



## PERITONEAL LAVAGE USING SALINE AND METRONIDAZOLE IN THE OPERATED CASES OF PERITONITIS, A COMPARATIVE STUDY

<b>Dr Tarun Garg</b>	junior Resident, Deptt of General Surgery, GMC, Patiala
<b>Dr Arun Garg*</b>	Assistant Professor, Deptt of CTVS, St John Medical College, Bengaluru *Corresponding Author
<b>Dr Daman</b>	MD Medicine
<b>Dr Varun Garg</b>	Senior Resident, Deptt of Surgery, Adesh Medical College Bbathinda

**ABSTRACT** The present study will be a prospective, observational and comparison between peritoneal lavage using normal saline and metronidazole will be conducted in 100 operated case of peritonitis admitted in department of surgery at Government Medical College and Rajindra Hospital, Patiala. The aim of this study is to evaluate the role of intraperitoneal lavage with normal saline and normal saline followed by putting metronidazole in patients with acute peritonitis. The cases in each group will be randomly selected and equally divided in two groups with 50 cases each. In Group A, peritoneal cavity will be lavaged with normal saline and closed after putting drains. In Group B peritoneal cavity will be lavaged with normal saline followed by 100 ml of metronidazole to be put in the abdomen and abdomen will be closed in layers after placing two drains which are to be kept closed for 1 hour after abdominal closure. The result of two groups will be compared in terms of surgical site infection, intraabdominal abscesses, sepsis and hospital stay. The result will be statistically compared and evaluated.

### KEYWORDS :

#### INTRODUCTION

The peritoneum is the most extensive serosal membrane of the body composed of two main segments, one covering the internal surface of the wall of the abdomen, including the diaphragm and pelvis, called the parietal peritoneum and other covering the surface of intra-abdominal organs, called the visceral peritoneum. The surface of the peritoneum is nearly 2m<sup>2</sup>, approximately equal to the area of the skin. The peritoneal cavity normally contains only about 100 ml of fluid to serve as lubrication between abdominal viscera and wall. Peritonitis is an inflammatory response which occurs as a result of infectious, ischemic and perforating injuries of gastro-intestinal tract (G.I.T.) and genitourinary system. Peritonitis can be (a) Primary peritonitis when source of peritoneal infection is from outside the peritoneal cavity and the infection is often monomicrobial (b) secondary peritonitis when source of infection is intra-abdominal usually a perforated hollow viscous organ or (c) tertiary peritonitis that develops following treatment of secondary peritonitis.<sup>[1]</sup>

The prognosis and outcome of peritonitis depend upon the interaction of many factors including patient-related factors, disease-specific factors and diagnostic and therapeutic interventions<sup>[2]</sup>.

General supportive measures such as maintenance of hydration, correction of electrolytes imbalance, and intravenous antibiotics are provided. The mainstay of the treatment in case of perforation is the surgical closure. Along with this, intraoperative peritoneal lavage plays an important role in the treatment of peritonitis.<sup>[3-5]</sup> The mode of action of this method is that it decreases the load of bacteria, thus reducing the severity of disease and hastens the recovery of the patient.<sup>[6]</sup>

Metronidazole is an antibiotic and antiprotozoal drug. It is used either alone or with other antibiotics to treat pelvic inflammatory disease, endocarditis, bacterial vaginosis, dracunculiasis, giardiasis, trichomoniasis, and amoebiasis. Common side effects include nausea, metallic taste, loss of appetite, and headaches. It inhibits nucleic acid synthesis by disrupting the DNA of microbial cells.<sup>[7-8]</sup>

In this study peritonitis patients are divided into two groups randomly. In the first group of patients, warm saline is used for intraoperative peritoneal lavage. In the second group, 200 ml of Metronidazole is added to the saline for peritoneal lavage. Outcomes of both groups are compared to assess whether there is any advantage of adding Metronidazole to the lavage fluid.

#### Material and method

The comparative study of peritoneal lavage using saline and metronidazole is based on 100 cases of peritonitis operated at rajindra hospital Patiala attached to government medical college Patiala during the period from January 2016 to July 2017.

#### Inclusion Criteria:

1. All patients with peritonitis who underwent laparotomy.
2. All patients giving written informed consent for enrollment in the study.

