

# Conversion in laparoscopic gastric cancer surgery a highlight on the abdominal access

 Akile Zengin,  Yusuf Murat Bag,  Mehmet Can Aydin,  Cuneyt Kayaalp

Department of Gastrointestinal Surgery, Faculty of Medicine, Inonu University, Malatya, Turkey

Copyright@Author(s) - Available online at [www.annalsmedres.org](http://www.annalsmedres.org)

Content of this journal is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.



## Abstract

**Aim:** The aim of this study was to compare the data of patients who underwent gastric cancer surgery as laparoscopically completed and converted to open surgery and draw attention to complications arising from trocar entry.

**Materials and Methods:** This study included 211 patients who underwent laparoscopic gastric cancer surgery. Patients were divided in to two groups as laparoscopically completed and converted to open surgery. Demographics parameters and perioperative data were retrospectively analyzed.

**Results:** The median age of the study group was 62 (19-91) years and 68.2% were males. Conversion occurred in 16 patients (7.5%). The reasons for conversion were locally advanced tumor (n=6), complications due to trocar insertion (n=4), technical difficulty in performing esophagojejunostomy anastomosis (n=4), leakage in esophagojejunostomy anastomosis (n=1), and persistent bradycardia (n=1). Intraoperative blood loss was higher and time to oral intake was longer in the conversion group. No significant difference was found in terms of demographic parameters, operative time, length of hospital stays, the rate of postoperative complications, reoperation, 30-day mortality.

**Conclusion:** Complications due to trocar entry is an unpredictable and preventable conversion reason in laparoscopic gastric cancer surgery. Thin patients are riskier for complications during abdominal access. Abdominal access should be performed with an open technique in thin patients.

**Keywords:** Complication; conversion; minimal invasive; trocar; port

## INTRODUCTION

Laparoscopic gastrectomy has better short-term results in terms of blood loss, length of hospital stays, return of bowel functions, and better cosmesis than open gastrectomy. Conversion is defined as the enlargement of the incision or making an unplanned surgical incision (1). Although conversion is unfavored by surgeons, it is sometimes necessary to be performed. The reasons for conversion are adhesions, bleeding, obesity, insufficient exposure, T4 tumor, tumoral invasion, and technical difficulty of anastomosis (2). The aim of this study was to compare the data of patients who underwent gastric cancer surgery as laparoscopically completed and converted to open surgery and draw attention to complications arising from trocar entry.

## MATERIALS and METHODS

This study included 211 patients who underwent laparoscopic gastric cancer surgery (at least started

laparoscopically) between November 2014 and September 2020. The operations were performed by the senior surgeon (C.K.) or training surgeons under the supervision of the senior surgeon. Patients were divided in to two groups as laparoscopically completed and converted to open surgery. Postoperative 30-day complications were classified as Clavien-Dindo classification (3). Any complication grade 3 or higher was accepted as a serious complication. In the study, age, gender, The American Society of Anesthesiologists classification (ASA), body mass indexes (BMI), previous abdominal surgery, operative time, blood loss, length of hospital stays, time to oral intake, tumor location and size, number of retrieved lymph nodes, reasons for conversion, complications in the early postoperative period, reoperation, and 30-day mortality were examined.

## Ethical Considerations

This study was approved by Inonu University ethical committee (2020/1143).

**Received:** 28.09.2020 **Accepted:** 16.12.2020 **Available online:** 24.06.2021

**Corresponding Author:** Akile Zengin, Department of Gastrointestinal Surgery, Faculty of Medicine, Inonu University, Malatya, Turkey

**E-mail:** [dr.akile.zengin@gmail.com](mailto:dr.akile.zengin@gmail.com)

### Statistical Analysis

Analysis of normality of distribution of continuous variables was performed using the Shapiro-Wilk test. Continuous variables were expressed as median (range) and mean  $\pm$  standard deviation as appropriate and categorical variables were expressed as frequency (percentage). The Mann-Whitney U test and Student's t-test were used in the analysis of continuous variables as appropriate. The chi-square or Fisher's exact test were used in the analysis of categorical data.  $P < 0.05$  value was considered significant. Analyses were carried out using SPSS version 17 for Windows (SPSS Inc., Chicago, IL, USA).

### RESULTS

Table 1 shows the preoperative findings and demographic data of the patients. No significant difference was found between the patients except ASA. Intraoperative and postoperative variables are summarized in Table 2. The conversion was occurred in 16 patients (7.5%). The reasons for conversion were locally advanced tumor in six patients (37.5%), complications due to trocar insertion in four patients (25%), technical difficulty in performing esophagojejunostomy anastomosis in four patients (25%), leakage in esophagojejunostomy anastomosis in one patient (6.25%), and persistent bradycardia in one patient (6.25%) (Table 3). BMIs were 18, 18.2, 22.4, 25.8  $\text{kg}/\text{m}^2$  in patients with conversion due to trocar insertion.

