

Outcome of laparoscopic repair of duodenal ulcer perforation compared with open technique in District Head Quarter Teaching Hospital Gujranwala, Pakistan

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Abstract

Objective: To compare the clinical outcome of laparoscopic with open repair surgery for duodenal ulcer perforation.

Study design: Retrospective non Randomized.

Center: District Head Quarter Teaching Hospital Gujranwala.

Material and Methods: From January 2016 to July 2019 retrospective study done 50 patients operated for duodenal ulcers perforation laparoscopically and 50 had an open repair were taken.

Clinical outcome measures: Complications, operating time, hospital stay, post-op pain and wound infection.

Results: Operating time is more in laparoscopic repair than open repair mean 2.5h verses 2h. and length of hospital stay were more in open repair mean 5-days as compared to the laparoscopic repair whose mean is 3.7-days. Moreover, patients with open repair had more post-operative pain as compared to laparoscopic repair. Complications and morbidity more in open group than laparoscopic group.

Conclusion: Laparoscopic repair of perforated duodenal ulcer is advantageous and minimally invasive but not beneficial for patient in shock.

Keywords: duodenal ulcer, laparoscopic repair, post-op pain, open repair.

Introduction:

Laparoscopic surgery has evolved in the recent past with the improvement of material and good surgical skills. Now in most part of the world it has become Gold standard for any elective surgeries such as cholecystectomy, colorectal or hernia repairs etc with little use in emergency settings such as appendectomy, peptic ulcer perforation etc. The benefit or advantage of laparoscopic peptic ulcer perforation repair is under debate with some literature showing it beneficial with good outcome and some showing no effect on outcome as compare to open repair.¹ First case of laparoscopic peptic ulcer perforation repair was done in 1990² and after that the use of laparoscopic repair showed it more favourable.³⁻⁷ And the previous analysis showed it the procedure of choice in patient who are at low

risk.^{8,9} Another review by Cochrane showed it that laparoscopic repair for peptic ulcer perforation is not advantageous as compare to open repair but that report also point out that good and large size of population is required to conclude about the results. Our study tool the population of Gujranwala in Punjab. And our objective is to compare the laparoscopic with open repair for duodenal ulcer perforation so that we can use a suitable method for different patient according to their risk.

Material and Methods:

Patient with duodenal ulcer perforation that was diagnosed and treated previously were retrospectively studied and the protocols were set and were approved by Institutional review board. This is a retrospective study that included

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100-patients with perforated duodenal ulcer admitted at the tertiary care center in Gujranwala from January 2016 to July 2019. The patients were divided into two groups: group-A included 50-patients for laparoscopic procedure, and group-B included 50-patients for open repair.

The inclusion criteria were patients with suspected perforated duodenal ulcer based on clinical assessment, investigation, and confirmed by exploration, either male or female of any age with Boey's score 0 or 1. The exclusion criteria were patients in Shock, gastric outlet obstruction, bleeding ulcer, and previous abdominal exploration.

Conversion criteria: The criteria to convert into open laparotomy in patients with perforation more than 10-mm, difficult identification of the perforation, vitally unstable, and iatrogenic injury that could not be managed laparoscopically.

All the patients were assessed through patient's history, clinical evaluation, radiological evaluation (plain radiography and abdominal ultrasound) and laboratory investigations (complete blood picture, liver function test, kidney function test and electrolytes for routine pre-operative evaluation. Pre-operatively resuscitation was done with I.V. fluids, intravenous antibiotic therapy and analgesics agents administered before surgery.

After resuscitation with I.V. fluids (crystalloids), antibiotics third generation cephalosporins and metronidazole and analgesics. Nasogastric and Folley passed before surgery and surgery was to be done as soon as the patient well resuscitated.

Open Graham's omentopexy procedure was performed in patients who were in the group of open repair and was done by senior surgeons.^{8,9} An upper mid line incision was given, all fluid aspirated, perforation identified, margins refreshed and a healthy piece of omentum was taken and over sewed over the perforation with absorbable vicryl suture, abdomen washed thoroughly and drain was left in subhepatic and pelvic region.

