

# Total Laparoskopik Mide Cerrahisinde İntraoperatif Gastroskopinin Lezyon Lokalizasyonundaki Etkinliği

## Efficiency of Intraoperative Gastroscoy in Lesion Localization in Totally Laparoscopic Gastric Surgery

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### ÖZ

**GİRİŞ ve AMAÇ:** Mide kanserinin total laparoskopik cerrahisinde, transeksiyon hattını belirlemek zor olabilir. Bu retrospektif çalışma, total laparoskopik gastrektomide rezeksiyon marjını belirlemede intraoperatif gastroskopinin klinik önemini değerlendirmeyi amaçlamaktadır.

**YÖNTEM ve GEREÇLER:** Mart 2017 ve Ocak 2021 tarihleri arasında total laparoskopik gastrektomi sırasında rezeksiyon sınırını belirlemek için intraoperatif gastroskopi yapılan 55 hasta çalışmaya dahil edildi. Endoskopik görüntüleme lezyon yerleşimi tespit edildikten sonra ışık transilluminasyonu ile rezeksiyon sınırı belirlenerek transeksiyon yapıldı.

**BULGULAR:** İntraoperatif gastroskopi ile total laparoskopik gastrektomi uygulanan 55 hastanın 28' i (%50.9) erkek, 27' si (%49.1) kadın ve yaş ortalaması 59.89±11.18 idi. Tümör yerleşimi, 25 (%45.4) hastada proksimal 1/3, 9 (%16.4) hastada orta 1/3 ve 21 (%38.2) hastada ise distal 1/3 yerleşimliydi. İntraoperatif gastroskopi yapılan ve total laparoskopik tamamlanan 19 (%34.5) hastaya subtotal gastrektomi, 10 (%18.2) hastaya vertical gastrektomi ve 26 (%47.3) hastaya total gastrektomi uygulandı. Hastalarda intraoperatif gastroskopiye bağlı komplikasyon görülmedi. Tüm olguların rezeksiyon marjının güvenli sınırlarda olduğu histopatolojik analiz ile gösterildi.

**TARTIŞMA ve SONUÇ:** Total laparoskopik gastrektomide, tümör lokalizasyonunu belirlemek ve rezeksiyon sınır güvenliğini sağlamak amacıyla intraoperatif gastroskopi güvenilir bir prosedürdür.

**Anahtar Kelimeler:** mide kanseri, laparoskopik gastrektomi, intraoperatif gastroskopi

### ABSTRACT

**INTRODUCTION:** It can be difficult to determine the transection line in total laparoscopic surgery of gastric cancer. This retrospective study aims to evaluate the clinical significance of intraoperative gastroscopy in determining the resection margin in total laparoscopic gastrectomy.

**METHODS:** 55 patients who underwent intraoperative gastroscopy to determine the resection margin during total laparoscopic gastrectomy between March 2017 and January 2021 were included in the study. After the lesion location was determined in endoscopic imaging, transection was performed by determining the resection margin with light transillumination.

**RESULTS:** Of 55 patients who underwent total laparoscopic gastrectomy with intraoperative gastroscopy, 28 (50.9%) were male, 27 (49.1%) were female, and the mean age was 59.89±11.18 years. Tumor was located in 1/3 proximal in 25 patients (45.4%), 1/3 medial in 9 patients (16.4%) and 1/3 distal in 21 patients (38.2%). Of the patients who underwent intraoperative gastroscopy and completed total laparoscopic surgery, subtotal gastrectomy was performed in 19 (34.5%) patients, vertical gastrectomy was performed in 10 (18.2%) patients, and total gastrectomy was performed in 26 (47.3%) patients. No complications related to intraoperative gastroscopy were observed in the patients. Resection margins of all cases were shown to be within safe limits by histopathological analysis.

**DISCUSSION AND CONCLUSION:** Intraoperative gastroscopy is a reliable procedure in total laparoscopic gastrectomy in tumor localization and to ensure resection margin safety.

**Keywords:** gastric cancer, laparoscopic gastrectomy, intraoperative gastroscopy

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## INTRODUCTION

In the treatment of gastric cancer, minimally invasive surgical procedures are being applied with increasing frequency to minimize surgical trauma and improve postoperative quality of life. Laparoscopic surgery is the preferred treatment especially in East Asian countries where gastric cancer is endemic (1). Totally laparoscopic gastrectomy is preferred, especially since it provides less pain and faster recovery compared to open or laparoscopic assisted surgery (2,3).

