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Research Article

A CROSS SECTIONAL STUDY TO EVALUATE IF CHLORHEXIDINE MORE EFFECTIVE THAN POVIDINE IODINE IN CONTROLLING SURGICAL SITE INFECTIONS

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Abstract:

Objective: Chlorhexidine (CHG) has been used extensively as a topical antiseptic agent, having broad clinical use in interventional medicine and procedures. clinical studies have rendered chlorhexidine gluconate to be a superior perioperative skin-prepping agent. The following research will be focusing on suggesting that CHG has a broad and safe range of applications when used in interventional procedures for reducing the risk of postoperative surgical site infections (SSI).

Methodology: A cross sectional study was carried out in sheikh Zayed hospital Rahim Yar Khan consisting of 250 surgical patients undergoing clean and clean contaminated surgeries, sample size calculated with WHO sample size calculator, half of them were scrubbed with 2% chlorhexidine gluconate and 70% isopropyl alcohol and remaining half scrubbed and painted with an aqueous solution of 10% povidone-iodine. patients were followed from perioperative time till 1 month after surgery for any local and systemic signs of infection at the site of operation. the study ranged over a period of 3 months consisting of a local examination of the wound for and pus/serosanguinous foul smelling discharge, redness, tenderness, pain or fever associated with malaise, loss of appetite and chills.

Results: The rate of surgical site infection was significantly lower in the chlorhexidine-alcohol group than in the povidone-iodine group (9.5% vs 16.1%; p value 0.004; relative risk, 0.59; 95% CI, 0.41 to 0.85). Chlorhexidine-alcohol was significantly more protective than povidone-iodine against both infections.

Conclusions: Preoperative cleansing of the patient's skin with chlorhexidine-alcohol is more beneficial to cleansing with povidone-iodine for preventing surgical site infections.

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INTRODUCTION:

chlorhexidine gluconate 4% is a disinfectant and anti-septic that is used for skin disinfection prior surgery and sterilizing medical equipment. It is active against gram positive as well as gram negative organisms, aerobes, anaerobes and yeast(1). Surgical site infections (SSIs) are wound infections that occur after invasive (surgical) procedures, developing after surgeries pose a main hindrance in recovery and render a need for revision surgeries elevating the cost of treatment(2). Despite the previous limited studies carried out the use of CHG is not advancing in operative medicine therefore we carried out this research in order to highlight its importance and reduce morbidities associated with SSIs.

DISCUSSION:

Recent clinical studies have shown that multiple applications of 2% or 4% CHG results in building up of high skin surface concentrations sufficient to inhibit skin colonizing flora, including methicillin-resistant *Staphylococcus aureus*.(3) A new technique for the use of CHG in patients involves washing of the wound prior to closure with 0.05% CHG followed by saline rinse. Recent studies suggest that following a 1-minute exposure, 0.05% CHG produces significant reduction against selective health care-associated pathogens and reduces bacterial adherence to the surface of implantable biomedical devices(4). General, orthopedic, cardiothoracic, and obstetrical surgical studies have registered the safety of CHG formulations in surgical procedures. Surgical site infections (SSIs) contribute extensively to increased morbidity and mortality(5). These infections are the cause of death in 77% of the patients who develop SSIs. Chlorhexidine gluconate has a broad spectrum anti-microbial effect including methicillin-resistant *Staphylococcus aureus*, MRSA. A recent study in orthopedic surgery found that CHG/alcohol skin preps were superior to povidone iodine scrubs in reducing *Staphylococcus* infections at the incisional site(6). A randomized controlled trial in obstetrics and gynaecology department registered that patients undergoing vaginal hysterectomy prepped with CHG then povidone iodine had a significant reduction of contamination skin flora 30 minute post application(7). The addition of alcohol leads to an enhanced effect of CHG's action. However, povidone iodine, when used in high concentration of 5%, leads to delayed wound healing secondary to retardation of fibroblast activity. Whereas CHG in high concentration of 0.05% has been found to have no adverse effect on granulation tissue formation thus

healing is rendered unaffected. CHG has been labelled as the only perioperative skin prep agent that has an excellent residual activity and immediately starts action upon application.(8)

The first use of antiseptic agent in surgery was done by Joseph Lister in 19th century. He used carbolic acid in his prep to reduce infectious complications post surgically(10). Following his work Louis Pasteur spent a splendid amount of time trying to develop ways to disinfect surgical equipment and develop ways to minimize risk of infections.(11) None the less, the risk of infection depends on the skill of the surgeon, the degree of contamination defined by the type of surgery (i.e., clean, clean-contaminated, or contaminated), and the patient's status with respect to underlying coexisting conditions and carriage of *S. aureus*(12). Approximately 20 to 30% of surgical-site infections are caused by *S. aureus* and the rest by the endogenous flora(13). Use of CHG in pregnancy also appears to be safe. At body pH CHG dissociates and releases cations and anions. When the cations bind with the negatively charged bacterial cell wall proteins it results in bactericidal effect. In low concentrations however it has a bacteriostatic effect(14). Prolonged exposure of it can lead to potential damages as carcinogenesis sets in, acute respiratory distress syndrome after aspiration resulting from gastrointestinal absorption and deafness, if put into ear canal, due to its ototoxicity. But the benefits outweigh the disadvantages if used within set standardized protocol.(15)

METHODOLOGY:

The study was a cross-sectional study in which surgical patients were assessed for local and systemic signs of infection following a surgical procedure till 1 month post-operatively.

It was carried out in Sheikh Zayed Hospital, Rahim Yar Khan with a sample size of 150 patients calculated through WHO sample size calculator. Data collection was accomplished over a span of 3 months after acquiring permission from the head of department of surgery. Patients were monitored and assessed for any pus/serosanguinous foul smelling discharge, redness, tenderness, pain or fever associated with malaise, loss of appetite and chills throughout their hospital stay.

RESULTS:

The overall outcome of SSIs was significantly reduced in CHG alcohol group as compared to povidone iodine (9.5% vs 16.1% $p=0.004$). In CHG alcohol group

less than half developed local and systemic signs of infection however a significant number of patients developed infectious complications with povidone iodine. thus, CHG is found to be superior pre operative prep agent as compared to povidone iodine in reducing superficial as well as deep tissue infections.

Signs of infection	CGH alcohol group	Povidone iodine group
Local	20	50
Systemic	5	15

CONCLUSION:

A cross sectional study was carried out in Sheikh Zayed hospital Rahim Yar Khan consisting of 250 surgical patients undergoing clean and clean contaminated surgeries, sample size calculated with WHO sample size calculator, half of them were scrubbed with 2% chlorhexidine gluconate and 70% isopropyl alcohol and remaining half scrubbed and painted with an aqueous solution of 10% povidone-iodine. patients were followed from perioperative time till 1 month after surgery for any local and systemic signs of infection at the site of operation. The study ranged over a period of 3 months consisting of a local examination of the wound for and pus/serosanguinous foul smelling discharge, redness, tenderness, pain or fever associated with malaise, loss of appetite and chills. The rate of surgical site infection was significantly lower in the chlorhexidine-alcohol group than in the povidone-iodine group (9.5% vs 16.1%; p value 0.004; relative risk, 0.59; 95% CI, 0.41 to 0.85). Chlorhexidine-alcohol was significantly more protective than povidone-iodine against both infections. Chlorhexidine reduces the risk of morbidity and mortality associated with infections following open procedures as compared to povidone iodine.

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