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Efficacy of A Solitary Application of an Alcohol-Based Antiseptic Solution in the Prevention of Surgical Site Infections

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Abstract
Surgical site infections are the most commonly encountered problem in all surgical procedure. The main aim of the study is finding out the effectiveness of single application alcohol basedanti septic solution during preoperative preparation to reduce the surgical site infections. It is a prospective study of patients who underwent major and minor procedure in the duration of January2024 - May 2024. The primary outcome of the study was evaluated on the basis of type of procedure, days of hospital stay, postoperative complications like seroma and pusdischarge. Out of two hundred patients included in this study, 100 patients underwent minor procedure and the other 100 underwent major procedure. Age distribution for minor cases less than 25 is 3, 26-50 is 42and 51-75 is 103 with mean±SD is 50.41±14.25 and for major cases less than 25 is 1, 26-50 is 51, 51-75is 48 with mean±SD is 50.87±13.59. Sex distribution of minor cases male-48 and female-52, major cases with distribution of male -45 and female -55. Hospitalisation of all minor cases are less than 1 day with mean value of 1 and major cases less than 1 day are 4, 2-3 days are 86 and more than 3 days are 10 with mean value of 2.3. Each patient was carefully monitored for the period of 30 days from the day of surgery and the complications, if any was treated accordingly. Out of 100 minor cases, seroma formation was noted in 3 patients and pus discharge in 4 patients. Collections were evacuated thorough wound wash and saline dressing were done (no antibiotics were given for these cases both preoperative as well as post operative period). Whereas, Out of 100 major cases (single dose of preoperative antibiotics are given) seroma formation were noted in 7 patients, seroma collections were evacuated, thorough wound wash and saline dressing were done (no antibiotics were given for these cases), Pus discharge was found in 7 patients, among them 4 were treated with IV Antibiotics for 5 days according to pus culture and sensitivity report. The 200 patients who underwent procedure with single application of alcohol based anti-septic solution (2% chlorhexidine) for pre-operative preparation, was found to be effective against surgical site infections.

INTRODUCTION

Any infection or collection near the site of surgical incision within 30 days of procedure is named as Surgical Site Infection (SSI), it is the third most common infection and nearly accounts for 15% of all nosocomial infections which directly contribute to the surgical mortality and morbidity each year worldwide[1]. The CDC has developed the set of standard criteria in management of surgical site infections.

In an attempt to understand the mode of spread and to calculate the surveillance rate of SSI occurring after the successful procedure.

They are Broadly Classified into three Types:

- Superficial incision SSI which involves only the skin and subcutaneous layer.
- Deep incisional SSI which involves skin, subcutaneous layer along with the fascia.
- Organ /space SSI which involves any other part of anatomy which is open.

The most common source of SSI in majority of cases is the native patient's flora skin and visceral organs[2], Staphylococcus, a gram positive aerobic cocci are the most common organism involved in SSI other organism includes E. coli, BacillusYeast[3]. When skin is incised, underlying tissue is exposed to overlying endogenous flora which leads to the formation of surgical site infections[4]. The first and foremost step needed to reduce the surgical site infection is by providing appropriate preoperative antibiotics, use of effective preoperative preparation. A source for pathogens is often thought to be the skin surface, making skin preparation at the time of the procedure critical. The most common skin preparation agents used today include products containing iodophors or chlorhexidine gluconate[13].

MATERIALS AND METHODS

In this study, 200 patients were selected who visited our hospital during period of January 2024- May 2024. A prospective study analysis is made for all two hundred cases on the basis of types of illness, type of procedure, hospital stay and Postoperative complications. All the patients who gave consent in this study are subjected to preoperative evaluation and they were categorized on the basis of diagnosis as major and minor groups. Minor group were treated on outpatient (day-care) basis with hospital stay less than one day, with nil preoperative and post-operative antibiotics. After successful procedure each patient was managed with analgesics alone (T. Paracetamol 500MG). Major group were treated as inpatients with hospital stay more than 1 daywere given a single dose of preoperative antibiotics 30 mins prior surgery. The same protocol was followed for all the patients and their response was analyzed.

RESULTS AND DISCUSSIONS

Out of two hundred patients included in this study, 100 patients under went minor procedure and the other 100 underwent major procedure. Age distribution for minor cases less than 25 is 3, 26-50 is 42 and 51-75 is 103 with mean±SD is 50.41±14.25 and major cases less than 25 is 1, 26-50 is 51, 51-75 is 48 with SD is 50.87±13.59 (Graph-1). Out of 200 patients, Sex distribution of minor cases male-48 and female -52, major cases sex distribution of male 45 and female -55. Comparing malepatients females were at higher distribution rate in both minor and major patients (Table-1). Out of all 200 cases, all 100 minor cases are treated as day care procedure, every case is discharged less than 1 day and Out of 100 major cases, 4 patients are discharged in less than 4 days, 86 patients in 2-3 days and 10 patients in more than 3 days.

All minor procedures, patients are subjected to preoperative evaluation and procedure were done under local anesthesia. Out of 100 cases, incision and drainage done in majority which accounts for 49 cases, 36 excision biopsy and 8 disarticulations, 3 incisional biopsy, 2 nail removals, 2 trucut biopsy .