The goal in gastric cancer surgery is resection of the tumor at negative surgical margins. However, insufficiency of tactile sensation and thick gastric wall structure make it difficult to determine resection margins in laparoscopic gastric surgery. Therefore, various methods have been proposed in the literature to determine the resection margins (4-6). However, a standardization could not be established for these methods applied in a limited number of patients.

Gastroscopy plays an important role in the diagnosis of gastric cancer, determination of its localization and early treatment (7). In addition to its diagnostic and therapeutic use, the use of intraoperative gastroscopy before intracorporeal resection may be a reliable method, especially in gastric cancer that cannot be detected on the serosal surface.

This study aims to evaluate the advantage, feasibility and safety of intraoperative gastroscopy in totally laparoscopic gastrectomy.

## MATERIALS AND METHODS

Of 73 patients who underwent totally laparoscopic gastrectomy with the diagnosis of gastric tumor between March 2017 and January 2021, 55 patients who underwent intraoperative gastroscopy by the same team were included in the study. The data of the patients were evaluated retrospectively from the hospital database, surgery notes and anesthesia resources. Demographic characteristics of the patients (age, gender, Body Mass Index (BMI), American Society of Anesthesiologists (ASA) score, and comorbid diseases), preoperative radiological and endoscopic imaging and tumor location, peroperative blood loss

and operation time, postoperative hospital stay, complications, pathology results and data on mortality were examined. The study was approved by the local ethics committee.

### *Inclusion Criteria*

Regardless of age, patients with good performance status (ECOG 2 and above) and ASA  $\leq 3$

Patients undergoing total laparoscopic gastrectomy  
Patients who underwent intraoperative gastroscopy by the same team

### *Exclusion Criteria*

Patients who did not undergo intraoperative gastroscopy (n=15)

Patients converted to open surgery (n=3)

### *Totally Laparoscopic Gastrectomy*

According to the 4th Japanese treatment guideline for gastric cancer (8), the surgical procedure to be performed according to the pathology and localization of the tumor was determined using a standard 5 port total laparoscopic procedure. In cases where total or subtotal gastrectomy was planned, anastomosis was completed intracorporeally.

### *Intraoperative Gastroscopy*

The endoscopy unit was placed on the left head of the operating table on the anesthesia side. Thus, the surgeon was able to see endoscopic and laparoscopic images at the same time. After the localization of the lesion was determined in endoscopic imaging, endostapler was placed, considering the safe proximal and distal surgical resection margin with light transillumination, and closed under endoscopic vision, and the transection was completed (Figure 1).



*Laparoscopic and endoscopic view shown simultaneously.*

**Statistical Analysis**

Statistical evaluation was performed with IBM SPSS 20.0 (IBM Corp., Armonk, NY, USA) package program. Numerical variables were given as mean±standard deviation, and categorical variables were given as frequency (percent).

**RESULTS**

Of the 55 patients who underwent totally laparoscopic gastrectomy with the diagnosis of gastric cancer, 28 (50.1%) were male and 27 (49.1%) were female. The mean age was 59.89±11.18. The mean body mass index (BMI) was 25.63±3.94. Most of the patients (50.8%) had no comorbidities and the most common comorbidity was diabetes mellitus (21.7%). In terms of preoperative risk scoring, ASA 2 (54.5%) was the most common. The demographic and clinicopathological characteristics of the patients are shown in Table-1.

**Table 1. Patient characteristic and demographic data**

Features (n=55)	n (%) / Mean ± SD
Age	59.89±11.18
BMI	25.63±3.94
Gender	
Male	28 (50.1)
Female	27 (49.1)
ASA	
ASA 1	4 (7.3)
ASA 2	30 (54.5)
ASA 3	21 (38.2)
Co-morbidity	
None	28 (50.8)
Diabetes Mellitus	12 (21.7)
Hypertension	9 (16.4)
Chronic obstructive pulmonary disease	7 (12.6)
Coronary artery disease	6 (10.8)