Laparoscopic repair was performed by a group of surgeons who were experienced in laparoscopic cholecystectomy and know how to do laparoscopic suturing. The patient were placed in a supine position first 10-mm umbilical port was inserted by using open method, pneumoperitoneum created via insufflator and insufflation pressure was kept 12mmHg, 30° laparoscope was then introduced, another 10-mm port was created at epigastric region, two additional working ports were inserted at the level of the mid-clavicular line and anterior axillary line or can be changed according to the bulk of abdomen. After initial visualization of the peritoneal cavity all the fluid was aspirated, the pyloro-duodenal region was searched for the perforation. If the omentum was adhere to the suspicious perforation site, the omentum was gently pulled away to assess the area. By compressing the antrum of the stomach and the first part of the duodenum it was easy to see escape of fluid and bubbles from the perforations. If it was gastric perforation then biopsy was taken. Perforation size was measured and the procedures were to be converted to open if perforations larger than 10-mm, it was considered rather difficult to do repair laparoscopically. 10-mm perforation was the cut-off point. The suture introduced inside through one port and the margins refreshed and approximated by suture and then same suture was used to place a piece of omentum over it. Abdomen washed with normal saline and drain placed.

After surgery all patients were kept Nil by mouth, intra venous antibiotics (Cefoperazone and metronidazole) continue fluids and analgesics (I.V. Nalbuphine 0.1mg/kg on request). Patient was assessed every morning for pain need of analgesia. Feeding wad resumed and NG removed as soon as the ileus has settled and patient was assessed for discharge when he is able to tolerate diet, ambulant and require only oral analgesics. All patients received same Eradication of H.pylori therapy same instructions on discharge for return to work and normal activity and asked to document and remember the day of return to work. Patients were asked for follow up after 1-week, 2-weeks, 1-month, 3-month s

Table 1: Patient Demographics

| Characteristics | Laparoscopic Group | Open Surgery Group |
|-----------------------------------|--------------------|--------------------|
| Age in years | 54.7 | 54.9 |
| Weight in kg | 68.9 | 68.6 |
| Duration of symptoms (hours) | 25 | 26 |
| WBCs on admission (109/L) | 13(9-18) | 14(10-19) |
| Smoking (out of total) | 33(50) | 33(20) |
| Time of surgery (hours) | 2.5(2-4) | 2.0(1.5-3.5) |
| Shock on admission (out of total) | 0(50) | 5(50) |

Table 2: Post-operative Complications

| Characteristics | Laparoscopic Group | Open Surgery Group |
|-----------------|--------------------|--------------------|
| Wound Infection | 0 | 8 |
| Leakage | 0 | 3 |
| Pneumonia | 7 | 10 |
| Ileus | 4 | 3 |
| Death | 0 | 3 |

Table 3: Effect of Procedure on Outcome

| | | Paired Samples Statistics | | | |
|---------|--|---------------------------|----|----------------|-----------------|
| | | Mean | N | Std. Deviation | Std. Error Mean |
| Pair 1 | Age of laparoscopic group patients | 54.7400 | 50 | 10.67480 | 1.50965 |
| | Age of open group patients | 54.9000 | 50 | 10.66800 | 1.50868 |
| Pair 2 | Weight of laparoscopic group patients | 68.9400 | 50 | 5.92266 | .83759 |
| | Weight of open group patients | 68.5600 | 50 | 5.30752 | .75060 |
| Pair 3 | duration of symptoms in laparoscopic group patients | 4.0800 | 50 | 1.02698 | .14524 |
| | duration of symptoms in open group patients | 4.0800 | 50 | 1.02698 | .14524 |
| Pair 4 | Smoking in laparoscopic group patients | 1.3400 | 50 | .47852 | .06767 |
| | Smoking in open group patients | 1.3400 | 50 | .47852 | .06767 |
| Pair 5 | Shock in laparoscopic group patients | 2.0000 | 50 | .00000 | .00000 |
| | Shock in open group patients | 1.7600 | 50 | .43142 | .06101 |
| Pair 6 | Length of Hospital stay in laparoscopic group patients | 3.6000 | 50 | .49487 | .06999 |
| | Length of Hospital stay in open group patients | 4.8200 | 50 | .62890 | .08894 |
| Pair 7 | Complication of laparoscopic group patients | 1.8000 | 50 | .40406 | .05714 |
| | Complication of open group patients | 1.6400 | 50 | .48487 | .06857 |
| Pair 8 | Infections in laparoscopic group patients | 2.0000 | 50 | .00000 | .00000 |
| | Infections in open group patients | 1.8400 | 50 | .37033 | .05237 |
| Pair 9 | Leakage in laparoscopic group patients | 2.0000 | 50 | .00000 | .00000 |
| | Leakage in open group patients | 1.9400 | 50 | .23990 | .03393 |
| Pair 10 | Pneumonia in laparoscopic group patients | 1.8600 | 50 | .35051 | .04957 |
| | Pneumonia in open group patients | 1.8000 | 50 | .40406 | .05714 |
| Pair 11 | Ileus in laparoscopic group patients | 1.9200 | 50 | .27405 | .03876 |
| | Ileus in open group patients | 1.9400 | 50 | .23990 | .03393 |
| Pair 12 | Death in laparoscopic group patients | 2.0000 | 50 | .00000 | .00000 |
| | Death in open group patients | 1.9400 | 50 | .23990 | .03393 |
| Pair 13 | Post Op Pain in laparoscopic group patients | 2.2200 | 50 | .64807 | .09165 |
| | Post Op Pain in open group patients | 3.8200 | 50 | .59556 | .08423 |

