

## A Comparative Study of Laparoscopic vs. Open Peptic Perforation Closure

Viral G. Sangani<sup>1</sup>, Kishan R. Katua<sup>2</sup>, Mehul M. Tadvi<sup>3</sup>, Jignesh N. Mahida<sup>4</sup>, Mohit Chauhan<sup>5</sup>, Sagar V. Katudiya<sup>6</sup>

<sup>1</sup>Assistant Professor, <sup>2,4,5,6</sup>3<sup>rd</sup>Year Resident, <sup>3</sup>Senior Resident, Department of General Surgery, Shri M.P. Shah Government Medical College, Jamnagar, Gujarat 361008, India.

### How to cite this article:

Viral G. Sangani, Kishan R. Katua, Mehul M. Tadvi et al. A Comparative Study of Laparoscopic vs. Open Peptic Perforation Closure. *New Indian J Surg.* 2019;10(2):220-224.

### Abstract

The objective of this study was to find the effectiveness of laparoscopic surgery in case of peptic perforation. A study was carried out with 40 patients with peptic perforation closure done in G.G hospital, Jamnagar during period of January 2016 to August 2018 and 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 ulcer perforation closure in way of lesser days antibiotic requirement ( $3.2 \pm 0.41$  SD days vs  $9.1 \pm 2.14$  SD days), lesser analgesic requirement ( $2.2 \pm 0.83$  SD vs  $6.9 \pm 0.78$  SD days), lesser post-operative hospital stay ( $4.5 \pm 0.51$  SD days vs  $9.2 \pm 2.89$  SD days) and early return to normal routine activity ( $5.0 \pm 0.72$  SD vs  $7.5 \pm 1.53$  SD days) in selected patients.

**Keywords:** Peptic ulcer perforation- Laparoscopic repair - Open repair

### Introduction

Perforation is a life threatening complication of peptic ulcer disease. Duodenal perforation is a common complication of duodenal ulcer. The first clinical description of perforated Duodenal Perforation was made by Crisp in 1843 [1].

Laparoscopic treatment of perforated Duodenal Perforation was first reported by Mouret [1]. in 1989 followed soon after by Nathanson et al. [2] Operative treatment of perforated duodenal ulcer consists of time honoured practice of omental patch closure but now this can be done by laparoscopic method. Laparoscopic approaches [3]. to closure of peptic perforation are now being applied widely and may become the gold standard in the future especially in patient with <10 mm perforation size presented with in first 24 hours of onset of pain [4]. Perforated peptic ulcer is a surgical emergency. Urgent simple closure of perforation with omental patching is widely applied for vast number of these patients. Various laparoscopic techniques have been advocated for closing the Perforation intra and extra corporeal knots, suture less techniques, holding the omental patch by fibrin glue or sealing with a gelatin sponge, stapled patch closure or Gastroscopically aided management in the perforation [5]. This is commonly associated with NSAIDS [6] use especially in elderly population. A significant percentage of patients have a history of smoking [6], alcohol abuse and postoperative stress. Most of them are positive for Helicobacter pylori [6] infection. Usually the patients are belonged to urban upper middle class. Approximately 10-20% of patients with peptic ulcers suffer a perforation of the stomach or duodenum which a chemical peritonitis [7] develops initially from the gastric and duodenal secretion but in a few hours bacterial contamination is superimposed. The disease could be life threatening and early diagnosis and treatment is extremely important. Nowadays due to presence of really effective medications against peptic ulcer for decreasing the amount of acid

---

**Corresponding Author: Kishan R. Katua**, 3<sup>rd</sup> Year Resident Doctor, Department of General Surgery, Shri M.P. Shah Government Medical College, Jamnagar, Gujarat 361008, India.

**E-mail:** [katua.kishan@gmail.com](mailto:katua.kishan@gmail.com)

**Received on 26.12.2018, Accepted on 02.02.2019**

and also eradication of *Helicobacter pylori* [8] the necessity for definitive therapy is much lesser than before.

#### *Aims and Objectives of the Study*

This study is a comparative study between laparoscopic and open perforation closure.

