



COMPARISON OF THE EFFICACY OF NORMAL SALINE AND POVIDONE IODINE WASH IN PREVENTING SURGICAL SITE INFECTIONS AFTER SHEATH CLOSURE

General Surgery

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ABSTRACT

Aim To comparison of the efficacy of normal saline and povidone iodine wash in preventing surgical site infections after sheath closure .

Objective –

1. Comparison of the Efficacy of Normal Saline and Povidone Iodine Wash in Preventing Surgical Site Infections. □
2. To study the effect on wound healing with the use of povidone iodine and normal saline after sheath closure. □

KEYWORDS

Povidone Iodine, Normal Saline, Surgical Site Infection, Clean Contaminated, Contaminated, Dirty Surgery, Irrigation

INTRODUCTIONS

Surgical site infection (SSI) is the second most common complication following surgical intervention after haemorrhage. It is due to bacterial entry with high virulence, change in wound microenvironment and altered host defence mechanisms. Pneumonia is the most common hospital acquired infection followed by SSI . Surgical site infection plays an important burden on both the surgeon and the patients.¹⁻³

After development of Anaesthesia by Morton in 1846 many number of surgeries were done in the second half of 19th century, Because of high rate of infection and mortality surgical field did not progress well. With introduction of antiseptics in medicine first practiced by Ignaz Philipp Semmelweis which was later adapted by Joseph Lister the reduction in wound infection rate and death rate in operative patients were seen. The contribution of Pasteur, Koch and Holmes in disease causing infection and establishment of operating room and environment by Halsted proved the antiseptic technique is the most efficient way in preventing the surgical site infection.^{4,5}

It can occur after 3.03% of all clean, 22.41% of all clean-contaminated, 20-40% of all contaminated, 40-80% of all dirty surgeries.² However prevalence studies tend to underestimate SSI because many of these infections occur after the patient has been discharged from the hospital. Surgical site infection is associated with increased hospital stay and recovery time which increases overall mortality and morbidity associated with surgeries . The incidence of SSI can vary on multiple factors like the definition of the infection used , surveillance and prevalence of risk factors in the population studied Multiple perioperative wound and host factors have been associated with elevated risk of SSIs. Therefore a range of preventive measures have been proposed.^{6,7} One of these measures is prophylactic intraoperative wound irrigation, which removes and dilutes body fluids, microbes and cellular debris and it can have a direct antimicrobial effect when additive antiseptic agents are combined .

Wound infection is defined as the invasion of organisms through tissue following a breakdown of local and systemic host defence which lead to cellulitis, lymphangitis, abscess and bacteremia.⁶ It is particularly common after prolonged intra- abdominal surgeries and it is a major factor that postpones wound healing.^{7,9}

Surgical site infection (SSI) represents 15% of all nosocomial infections, which lead to increased length of postoperative hospital stay, drastically escalated expense, higher rates of hospital readmission and jeopardized health outcomes. It's also a major cause of morbidity in surgical patients.

The prevention of surgical site infections encompasses meticulous operative technique, timely administration of appropriate preoperative

antibiotics and a variety of preventive measures aimed at neutralizing the threat of bacterial, viral and fungal contamination posed by operative staff, the operating room environment, and the patient's endogenous skin flora. In the majority of SSI cases, the pathogen source is the native flora of the patient's skin, mucous membranes or hollow viscera.^{10,11}

Povidone-iodine (Betadine) is an antiseptic medicine composed of polyvinylpyrrolidone with water, iodide and 1% available iodine. It has bactericidal properties against a large number of pathogens.⁷ 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.

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.⁸ In new research, it is found that surgical site infections accounted for 31% of all Healthcare-Associated Infections (HAIs) amongst hospitalized patients.⁹

The postoperative infection has extreme surgical outcomes which often requires repeat surgery and extended hospital stay. 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.

MATERIALS AND METHODS

The study population included were patients above 14 years of age who were posted for surgery. Clean-contaminated, contaminated and dirty surgeries were included in our study. After giving a written informed consent, patients who were willing to participate in the study were studied over a period of two year between January 2021 to July 2022 , This is a randomized control study .

Inclusion Criteria

Patients above 14 years of age, planned for surgery (clean-contaminated, contaminated and dirty surgeries), who were willing to participate in the study after giving written informed consent.

Exclusion Criteria

1. Patients <14yrs of age undergoing abdominal surgery. □
2. Patients undergoing clean elective surgery. □

RESULTS

In this study , 180 patients who underwent abdominal surgery were divided into clean contaminated , contaminated and dirty surgery . Wash was given with 5 % povidone iodine vs 0.9% normal saline .

