



Comparative Study of Efficiency between Povidone Iodine and Normal Saline Lavage in the Treatment of Acute Peritonitis

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Abstract

Background: Control of the primary site of sepsis is the main determinant of good surgical outcome. **Objective:** The purpose of the present study was to compare the efficiency between povidone iodine and normal saline lavage in the treatment of acute peritonitis. **Methodology:** This was a randomized clinical trial conducted in the Department of Surgery at Dhaka Medical College & Hospital, Dhaka, Bangladesh. Patients with acute peritonitis due to gastrointestinal causes who were admitted in the different units of Dhaka Medical College Hospital during the study period were selected as study population. Among them patients who were treated with povidone iodine were enrolled in the present study in group A and patients who were treated with conventional normal saline were in group B. **Results:** A total number of 1050 patients were recruited for this study. Among them 100 patients were enrolled in the present study of which group A (50 patients) for povidone iodine and group B (50 patients) for conventional normal saline. On 7th POD wound infection was found in Group A and Group B were 11(22.4%) and 21(44.7%) respectively. Statistically significant difference in post operative complication of wound infection was observed on 7th POD between the groups ($p < 0.05$). Post operative hospital stay in Group A and Group B were 11.50 ± 4.48 and 13.46 ± 5.13 days respectively. There is statistically significant difference in post operative hospital stay between the groups ($p < 0.05$). **Conclusion:** Statistically significant difference observed in post operative complication of wound infection and burst abdomen on 7th POD between the groups. The present study there is statistically significant difference in post operative hospital stay between the groups also observed. [Bangladesh Journal of Infectious Diseases 2017;4(1):15-20]

Keywords: Acute peritonitis; povidine iodine; normal saline; wound infection

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Introduction

Peritonitis is an inflammatory response to peritoneal injury. Injury results in an influx of protein rich fluid, activation of the complement cascade, up-regulation of peritoneal mesothelial cell activity and invasion of the peritoneum with polymorphonuclear neutrophils and macrophages¹. The pathogenesis of intra-abdominal infections is determined by bacterial factors which influence the transition from contamination to infection. Bacterial stimuli, especially endotoxin, lead to an almost uniform activation response which is triggered by reaction of mesothelial cells and interspersed peritoneal macrophages and which also involves plasmatic systems, endothelial cells and extra- and intravascular leukocytes. The local consequences of this activation are the transmigration of granulocytes from peritoneal capillaries to the mesothelial surface and a dilatation of peritoneal blood vessels resulting in enhanced permeability, peritoneal edema and lastly the formation of protein-rich peritoneal exudate². Intra-abdominal adjuvants such as bile, talc, barium and the local host response are additionally important³. Sequential metabolic changes occur as a result of induction of the systemic inflammatory response syndrome by severe sepsis or blunt trauma and result in protein catabolism and weight loss⁴.

Hemodynamic resuscitation, early antibiotics and source control are the essential elements of peritonitis treatment. Restoration of cardiac and pulmonary function recognized by normalization of blood pressure, urinary output and O₂ saturation through the prompt administration of supplemental oxygen and intravenous fluids are critical to survival. These measures should be instituted immediately on initial assessment of the patient and continued throughout the operative and post-operative period. Septic patients may require invasive monitoring with inotropic support and mechanical ventilation if these are available⁵⁻⁶.

Lavage was adopted by surgeons around the turn of the century for managing patients with peritonitis. In 1906, Franz Torek from the New York Post-Graduate Medical School described how “the salt water is poured into all recesses” and “the hand, by some gentle to-and-fro motions, assists it in washing all parts” and pus was “dipped out, rather than wiped out, as the latter procedure would be more likely to injure the peritoneum.” Over the years, support for its use has fluctuated, depending largely on opinions rather than evidence⁷⁻¹⁰. Lavage is currently widely used in the treatment of patients

with peritonitis either from bowel perforation or from acute pancreatitis¹¹⁻¹⁴.

Povidone-iodine has been shown significantly to reduce infection in a wide variety of abdominal wounds particularly those contaminated with Gram-negative organisms¹⁵. It has been shown to be as effective as short-term systemic prophylaxis with tobramycin and lincomycin in acute abdominal surgery. It does not inhibit healing¹⁶. In addition, attempts to induce bacterial resistance to this agent completely failed^{15,17}. The purpose of the present study was to compare the efficiency between povidone iodine and normal saline lavage in the treatment of acute peritonitis.