1. To study of peptic perforation patient in department of general surgery, M.P. Shah Government Medical College, G.G.G Hospital, Jamnagar.
2. To evaluate safety and efficacy of laparoscopic repair for perforated peptic ulcer.
3. To find out whether it can stand against conventional laparotomy to treat peptic perforation.
4. To evaluate whether laparoscopic peptic perforation closure is better than conventional laparotomy for peptic perforation closure in terms of lesser duration of surgery, lesser post-operative pain and nausea, lesser requirement of antibiotics and analgesics and so lesser cost of drugs, lesser period of hospital stay, earlier removal of Ryle's Tube, Earlier resume to oral feed, earlier ambulation and earlier return to physical activity and work.

#### **Materials and Methods**

The study involved 40 patients with perforated peptic ulcer that presented during the period of January 2016 to August 2018 in Guru Gobind Singh government hospital, Jamnagar.

All the patient's case paper were taken from medical record branch and data collected from either sub-group was analysed and compared with respect to intra operative time, intra operative complication, postoperative pain, postoperative events, postoperative complications, patients outcome after surgical treatment.

#### *Inclusion Criteria*

1. All patients of abdominal pain having either clinically and radiologically diagnosed peptic ulcer perforation.
2. For laparoscopic closure patient having history of pain in epigastric region less than 48 hours

3. For open peptic perforation closure all patients having abdominal pain more than 48 hours.
4. Patient who having mild to moderate ascites in ultrasonography and ct scan and history of abdominal pain more than 48 hours laparoscopic peptic perforation trial done.

#### *Exclusion Criteria*

1. Old age patients with respiratory distress, history of cardiac disorder or respiratory disorders such as ischemic heart disease, arrhythmias, chronic obstructive pulmonary disease or asthma, bleeding and clotting disorders.
2. Paediatric patient.
3. Intestinal perforation other than peptic perforation diagnosed laparoscopically or open procedure.
4. Malignant perforation.

#### **Results**

In this comparative study we found that there is male predominance with 72.5% and female 27.5% (Table 1), most common age group is 41-60 years (Figure 1). Peptic perforation is most common in Pre-Pyloric region (55%) followed by pyloric (25%) and First part of duodenum (20%) (Table 1). In our study (55%) patients had perforation size 1-2 cm (30%) patients had <1 cm size and about 25% patients had >2 cm size of perforation (Table 1).

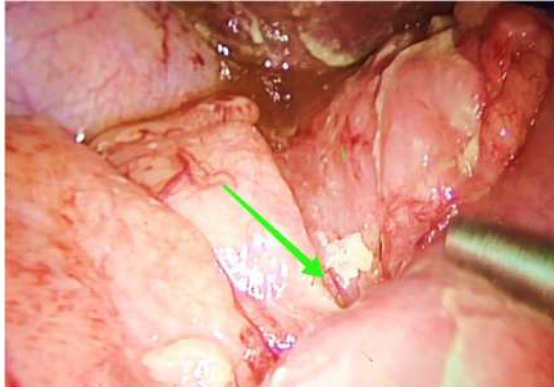
We found that analgesic requirement was mean  $2.2 \pm 1.66$  (2SD) days in laparoscopic perforation closure compared to  $6.9 \pm 1.56$  (2SD) days in open group. Postoperative antibiotic requirement was  $3.2 \pm 0.82$  (2SD) days in laparoscopy group and  $9.1 \pm 0.28$  (2SD) days in open group. The nasogastric tube was removed after  $2.85 \pm 1.34$  (2SD) days and  $6 \pm 1.38$  (2SD) days in the laparoscopic and open group respectively. Resumption of oral feeding was achieved on day  $3 \pm 0.82$  (2SD) and day  $5 \pm 1.48$  (2SD) in the laparoscopic and open group respectively. Post-operative hospital stay was  $4.5 \pm 1.02$  (2SD) days in the laparoscopic group and  $8.9 \pm 1.78$  (2SD) days in open group (Table 2) and (Fig. 2).

