

# Comparative Study Of Laparoscopic Versus Open Peptic Perforation Closure

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## Abstract

The objective of this study was to find out the effectiveness of laparoscopic surgery in case of peptic perforation. A study was carried out on 50 patients with peptic perforation; 25 underwent open surgery and 25 laparoscopic surgery. There was a significant difference in the outcome of the patients of these two groups, which established laparoscopic surgery as preferred method over open surgery for peptic perforation closure.

## INTRODUCTION AND AIMS OF THE STUDY

Perforation is a life-threatening complication of peptic ulcer disease. The management of peptic ulcer disease has evolved over the decades, due to advances in operative techniques, bacteriology and pharmacology<sup>1</sup>. In the world of surgery, the 21st century is the empire of laparoscopic surgery. Various laparoscopic techniques are flourishing with great momentum with outstanding abilities to provide patients with incredible benefits, which have become a great boon to them. The extraordinary results that we are getting by laparoscopic techniques have almost disqualified conventional laparotomy for treatment of peptic perforation closure. While debate continues about the appropriate management of perforated duodenal bulb and prepyloric ulcers, the astonishing results of our study establish laparoscopic peptic perforation closure as the excellent method for treatment of perforated peptic ulcer.

This study is a non-randomized comparative study between laparoscopic peptic perforation closure and open peptic perforation closure.

This ambitious study was under taken with the following aims & objectives:

- (1) To evaluate safety & efficacy of laparoscopic repair for perforated peptic ulcer in routine clinical practice.
- (2) To evaluate whether it is justifiable to perform laparoscopic peptic perforation closure and to find out and evaluate whether it can stand against conventional laparotomy to treat peptic perforation.

- (3) To evaluate whether laparoscopic peptic perforation closure is better than conventional laparotomy for peptic perforation closure in terms of benefits of minimal invasive surgery

## MATERIAL AND METHODS

This study, which is non-randomised and prospective, involved 50 patients with perforated peptic ulcer that presented during the period of January 2005 to January 2007 in our institute (G.G. Hospital Jamnagar) and were subjected to repair either by laparoscopy or laparotomy (open repair).

## PREPARATION OF THE PATIENT

- (1) Ryle's tube insertion
- (2) Intra venous fluids
- (3) Antibiotics given 10 minutes before surgery.

## LAPAROTOMY(OPEN REPAIR)

All open repairs were performed according to standard techniques described in surgical textbooks. We used an upper midline incision of approximately 12-15cm length. After identification of the site of perforation, it was closed by polygalactin 3-0 (Vicryl 3-0, Ethicon) intermittently. Then an omental patch was placed over the perforation. Thorough peritoneal toilet followed and a drain was kept.

## LAPAROSCOPIC CLOSURE

The laparoscopy was performed under general anaesthesia.

Position of patient: The patient was kept in reverse

Trendelenburg's position at 15-20 with the surgeon standing on the left side of the patient.

Sites of Trocars: The first trocar was introduced through the umbilicus by open method. The pneumoperitoneum was created by CO<sub>2</sub> and the peritoneal cavity was inspected, and then other trocars were inserted as described below.

1st Trocar (10 mm) through the umbilicus for telescope,

2nd Trocar (5mm) at the left midclavicular line between xiphisternum and umbilicus,

3rd Trocar (10mm) at the right anterior axillary line at the level of the umbilicus,

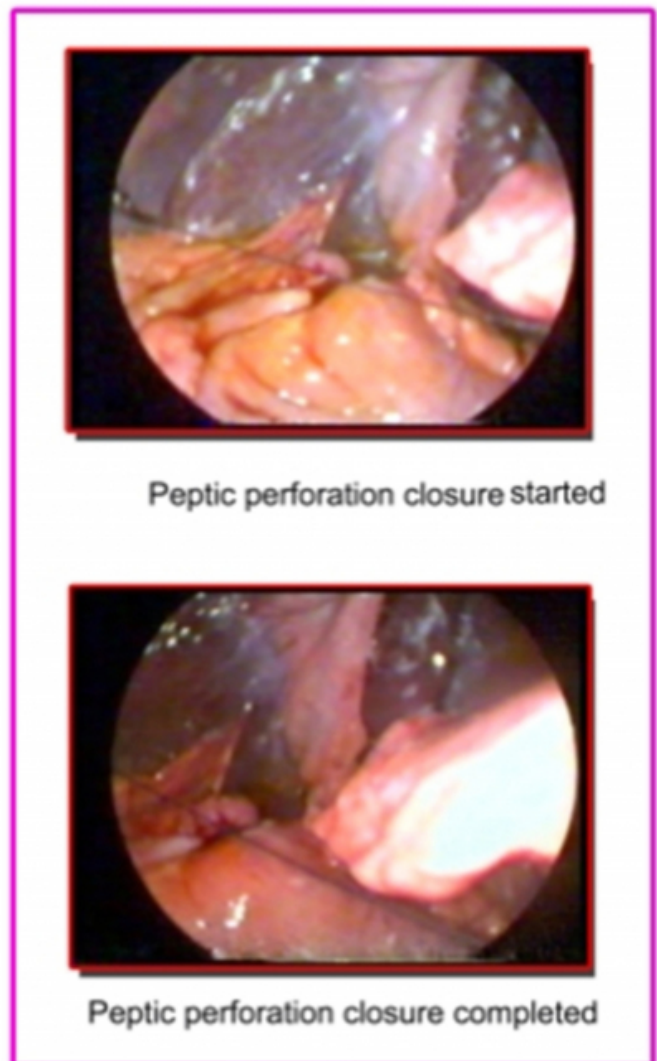
4th Trocar (5mm) accessory trocar in the epigastric region, right to the falciform ligament to retract the right lobe of the liver and the gall bladder.

