

Effect of Chlorhexidine Scrub on Surgical Site Infection: A Hospital Based Randomised Study

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Abstract

The incidence of surgical site infection (SSI) varies not just from one surgeon to another, but also between hospitals, between surgical procedures, and most importantly between patients. Use of appropriate pre-operative skin antiseptics is an important factor in the incidence of SSI. This randomized prospective study compared the use of two different antiseptic preparations, namely Chlorhexidine and Povidone Iodine, and their role in reducing SSI. It was concluded that Chlorhexidine scrub as a preoperative skin preparation had less patients with SSI, than Povidone Iodine.

Keywords: Surgical Site Infection (SSI); Chlorhexidine; Povidone-Iodine (PI).

Introduction

Surgical site infection (SSI) is a dangerous condition and a heavy burden on the patient and social health system, comprising about 14 to 16% of all inpatient infections. The major source for pathogens causing SSI is the patient's skin. A reduction of these pathogens can significantly reduce the incidence of SSI. Povidone Iodine and Chlorhexidine are the commonly used antiseptics in clinical practice.

The present study has attempted to evaluate the efficacy of Chlorhexidine over Povidone Iodine in elective clean and clean contaminated surgeries, to reduce SSI.

Methodology

300 elective surgeries from the departments of general surgery, cardiothoracic surgery and paediatric surgery were prospectively studied. The patients were randomized into two groups. Patients in group A had Chlorhexidine skin scrub prior to surgery and group B had Povidone Iodine. Post operative screening for a period of 30 days was done for any evidence of SSI. SSI rate, as defined by the Centers for Disease Control & Prevention (CDC), was calculated.

Patients in Group A & Group B were similar in regard to baseline characteristics and clinical history. The two groups were compared using univariate analysis.

Results

The details of the patients, and their demographic profile are in Table 1.

SSI was found in 14 patients out of 300 (4.66%), as shown in Table 2.

Table 3 shows that 7 of the 14 patients with SSI isolated organisms.

Use of Chlorhexidine scrub as pre-operative skin preparation had significant reduction in SSI when compared to the use of Povidone Iodine, as shown in Table 4.

Discussion

SSI represents about a fifth of all health care associated infections and in the most meticulous

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Table 1:

	Povidone Iodine	Chlorhexidine	Total
Age Distribution			
<10Yrs	47 (51.1%)	47 (51%)	92
10-30Yrs	11 (64.7%)	6 (34.3%)	17
30-50Yrs	39 (47.6%)	43 (52.4%)	82
>50Yrs	53 (48.6%)	56 (51.4%)	109
Sex Distribution			
Male	101 (47.6%)	111 (52.4%)	212
Female	49 (55.7%)	39 (44.3%)	88
Socio-Economic Status			
Class I	9 (33.3%)	18 (66.7%)	27
Class II	49 (54.4%)	41 (45.6%)	90
Class III	76 (51.4%)	72 (48.6%)	148
Class IV	16 (45.7%)	19 (54.3%)	35
Class V	0	0	0

Table 2:

SCRUB	SSI		Total
	Absent	Present	
Clean surgeries	234 (96.3%)	9 (3.7%)	243
Clean contaminated surgeries	52 (91.2%)	5 (8.8%)	57
Total	286 (95.3%)	14 (4.7%)	300

Table 3:

Escherichia coli	3 patients
Escherichia coli ESBL	1 patient
Escherichia coli & Klebsiella	1 patient
Klebsiella	1 patient
Staphylococcus aureus CONS	1 patient

Table 4:

	Povidone-Iodine	SSI Chlor-Hexidine	P Value
	Clean surgeries	7 out of 115 (6.1%)	
Clean contaminated surgeries	5 out of 35 (14.3%)	0 out of 22	0.002
Total	12 out of 150 (8.0%)	2 out of 150 (1.3%)	

review of literature the infection rate is always higher [1]. Preoperative disinfection of skin is a key factor for reducing SSI. Chlorhexidine and Povidone Iodine are the 2 common antiseptics used for pre-operative skin preparation.

The overall infection rate in the present study was 4.7% and compares favorably with other reported SSI rates ranging from 2.5 to 41.9% [2-9]. In India, the rate varies from 4.04 to 30% in clean surgeries and 10.06 to 45% in clean contaminated surgeries [3,5,8]. Findings in the present study showed that the rate in clean surgeries was 3.7%, while in clean contaminated surgeries it was 8.8%.

The SSI observed in Chlorhexidine and Povidone Iodine groups, in the present study, were 1.3% and 8.0% respectively. The difference in SSI was statistically significant. A meta-analysis of studies comparing Chlorhexidine with Povidone Iodine

concluded that Chlorhexidine reduced SSI in comparison with Povidone Iodine (pooled odd ratio-0.68, P=0.019) [11]. There was evidence from another study suggesting that pre-operative skin preparation with Chlorhexidine in methylated spirits led to a reduced risk of SSI compared with an alcohol based Povidone Iodine solution [12].

At the surgical site incision, chlorhexidine has been shown to have a superior effect in reducing the skin colonization when compared with povidone-iodine [13]. In addition, it has a longer residual activity on the skin that helps to prevent rapid re-growth of skin organisms and enhances the duration of skin antiseptics [14,15].

The bacterial count suppression on the skin was maintained up to 6 hours [15,16]. Chlorhexidine, unlike the iodophors, is active even in the presence of blood or serum proteins.

Although both antiseptic preparations possess broad-spectrum antimicrobial activity, the superior clinical protection provided by Chlorhexidine is probably related to its more rapid action, persistent activity despite exposure to bodily fluids and residual effects. The superior clinical efficacy of Chlorhexidine in our study correlates well with previous microbiological studies showing that it is more effective in the operative field. Chlorhexidine is commercially available in aqueous or alcohol formulations and has broad activity against gram positive and negative bacteria, anaerobes, yeast and some lipid enveloped viruses.

Conclusion

Chlorhexidine scrub as a preoperative skin preparation had less number of surgical site infections when compared to Povidone Iodine. Its superior clinical efficacy makes it an ideal antiseptic solution for preoperative skin scrub prior to surgery.

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