t-test was used to compare parametric measurements, whereas the Mann-Whitney U test was used to examine non-parametric analyses. For categorical variables, the Chi-square test was utilized. Significant values were those with a P-value of 0.05 or less.

RESULTS

Between May 2018 and October 2021, 140 participants underwent gastric cancer surgery for the study. The patients' average age was 68.85±10.96 (min-max 36-95). Of the patients, 107 (76.4%) were male and 33 (23.6) were female. Of the operated patients, 115 were operated openly and 25 were operated laparoscopically (**Table 1**). Even as open total gastrectomy was performed in 70 patients (50%) and laparoscopic total gastrectomy was performed in 14 patients

(10%), open subtotal gastrectomy was performed in 45 patients (32.1%) and laparoscopic subtotal gastrectomy was performed in 11 patients (7.9%).

Table 1. Descriptive Analisis

	Total (n:140)	Open Surgery (n:115)	Laparoscopic Surgery (n:25)	p value
Age, year	68.85±10.96	69.1±10.9	67.6±10.9	0.558†
Sex (%)				
Female	33(23.6)	27	6	0.569†
Male	107(76.4)	88	19	
Hospital Stay, day, (min-max)	17.34(6-69)	16(6-69)	14(9-37)	0.205‡
Critical Care Stay, day, (min-max)	1.84(0-10)	1(0-10)	1(0-3)	<0.001‡
LN counts, SD	21.85(1-56)	20.67±10.7	27.2±5.7	0.004*
Metastatic Lenf node, (min-max)	6.28(0-44)	3(0-44)	2(0-19)	0.945‡
Operation Time, minute, SD (min-max)	191±69.1(79-400)	174.6±56.5	226.1±72.7	<0.001*
Blood Transfusion	1(0-6)	1(0-6)	1(0-2)	0.057‡

SD: Standard deviation; n: patient counts; LN: Lymph node; Met: Metastatic LN. *Student T-test, †Chi-Square test, ‡ Mann-Whitney U test, Statistically significant data bolded

There was no difference between open and laparoscopic surgical patients in terms of age, gender, length of stay, number of metastatic lymph nodes harvested, or transfusion replacement. The number of days spent in the intensive care unit was shown to be lower in the laparoscopic patient group. Furthermore, the number of lymph nodes removed in the laparoscopic surgery group was higher. In open surgery, the operation time was statistically shorter.

Afterward, patients who underwent Total Gastrectomy were compared openly and laparoscopically, and patients who underwent subtotal gastrectomy were compared by separating open and laparoscopic sickles. When all groups were examined, no difference was found in terms of age and gender (p: 0.585, p: 0.685, respectively). Also, there was no difference in terms of hospitalization day, blood transfusion, or metastatic LN counts (p:0.082, p:0.130, p:0.162, respectively).

In terms of hospitalization days in the intensive care unit, there was a statistical difference between the groups (p: 0.003). The reason for this disparity was the fact that total gastrectomy patients who underwent laparoscopic surgery spent less time in the intensive care unit (p: 0.006). In terms of hospitalization in the intensive care unit, there was no statistically significant difference between patients who had laparoscopic surgery and those who had a subtotal gastrectomy (p: 0.368).

When evaluated in terms of the number of lymph nodes removed, a difference was found between the groups (p:0.006). There was no difference in the number of lymph nodes in open or laparoscopic total gastrectomy. When the duration of the operation was examined, there was no difference between whether the operation was subtotal or total gastrectomy, but laparoscopic surgeries were completed in a statistically longer time (p<0.001)(**Table 2**).

In terms of complications, there was no statistical difference between laparoscopic and open surgery, nor between the subgroups (**Table 3**).