Surgical Site Infection Incidence

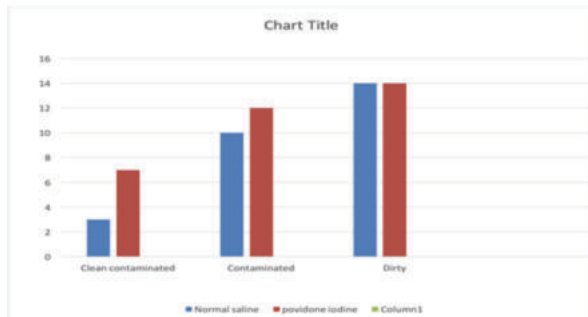
Table 1: Incidence Of Type Of Infection Of Study Groups

			Povidone-iodine	Normal Saline	P value
Clean Contaminated	SSI rate	Count	7	3	0.149 (NS)
		% within Group	23.3%	10.0%	
Contaminated	SSI rate	Count	12	10	0.395 (NS)
		% within Group	40.0%	33.3%	
Dirty Surgery	SSI rate	Count	14	14	0.602 (NS)
		% within Group	46.7%	46.7%	

NS = Not Significant ; S=Significant

The above data shows the total surgical site infection rate in clean contaminated, contaminated and dirty surgery after wash with normal saline versus povidone-iodine after sheath closure and before closing of the skin .

SURGICAL SITE INFECTION INCIDENCE



With regards to total surgical site infection rate in clean contaminated, contaminated and dirty surgery . The overall surgical site incidence rate in clean contaminated surgery (7 in group A and 3 in group B) . There is significantly decrease in SSIs in clean contaminated surgery after normal saline . There is significant decrease in SSIs from 23.2% to 10% .(P>0.05).

In category of contaminated surgery of both the groups , 22 patients had SSIs (12 in group A and 10 in group B) . This shows that the result is not significant as the P value is P>0.05.

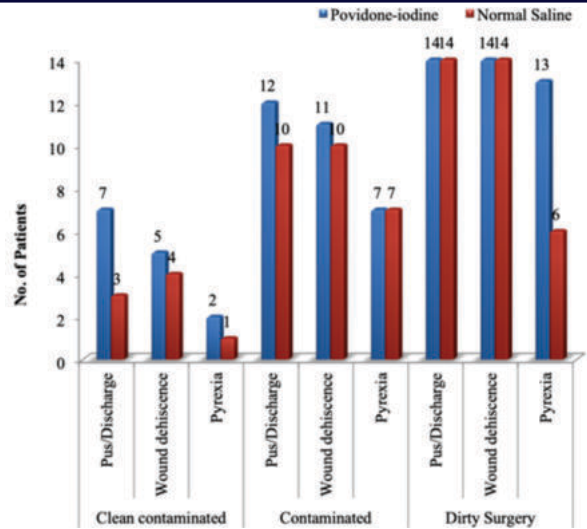
In category of dirty surgery of both groups ,28 patients had SSIs (14 in group A and 14 in group B) . This shows that the result is not significant as the P value is P>0.05.

Table 2: Incidence of type of infection of study groups

			Povidone-iodine	Normal Saline	P value
Clean Contaminated	Pus/Discharge	Count	7	3	0.149 (NS)
		% within Group	23.3%	10.0%	
	Wound dehiscence	Count	5	4	0.718 (NS)
		% within Group	16.7%	13.3%	
	Pyrexia	Count	2	1	0.554 (NS)
		% within Group	6.7%	3.3%	
Contaminated	Pus/Discharge	Count	12	10	0.395 (NS)
		% within Group	40.0%	33.3%	
	Wound dehiscence	Count	11	10	0.787 (NS)
		% within Group	36.7%	33.3%	
	Pyrexia	Count	7	7	0.619 (NS)
		% within Group	23.3%	23.3%	
Dirty Surgery	Pus/Discharge	Count	14	14	0.602 (NS)
		% within Group	46.7%	46.7%	
	Wound dehiscence	Count	14	14	0.602 (NS)
		% within Group	46.7%	46.7%	
	Pyrexia	Count	13	6	0.047 (S)
		% within Group	43.3%	20.0%	

NS = Not Significant; S=Significant

With regard to type of infection in clean contaminated surgery of both the groups,10 (7 in group A & 3 in group B) patients had pus/discharge, 9 (5 in group A & 4 in group B) patients had wound dehiscence and 3 (2 in group A & 1 in group B) patients had pyrexia (P>0.05).



In the category of contaminated surgery of both the groups,22 (12 in group A & 10 in group B) patients had pus/discharge, 21 (11 in group A & 10 in group B) patients had wound dehiscence and 14 (7 in group A & 7 in group B) patients had pyrexia (P>0.05).

In the category of dirty surgery of both the groups,56 (same divided in both groups) patients had pus/discharge and wound dehiscence (P>0.05) and 19 (13 in group A & 6 in group B) patients had pyrexia (P<0.05).

Same patient can have wound dehiscence ,pus discharge, pyrexia.

