International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 19s, 2025
https://theaspd.com/index.php

Topical Metronidazole To Prevent Surgical Site Infection In Emergency Exploratory Laparotomy For Gastrointestinal Perforation.

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Abstract:
Background: *Surgical Site Infection is one of the most common postoperative complications in exploratory laparotomy performed for gastrointestinal perforations. It increases the morbidity and prolongs total hospital stay, thus increasing the cost of treatment, in spite of following aseptic techniques in many cases. Hence, it is necessary to find out effective solutions to minimize the same. Metronidazole is a commonly used antibiotic which is effective against anaerobic organisms. Topical use of metronidazole in treating various skin infections and wounds is well established. In this study we used metronidazole solution lavage to surgical site and therefore is estimated to prevent surgical site infection as well.*
Methods: *36 Participants were divided into cases and controls. After closure of rectus sheath, cases received metronidazole wound wash whereas controls received normal saline wound wash. All patients were checked for Surgical Site Infection at regular intervals. Asepsis score was used to divide them into groups who did not have any surgical site infection and those who had. The latter were further divided into minor, moderate and major surgical site infection bases on Asepsis score only.*
Results: *4 out of 18 patients from cases developed surgical site infection and 9 out of 18 patients from controls developed surgical site infection (p=0.07). However, presence of major Surgical Site Infection was found in 6 patients in the control group and only in 1 patient in the cases group (p=0.035), which is statistically significant.*
Conclusions: *Use of metronidazole solution lavage to surgical site significantly reduces major surgical site infection. Overall results show that the number of patients who developed surgical site infection is less in the cases group.*
KeyWords: *Surgical Site Infection, Metronidazole, Emergency Exploratory Laparotomy, Gastrointestinal Perforation*

INTRODUCTION:

Gastrointestinal perforation is one of the most common emergencies seen in general surgery department (1). Emergency exploratory laparotomy with repair of the perforation is the mainstay of treatment. Since there is spillage of intestinal contents in the peritoneal cavity, it is classified as a contaminated wound (2). Therefore, the chances of developing surgical site infection are very high. Surgical Site Infections (SSI) are defined as infections occurring up to 30 days after surgery (or up to 1 year after surgery in patients receiving implants) and affecting either the incision or deep tissue at the operation site (3). SSI is one of the most common operation related complications after emergency exploratory laparotomy (4). Escherichia coli and Klebsiella pneumonia are one of the most common organisms responsible for SSI in emergency laparotomies (5). Metronidazole is a commonly used antibiotic to treat such infections as it is active against such anaerobic bacteria. Use of topical antibiotics has shown to reduce the evidence of SSI following exploratory laparotomy (6,7). Therefore, it is estimated that wound wash with metronidazole will be effective in preventing SSI.

MATERIALS AND METHODS:

This is a case control study performed at a tertiary centre with a sample size of 36 for a time period of 1 year. The inclusion and exclusion criteria of the study were as follows:

- Inclusion Criteria:

1. All patients undergoing exploratory laparotomy in view of gastrointestinal perforation
2. Patients with age >18 years

- Exclusion Criteria:

1. Patients with malignant perforation

2. Patients who are readmitted with infection at surgical site after 30 days of procedure
3. Patients who are immunocompromised, having uncontrolled diabetes mellitus or hemodynamically unstable at the time of admission
4. Patients who did not consent to participate in the study

The study was carried out for a period of 1 year, during which a total of 36 patients were included in the study.

All patients included in the study were first examined clinically. Relevant demographic parameters such as age, sex, address were noted. Thorough clinical examination was carried out i.e. recording vital parameters and abdominal signs. All necessary investigations such as complete blood counts, renal function tests, liver function tests, urine routine and microscopy, blood sugar level levels etc and radiological investigations like radiograph of the abdomen (erect) and CT scan of the abdomen, whenever required were done and recorded.

Patients then underwent emergency exploratory laparotomy during which the diagnosis of perforation peritonitis was confirmed and the site of perforation was noted. All patients received through peritoneal lavage with normal saline only. Patients were randomly assigned to two groups namely cases and controls. After closure of the rectus sheath, patients in the cases group received a wound wash with 100 ml of metronidazole at a concentration of 5mg/mL. Whereas, those in the control group received a wound wash with 100 ml of normal saline at a concentration of 0.9%. Skin closure was performed and sterile dressing applied to both groups.

After the surgery, regular dressings were performed under all aseptic precautions according the following time table

1. First dressing – after 48 hrs of surgery
2. Second dressing – Daily. At the time of suture removal or any signs of SSI such as fever, tachycardia, Leukocytosis, Discharge from the wound etc
3. If SSI was present, daily dressings were done until the clearance of the same.

If any discharge was present from the wounds, then it was collected and sent for culture and sensitivity and the reports of the same were noted.

The surgical site was graded according to ASEPSIS SCORE to determine the presence of Surgical Site Infection (8).