#### Exclusion Criteria:

1 Immunocompromised patients having diabetes mellitus, HIV or malignancies Patients coming with clinical features of peritonitis were assessed by thorough clinical examination diagnosis was confirmed by erect x ray of the abdomen in most of the cases with the evidence of the gas under diaphragm. USG abdomen was done in some cases. Investigation like haemoglobin, total count, differential count, blood urea, serum creatinine were done. cases were randomly divided into two groups, each receiving plain saline peritoneal lavage and metronidazole lavage. plain saline lavage group received intraperitoneal lavage with 2L of saline. metronidazole lavage group received intraperitoneal lavage using 2L of saline mixed with 200 ml of metronidazole. cases were followed up till the discharge or death of the patient. post operative complication-wound infection, intra abdominal abscesses, sepsis, faecal fistula and death were noted. post operative hospital stay noted. data was tabulated. results of the two group in terms of wound infection, intra abdominal abscesses, sepsis, faecal fistula, mortality and post operative hospital stay were compared using statistical tests, results expressed in graphs and charts results were compared with similar studies in past.

#### POST-OPERATIVE COURSE

The antibiotics given post-operatively were the same in all patients, i.e., ceftriaxone (1.5 g twice a day intravenously for 7 days), gentamycin (80 mg twice a day intravenously for 5 days), metronidazole (400 mg thrice a day intravenously for 5 days).

The wound was primarily dressed with sterile surgical gauze and covered with occlusive adherent bandage. The primary dressing was removed after 24 h and daily dressing was carried out with povidone-iodine solution. The wound was inspected for signs of infection (sinus formation, seroma formation and pus formation) and dehiscence before each dressing. Secondary suturing was performed after control of infection.

Swab cultures from the wound were sent for microbiological culture

and antibiotic sensitivity if any signs of infection were present. Patients were then put on antibiotics according to the culture and sensitivity report if they showed any sign of SSI.

Drain output was monitored daily; amount and also its character (serous/purulent). The drains were removed when output was <50 ml daily and serous. Day of drain removal was noted. If two drains were present then day of removal of both drains was noted separately.

Return of bowel sound was noted and observed by hearing 3-4 bowel sounds/min by stethoscope just right to the umbilicus.

In the post-operative period, fever if present and its duration were recorded. Total leucocytes count and differential leucocytes count were also noted.

Number of days for which the patient stayed in the hospital was recorded.

Stitches were removed on 10th post-operative day.

**RESULTS TABLE 1 Age specific distribution of the cases**

Age	No. of Cases	Percentage
<20	2	2%
21-30	32	32%
31-40	30	30%
41-50	23	23%
51-60	13	13%

Cases studied were in the age group of 15 to 60 yrs. Maximum number of cases were in the age group of 21 to 30 yrs (32%). Least number was in the age group of <20 yrs (2%).

**Table 2 Causes of Peritonitis**

Cause	No. of Cases	Percentage
Duodenal Ulcer Perforation	60	60%
Ileal perforation	21	21%
Appendicular perforation	9	9%
Gastric perforation	5	5%
Ischemic bowel	3	3%
Traumatic jejunal perforation	1	1%
Perforation Meckel's diverticulum	1	1%

The most common cause of peritonitis in this study was Duodenal Ulcer Perforation (60%), followed by ileal perforation (21%) and appendicular perforation (9%). Other causes were Gastric perforation, Ischemic bowel, Traumatic jejunal perforation, Perforation Meckel's diverticulum.

In most of the patients perforation was closed primarily (78). Out of which 60 were duodenal perforations, 12 were ileal perforations, 5 were gastric perforations and 1 was jejuna perforation. Resection and anastomosis of bowel was performed in 12 cases (ileal perforations, 3 ischemic bowels, perforated Meckel's diverticulum). Appendectomy was done in 9 cases. One patient with ileal perforation underwent ileostomy.

**Table 3 Comparison of outcomes in saline lavage group and Metronidazole lavage group**

Parameter	Saline lavage group	Metronidazole lavage group	P value
Wound infection	40%	26%	0.2
Intra abdominal abscess	12%	10%	1
Sepsis	28%	18%	0.3
Fecal fistula	6%	6%	0.6
Death	8%	10%	1

There was a 14 % reduction in the incidence of wound infection in metronidazole lavage group when compared to saline lavage group. Incidence of intra abdominal abscess reduces by 2% in metronidazole lavage group. 10% reduction was seen in the incidence of sepsis in patients receiving metronidazole peritoneal lavage. There was no difference in the incidence of fecal fistula in either groups. Mortality was higher in metronidazole lavage group by 2%. Chi square test did not show any statistical significance of these apparent advantages of

metronidazole lavage over saline lavage.

**DISCUSSION**

treatment of peritonitis is associated with a high morbidity and mortality. The ----- treatment of the peritonitis consists of fluid replacement, nasogastric suction, IV antibiotics and operative intervention. Operation consists of suction of the fluid, which has collected in the peritoneal cavity, and definitive procedure for the pathology of the peritonitis (closure of perforation, closure bypass, resection and anastomosis or appendectomy etc.). This is followed by peritoneal lavage and then the abdomen is closed with drain/drains.