Table 3: Organism isolated before wash of study groups in Clean contaminated surgery

Organism isolated		Povidone-iodine	Normal Saline	Fisher's exact test P-value
E. coli	Count	3	4	0.922 (NS)
	% within Group	10.0%	13.3%	
C. difficile	Count	1	1	
	% within Group	3.3%	3.3%	
Sterile	Count	26	25	
	% within Group	86.7%	83.3%	
Total	Count	30	30	
	% within Group	100.0%	100.0%	

NS = Not Significant

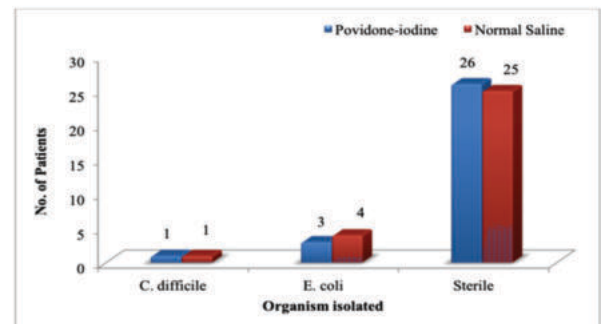


Table 3.2: Organism isolated before wash of study groups in Contaminated Surgery

Organism isolated		Povidone-iodine	Normal Saline	Fisher's exact test P-value
E. coli	Count	4	4	0.556 (NS)
	% within Group	13.3%	13.3%	
Klebsiella	Count	0	1	
	% within Group	0.0%	3.3%	
Proteus mirabilis	Count	0	1	
	% within Group	0.0%	3.3%	
Sterile	Count	26	24	
	% within Group	86.7%	80.0%	
Total	Count	30	30	
	% within Group	100.0%	100.0%	

NS = Not Significant

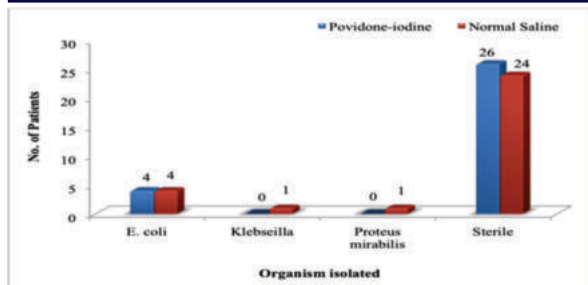


Table 3.3: Organism isolated before wash of study groups in Dirty Surgery

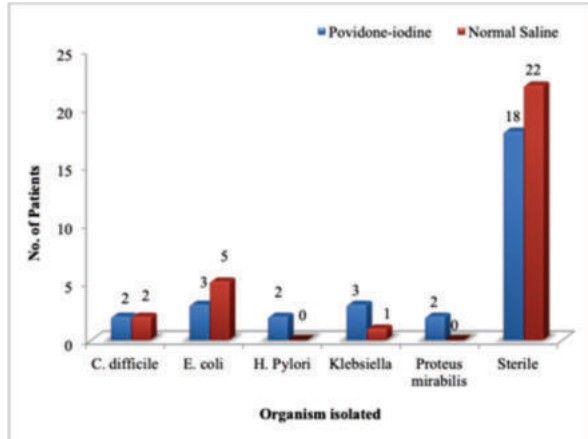


Table 3 presents the organisms isolated before wash in both the groups for different types of surgeries. *Most common organism isolated in our patients were E.coli in all types of surgery.* Next in order are *C. difficile* and then comes *klebsiella*. This shows that the result is not significant as the P value is $P > 0.05$.

Summary

Our study was done in the patients who underwent surgery in Department of General Surgery, Mahatma Gandhi Medical College and Hospital, Jaipur. Totally we studied 180 patients of abdominal surgeries, equally patients were divided into 3 parts (60 patients in clean contaminated, 60 patients in contaminated and 60 patients in dirty surgery).

CONCLUSION

The incidence of surgical site infection was found to be higher in emergency surgeries. This type scoring system is also useful for predicting and assessing the severity of surgical site wound infection .E.coli was found to be the most common organism causing surgical site infection in abdominal surgeries. Next in order to C.difficile & klebsiella .Change in bacterial gram positive organisms to gram negative organisms due to frequent use of antibiotics. Pus discharge, wound dehiscence and pyrexia were observed as post operative complication due to wound infection. The best way to decrease wound infection is by vigorous surveillance and reporting of wound infection rate. Moreover, hospital guidelines on antibiotic use among surgical patients should be revised on the basis of most commonly detected causative organism .In this study we found that wash with normal saline and povidone iodine after sheath closure decreases the surgical site infection and when compared wash with normal saline is better to decrease the wound infection compared to povidone iodine wash. The wound type of clean contaminated surgery is better to prevent the surgical site infection in compared to contaminated and dirty surgery.

Limitations

3. It was a time bound clinical trial conducted in a single center and so there is paucity of data and number of cases. □
4. There was no prescribed pressure at which the irrigation was to be performed. This could be an important factor. □
5. The interim analysis of a clinical trial might not depict the entire picture of the intervention. □

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