

The Effect of Laparoscopic and Laparotomic Surgery On Post Op Mortality and Morbidity in Repair of Peptic Ulcer Perforation

Firat Aslan*, Ali Riza Karayıl

SBÜ Van Training and Research Hospital

SBÜ Van Training and Research Hospital

ABSTRACT

Our aim is to examine the significance of laparotomic repair (OR) and laparoscopic repair (LR) on postoperative morbidity and mortality in peptic ulcer perforation (PUP) surgery, to explore the postoperative complications, and to determine the effectiveness of LR.

Patients operated for PUP in our hospital between January 2015, and December 2022, were evaluated retrospectively. Gastric perforations from stab wounds and blunt traumas, patients with diseases for which LR is contraindicated, patients with repeated abdominal surgery, and pregnant patients were excluded from the study. 142 patients were included in the research including 37 patients who underwent LR for PUP and 105 patients who underwent OR. Patients were grouped as LR and OR. Infective parameter values, demographic characteristics, postoperative hospital stay, presence of surgical site infection, reoperation, and additional complications of all patients were examined before and after the operation.

We observed no significant difference in demographic characteristics between the groups ($p>0.05$). The rate of postoperative decrease in leukocyte count was significantly higher in the LR group ($p<0.05$). Postoperative hospital stay and surgical site infection were lower in the LR group ($p<0.05$). Although there were no patients in the LR group who were reoperated due to postoperative leakage, the rate was 1.9% in the OR group, although the differences were not significant ($p>0.05$). The development of postoperative atelectasis was found to be significantly higher in patients who underwent OR ($p<0.05$). There were no significant differences between the groups in terms of postoperative mortality ($p>0.05$).

Our data suggests that the LR method can be safely performed in suitable patients as the postoperative morbidity and mortality rates are lower in laparoscopic surgical repair compared with OR.

Keywords: Laparoscopy, peptic ulcer, laparotomy, perforation

Introduction

Peptic ulcers (PU) are an acid-induced lesion of the digestive system that extends to the submucosa or muscularis propria, usually in the stomach or proximal duodenum (1). Excessive hepatic secretion causes damage to the gastroduodenal mucosa, affecting the tissues under the mucous membrane and causing PU formation. Before the 20th century, perforated PUs were rare, but always fatal (2). The prevalence of PU disease in the USA is estimated to be 8.4% (3). The increase in helicobacter incidence in recent years, stress factors, smoking, dietary factors, and excessive use of non-steroidal anti-inflammatory drugs (NSAIDs) have been associated with PU disease (4, 5). PU perforation (PUP), which carries a high risk of death particularly in elder people,

accounts for approximately 2–10% of PU disease cases (6, 7). Laparoscopic PUP repair studies first emerged in the early 1990s (8).

Laparoscopic surgery is accepted as the standard in cholecystectomy and appendectomy cases worldwide. Today, laparoscopy also provides good results in colorectal surgery. The advantages of laparoscopy include fast recovery, short hospital stay, reduced postoperative pain, early return to work, and rapid resumption of normal daily living activities (9, 10).

Our aim of the research was to examine the effectiveness of laparoscopic repair (LR) and open repair on postoperative mortality and morbidity in PUP surgery and to determine the postoperative complications.

*Corresponding Author: Firat Aslan, General Surgery, Sbü Van Training And Research Hospital, Van, Turkey

E-Mail: dr.aslan.2609@hotmail.com, Telephone number: 0 (543) 943 38 75

ORCID ID: Firat Aslan: 0000-0001-8508-196X, Ali Riza Karayıl: 0000-0002-4080-4455

Received: 04.04.2023, Accepted: 25.06.2023

Materials and Methods

After obtaining ethics committee approval from the Clinical Research Ethics Committee, the patient data those operated for PUP in our hospital between January 2015, and December 2022, were evaluated retrospectively. Cases excluded from the study and deemed unsuitable for laparoscopic surgery included traumatic gastric perforations, iatrogenic perforations, micro-perforations followed by conservative treatment, patients for whom laparoscopic surgery is contraindicated, pregnant patients, and those with a previous history of repeated abdominal surgeries. Of the 142 cases selected, 37 patients underwent LR and 105 underwent laparotomic repair (OR). The patients were divided into two groups: open repair and closed repair. Demographic data that was examined included preoperative and postoperative leukocyte count, type of operation, postoperative complication status, length of hospital stay, and reoperation status.

