

Peptic ulcer complications, surgical treatment, comparison of open and laparoscopic approach, minimally invasive approach recommendations

 Bahtiyar Muhammedođlu,¹  Sezgin Topuz²

¹Department of Gastroenterology Surgery Clinic, Kahramanmaraş Necip Fazil City Hospital, Kahramanmaraş, Türkiye

²Department of General Surgery, Kahramanmaraş Sütçü İmam University Faculty of Medicine, Kahramanmaraş, Türkiye

ABSTRACT

Introduction: The treatment of peptic ulcer disease (PUD) has undergone significant changes over time. Elective surgical treatment of PUD has been replaced by medical treatment. Surgical treatment of PUD is limited to ulcer complications and disease resistant to medical treatment. The main issue to be decided during surgery is whether to add a definitive anti-ulcer surgery in addition to treating the immediate ulcer complication. Our aim in this study is to share the results of gastric ulcer complications treated with open and laparoscopic methods in our clinic and the postoperative endoscopy results of these patients.

Materials and Methods: Patients who underwent open or closed ulcer surgery due to ulcer complications in our General Surgery clinic between 2014 and 2023 were retrospectively scanned from the hospital information system. In addition to demographic data such as patients' age and gender, the surgical method applied, duration of hospital stays, and endoscopy findings in patients who underwent endoscopy during the postoperative period were recorded. The results were examined.

Results: A total of 194 patients were included in the study. Of the patients, 178 (91.8%) were male and 16 (8.2%) were female. The patients were between the ages of 18 and 93, with a mean age of 45.4±20.4 years. Endoscopy was performed on 44 patients after surgery. The mean duration between surgery and endoscopy was 504±586 days. Of the surgeries, 145 (74.7%) were open and 49 (25.3%) were laparoscopic. Gastritis and erosion were the most frequently observed findings in postoperative endoscopies, with bleeding in 2 patients, stenosis in 4 patients, and recurrent ulcers in 16 patients.

Conclusion: Surgical treatment of PUD can be performed using open and laparoscopic methods. Despite the advances in medical treatments, ulcer complications are still observed after surgery. The dilemma of whether to add anti-ulcer treatment to emergency surgeries continues, and more comprehensive studies are needed in this regard.

Keywords: Esophagogastroduodenoscopy, Peptic ulcer complications, Laparoscopy

Introduction

Elective surgical methods that have played a leading role in the treatment of peptic ulcer disease (PUD) have gradually become a thing of the past, and medical treat-

ment has taken the forefront. Most cases of peptic ulcer disease (PUD) heal by proton pump inhibitors (PPIs), eradication of *Helicobacter pylori* (HP) infection, and discontinuing drugs contributing to the pathology, such



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Correspondence: Sezgin Topuz, M.D., Department of General Surgery, Kahramanmaraş Sütçü İmam University Faculty of Medicine, Kahramanmaraş, Türkiye
e-mail: sezgintpz@gmail.com



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as nonsteroidal anti-inflammatory drugs (NSAIDs).^[1] Surgical treatment for PUD is indicated in the presence of complications. Non-emergency surgical procedures for PUD are now limited to patients with pyloric stenosis. Bleeding is the first and perforation is the second leading cause of operations performed for complicated PUD.^[2] In complicated peptic ulcer disease, the aim of surgery should be to eliminate the complication that led to surgery, prevent ulcer recurrence, perform a rapid and safe surgery, and reduce the gastrointestinal side effects of surgery.^[3] Elective surgical options for PUD include drainage procedures, vagotomies, and gastric resections. All of these procedures can disrupt the physiology of the upper gastrointestinal system.^[3]

The main dilemma for the surgeon during surgery is whether to add an anti-ulcer surgical procedure to eliminate the immediate complication and reduce the recurrence of ulcer. However, studies show a trend toward less complex procedures in emergencies, avoiding vagotomy or gastric resection.^[4]

The aim of this study was to share the results of gastric ulcer complications treated with open and laparoscopic methods in our clinic and the postoperative endoscopy results of these patients.