and 6-months after surgery.

The end point that was assessed were operating time, post-operative pain and analgesia requirements, length of hospital stay, complications such as infection, ileus, chest infection and death.

Data collection was done by senior doctors. Operative time was defined by the time from incision to complete closure. All the complications either operative or non-operative were noted. At the surgical site the presence of pus or purulent discharge was considered as wound infection. Both clinical and radiographic evidence of pulmonary changes were used to label a patient having chest infections. The number of days in the hospital after surgery also includes the day

Table 3: Effect of Procedure on Outcome

| | | Paired Samples Statistics | | | | | | | | |
|---------|---|---------------------------|----------------|-----------------|---|----------|---------|----|-----------------|--|
| | | Paired Differences | | | | | | | | |
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | t | df | Sig. (2-tailed) | |
| | | | | | Lower | Upper | | | | |
| Pair 1 | Age of laparoscopic group patients - Age of open group patients | -.16000 | 16.89869 | 2.38984 | -4.96255 | 4.64255 | | | | |
| Pair 2 | Weight of laparoscopic group patients - Weight of open group patients | .38000 | 6.18058 | .87407 | -1.37650 | 2.13650 | .435 | 49 | .666 | |
| Pair 3 | duration of symptoms in laparoscopic group patients - duration of symptoms in open group patients | .00000 | 1.24540 | .17613 | -.35394 | .35394 | .000 | 49 | 1.000 | |
| Pair 4 | Smoking in laparoscopic group patients - Smoking in open group patients | .00000 | .60609 | .08571 | -.17225 | .17225 | .000 | 49 | 1.000 | |
| Pair 5 | Shock in laparoscopic group patients - Shock in open group patients | .24000 | .43142 | .06101 | .11739 | .36261 | 3.934 | 49 | .000 | |
| Pair 6 | Length of Hospital Stay in laparoscopic group patients - Length of Hospital Stay in open group patients | -1.22000 | .84007 | .11880 | -1.45874 | -.98126 | -10.269 | 49 | .000 | |
| Pair 7 | Complication of laparoscopic group patients - Complication of open group patients | .16000 | .61809 | .08741 | -.01566 | .33566 | 1.830 | 49 | .073 | |
| Pair 8 | Infections in laparoscopic group patients - Infections in open group patients | .16000 | .37033 | .05237 | .05475 | .26525 | 3.055 | 49 | .004 | |
| Pair 9 | Leakage in laparoscopic group patients - Leakage in open group patients | .06000 | .23990 | .03393 | -.00818 | .12818 | 1.769 | 49 | .083 | |
| Pair 10 | Pneumonia in laparoscopic group patients - Pneumonia in open group patients | .06000 | .54995 | .07778 | -.09630 | .21630 | .771 | 49 | .444 | |
| Pair 11 | Ileus in laparoscopic group patients - Ileus in open group patients | -.02000 | .37742 | .05338 | -.12726 | .08726 | -.375 | 49 | .709 | |
| Pair 12 | Death in laparoscopic group patients - Death in open group patients | .06000 | .23990 | .03393 | -.00818 | .12818 | 1.769 | 49 | .083 | |
| Pair 13 | Post Op pain in laparoscopic group patients - Post Op pain in open group patients | -1.60000 | .92582 | .13093 | -1.86312 | -1.33688 | -12.220 | 49 | .000 | |

of surgery. Patients having symptoms for more than 24-hours before admission were included in delayed presentation. Data were collected and were retrospectively entered into a SPSS version 20. Pre-operative data included of the patients, history, physical examination, and laboratory and imaging findings.

