



Comparative Study of Laparoscopic and Open Repair of Duodenal Ulcer Perforation

KEYWORDS

perforation, duodenal ulcer, laparoscopic

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ABSTRACT *BACKGROUND: Peritonitis due to perforated duodenal ulcer is relatively common in our setup. Postoperative pain and morbidity remain the main concerns after conventional open approach of perforation repair.*

AIM & OBJECTIVES: The goal of this study is to compare the effectiveness and outcomes of laparoscopic and open methods of duodenal perforation repair in terms of Duration of surgery, Time to resume orals, Analgesic requirement, Hospital stay, Post-operative complications and Time to return to normal activity.

STUDY DESIGN: prospective comparative study

MATERIAL AND METHODS: Patients undergoing laparoscopic or open repair of duodenal ulcer perforation in Gandhi hospital from the period of August 2012 to August 2014 were studied prospectively. A total of 69 patients, 23 in the laparoscopy group and 46 in the open group were compared.

Statistical methods: Student t test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups. Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups. P-value < 0.05 is considered as significant.

RESULTS: Time to resume normal diet, analgesic requirement, duration of hospital stay and time to return to normal activity and economic burden were significantly lower in the laparoscopy group along with best cosmetic results.

Post-operative complications like wound infection and wound pain were significantly higher in the open group whereas there was no significant difference in post-operative fever, respiratory infections, prolonged ileus and intra-peritoneal collections.

Conclusions: laparoscopic simple closure of perforated peptic ulcer disease is safe and may be the first and suitable method of treatment up to now.

INTRODUCTION¹⁻⁴

Duodenal ulcer perforation is one of the common complications of peptic ulcer disease despite the use of various anti-ulcer agents and eradication therapy. It is one of the most common causes of admission in casualty worldwide and particularly more in developing nations.

Important etiological factors of peptic ulcer disease are H. Pylori infection, chronic NSAIDs intake, chronic alcohol intake, cigarette smoking, intake of smoked foods, spicy foods, and irregular diet intake and in type A personalities. Common sites for peptic ulcers are the first part of duodenum and the lesser curvature of the stomach, they may also occur on the stoma after gastric surgery, esophagus and even in Meckel's diverticulum.

Duodenal ulcer perforation is an abdominal emergency, and is in third in frequency, after acute appendicitis and acute intestinal obstruction. Prompt early diagnosis and early intervention are needed to decrease the still high mortality of this disease. Perforation and peritonitis are immediate threats to life, the ulcer itself is not. Thus therapeutic priorities are treatment of peritonitis and securing the closure of perforation which may be achieved with surgical procedure, open or laparoscopic.

The conventional open technique deal well with the perforation and peritoneal lavage but has the disadvantages of large upper abdominal incision, wound infection, wound dehiscence, prolonged ileus and pulmonary complications and late complications of incisional hernias.

PPU is a condition in which laparoscopic repair is an attractive option. Not only it is possible to identify site and pathology of the perforation, but the procedure also allows closure of the perforation and peritoneal lavage, just like in open repair but without a large upper abdominal incision. But the effects of laparoscopy in the setting of generalized peritonitis, physiological disturbances which are unpredictable need to be balanced with the advantages of faster recovery.

This study is an effort to compare the efficacy and safety of laparoscopic and conventional open closure of duodenal ulcer perforation.

MATERIALS AND METHODS

Patients who presented to the emergency department in our unit in Gandhi hospital with clinical diagnosis of Duodenal ulcer perforation during the period of 2 years from August 2012 to August 2014, were prospectively non-ran-

domized (by Consent and Cafeteria method) to undergo either laparoscopic or open repair of duodenal ulcer perforation. Patients were followed up to 3 months after the surgery. A total of 82 patients underwent surgery for duodenal ulcer perforation during the period of 2 yrs. 13 patients were excluded from the study based on the criteria selected, 6 patients presented with shock, 2 patients had previous upper abdominal surgery, 3 patients had perforation size >10mm and 2 patients needed conversion from laparoscopic to open surgery. A total of 69 patients were included in the study, 46 were treated by conventional open method and 23 were treated by laparoscopic closure of duodenal ulcer perforation. (Of the total 25 laparoscopic cases, 2 needed conversion, these cases were excluded from the comparison). All cases underwent preoperative assessment in the emergency department, their preoperative findings and post-operative complications were meticulously recorded as per protocol.