Materials and Methods

After obtaining local Ethics Committee approval, patients who underwent open or closed ulcer surgery due to ulcer complications in our clinic between 2014 and 2023 were retrospectively scanned from the hospital information system. The study was conducted in accordance with the Helsinki Declaration protocol. In addition to demographic data such as patients' age, gender, surgical method applied (open, laparoscopic, Graham patch, pyloroplasty, vagotomy, gastroenterostomy), duration of hospital stay, endoscopy findings in patients who underwent endoscopy during the postoperative period to determine the recurrence of ulcer or complication development (ulcer, bleeding, stenosis, gastritis, presence of erosion) were recorded and evaluated. All patients over 18 years old who underwent ulcer surgery due to ulcer complications through open or closed methods were sequentially included in the study.

The median superior incision was used for open surgery. Laparoscopic procedures were performed using 4 trocars, one of which was a camera port under the umbilicus (Fig. 1).



Figure 1. Port placement in laparoscopic surgery.

Postoperative treatment with PPI was applied to all patients for 2 months. Records of *H. pylori* eradication therapy for patients could not be accessed. Endoscopy was performed on patients who had complaints after surgical treatment for PUD perforation. Patients who underwent gastroenterostomy and vagotomy were all subjected to endoscopy after the 2nd month post-surgery. Surgical procedures and endoscopies were performed by multiple surgical specialists with the same expertise at a single center.

Statistical Analysis

IBM Statistical Package for the Social Sciences, Version 20.0 for Windows (IBM Corp., Armonk, NY, USA) was used to evaluate statistical data. Numerical data were presented as median±standard deviation (SD), and minimum-maximum, while categorical data were presented as number (n) and percentage (%). Normal distribution of patient data was tested using the Kolmogorov-Smirnov test. Numeric data not meeting parametric test conditions were compared using the Mann-Whitney U test. Fisher's exact test was applied for evaluating categorical data. $p < 0.05$ was accepted as statistically significant in all analyses.

Results

A total of 194 patients were included in the study, comprising 178 males (91.8%) and 16 females (8.2%). Patients were between 18 and 93 years of age, with a mean age of 45.4 ± 20.4 years. Of these patients, 145 (74.8%) were ASA I and II. Endoscopy was performed on 44 patients postoperatively. Among those who underwent endoscopy, *H. pylori* was pathologically examined in 24 patients, of whom 17 (70%) tested positive for *H. pylori* infection. The mean duration between surgery and endoscopy was 504 ± 586 days. There was no intraoperative or postoperative mortality within the first month.

Of the surgeries performed, 145 were open surgeries (74.7%) and 49 were laparoscopic surgeries (25.3%). The surgical methods applied are shown in Table 1.

When the length of hospital stay was compared between open and closed surgery, there was no statistically significant difference between the groups (Table 2) ($p > 0.05$). However, when only perforated ulcers were evaluated, the length of hospital stay was found to be statistically significantly lower in the laparoscopic surgery group ($p = 0.025$).

BTV+ drainage procedure was performed on 38 patients (19.6%) and not performed on 156 patients (80.4%). The distribution of pathologies detected in patients' control endoscopy is shown in Figure 2.

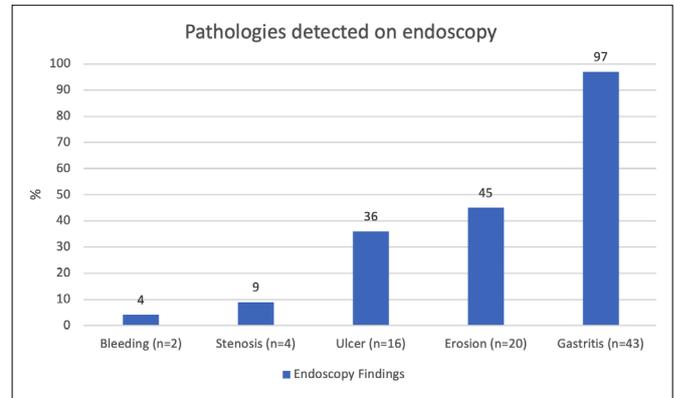


Figure 2. Distribution of pathologies detected in control endoscopy.

