

Comparison of the Efficacy of Normal Saline and Povidone Iodine Wash in Preventing Surgical Site Infections

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Abstract:

Introduction: Healthcare-Associated Infections (HAIs) is a subject of great concern of the healthcare services. Surgical Site Infection (SSI), among the topographies of the HAIs, is directly related to surgical procedures, and is currently one of the most important among the HAIs. Surgical site infection is serious complication of surgery with significant impact on morbidity and mortality. However, Povidone-iodine has been utilized as a broad-spectrum antiseptic irrigation solution in the wound management processes for many years but some recent studies showed that the infection rate in laparotomy wounds decreases more by using normal saline.

Objectives: In the background of postoperative infection and associated morbidity-mortality, this prospective study compares the efficacy of Povidone-iodine and Normal Saline in Preventing Surgical Site Infections in laparotomy and laparoscopic wounds.

Method: The patients undergoing elective laparotomies and laparoscopic procedures were included and randomly assigned to 2 groups. In the first group (118 patients), incision wounds were flushed with 5% povidone-iodine solution. In the second group (118 patients), incisions were flushed with 0.9% normal saline solution. By comparing the infection rates of the wound outcomes were measured between the two groups.

Result: Surgical site infections were seen in 25 of 236 (10.5%) patients 14 in povidone-iodine versus 11 in normal saline groups. The difference in the infection rates in the two studied groups has no statistical significance.

Conclusion: There is not increase or decrease in the in the rate of SSI in laparotomy and laparoscopic wounds irrigation with 5% Povidone-iodine compared to irrigation with 0.9% saline solution.

Keywords: Wound irrigation; Infection; Povidone-iodine; Normal saline.

Date of Submission: 19-09-2019

Date of Acceptance: 07-10-2019

I. Introduction

Healthcare-Associated Infections (HAIs) is a subject of great concern of the healthcare services. Surgical Site Infection (SSI), among the topographies of the HAIs, is directly related to surgical procedures, and is currently one of the most important among the HAIs[1]. According to the National Nosocomial Infections Surveillance (NNIS) system, SSI is the third most frequently reported nosocomial infections [2]. Surgical site infection is serious complication of surgery with significant impact on morbidity and mortality [3]. SSI leads to serious consequences, including increased costs due to its treatment and increased length of hospital stay [4]. The risk of death in patients with SSI is increased when compared to those who did not develop an infection [5]. Postoperative infection often requires repeat surgery and prolonged hospitalization, and it may compromise ultimate surgical outcomes. Despite the widespread use of prophylactic antibiotics, however, surgical site infection continues to occur and is devastating for patients. Many different wound irrigation solutions, including soaps, antibiotics and antiseptics, have been used to reduce surgical site infection [6, 7]. Wound irrigation with povidone-iodine, an antiseptic solution, may be useful for reducing infection, but it is of uncertain efficacy and risk.

Povidone-iodine (Betadine) is an antiseptic solution consisting of polyvinylpyrrolidone with water, iodide and 1% available iodine; it has bactericidal ability against a large array of pathogens [8]. Povidone-iodine has been utilized as a broad-spectrum antiseptic irrigation solution in the wound management processes for many years. Although its use as an antibacterial agent in surgery has been studied in many kinds of literature, using it against Surgical Site Infection (SSI) as a prophylactic irrigation solution has been examined to a lesser degree.

There are different types of irrigation solutions but their effectiveness and safety are controversial. However, some recent studies showed that the infection rate in laparotomy wounds decreases more by using normal saline. Since the selection of irrigation solution is generally based on the preference and experience of the surgeon, institutional policies, economic issues, and procedures used [9].

Normal saline (0.9%) is an isotonic solution generally selected for wound irrigation and cleaning because it's safe, doesn't interfere with normal skin flora, wound healing process and is inexpensive. However, it has no antiseptic effects [10]. In the background of postoperative infection and associated morbidity-mortality, this prospective study compares the efficacy of Povidone-iodine and Normal Saline in Preventing Surgical Site Infections in laparotomy wounds.

II. Material And Methods

Study design

A prospective randomized study was done on patients undergoing elective laparotomy involving gastrointestinal tract causing clean contaminated wounds. Study period over 1 year from June 2018 to May 2019, in Rajendra Institute of Medical Sciences, Ranchi.

Methods

Cases undergoing elective laparotomy laparoscopic procedure, who met the inclusion criteria and willing to participate were included in the study. The patients of age ≥ 18 year were included in this study. Randomization was done with computer-generated third-party applications.

A total number 236 of cases that underwent exploratory laparotomy and laparoscopic procedure were included. In Group A, the incision site was treated with 400 ml, 0.9% normal saline and 100 ml 5% povidone-iodine solution. In Group B, the incision site was treated with 500 ml 0.9% normal saline solution. After wash, incisions were closed with standard suturing techniques. Post-operatively, wound dressings changed after 72 hrs. Saline and Betadine dressings were repeated, corresponding to the initial study. Suture removal was done at the discretion of the primary surgeon.