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

	Total group (n=211)	Complete laparoscopic group (n=195)	Converted group (n=16)	p value
Age (year)	62 (19-91)	62 (19-82)	67.5 (28-91)	0.10
Gender (male)	144 (%68.2)	131 (%67.2)	13 (%81.3)	0.24
BMI ( $\text{kg}/\text{m}^2$ )	25 (15.5-45)	25 (15.5-45)	22.4 (18-34.5)	0.30
<b>ASA</b>				<b>0.043</b>
1	31 (%14.7)	31 (%15.9)	(-)	
2	138 (%65.4)	123 (%63.1)	15 (%93.8)	
3	42 (%19.9)	41 (%21)	1 (%6.3)	
<b>Tumor location</b>				0.30
Proximal	75 (%35.5)	66 (%33.8)	9 (%56.3)	
Middle	17 (%8.1)	16 (%8.2)	1 (%6.3)	
Distal	110 (52.1)	104 (%53.3)	6 (%37.5)	
Diffuse	9 (%4.3)	9 (%4.6)	(-)	
Previous abdominal surgery	33 (%15.6)	30 (%15.4)	3 (% 18.8)	0.72

**Table 2. Intraoperative and postoperative variables**

	Total group (n=211)	Complete laparoscopic group (n=195)	Converted group (n=16)	p value
<b>Operation Type</b>				1
Gastrectomy	195 (92.4%)	180 (92.3%)	15 (7.7%)	
Diagnostic laparoscopy	16 (7.6%)	15 (7.7%)	1 (6.3%)	
<b>Operative time (min)</b>	300 (20-720)	300 (20-720)	285 (150-720)	0.65
<b>Blood loss (ml)</b>	100 (0-2100)	100 (0-2100)	150 (20-700)	<b>0.009</b>
<b>Time to oral intake (day)</b>	2 (1-15)	2 (1-15)	3 (1-10)	<b>0.026</b>
<b>Length of hospital stays (day)</b>	6 (1-48)	6 (1-48)	8 (3-29)	0.25
<b>Tumor size (cm)</b>	6.2 $\pm$ 4.3	6 $\pm$ 4.3	8 $\pm$ 4	0.16
<b>Retrieved lymph nodes (n)</b>	31.0 $\pm$ 16.9	30.9 $\pm$ 16.9	33 $\pm$ 17.5	0.71
<b>Pathological lymph nodes (n)</b>	7.8 $\pm$ 10.6	7.5 $\pm$ 10.7	11.8 $\pm$ 10.1	0.20
<b>Postoperative Complications</b>	56 (%26.5)	52 (%26.6)	4 (%25)	
Intraabdominal abscess	4	4	0	
Intraluminal hemorrhage	7	6	1	
Intraabdominal hemorrhage	4	3	1	
Pneumonia	1	1	0	
Pulmonary embolism	1	1	0	
Celiac artery thrombosis	1	1	0	
Duodenal stump leakage	11	11	0	

Gastric fistula	2	2	0	
Colonic fistula	1	1	0	
Ileus	2	2	0	
Biloma	1	1	0	
Lymphatic fistula	1	1	0	
Leakage	13	11	2	
Gastric atony	2	2	0	
Duodenal stump leakage and esophagojejunostomy leakage	1	1	0	
Subcutaneous abscess	2	2	0	
<b>Clavien Dindo<math>\geq</math>3</b>	23 (%10.9)	20 (%10.3)	3 (18.8)	0.39
<b>Reoperation</b>	17 (%8.1)	15 (%7.7)	2 (%12.5)	0.62
<b>30-day-mortality</b>	10 (%4.7)	9 (%4.6)	1 (%6.3)	0.55

Table 3. Reasons of conversions

Patient (n)	Conversion reasons
6	Locally advanced tumor
4	Technical difficulty in performing esophagojejunostomy anastomosis
4	Trocar injury ( Two uncontrolled meso bleeding, one massive subcutaneous emphysema, and one injury of left iliac artery)
1	Leakage of esophagojejunostomy anastomosis
1	Deep Bradycardia

## DISCUSSION

In our study one quarter of conversions were due to abdominal access and were preventable. Three quarters of patients with conversion due to trocar insertion had BMI under 25 kg/m<sup>2</sup>. We recommend trocar insertion with an open technique in thin patients in order to avoid complications.

The US Food and Drug Administration Center (FDA) estimate the rate of major trocar-related vascular injury at 0.1% (4). In a published review, it was reported that extraperitoneal insufflation, including omental / subcutaneous emphysema, was less common when using the direct trocar technique compared to Veress needle insertion. It has been stated that the use of the direct trocar technique decreases the major life-threatening complications (5).

