

# Comparison of Clinical Outcome of Laparoscopic with Open Repair Surgery for Duodenal Ulcer Perforation

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## ABSTRACT

**Objective:** To determine the clinical outcome of laparoscopic versus open repair of perforated peptic ulcer.

**Study Design:** Comparative analytical study

**Place and Duration of Study:** Department of Surgery Ward-2, Jinnah Postgraduate Medical Centre Karachi from 1<sup>st</sup> March 2021 to 28<sup>th</sup> February 2022.

**Methodology:** Fifty patients with duodenal ulcer perforation were divided into two equal groups and open surgery or laparoscopic was performed after clinical examination. Boeys score, Mannheim Peritonitis Index preoperatively and VAS scoring as post-operative was done.

**Results:** There were more males than females within both groups with a mean age of 51.3±16.5 years in group I and 55.7±14.9 years in group II. The perforation size of group I was greater as 16.3±6.4 mm than group II patients which were 15.9±5.7 mm. The post-operative complications showed a high frequency of respiratory cardiovascular and surgical site complications with greater mortality rate in Group II A major decrease in pain score was recorded in laparoscopic group such as group I in comparison with open repair such as group II.

**Conclusion:** Shorter hospitalization and less post-operative pain was observed in laparoscopic repair for perforated peptic ulcer as compared to open-repair surgery.

**Keywords:** Peptic ulcer, Laparoscopy, Advantages, Disease management

## INTRODUCTION

Less invasive surgeries are becoming widely accepted and broadly used all over the over especially from past decade. Minimally invasive surgery is exceptionally improved due to improvements in materials, optics, refinement of surgical approaches and manufacturing. Laparoscopic surgery has extensively replaced the old elective and invasive surgical methods including colorectal surgeries, anti-reflux procedures and laparoscopic cholecystectomy. On one hand, it replaces the many traditional surgical methods for many general procedures, on the other hand, much research needs to be done in the management of perforated peptic ulcer (PPU) surgery with laparoscopy.<sup>1-4</sup>

Although laparoscopic treatment method has revolutionized the medical science world, much information is still needs to be explored. Early reports of PPU through laparoscopic repair have showed the greater efficacy and feasibility of laparoscopic protocols.<sup>5-10</sup> Various meta-analysis demonstrated that it should be primary protocol for low risk patients.<sup>11,12</sup> However, a review published by Cochrane highlighted open repair is safer and reliable protocol for PPU treatment. This report also put great emphasis on conducting randomized controlled trials to deduce any confirmatory conclusion.<sup>4</sup> There is paucity of reported data from South Asian countries on PPU treatment through laparoscopic approaches.

Present study is designed to compare the clinical outcomes of laparoscopic versus open repair of perforated peptic ulcer. Result of the presently designed study will prove helpful for health practitioners, surgeons and medical officers to design the treatment plan for perforated peptic ulcer patients to minimize the health risk and to increase the success of treatment plan and life expectancy.

## MATERIALS AND METHODS

This comparative analytical study was conducted at Department of Surgery Ward-2, Jinnah Postgraduate Medical Centre Karachi from 1<sup>st</sup> March 2021 to 28<sup>th</sup> February 2022. The type of the study was comparative analytical which included all those patients who were admitted in emergency and indoor surgical department for duodenal ulcer perforation. The number of patients admitted as study participants was 50. The sample size was calculated using

WHO sample size calculator with 80% power of test and 95% confidence interval and 7% margin of error. The patients without perforation a previous history of upper area of abdominal-surgery, sealed-off perforations with no peritonitis/sepsis signs, concomitant ulcer-bleeding evidence, gastric outlet-obstruction were also excluded. The study enrolled patients were further divided into two groups. Group I had those patients which underwent laparoscopic surgery for their correction while Group II had those patients on which open surgery protocol was opted for treatment. The number of patients in both groups was decided in accordance with their clinical presentation and complications in addition to the age and comorbidities presented as well as their informed consent deliverance. Before the surgery resuscitation with isotonic-crystalloid was performed in each patient and sufficient analgesic was given as well as IV antibiotics. The sutures were placed intracorporeally with sequential laparoscopic-lavage for ensuring complete clearance of contamination in peritoneum.

Parallely interrupted 2 sutures of polyglactin were used for perforation closure which was followed with a single tie suture over the pedicle-omentum. In case of open surgery repair incision was given over the midline using standard protocol as described by Cellan Jones. The Mannheim Peritonitis Index (MPI) scoring was applied with a score from 0-47 for assessing prognostic factors with scoring >26 was lined with mortality rate high while Boey scoring sum of 3 independent risk factors was also used with scoring based on severity of medical illness, shock state on admission and delay in symptoms presenting greater than 24 hours. VAS scoring was used for describing pain. Demographic information as well as gender, clinical history and symptoms were documented on a well-structured questionnaire. The mean operative time, blood loss during operation, SSI, pain scoring was also recorded in each patient for comparative analysis of both surgical techniques. Data was analyzed using SPSS version 26.0 using Pearson Chi square test where p value <0.05 was considered as significant.

