

Intraoperative Lavage in Peritonitis: Comparison between Saline and Metronidazole

Harpreet Singh¹, Malika Agrawal¹, Naveen Kumar Singh², Roop Kishan Kaul¹, Ikram Ilahi³, Rakshit Ahuja³

¹Assistant Professor, Department of Surgery, Teerthanker Mahaveer Medical College, TMU, Moradabad, Uttar Pradesh, India, ²Professor, Department of Surgery, Teerthanker Mahaveer Medical College, TMU, Moradabad, Uttar Pradesh, India, ³Post-graduate Student, Department of Surgery, Teerthanker Mahaveer Medical College, TMU, Moradabad, Uttar Pradesh, India

Abstract

Background: Intraoperative peritoneal lavage plays an important role in a treatment of peritonitis. Sterile water, warm saline, and povidone-iodine are most commonly used for the purpose of peritoneal lavage. But now, the addition of antibiotics in these fluids is supposed to give better results. Among various antibiotics, metronidazole has proved to be most beneficial in treating the peritonitis.

Materials and Methods: A total of 100 patients were randomly divided into two categories. Group S patients received intraoperative peritoneal lavage with 2 L of saline water. Group M patients received intraoperative peritoneal lavage using 2 L of saline mixed with 200 mL of metronidazole. Results of both the groups were analyzed statistically with the help of *t*-test. The $P < 0.05$ was considered statistically significant.

Results: The most common etiology of peritonitis was a duodenal ulcer in 64% of patients. Other reasons were appendicular perforation (13%), gastric perforation (9%), bowel ischemia (7%), trauma (4%), and Meckel's diverticulum (2%). The incidence of infection (both wound infection and sepsis) is statistically high in the group receiving saline peritoneal lavage. In other parameters like incidence of abscess and fistula formation, mortality rate and duration of stay in hospitals no statistically significant difference was found.

Conclusion: Intraoperative peritoneal lavage with metronidazole in the patients of peritonitis is more beneficial as to saline. The occurrence rate of complications is found to be more in patients receiving saline for peritoneal lavage as related with antibiotic like metronidazole.

Key words: Metronidazole, Peritoneal lavage, Saline

INTRODUCTION

Peritonitis is defined as the inflammation of thin tissue layer surrounding the abdominal organs. Acute generalized peritonitis is considered as the surgical emergency. Sequestration of fluid and electrolytes result in electrolyte imbalance leading to hypovolemia and finally shock or acute renal failure. The most common etiology of peritonitis is infection resulting in perforation or rupture of viscera.^{1,2}

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.³⁻⁵ 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.⁶

Traditionally, sterile water, warm saline, and povidone-iodine are most commonly used for the purpose of peritoneal lavage. Some researchers recommend the addition of antibiotics in these fluids for better results. Among various antibiotics, metronidazole has proved to be most beneficial in treating the peritonitis.⁷⁻⁹

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

Access this article online



www.ijss-sn.com

Month of Submission : 04-2016
Month of Peer Review : 05-2016
Month of Acceptance : 05-2016
Month of Publishing : 06-2016

Corresponding Author: Dr. Harpreet Singh, Department of Surgery, Teerthanker Mahaveer Medical College, TMU, Moradabad, Uttar Pradesh, India. E-mail: harpreet_singh_22@yahoo.com

appetite, and headaches. It inhibits nucleic acid synthesis by disrupting the DNA of microbial cells.^{10,11}

Different studies^{4,12-14} suggest that saline lavage reduces significantly counts in peritoneal fluid of aerobic and anaerobic bacteria in peritoneal fluid. Despite the profound reduction in peritoneal bacterial counts the rate of post-operative sepsis, wound infection, intra-abdominal abscess and septicemia were extremely high. These results indicate that saline peritoneal lavage alone is no substitute for short-term antimicrobial prophylaxis. Still the literature regarding the advantage of using antibiotics along with sterile water for peritoneal lavage is lacking. Hence, this study is conducted to compare the effect of sterile warm water and antibiotics for the purpose of peritoneal lavage.

MATERIALS AND METHODS

This study was conducted in the Department of General Surgery, TMMC & RC, Moradabad for the duration of 1 year. A total of 100 patients aged between 15 and 60 years were included in this study, out of which 75 were males and 25 were females. All these patients underwent laparotomy for the treatment of peritonitis.

All these patients presented with clinical features of peritonitis. Blood tests, erect X-ray abdomen, and USG abdomen also show positive results. These patients were randomly divided into two categories. Group S patients received intraoperative peritoneal lavage with 2 L of saline water. Group M patients received intraoperative peritoneal lavage using 2 L of saline mixed with 200 mL of metronidazole.

Duration of stay in the hospital was observed. The patients were followed postoperatively until the discharge and 1 month after discharge. Any type of early or late complications like localized or general infection, abscess formation, fistula and death were noticed.

