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OUTCOMES OF LAPAROSCOPIC VERSUS OPEN REPAIR OF DUODENAL ULCER PERFORATION

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Abstract

Introduction:
For the management of a perforated duodenal ulcer (PDUs), surgical intervention is the primary method. During this procedure, the perforation is sealed either with or without an omental patch. Open and laparoscopic repair are two commonly used approaches for repair of perforations.

Aims and Objectives:
To compare the outcomes of open repair with laparoscopic repair for perforated duodenal ulcers (PDUs).

Place and Duration of Study:
The study duration was March-2024 to September-2024 and was conducted in general surgery unit of Bahawal Victoria Hospital, Bahawalpur.

Materials and Methods:
This prospective study containing 104 patients having duodenal ulcer perforations were included. Patients of age 15-65 years who presented within 24 hours of symptoms onset were included. Group A (N=52) was the laparoscopic group while Group B (N=52) was the open repair group. Patients were kept under observation for 4 weeks, we recorded their operative time, hospital stay, post-operative complications such as intra-abdominal abscess formation, wound infection, leakage of repair requiring re-exploration.

Results:
Mean operative time was prolonged in group A; 93.4±37.1 minutes versus 78.1±43.5 minutes in group B (p-value 0.05). However, there was no significant difference in anastomotic leakage, wound infections rate and intraabdominal abscess between the groups. Wound infections occurred in 3 (5.8%) patients in group A and in 9 (17.3%) patients in group B (p-value 0.06). Mean hospital stay was significantly shorter in group A; 8.5±6.4 versus 12.1±9.8 days in group B (p-value 0.02).

Conclusion:
This study found that laparoscopic repair of PDUs was linked with longer operative times compared to open repair, but with shorter length of hospital stay and a decreased risk of infections. It is therefore possible to adopt laparoscopic

surgery as a risk-free alternative to open repair in patients who have PDUs.

INTRODUCTION

In the general community, peptic ulcer disease (PUD) impacts approximately 5% to 10% of individuals, across their lifespan.[1] In addition to less frequent variables such as alcohol consumption, smoking, chronic stress, and ageing, the primary causes of PUD are H. pylori infection and NSAIDs.[2, 3]

The prevalence of PUD has decreased during the last three decades due to the widespread use of proton-pump inhibitors, although morbidities still manifest in 10-20% of patients.[4] Gastrointestinal bleeding is the predominant adverse impact of a peptic ulcer, sometimes succeeded by perforation and subsequent complications. The mortality rate for peptic ulcer perforations varies between 1.3% and 20%, with a greater mortality rate of 40% for gastric ulcer perforations compared to 10% for duodenal ulcer perforations.[5, 6]

When it comes to the management of a perforated duodenal ulcer (PDUs), surgical intervention is the primary method. During this procedure, the perforation is sealed either with or without an omental patch.[7] Laparoscopic (LC) treatment of PPUs was initially documented in the 1990s.[8] LC allows lesion closure with little invasiveness, while also guaranteeing adequate peritoneal lavage. This is accomplished without the drawbacks that are associated with an upper laparotomy intervention. With that being said, a sizeable portion of patients will require a transition from a LC to an open surgical procedure. On the other hand, there are certain people who could require a main open surgery because they are unable to undergo laparoscopy or because the surgeons are not comfortable with this minimally invasive method.[9]

We planned this study because laparoscopic procedures are still rarely used for treating acute emergencies and majority of the PDUs are still managed using open technique. In this study, we sought to compare the outcomes of open repair of PDUs with LC repair.

Materials and Methods:

This prospective study containing 104 patients having duodenal ulcer perforations were included. The study duration was March-2024 to September-2024 and was conducted in general surgery unit of Bahawal Victoria Hospital, Bahawalpur. Patients of age 15-65 years who presented within 24 hours of symptoms onset were included. While patients with gastric ulcers, having comorbidities (Diabetes, CKD, and IHD), DU perforation with shock (systolic pressure <90mmHg) were excluded.

The demographic data of all patients such as age, BMI and gender was recorded. Selected patients were divided into two groups. Group A (N=52) was the laparoscopic group while Group B (N=52) was the open repair group. A consent of laparoscopic to open repair conversion, if required, was also taken in group A. Duodenal perforation closure was carried out by an omental patch in both groups under general anaesthesia.

In open repair group, repair was performed through midline vertical incision. While LC was performed using 4 ports. The pneumoperitoneum was created either by open (Hasson cannula) or closed (Veress needle) technique.

Both procedures were performed by the same consultant surgeon. Same medicines were given to both groups preoperatively, per operatively and post operatively.

Patients were kept under observation, to record their operative time, post-operative complications such as intra-abdominal abscess formation, wound infection, leakage of repair requiring re-exploration and hospital stay. Post Op patients were followed and final outcome was noted by the researcher at the end of 4 weeks.

Data was analyzed using SPSS statistics software version 25.0. Intra-abdominal abscess and leakage of repair were dealt with Chi-square test. Test taking p-value ≤0.05 as statistically significant.

