

A Comparative Study of Surgical Outcome in Patients of Perforation Peritonitis with or Without Preoperative Drain InsertionShourabh Sinha¹, Amandeep Singh², Arzoo³, Sudhir Khichi⁴, Haramritpal Kaur⁵, Navkiran Kaur⁶, Sunandan Singla⁷¹Assistant Professor, Department of General Surgery, GGSMCH Faridkot, Punjab, India²Associate Professor Department of General Surgery, GGSMCH Faridkot, Punjab, India³Senior Resident, Department of General Surgery, GGSMCH Faridkot, Punjab, India⁴Professor Department of General Surgery, GGSMCH Faridkot, Punjab, India⁵Associate Professor Department of Anaesthesia, GGSMCH Faridkot, Punjab, India⁶Assistant Professor, Department of Obstetrics and Gynaecology, GGSMCH Faridkot, Punjab, India⁷Junior Resident, Department of General Surgery, GGSMCH Faridkot, Punjab, India

Received: 30-05-2023 / Revised: 30-06-2023 / Accepted: 30-07-2023

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Conflict of interest: Nil

Abstract:**Background:** The aim of this study was to assess the role of primary peritoneal drainage (PPD) in patients of perforation peritonitis, who were unfit for general anaesthesia (GA) prior to exploratory laparotomy and definitive procedure. Furthermore to evaluate its role in patient survival and complication prevention.**Method:** It is a prospective comparative study done on 60 patients with confirmed diagnosis of perforation peritonitis at tertiary care hospital. Patients were divided into two groups of 30 each as per inclusion and exclusion criteria. Study group was subjected to PPD under local anaesthesia.**Result:** In the present study the average age of patients was 39.1 years. The male to female ratio was 4.5:1. The most affected site was ileum (42%). Postoperative complications like SSI, wound dehiscence, drain site infection with the use of PPD was though lesser as compared to without PPD, but it was statistically insignificant. Overall mortality rate was 27%, whereas with PPD it was 13% and 20% without it. Post-operative hospital stay was more or less the same in both the groups.**Conclusion:** Use of PPD under LA in patients of perforation peritonitis is a low cost intervention not requiring higher degree of surgical expertise. It can be used prior to definitive exploratory laparotomy for hemodynamic stabilization and resuscitation of sick patients who would not tolerate GA. Though use of PPD is not a definitive alternative to standard surgical procedure but it provides surgeon with a prospect to stabilize critically ill patient by draining the toxic fluid. Its can find extensive applicability resource deficient country.**Keywords:** Primary peritoneal drainage, General anaesthesia, Exploratory laparotomy, Perforation peritonitis.This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

Perforation peritonitis is one of the most common surgical emergency conditions encountered in surgical practice world over, India and this part of country is no exception to it. [1] In the Indian subcontinent perforation peritonitis most commonly affects males in their forties of their life with a male to female ratio of 5:1. [2] The perforations of proximal gastrointestinal tract were six times as common as perforations of distal gastrointestinal tract as has been noted in earlier studies from India, which is in sharp contrast to studies from developed countries like United States.[3,4] The increasing incidence of post-traumatic gastro-enteric injuries may be due to an increase in high speed motor vehicle accidents which warrant early recognition and prompt treatment to avoid serious complications and

death.[5] Successful treatment requires a thorough understanding of the pathophysiology of this disease process and in-depth knowledge of the therapy including resuscitation, antibiotics, source control and physiologic support.[6] Perforation peritonitis has a high mortality rate ranging between 6 and 27 %.[7,8] Factors contributing to the high mortality include advanced age, late presentation, septicemia, associated co-morbid conditions and delay in the treatment.[9] Up to the early part of the 19th century non-operative management was mainstay of treatment. But since late nineteenth century when the first operative treatment of gastric perforation was done successfully the non-operative management fell into disrepute because of their high morbidity and mortality.[10] The immediate laparotomy under

general anesthesia is not recommended in patients of high-risk status in whom general condition is not improving even after following intensive resuscitative protocols. Many substitute to immediate laparotomy recommended are primary peritoneal drainage (PPD), laparoscopic sanitation, Taylor's conservative method, laparostomy and planned re-laparotomies.[11-14] Primary peritoneal drainage under local anesthesia has long been established as definitive approach of management in infants with necrotizing enterocolitis associated peritonitis but its use in adults is still under debate.[15,16] There is paucity of surgical literature on the role of primary peritoneal drainage under local anesthesia in critically ill adult patients of generalized peritonitis. Therefore, this study was undertaken with objective to assess the benefits of primary peritoneal drainage under LA in critical ill patients to prevail over unfavorable effects of immediate laparotomy and general anesthesia.

