

Original Article

Peritoneal Lavage with Antiseptics in the Management of Peritonitis in Patients with Perforated Duodenal Ulcer

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Abstract

Background : Postoperative wound infection is a common consequence following laparotomy for peritonitis. Peptic ulcer perforation followed by peritonitis remains as an important cause of mortality. In severe peritonitis, the use of exploratory laparotomy and intra-operative lavage with large amount of saline solution has been the standard of care to reduce risk of postoperative infections. **Objective:** To compare the outcome between povidone iodine mixed normal saline (N/S) lavage and conventional normal saline lavage in the management of peritonitis in a tertiary care public hospital in Bangladesh. **Methodology:** This was a randomized clinical trial conducted in the department of Surgery, Shaheed Ziaur Rahman Medical College Hospital, Bogura during July 2013 to December 2013. There were total 50 patients, selected by purposive sampling as a diagnosed case of peritonitis due to peptic ulcer perforation. All the patients were divided into 2 groups by using coin toss as group A (conventional N/S) and group B (povidone iodine mixed with N/S). The data were collected using the pretested data collection sheet. Results were tested by chi-square test to see their level of significance with a p-value at <0.05. **Results:** The maximum (17, 34.0%) patients presented as peritonitis due to peptic ulcer perforation was from 18-30 years age group. The mean age of the patient was 29.16±9.25 years (age range: 18-61 years). The female to male ratio were 5.25:1 and 3.16:1 in group A and B respectively. Some (22, 44.0%) of the patients showed 13-18 hours delay since first symptom appeared. Fever (88.0% vs 80.0%), surgical site infection (SSI) (32.0% vs 24.0%), burst abdomen (20.0% vs 12.0%), intra-abdominal sepsis (8.0% vs 4.0%) were evident as postoperative complications in the groups A and B respectively. Only 1 (4.0%) patient died among group A patients due to sudden cardiac arrest. Mean hospital stay was a little lower among group B patients with milder complications and good outcome (though difference was not statistically significant). **Conclusion:** The outcome was observed better in case of using povidone iodine mixed with normal saline for peritoneal lavage.


Key words: Perforated Peptic ulcer, Peritonitis, Peritoneal lavage

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Introduction:

The incidence of elective surgery due to peptic ulcer disease is decreasing day-by-day due to use of modern medication.¹ But still peptic ulcer perforation remains as a cause of mortality among low-income people with mortality rates of as high as 30%.^{2,3} One of the important causes of this mortality is intra-abdominal sepsis. The fatality rate of perforation peritonitis may be as high as 33%. Clinical outcome may vary from fulminant toxemia to development of sepsis with single or multiple abscesses. The treatment of perforation peritonitis requires early and continuous efforts to control the bacterial factors, colloid changes, cellular and extracellular electrolytes and prevention of respiratory and cardiac failure.⁴

In severe peritonitis, the use of exploratory laparotomy and intra-operative lavage with large amount of saline solution has been the standard of care to reduce risk of post-operative infections. The instillation of crystalloid solutions into the peritoneal cavity during the laparotomy is a routine practice of many surgeons.⁴

A study by Athranholz has shown that irrigation with these solutions not only dilute bacterial mass, but also impair bacterial phagocytosis, because of dilution of defensive proteins like opsonins.⁵ Several other studies also support the idea that intraoperative irrigation in the absence other antimicrobial substance, have no beneficial effect.⁶ The role of antimicrobial agents such as kanamycin, metronidazole and povidone iodine in intra-operative peritoneal lavage (IOPL) was proved to be non-effective by same authors.

The IOPL appears to have first performed in 1905 by a Gynaecologist Joseph Price, who advocated lavage with sterile water.⁵ A few years later, in 1911, a surgeon named Torek found that saline lavage reduced the mortality of patients from 100% to 35%.⁷ The first successful closure of a perforated gastric ulcer was performed on a 20-years old woman by Morse in Norwich in 1911 and he used 17-pints of hot water to lavage the abdominal cavity.⁸ At this time in the US, however, Deaver began to question regarding the usefulness of IOPL, declaring that it was important not to spread infection across the peritoneal cavity through the use of lavage.⁹ This philosophy was also adopted in the UK as evidenced by Lord Moynihan in 1926, and the IOPL was abandoned.¹⁰ A resurgence of IOPL occurred in the late of 1950s as a result of Burnett, who published a paper

on the treatment of peritonitis using peritoneal lavage.⁹ This showed that patients with a contaminated peritoneum had an improved outcome having undergone lavage. Since then, numerous studies have examined the use of various irrigation fluids, but debate continues as to whether lavage should be undertaken and if so, which solution should be used.