Methodology

It was a randomized clinical trial. This study was carried out in the Department of surgery, Dhaka Medical College Hospital, Dhaka. The study was conducted from July 2008 to June 2010 for duration of 2 (two) years. During this study period clinically diagnosed patients having acute peritonitis admitted in the Department of Surgery, DMCH, Dhaka were enrolled as study population. Total 1050 patients with acute peritonitis due to gastrointestinal causes were admitted in the different units of Dhaka Medical College Hospital during the study period. Among them 100 patients were enrolled in the present study. Sample size were 100 patients of which group A: 50 for povidone iodine and group B: 50 for conventional normal saline lavage. Simple were selected randomly by lottery method. After selection of the patient with the inclusion and exclusion criteria lottery were done in every patient. All diagnosed cases of acute peritonitis due to gastrointestinal causes irrespective of age and sex were included. Patients with uncontrolled diabetes mellitus and those who required a second operation within 2 weeks of the first and known malignancy were excluded from this study. Here variables were age, sex, smoking, hypertension, vomiting, abdominal distention, abdominal pain, fever, clinical diagnosis, per operative findings, operative findings, post operative follow up on 3rd POD (abdominal pain, vomiting, abdominal distention, wound infection, burst abdomen), post operative follow up on 7th POD (abdominal pain, vomiting, abdominal distention, wound infection, burst abdomen, hospital stay, discharge and death. Patient's data were recorded in a predesigned structured questionnaire. Information's were collected through taking clinical history and clinical examination. Data were collected by registers, assistant registers and indoor medical officers of the

respective unit of the department of surgery during the study period. Patients were selected by inclusion and exclusion criteria. Group A 50 patients and Group B 50 patients were enrolled by simple random sampling (lottery method). After enrollment, all the patients were resuscitated with intravenous fluid, intravenous antibiotics, analgesics, nasogastric suction and continuous catheterization. Emergency laparotomy was done within 24 hours of admission. On the background of clinical diagnosis abdomen was opened by appropriate incision and peroperative diagnosis were made. Operation was performed according to peroperative diagnosis and clinical condition of the patients. Peritoneal lavage with povidone iodine was given in Group A patients with 1:10 dilution with normal saline. Only normal saline lavage was given to the Group B patients. With keeping a drain in pelvic cavity, abdomen was closed in layers. Same antibiotics e.g., Inj. cefuroxime (750mg) I.V. 8 hourly and Inj. metronidazole (500mg/100ml) I.V. 8 hourly used in both groups. Postoperative clinical information was collected on 3rd and 7th postoperative days by the registrars, assistant registrars and indoor medical officers of respective unit of department of surgery. Outcomes also recorded by the same persons.

Results

The distribution of complication of wound infection on 7th POD by groups. On 7th POD wound infection was found in Group A and Group B were 11 (22.4%) and 21 (44.7%) respectively.

Table 1: Distribution of patients of two groups according to age (Group A, n=50; Group B, n=50)

Age (in year)	Group		df	t value	p value*
	Group A (Povidone iodine lavage)	Group B (Normal Saline)			
<20	07 (14.0)	04 (8.0)			
20-30	08 (16.0)	16 (32.0)			
30-40	20 (40.0)	13 (26.0)			
40-50	08 (16.0)	10 (20.0)			
50-60	03 (06.0)	04 (08.0)			
60-70	02 (04.0)	03 (06.0)			
>70	02 (04.0)	00 (0.0)			
Total	50 (100.0)	50 (100.0)			
Mean ± SD	37.65 ± 15.11	36.24 ± 13.50	98	0.492	0.624

Statistically significant difference in post operative complication of wound infection was observed on 7th POD between the groups (p<0.05). The distribution of complication of burst abdomen on 7th POD by groups. On 7th POD wound infection was found in Group A and Group B were 05 (10.2%) and 13 (27.7%) respectively. Statistically

significant difference in post operative complication of burst abdomen was observed on 7th POD between the groups (p<0.05).