Methods

This prospective comparative study was conducted in the Department of General Surgery at tertiary care hospital from 1st January 2019 to 31st October 2020 after clearance from Institutional Ethical Committee. Sixty eligible patients of either gender with confirmed diagnosis of perforation peritonitis were included in the study using convenient sampling technique. These patients were divided into Group A and Group B.

In Group A including 30 patients, preoperative drain insertion was done and in Group B including 30 patients, no drain insertion was done before definitive surgery. The informed consent was taken from all patients before preoperative drain insertion. A computerized generated random table was used for allocation of participants. Patient with confirmed diagnosis of perforation peritonitis and age group 18-65 years of either gender were included in study. While patients with significant medical disease (e.g. Diabetes Mellitus, Ischemic Heart Disease), immunocompromised patients, patients with primary peritonitis or spontaneous bacterial peritonitis (e.g.cirrhosis) and history of multiple previous abdominal surgeries were excluded.

Post patient selection into respective group initial resuscitation was started followed by peritoneal drain insertion in group A patients. Further the patient's vitals were monitored and recorded as performa of the study. Preoperative screening was done. Patients were subjected to detailed history and clinical examination, complete hemogram, coagulation profile, renal functions tests, liver function tests, viral markers, serum electrolytes, x-ray chest, x-ray abdomen, usg abdomen were done. Operative Technique Site and type of incision was

dependent on clinical suspicion and ultrasonography. Drain insertion was performed under local anesthesia through a 2-2.5cm long incision on either flank. The external oblique aponeurosis, internal oblique, and transversus abdominis was splitted under vision with the help of artery forceps. Upon entering the peritoneal cavity, the index finger was swiped in all direction to allow protection and good drainage. Two wide bored intra-abdominal tube drains of 32 F were placed in either flank through these incisions. One drain was kept towards the pelvic cavity and the other in upward direction. Pus/fluid/bile was evacuated and collected for culture and sensitivity. After drain insertion, the patients were watched closely. Their pulse, temperature, blood pressure, respiratory rate were recorded hourly. After full resuscitation, within 24 hours, all patients were subjected to standard laparotomy for definitive surgical procedure.

Post procedure analysis was made in terms of post-operative early complications including surgical site infection, mortality, drain site infection, anastomotic leak, wound dehiscence, total duration of hospital stay. The patients were followed up upto 4 weeks for any late complication like stoma prolapse, stoma retraction, para-stomal skin excoriation, parastomal hernia, fecal fistula, adhesive bowel obstruction, incisional hernia etc.

After completion of the study, observations obtained were tabulated, analyzed and evaluated using statistical methods. Statistical testing was conducted with the statistical package for the social science system version 17.0. Continuous variables were presented as mean[±] SD or median if the data was unevenly distributed. Categorical variables were expressed as frequencies and percentages. The comparisons of normally distributed continuous variables between the groups were performed using Student's t test. Nominal categorical data between the groups were compared using Chi-Square test or Fisher's exact test as appropriate. Non-normal distribution continuous variables were compared using Mann Whitney U test. For all statistical tests, a p value less than 0.05 was taken to indicate a significant difference.

Results

In the present study a total of 60 patients (n=60) were included in the study. Patients were randomized in two groups comprising of 30 patients each. Group A (n=30) included patients with preoperative intraperitoneal drainage under local anaesthesia. Group B (n=30) included patients without preoperative intraperitoneal drainage, before definitive surgery. Both the groups were comparable in terms of age and gender distribution (Table 1).

Table 1: Demographic characteristics (n=30)

Parameter	Group A	Group B	Total	P value
Age in years	40.4 ± 13.6	37.8 ± 14.8	39.1±14.2	0.27
Gender Male: female	6.5:1 (26:4)	5.2:1 (23:7)	4.5:1 (49:11)	0.34

The most common site of perforation in this study was ileum whereas least cases were of jejunum and colon perforation (Table 2). Primary repair was done in 39 cases and 21 cases required stoma formation (Table 3). The difference between both the groups was statistically insignificant with respect to type of surgery.

Table 2: Site of Perforation Observed Intraoperatively

Site of perforation	Group A	Group B
Gastric	7 (23%)	7 (23%)
Duodenum	9 (30%)	8 (27%)
Jejunum	1(3%)	1 (3%)
Ileum	12 (40%)	13 (43%)
colon	1 (3%)	1 (3%)
total	30	30

Table 3: Type of surgery

Type of surgery	Group A	Group B	P value
Primary Repair	21(70%)	18(60%)	0.41
Stoma	9(30%)	12(40%)	

