

ORIGINAL ARTICLE

Outcome of Laparoscopic Repair of Duodenal Ulcer Perforation Compared with Open TechniqueMUHAMMAD SAIM¹, MUHAMMAD AKBAR², SAIFULLAH BROHI³, SARA KHALID MEMON⁴, RAMNA NADEEM⁵, MUHAMMAD ZUBAIR⁶¹MBBS, FCPS, General Surgery, Liaquat University Hospital Hyderabad²Assistant professor of surgery, Liaquat University OF Medical and Health Sciences, LUMHS, Jamshoro³Assistant professor of surgery, Bilawal Medical College for Boys LUMHS, Jamshoro⁴MBBS, FCPS, Medical Officer General Surgery, Liaquat University Hospital Hyderabad⁵Resident, Agha Khan University Hospital, Karachi⁶Professor of Surgery, Niazi Medical and Dental College, SargodhaCorresponding author: Muhammad Saim, Email: dr.saim87@gmail.com**ABSTRACT****Background:** The surgical treatment of perforated duodenal ulcers is not controversial; however, the best surgical strategy is still up for debate. The perforation closure with an omental patch or without it during surgery is the basis of perforated duodenal ulcers treatment. Laparoscopic surgery can now be used to repair a perforated duodenal ulcer due to developments in minimal access surgery.**Aim:** In this analysis, the results of open versus laparoscopic repair of perforated duodenal ulcers were compared in terms of operating time, length of hospital stays, postoperative pain and complications after the operation, among other factors.**Methods:** This prospective comparative study was held at the surgical department of Agha Khan University Hospital, Karachi for one-year duration from January 2022 to December 2022. Patients were divided randomly into two groups, A and B, who underwent operations using laparoscopic and conventional methods, correspondingly, and results were compared.**Results:** This study found that men between the ages of 51 and 60 were most frequently affected. Laparoscopic group patients experienced much less post-operative pain, need less analgesics, minimum wound infection, and less stay in hospital than open group patients (p 0.05).**Conclusions:** Laparoscopic repair when performed on carefully chosen patients for perforated duodenal ulcers, it is safe, practical, and produces better outcomes than open surgery.**Keywords:** Omental patch, laparoscopic repair, open repair, perforated duodenal ulcer**INTRODUCTION**

Although nonsteroidal anti-inflammatory medicines (NSAIDs) and increased smoking among women have made the perforated duodenal ulcer more common among adults overall but it is still mostly a condition of young males¹⁻². The peptic ulcer disease incidence and its associated complications have significantly reduced since the development of curative medicinal therapy for *Helicobacter pylori*, and definitive surgical operations are now only sometimes carried out³⁻⁴. Unexpectedly, the frequency of PUD has not declined, indicating that there may be other contributing factors to perforated peptic ulcer disease⁵⁻⁶. All of the documented statistically significant risk variables for perforation including smoking, *H. pylori* infection, use of NSAIDs, Ramadan fasting, and prior peptic ulcer history have been identified⁷. The primary method of treating a perforated duodenal ulcer is surgery, which involves sealing the perforation with or without an omental patch⁸⁻⁹. The surgical treatment of perforated duodenal ulcers is not controversial; however, the best surgical strategy is still up for debate¹⁰. The purpose of the current analysis was to assess the feasibility of laparoscopic duodenal perforation repair and its comparison to open surgery in terms of postoperative pain, operation time, complications occurred postoperatively and hospital stay in our setting.

METHODS

This prospective comparative study was held at the surgical department of Agha Khan University Hospital, Karachi for one-year duration from January 2022 to December 2022. All patients with the diagnosis of a perforated duodenal ulcer, regardless of age or gender were included. The patients with sealed perforations were omitted. Although, patients with radiological sign of gas under the diaphragm but no clinical signs of peritonitis, patients with shock who don't respond to intravenous fluids and vasopressor medications and have systolic blood pressure (<90 mm Hg), patients with perforations other than those in the duodenal ulcer were also excluded.

