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Original Research Article

Feasibility of laparoscopic repair of peptic ulcer perforation

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ABSTRACT

Background: Perforation is a common complication of peptic ulcer disease and presents as Perforation peritonitis. It has the highest number of mortality among all complications (≈15%). In spite of modern progress in the management, it is still a life-threatening catastrophe. Emergency surgery for complicated cases required in 7% of hospitalized peptic ulcer disease patients. Factors such as >24 hours of history, concomitant disease, shock, post operated wound infections, all are associated with increase in mortality and morbidity.
Methods: A Prospective, observational, single hospital base study done during the period from 2016 to 2020 in the Department of Surgery, Gandhi medical college Bhopal. Sample size was taken 63
Results: 52 out 63 cases presented with perforation peritonitis included under study period, 11 cases were excluded due to death and absconding of cases. In rest 52 cases, 15 of them went through laparoscopic repair, 28.85% of the cases were shifted directly to ORG.
Conclusions: Laparoscopic repair of peptic ulcer perforation is feasible if patient presents early to the hospital. All perforation peritonitis should give fair chance to repair laparoscopically if patient's general condition and anesthetic permits. This is a good alternative for conventional open surgery with less post-operative pain, early return to normal activities, less hospital stays and few postoperative wound infections. Thus it can significantly decrease the economic burden.

Keywords: Peptic ulcer disease, Laparoscopic peptic perforation repair, Gastrointestinal, Laparoscopic repair group, Open repair group

INTRODUCTION

Perforation is a common complication of peptic ulcer disease and presents as Perforation peritonitis. It has the highest number of mortality among all complications (≈15%). In spite of modern progress in the management, it is still a life-threatening catastrophe. Crisp had first described the symptomatology of a perforated ulcer (1843).[1] Incidences of Emergency surgery, Hospital admission and mortality for peptic ulcer perforation had remained stable through last two decades. Emergency surgery for complication required in 7% of hospitalized peptic ulcer disease patients.[2] Factors such as >24 hours of history, concomitant disease, shock, post operated wound infections, all are associated with increase in mortality and morbidity.[3]

Open repair with G patch omentopexy (Graham-Steel) remains the Conventional method of management since years. It is having very good outcome, but is associated with more post operative complications like long post-operative pain, long post-operative hospital stay, surgical site infections, wound dehiscence.[5,6] Laparoscopic repair of prepyloric perforation is well accepted management at present and having better future prospective.

Though laparoscopic peptic ulcer perforation repair is feasible, effective and decreases morbidity it is associated with some of the factors that limits its possibilities and as regular surgery option.[17] The purpose of the present study is to evaluate the feasibility and difficulties in laparoscopic repair of peptic ulcer perforation without compromising the quality and efficacy with respect to conventional open repair in our set up (Department of General Surgery, Gandhi Medical College, Bhopal, M.P.).

Laparoscopic repair of perforated peptic ulcer is having following advantage

Better/magnified visualization of peritoneal cavity. Accessibility of thorough peritoneal lavage. Low intra operative and post-operative complications.[6,7,10,11] It is as safe, effective and feasible.[5,9,17] Less post-operative pain/less requirement of post-operative analgesia.[4,5,8-12,15,18] Minimal unwanted bowel handling / less chances of post-operative adhesions.[10] Cosmetically better results.[10] Less operating time.[7,11] Early mobilization, less hospital stay and early return to work.[3,8,9,11-15] Less abdominal wall complication (wound infections, burst in abdomen).[4] Lower morbidity and mortality.[3,8,11,12,16,17]

METHODS

Study design

This study was prospective, observational.

Study period

Duration of the study was from October 2016 to October 2020.

Study place

This study was placed on Department of Surgery, Gandhi Medical College, Bhopal, (M.P.).

Sample size

Sample size of the study was 63 patients.

A total of 63 cases were admitted in ward with diagnosis of perforation peritonitis during the period of study. Due to death and absconding, 11 cases were excluded from study. Remaining 52 cases were tried to include for laparoscopic repair (LRG). But only 15 cases were able to go for successful laparoscopic repair, although one of them was found to be illeal perforation which was dealt with extra corporeal suturing. Among rest 37 cases excluded from LRG due to suspicion of other hollow viscera perforation, late presentation of cases, difficulty in general anesthesia (due to shock, respiratory distress, technical), unavailability of surgeon. They were managed by standard conventional open perforation repair. Only 14 (excluding 01 illeal perforation) out of 63 cases were successfully repaired for peptic ulcer perforation which were considered in LRG and remaining 37 in ORG.

Inclusion criteria

All patients presenting early (<5 days of onset) with perforation peritonitis and who are documented radiologically and vitally stable shall be included in the study. Patients diagnosed to have Giant peptic peptic ulcer perforation shall be managed laparoscopically.