During intra operative procedure none of the patients had complications like uncontrolled bleeding from any vessels and none of patient had liver injury specially in laparoscopic peptic perforation, no patients had liver injury. None of

the patients had iatrogenic perforation during operation. But during laparoscopic closure 2 patients had adhesions around stomach, large size of perforation (2.5-3 cm) and leakage of food particles from stomach into the peritoneal cavity. So laparoscopic surgery had to be converted into laparotomy via midline incision.

**Table 1:** Patients Demography, 20 patient open peptic perforation repair and 20 patient laparoscopic peptic perforation repair.

	Laparoscopy (n=20)	Open(n=20)	Total(40 patients)
Mean (SD) age	50 ± 18.35	43.95 ± 14.73	-
Male	15	14	29 (72.5%)
Female	5	6	11 (27.5%)
Smoking	16	17	33 (82.5%)
Alcohol	8	6	14 (35%)
NSAIDS	14	13	27 (67.5%)
Site of Perforation			
Prepyloric	9	13	22 (55%)
Pyloric	6	4	10 (25%)
First part of duodenal	5	3	8 (20%)
Size of Perforation			
<1 cm	4	8	12 (30%)
1-2 cm	8	10	18(45%)
>2 cm	8	2	10(25%)



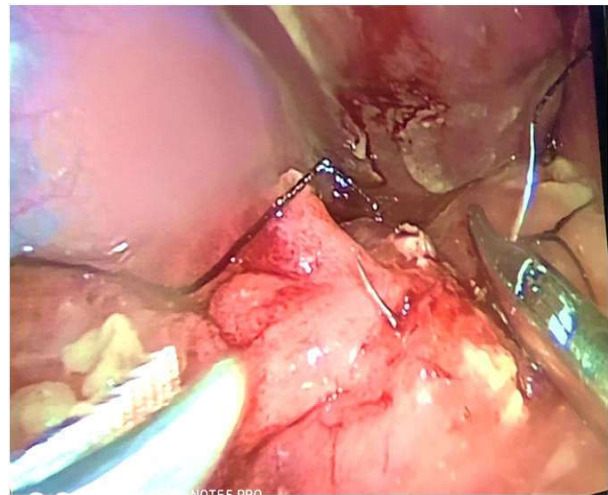
**Fig. 1:** Laparoscopic View of Prepyloricperforation (Green Arrow Showing Perforation)

**Table 2:** Result.

	Open (Mean + SD)	Laposcopic (Mean + SD)
Age	50 ± 18.35	43.95 ± 14.73
Operation duration (min)	100 ± 9.75	68.55 ± 7.07
Analgesic requirement (days)	6.9 ± 0.78	2.2 ± 0.83
Antibiotic requirement (days)	9.1 ± 0.14	3.2 ± 0.41
Nasogastric tube (days)	6 ± 0.69	2.85 ± 0.67
Postop hospital stay (days)	9.2 ± 0.89	4.5 ± 0.51
Resumption to oral feeding (days)	5.2 ± 0.74	3.2 ± 0.41
Return to physical activity (days)	7.5 ± 1.53	5 ± 0.72
Return to work (days)	14.4 ± 4.71	6.1 ± 1.16

Post operatively wound gap was not present in laparoscopic closure while 2 patients had gap in open laparotomy repair which was treated by daily dressing and healing occurred in 9-10 days. 1 patient had burst abdomen in open laparotomy repair which was treated by spontaneous closure of wound. During follow up 1 patient developed incisional hernia after 2 years (Table 3).

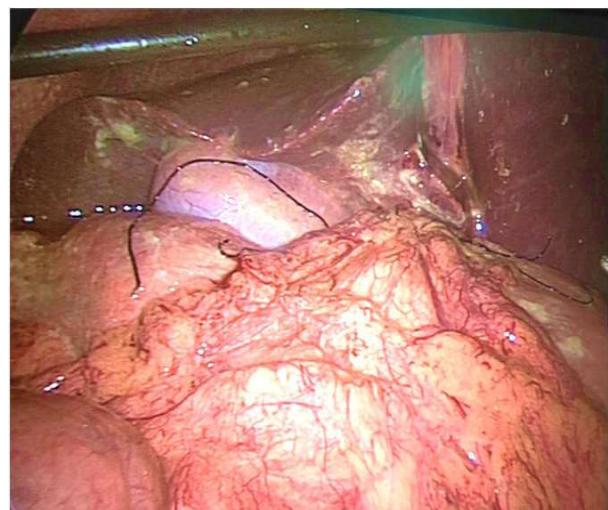
The excellent results of our study are compared with other two studies which are shown in Table 4 [9,10].



