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Conventional omental patch repair versus laproscopic closure of duodenal ulcer: A comparative study in north Indian teaching hospital

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Abstract

Background: Duodenal perforation is a rare, but potentially life-threatening injury. Multiple etiologies are associated with duodenal perforations such as peptic ulcer disease, iatrogenic causes and trauma. Computed tomography with intravenous and oral contrast is the most valuable imaging technique to identify duodenal perforation. Laparotomy has been the standard treatment of perforated peptic ulcers. Laparoscopy allows the confirmation of the diagnosis, better magnified visualization during the procedure and the identification of the position, site and size of the ulcer.

Aim and Objectives: To evaluate the efficacy of Omental patch repair versus laproscopic closure of duodenal ulcer.

Materials & Methods: Laparoscopy allows the confirmation of the diagnosis, better magnified visualization during the procedure and the identification of the position, site and size of the ulcer. This is a prospective study of patients with perforated duodenal ulcers who underwent laparoscopic repair or open repair. During the study period 53 cases admitted in our surgery emergency and were studied thoroughly according to the prepared proforma, proportions, chi square test and student 'T' tests were used to find out the significance.

Results: 53 patients were included in our study. 49 patients underwent surgical repair of perforated duodenal ulcer disease (16 laparoscopic repairs and 33 open repairs; mean age - (range, 32-82 years). There was decrease in total operative time in patients who had undergone laparoscopy repair (mean: 67.2 minutes laparoscopic versus 106.8 minutes open), less requirement for intravenous/intramuscular opiate analgesia in patients who had undergone laparoscopic repair (mean time to oral analgesia: 3 days laparoscopic versus 6.78 days open). Wound infection and gaping and burst abdomen were nil in laparoscopic (wound infection 8 cases and burst abdomen 2 cases). There was decrease in recovery without complication in patients who underwent laparoscopic repair (02 complications in lap versus 16 complications in open) and shorter in-patient hospital stay (mean: 4.56 days laparoscopic versus 8.94 days open) and early return to normal activity in patients who underwent laparoscopic repair (mean: 6.44 days laparoscopic vs. 11.48 open).

Conclusion: Therefore laparoscopic repair is almost safe surgical option for patients with perforated duodenal ulcer disease and should be considered for all patients, provided that the necessary expertise is available.

Keywords: Omental Patch Repair, conventional duodenal perforation surgery, duodenal perforation surgery, Laparoscopic surgery, Peptic ulcer

Introduction

Peptic ulcer disease is a leading cause of duodenal perforation. Acute perforations of the duodenum are estimated to occur in 2–10% of patients with ulcers. The two major causes of peptic ulceration and perforation are H. pylori infection and NSAIDs. In patients with recurrent ulcers despite active treatment, hypersecretory states such as Zollinger-Ellison syndrome need to be considered. The incidence of peptic ulcer disease (PUD) has been decreasing globally due to eradication of *Helicobacter pylori* and use of proton pump inhibitors (PPIs) [1]. In spite of this, the incidence of perforated PUD has increased because of the wider use of nonsteroidal anti-inflammatory drugs (NSAIDs) [2]. Emergency surgery usually is essential in PUD complications. Laparotomy has long been the standard treatment of perforated peptic ulcers (PPU) [1]. After the first description of the procedure by Mouret *et al.* and Nathanson *et al.* in the nineties, a number of studies have demonstrated that laparoscopic repair is feasible and safe and even better than the open approach [3-7].

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The aim of this prospective study is to compare laparoscopic and open repair of perforated duodenal ulcer disease in our institution. We evaluated whether the early results from laparoscopic repair resulted in improved patient outcome compared with conventional open repair.