Table 2: Distribution of patients of two groups according to sex (Group A, n=50; Group B, n=50)

Sex	Group		Degree of Freedom	Chi square value	p value*
	Group A (Povidone iodine lavage)	Group B (Normal Saline)			
Male	41 (82.0)	47 (94.0)	1	3.409	0.065
Female	09 (18.0)	03 (6.0)			
Total	50(100.0)	50(100.0)			

The distribution of duration of hospital stays by groups. Post operative hospital stay in Group A and Group B were 11.50 ± 4.48 and 13.46 ± 5.13 days respectively. There is statistically significant difference in post operative hospital stay between the groups (p<0.05).

Table 3: Distribution of patients of two groups according to the complication wound infection on 7th POD (Group A, n=49; Group B, n=47)

Complication	Group		Degree of Freedom	Chi square value	p value*
	Group A (Povidone iodine lavage)	Group B (Normal Saline)			
Present	11 (22.4)	21 (44.7)	1	5.336	0.021
Absent	38 (77.6)	26 (55.3)			
Total	49 (100.0)	47 (100.0)			

Discussion

In the present study out of 50 patients in Group A 7(14.0%) were in the age group of less than 20 years, 8(16.0%) were in the age group of 20-30 years, 20(40.0%) were the highest number of patients, present in the age group of 30-40 years, 8(16.0%) were in the age group of 40-50 years and 3(6.0%) were in the age group of 50 -60 years. Two(4.0%) were in the age group of 60-70 and more than 70 in each. Out of 50 patients in Group B 4(8.0%) were in the age group of less than 20 years, 16(32.0%) were in the age group of 20 -30 years, 13(26.0%) were the highest number of patients, present in the age group of 30-40 years, 10(20.0%) were in the age group of 40-50 years and 4(8.0%)

were in the age group of 50 -60 years and 3 (6.0%) were in the age group of 60-70 years. No patients in this group were in the age group of more than 70 years. There is no statistically significant difference in age between the groups ($p>0.05$).

Table 4: Distribution of patients of two groups according to the complication of burst abdomen on 7th POD (Group A, n=49; Group B, n=47)

Complication	Group		Degree of Freedom	Chi square value	p value*
	Group A (Povidone iodine lavage)	Group B (Normal Saline)			
Present	05 (10.2)	13 (27.7)	1	4.798	0.028
Absent	44 (89.8)	34 (72.3)			
Total	49 (100.0)	47(100.0)			

In laparotomy type of incision given usually directed by clinical diagnosis. In the present study among the 50 patients in Group A, 30 (60.0%) were given UMLI and 10 (20.0%) were given LMLI and MLI in each. Among the 50 patients in Group B, 29 (58.0%) were given UMLI, followed by 18 (36.0%) were given LMLI and 3 (6.0%) were given MLI. There is statistically significant difference in type of incision between the groups ($p<0.05$).

Table 5: Distribution of patients of two groups according to the post operative hospital stay (Group A, n=50; Group B, n=50)

Post operative hospital stay	Group		Degree of Freedom	t value	p value*
	Group A (Povidone iodine lavage)	Group B (Normal Saline)			
Post operative hospital stay (day)	11.50 ± 4.48	13.46 ± 5.13	98	2.035	0.045

Among the 50 patients in Group A highest number of clinical diagnosis was perforation of PUD 31(62.0%), followed by small intestinal obstruction 7(14.0%) and then typhoid ulcer perforation. Other clinical diagnosis were volvulus causing intestinal obstruction, burst appendicitis and post appendisectomy feecal fistula were 3(6.0%), 2(4.0%) and 2(4.0%) respectively. Among the 50 patients in Group B highest number of clinical diagnosis was perforation of PUD 29(58.0%), followed by small intestinal obstruction 9(18.0%) and then typhoid ulcer perforation 5(10.0%). Other

clinical diagnosis volvulus causing intestinal obstruction and burst appendicitis were 2(4.0%) and 3(6.0%) respectively. No patients in Group B had the clinical diagnosis of post appendisectomy feecal fistula.