**Fig. 2:** Laparoscopic Peptic Perforation Closure

**Table 3:** Comparison of post operative complication

Complications	Lap Repair	Open Repair
Wound Gap	0	2 (5%)
Pelvic Abscess	0	1(2.5%)
Incision Hernia	0	1(2.5%)
Burst Abdomen	0	1(2.5%)



**Fig. 3:** Laparoscopic Omental Patch Closure

**Table 4:** Comparison with various study

Observation	Swiss Study of Lap vs Open Peptic Perforation Closure		Current Mx of Peptic Ulcer Perforation Pak Journal of Med Sciences 2004		Lama Trial		Our Study	
	LAP	Open	LAP	Open	LAP	Open	LAP	Open
Operative duration (min)(SD)	65 ± 4	80 ± 5	60 ± 4	80 ± 8.0	60 ± 4.1	80 ± 8.1	68.55 ± 7.07	100 ± 9.75
Analgesic requirement(days)(SD)	1 ± 0.5	6 ± 0.3	1.0 ± 0.6	5 ± 0.6	1.2 ± 0.6	5.8 ± 4.1	2.2 ± 0.83	6.9 ± 0.78
Nasogastric tube kept for (days)(SD)	2 ± 0.9	6 ± 0.3	3 ± 0.8	5 ± 0.6	2 ± 3	3 ± 1.3	2.85 ± 0.67	6 ± 0.69
Resumption of oral feeding (days)(SD)	3 ± 0.6	6 ± 0.9	3 ± 0.6	5 ± 0.6	3 v 0.8	5 ± 0.8	3.2 ± 0.41	9.1 ± 2.14
Post op hospital stay (days)(SD)	3 ± 1	6 ± 0.6	3 ± 0.5	7 ± 0.2	6.5 ± 9.3	8.0 ± 7.3	4.5 ± 0.51	9.2 ± 2.89
Antibiotic requirement (days)	2 ± 0.4	7 ± 0.8	3 ± 0.6	7 ± 0.8	3 ± 0.6	6 ± 1.2	3.2 ± 0.41	5.2 ± 0.74
Wound gap	1%	7%	3%	12%	Nil	9%	Nil	5%
Incisional hernia	Nil	6%	Nil	10%	Nil	3%	Nil	2.5%
Burst abdomen	Nil	1%	Nil	5%	Nil	3%	Nil	2.5%
Return to normal physical activity (days)(SD)	3 ± 0.8	6 ± 0.5	5 ± 0.2	8 ± 1.0	6 ± 0.8	8 ± 1.4	5 + 0.72	7.5 ± 1.53
Return to work (SD)	8 ± 1	11 ± 1	11 ± 1.0	14 ± 0.1	9 ± 0.2	13 ± 2	6.1 ± 1.16	14.4 ± 4.71



**Fig. 4:** Laparoscopic Peptic Perforation Closure Post Operative



**Fig. 6:** Open Peptic Perforation Closure Wound Gaping



**Fig. 5:** Open Peptic Perforation Closure Day 1 Left Side Drain Placement in Pelvic Cavity and Right Side in Morision Pouch

**Discussion**

In this study of 20 patients who underwent laparoscopic perforation closure and 20 patients who underwent open peptic perforation closure, following is observed that patients were of male preponderance, 12 patients of laparoscopic group were having history of peptic ulcer disease, 11 patients of open group were having history of peptic ulcer disease, Most of the patients (>82%) had history of smoking.

The laparoscopic approach reduces the access trauma, can confirm or refute the diagnosis and can be used to perform the same repair procedure and lavage as omental patch repair.