Result:

There was no difference in age, weight, duration of symptoms. Of the 50-patients treated laparoscopically, and 50-treated with open repair. Smoking was almost similar between the 2-groups. The median operating time of the laparoscopic patch repair was significantly longer

than the open procedure 2.5 hours [range, 2-4 hours] vs 2.0 hours [range, 1.5-3.5 hours]. One patient in the laparoscopy group underwent conversion to an open procedure. The reasons for conversion was large perforations (diameter > 6 mm) and patients with shock were not operated laparoscopically.

There was a difference in morbidity and mortality between the laparoscopy and open surgery groups. There was a wound infection occur in 10-patients operated by open repair as compare no wound infection in laparoscopic repair. 3-leakage occur in open group no leakage in laparoscopic group. Pneumonia occur in 10-patients of open group 7 in laparoscopic group. Il-

eus was almost equal in both groups and 3-death occurred in open group and no death in laparoscopic group.

P-value signify laparoscopic repair of duodenal ulcer perforation repair as compare to open group with average of hospital stay that was less than in the laparoscopy group (3.7-days [range, 3-5]) as compare to open surgery group (5-days [range, 4-6]). The requirements of analgesics specially opiates analgesic was less in the laparoscopy group as compare to open surgery group and pain was less in patients undergoing laparoscopic group as compare to open group. Complications were less patients in laparoscopic group as compare to open group.

Discussion:

With the use of PPIs and H2 receptor blockers and new advances in eradication of H.Pylori the use of surgery for peptic ulcer except perforation has decreased but the frequency of perforation is still high specially in elder female due to excessive use of NSAIDs.¹⁰ With laparoscopy use for peptic ulcer disease it is feasible for easy closure of duodenal ulcer perforation and it has been seen in large number of trials.¹¹⁻¹³ This minimally invasive approach is very helpful as simple patch closure with H2 receptor blocker has been shown that less than 20% require any other surgery.

A study done by Sebastian et al.¹⁴ and Tokunaga et al¹⁵ showed that H. pylori infection is present in 83% to 90% of patients with perforated ulcers, and addition of H.Pylori eradication has even further reduce number of patients requiring any other surgery regarding acid suppression. The use of laparoscopy has shown advantages in many other procedures. Laparoscopy is not only helpful in reducing post-operative pain it is also helpful in early oral intake, short hospital stay and early return to work. Also it is advantageous in reducing trauma to abdominal wall and good cosmetic results as compare to open technique as large abdominal incision in patients with peritonitis results in post-operative wound infection and incisional hernia in 15% patients.¹⁶

Additional benefit is its diagnostic efficacy as routine use of laparoscopy for peritonitis any additional concomitant pathology can be detected with this. And good thorough cleaning could be done and it causes decrease in intra-abdominal abscess as compare to 15% reported in patients managed conservatively reported by Crofts et al.¹⁷ Main concern in laparoscopy is the longer operative time. But some surgeons are using gelatin plugs to seal the perforation which has showed good results. One major concern in laparoscopy is the spread bacteraemia and endotoxemia due to high insufflation and experiments on animals like pigs having peritonitis in which laparoscopy done after 12-hours has showed increase incidence bacteraemia and endotoxemia as compare to open group¹⁸ Lau et al,¹⁹ which depict that laparoscopy should be done early to prevent bacterial relocation and endotoxemia. Second major concern is laparoscopy performed in patients who presented with shock. Laparoscopy done in these patients shown increase chance of conversion to open and poor post-operative course as compare to open. This situation shows selection of patients should be done with great care.

Conclusion:

This study reflects that laparoscopic repair for duodenal ulcer perforation is more beneficial and safe as compare to open repair. But its use should be for selective patients and selective cases. The open method should be done in patients presenting with shock on admission. The patients having symptoms more than 24-hours should be done with open procedure as laparoscopic approach has a increase chance of conversion to an open approach.

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Role and contribution of authors:

Dr. Farhan Tahir, collected the data, references and helped in discussion writing.

Dr. Abdur Rehman Alvi, collected the data, references and did the initial writeup.

Dr. Mobeen Adnan, collected the data and helped in introduction writing.

Dr Muhammad Mussadiq Jafri, helped in references and critically review the article.

Dr Ahsan Rehman, helped in collectino of data and references.

Dr Amin Warraich, helped in collection of data and also helped discussion writing.

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