Most of the patients in both Group A and Group B were perforation of duodenal ulcer, 30(60.0%) and 28(56.0%) respectively. In Group A other preoperative diagnosis were perforation of antral ulcer 1(2.0%), gangrenous ileum 1(2.0%), gangrenous ileum and part of jejunum 2(4.0%), burst appendicitis 3(6.0%), gangrenous sigmoid volvulus 2(4.0%), perforation of typhoid ulcer (single perforation) 4(8.0%), perforation of typhoid ulcer (double perforations) 1(2.0%), small gut obstruction but viability was intact 1(2.05), stricture/stictures 2(4.0%), intraperitoneal abscess 1(2.0%) and perforation in the caecum 2(4.0%). No one in Group A had the preoperative diagnosis of perforation in the anterior aspect of stomach and perforation of typhoid ulcer (multiple perforations). In Group B other preoperative diagnosis were perforation of antral ulcer 1(2.0%), gangrenous ileum 9(18.0%), burst appendicitis 3(6.0%), gangrenous sigmoid volvulus 2(4.0%), perforation in the anterior aspect of stomach 1(2.0%), perforation of typhoid ulcer (single perforation) 4(8.0%), perforation of typhoid ulcer (multiple perforations) 1(2.0%), small gut obstruction but viability was intact 1(2.05). No one in the Group B had the preoperative diagnosis of gangrenous ileum and part of jejunum, perforation of typhoid ulcer (double perforations), stricture/ stictures, intraperitoneal abscess and perforation in the caecum. Wani et al¹⁸ prospectively studied with aim to evaluating the clinical profile, etiology and optimal surgical management of patients with non traumatic terminal ileal perforation. In their study total 79 cases of non traumatic terminal ileal perforation; the causes for perforation were enteric fever (62.0%), nonspecific inflammation (26.0%), obstruction (6.0%), tuberculosis (4%) and radiation enteritis (1.0%). Simple closure of the perforation (49.0%) and end to side ileotransverse anastomosis (42.0%) was the mainstay of the surgical management. They concluded that the terminal ileal perforation should be suspected in all cases of peritonitis especially in developing countries and surgical treatment should be optimized taking various accounts like etiology.

Among the 50 patients in Group A 31(62.0%) had PUD, 11(22.0%) had small gut pathology and 8(16.0%) had large gut pathology. Among the 50 patients in Group B 30(60.0%) had PUD, 15(30.0%) had small gut pathology and 5(10.0%)

had large gut pathology. There is no statistically significant difference in the pathology between the groups ($p>0.05$)

In the present study out of 50 patients in Group A 7(14.0%) were in the age group of less than 20 years, 8(16.0%) were in the age group of 20 -30 years, 20(40.0%) were the highest number of patients, present in the age group of 30-40 years, 8(16.0%) were in the age group of 40-50 years and 3(6.0%) were in the age group of 50 -60 years. Two (4.0%) were in the age group of 60-70 and more than 70 in each. Out of 50 patients in Group B 4(8.0%) were in the age group of less than 20 years, 16(32.0%) were in the age group of 20 -30 years, 13(26.0%) were the highest number of patients, present in the age group of 30-40 years, 10(20.0%) were in the age group of 40-50 years and 4(8.0%) were in the age group of 50 -60 years and 3 (6.0%) were in the age group of 60-70 years. No patients in this group were in the age group of more than 70 years. There is no statistically significant difference in age between the groups ($p>0.05$). Bapat et al¹⁹ studied total twenty-five patients of ileal perforations presented to a surgical unit. The ages of the patients varied from 16 to 50 years with a mean of 29.6 years. There were 21 males and 4 females in the study group.

Most of the patients in Groups A and Group B were treated by repair and toileting and they were 35(70.0%) and 29(58.0%) respectively. Other operation in Group A were repair and ileostomy 1(2.0%), resection and ileostomy 1(2.0%), ileostomy and toileting 1 (2.0%), resection and anastomosis 3(6.0%), resection and colostomy 4(8.0%), appendisectomy with toileting 3(6.0%), release of band/bands 1(2.0%) and toileting and ileostomy 1(2.0%). Other operation in Group B were repair and ileostomy 2 (4.0%), resection and ileostomy 5(10.0%), ileostomy and toileting 3(6.0%), resection and anastomosis 4(8.0%), resection and colostomy 1(2.0%), appendisectomy with toileting 3(6.0%), release of band/bands 1(2.0%) and resection and jejunostomy 2(4.0%). There is no statistically significant difference in post operative complications on 3rd POD between the groups ($p>0.05$).