RESULTS:

There was no significant difference in baseline variables such as BMI, gender, and co-morbidities (diabetes and smoking history) between the groups. 7 (13.5%) patients in group A and 5 (9.6%) in group B had previous history of NSAIDs/Steroids use (p-value 0.53). Mean size of perforation was 7.6±2.4

mm in group A and 7.8±3.1 mm in group B (p-value 0.71) [Table 1].

Mean operative time was prolonged in group A; 93.4±37.1 minutes versus 78.1±43.5 minutes in group B (p-value 0.05). However, there was no significant difference in anastomotic leakage, wound infections rate and intraabdominal abscess between the groups. Leakage at repair site occurred in 2 (3.8%) patients in group A and in 3 (5.8%) in group B (p-value 1.0). Wound infections occurred in 3 (5.8%) patients in group A and in 9 (17.3%) patients in group B (p-value 0.06). Intraabdominal abscess occurred in 1 (1.9%) patient in group A and in 2 (3.82%) patients in group B (p-value 1.0). Mean hospital stay was significantly shorter in group A; 8.5±6.4 versus 12.1±9.8 days in group B (p-value 0.02). [Table 2].

Table 1. Baseline Study Variables.

	Group A (N=52)	Group B (N=52)	P-value
Age (Years)	51.4±13.1	53.2±11.9	0.46
BMI (Kg/m^2)	26.37±3.17	25.79±3.62	0.38
Gender (%)			
Male	34 (65.4%)	37 (71.1%)	0.52
Female	18 (34.6%)	15 (28.8%)	
Smoker	22 (42.3%)	24 (46.1%)	0.69
Diabetes	8 (15.4%)	10 (19.2%)	0.60
History of NSAIDs/Steroids	7 (13.5%)	5 (9.6%)	0.53
Perforation Size (mm)	7.6±2.4	7.8±3.1	0.71

Table 2. Comparison of Study Outcomes.

	Group A (N=52)	Group B (N=52)	P-value
Operative Time (mins)	93.4±37.1	78.1±43.5	0.05
Leakage (%)	2 (3.8%)	3 (5.8%)	1.0
Wound Infections (%)	3 (5.8%)	9 (17.3%)	0.06
Intraabdominal Abscess (%)	1 (1.9%)	2 (3.82%)	1.0
Hospital Stay (days)	8.5±6.4	12.1±9.8	0.02

DISCUSSION:

Five to ten percent of patients with duodenal ulcers experience the frequent and occasionally fatal consequence of perforation, which accounts for about 70% of mortality associated with peptic ulcer disease.[10] For the primary surgical technique for PDU repair various approaches have been documented in the literature.[11-13] But it's still difficult to figure out the best surgical strategy for this kind of illness. Minimal access surgery is gradually replacing open surgery for an enormous range of applications. Due to its comparable effectiveness and less invasiveness when compared to traditional open surgery, laparoscopic treatment for perforated peptic ulcers has become increasingly popular.[14, 15] A study found that from 4.5% in 2010 to 11.4% in 2016, the percentage of laparoscopic PDU repairs nearly tripled, suggesting that more surgeons are turning to the laparoscopic method for PPU repairs.[16]

In our study, we found shorter hospital stay and risk of infections using laparoscopic approach. Salman et al. in a meta-analysis study to compare the efficacy of laparoscopic and open surgery of duodenal ulcer perforations. Their result reported the association of laparoscopic surgery with prolong operative time (Mean Difference (MD)=8.36), shorter hospital stay (MD=−2.74), high risk of suture leakage, low risk of mortality as compared to the open surgery treatment.[7]

Similarly, Odisho et al. also compared the outcomes of LC and open repair for management of PPUs. They reported lower blood loss, longer operative

time, earlier regain of bowel function and shorter hospital stay in case of Laparoscopic management.[17] Deshmukh and Parikh reported 16.67% of cases of wound infection in the open repair group while 3.33% of cases were in the laparoscopic group. Moreover, no suture leaks and intra-abdominal abscesses were reported in the Open repair group. Wound dehiscence was reported in both groups i.e., 6.67% in open repair and 3.33% in laparoscopic group.[18]

Despite the multitude of research demonstrating the advantages of laparoscopic repair, our study found that the operating duration was longer in the Laparoscopic group compared to the open group. The rationale behind this is that there exists a broad spectrum of exposure and sufficient dissection for effective mobilization in open repair. In addition, the extensive and repetitive washing of the intraperitoneal cavity and the use of omental patches for closure during laparoscopy are not only time-consuming but may also contribute to the extended duration of the procedure.

This work is subject to various limitations. Firstly, the research was carried out in a single institution. Furthermore, certain preoperative clinical data, such as the Boey or APACHE II scores, were excluded from the analysis due to missing data in the majority of cases. Notwithstanding these constraints, the data acquired from the quite extensive group of patients included in the present study is expected to make a significant useful addition to the existing body of knowledge.

CONCLUSION:

This study found that laparoscopic repair of PDUs was linked with longer operative times compared to open repair, but with shorter lengths of hospital stay and a decreased risk of infections. It is therefore possible to adopt laparoscopic surgery as a risk-free alternative to open repair in patients who have PDUs.

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