100 patients were include in this study. Patients were randomly assigned into two groups. Saline lavage group and metronidazole lavage group. Patients in saline lavage group received intra operative peritoneal lavage(IOPL) with saline and metronidazole. Results were compared between the two groups.

**Age**

In this study it was found that maximum numbers of cases were in the age group of 21 to 30 years. Least number of cases were in the age group of <20 years. Mean age of patients in this study was 37.25 years. This is comparable to the age distribution found by Sheeraz khan et al were maximum patients were in the age group of 31-40 years. Mean age was 37 years.[13]

**Table 4 Comparison of age distribution with previous studies**

Age group	Present study	Sheeraz Khan et al <sup>[13]</sup> (2009)	Garg et al(2013) <sup>[10]</sup>
<20	2%	5%	18%
21-30	32%	16.25%	08%
31-40	30%	23.75%	28%
41-50	23%	18.75%	17%
51-60	13%	15%	13%
>60	-	6.6%	16%

**Cause of peritonitis**

**Table 5 Comparison of cause of peritonitis**

Cause	Present study	Garg et al(2013)	Singal et al(2016)
Gastric perforation	5%	15%	37.08%
Duodenal perforation	60%	23%	12.08%
Ileal perforation	21%	34%	31.25%
Appendicular perforation	9%	5%	5%
Ischemic bowel	3%	-	-
Jejuna perforation	1%	10%	7.08%
Perforated Meckel's diverticulum	1%	-	-

Duodenal perforation was the leading cause of peritonitis in the present study, followed by ideal perforation and appendicular perforation. Gastric perforation, bowel ischemic, jejuna perforation and perforation of meckels diverticulum were the less common cause of peritonitis.

**Table 6 Comparison of outcome in different studies**

Parameter	Present study		Raeeszade et al (2017)		Sheeraz Khan et al (2009)	
	Saline	Metronidazole	Saline	Gentamycin	Saline	Superoxide solution
Wound infection	40%	26%	35%	17.5%	72.2%	52%
Intra abdominal abscess	12%	10%	17.5%	12.5%	-	-
Sepsis	28%	18%	-	-	-	-
Fecal fistula	6%	6%	-	-	5%	2.5%
Death	8%	10%	10%	12.5%	5%	5%
Hospital stay	15days	13.22days	-	-	11.9days	14.5days

**Wound infection**

In the present study there was 14% reduction in incidence of wound infection in the metronidazole lavage group. However this difference is not statistically significant (P value 0.2). Similarly, Sheeraz Khan et al reported 20% reduction in incidence of wound infection, when superoxide solution was used for IOPL.<sup>[13]</sup> Raeeszade et al(2017) reported reduction in incidence of wound infection when Gentamycin was used for IOPL.<sup>[12]</sup>

#### Intra abdominal abscess

There was 2% reduction in the incidence of post operative intra abdominal abscess in the metronidazole IOPL group. However this is not statistically significant, (P value 1). R. Fowler in 1974, reported 16% reduction in the incidence of intra abdominal abscess when Cephaloridine was used for IOPL.<sup>[14]</sup> Raeeszade et al(2017) reported 5% reduction in the incidence of intra abdominal abscess when Gentamycin is used.<sup>[13]</sup>

#### Sepsis

In this study there was 10% reduction in the incidence of systemic sepsis in the metronidazole IOPL group. Statistically, significant difference was not found in the incidence of sepsis between either groups.

#### Fecal fistula

Study did not find any difference in the incidence of postoperative fecal fistula in saline lavage group or metronidazole lavage group. In contrast to this study, Sheeraz Khan et al (2009) reported 2.5% reduction in the incidence of fecal fistula in the study group, when superoxide solution was used for IOPL. This was not significant statistically.<sup>[13]</sup>

#### Mortality

Mortality was 2% higher in the metronidazole IOPL group in this study but the difference is not statistically significant. Raeeszade et al (2017) found 2.5% higher mortality when gentamycin was used for IOPL. Schein (1990) found no significant difference in mortality of patients treated with or without with interperitoneal with chloramphenicol.<sup>[9]</sup> Rambol (1972) also found no difference in the no of death when intraperitoneal irrigation with cephalothin was used.<sup>[6]</sup>

#### Postoperative Hospital stay

Mean postoperative stay was 15 days in saline lavage group and 13.22 days in metronidazole lavage group. This improvement in the hospital stay is not statistically significant (p 0.17). Sheerz Khan et al (2009) reported reduction in hospital stay by 1.5 days, which was not statistically significant.<sup>[13]</sup>

#### CONCLUSION

Addition of Metronidazole to normal saline or intraoperative peritoneal lavage has beneficial effects in terms of reduction in incidence of peritoneal lavage has beneficial effects in terms of reduction in incidence of wound infection, intra abdominal abscess, systemic sepsis and post operative hospital stay. However these are statistically not significant.

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