Materials & Methods

Duodenal injuries may be caused by surgical instrumentation. They may go unnoticed during the initial operation and manifest themselves several days later as a delayed perforation as a consequence of coagulation necrosis of the duodenal wall. This prospective study was conducted on patients with the diagnosis of perforated duodenal ulcer at NC Medical College Israna Haryana. Patients were divided into two groups based on the surgical approach. Patients included in the laparoscopic surgery (LS) group were considered the study group and patients who underwent open surgery (OS) were included in the control group. All the patients were treated preoperatively by intravenous fluids, a nasogastric suction tube, parenteral analgesics and antibiotics. Open surgery was performed with midline laparotomy incision, various techniques were used for perforation repair and thorough peritoneal irrigation was required in all cases. For laparoscopic surgery, pneumoperitoneum was achieved by Veress needle or open Hasson technique. The first trocar was placed in the supra-umbilical position (optic port). Diagnostic laparoscopy was performed in every patient with a 30° laparoscope. Under direct vision, 10-and 5-mm working ports were inserted in the left and right midclavicular line and 5-mm in sub-xiphoid position for liver retraction. The perforation was closed after excision of ulcer margins (Figure 1). Closure was performed with primary suture closure (PC) or primary closure with omental patch (PC + OP). After closure, intraoperative endoscopy was performed for tissue biopsy and leaking proof, when available. Thorough peritoneal lavage was performed under direct vision with normal saline solution. During the study period 50 cases admitted in our surgery emergency and were studied thoroughly according to the prepared proforma. We reported the data as means (standard deviation), medians (interquartile range) or as the number of patients (percentages). Quantitative and qualitative variables were compared with Student's t-test and the Fischer's exact test or Chi-square test, respectively. The Mann-Whitney U test was used for variables not distributed normally. All statistical tests were two-tailed and a value of $p < 0.05$ was considered significant. The data were analyzed using SPSS v18.0 for Windows (SPSS Inc. Chicago, IL, USA).

The main surgical treatment is simple repair of the perforation site. This can be performed as a primary closure with or without the addition of an omental patch. Alternatively, a pedicled omental flap (Cellan-Jones repair) or free omental plug (Graham patch) can be sutured into the perforation. Sutureless techniques have also been developed using a gelatin sponge and fibrin glue to seal off the perforation. There seem to be no significant differences in terms of postoperative morbidity and mortality rates when comparing primary closure, omentopexy or tegmentation (without closure). Surgical repair can be performed either with conventional open surgery or with laparoscopy.

Inclusion Criteria: All patients admitted in NCMC with non traumatic duodenal ulcer perforation.

Exclusion Criteria: Patients with traumatic duodenal perforation and all moribund patients with duodenal ulcer perforation.

Results & Observations

A total of 53 patients included for the study and among them, high number of patients (44%) were in the age group of 31 – 40 years and only 4% were above 60 years. There was no much difference in 3rd and 5th decade for the number of patients. The study patients included both males and females. Majority of patients are males (76%). Male: Female ratio is 3.17: 1. Out of 50 patients, one patient was treated conservatively (2%). Remaining 49 (98%) underwent surgery and among them 16 had undergone laparoscopic (32%) and 33 had undergone open surgery (66%), out of which 8 were converted from laparoscopic procedure to open technique. Conversion rate being 33.33%, among these 2 cases were converted because of cardiorespiratory instability while performing laparoscopic, 1 due to dense adhesions which could not be separated in laparoscope, 3 due to system failure (laparoscopic instruments) and 2 were due to inexperienced surgeons. Out of 53 treated patients, 54% recovered without any complications whereas 16% had bronchopneumonia, 16% had burst abdomen, 8% had wound infection and 5% died.

Table 1: Relation between management technique and outcome of the patients

Management technique	Recovery without Complication	Recovery with complication	Deaths	Total
Conservative	00	00	01(100%)	01(100%)
Open surgery	13 (39.4%)	16 (48.5%)	04(12.1%)	33(100%)
Laparoscopy	14 (87.5%)	02 (12.5%)	00	16(100%)
Total	27 (54.0%)	18 (36.0%)	05(10.0%)	50(100%)

Chi-square – 19.26 df – 4 p value – < 0.001

Only one patient was treated conservatively and died. Out of 16 patients who underwent laparoscopy, no one died but only 12.5% developed complications but among the patients who underwent open surgery, 4 died (12.1%) and 16 (48.5%) developed complications. This difference is found statistically significant.