LAPAROSCOPIC CLOSURE OF PERFORATIONS^{5,6,7,8,9}

The perforation can be approached using 4 ports (1 is 10mm umbilical port for camera, another 10mm working epigastric port and remaining 2 are of 5mm which are functional ports), additional ports can be used if required.

The perforation can be closed by any of the following methods:

1) Fibrin glue for minute perforation, 2) Simple closure with Graham's omental patch and copious irrigation of the abdominal cavity (this procedure was followed in our study), 3) Automatic staples can be applied via laparoscopic device (BJS, Dec 1993). 4) A proximal gastric vagotomy or Taylor procedure (anterior seromyotomy and truncal vagotomy) may be performed.

Statistical methods:

Student t test (two tailed, independent) and **Chi-square/Fisher Exact test** has been used. Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements are presented on mean \pm sd (min-max) and results on categorical measurements are presented in number(%).

RESULTS AND DISCUSSION:^{10,11,12,13}

23 patients in the laparoscopic group and 46 patients in the open group were studied to compare the effectiveness and postoperative outcomes in terms of

- Duration of surgery,
- Time to resume orals,
- Analgesic requirement,
- Hospital stay,
- Post-operative complications and
- Time to return to normal activity.

Descriptive statistical analysis was carried out in the study. The findings were tabulated and the following observations were made. There was no significant difference in duration of symptoms, mean age, ASA grade and mean perforation size in both groups

AGE & SEX DISTRIBUTION OF THE PATIENTS: Age of patients of both open and laparoscopic groups ranged between 14 to 70 years, with a mean age of **41.86957 yrs.** in the open group and **48.04 yrs.** in the laparoscopic group. The difference was not statistically significant as the p-value by student's T-test was 0.114, male to female ratio in the open group 8.2:1, and 4.75:1 in the laparoscopy

group.

DURATION OF SYMPTOMS: Duration of symptoms ranged from 1 to 4 days in both groups, with a mean duration of 1.56 ± 0.86 days in the open group and 1.95 ± 1.1 days in the laparoscopic group. There was no statistical significance as the p-value was 0.146.

INTRAOPERATIVE FINDINGS: The size of ulcer perforation in the open group was a mean of 5.39 mm and that of the lap group was 5.95 mm. The difference was not statistically significant.

Two of the total 25 laparoscopic cases needed conversion to open technique due to dense adhesions and thick purulent collection. These cases were not included in the comparison. Conversion rate was 8%.

The mean operation time in the laparoscopic group was 113.91 minutes which was significantly greater than that of the open group (96.41 min). Although it had longer operation time, but no impact on the outcomes and also it depends on the surgeons skills.

Analgesic requirement was significantly lower in the laparoscopy group (3.39 ± 0.58 vs 4.84 ± 0.66 days). However (**Table-1**), our patients who underwent laparoscopic repair were enabled to be discharged significantly earlier from the hospital (8.3 ± 2.3 vs 10.67 ± 3.9 days, $p=0.0027$). We found that laparoscopic repair did result in earlier return to normal diet (4.26 ± 0.81 vs 4.87 ± 0.86 days). Time required for mobilisation of patients was also significantly lower (3.3 ± 0.7 vs 4.34 ± 0.62 days). Early return to work after laparoscopic surgery for perforated peptic ulcer offsets the cost incurred in performing laparoscopic repair.

