

# A Comparative Study of Laparoscopic vs Open Surgery for the Management of Duodenal Ulcer Perforation

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## ABSTRACT

Approximately, 10 to 20% of patients with peptic ulcer suffer a perforation of stomach or duodenum in which chemical peritonitis develop initially from gastric and duodenal secretion but in a few hours bacterial contamination superimpose the disease. The disease could be life-threatening, early diagnosis and treatment is extremely important. The mortality will increase up if perforation exists more than 24 to 48 hours. Usually the only surgical procedure that is necessary is simple closure with omental patch. When repair of perforated ulcer can be achieved by suture closure, laparoscopic approach seems to be appropriate. This study aims at evaluating efficacy, safety and outcome of laparoscopic surgery for perforated duodenal ulcer. Patients admitted with perforated duodenal ulcer perforation, during the period of January 2010 to January 2011 at RL Jalappa Hospital and Research Center were evaluated. A total 61 cases were diagnosed as peritonitis secondary to duodenal perforation were involved in study. Thirty underwent laparoscopic closure and 31 underwent open surgeries which were nonrandomized. The results of study revealed lesser antibiotic open: lap (5:4.03 days;  $p = 0.001$ ), analgesic requirement (7:4.87 days;  $p = 0.001$ ) and lesser hospital stay (8:6.17 days;  $p = 0.001$ ) and reduced postoperative complications open-three (9%): lap-one (3%) patients. The duration of surgery was more with laparoscopic surgery (open-56: lap-62.17 minutes;  $p = 0.003$ ) since we are at initial stages at laparoscopic management for DU perforation, also depend on skill of surgeon but it had no effect on the overall outcome. Three (9.6%) patients in lap group were needed conversion to open surgery.

**Keywords:** Laparoscopy, Peritonitis, Duodenal ulcer perforation.

**How to cite this article:** Sreeramulu PN, Venkatachalapathy TS, Supreet CS, Prathima S. A Comparative Study of Laparoscopic vs Open Surgery for the Management of Duodenal Ulcer Perforation. *World J Lap Surg* 2013;6(1):11-14.

**Source of support:** Nil

**Conflict of interest:** None declared

## INTRODUCTION

Laparoscopic repair of perforated peptic ulcers is now technically feasible<sup>1-3</sup> and, in the small series reported to date, carries many of the minimal access advantages apparent in other upper gastrointestinal (GI) and biliary procedures.<sup>2</sup> With the establishment of the role of *Helicobacter pylori*<sup>13</sup> eradication making simple over sewing of perforated ulcers an effective long-term solution, the laparoscopic procedure is increasingly within the compass of surgical trainees and, as the role of routine laparoscopy in the diagnosis and management of peritonitis becomes accepted,<sup>4</sup> it is in danger of being seen as the procedure of choice without prior evaluation or evidence

of benefit. Unlike many of the procedures that have established the role of laparoscopy in elective upper GI surgery, however, it is performed in patients with generalized peritonitis<sup>5</sup> and the often severe physiological disturbances which may accompany this. The pathophysiological insult of a 'tension CO<sub>2</sub> pneumoperitoneum' during laparoscopy may be exaggerated in such patients, while the effect on the immune system and its mediators is unpredictable. The balance of exchanging the obvious postoperative benefits of rapid recovery,<sup>6-8</sup> reduced wound complications, improved respiratory function and improved cosmetic appearance for an increase in intraoperative physiological compromise may be in favor of laparoscopic surgery in relatively fit elective patients, but may be considerably more marginal in ill patients at risk of multiple organ dysfunction syndrome (MODS).<sup>9</sup> To examine the risks and benefits of laparoscopic surgery for perforated peptic ulcers, this nonrandomized cohort comparison compared a consecutive series of laparoscopic repairs of perforated peptic ulcers (lap group)<sup>10-12</sup> with a concurrent series of consecutive open repairs (open group).

## MATERIALS AND METHODS

All patients diagnosed clinically with perforated peptic ulcers were prospectively nonrandomized to undergo either conventional open or laparoscopic suture omental patch repair<sup>13-16</sup> (consent and cafeteria approach) who are admitted to RL Jalappa Hospital and Research Center attached to Sri Devaraj Urs Medical College, Tamaka, Kolar. The study protocol was approved by the hospital ethics committee before the trial began from January 2010 to January 2011. Informed consent for randomization to laparoscopic or open omental patch repair was obtained from all patients. A total of 61 patients were included in the study with 30 in lap group and 31 in open group.<sup>17-20</sup> Patients with a surgical diagnosis other than perforated peptic ulcer and previous abdominal surgery were excluded at surgery. Following parameters were noticed: operative duration, analgesics and antibiotics requirement (pre- and postoperative), postoperative hospital stay,<sup>21</sup> local and systemic complications. All the cases underwent preoperative assessment, the decision to operate laparoscopic or open surgery depending on the patient presentation.<sup>22</sup> Their preoperative and intraoperative, postoperative findings and complications were meticulously recorded as per protocol.<sup>23</sup>