Table 2: Relation between duration of surgery and outcome of the patients (Laparoscopy)

Duration of Surgery	Recovery without Complication	Recovery with complication	Total
1.00 hour	03 (100%)	00	03(100%)
1.10 hour	09 (90.0%)	01 (10.0%)	10(100%)
1.30 hour	01 (100%)	00	01(100%)
1.50 hour	00	01 (100%)	01(100%)
1.80 hour	01 (100%)	00	01(100%)
Total	14 (87.5%)	02 (12.5%)	16(100%)

Chi-square – 16.00 df – 5 p value – <0.001

Table 3: Relation between duration of surgery and outcome of the patients (open)

Duration of surgery	Recovery without complication	Recovery with complication	Deaths	Total
Up to 1.0 Hour	01 (50.0%)	01 (50.0%)	00	02 (100%)
1.0 – 1.5 Hour	03 (60.0%)	01 (20.0%)	01 (20.0%)	05 (100%)
1.6 – 2.0 Hour	09 (39.1%)	12 (52.1%)	02 (8.8%)	23 (100%)
> 2.0 Hour	00	02 (66.7%)	01 (33.3%)	03 (100%)
Total	13 (39.4%)	16 (48.5%)	04 (12.1%)	33 (100%)

Chi-square – 16.49 df – 6 p value – 0.41

Among the patients undergone open surgery, as the duration of surgery increases, complications also increases and high

percentage of deaths (33.3%) were found of duration more than two hours.

Table 4: Relation between surgical technique and duration of hospital stay

Surgery	Mean hospital stay (days)	Standard deviation
Laparoscopy	4.56	0.89
Open	8.94	1.62

*student 't' test p- value – < 0.001.

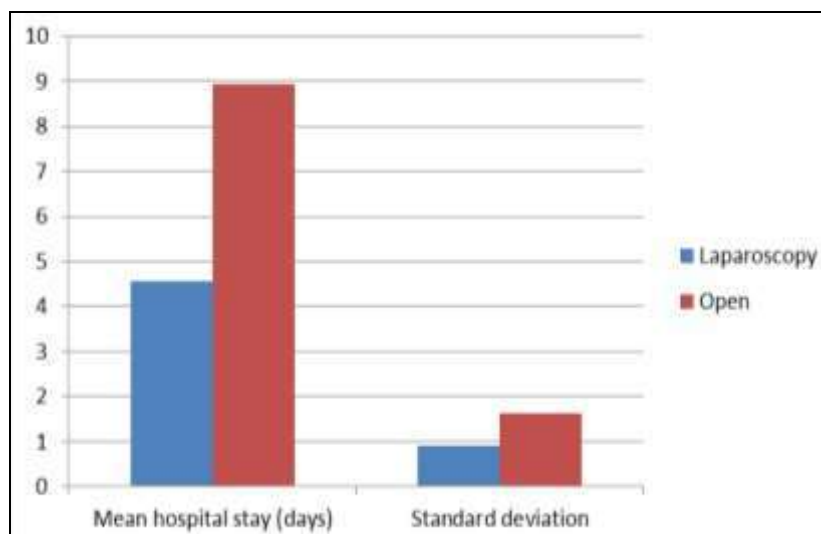


Fig 1: Shows in Hospital stay days and standards deviation

The mean duration of hospital stay was high among patients undergone open surgery (8.9 days) compared to laparoscopy (4.5 days) and it is found statistically significant. In laparoscopic procedure mean duration of surgery is 1.12hrs, which is high i.e., 2hrs when inexperienced surgeon is performing the operation while in open technique mean time taken is 1.78hrs which is significantly high. The mean duration of returning to

normal activity was high among patients undergone open surgery (11.4 days) compared to laparoscopy (6.4 days) and it is found statistically significant. The mean duration of analgesia was high among patients undergone open surgery (6.7 days) compared to laparoscopy (3.0 days) and it is found statistically significant. As in Table 4 and Figure 1.

Table 5: Showing comparison of present study with other studies

Variables	Present study		Swiss study (lap v/s open)		Siu WT <i>et al.</i> 2004 [9]	
	Lap	Open	Lap	Open	Lap	Open
Operative time (in minutes, mean)	67.20	106.80	65±40	80±50	60±50	75±10
Post operative analgesic requirement (in days)	3.00	6.78	1±0.5	6±0.3	1±0.3	6±0.8
Wound infection/gaping	Nil	08	1%	7%	Nil	5%
Burst abdomen	Nil	02	Nil	1%	Nil	3%
Bronchopneumonia	02	06	--	--	--	--
Post op hospital stay(in days)	4.56	8.94	3±1	6±0.6	3±0.9	7±0.5
Return to daily activity(in days)	6.44	11.48	3±0.8	6±0.8	3±0.5	6±1

The results of a recent meta-analysis including seven randomized controlled trials showed a significant benefit for the laparoscopic approach for the treatment of perforated peptic ulcer disease with a significant reduction in postoperative complications and hospital stay.