The advantage of using antiseptic lavage solutions for eliminating contamination and surgical spillage lies in their rapid bactericidal action and broad spectrum of activity. The use of antiseptics was reappraised because of increasing problem of antibiotic resistant bacteria. The antiseptics which often used for prevention or treatment of bacterial peritonitis are povidone iodine (PVI) and the formaldehyde-releasing compounds Noxytiolir and Taurolin. The PVI has been shown to reduce infection significantly in a wide variety of abdominal wounds, particularly those contaminated with Gram-negative organisms. It has been shown to be as effective as short-term systemic prophylaxis with tobramycin and lincomycin in acute abdominal surgery.

The main aim of this study was to compare the outcome between PVI mixed with normal saline lavage and conventional normal saline lavage in the prevention of postoperative sepsis in the patient suffering from peritonitis.

Methodology:

The study was conducted among the patients underwent laparotomy for 'peptic ulcer perforation with peritonitis' in the department of Surgery of Shaheed Ziaur Rahman Medical College Hospital, Bogura from July 2013 to December 2013. It was a quasi clinical trial, including a total of 50 patients, selected on the basis of clinical diagnosis and selection criteria, using the purposive sampling method by lottery. All diagnosed cases of acute peritonitis due to peptic ulcer perforation were included irrespective age of the patient. Patients with uncontrolled diabetes mellitus, known malignancy and those, requiring a second operation within 2-weeks of the first, were excluded.

Patients' data were recorded in a pre-designed structured questionnaire and information was collected taking clinical history and clinical examinations.

All patients after admission were resuscitated with intravenous fluid, intravenous antibiotics, analgesics, nasogastric suction and continuous catheterization.

Emergency laparotomy was done in every patient within 24-hours of admission. On the background of clinical diagnosis, abdomen was opened, and operation was performed according to clinical condition of the patient. The patients were priorly divided into 2 groups, each comprising 25 patients: (a) group A [lavage with conventional normal saline (N/S)] and (b) group B [lavage with povidone iodine (PVI) diluted 1:10 with N/S]. The variables considered were age, sex, smoking, hypertension, vomiting, abdominal distension, abdominal pain, fever, clinical diagnosis, per-operative findings, post-operative follow-up on 3rd post-operative day (POD) (abdominal pain, vomiting, abdominal distension, wound infection, burst abdomen), post-operative follow-up on 7th POD (abdominal pain, vomiting, abdominal distension, wound infection, burst abdomen, hospital stay, discharge and death).

Peritoneal lavage was given following the protocol and a drain was kept in the pelvic cavity before closing the abdomen in layers. Same antibiotics [Inj. Cefuroxime (750mg) I/V 8-hourly and Inj. Metronidazole (500mg/100ml) I/V 8-hourly along with antiulcerant PPI] were administered in all patients. Post-operative clinical information was collected on 3rd and 7th POD and outcomes were recorded appropriately.

Results:

Maximum patients (17, 34.0%) having peritonitis due to peptic ulcer perforation was from 18-30 years age group. The mean age of the patients was 29.16±9.25 years (age range: 18-61 years). (Table 1) The female to male ratio in both groups were 5.25:1 and 3.16:1 in groups A and B respectively.

