



A STUDY ON COMPARISON OF EFFICACY BETWEEN POVIDONE IODINE AND CHLORHEXIDINE GLUCONATE SOLUTION USED FOR PREOPERATIVE SKIN PAINTING IN PREVENTING SURGICAL SITE INFECTION

General Surgery

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ABSTRACT

Background: Infections that occur in the wound created by an invasive surgical procedure are referred to as surgical site infections (SSIs). SSIs are one of the most important causes of healthcare-associated infections (HCAIs). SSIs are associated with considerable morbidity and it has been reported that over one-third of postoperative deaths are related, at least in part to SSI. This study was conducted at Sir Sayajirao General Hospital with the objective of assessing SSI in clean and clean-contaminated surgeries using two methods of preoperative painting. **Aims and Objectives:** To compare the efficacy of 2% Chlorhexidine Gluconate(w/v) and 70% isopropyl alcohol(v/v) solution versus aqueous solution of 10% Povidone-iodine (w/v) used for preoperative skin painting in preventing Surgical site infections (SSIs). **Materials And Methods:** A prospective, randomized study of 280 patients of Clean and Clean-contaminated surgery was conducted in the department of General Surgery at Sir Sayajirao General Hospital & Medical College, Baroda. 280 patients were enrolled in this study and allocated into two groups by Alternate Technique, in Group A Preoperative Painting done with Chlorhexidine gluconate-alcohol solution and in Group B Preoperative Painting done with an aqueous solution of Povidone iodine. **Conclusion:** Chlorhexidine gluconate as a preoperative antiseptic agent significantly achieved greater reduction in the postoperative surgical site infection(SSIs) than Povidone iodine and hence was a more effective agent for preoperative preparation of skin.

KEYWORDS

Surgical site infection, Povidone iodine, Chlorhexidine gluconate

INTRODUCTION

Infections that occur in the wound created by an invasive surgical procedure are referred to as surgical site infections (SSIs). SSIs are one of the most important causes of healthcare-associated infections (HCAIs). SSIs are associated with considerable morbidity and it has been reported that over one-third of postoperative deaths are related, at least in part to SSI. Other clinical outcomes of SSIs include poor scars, such as hypertrophic scars or keloid. They may result in persistent pain and itching, restriction of movement, particularly when over joints, and a significant impact on emotional wellbeing of the patient. SSI can increase the length of hospital stay and thereby increases healthcare costs. An elaborate ritual has gradually evolved that surgeons and nursing staff observe in their efforts to prevent SSI. But despite these efforts, wound SSI is still a major clinical problem.

It is important to realize that from a strict bacteriologic stand point, there is no such thing as a sterile wound. Wound access to bacteria can be prevented by aseptic surgical techniques and bacteria can be removed substantially from wound toilet. However, if by any reason micro-organisms gain a foothold, infection becomes imminent. Antibiotics have contributed to prevention and treatment of SSI. But unfortunately antibiotics are double edged weapons and their inadvertent use has compounded the problem of SSI leading to emergence of drug resistant bacteria, making the treatment more difficult.

The incidence of postoperative SSI varies from hospital to hospital and also varies in different studies. Apart from the bacterial contamination of the wound, there are many other factors within the patient and his environment, both local and general, which ultimately determine the final outcome. Local factors such as hematomas, seromas, suture-material, poor surgical techniques and degree of contamination have an important role in development of SSI. General factors such as age, nutrition, hygiene and other associated diseases also have a decisive role in the development of postoperative wound SSI. Preoperative skin preparation in the operative room plays an important part in prevention of SSIs.

This study was conducted at Sir Sayajirao General Hospital with the objective of assessing SSI in clean and clean-contaminated surgeries using two methods of preoperative painting.

AIMS OF STUDY

Primary aim is to compare the efficacy of 2% Chlorhexidine Gluconate(w/v) and 70% isopropyl alcohol(v/v) solution versus

aqueous solution of 10% Povidone-iodine (w/v) used for preoperative skin painting in preventing Surgical site infections (SSIs).

Secondary aim is to identify the common pathogen causing Surgical Site Infections (SSIs) and to compare the cost of Chlorhexidine Gluconate versus Povidone-iodine in preoperative skin painting.

MATERIALS AND METHODS

Inclusion Criteria:

- All patients who are undergoing clean and clean-contaminated surgery performed under controlled conditions without substantial spillage or unusual contamination.
- All surgeries in which antibiotic dose was given before 1 hour of skin incision.
- All patients with full 30 days postoperative follow up.