*BMI: Body mass index, ASA: American society of Anesthesiologist*

Tumor was located in 1/3 proximal in 25 patients (45.4%), 1/3 medial in 9 patients (16.4%) and 1/3 distal in 21 patients (38.2%). Intraoperative gastroscopy was performed in all cases. Subtotal gastrectomy was performed in 19 (34.5%) patients, vertical gastrectomy was performed in 10 (18.2%) patients, and total gastrectomy was performed in 26 (47.3%) patients. The mean time used in tumor localization by intraoperative gastroscopy was 6.24±3.15 minutes and there were no complications related to intraoperative gastroscopy. The mean operation time was 249.82±84.11 minutes and the mean blood loss was 67.64±49.78 ml. Histopathological analysis showed that the resection margin of all cases was noncancerous. The most common histopathological diagnosis was adenocarcinoma (61.8%). In the postoperative period, anastomotic leakage occurred in 4 (7.3%) patients, pneumonia in 1 (1.8%) patient, portal vein thrombosis in 1 (1.8%) patient, myocardial infarction in 1 (1.8%) patient, and wound infection in 1 (1.8%) patient. The mean hospital stay was 10.75±10.73 days, and the 30-day mortality rate was 5.5%. The peroperative and postoperative characteristics of the patients are shown in Table-2

Table 2. Preoperative and postoperative characteristics of patients

Features (n=55)	n (%) / Mean $\pm$ SD
<b>Location of tumor</b>	
Proximal 1/3	25 (45.4)
Middle 1/3	9 (16.4)
Distal 1/3	21 (38.2)
<b>Planned procedure</b>	
Subtotal gastrectomy	4 (7.3)
Wedge resection	30 (54.5)
Total gastrectomy	21 (38.2)
<b>Operation time in minute</b>	249.82 $\pm$ 84.11
<b>Blood loss in milliliter</b>	67.64 $\pm$ 49.78
<b>Pathology</b>	
Adenocarcinoma	34 (61.8)
GIST	13 (23.6)
Leiomyoma	2 (3.6)
Schwannoma	2 (3.6)
Neuroendocrine tumor	4 (7.3)
<b>Postoperative complication</b>	
Anastomotic leak	4 (7.3)
Pneumonia	1 (1.8)
Portal vein thrombosis	1 (1.8)
Myocardial infarction	1 (1.8)
Wound infection	1 (1.8)
<b>Hospital stayday</b>	10.75 $\pm$ 10.73
<b>30-day mortality</b>	3 (5.5)

GIST: Gastro intestinal stromal tumor

## DISCUSSION

Safe feasibility of intracorporeal anastomosis with the developments in laparoscopic surgical technique, allowed the widespread use of totally laparoscopic gastrectomy. However, intraoperative tumor localization is potentially difficult to determine due to limited gastric manipulation, thick gastric wall structure, and insufficient tactile sensation at laparoscopy. Although various methods

such as preoperative endoscopic marking or clipping (5,9,10), intraoperative endoscopy (11-13), intraoperative radiography (5,6,14), and intraoperative laparoscopic ultrasonography (4) have been described in the literature in tumor localization, a standard procedure has not been established. Endoscopic marking is one of the most widely applied methods. However, there are also publications reporting that the injected dye can spread to the serosal surface, the exact localization of the tumor cannot be determined, and the dye used causes gastritis (15). In the methods in which intraoperative radiography and ultrasonography are used, imaging cannot be provided during the transection of the tumor with the stapler.

Compared to these methods, intraoperative gastroscopy can be performed with direct view of the tumor and gastric transection by obtaining negative surgical margins. In this study, in which we used intraoperative gastroscopy, surgical margin positivity was not detected in any patient.

Endoscopy-assisted laparoscopic surgery is increasingly used in gastrointestinal tumor resection (11,13,16,17). However, this method also has some limitations. First of all, it causes a short prolongation in the operation time due to the use of intraoperative gastroscopy. Specific endoscopic skills require a learning curve. In addition, the costs associated with staff scheduling for endoscopy are among other limitations.

## CONCLUSION

In total laparoscopic gastrectomy, we recommend intraoperative gastroscopy in tumor localization and to ensure resection margin safety. We believe that laparoscopic gastric surgery should be used as the standard procedure of intraoperative gastroscopy.

**Ethics Committee Approval:** Ethical approval was obtained.

Kocaeli Derince Training and Research Hospital Clinical Research Ethics Committee (25/02/2021 date and 2021/39 number)

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