There were 6(20%) cases surgical site infection in Group A and 9(30%) cases in Group B. Drain site infections were observed in 3(10%) cases in Group A and in 5(17%) cases in Group B. A total of 3 cases of anastomotic leak were observed in this study. Out of these, 1(3%) case was in Group A which was managed conservatively, and 2(7%) cases in Group B, one of which was managed conservatively and one required re-exploration. Wound dehiscence was observed in a total of 7 cases in this study. Out of these 2(7%) cases were in Group A and 5(17%) were in Group B. All the cases of wound dehiscence were managed with secondary closure. In respect of early complications the results were statistically insignificant (Table 4). There were 10 patients who required inotropic support of which 4(13%) were in group A and 6(20%) were in group B. As far as the requirement of inotropic support in both the groups result was statistically insignificant. A total of 10(17%) cases required post-op mechanical ventilation. In Group A, 4(13%) patients required

postoperative mechanical ventilation requirement and in Group B, 6(20%) patients required mechanical ventilation after surgical exploration. The number of patients who required post-operative ICU care in Group A was 6(20%) with an average duration of ICU stay of 3.67 ± 2.16 days.

The number of patients in Group B that required post-OP ICU care was 8(27%) with an average duration of ICU stay of 4.37 ± 3.06 days. Again results were statistically insignificant while comparing for post op ICU stay. In Group A, the mean duration of hospital stay was observed to be 11.27 ± 5.66 days while in Group B, the mean duration of hospital stay was observed to be 12.06 ± 5.33 days and result was found to be statistically insignificant. The total number of mortalities observed in this study was 10(17%).The number of mortalities observed in Group A was 4 (13%), whereas, in Group B was 6(20%) which were statistically insignificant on applying Pearson's chi square test.

Table 4: Postoperative stay and complications

Variables	Group A	Group B	Total	P value
Early complications				
Surgical Site Infection	6 (20%)	9 (30%)	15(25%)	0.37
Drain Site Infection	3 (10%)	5 (17%)	8(13.4%)	0.45
Anastomotic Leak	1 (3%)	2 (7%)	3(5%)	0.55
Wound Dehiscence	2 (7%)	5 (17%)	7(11.7%)	0.22
Stoma Necrosis	0	0	0	
Stoma Prolapse	1 (3%)		1(1.7%)	0.31
Stoma Retraction	0	1 (3%)	1(1.7%)	0.31
Post-operative inotrope support requirement	4 (13%)	6 (20%)	10(16.7%)	0.48
Post-operative mechanical ventilation	4 (13%)	6 (20%)	10(16.7%)	0.48
Duration of icu stay (Mean Duration ±SD (in days))	3.67 ± 2.16	4.37 ± 3.06	4.07±2.64	0.51
Duration of hospital stay (Mean Duration ±SD (in days))	11.27 ± 5.7	12.06 ± 5.3	11.7±5.5	0.36

Mortalities	4 (13%)	6 (20%)	10(16.7%)	0.48
Late complications (after 4 weeks of follow up)				
Incisional hernia	2 (7%)	3 (10%)	5(8.4%)	0.64
Stoma prolapsed	0	1 (3%)	1(1.7%)	0.31
Stoma retraction	0	0	0	
Para-stomal skin excoriation	3 (10%)	4 (13%)	7(11.7%)	0.68
Parastomal hernia	0	0		
(after 8 weeks of follow up)				
Fecal fistula	0	0	0	
Adhesive bowel obstruction	0	0	0	

After a follow up of 4 weeks, late complications were observed. Incisional hernia was seen in 2(7%) cases in Group A, whereas it was seen in 3(10%) case in Group B. The results were statistically insignificant. Late complications such as fecal fistula and Adhesive bowel s obstruction were not observed in any case in this study after 8 weeks follow up.

Discussion

Perforation peritonitis is one of the frequent surgical conditions faced by surgeons and is a common cause of morbidity and mortality which requires prompt surgical procedure.[17] In majority of the cases peritonitis becomes diffuse when it occurs in patients with gastrointestinal perforation, extremes of age, immunodeficiency, and following trauma.[18] In spite of a better knowledge of pathophysiology, advances in diagnosis, antimicrobial therapy, surgery and intensive care support, peritonitis remain a extremely fatal ailment and mortality increases with delay in definitive surgery.[7,19]

As these patients are critically sick and often not stabilized hemodynamically even after resuscitation for 2-4 hours, anaesthetists often refuse for general anesthesia considering the high risks for continued postoperative ventilator support and perioperative mortality. Hence there is often a delay of about 12 to 36 hours for any definitive surgical intervention. In view of the well-known increased mortality rate with increasing delay for definitive surgery secondary to contained toxic load within the abdominal cavity, and to evaluate the efficacy of primary peritoneal drainage (PPD) under local anaesthesia during the waiting period for definitive surgical treatment, the present study has been conducted to compare the outcome in patients of perforation peritonitis with and without primary peritoneal drainage before surgical exploration.[20]