Criterion	Description	Points
Additional Treatment	Antibiotics	10
	Drainage of Pus under Local Anaesthesia	5
	Drainage of Pus under General Anaesthesia	10
Serous Discharge		0-5
Erethyma		0-5
Purulent Discharge		0-10
Separation of Deep Tissues		0-10
Isolation of Bacteria		10
Stay in Hospital Prolonged over 14 days		5

Score	Interpretation
0-10	Satisfactory Healing
11-20	Disturbed Healing
21-30	Minor SSI
31-40	Moderate SSI
>40	Major SSI

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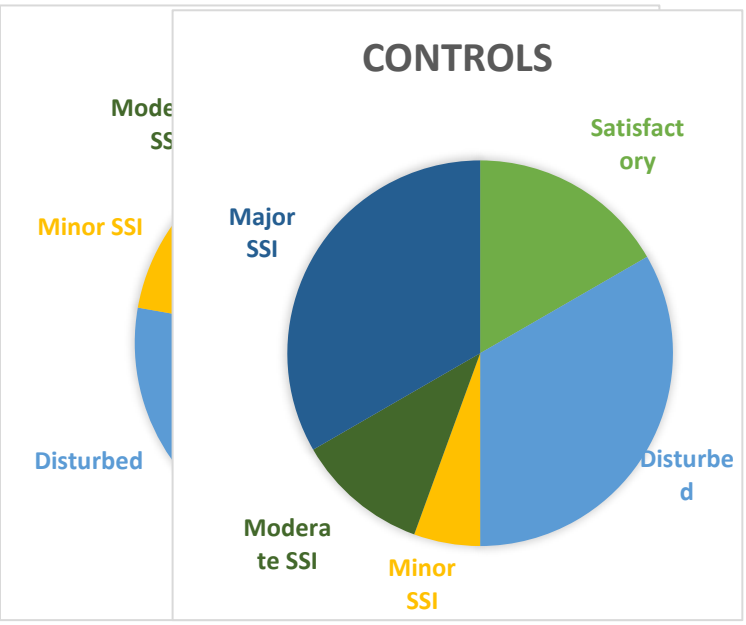
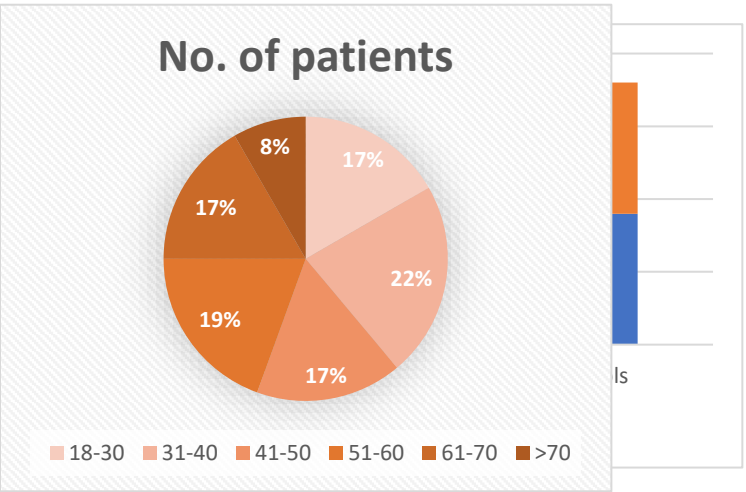
RESULTS :

Presence of SSI: There were 18 patients in the cases group, out of which 4 (22.22%) developed SSI. From the Control group, 9 out of 18 patients (50%) developed SSI. The p value for the same is 0.07. Out of the 4 patients from the case group who developed SSI, 2 patients had minor SSI, 1 had developed moderate SSI and 1 had developed major SSI. From the control group, only 1 patient developed minor SSI, 2 patients developed moderate SSI, whereas 6 patients developed major SSI. 10 patients from the cases group showed satisfactory healing and 4 showed disturbed healing. From the control group, 3 patients showed satisfactory healing and 6 showed disturbed healing. The p value calculated for correlation between presence of SSI and use of metronidazole solution wound wash over rectus sheath is 0.035.

	No SSI	SSI Present
Cases	14	4
Controls	9	9



Age: Of the total 36 participants included in the study, following distribution was found in the age groups.



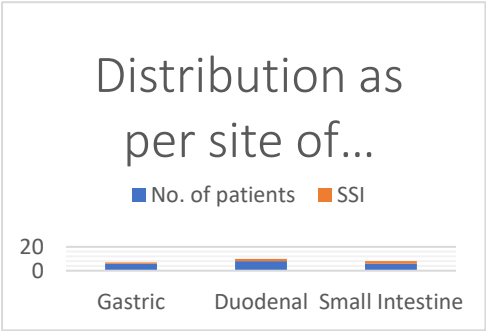
Age Group (Yrs)	No. of patients	SSI
18-30	6	1
31-40	8	2
41-50	6	2
51-60	7	4
61-70	6	2
>70	3	2

As we can see, only 16.66% of patients in the age group 18-30 developed SSI, whereas 57.14% of patients in the age group developed SSI. For the rest of the groups the percentages were 25% for 31-40, 33.33% for 41-50, 33.33% for 61-70 yrs and 66% for patients of age>70 yrs. However, there is no significant statistical correlation between age group and development of SSI (p=0.858)

Sex: Total 4(11.11%) females were included in the study and 32(88.88) males were included in the study. Out of them, 2 females and 11 males developed SSI. However, the difference in the occurrence of SSI was statistically insignificant (p=0.687).