POST-OPERATIVE COMPLICATIONS: Patients in the open group had significantly higher rates of wound infection (**Table-2**). There was no significant difference between both groups in terms of other complications like fever, intraperitoneal collection, pulmonary infection and prolonged ileus (**Diagram-1**).

The patients in the open group needed NG tube for a mean of 3.43 ± 0.65 days and those in the lap group for 3 ± 0.6 days. The difference was significant with a p-value of 0.008. The patients in the open group needed intravenous fluids for a mean of 4.17 ± 0.52 days and those in the lap group for 3.47 ± 0.66 days, the difference was significant favouring the lap group. Post-operative Leakage may be due to technical error or friability of the patients' tissue, in our study the leakage rate is 0%.

FOLLOW-UP: Wound pain at follow up was also significantly lower in laparoscopic group (**Table-3**). There was one death in each group. The patients in each group were followed up for a maximum of 3 months, 5 patients from the open group and 3 from the Lap group did not come for follow-up. 14 patients in the open group and none in the lap group had pain at the suture site during the follow-up. 2 patients from the open group developed incisional hernia. None of the patients had complications due to intraperitoneal collections or adhesions.

LIMITATIONS. 1) Laparoscopic simple closure is not available in all hospitals especially primary hospital centre.

2) Sample size should be more to make generalized analysis.

CONCLUSIONS

Laparoscopic repair of duodenal ulcer perforation is as safe and effective as open repair, has the advantages of less wound related complications, early recovery and return to normal activity.

It is beyond doubt laparoscopy offers better cosmetic results. Laparoscopic repair can be as effective as open method in treatment of perforated peptic ulcer

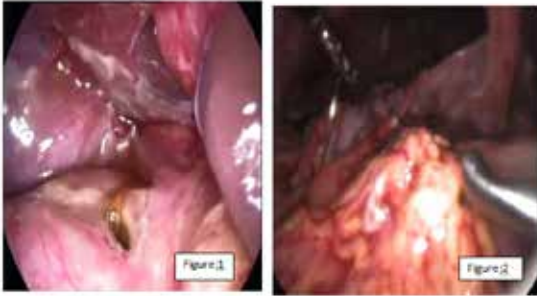


Fig1:intraoperative laparoscopic photograph showing D1 perforation

Fig 2: Intraoperative laparoscopic photograph showing omentopexy.



Fig 3: Intraoperative photograph showing Jones-Graham patch closure of PPU by open method

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1	AGE in years	MEAN	41.86957	48.04	0.11437
		SD	13.99	15.46	
2	OPERATIVE TIME(In minutes)	MEAN	96.41	113.91	0.0083
		SD	26.07	24.25	
3	NG TUBE requirement in days	MEAN	3.43	3	0.008
		SD	0.65	0.6	
4	IV FLUIDS requirement in days	MEAN	4.17	3.47	<0.001
		SD	0.53	0.66	

5	ANALGESICS REQUIRED FOR DAYS	MEAN	4.84	3.39	<0.001
		SD	0.66	0.58	
6	MOBILISATION TIME IN DAYS	MEAN	4.34	3.30	<0.001
		SD	0.62	0.70	
7	TIME TO RESUME NORMAL DIET (days)	MEAN	4.87	4.26	0.005
		SD	0.86	0.81	
8	HOSPITAL STAY IN DAYS	MEAN	10.67	8.30	0.0027
		SD	3.9	2.32	

	OPEN	LAP	P-VALUE
FEVER	8	4	1
LEAK	0	0	-
WOUND INFECTION	14	2	0.043
WOUND DEHISENCE	5	0	0.1006
INTRAPERITONEAL COLLECTION	3	3	0.364
PULMONARY INFECTION	7	3	0.808
PROLONGED ILEUS	6	2	0.59
DEATH	1	1	0.99

	OPEN	LAP	P-VALUE
WOUND PAIN	14	0	0.0029
INCISIONAL HERNIA	2	0	0.310
COMPLICATIONS DUE TO ADHESIONS	0	0	