Discussion

Although incidence of surgery for peptic ulcer diseases has reduced drastically with the advent of newer proton pump inhibitors and H2 receptor antagonists, surgery for complications such as perforation has not changed. In our study patients presenting within 24 hrs of onset of symptoms, with minimal to moderate distension of abdomen and without presenting in shock are considered for laparoscopic technique, and the post-operative analgesic requirement, hospital stay, complications such as wound infection, gaping and burst

abdomen and bronchopneumonia are compared with the patients who underwent open procedure. In our study out of 50 patients 22 were underwent laparoscopic technique closure, 8 are converted to open technique, out of remaining 16, 2 had bronchopneumonia, none were experienced wound infection or gaping or burst abdomen with 3 to 4 days of analgesics and 5 to 6 days of hospital stay. Among patients who underwent open procedure, 6 had bronchopneumonia, 8 had wound infection, 2 burst abdomen, with 6 to 7 days of analgesics, 13 to 14 days of hospital stay and 5 were died wherein no one died in laparoscopic technique which may be due to reduced operating time of patients for the laparoscopic procedure. Out of 8 which were converted to open procedure, 2 is due to the cardiovascular instability during the procedure, 1 is due to adhesions which were dense, 3 were due to instrument failure and another 2 were due to inexperienced surgeon's attempt (trainee student). The

conversion rate in the present study is 33.3% which is comparable with the studies done previously. Hence in a set up where experienced surgeon's were available, instruments were good, patients doesn't have co morbid conditions which limits creation of pneumoperitoneum and in patients presenting early (because of less chance of dense adhesions and contamination) laparoscopic technique is superior to conventional open closure. In a study conducted by Dr. Nita Zaji ^[8], in Laparoscopic hospital, New Delhi India july-2007, published in internet had concluded that laparoscopic closure of duodenal perforation is superior to conventional open technique if the patient presents in early stage, if he don't have any co-morbid conditions which limits anaesthesia, if the catering hospital is well equipped with instruments required and the surgeon is well trained in laparoscopic procedures. Our study is compared to the study conducted Sui WT *et al.* ^[9] and Swiss study lap v/s open duodenal perforation closure, the results of our study is comparable with these studies as shown in the table.

In another study done by M.M, Porecha ^[10] and co published in internet journal of surgery 2008, the variables are compared with the present study which closely resembles.

Our study results are comparable with other studies as depicted in the tables, since most of the patients present after 24hrs of onset of symptoms, lack of modern anaesthetic instruments and presence of co morbidities limits the treating doctors to take up the laparoscopic technique as the choice of procedure in our hospital. Laparoscopic closure of duodenal perforation closure is encouraging, in patients who presents within 24hrs of onset of symptoms, relatively younger patients, without any co morbid conditions and if the surgeon is expertise in laparoscopic surgeries.

Conclusion

Duodenal perforation is caused by a variety of different mechanisms. Some duodenal perforations can be managed conservatively, while others require prompt surgical treatment. The type of treatment should be individualized and depends on the mechanism of injury, the timing, location and extent of the injury and the clinical state of the patient. Open surgery is still the gold standard for patients that need surgical intervention and most duodenal perforations can be managed with a simple repair of the defect. Gastric diversion procedures such as pyloric exclusion have been used for many years to treat duodenal perforations, but there is little evidence to support any benefit. Minimally invasive treatments are slowly emerging as alternative methods to open surgery in the treatment of duodenal perforation. Laparoscopic repair of duodenal perforations is a safe alternative treatment to non traumatic perforated duodenal ulcers. Laparoscopic repair for peptic ulcer perforation in our study was associated with less duration of nasogastric decompression, faster return to diet and shorter hospital length of stay. Results in our study are in concordance with results published globally.

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