There is no statistically significant difference in post operative complication of fever, vomiting abdominal distention and pain in abdomen on 7th POD between the groups ($p>0.05$). Statistically significant difference in post operative complication of wound infection and burst abdomen were observed on 7th POD between the groups ($p<0.05$).

Among the 50 patients in Group A, 41 (82.0%) were male and 9 (18.0%) were female. Out of 50 patients in Group B, 47 (94.0%) were male and 3 (6.0%) were female. There is no statistically significant difference in sex between the groups ($p>0.05$). Among the 50 patients in each group 16(32.0%) had history of smoking and 34 (68.0%) had no history of smoking in both Group A and Group B. There is no statistically significant difference in history of smoking between the groups ($p>0.05$). Among the 50 patients in Group A, 4 (8.0%) had history of hypertension and 46 (92.0%) had no history of hypertension. Among the 50 patients in Group B, 1 (2.0%) had history of hypertension and 49 (98.0%) had no history of hypertension. There is no statistically significant difference in hypertension between the groups ($p>0.05$). Among the 50 patients in Group A, 9 (18.0%) were anaemic and 41 (82.0%) were not anaemic. Among the 50 patients in Group B, 13 (26.0%) were anaemic and 37 (74.0%) were not anaemic. There is no statistically significant difference in anaemia between the groups ($p>0.05$). Among the 50 patients in Group A, 2 (4.0%) had oedema and 48 (96.0%) had no oedema. Among the 50 patients in Group B, 3 (6.0%) had oedema and 47 (94.0%) had no oedema. There is no statistically significant difference in oedema between the groups ($p>0.05$). In the present study the post operative hospital stay in Group A and Group B were 11.50 ± 4.48 and 13.46 ± 5.13 days respectively. There is statistically significant difference in post operative hospital stay between the groups ($p<0.05$).

Among the 30 patients with PUD in Group A, 1(3.3%) and 29 patients in Group B, 8(27.6%) developed wound infection on 7th POD. There is significant differences observed in wound infection among the patients with PUD on 7th POD between the groups ($p<0.05$).

Among the 11 patients with small gut pathology in Group, 4(36.4%) and 13 patients in Group B, 11(84.6%) patients developed wound infection on 7th POD. There is significant differences observed among the patients with small gut pathology on 7th POD between the groups ($p<0.05$). Among the 8 patients with large gut pathology in Group A, 3(37.5%) and 5 patients in Group B, 2(40.0%) patients developed wound infection on 7th POD. There is no statistically significant difference in wound infection among the patients with large gut pathology between the groups ($p>0.05$). Among the 30 patients with PUD in Group A, 2(6.7%) and 29 patients in Group B, 2(6.9%) developed burst abdomen on 7th POD. Statistically no significant differences observed in wound infection among the

patients with PUD on 7th POD between the groups ($p>0.05$). Among the 11 patients with small gut pathology in Group A, 1(9.1%) and 13 patients in Group B, 9(69.2%) patients were developed burst abdomen on 7th POD. There is significant differences observed among the patients with small gut pathology on 7th POD between the groups ($p<0.05$). Among the 8 patients with large gut pathology in Group A, 1(12.5%) and 5 patients in Group B 1 (20.0%) patient developed burst abdomen on 7th POD. There is no statistically significant difference in wound infection and burst abdomen in large gut perforation or gangrenous between the groups ($p>0.05$).

Conclusion

The present study was conducted in the department of surgery of Dhaka Medical College Hospital with objectives to determine the efficacy of povidone iodine as a peritoneal lavage for peritoneal toileting and to compare between the effectiveness of povidone iodine lavage and normal saline lavage in cases of acute peritonitis due to gastrointestinal causes. In the present study there is no statistically significant difference in age, sex, sociodemographic characteristics, clinical presentation, clinical diagnosis and preoperative diagnosis between the groups. Statistically significant difference observed in postoperative complication of wound infection and burst abdomen on 7th POD between the groups. The present study there is statistically significant difference in post operative hospital stay between the groups also observed.

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