In the present study, Majority i.e., 49 (82%) patients were males and 11(18%) patients were females. Male to female ratio in study group was 4.5:1. (Table 1) The mean age of patients in this study was 39.1 ± 14.2 years. (Table 1) Jhobta et al conducted a study with 504 patients of perforation peritonitis, in which the mean age of patients was 36.8 years with majority of patients

being males (84%).[5] Similar to ours, study conducted by Finan et al concluded that perforation peritonitis most commonly affects males in their forties of their life with a male to female ratio of 5:1.[2]

In our study, majority of patients were found to have perforation in small bowel (ileum 42%, duodenum 28%, jejunum 3%) followed by stomach (23%) and colon (3%). (Table 2) Analogous to our study Yadav et al concluded that the highest number of perforations were seen in ileum (39.1 %) followed by duodenum (26.4 %), stomach (11.5 %), appendix (3.5 %), jejunum (4.6 %), and colon (3.5 %).[21]

The early postoperative complications like SSI, wound dehiscence, drain site infection were observed. The surgical site infection was observed in a total to 15 (25%) patients. Wound dehiscence was seen in 2 (7%) patients with PPD whereas in patients without it was seen in 5 (17%) patients. Drain site infection in present study was seen in 3 (10%) patients in Group A whereas it was seen in 5 (17%) patients in Group B. (Table 4) Though not statistically significant, there were numerically fewer cases of surgical site infection, drain site infection and wound dehiscence observed in patients with use of PPD than without its use.

The above results were in concordance with the study conducted by Finan et al, which was conducted on 100 patients of perforation peritonitis; in their study surgical site infection in the study group was noted to be 44% while it was 68% in patients without primary peritoneal drainage.2 Drain site infection was noted in 5 (10%) in study group and 8 (16%) patients in the control group.[6]

In this study, a total of 10 (17%) patients required inotrope support postoperatively.(Table 4) 10 (17%) patients in this study required post-operative mechanical ventilation (Table 4). Average duration of ICU stay was noted to be 4.07 ± 2.64 days in the present study. (Table 4) Through the present study, it was observed that PPD, though insignificantly, decreases the requirement of post-operative inotrope support and mechanical ventilation. Furthermore, PPD also seemed to decrease the duration of intensive care stay of these patients.

The overall mean duration of hospital Stay was observed to be 11.7 ± 5.5 days. (Table 4) It was observed that patients in Group A had a shorter duration of hospital stay as compared to patients in Group B. A comparable study conducted by Finan et al concluded that mean duration of hospital stay was 10.04 ± 7.6 days in study group whereas it was 10.18 ± 7.6 days in control group and there was statistically insignificant difference between the two groups.[2]

In current study, the overall mortality rate was observed to be 10 (27%). (Table 4) These results were comparable with the study conducted by Saber A et al which reported an overall mortality of 20.8%. [22] Another similar study conducted by Bhasin et al, reported an overall mortality rate of 66.6% in patients of perforation peritonitis which was quit high as compare to ours. [23]

Late complications were noted after a follow up of 4 weeks. Incisional hernia was seen in 2 (7%) patients in Group A whereas it was observed in 3 (10%) patients in Group B. Among late stoma related complications, skin excoriation was seen in 3 (10%) patients in Group A and 4 (13%) patients in Group B. Stoma prolapse was seen in 1 (3%) patient of Group B. Other late complications such as fecal fistula and adhesive bowel obstruction were not observed in this study in the mentioned duration of follow up. (Table 4). Bansal et al. reported late post-operative complications observed between 4-12 weeks after surgical exploration in patients of perforation peritonitis. The study reported subacute obstruction in 7% cases, incisional hernia in 6% cases and late stoma related complications in 3% cases. [24]

Conclusion

Peritonitis is one of the most common surgical emergencies throughout the world, causing significant morbidity and mortality. Gold standard treatment of perforation peritonitis is exploratory laparotomy with peritoneal lavage. Delay in treatment of such patients occurs due to late presentation as well as impediment in taking medical consultation leading to sepsis and shock which preclude surgical management which in turn forms a vicious cycle driving the patient into a worsening course. Also the role of PPD in critically ill adult patients of perforation peritonitis is not proven in literature. Through this study we want to provide data based explanation regarding the role of PPD in critically ill patients of perforation peritonitis. PPD was not equivalent to definitive surgical management but it did proved to be an effective procedure for resuscitation and stabilization of sick patient. In our study the results in favour of use of PPD was statistically insignificant, this can be attributed to smaller sample size of our study. In the present study,

Preoperative Peritoneal Drainage proved to be beneficial in all the aspects under observation though not significant. The procedure being a low-cost intervention, and not requiring a higher degree of surgical expertise, has the potential to be a useful adjunct to the available surgical management strategies for patients of perforation peritonitis and thus warrants further exploration in more centres with larger sample sizes.

Ethical approval

The study was approved by the institutional ethic committee

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