## SURGICAL PROCEDURE

A pneumoperitoneum was created using Hasson open technique, insufflation pressure was maintained at 11 mm Hg. Four ports were inserted,<sup>24</sup> the upper port in subxiphoid area used for irrigation and suction, retraction of liver. An umbilical port was used for camera and two remaining ports were placed on each side of camera port in triangular position. Surgeon stands on left of patient, with assistant on each side.<sup>25</sup> The gallbladder was retracted upward and held by assistant. Inflammatory adhesions were released and suctioned. The perforation area isolated and tip of the suction tube is used as to measure the size of perforation. The next step was irrigation and thorough suction of intra-abdominal fluid using normal saline. All the quadrants were cleaned in clockwise fashion. The perforation was closed using the classical omental patch with 2 to 3 stitches of absorbable sutures before tying the knot intracorporeally. Pelvic and subhepatic drains were placed at the end of procedure. The open surgery was conducted by midline incision and followed the same technical guidelines. All the data expressed as median and in quartile range unless stated. Comparison between two groups was made using nonparametrical methods. Comparison was done using independent samples t-test,  $p < 0.05$  taken as statistically significant.

## RESULTS

There was male preponderance with 80% of patients, and 57% of the cases in 4, 5 and 6th decade of life the mean age is 50 years. The mean duration of surgery in open group is 56 minutes compared with 62 minutes in lap group which was statistically significant ( $p = 0.003$ ). The mean number of antibiotic used in open group was 5 days compared with 4 days in lap group ( $p = 0.001$ ). The mean usage of analgesics in open group was 7 days as compared with 5 days<sup>5,17,22</sup> ( $p = 0.001$ ). The mean duration of hospital stay

for open surgery was 8 days as compared with 6 days in lap group ( $p = 0.001$ ). There was wound infection in three (9%)<sup>25-27</sup> patients in open group as compared with one (3%) in lap group, one patient had wound dehiscence<sup>16</sup> in open group (3%). Two patients had died in open group (6%), no mortality in lap group. No leakage in either of the groups. Three (9.6%)<sup>23</sup> of lap group were needed to be converted to open surgery due to large perforation and extensive adhesions (Figs 1 to 4 and Tables 1 to 3).

## DISCUSSION

There was no difference in age, weight, duration of symptoms and the time to surgery in both groups. Often it is mentioned that the age of presenting with peptic ulcer in more so in older age group due to excessive use of NSAIDs and aspirin usage. The results in Table 1 show that 57% of the population was among the 40 to 60 age groups, with mean age of 52 years which correlates with literature.<sup>20,22,23</sup>

The mean operating time of the laparoscopic patch repair was significantly longer than the open procedure (52.4:62.1 minutes;  $p = 0.001$ ) which correspond to other studies. A disadvantage of the laparoscopic approach is longer operating time, but this had no impact on the outcome. Three (9.6%) patients were needed conversion to open surgery due large perforation (>1 cm) and other 2 patients had dense adhesions. In analyzing our results with other studies, we observed that clinical parameters that are excluded for safe laparoscopic procedure are shock and symptom duration >24 hours. Patients who presented with shock and delayed presentation have higher conversion rate and worse post-operative course.

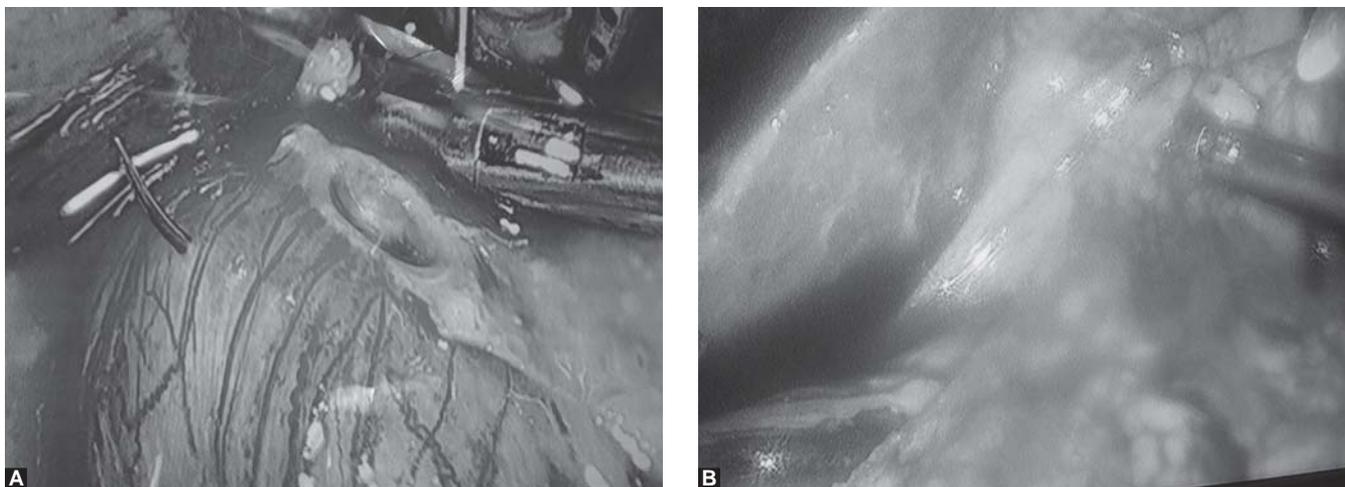
The best parameters to compare the two different surgical techniques are morbidity and mortality. Peptic ulcer perforation has high morbidity with problems of wound infection, sepsis, leakage at repair and pulmonary infections. In our study, high morbidity three (9%) and mortality two (6%) was noticed in open group which is consistent with