In OR patients, the abdomen was entered via an incision extending from the umbilicus level to below the xiphoid in the midline of the abdomen.

In the LR group, the abdomen was entered with ten camera ports from the umbilical area and five working ports from the bilateral pararectal area, the fluid in the abdomen was aspirated, and an omental patch was placed on the suture line after the primary repair of the perforated area. A drain was placed into the subhepatic area and postoperative nasogastric decompression (NG insertion) was applied to both groups. In the postoperative period, patients were given proton pump inhibitors, antibiotics, and balanced intravenous fluids.

Statistical Analysis: Descriptive statistics for continuous variables in the research included the mean, standard deviation, minimum and maximum, and for categorical variables, numbers and percentages. Pearson Chi-Squared test and independent T-tests were used to examine the groups. The statistical significance level stated as 5% and the SPSS (IBM SPSS for Windows, ver.22) software was used for analysis. A p value less than 0.05 was considered as statistically significant.

Results

Our results showed no significant difference observed between the LR and OR groups with regards to age and gender ($p>0.05$; tables 1 and 2).

Preoperative leukocyte values were higher in the LR compared with the OR group ($p<0.05$). When the patients were compared by preoperative and postoperative leukocyte values, particularly on day 1, the rate of leukocyte reduction was significantly higher in the open repair group than in the LR group ($p<0.05$). When compared in terms of hospital stay, there was a significantly shorter time spent in hospital in the LR group ($p<0.05$).

Although surgical site infection was observed in 11% of patients who underwent OR, this rate was observed as 0% in patients who underwent LR ($p<0.05$; table 2). Atelectasis developed in 31.4% of patients in the postoperative OR repair group as a result of their incapability to perform deep breathing. These complications were seen in 2.7% of patients in the closed repair group ($p<0.05$).

When the patients were examined regarding the intra-abdominal abscess formation after surgery, intra-abdominal abscess did not occur in the closed repair group, whereas abscesses formed in seven patients in the OR group. Two patients in the OR group with intra-abdominal abscess developed leaks and were reoperated on. Abscess drainage was performed with a catheter in three patients who developed abscesses, while two patients were treated by changing the antibiotic therapy regimen. When the two surgical groups were compared, intra-abdominal abscess formation was significantly less in the LR group compared with the OR group ($p<0.05$).

Although there were no significant difference between the groups regarding mortality, no mortality was reported in the LR group, whereas 4.8% mortality was observed in the OR group ($p>0.05$).

Discussion

From our study, we observed that patients who underwent surgery for PUP had less morbidity and shorter hospital stay in the LR group compared with the OR group, a similar result to that reported by Quah GS et al. (2018) (2). Ge B et al. (2015) reported that the length of hospital stay and developing comorbidities were less in patients who undergo LR (11), which is important in terms of cost effectiveness. Similarly, a multicenter study by Kim CW et al., also showed that the total hospital stay was shorter in the patient group who undergone LR (12). These studies corroborate our findings that LR reduces the length of hospital stay.