Although it is aimed to finish every laparoscopic operation totally laparoscopically, the development of conversion is also a part of this process. The conversion rate in laparoscopic gastrectomy was reported from 0% to 20% in the literature (2). The causes of conversion in laparoscopic gastric cancer surgery can be classified as technical, patient related, and tumor related (2). In a case series, it was stated that the main reason for conversion was organ injury due to adhesiolysis (6-8). In our study the most often reason of conversion was tumor related and was inevitable condition. If there is difficulty in dissection or definition of anatomical structures in the presence of locally advanced tumor, conversion should be considered. Conversion prevents both false oncological dissection and poor oncological results in this situation. (1)

In proximal gastric cancer the area of lymph node dissection increases that makes the operation more difficult than laparoscopic distal gastrectomy (2). In the study conducted by Ding et al., laparoscopic distal gastrectomy was carried out, and therefore, conversion rates were low. In the same study, it was reported that tumor characteristics, lymph node number, and tumor differentiation were independent risk factors affecting prognosis but conversion did not affect prognosis (8). In our study there was no significant difference between tumor location, and number of lymph node, and tumor size. In addition we couldn't determine any independent risk factor for conversion.

In a meta-analysis, the results of laparoscopic gastrectomy and open gastrectomy were compared. Oral intake time was earlier and hospital stay was indicated significantly shorter in laparoscopic group (9). The results of our study were also similar with the literature.

The curiosity for patients with conversion is short and long time results. In a related study, it was stated that conversion alone did not affect the short and long-term outcomes of gastric cancer patients (1,2,10). In our study there was no difference in terms of short term results between laparoscopically completed and converted to open surgery groups.

There are publications stating that the learning curve in laparoscopic gastrectomy can be achieved after 40 to 100 cases (2,11). Therefore, we believe that the conversion rate will decrease if the operation is carried out by an experienced surgeon. Since our clinic is also a training clinic, we think that perioperative complications occur more in the learning process.

## LIMITATIONS

The limitations of our study were retrospective design, limited number of patients, and lack of long-term results.

## CONCLUSION

Although laparoscopic gastrectomy is a comfortable and safe operation when carried out by experienced surgeons, it should not be forgotten that conversion is a part of the surgery. Complications due to trocar entry are an unpredictable and preventable conversion reason in laparoscopic gastric cancer surgery. Thin patients are riskier for complications during abdominal access. Abdominal access should be performed with an open technique in thin patients.

*Competing Interests: The authors declare that they have no competing interest.*

*Financial Disclosure: There are no financial supports.*

*Ethical Approval: This study was approved by Inonu University ethical committee (2020/1143).*

## REFERENCES

1. Ye M, Jin K, Xu G, et al. Short-and long-term outcomes after conversion of laparoscopic total gastrectomy for gastric cancer: A single-center study. *J BUON* 2017;22:126-33.
2. Yue F, Geng X. Impact of conversion during laparoscopic gastrectomy on outcomes of patients with gastric cancer. *JBUON* 2017;22:926-31.
3. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. *Ann Surg* 2004;240:205-13.
4. Fuller J, Ashar BS, Carey-Corrado J. Trocar-associated injuries and fatalities: an analysis of 1399 reports to the FDA. *J Minim Invasive Gynecol* 2005;12:302-7.
5. Cornette B, Berrevoet F. Trocar injuries in laparoscopy: techniques, tools, and means for prevention. A systematic review of the literature. *World J Surg* 2016;40:2331-41.
6. Alhossaini RM, Altamran AA, Cho M, et al. Lower rate of conversion using robotic-assisted surgery compared to laparoscopy in completion total gastrectomy for remnant gastric cancer. *Surg Endosc* 2020;34:847-52.
7. Liao G, Wen S, Xie X, et al. Laparoscopic gastrectomy for remnant gastric cancer: Risk factors associated with conversion and a systematic analysis of literature. *Int J Surg* 2016;34:17-22.
8. Ding Z, Jiang L, Zhang K, et al. Short-and long-term outcomes of conversion in laparoscopic gastrectomy for gastric cancer. *J BUON* 2018;23:1004-12.
9. Ohtani H, Tamamori Y, Noguchi K, et al. A Meta-Analysis of Randomized Controlled Trials that Compared Laparoscopy-Assisted and Open Distal Gastrectomy for Early Gastric Cancer. *J Gastrointest Surg* 2010;14:958-64.
10. Son T, Hyung W, Lee JH, et al. Minimally invasive surgery for serosa-positive gastric cancer (pT4a) in patients with preoperative diagnosis of cancer without serosal invasion. *Surg Endosc* 2014;28:866-74.
11. Jeong O, Ryu SY, Choi WY, et al. Risk factors and learning curve associated with postoperative morbidity of laparoscopic total gastrectomy for gastric carcinoma. *Ann Surg Oncol* 2014;21:2994-3001.