Statistical analysis

Statistical analysis performed for primary, secondary and safety outcomes. Data were processed using mean value (standard deviation, SD) and were tested with an unpaired mean difference (median). The data was analyzed using a software program of SPSS version 22.0.

Outcome evaluation

The difference in infection rates between the two studied groups were studied as the outcome measures. Follow-up of 30-day after surgery was considered. Infection was defined as per CDC, Atlanta, 1992 guidelines as the wound discharge within 4 weeks after surgery or a positive culture of fluid from the wound. The postoperative complications were graded by the Clavien-Dindo classification of surgical complication. Surgical site infections were the main focus of this study.

III. Results

In both groups the baseline characteristics of the patients were similar. Study patients variables are compared as detailed in the table below. Similar suturing techniques and layers were used in wounds closure. Antibiotics were provided to all patients with wound infections as per institutional protocol and according to the culture-sensitivity reports and regular wound dressing. During follow up 25 (10.5%) patients documented wound infection.

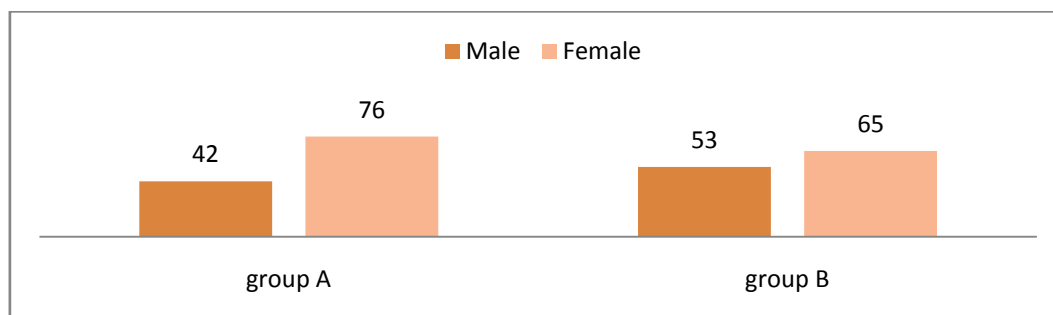


Figure 1: sex ratio in Group A and Group B

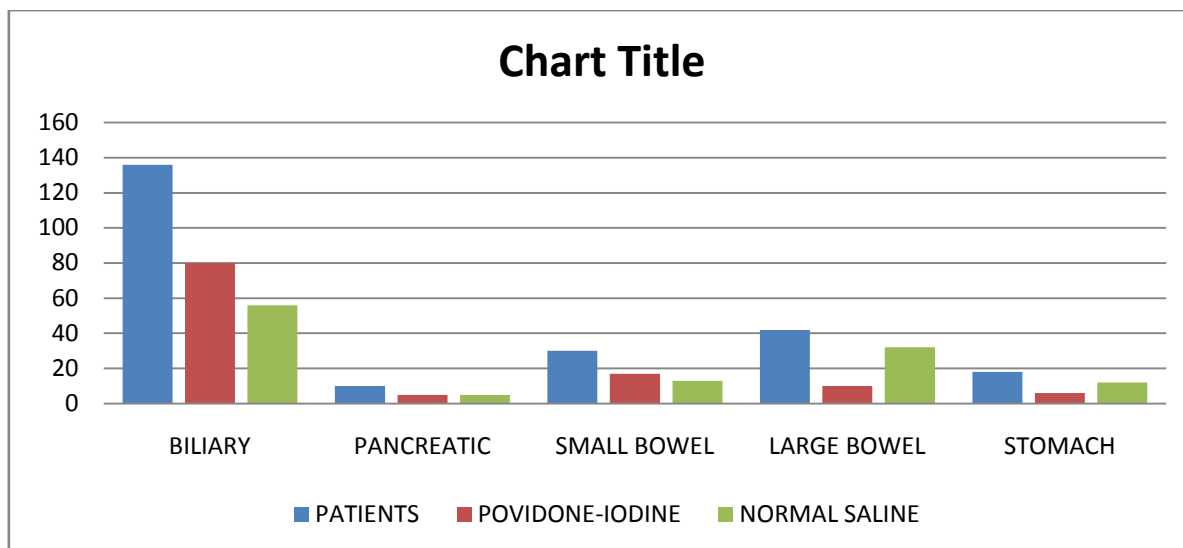


Figure 2: Baseline characteristics of patients

Variable	Patients (n=236)	GROUP A (n= 118)	GROUP B (n= 118)
Biliary	136	80	56
Pancreatic	10	5	5
Stomach	30	17	13
Large bowel	42	10	32
Small bowel	18	6	12
SSI	25(10.5%)	14(11.8%)	11(9.3%)

Table 1: Baseline characteristics of patients

In Povidine-iodine group wound infection in 14 (11.8%) out of 118 patients was observed. In normal saline group wound infection was observed in 11 (9.3%) out of 118 patients. In both groups, no wound bursting was observed. There is no statistically significant difference wound infection and dehiscence in both groups.