**Figure 1**



After placement of other ports liver and gall bladder were retracted. The perforation was searched for. Once the perforation was identified (as shown in the figure below), thorough peritoneal lavage with saline was given. In the circumstances where the ulcer was found to be very big (>3cm), situated at greater curvature and very hard, the procedure was converted to open laparotomy and a biopsy was taken from the ulcer. Otherwise, the perforation was closed with polygalactin 2-0 (Vicryl 2-0 Ethicon on skke-needle) by intracorporeal suturing (as shown in the figure above).

**Figure 2**



The needle was passed through a good bite of full-thickness healthy tissue taken longitudinally across the perforation. Depending on the size of the perforation, 2-3 interrupted stitches were taken. An omental flap was raised with intact blood supply and placed over the perforation site and tied over the site of perforation with long threads of interrupted stitches (as shown in the figure above).

Figure 3



Thorough peritoneal lavage was again given by normal saline. A drain was kept in the subhepatic space from the anterior axillary port site. Port sites were closed by 2-0 prolene on port-closure needle.

After surgery, the patients with laparoscopic peptic perforation closure were kept on “nil by mouth” for 2 - 3 days,

- given pantoprazole (40mg) intravenously once a day,
- Tramadol 1 amp. intravenously once post-operatively and then according to requirement and
- antibiotics - (cefalosporins (3) days
- metronidazole (3) days).
- The drain was removed after 48-72 hours.
- After 2-3 days, when bowel sounds were present, Ryle's Tube was removed and clear liquids were given for 1 to 2 days, followed by soft diet.
- When the patient tolerated soft diet, we switched over to T - Pantoprazole 40 mg once a day and sent the patient home with T - Pantoprazole 40 mg once a day.

RESULTS

Demographic characteristics of the two groups are shown in Table I.

Figure 4

PATIENT DEMOGRAPHICS			
		Laparoscopic repair (n=25)	Open repair (n=25)
1.	Age	25-60 years (median 30 years)	27-62 years (median 51 years)
2.	Sex		
	Male	22	20
	Female	03	05
3.	H/o peptic ulcer disease	08	12
4.	Site of perforation		
	Duodenum first part	16	18
	Pylorus	02	03
	Prepyloric	07	04
5.	Size of Perforation		
	<1 cm	15	13
	1-2 cm	8	9
	>2 cm	2	3

A comparison of various outcome parameters for the two groups is shown in Table II

Figure 5

RESULTS			
No.		Laparoscopic repair (n=25)	Open repair (n=25)
1.	Operative duration (minutes) (SD)	68 ± 5.2	90 ± 5.5
2.	Analgesic Requirement (days) (SD)	1 ± 0.45	6.78 ± 0.60
3.	Nasogastric tube kept for (days) (SD)	3.0 ± 0.50	5.00 ± 1.21
4.	Resumption of oral feeding (days) (SD)	3.0 ± 0.44	5.2 ± 1.11
5.	Postoperative hospital stay (days) (SD)	3.04 ± 2.0	8.06 ± 2.2
6.	Antibiotic Requirement (days)	3	5.7
7.	Wound gap	Nil	3
8.	Palvic Abscess	Nil	1
9.	Incisional hernia	Nil	2
10.	Burst Abdomen	Nil	1
11.	Return to normal physical activity	5±1 d	7.8 ± 2 d
12.	Return to work	10-11 d	14-15 d

We found that the mean operative time for laparoscopic repair was 68 minutes which was shorter than that for open repair which was 90 minutes.

It was evident that patients who underwent laparoscopic repair required significantly less parenteral analgesics than the open group. In the laparoscopy group, analgesic requirement was for 1.5 days as compared to 5-6 days in the open group. The nasogastric tube was removed after 3 days and 5 days in the laparoscopic and in the open group, respectively. Resumption of oral feeding was achieved on 3rd and 5th day in the laparoscopic group and in the open group, respectively. Post-operative hospital stay was 5 day in the laparoscopy group while it was 8 days in the open group.

We concluded that no wound complications occurred in patients in the laparoscopic group, although there were 3 wound infections in the open group.

Post-operative antibiotic requirement was for 3 days in the laparoscopic group and 5-7 days in the open group.

Post-operative incisional hernia was seen in no patient of the laparoscopy group and in one patient in the open group.

Post-operative burst abdomen was seen in no patient of the laparoscopy group and in one patient in the open group.