## RESULTS

There were more males than females within both groups with a mean age of 51.3±16.5 years in group I and 55.7±14.9 in group II. No significant difference in BMI was noticed in patients at

admission with comorbidity observed through clinical history as diabetes to be slightly higher in group II than group I, however with no significant difference. There was no significant difference presented in Boey scoring or MPI between both groups (Table 1).

The perforation size of group I was greater as  $16.3\pm 6.4$ mm than group II patients which was  $15.9\pm 5.7$  mm. Site of perforation was presented as Juxta-pyloric in majority of the cases in both groups followed by duodenum. The mean operation time was higher in group I in comparison with group II while the post-operative stay in group I was much lesser than in group II (Table 2).

The post-operative complications showed a high frequency of respiratory cardiovascular and surgical site complications with greater mortality rate in Group II such as open repair cases than Group I meaning laparoscopic surgical repair. The overall complication rate was also very high in open surgery repair cases (Fig. 1).

The pain scoring through VAS was performed from day 1 to day 4 within both groups. The scoring until day 4 showed slight decrease in group II while a rapid decrease in group I with a significant difference between two groups as shown through Pearson chi square test. A major decrease in pain score was recorded in laparoscopic group such as group I in comparison with open repair such as group II (Table 3).

Table 1: Demographic and clinical presentation at admission within Group I and II

Variables	Group I (n=25)	Group II (n=25)	P value
Gender			
Male	22 (88%)	21 (84%)	0.31
Female	3 (12%)	4 (16%)	
Age (years)	$51.3\pm 16.5$	$55.7\pm 14.9$	0.44
BMI (kg/m <sup>2</sup> )	$21.2\pm 3.3$	$22.5\pm 4.2$	0.18
Comorbidities			
None	16 (64%)	15 (60%)	0.22
Respiratory	2 (8%)	2 (8%)	1.2
Cardiovascular	4 (16%)	4 (16%)	1.2
Renal impairment	---	1 (4%)	---
Diabetes	1 (4%)	2 (8%)	0.83
Hypertension	2 (8%)	1 (4%)	0.36
Boey score			
0	8 (32%)	8 (32%)	1.2
1	10 (40%)	10 (40%)	1.2
2 or 3	7 (28%)	7 (28%)	1.2
Mannheim Peritonitis Index			
Score < 27	23 (92%)	18 (72%)	0.53
Score $\geq$ 27	2 (8%)	7 (28%)	
Shock on presentation	2 (8%)	3 (12%)	1.3
Duration of symptoms > 24 h	16 (64%)	15 (60%)	0.86

Table 2: Comparative operational data between group I and group II

Variables	Group I (n=25)	Group II (n=25)	P value
Perforation size (mm)	$16.3\pm 6.4$	$15.9\pm 5.7$	0.72
Perforation Site			
Juxta-pyloric	16 (64%)	17 (68%)	0.33
Duodenum	5 (20%)	7 (28%)	0.32
Stomach (%)	4 (16%)	1 (4%)	0.12
Operation time (min)	$109.3\pm 41.4$	$103.8\pm 36.2$	0.62
Post-operative stay (days)	$4.4\pm 3.3$	$7.3\pm 7.8$	0.03

Table 3: Comparison of VAS pain scores in post-operative group I and group II

Days	Group I (n=25)	Group II (n=25)	P value
1	$2.6\pm 1.6$	$3.4\pm 2.1$	0.04
2	$1.1\pm 1.2$	$2.3\pm 2.0$	0.002
3	$0.6\pm 0.8$	$1.4\pm 1.6$	0.001
4	$0.3\pm 0.4$	$0.7\pm 1.4$	0.011

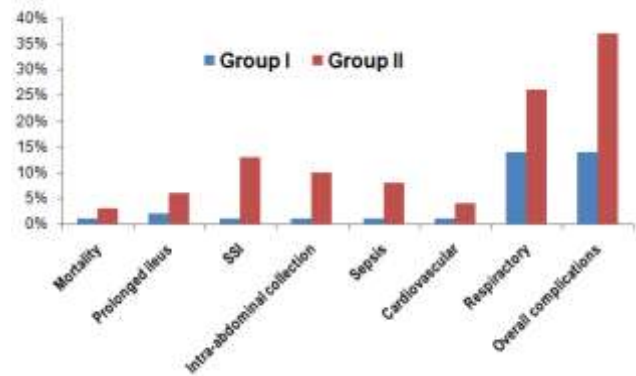


Fig. 1: Comparison of surgical outcomes in group I and Group II

## DISCUSSION

Although laparoscopy is now considered a routine surgical method for number of treatment and surgical methods, there is still paucity of published data on the outcome and comparison of perforated peptic ulcer treatment through open-repair or laparoscopic approach. For more than two decades, open surgery remains a preferred and reliable method for perforated duodenal ulcer management despite of adequate evidences supporting laparoscopic repair to be a better treatment option. Present study was designed to find and compare the clinical outcomes of laparoscopic versus open repair of perforated peptic ulcer.<sup>13-17</sup>

Improvement of post-operative pain was observed in laparoscopic group and early discharge from hospital. Surgery related complications was also significantly lesser in laparoscopic repair method. Lau<sup>11</sup> also reported similar findings and stated that lesser incidence of pulmonary complications in laparoscopic group in contrast to open-surgery and the difference was significant. In current study, fewer pulmonary complications were reported in laparoscopic group while on the other hand, it was more in number in open repair group. Earlier return to home and normal activities are some of the key benefits of laparoscopic surgery.<sup>18</sup> Likewise, result of systematic review also supports the same findings and reported significant difference between both groups.<sup>19</sup> In our study group, lower incidence of post-operative pain and morbidity was observed leading to shorter hospital stay after laparoscopic surgery. There was a considerable reduction of hospital stay after laparoscopic repair as compared to open-surgery.