IV. Discussion

In our study, Surgical Site Infections (SSI's) rate was 25 in 236 (10.5%) with approximately equal distribution in both groups. By using antiseptic irrigation solutions and traditional sterile techniques the conclusion made by our study was similar to the results that showed decreased rate of SSI and its related morbidity and mortality in different types of wounds and different patient groups.

HB Ghafouri et al., conducted a similar, showed 29 (7.40%) out of 320 patients experienced wound infection during follow up period. 15 (7.65%) patients in the Povidine-iodine group and 14 (7.26%) patients in the normal saline group showed sign of wound infection [11].

The results of our study are contradictory to other mentioned studies on surgical wounds. Sindelar et al done a comparative study on wound infection rate in patients undergoing abdominal, gastrointestinal and urologic procedures and showed that the effectiveness in decreasing the rate of infection of 10% povidone-iodine is more than normal saline in these groups of patients [12]. Another study by Singah et al., on clean-contaminated surgical wounds, found that infection rate is higher in wounds irrigated with normal saline than wounds irrigated with 5% povidone-iodine or 5% povidone-iodine plus metronidazole [13, 14].

V. Conclusion

There is not increase or decrease in the in the rate of SSI in laparotomy and laparoscopic wounds irrigation with 5% Povidone-iodine compared to irrigation with 0.9% saline solution.

References

- [1]. Centers for Disease Control And Prevention (CDC). Procedure-Associated Module: surgical site infection event [Internet]. Atlanta; 2016. 29 p. [Access 2016 Ago 17]. Available from: <http://www.cdc.gov/nhsn/pdfs/pscmanual/9pscscscurrent.pdf>.
- [2]. Emori TG, Gaynes RP. An overview of nosocomial infections, including the role of the microbiology laboratory. *Clin Microbiol Rev.* 1993;6:428-42.
- [3]. Hedrick TL, Anastacio MM, Sawyer RG. Prevention of surgical site infections. *ExpertRev Anti Infect Ther* 2006;4:223-33.
- [4]. Anderson DJ, Podgorny K, Berríos-Torres SI, Bratzler DW, Dellinger EP, Greene L, et al. Strategies to prevent surgical site infections in acute care hospitals. *Infect Control Hosp Epidemiol.* [Internet]. 2014 [Access 2016 Ago. 16]; 35(s2): s66-s88.

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- [5]. Engemann JJ, Carmeli Y, Cosgrove SE, Fowler VG, Bronstein MZ, Trivette SL, et al. Adverse clinical and economic outcomes attributable to methicillin resistance among patients with *Staphylococcus aureus* surgical site infection. *Clin Infect Dis*. [Internet]. 2003 [Access 2016 Ago.16]; 36: 592-8. Available from: <http://cid.oxfordjournals.org/content/36/5/592.full.pdf+html>
- [6]. Sindelar WF, Mason GR. Efficacy of povidone-iodine irrigation in prevention of surgical wound infections. *Surg Forum* 1977;28:48-51.
- [7]. Sindelar WF, Mason GR. Irrigation of subcutaneous tissue with povidone-iodine solution for prevention of surgical wound infections. *Surg Gynecol Obstet* 1979;148: 227-31.
- [8]. Zamora JL. Chemical and microbiologic characteristics and toxicity of povidoneiodine solutions. *Am J Surg* 1986;151: 400-6.
- [9]. RS Fernandez, RD Griffiths, Ussia C (2001) Wound cleansing: Which solution, what technique? *Prim Intent* 9: 51-58.
- [10]. BA Nicks, EA Ayello, K Woo, D Nitzki-George, RG Sibbald (2010) Acute wound management: Revisiting the approach to assessment, irrigation, and closure considerations. *Int J Emerg Med* 3: 399-407.
- [11]. Ghafouri HB, Zavareh M, Jalili F, Cheraghi S (2015) Is 1% povidone-iodine solution superior to normal saline for simple traumatic wound irrigation? *Wound Medicine* 15: 1-5.
- [12]. Sindelar WF, Mason GR (1977) Efficacy of povidone-iodine irrigation in prevention of surgical wound infections. *Surg Forum* 28: 48-51.
- [13]. Singh A, Goyal HO, Kaur B (1988) Wound healing: Some observations. *J Indian Med Assoc* 86: 81.
- [14]. Horan TC, Gaynes RP, Martone WJ, Jarvis WR, Emori TG (1992) CDC definitions of nosocomial surgical site infections, 1992: A modification of CDC definitions of surgical wound infections. *Infect Control Hosp Epidemiol* 13: 606-608.

Dr. Anil Kumar Kamal. "Comparison of the Efficacy of Normal Saline and Povidone Iodine Wash in Preventing Surgical Site Infections." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, vol. 18, no. 10, 2019, pp 76-79.