Exclusion criteria

Contraindications of pnuemoperitoneum: congestive cardiac failure, respiratory distress, signs of acid-base imbalance. Patients who are not suitable from anesthesia.

Operating technique

Fully prepared patient with valid consent shifted to operation theater.

Patient is carefully positioned supine with both arms and legs close to midline of body and secured over operation table. The surgeon and first assistant stand on left side of patient. Second assistant stands by right side of patient with monitor and laparoscopic unit besides him. The instrument table is easily accommodated at foot of table and scrub nurse on left side of patient beside first assistant (Figure 1). Operating table is taken in Reverse Trendelenburg position (tilted head up by 100 to 150) during surgery to make stomach and greater omentum to hang freely downwards for easy localization of perforations. In all cases General Anesthesia is given.

After proper scrub, painting and draping of patient is done.

After making incision over umbilicus and separation of linea alba with 10 mm trocar with sheath is pushed inside gently under direct visualization to avoid any viscus injury (Hassan technique). Possible suction and drainage is done. Now CO2 Insufflator is connected to 10mm port and pnuemoperitoneum is created with a flow rate of 4-6 L/min for an intra-abdominal pressure of about 8-12 mmHg.

Insertion of ports- right subcostal 5 mm port in the right mid clavicular line, two finger breath above the umbilicus. Another left subcostal 5 mm port medial to left mid clavicular line which is also two finger breath above umbilicus to make “diamond of success” for the working port.[11] An extra 5 mm port is inserted at umbilical region, between umbilical and left port to provide traction over stomach (Figure 2). Sometime Pan-liver retractor may be passed for providing traction over liver from this port.

Diagnostic laparoscopy

After peritoneal lavage, the localization of peptic ulcer perforation and all the accessible solid and hollow (gut walk) organs is done. A suitable patch of omentum with fair vascularity identified and placed in right paracolic gutter for ongoing peptic ulcer perforation repair.

After assessing the size of peptic ulcer perforation, freshening of ulcer margins done. Alternate Silk 2-0 and Vicryl 2-0 round body sutures are passed (Figure 3). For easy identification of suture, first suture is kept over anterior liver surface (Figure 4). Subsequently further suture passed and is spatially arranged. Now the omentum placed in the right paracolic gutter is taken out and passed under these sutures (Figure 5) and tied (G patch Omentopexy; Figure 6).

Peritoneal lavage is repeated. Single subhepatic abdominal drain is passed from right port (subcostal) entry. Occasionally a second pelvic abdominal drain passed through left port entry and fixed to skin by Silk 2-0 cutting body.

Sterile dressing of surgical incision wound is done.

After successful reversal from general anesthesia, stable patient is shifted to ward.

All patients were put on antibiotic, proton pump inhibitors.

All the laparoscopic peptic ulcer perforation were recorded as soft copy, hard copy and videographically, and reviewed by surgical team in all cases. Other remaining cases went through conventional open repair.

RESULTS

This prospective, observational study was carried out in the Department of Surgery, Gandhi Medical College, during the period from October 2016 to October 2020.

Table 1: Age distribution of patients in the study.

Age (Years)	Cases (%)
<20	02 (3.85)
20-29	12 (23.08)
30-39	10 (19.23)
40-49	16 (30.80)
50-59	05 (9.62)
60-69	05 (9.62)
>70	02 (3.85)

Type of perforation

63 cases presented with perforation peritonitis were included under study period. Amongst them 11 cases were excluded due to death and absconding of cases. In rest 52 cases 42 (80.77%) were found to be peptic ulcer perforation and 10 (19.33%) were other GI causes. Amongst them 15 cases went through laparoscopic repair, one of them was found as illeal perforation during laparoscopic exploration and closed extra corporeally.

Table 2: Unfavorable factors for laparoscopic repair.

Unfavorable factors for laparoscopic repair		Cases
Patient Factors	Late presentation	4 (7.69%)
	Deranged CBC / RFT	4 (7.69%)
	Shock	3 (5.77%)
Anesthesia Factors	Respiratory distress	3 (5.77%)
	Technical difficulties	1 (1.92%)
Surgeons Factors	Unavailability / Reluctance	7 (13.46%)
	Suspect of other GI perforations	15 (28.85%)

Table 3: Intra operative complications.

Intra operative complication	Open	Laparoscopic
Respiratory difficulties	00	00
Cardiovascular instability	00	01
Technical difficulty	00	02
Other	00	00
Total	00/37	03/14

Table 4: Success rate.

Laparoscopic repair done	Conversion to open	Total
11	03	14

Sex ratio

Among the understudy 52 cases presented with perforation peritonitis 51 (98.08%) are Male and 01 (1.92%) are Female.