Return to normal physical activity was after 5 days in the laparoscopy group while it was after 7-8 days in the open group

**DISCUSSION**

The essential fact of the time is that the incidence of perforated peptic ulcer has not been reduced despite an overall decline in incidence of complicated peptic ulcer disease which is due to tremendous use of non-steroidal anti inflammatory drugs in the last 20 years. Minimal access surgery has assumed an ever expanding role in gastrointestinal surgery since the introduction of laparoscopic cholecystectomy.

Up to this time, different techniques of perforation closure have been tried. These include gelatin sponge and fibrin glue<sup>3,4</sup>, stapled omental patch repair<sup>1,5</sup> and gastroscopy-aided insertion of the ligamentum teres hepatis.<sup>5</sup>

The results of our non-randomized controlled study revealed that, as compared to open repair, laparoscopic repair is associated with lesser time for surgery, shorter time for nasogastric aspiration, reduced postoperative pain, lesser analgesic requirement, lesser antibiotic requirement, shorter hospital stay and earlier return to normal daily activities. The complication rate for laparoscopic repair was low, the laparoscopic procedure was associated with potentially less

wound infection compared with open repair. The benefit of early discharge and early return to work may outweigh the consumable cost incurred in the execution of the laparoscopic procedures<sup>6</sup>. There were lower chances of drug resistance and wound-related complications. We repaired peptic perforation of sizes even >2cm by laparoscopic procedure without any complications.

The excellent results of our study are quite comparable with other studies as shown in Table III.

**Figure 6**

Comparison of our study with other studies

Observation	PURR trial, Belgian perforated ulcer repairs - Randomised trial <sup>1</sup>		Current Mx of peptic ulcer perforation. Pak. Journal of Med. Sciences 2004 <sup>2</sup>		Su WT et al., 2004 <sup>3</sup>		Swiss study of lap vs open peptic perforation closure <sup>4</sup>		Current study	
	Lap rp.	open rp.	Lap.	open	Lap.	open	Lap.	open	Lap.	open
1. Operative duration (day) (SD)	66±5	85±10	60±4	80±8	60 ± 5	75 ± 10	65 ± 4	80 ± 5	68 ± 5.2	90 ± 5.5
2. Analgesic requirement (days) (SD)	1±0.5	6±1	1±0.6	5±0.6	1 ± 0.3	5 ± 0.8	1 ± 0.5	6 ± 0.2	1 ± 0.45	6.78 ± 0.60
3. Nasogastric tube kept for (days) (SD)	3±0.2	4 ± 0.8	3±0.8	5±0.6	3 ± 0.8	5 ± 0.3	2 ± 0.9	6 ± 0.2	3 ± 0.5	6 ± 1.21
4. Resumption of oral feeding (days) (SD)	3±0.2	5±1	3±0.5	5±0.6	3 ± 0.8	5 ± 0.8	3 ± 0.6	5 ± 0.9	3 ± 0.44	5.2 ± 1.11
5. post op. hospital stay (days) (SD)	2±0.3	7.5±1	3±0.5	7±2	3 ± 0.9	7 ± 0.5	3 ± 1	6 ± 0.6	3.04 ± 2.2	8.06 ± 2.2
6. Antibiotic requirement (Days)	2	6-7 d	3	5-7	3	6	2	7	3	5-7
7. Absound gap	1%	8%	2%	12%	nil	8%	1%	7%	nil	10%
8. Incisional hernia	nil	6%	nil	10%	nil	8%	nil	6%	nil	8%
9. Burst Abdomen	nil	2%	nil	5%	nil	3%	nil	1%	nil	8%
10. Return to Normal physical activity (days) (SD)	3±1	6±2	5±2	8±1	3 ± 0.5	6 ± 1.1	3 ± 0.8	6 ± 0.5	5 ± 1	7 ± 2
11. Return to work (days) (SD)	8±1	12±2	11±1	14±1	9±2	13 ± 2	9±1	11±1	10 ± 2	14±2

This supports our strong recommendation that laparoscopic repair of peptic perforation should be the procedure of choice in the well-experienced laparoscopic surgeon's hand.

Contraindications include complicated ulcers requiring definitive ulcer surgery e.g. perforated stomal ulcers, associated bleeding ulcers, very big size of ulcers (>3cm) and patients unsuitable for laparoscopic procedures, viz. with serious associated cardiopulmonary diseases.

Furthermore, it should be emphasized that by surgeons who do not have enough experience in laparoscopic surgery, this approach should not be attempted because suture repair is technically more demanding.

**CONCLUSIONS**

To conclude in a nutshell, laparoscopic suture with omental patch repair is an attractive and superior alternative to conventional surgery with extraordinary benefits of minimal invasive surgery such as

- Shorter operative time and reduced postoperative pain.
- Lesser requirement of nasogastric aspiration and lesser wound infection.

- Lesser blood loss and lesser transfusion requirement.
- Shorter hospital stay and early rehabilitation.
- Earlier resumption of oral feeding and lesser antibiotic requirement.
- Lesser occurrence of incisional hernia and burst abdomen and lesser occurrence of pelvic abscess.
- Earlier return to normal physical activity and earlier return to work.

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