Table 2. Subgroup Analisis

	Open Surgery (n:115)		Laparoscopic Surgery(n:25)		p-value
	Total Gastrectomy	Subtotal Gastrectomy	Lap. Total Gastrectomy	Lap. Subtotal Gastrectomy	
Type of Surgery(%)	70(50)	45(32.1)	14(10)	11(7.9)	
Hospital Stay, day,(min-max)	15(7-49)	16(6-69)	16(11-37)	13(9-19)	0.082*
Critical Care Stay, day,(min-max)	1(1-10)	1(0-10)	1(0-1)	1(1-3)	0.003*
Lymph node, SD	22(1-56)	19(2-40)	27(17-39)	28(18-36)	0.006*
Metastatic Lenf node,(min-max)	4(0-44)	1(0-23)	1.5(0-16)	4(0-19)	0.162*
Operation Time, minute, SD(min-max)	169.5(80-390)	160(79-240)	297(180-400)	235(145-360)	<0.001*
Blood Transfusion	1(0-4)	1(0-6)	1(0-2)	1(1-2)	0.130*

*Kruskal-Wallis Test

Table 3. Clavien-Dindo Classification

Dindo-Clavien	Total Gastrectomy	Subtotal Gastrectomy	Lap. Total Gastrectomy	Lap. Subtotal Gastrectomy	Total
Grade I	31	6	13	2	52
Grade II	29	8	30	9	76
Grade IIIa	9	0	1	0	10
Grade IIIb	1	0	1	0	2
TOTAL	70	14	45	11	140

*Chi-Square test, p:0.542

DISCUSSION

This study shows that LG's postoperative stay in intensive care and lymphatic dissection performed by surgical oncological principles are more advantageous than OG. However, while the postoperative stay in the intensive care unit was shorter than in open surgeries, there was no significant difference in terms of length of stay, intraoperative and postoperative complications. The operative time was found to be longer in LG.

Laparoscopic procedures have been widely used by surgeons in recent years after increasing surgical experience and advances in technology. Especially compared to traditional procedures, widespread use of laparoscopic gastric surgery (LGS) has been demonstrated to improve short-term outcomes and quality of life.[6]

Because of the increased risk of locoregional recurrence induced by poor lymphadenectomy, the oncological safety of laparoscopic surgery in stomach cancer was questioned.[20] Many studies have found a link between the number of lymph nodes resected and long-term oncological outcomes in LG.[16,17] In the CLASS-1 randomized clinical study conducted by Hyung-Ho Kim et al.[17] they showed that when LG and OG were compared, equivalent surgical and pathological oncological efficacy was observed, the number of lymph nodes dissected, overall and cancer-specific survival was similar, and laparoscopic procedures were oncologically safe.

According to studies evaluating the early results of the LG technique applied in EGC, lower complication rate, faster recovery, and less postoperative pain were observed compared to OG.[8-11] In the CLASS2 multicenter randomized study conducted by Liu F. et al.[21] they attributed more severe complications in the LG group than the OG group to the surgeons' inexperience in laparoscopy. In the study of Zeng F. et al.[22] it was shown that patients lost less blood during the operation, developed fewer complications, required less analgesia, had an earlier oral intake, and had a shorter hospital stay compared to OG in LG. While there was no significant difference between LG and OG in terms of complications in our study, the day of hospitalization in the intensive care unit was significantly shorter in LG. The duration of surgery was significantly longer in LG than in OG.[12,21,22] Consistently, the operative time was found to be longer in LG. As experience increases in surgeries performed with laparoscopy, the duration of the operation can be shortened. By reducing the difference, laparoscopy can be made the gold standard treatment as in gallbladder and appendectomy surgeries.[23] Thus, better results can be obtained by using technological advantages instead of traditional surgical methods.

The limitations of the study are that it is primarily retrospective, the number of cases is relatively low, it is single-centered, and the long-term results are not comparable. Another limitation is related to the study; The fact that the length of stay of the patients in the intensive care unit is associated with comorbid diseases and this has not been examined by us. In this study, in which we aim to present our early results, we want to show that advanced laparoscopy operations can be performed by experienced surgeons outside of central hospitals and we want to share our prospective long-term results. Although the complication rates were the same, we could not compare the incisional hernia rates in open surgeries. However, in the studies, it is clear that incisional hernia rates are more common in open surgeries than in laparoscopic surgeries.[24]

CONCLUSION

As a result of our study, we aimed to present our early results after laparoscopic gastric cancer surgeries. As a result, we showed that LG has better early postoperative results compared to OG and that lymph node dissection can be performed by experienced surgeons with good results in small centers according to oncological principles. We believe that larger randomized controlled trials should be conducted for laparoscopic gastric cancer surgery to be the gold standard treatment.

ETHICAL DECLARATIONS

Ethics Committee Approval: After obtaining the approval of the ethics committee of Hitit University non-interventional studies (date: 09/11/2021, no: 2021-81)

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

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

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