Age distribution

In 52 cases, of perforation peritonitis the age of the patients varied from 14 years to 72 years. Maximum number cases, 16 (30.80%) of patients were in 40-49 year age group. Mean age of presentation was 39.59±14.73 years.

Among 52 cases only 15 cases were able to go through laparoscopic repair, rest 37 cases had following difficulties and were not able to go through laparoscopic repair.

Among the 14 cases there was difficulty in stabilizing traction over stomach for perforation repair in first 02(14.29%) cases. In a single case (7.14%) there was intra-operative fluctuation of blood pressure.

Table 5: Day wise assessment of patient activity.

Mobilize (6.55± 1.81)	Bowel sounds (3.36± 0.67)	Oral sips (4.27± 0.65)	Soft diet (5.55± 1.04)	Drain Out (5.91± 1.22)	Discharge on POD (8.18± 2.04)
6th hour	3rd	4th	6th	7th	10th
10th hour	5th	5th	7th	8th	10th
8th hour	3rd	6th	8th	8th	12th
6th hour	3rd	4th	5th	6th	10th
6th hour	3rd	4th	5th	5th	7th
6th hour	3rd	4th	5th	5th	7th
8th hour	4th	4th	5th	5th	6th
8th hour	4th	4th	5th	5th	6th
6th hour	3rd	4th	5th	6th	8th
4th hour	3rd	4th	5th	5th	8th
4th hour	3rd	4th	5th	5th	6th

Table 6: Post-operative complications.

Post operative complications	Open	Laparoscopic
Respiratory complications	04 (7.67%)	01 (1.92%)
Cardiovascular complications	00	00
Intra peritoneal collections	03 (5.77%)	00
Surgical / Port site Infections	03 (5.77%)	00
Wound Dehiscence	02 (3.85%)	00
Leak / Fistula	01 (1.92%)	00
Deaths	02 (3.85%)	00
Total	15 (28.85%)	01 (1.92%)

For all 03 intra-operative complications, conversion of laparoscopic repair to Conventional Open repair was done. There was no as such difficulty except the reason for which conversion was opted for conventional open repair group.

Among the 14 cases the Success rate was 78.57% cases and mean conversion rate was 21.43%. The overall success rate was 11/52=21.15%. All converted cases dealt with standard open repair and considered under ORG limb.

On 7th post-operative day sonography among the 11 LRG cases was done, only a single (9.09%) patient developed bilateral mild pleural effusion(L>R) which was cured simultaneously by stepping up the antibiotics. There was no or mild intra-peritoneal collection amongst all the patients. There were no cases with observation of any Port Site Infection, Wound Dehiscence, or Leak during the stay in hospital. All cases did well in follow up visit after a week. In ORG, 15(40.54%) develop various post-operative complication.

DISCUSSION

Though there is better medical management for peptic ulcer disease but in case of peptic ulcer perforation, surgery is the only method for cure. Till date, conventional Open repair is frequently done which has good results but is associated with post-operative complications. But in this era of Minimal Access Surgery, patient's demand is to get back to work early as well as minimal scar surgery. Therefore, Laparoscopic method for repair is gaining popularity day by day. Results with laparoscopic surgery are also comparable to open with less post-operative complications, less post-operative hospital stay and less economic burden.

After excluding other GI perforations from 52 cases, 42 cases entered in final analysis. There were 41 males and 01 female. Age of cases varied between 14-72 years with median age of presentation 39.59±14.73 years. Laparoscopy offered correct diagnosis in all cases. Out of 14 Laparoscopic repair, there were 11 (78.57%) successful repair but the overall success rate is 21.15%. Among ORG 04 (9.52%) and 01 (2.38%) in laparoscopic repair develop respiratory difficulties. Morbidity like intra peritoneal collection 03 (7.14%), surgical site infections 3 (7.14%), wound dehiscence 2 (4.76%) occur only in ORG. There were 02 (4.76%) mortality in ORG and no mortality in LRG.

From our study, laparoscopic repair of peptic ulcer perforation is feasible and is the demand of present time. Following studies shows feasibility of laparoscopic repair- in a study by Schirru et al found laparoscopic repair of perforated ulcer is technically feasible in abdominal emergencies also but require sound experience.[5] According to Matsuda et al after a little expertise laparoscopic repair of peptic ulcer perforation is an attractive alternative to open surgery.[7,18-23] In an another study done by Wadaani et al laparoscopic repair of peptic ulcer perforation is an amenable and feasible

technique within the hands of experienced surgeon when the cases are early and properly diagnosed.[18] But they do not tell about the difficulties which they face during the study. In our study 37 cases were not able to go through laparoscopic repair because in 15 (28.85%) cases there were suspicions of other GI perforation which can be ruled out by taking proper detailed history, examination of content of naso gastric tube and although confusion persisted, at least once try to put laparoscope to find out site of perforation. In 07 (13.46%) cases there were unavailability of surgeons due to summer (June-July 2014) vacations, which can easily sort out by having more trained surgeons instead of depending over single one. There were some difficulties which were encountered by anesthetics such as 03 (5.77%) cases presented with respiratory distress and 01 (1.92%) case was cancelled due to unavailability of EtCO2 for intra-operative monitoring. In other 11 cases, patient factors such as delayed presentation in 7.67% cases, deranged CBC/RFT in 7.67% cases, presentation with shock in 5.77% cases made them non amenable for laparoscopic repair.