Table 1: Distribution of age of the patients (n=50)

Age groups in years	Number (%) of the patients			P value*
	Group A (n=25)	Group B (n=25)	Total	
18-30	10 (40.0)	7 (28.0)	17 (34.0)	0.23 NS
31-40	5 (20.0)	9 (36.0)	14 (28.0)	
41-50	8 (32.0)	4 (16.0)	12 (24.0)	
>50	2 (8.0)	5 (20.0)	7 (14.0)	
Total:	25 (100.0)	25 (100.0)	50 (100.0)	
Mean age (±SD)	28.92±7.93	30.13±8.79		
Age range in years	18-53	19-59		

* Statistical significance was tested by Chi square. NS- not significant

Some 22 (44.0%) of the patients arrived in the hospital 13-18 hours after the first symptom of the condition. (Table 2)

Table 2: Lapse period in arrival at hospital by the patients since perforation (n=50)

Lapse period in hours	Number (%) of the patients			P value*
	Group A (n=25)	Group B (n=25)	Total	
≤ 6	5 (20.0)	4 (16.0)	9 (18.0)	0.74 NS
7-12	2 (8.0)	1 (4.0)	3 (6.0)	
13-18	10 (40.0)	12 (48.0)	22 (44.0)	
19-24	5 (20.0)	7 (28.0)	12 (24.0)	
>24	3 (12.0)	1 (4.0)	4 (8.0)	
Total:	25 (100.0)	25 (100.0)	50 (100.0)	

* Statistical significance was test by Chi square, NS-not-significant

Post-operative complications as found among the cases in group A and group B respectively showed no difference (Table 3)

Table 3: Post-operative complications among the cases (n=50)

Post-operative complications	Number (%) of the patients			P value*
	Group A (n=25)	Group B (n=25)	Total (n=50)	
Fever (>100°F)	22 (88.0)	20 (80.0)	42 (84.0)	0.86 NS
Surgical site infection (SSI)	8 (32.0)	6 (24.0)	14 (28.0)	
Burst abdomen	5 (20.0)	3 (12.0)	8 (16.0)	
Intra-abdominal sepsis	2 (8.0)	1 (4.0)	3 (6.0)	
Death	1 (4.0)	0 (0.0)	1 (2.0)	

* Statistical significance was test by Chi square, NS-not-significant

Discussion:

Majority of patients in this study have intervals of 13-18 hours to arrive in hospital after perforation due to peptic ulcer. This could be a reason of complications found among the cases- this fact had been reported by some other investigators and found that risk of post-operative morbidity and mortality is closely related to the duration of perforation.¹¹ European surgeons reported a time interval of 10-hours,¹² responsible for subsequent complications. Longer interval was claimed as necessary for these complications in other parts of the world.¹³ Prolonged interval in this study can be explained by lack of awareness, inaccessibility to the health facilities, poverty, communi-

-cation problem as well as staff crises in anesthesia and operation at night.

Only 1(4.0%) patient died in this study in 1st postoperative day belonged to group A. The cause of mortality was not directly related to the management approach of peritonitis due to peptic ulcer perforation. He had the previous history myocardial infarction, and chronic kidney disease with hypertension. He died of sudden cardiac arrest. In group B, appearance of fever (>100°F) was found in 20 (80.0%) patients, whereas in group A, among 22 (88.0%) patients. This difference was not statistically significant ($P>0.05$). Here, fever may be due to drug reaction, atelectasis, transfusion set reaction, infusion related phlebitis, surgical site infection (SSI). The SSI rates in 2 groups were (8/25, 32.0%) and (6/25, 24.0%) in group A and B respectively. The overall wound infection rate was 14 (28.0%). Burst abdomen found in 5 (20.0%) and 3 (12.0%) in groups A and B respectively. The SSI was the commonest complication reported by Bhansali¹⁴ when they studied the SSI in deep experimental wounds in Guinea pigs. They found that irrigation with saline and Clorpaction solutions reduced the incidence by 50.0%, while identical treatment with 1% neomycin reduced it by 97.0%. Bhushan et al¹⁰ found increased evidence of wound dehiscence in the normal saline group (30.0%) than in the antibiotic group (23.3%). Their results almost match with this study (20.0% vs 12.0%).

Conclusion:

Peritoneal lavage with povidone iodine (PVI) mixed with normal saline (N/S) is more effective than conventional normal saline lavage. The PVI with N/S lavage reduced post-operative fever, abdominal sepsis, hospital stay and SSIs. Large scale multicenter study can give more information.

Conflict of interest: none declared.

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