Results of both the groups were analyzed statistically with the help of *t*-test. The *P* < 0.05 was considered statistically significant.

RESULTS

This study included 100 patients out of which 75 were males and 25 were females. 42% of patients belonged to the age group of 25 to 40 years. The most common etiology of peritonitis was duodenal ulcer in 64% of patients. Other reasons were appendicular perforation (13%), gastric perforation (9%), bowel ischemia (7%), trauma (4%), and Meckel's diverticulum (2%) (Figure 1).

In the case of perforation, the primary treatment was closure of opening followed by peritoneal lavage. The duodenal perforation was the commonest followed by gastric, ileal, and jejunal. In some cases of bowel ischemia and traumatic injury, resection and anastomosis of bowel were done. Few patients of ileal perforation underwent ileostomy.

The incidence of infection (both wound infection and sepsis) is statistically high in Group S, which suggests that peritoneal lavage with metronidazole is better than the saline (*P* < 0.05). Besides this incidence of intra-abdominal abscess formation is also high in Group S as compared to the Group M, but it is statistically insignificant (*P* > 0.05). Other complications were rare in both the groups (Table 1, Figure 2).

In the majority of the patients, the duration of the hospital stay was less than a week (70%). However, no statistically significant difference was found in the two groups (*P* > 0.05) (Table 2).

DISCUSSION

The patients in this study belonged mainly to age group 25-40 years which is comparable to age distribution

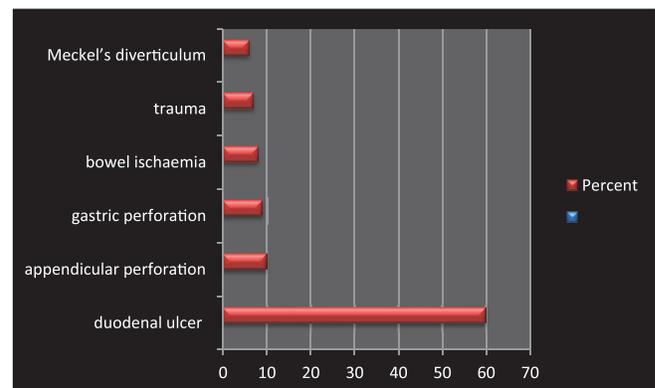


Figure 1: Bar diagram depicting the etiology (%) of peritonitis

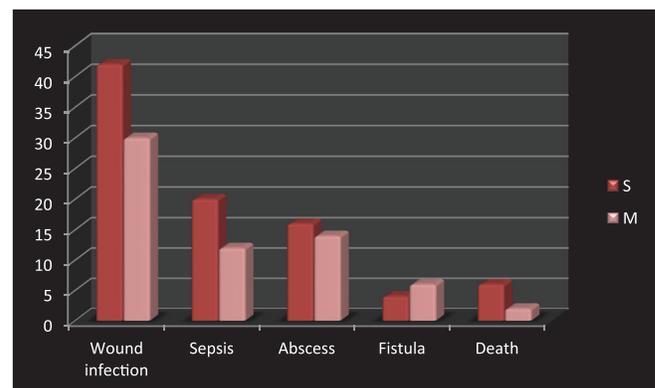


Figure 2: Comparison of the percentage of incidence of complication in two groups

Table 1: Incidence of complications in two groups

Complication	n (%)	
	Group S (n=50)	Group M (n=50)
Wound infection	21 (42)	15 (30)
Sepsis	10 (20)	6 (12)
Abscess	8 (16)	7 (14)
Fistula	2 (4)	3 (6)
Death	3 (6)	1 (2)

Table 2: Comparison of the duration of stay in the hospital in two groups

Duration of hospital stay	<7 days	>7 days	P value
Group S	31	19	>0.05
Group M	39	11	>0.05

in the study by Dalvi *et al.*¹⁰ The difference in the mean age of patients in both the groups was statistically insignificant. Similarly, the male predominance was found in both the studies.

According to a study by Sulli and Rao,¹⁵ duodenal perforation is the most common etiology of peritonitis followed by gastric perforation, trauma and bowel ischemia. In this study also, duodenal perforation was found to be the leading etiology of peritonitis. Other common causes were appendicular perforation, gastric perforation, bowel ischemia, trauma, and Meckel's diverticulum.

Different studies were done to compare the effect of different antibiotics and saline in the peritoneal lavage. One of the studies done by Schein *et al.*,⁹ no statistically significant difference was found in the chloramphenicol and saline peritoneal lavage. In our study, statistically significant reduction in the incidence of localized and generalized infection was found after use of metronidazole for intra-abdominal peritoneal lavage. This finding is similar to Dalvi *et al.*,¹⁰ who reported 20% reduction in the incidence of wound infection.

In this study, there was a reduction in the occurrence of intra-abdominal abscess in the patients undergoing metronidazole peritoneal lavage as compared to saline lavage, but it was not statistically significant. In a similar study by Fowler,¹⁶ 16% decrease in the incidence of this complication was found when they compared the use of saline and cephaloridine.