Site of Perforation: There were 23 patients in which a gastric perforation was found (63.88). Duodenal Perforation was found in 10 patients (27.77) and small intestine perforation was found in 3 patients (8.33). No patients were found to have colonic perforation. Out of these, 6 patients from the gastric group, 5 patients from the duodenal group and 2 patients from the small intestinal group developed SSI. The p value for the same is 0.5145.

Site of Perforation	No. of patients	SSI
Gastric	6	1
Duodenal	8	2
Small Intestine	6	2



DISCUSSION:

Bhatia et al. conducted a randomized controlled trial and found that topical metronidazole reduced SSI incidence from 47.6% to 18.5%, strongly supporting the findings in the present study (9). Likewise, **Gupta et al.** showed reduced postoperative wound complications using metronidazole-soaked dressings, especially in surgeries involving gastrointestinal contamination (10).

Mukhopadhyay et al. also demonstrated the wound-healing benefits of topical metronidazole in Fournier's gangrene, where enhanced local infection control led to improved healing and shorter hospital stays (11). Though not directly comparable, their findings underline the broad utility of metronidazole in infected surgical fields.

In contrast, **Singh et al.** did not find a significant benefit of topical metronidazole in clean-contaminated surgeries (12). The difference in outcomes could be attributed to the type of wound, infection risk, and sample characteristics, highlighting the need for tailored interventions in high-risk surgeries like perforation peritonitis.

Another noteworthy observation from our study is the higher proportion of satisfactory healing in the metronidazole group (55.56%) compared to the control group (16.67%), further supporting its beneficial role in the postoperative wound environment.

CONCLUSION:

This study demonstrates that there is significant reduction in the development of major SSI after using metronidazole solution lavage over rectus sheath during exploratory laparotomy done for gastrointestinal perforation. Percentage of patients who developed SSI was lower in the cases group; however, the difference was statistically insignificant. This indicates that metronidazole solution lavage over rectus

sheath should be used for preventing SSI. Future studies should focus on getting more sample size and performing separate studies according to the site of perforation to accurately get results in these particular situations.

REFERENCES

1.Colin McCord, Doruk Ozgediz, Jessica H Beard, and Haile T Debas. Essential Surgery: Disease Control Priorities, Third Edition (Volume 1).

2.P. Ronan O'Connell AWMRDS, editor. Bailey & Love's Short Practice of Surgery - 28th Edition. 28th ed. Boca Raton; 2023.

3.C.D. Owens, K. Stoessel. Surgical site infections: epidemiology, microbiology and prevention. Journal of Hospital Infection. 2008 November; 70: 3-10.

4.Aura T. Ylimartimo, Juho Nurkkala, Marjo Koskela, Sanna Lahtinen, Timo Kaakinen, Merja Vakkala, Siiri Hietanen, Janne Liisanantti. Postoperative Complications and Outcome After Emergency Laparotomy: A Retrospective Study. World Journal of Surgery. 2022 October 16; Volume 47(Issue 1): 119-129.

5.Miima, Elikanah S. Surgical site infection following emergency laparotomy for bowel surgery at Kenyatta national hospital. University of Nairobi Research Archive. 2016.

6.Chatterjee S, Khaitan A, Bhattacharya S, Samanta S, Saha AK. Prospective study of surgical site infection in laparotomy wounds with antibiotic lavage. International Surgery Journal. 2016.

7.Hira Aslam, Muhammad Khurram Jameel, Pir Muneeb, Aneeqa Nasir Qureshi. Intraoperative Peritoneal Lavage in Peritonitis: Normal Saline vs Metronidazole. 2023 September; Volume 37.

8.A.P.R. Wilson, C.Weavill, J.Burridge, M.C. Kelsey. The use of the wound scoring method 'ASEPSIS' in postoperative wound surveillance. Journal of Hospital Infection. 1990 November; Volume 16(Issue 4): 297-309.

9.Bhatia P, Jain SK, Agrawal A, Jadon RS. Topical metronidazole in prevention of surgical site infection after abdominal surgery: a randomized controlled trial. Int J Res Med Sci. 2016;4(3):829–833.

10. Gupta R, Gupta S, Singh SP. Role of metronidazole soaked dressing in surgical wounds. Int Surg J. 2014;1(3):125–129.

11. Mukhopadhyay P, Ghosh S, Ghosh D, Ghosh A. Topical metronidazole in the management of Fournier's gangrene. Int J Surg. 2018;53:271–274.

12. Singh R, Sharma A, Singh D, Singh G. Role of topical metronidazole in surgical wound healing. Indian J Surg. 2015;77(2):149–152.