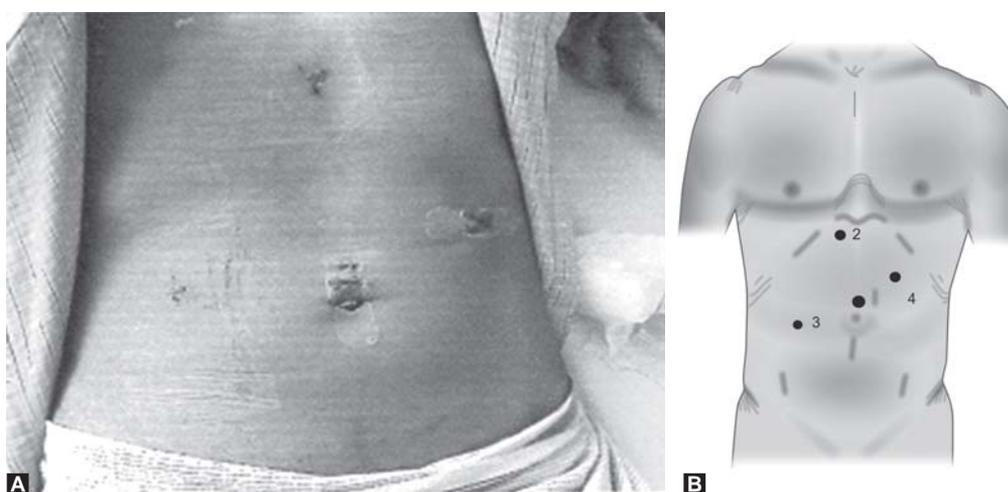
Fig. 1: Laparoscopic position of trocars



Fig. 2: Duodenal ulcer perforation (D1)



**Figs 3A and B:** Perforation closed by placing omentum



**Figs 4A and B:** Postoperative photo at the time of discharge

other studies.<sup>25,26</sup> The analgesic requirement was significantly less in lap group ( $p = 0.002$ ); the time to return to normal diet is shorter in lap group (3 days,  $p = 0.001$ ). This was significantly reflected on the duration of hospital stay which was shorter with lap group (3 days,  $p = 0.003$ ). A follow-up of upper GI endoscopy was performed on 5 in lap group and 7 in open group after 6 months, rest of patients did not turn up for follow-up. No recurrence of ulcer was noticed in both groups.

Laparoscopic surgery minimizes postoperative wound pain, encourages early mobilization and return to normal.

Daily activities. The benefit of early discharge and early return to work may outweigh the consumable cost incurred.

In the execution of the laparoscopic procedures, the role of laparoscopic surgery in emergencies is well-documented.

The change of disease pattern in perforated peptic ulcer favors a simple repair procedure. With the demonstrated benefit in our trial, laparoscopic repair of perforated peptic ulcers should be the procedure of choice. Laparoscopy should be incorporated into the general surgeon's

armamentarium for the management of patients with peritonitis.

## CONCLUSION

Laparoscopic repair of perforated peptic ulcer is a safe and reliable procedure and is proven to be efficient. Even though it was associated with longer operating time, it had no impact

**Table 1:** Sex distribution

Sex	Number of cases	%
Male	49	80
Female	12	20
Total	61	100

**Table 2:** Age distribution

Age	Number of cases	%
21-40	23	37
41-60	35	57
61-80	3	4
Total	61	100

**Table 3:** Postoperative complications

Post op. complications	Open	Laparoscopic group
Wound infection	3 (9%)	1 (3%)
Wound dehiscence	1 (3%)	0
Mortality	2 (6%)	0

on outcome. It had less postoperative pain, reduced chest complications and reduced analgesic usage, shorter postoperative hospital stay, and earlier return to normal daily activities than the conventional open repair. It has lesser morbidity and mortality as compared to open group. Data from the present study indicate that laparoscopic surgical treatment of patients with peptic ulcer perforation can be implemented and completed safely in a large proportion of patients with this life-threatening condition, given that the responsible surgical team has the appropriate technical expertise. We need to do study with more number of cases as to claim advantage of laparoscopic surgery.

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