In our study we found that there are few intra-operative difficulties 3 (21.43%) in LRG. There was difficulty in attaining traction over stomach to localize perforation in first 2 (14.9%) LRG cases. And a single LRG case (7.14%) was with intra-operative hemodynamic instability. Amongst all 3 (21.43%) LRG cases there are conversion to open repair with a conversion rates of 21.43%.[24] With previous incidences, in one case stabilization of stomach was done by applying suture traction over antrum and tied to anterior abdominal wall. In two cases Panliver retractor was applied for traction over liver to localize perforation. In rest of cases traction over antrum with atraumatic bowel grasper is sufficient and routinely done in rest cases. There was early mobilization of cases, 6.55±1.81 hours after surgery, there was start of early feeding in 5.55±1.04 days and early drain out on 5.91±1.22 days in LRG. In few early cases, patient discharges were delayed even though no complication were reported just for better post-operative evaluation, but it increased the hospital stay and were comparable to open repair. Among 11 cases in LRG there were post-operative complications in a single case (9.09%) in which bilateral mild pleural effusion (L>R) appeared on 7th postoperative day in ultrasonography. The case was shifted to higher antibiotics and chest physiotherapy. Later on, on 12th postoperative day, ultrasonography was repeated which showed resolution of pleural effusion in this particular case. There was less post-operative stay of about mean 8.18±2.04 days in LRG. There were no postoperative complications like Surgical Site Infection, Wound dehiscence, Leak or Fistula in LRG. A study by Ellatif et al also says that early resume to oral intake, less hospital stay, less postoperative complications.[23] But there was no conversion to open. In another study by Wadaani et al there was mean hospital stay of 75±12.6 hours. Conversion rate=4.3%.[18] Study by Vaidya et al shows there were conversion to open due to technical difficulties.[21] In a study by Schirru et al there were mean hospital stay 9 days comparable to our results.[5] In study conducted by Lunevicius et al there were 23.3% that had converted to open, post-operative complication in 13.3%.[22] And there were no mortality which similar to our results.

CONCLUSION

Total 52 out 63 cases presented with perforation peritonitis included under study period, 11 cases were excluded due to death and absconding of cases. In rest 52 cases, 15 of them went through laparoscopic repair, one of them was found to have illeal perforation during laparoscopic exploration and was closed extra corporeally. In remaining 37 cases, there was confusion in whether the perforation peritonitis was due to peptic ulcer or other GI causes. 28.85% of the cases were shifted directly to ORG limb and revealed peptic ulcer perforation in 9.62% of them during open repair. This could have been sorted out by detailed history or at least one trial of diagnostic laparoscopy to localize perforation which was not possible due to our reluctance. In other 13.46% cases due to unavailability of laparoscopic surgeon, cases directly landed up into ORG limb. This can be overcome by making laparoscopic surgeons team and by not depending solely on single surgeon. While comparing the two groups Intra-operative difficulties like technical difficulty in stabilization of stomach for localization of ulcer and hemodynamic instability for which conversion to open was done with a Conversion rate of 21.43%. These difficulties were later rectified. There was postoperative complication with appearance of bilateral mild pleural effusion in single case (2.38%). There was no postoperative complication like Surgical Site Infection, Wound dehiscence, Leak or Fistula and no mortality in LRG. In ORG there were higher morbidity due to respiratory complications (7.67%), intraperitoneal collections (5.77%), Surgical site infections (5.77%), Wound dehiscence (3.85%), repair Leak (1.9%) and even Death (3.85%) cases. We can conclude that laparoscopic repair of peptic ulcer perforation is feasible if patient presents early to the hospital. Patient should be attended by experienced surgeons team. A thorough history and examination should be done to find out the cause and the type of perforation. The Operating room should be well functional and must have all the required instruments. The case should be thoroughly discussed with Anesthetics for early priming. All perforation peritonitis should give fair chance to repair laparoscopically if patient's general condition and anesthetic permits. This is a good alternative for conventional open surgery with less post-operative pain, early return to normal activities, less hospital stays and few postoperative wound infections. Thus it can significantly decrease the economic burden.

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