The results of our comparative study revealed that as compared to open repair, laparoscopic surgery was associated with a 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 to open repair. The benefit of early discharge and early return to work may outweigh the consumable cost incurred in the execution of laparoscopic procedures. There were lower chances of drug resistance and wound related complications.

In this study peptic perforations of sizes even greater than 2cm were repaired by laparoscopic procedures without any complications.

Contraindications include complicated ulcers requiring definitive ulcer surgery example: perforated stomal ulcers, ulcer associated with active bleeding, ulcers of very big size (3 cm), patients with serious associated cardiopulmonary diseases are unsuitable for laparoscopic surgery.

#### *Disadvantages of Laparoscopic Surgery*

It is difficult and costly to have laparoscopic set up and operative cost also increases as compared to open surgery. In the initial period of practice there are more chances of conversion to open surgery and complications due to inadequate experience, there are complications of general anaesthesia which includes aspiration, atelectasis, etc.

#### **Conclusion**

To conclude in a nutshell, laparoscopic peptic perforation closure with omental patch placement is superior alternative to open surgery, has considerable advancement and extraordinary benefits of minimal invasive surgery. Following conclusions are made from this study that laparoscopic procedure has shorter operative time, reduced postoperative pain, lesser requirement of nasogastric aspiration, lesser wound infection, lesser blood loss, lesser transfusion requirement, shorter hospital stay, early rehabilitation, earlier resumption of oral feeding, lesser antibiotic requirement, lesser occurrence of wound infection and wound gape, lesser occurrence of pelvic abscess

and incisional hernia, earlier return to normal physical activity, earlier return to work.

The laparoscopic procedure is costly compared to open procedure as it requires proper setup and dedicated centres. But this difference is overcome by the other costs incurred in the post-operative period of open procedure. In the laparoscopic repair of peptic perforation surgeons should have proper experience in laparoscopic techniques as well as inter corporeal knotting. Laparoscopic learning curve is greater and need proper surgical skill as well as decision making abilities of the surgeon.

In conclusion, laparoscopic peptic perforation closure is another very good alternative to open surgery treatment of peptic perforation with its own advantages in current study in selected patient with skilled surgeon.

#### **References**

1. Mouret P, Francois Y, Vignal J, et al. Laparoscopic Treatment of Perforated Peptic Ulcer. *Br J Surg* 1990;77:1006.
2. Nathanson Lk, Easter Dw, Cuschieri A. Laparoscopic Repair/Peritoneal Toilet of Perforated Duodenal Ulcer. *SurgEndosc*. 1990;4:232-23.
3. Lunevicius R, Morkevicius M. Management Strategies, Early Result, Benefit and Risk Factor of Laparoscopic Repair of Perforated Peptic Ulcer. *World J Surg*. 2005;29:1299-1310.
4. Current Management of peptic Ulcer Perforation, Menakuru Sr *Pak J Med Sci*. 2004;20(2):157-6.
5. Tate J J T, Dawson Jw, Lau Wy, Li Akc, Sutureless Laproscopic Treatment of Perforated Duodenal Ulcer. *Br J Surg*. 1993;80:235.
6. Kurata, John H., Nogawa, Aki N. Meta-Analysis of Risk Factor for Peptic Ulcer; Non-Steroidal Anti-Inflammatory, Drugs, Helicobacter Pylori, and Smoking. *Journal of Clinical Gastroenterology*. 1997 Jan;24(1):2-17.
7. Current Management of peptic Ulcer Perforation, Menakuru Sr *Pak J. Med Sci*. 2004;20(2):157-63.
8. Sebastian, Prem Chandran Vp, Elashaal, Yim, Sim Ajw, Helicobacter Pylori Infection in Perforated Peptic Ulcer Disease. *Br. J Surg*. 1995;82:360-62.
9. Randomized Clinical Trial of Laparoscopic Versus Open Repair of the Perforated Peptic Ulcer: The LAMA Trial. *World J Surg*. 2009 Jul;33(7):1368-73.
10. Svanes C. Current management of peptic ulcer perforation. *Pakistan journal of medical sciences*. 2004;80:115-11.