Regarding the pathologies detected during endoscopy in patients who underwent endoscopy, no statistically significant difference was observed between those who underwent BTV + drainage and those who did not in terms of bleeding, stenosis development, ulcer recurrence, erosion, and gastritis ($p > 0.05$). However, bleeding, ulcer, and stenosis were more frequently observed in patients who underwent the Graham procedure (BTV+ drainage n:5, Graham: n:19). Statistical analysis is shown in Table 3.

Discussion

Peptic ulcer disease is a prevalent issue showing significant geographic differences alongside a decreasing prevalence in Western countries.^[5] Complications of PUD include

Table 1. Surgical methods applied

Indication	Surgery	n	%
Ulcer perforation	Graham omentoplasty	128	66.0
	Laparoscopic Graham omentoplasty	28	14.4
Bleeding	Suturing of bleeding ulcer, truncal vagotomy, drainage of bleeding ulcer	5	2.6
Pyloric stenosis	Truncal vagotomy, drainage	12	6.2
	Laparoscopic truncal vagotomy, drainage	21	10.8
Total		194	100.0

Table 2. Length of Hospital Stay

	Minimum	Maximum	Median	p*
Open surgery	2	67	8	0.13
Laparoscopic surgery	2	24	7	
Open Perforated Ulcer surgery	2	67	8	0.025
Laparoscopic Perforated Ulcer surgery	2	16	7	

*Mann-Whitney U test.

Table 3. Statistical analysis

	Endoscopy for bleeding		Total	p
	No	Yes		
Vagotomy drainage				
No	35	1	36	.334**
Yes	7	1	8	
Total	42	2	44	
	Stenosis at Endoscopy		Total	
	No	Yes		
Vagotomy drainage				
No	33	3	36	.566**
Yes	7	1	8	
Total	40	4	44	
	Ulcer on endoscopy		Total	
	No	Yes		
Vagotomy drainage				
No	23	13	36	1.000**
Yes	5	3	8	
Total	28	16	44	
	Erosion on Endoscopy		Total	
	No	Yes		
Vagotomy drainage				
No	20	16	36	1.000**
Yes	4	4	8	
Total	24	20	44	
	Gastritis		Total	
	No	Yes		
Vagotomy drainage				
No	0	36	36	.182**
Yes	1	7	8	
Total	1	43	44	

**Fisher exact test.

bleeding, perforation, and pyloric stenosis, and recurrent or uncontrolled bleeding is a predictive contributor to mortality. Approximately 30% to 35% of patients presenting to the operating room due to perforated PUD will exhibit signs of shock and sepsis, with approximately half of these pa-

tients resulting in mortality.^[6] Ulcer perforation and bleeding necessitate surgical emergencies when endoscopic interventions are inadequate, while gastric outlet obstruction is an elective surgical practice.^[3] The complications of PUD vary by geographical region; while bleeding ranks high in

the United States, other complications may be more common in different geographies.^[7,8] In our study, perforation was the most encountered complication, unlike Western societies, with a rate of 80.4%. Additionally, pyloric stenosis with a rate of 17% ranked second.

Surgical procedures can be performed using open or laparoscopic methods. Laparoscopic repair of perforated peptic ulcer is considered a safe practice.^[9] It provides advantages such as shorter surgical duration, reduced postoperative pain, decreased lung problems, shorter hospital stay, and early return to daily activities compared to open surgery.^[10] In a study conducted by Birol et al.,^[11] 15 out of 52 patients with perforated peptic ulcer were treated using the laparoscopic method, over 90% of the patients were male, and no mortality was observed. In contrast to most studies in the literature, our study included all complications of PUD.^[12-14] Male patients constituted the majority, and no mortality was observed. Furthermore, the length of hospital stay was shorter in the laparoscopic surgery group when only perforated peptic ulcer patients were evaluated.