Other complications like fistula formation showed no statistically significant reduction in the present study. This finding is supported by other studies such as Dalvi *et al.*¹⁰ and Sulli and Rao.¹⁵

In this study, the mortality rate was higher in the Group S as compared to Group M. This might be due to increase in the incidence of infection, both localized and generalized in Group S. However, this difference was statistically insignificant. Likewise, Schein *et al.*⁹ found no significant difference in the outcome between the patients undergoing peritoneal lavage with saline and chloramphenicol. In another study, Rambo *et al.* also said that intraoperative peritoneal lavage with saline and cephalothin also does not affect the outcome significantly. In contrast to our study, significant difference was found in the patients receiving intraoperative peritoneal lavage with saline and other antibiotics by Bhushan *et al.*¹⁴

CONCLUSION

About 42% of patients of peritonitis belonged to the age group of 25 to 40 years. There is a male preponderance with male:female ratio of 3:1. The most common etiology of peritonitis was duodenal ulcer in 64% of patients. Other reasons were appendicular perforation (13%), gastric perforation (9%), bowel ischemia (7%), trauma (4%), and Meckel's diverticulum (2%). The incidence of infection (both wound infection and sepsis) is statistically high in the group receiving saline peritoneal lavage. In other parameters like the incidence of abscess and fistula formation, mortality rate and duration of stay in hospitals no statistical difference was found. Thus, we conclude that intraoperative peritoneal lavage with metronidazole in the patients of peritonitis is more beneficial as compared to saline.

REFERENCES

1. Saha SK. Peritoneal lavage with metronidazole. *Surg Gynecol Obstet* 1985;160:335-8.
2. Whiteside OJ, Tytherleigh MG, Thrush S, Farouk R, Galland RB. Intraoperative peritoneal lavage – Who does it and why? *Ann R Coll Surg Engl* 2005;87:255-8.
3. Schein M, Gecelter G, Freinkel W, Gerding H, Becker PJ. Peritoneal lavage in abdominal sepsis. A controlled clinical study. *Arch Surg* 1990;125:1132-5.
4. Myers E, Hurley M, O'Sullivan GC, Kavanagh D, Wilson I, Winter DC. Laparoscopic peritoneal lavage for generalized peritonitis due to perforated diverticulitis. *Br J Surg* 2008;95:97-101.
5. Zhao K, Kirman I, Tschepchen I, Schwab R, Weksler ME. Peritoneal lavage reduces lipopolysaccharide-induced elevation of serum TNF-alpha and IL-6 mortality in mice. *Inflammation* 1997;21:379-90.
6. Johnson CC, Baldessarri J, Levison ME. Peritonitis: Update on pathophysiology, clinical manifestations, and management. *Clin Infect Dis* 1997;24:1035-45.
7. Rambo WM. Irrigation of the peritoneal cavity with cephalothin. *Am J Surg* 1972;123:192-5.
8. Broderick T, Matthews J. Ulcer complications. In: Zinner M, Ashley S, editors. *Maingots Abdominal Operations*. 11th ed. Philadelphia, PA: McGraw Hill Medical; 2007. p. 253-6.
9. Schein M, Saadia R, Freinkel Z, Decker GA. Aggressive treatment of

- severe diffuse peritonitis: A prospective study. *Br J Surg* 1988;75:173-6.
10. Dalvi AN, Gondhalekar RA, Upadhye AS. Post-operative irrigation in the management of amoebic peritonitis. *J Postgrad Med* 1987;33:61-4.
 11. Schein M, Saadia R, Decker GA. Perforated peptic ulcer at the J.G. Strijdom Hospital. A retrospective study of 99 patients. *S Afr Med J* 1986;70:21-3.
 12. Schein M, Saadia R, Decker G. Intraoperative peritoneal lavage. *Surg Gynecol Obstet* 1988;166:187-95.
 13. Fowler R. A controlled trial of intraperitoneal cephaloridine administration in peritonitis. *J Pediatr Surg* 1975;10:43-50.
 14. Bhushan C, Mital VK, Elhence IP. Continuous postoperative peritoneal lavage in diffuse peritonitis using balanced saline antibiotic solution. *Int Surg* 1975;60:526-8.
 15. Sulli D, Rao MS. Comparative study of saline versus metronidazole peritoneal lavage in operated peritonitis cases. *J Evid Based Med Health* 2016;3:1446-8.
 16. Fowler R. A controlled trial of intraperitoneal cephaloridine administration in peritonitis. *J Pediatr Surg* 1975;10:43-50.

How to cite this article: Singh H, Agrawal M, Singh NK, Kaul RK, Ilahi I, Ahuja R. Intraoperative Lavage in Peritonitis: Comparison between Saline and Metronidazole. *Int J Sci Stud* 2016;4(3):131-134.

Source of Support: Nil, **Conflict of Interest:** None declared.