Laparoscopic approach is now widely accepted and greatly improved over time. Larger study with randomized trials needs to be conducted for better evaluation. Less post-operative pain will enable patients to avoid pulmonary complications and to ambulate early.

## CONCLUSION

Shorter hospitalization and less post-operative pain were observed in laparoscopic repair for perforated peptic ulcer as compared to open-repair surgery. Overall lesser complications were reported by laparoscopic group.

## REFERENCES

1. Asghar MS, Zaman BS, Zahid A. Past, present and future of surgical simulation and perspective of a developing country: a narrative review. *JPMa* 2021; 71(12): 2770-76.
2. Siddaiah-Subramanya M, Tiang KW, Nyandowe M. A new era of minimally invasive surgery: progress and development of major technical innovations in general surgery over the last decade. *Surg J (NY)* 2017; 3(4): e163-6.
3. Jaafari J, Douzi S, Douzi K, Hssina B. The impact of ensemble learning on surgical tools classification during laparoscopic cholecystectomy. *J Big Data* 2022; 9(1): 1-20.
4. Sanabria A, Villegas MI, Morales Uribe CH. Laparoscopic repair for perforated peptic ulcer disease. *Cochrane Database Syst Rev* 2013; 2:CD004778.

5. Nathanson LK, Easter DW, Cuschieri A. Laparoscopic repair/-peritoneal toilet of perforated duodenal ulcer. *Surg Endosc* 1990;4:232e233.
6. So JBY, Kum CK, Fernandes ML, Goh P. Comparison between laparoscopic and conventional omental patch repair for perforated duodenal ulcer. *Surg Endosc* 1996; 10:1060e1063.
7. Naesgaard JM, Edwin B, Reiertsen O, Trondsen E, Faerden AE, Rosseland AR. Laparoscopic and open operation in patients with perforated peptic ulcer. *Eur J Surg* 1999;165:209e214.
8. Katkhouda N, Mavor E, Mason RJ, Campos GM, Soroushyari A, Berne TV. Laparoscopic repair of perforated duodenal ulcers: outcome and efficacy in 30 consecutive patients. *Arch Surg* 1999;134:845e850.
9. Matsuda M, Nishiyama M, Hanai T, Saeki S, Watanabe T. Laparoscopic omental patch repair for perforated peptic ulcer. *Ann Surg* 1995;221:236e240.
10. Siu WT, Leong HT, Law BK, et al. Laparoscopic repair for perforated peptic ulcer. A randomized controlled trial. *Ann Surg* 2002;235:313e319.
11. Lau H. Laparoscopic repair of perforated peptic ulcer: a metaanalysis. *Surg Endosc* 2004; 18: 1013e1021.
12. Lunevicius R, Morkevicius M. Systematic review comparing laparoscopic and open repair for perforated peptic ulcer. *Br J Surg* 2005; 92: 1195e1207.
13. Lagoo S, McMahon RL, Kakihara M, Pappas TN, Eubanks S. The sixth decision regarding perforated duodenal ulcer. *JLS* 2002; 6: 359e368.
14. Quah GS, Eslick GD, Cox MR. Laparoscopic Repair for Perforated Peptic Ulcer Disease Has Better Outcomes Than Open Repair. *J Gastrointest Surg* 2019;23(3):618-25.
15. Siow SL, Mahendran HA, Wong CM, Hardin M, Luk TL. Laparoscopic versus open repair of perforated peptic ulcer: Improving outcomes utilizing a standardized technique. *Asian J Surg* 2018;41(2):136-42.
16. Pansa A, Kurihara H, Memon MA. Updates in laparoscopic surgery for perforated peptic ulcer disease: state of the art and future perspectives. *Ann Laparosc Endosc Surg* 2020; 5(5): 9-13.
17. Chalya PL, Mabula JB, Koy M, Mchembe MD, Jaka HM, Kabangila R, et al. Clinical profile and outcome of surgical treatment of perforated peptic ulcers in Northwestern Tanzania: a tertiary hospital experience. *World J Emerg Surg* 2011; 6(1): 1-10.
18. Bertleff MJ, Halm JA, Bemelman WA, et al. Randomized clinical trial of laparoscopic versus open repair of the perforated peptic ulcer: the LAMA Trial. *World J Surg* 2009;33: 1368e1373.
19. Bertleff MJ, Lange JF. Laparoscopic correction of perforated peptic ulcer: first choice? A review of literature. *Surg Endosc* 2010; 24: 1231e1239.