One of the major dilemmas in the treatment of PUD complications, particularly in emergency situations, is whether to add anti-ulcer therapy to the treatment to reduce the recurrence of the disease or to reduce the recurrence of complications. The addition of anti-ulcer surgery may have a negative effect by prolonging the operation time in emergency cases but might be significant in preventing recurrences. With advances in medical therapy, in the era of proton pump inhibitors (PPIs), it has been shown that lifelong PPIs can reduce the complications of PUD without vagotomy.^[15] With increasing laparoscopic surgical applications, PPI drug therapy with vagotomy or gastrojejunostomy has started a revival in the treatment of pyloric stenosis.^[3] In our study, we performed BTV + drainage procedure in cases of bleeding and pyloric stenosis in the surgical treatment of PUD and gave PPI treatment routinely for 2 months. When the complications were analyzed individually, there was no statistically significant difference between those who underwent vagotomy+drainage and patients who did not receive anti-ulcer surgery, but bleeding, ulcer, and stenosis complications were more common in the second group. This may be due to the fact that patient records of eradication treatment were not available and some of the patients did not receive eradication treatment.

The absence of an anti-ulcer procedure might result in

recurring ulcer complications. This risk can be significantly reduced in patients who test positive for HP by HP therapy.^[16] Intraoperative rapid HP testing is not available. In most cases, the patient's HP status is usually unknown during surgery. In cases where HP positivity cannot be tested during surgery, the benefits of anti-ulcer surgery should be considered.^[3] In a study, it was shown that 81% of patients with perforated duodenal ulcer were HP positive. In this study, perforation was simply closed in all patients. In postoperative HP positive patients, one group received only PPI and the other group received treatment to eradicate HP. In the control endoscopy, the ulcer recurrence rate in one year was 5% in the eradication treatment group and 38% in the group treated only with PPI.^[16] This study demonstrates the importance of HP eradication in perforated acute duodenal ulcers when antiulcer procedures are not included in the treatment. Moreover, in patients in whom NSAIDs cannot be discontinued as medical treatment, anti-ulcer surgery can be performed in patients who develop ulcer complications despite treatment with PPIs.^[3] On the other hand, the addition of anti-ulcer surgery can cause serious gastrointestinal problems in inappropriate patients. Definitive surgery should generally be avoided during emergency procedures with underlying major medical illness or intraoperative hemodynamic instability.^[3] In our study, no patient operated for perforation received anti-ulcer therapy. This may have been due to the surgeon's concern that a prolonged surgery may impair hemodynamic balance. In our study, the rate of HP positivity was 70% during the control endoscopy. This suggests that the necessary importance was unfortunately not given to eradication in our clinic, which could be related to complications.

Acute NSAID-induced perforations, patients who have not been previously treated with PPIs but who can be treated with PPI and HP therapy, as well as cases of concomitant delayed presentation, severe comorbid disease, or significant peritoneal contamination are suitable for surgery aimed solely at correcting complications without the addition of anti-ulcer surgery.^[3] In our study, Graham omentoplasty was performed in all perforated patients but anti-ulcer therapy was not added.

Our study has several limitations. Its retrospective nature, the unrecorded NSAID usage histories of patients, whether eradication treatment was received or not, and the unknown gastrin levels are its negative aspects.

Conclusion

In our study, the laparoscopic method in stomach perforation showed advantages in terms of shorter hospital stays and safety concerning mortality, particularly in pyloric obstruction and perforation. When only patients with perforated peptic ulcers were evaluated, the duration of hospital stay was shorter in the laparoscopic surgery group, but no difference in hospital stay was observed when all patients were evaluated. The majority of the cases in our study underwent simple closure (all perforation cases), and the rest underwent trunkal vagotomy and drainage. When the endoscopy results of cases that underwent anti-ulcer surgery and those treated only for complications were evaluated, no statistical difference was found between the two groups. However, the observation of complications such as bleeding, ulcer, and stenosis in the endoscopy results of both groups suggests that despite advancements in medical treatment of PUD, recurrences and repeated complications are still encountered.

Disclosures

Ethics Committee Approval: After obtaining local Ethics Committee approval, patients who underwent open or closed ulcer surgery due to ulcer complications in our clinic between 2014 and 2023 were retrospectively scanned from the hospital information system. The study was conducted in accordance with the Helsinki Declaration protocol.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

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