Table 1: Age Characteristics, Leukocyte Drop Status, and Length of Hospital Stay

		N	Mean	Min.	Max.	Std. Dev.	t	p
Age (years)	Laparoscopy repair	37	36.4324	19.00	65.00	10.85649	0.718	0.474
	Laparotomy repair	105	35.0095	18.00	78.00	10.19662		
Preoperative leukocyte count (n)	Laparoscopy repair	37	19.0000	12.00	28.00	3.88730	3.244	0.001
	Laparotomy repair	105	16.5524	6.00	31.00	3.96616		
Postoperative leukocyte count (1 day; n)	Laparoscopy repair	37	10.1892	6.00	15.00	2.14525	-7.281	0.001
	Laparotomy repair	105	13.7238	7.00	20.00	2.66204		
Length of stay in hospital (days)	Laparoscopy repair	37	4.3514	3.00	6.00	0.78938	-	0.001
	Laparotomy repair	105	7.8476	4.00	15.00	1.87996		

Table 2: Postoperative Complications and Gender Characteristics

		Surgical method				χ^2	p
		Laparoscopy		Laparotomy			
		N	%	N	%		
Gender	Male	20	54.1	50	47.6	0.453	0.501
	Female	17	45.9	55	52.4		
Surgical site infection	No	37	100	93	88.6	4.619	0.032
	Yes	0	0	12	11.4		
Atelectasis	No	36	97.3	72	68.6	12.397	0.001
	Yes	1	2.7	33	31.4		
Abdominal abscess formation	No	37	100	98	93.3	2.595	0.107
	Yes	0	0	7	6.7		
Leak	No	37	100	103	98.1	0.715	0.398
	Yes	0	0	2	1.9		
Reoperated patient	No	37	100	103	98.1	0.715	0.398
	Yes	0	0	2	1.9		
Mortality	No	37	100	100	95.2	1.826	0.177
	Yes	0	0	5	4.8		

We observed that lower surgical site infection rates in patients who underwent LR for PUP. Similar results were found in a meta-analysis conducted by Salman MA et al. in 2022 (13) and other studies (11–14). The reason for this situation is that fewer surgical site infections develop due to the minimal invasiveness of the LR approach.

We found that lung pathologies were rare in laparoscopic repair within both patient groups. This could be because LR might cause less pain in the postoperative period due to its minimal invasiveness, and in this case, lung functions might be less affected. In the study of Quah GS et al. (2), no significant difference was found within

the LR and OR groups regarding respiratory complications. This might be attributed to the fact that the patient groups selected for LR were in a septic condition, of an older age, and might not have been suitable for LR. However, we observed fewer respiratory pathologies after LR in appropriately selected cases.

In terms of intra-abdominal abscess formation in the postoperative period, this difference was not significant between these LR and OR groups, although it was seen at a higher rate in the OR group. Regarding postoperative leakage and reoperation, two cases were reoperated in the OR group due to the formation of uncontrollable intra-abdominal abscess and leaks. Although there

was no case of resurgery in the LR group, this difference was not significant between the two patient groups. Similar results were reported by Golash V et al. (2008) and Varcus F et al. (2018) (15–16). In our study, post-surgical mortality was seen in the open repair group but not in the closed repair group, but no significant difference was found between these two groups. Similar results were reported Tulinsky L (17).

Our study was limited because it was a retrospective study, therefore the number of cases was relatively low. It was also a single-center study.

Our study has shown that LR has significant advantages such as shorter hospital stay, lower respiratory complication rates, lower surgical site infection rates in PUP, compared with OR. When compared with LR in terms of intra-abdominal abscess development, reoperation due to leakage, and mortality, the differences between the LR and OR groups was not significant possibly due to the small sample size, although there were no cases in the LR group.

Based on our analyses, we suggest that PUP repair can be safely performed by laparoscopic methods in suitable patients, since the postoperative morbidity and mortality rates are lower than OR in patients who require surgery for PUP.

Acknowledgments: The authors alone are liable for the content and writing of the paper.

Conflicts of interest: The authors report no conflicts of interest.

Funding: None to declare.