80 patients were divided randomly into two groups by lottery method, A and B, who underwent operations using conventional

and laparoscopic methods, respectively, and results were compared.

In the laparoscopic group, consent for conversion to open surgery was obtained prior to surgery. Under general anaesthesia, omental patches were used in both groups to close the duodenal perforation. The open exploratory laparotomy carried out by a vertical incision in the middle. Four ports were used for laparoscopic surgery (10 mm supraumbilical port, 5 mm and 10 mm in the right and left midclavicular line respectively, 5 mm in sub-xiphoid position for retraction of livers). The pneumoperitoneum formation was done with closed technique (Veress needle) or open (Hasson technique). Blood loss during surgery was evaluated with dry gauze method. In every patient, a thorough peritoneal lavage was performed. All patients received long-term proton pump therapy and *H. pylori* eradication therapy before being discharged. Microsoft Excel was used to collect and tabulate data from each subject. SPSS version 23.0 was used to conduct all of the statistical analysis. Graphs, tables, and other variables have been generated using Microsoft Word and Excel. Z test was the statistical technique utilized, with p<0.05 being considered statistically significant.

RESULTS

Throughout the study period, 80 consecutive duodenal perforation patients who undertook surgical treatment were included. The study's most susceptible age group was 51-60 years of age group (30%). 60 of the 80 cases were male, and 20 were female.

Table-1: shows the gender wise and age wise distribution of patients

Age group (years)	Total cases (%)
20-30	10 (12.5)
21-30	17 (21.3)
31-40	14 (17.5)
41-50	9 (11.3)
51-60	24 (30)
61-70	4 (5)
>70	2 (2.5)
Males	60(75%)
Females	20(25%)

The perforation size was ≤10 mm in the vast majority of cases (60%). 63.8% of individuals in our study presented within 12 hours of the start of their symptoms and only 3 patients presented after 72 hours.

Table-2: shows the duodenal perforation size and presentation to the hospital

Duodenal perforation size in mm	Total patients (%)
<5	0 (0)
5-10	48 (60)
11-15	24 (30)
16-20	8 (10)
Presentation time to the hospital	
<12	51(63.8%)
12-48hrs	26 (32.5%)
>48hrs	3 (3.7%)

The mean operative duration was 67.30 mints in the open group and the laparoscopic group has mean operative time of 116.2 minutes which is statistically significant. The dry gauze method is used to measure intraoperative blood loss. The difference between the average blood loss intra-operatively in the open group was 124.2 ml and 43 ml in the laparoscopic group, which was statistically significant.

Table-3: shows the operative time and Intraoperative blood loss

Operative time (minutes)	Open group	Laparoscopic group
	No. (%)	No. (%)
<40	0 (0)	0 (0)
41-60	20 (50)	0 (0)
61-80	18 (45)	0 (0)
81-100	2 (5)	5 (12.5)
101-160	0 (0)	35 (87.5)
>160	0 (0)	0 (0)
Total	40 (100)	40 (100)
Blood loss in ml Intraoperatively		
	Open group	Laparoscopic group
30-50	0	40(100)
50-90	0	0
90-130	30(75)	0
130-150	6(15)	0
>150	4(10)	0

In the laparoscopic group; the average analgesic requirement perioperatively was 2.8 days while in the open group, it was 4.9 days which was significant statistically. The average hospital stays post-operatively in the open and laparoscopic groups was 15 days vs. 4.3 days which was statistically significant.

Table-4: shows the maximum peri-operative analgesic requirement in days and post-operative stay in hospital

Maximum duration of peri-operative analgesic requirement (POD-post operative day)	Open group	Laparoscopic group
	No. of patients (%)	No. of patients (%)
1-2 days	0 (0)	32 (80)
3-4 days	30 (75)	6 (15)
5-6 days	5 (12.5)	0 (0)
6 days	5 (12.5)	2 (5)
Hospital stays in days Post-operatively		
	Open group	Laparoscopic group
	No. (%)	No. (%)
3-5	0 (0)	29 (72.5)
6-10	4 (10)	8 (20)
11-15	30 (80)	0 (0)
15-17	2 (5)	3 (7.5)

The open group had high incidence of postoperative wound infection (22.5%) than the laparoscopic group (2.5%). In the laparoscopic group, intra-abdominal abscess incidence is higher.