Exclusion Criteria:

- History of Allergy to chlorhexidine, alcohol, or iodophores.
- Evidence of infection at or adjacent to the operative site.
- Inability to follow the patient's course for 30 days after surgery.
- Already immunocompromised patient.
- BMI <17.5 and >24.9
- Uncontrolled diabetes mellitus.
- Nutritionally challenged individual

Study Design:

A prospective, randomized study of 280 patients of clean and Clean-contaminated surgery was conducted in the department of General Surgery at Sir SSG Hospital & Medical College, Vadodara. Patients were allocated into two groups by Alternate Technique, Group A: Preoperative Painting done with 2% chlorhexidine gluconate + 70% Isopropyl alcohol, Group B: Preoperative Painting done with an aqueous solution of 10% Povidone-iodine.

Microsoft Excel programme was used for data entry. The quantitative data were calculated by Mean and Standard deviation, and were analysed by independent t-test. The qualitative data were calculated by proportion and analysed by Chi-square test.

All patients coming to the Surgical Out-Patient-Department(OPD) who were planned for clean or clean-contaminated surgery were subjected to routine preoperative workup.

After getting written consent, patients were blinded, they did not know

into which group they were being allotted. Preoperatively before incision a swab was taken for culture and sensitivity (C/S) study. The Patient's skin was prepared by applying an antiseptic in concentric circles, beginning in the area of the proposed incision, going towards periphery and wait for 3 min before making the incision. The prepared area must be large enough to extend the incision or create new incisions or drain sites if necessary. All patients were given Systemic prophylactic antibiotic (Inj. Ceftriaxone 1gm stat) 1 hour before incision.

Following surgery during hospitalization, first dressing was done after 48 hours and after that dressing was done every alternate day. Microbiological samples (culture and sensitivity) were taken on clinical suspicion of infection. The wound was then examined later at any time if the patient had any local complaint or systemic symptoms of infection.

After discharge of the patient follow up was taken till 30th postoperative day twice a week for first week, then after one week and then after 15 days on OPD basis or by telephonic means.

Data recorded during follow-up period was:

Occurrence of any SSI within 30 days after surgery. SSI is any infection occurring at incision site within 30 days after surgery (90 days in case of implant) which will be clinically evaluated as occurrence of at-least one of the following: Purulent drainage from the incision site, Organism isolated from an aseptically obtained culture of fluid or tissue from the incision site, At least one of the following sign or symptoms of Pain/ Tenderness/ Localised swelling/ Redness/ Heat/ incision deliberately opened by a surgeon unless culture is negative. Other factors evaluated are Causative bacteria, Cost of antiseptics, Length of hospital stay, undesirable adverse consequences e.g. toxicity, allergies.

RESULTS

PRE PAINTING ORGANISMS ISOLATED IN BOTH GROUPS:

Organism	Patients in Group A	Patients in Group B
Staphylococcus spp.	16	20
E. coli	7	8
Acinetobacter spp.	3	3
Klebsiella Spp	2	2
Total	28	33

P value: 0.469 (Not significant)-by Chi Square method

ORGANISMS ISOLATED IN PATIENTS WITH SSI (Post Op):

Organism	Group A	Group B
Staphylococcus aureus	5	11
Escherichia coli	2	5
Klebsiella	2	3
Pseudomonas	3	5
Acinetobacter	1	3
Total	13	27

P value: 0.0168 (Highly significant)-by Chi Square method

DISCUSSION

The results of this prospective, randomized study shows that Chlorhexidine solution is better than Povidone iodine for preoperative painting in preventing SSIs which is also statistically significant. Patients in both group were comparable in terms of age and gender.

There was no significant difference found in between both groups in terms of pre-paint bacterial colonization and postoperative hospital stay.

In this study, the application of Chlorhexidine reduced the incidence of SSI by 48.1% as compared with Povidone iodine (9.28% incidence of SSI in group A vs 19.28% incidence of SSI in group B). This finding is similar to findings in other studies by Darouiche RO et al⁽¹⁾ where Chlorhexidine group showed 9.5% of SSI and Povidone Iodine showed 16.1% of SSIs. Similar findings were also observed in Noorani A et al 2010⁽²⁾ and Levin I et al 2011⁽³⁾.

In this study gram positive bacteria (Staphylococcus aureus) were responsible for the majority of the SSIs in both the groups inclusive.

CONCLUSION

2% Chlorhexidine gluconate as a preoperative antiseptic agent

significantly achieved greater reduction in the postoperative surgical site infection than 10% Povidone-iodine for Preoperative skin painting and hence was a more effective agent for preoperative preparation of skin. 2% Chlorhexidine gluconate should be used as a first line of antiseptic agent for preoperative skin preparation to reduce the SSI. Staphylococcus aureus was the most common isolated organism from the pre-operative paint sites and SSIs.

The expenditure incurred by either group has no significant difference (30 rupees/patient in Group A and 24.5 rupees/patient in Group B); hence cost is not a limiting factor for using either 2% Chlorhexidine gluconate or 10% Povidone iodine as a preoperative skin preparatory agent.

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