References

1. Kuna L, Jakab J, Smolic R, Raguz-Lucic N, Vcev A, Smolic M. Peptic Ulcer Disease: A Brief Review of Conventional Therapy and Herbal Treatment Options. *J Clin Med*. 2019 Feb 3;8(2):179.
2. Quah GS, Eslick GD, Cox MR. Laparoscopic Repair for Perforated Peptic Ulcer Disease Has Better Outcomes Than Open Repair. *J Gastrointest Surg*. 2019 Mar;23(3):618-625.
3. Kavitt RT, Lipowska AM, Anyane-Yeboah A, Gralnek IM. Diagnosis and Treatment of Peptic Ulcer Disease. *Am J Med*. 2019 Apr;132(4):447-456.
4. Malmi H, Kautiainen H, Virta LJ, Farkkila N, Koskenpato J, Farkkila MA. Incidence and complications of peptic ulcer disease requiring hospitalisation have markedly decreased in Finland. *Aliment Pharmacol Ther*. 2014;39:496–506
5. Kavitt RT, Lipowska AM, Anyane-Yeboah A, Gralnek IM. Diagnosis and Treatment of Peptic Ulcer Disease. *Am J Med*. 2019
6. Bertleff M, Lange JF. Perforated peptic ulcer disease: a review of history and treatment. *Dig Surg* 2010;27:161–9
7. Siu WT, Leong HT, Law BK, et al. Laparoscopic repair for perforated peptic ulcer. *Ann Surg* 2002;235:313–9.
8. Mouret P, François MY, Vignal J, Bartht X, Lombard-Platet R. Laparoscopic treatment of perforated peptic ulcer. *Br J Surg*. 1990;77(9):1006-6
9. Di Saverio S. Emergency laparoscopy: a new emerging discipline for treating abdominal emergencies attempting to minimize costs and invasiveness and maximize outcomes and patients' comfort. *J Trauma Acute Care Surg* 2014; 77: 338-350 [PMID: 25058263]
10. Mehmet kağan katar murat başer pamir erensoy. Peptik ülser perforasyon onarımında laparoskopinin yeri nedir?. <https://doi.org/10.16919/bozoktip.676783>
11. Ge B, Wu M, Chen Q, Chen Q, Lin R, Liu L, Huang Q. A prospective randomized controlled trial of laparoscopic repair versus open repair for perforated peptic ulcers. *Surgery*. 2016 Feb;159(2):451-8.
12. Kim CW, Kim JW, Yoon SN, Oh BY, Kang BM. Laparoscopic repair of perforated peptic ulcer: a multicenter, propensity score matching analysis. *BMC Surg*. 2022 Jun 16;22(1):230.
13. Salman MA, Issa M, Salman A, Tourky M, Elewa A, Alrahawy M, Shetty N, Elsherbiney M, Elhaj MGF, Shaaban HE. Surgical Management of Perforated Peptic Ulcer: A Comparative Meta-analysis of Laparoscopic Versus Open Surgery. *Surg Laparosc Endosc Percutan Tech*. 2022 Oct 1;32(5):586-594.
14. Byrge N, Barton RG, Enniss TM, Nirula R. Laparoscopic versus open repair of perforated gastroduodenal ulcer: a National Surgical Quality Improvement Program analysis. *Am J Surg*. 2013;206(6):957-63.
15. Golash V. Ten-Year Retrospective Comparative Analysis of Laparoscopic Repair versus Open Closure of Perforated. *Oman Med J*. 2008 Oct;23(4):241-6.
16. Varcus F, Paun I, Duta C, Dobrescu A, Frandes M, Tarta C. Laparoscopic repair of perforated peptic ulcer. *Minerva Chir*. 2018 Apr;73(2):188-193.
17. Tulinsky L, Mitták M, Hrubovčák J, Kepičová M, Ihnát P, Martínek L. Laparoscopic repair of perforated peptic ulcer - routine procedure or targeted patient selection? *Rozhl Chir*. 2022 Summer;101(7):326-331. English.