Two patients in the laparoscopic group experienced a post-operative leak, which was treated with an exploratory laparotomy and re-suturing.

Table-5: shows the post-operative complications

Postoperative complications	Open group	Laparoscopic group
	No. (%)	No. (%)
Leak	0 (0)	2 (5)
Wound infection	9 (22.5)	1 (2.5)
Prolonged paralytic ileus	5 (12.5)	1 (2.5)
Burst abdomen	3 (7.5)	1 (2.5)
Intraabdominal abscess	1 (2.5)	3 (7.5)
Pulmonary complications	2 (5)	0 (0)
Death	3 (7.5)	0 (0)

During treatment, 3 individuals in the open group passed away. In the open group, it took an average of 32.07 days to return to regular work, whereas it took an average of 13.33 days in the laparoscopic group with statistically significant difference (p<0.05).

DISCUSSION

Over 70% of deaths related to peptic ulcer disease are caused by the common and sometimes fatal complication of perforation, which affects 5- 10% of people with duodenal ulcers¹¹⁻¹². For a huge variety of purposes, minimal access surgery is progressively substituting the open surgical method. The laparoscopic repair is equally effective and less intrusive than the conventional open repair, the laparoscopic treatment to perforated peptic ulcer has acquired widespread popularity¹³⁻¹⁴.

The study's most susceptible age group was 51-60 years of age group (30%). The study carried out by Critchley et al reported similar findings as well. The average patient age with duodenal perforation in the Karydakis et al study was 46 years¹⁵. In our study, the ratio of men to women was 2:0.1. Males were predominant than females. Other studies also reported comparable results. The mean operative duration was 67.30 mints in the open group and the laparoscopic group has mean operative time of 116.2 minutes which is statistically significant, which is equivalent to 64 minutes for open surgery and 108 minutes for laparoscopic surgery in Katkhouda et al study. The length of the procedure depends on the surgeon's laparoscopic expertise. In the laparoscopic group; the average analgesic requirement perioperatively was 2.8 days while in the open group, it was 4.9 days which was significant statistically, which is equivalent to 4 days for the open group and 2 day for the laparoscopic group in the study by Katkhouda et al. The average hospital stays post-operatively in the open and laparoscopic groups was 15 days vs. 4.3 days which was statistically significant. These results are comparable to Golash et al findings that open repair took 9 days and laparoscopic repair took 4 days stay in hospital¹⁶.

In our study, the open group had a high incidence of postoperative wound infection (22.5%) than the laparoscopic group (2.5%). Because laparoscopic incisions are so small, the wound infection rate is lower in the laparoscopic group. Comparable results were seen in the Lunevicius et al study¹⁷⁻¹⁸. In comparison to Golash et al study, the mean time needed to return to regular activities in the open group was 33 days and in the laparoscopic group was 14 days which showed that the open group required more time to resume normal work¹⁹. In the Mehendale et al investigation, similar results were also reported in which 34.23 days were required in the open group and 13.06 days in the laparoscopic group to resume their normal activities²⁰. Due to less bowel handling and a lower risk of post-operative ileus, the time needed to return to a normal diet is shorter in the laparoscopic group²¹⁻²².

CONCLUSION

Laparoscopic repair when performed on carefully chosen patients for perforated duodenal ulcers, it is safe, practical, and produces

better outcomes than open surgery. Less post-operative pain, less analgesics needed, quicker recovery, lower wound infection rates and shorter hospital stay were statistically significant findings in favour of laparoscopic repair in our study.

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