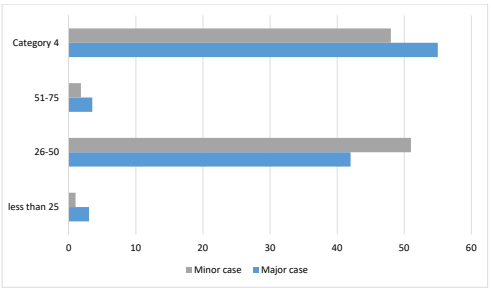

Fig. 1: AGE Distribution

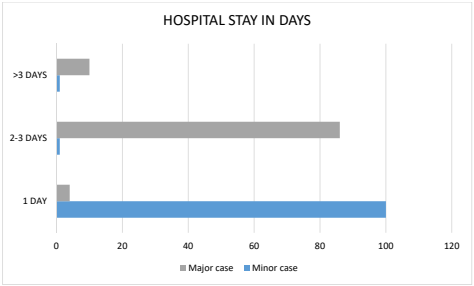

Fig. 2: Hospital stay in days

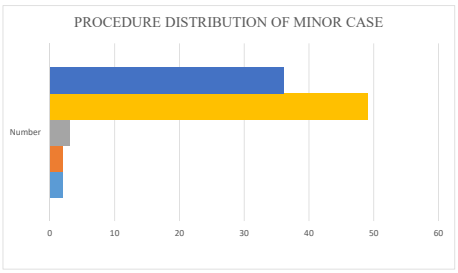

Fig. 3: Procedure distribution of minor case

Table 1 : Distribution of patients based on the gender.

	Minor Cases		Major Cases	
Gender	No:	Percentage	No:	Percentage
Male	48	48	45	45
Female	52	52	55	55
Total	100	100	100	100

Table 2 :Distribution of patients based on complication

	Minor Cases		Major Cases	
Complication	Number	Percentage	Number	Percentage
Pus discharge	4	4	7	7
Seroma & Discharge	3	3	7	7
NIL	93	93	86	86
Total	100	100	100	100

Out of 100 cases in major category, modified radical mastectomy and mesh repair accounts for 13 cases, total thyroidectomy for 12, laparoscopic Cholecystectomy 11, haemorrhoidectomy 9, inguinal hernia 8, excision and biopsy 7, lateral sphinctorotomy 2, amputation 7,Splenectomy 2, Webster procedure and other procedure[8].

Out of 100 cases in minor procedure, 3 patient presented with seroma formation and 4 patient presented with pus discharge, collections and discharge are evacuated and they are treated. Post operatively no antibiotics were given to them. Out of 100 major cases, seroma was noted in 7 cases and pus discharge in 7 patients these cases are treated conservatively ,thorough saline wash and daily saline dressing were given. Out of 7 pus discharge cases, 4 patients were treated with I V antibiotics for 5 days according to pus culture and sensitivity

Cornerstone practices in reducing the danger of surgical site infection is by reducing the microbial skin burden on the operative site. Preoperative bathing or showering with an antiseptic skin wash product is a well-accepted procedure for reducing skin bacteria (micro flora)[6]. A huge amount of research has addressed with this aimed to prove chlorhexidine in view of effective in reducing the surgical site infections in surgical programs.

Maintaining normothermia as against mild hypothermia has been shown to decrease the SSI rate from 19%-6% and to decrease hospital stay in patients[7]. In our analysis, we have studied the effectiveness in 200 patients which clearly states that the utilization of chlorhexidine -alcohol based antiseptic solution in preoperative period has found effective in reducing the SSI. Edmiston[7] chlorhexidine is a simple, effective in reducing the risk of SSIs.

Single-dose of broad-spectrum antibiotic alongside alcohol-based preparation within the perioperative period has been shown to scale back infection rates in surgical patients. Ishai Levin[8] demonstrates that antisepsis with chlorhexidine and alcohol was related to a big reduction within the rate of SSIs compared to povidone-iodine antisepsis in patients undergoing elective gynecological laparotomies. Culligan[14] demonstrated that cleansing with chlorhexidine as opposed to povidone-iodine reduced the rate of bacterial colonization in the operative field.

Sowapat[15] didn't find a big difference in patients undergoing total abdominal hysterectomy after cleansing with chlorhexidine or povidone-iodine solutions. Michael T Adler[16] made a study on 50 participants which shows 2% chlorhexidine-alcohol-based solution had excellent bactericidal efficacy and was superior to povidone-iodine for cleansing the maternal abdomen. Aaron[5] studied preoperative chlorhexidine preparation in 1134 patients among them 157 patients completely complaint to chlorhexidine preparation with an infection rate of 1.6% proves that chlorhexidine is that the better antiseptic solution to scale back infection. Charles E. Edmiston[7] clinical studies have shown chlorhexidine gluconate to be a secure and effective perioperative skin-prepping agent. By employing a standardized protocol which ends up in high skin surface concentrations sufficient to inhibit/kill skin colonizing flora, including methicillin-resistant Staphylococcus aureus. Gulden Menderes[9] there's good evidence that CHG-alcohol is superior to aqueous PVI-a crucial competitor-altogether three areas of skin antisepsis and he also states that perceived efficacy of CHG in skin antisepsis is usually actually supported evidence for the efficacy of the CHG-alcohol combination.

Matthias Maiwald[11] perceived efficacy of CHG in skin antisepsis is usually actually supported evidence for the efficacy of the CHG- alcohol combination. It's better in reducing the danger of surgical site infection.

CONCLUSION

Decreasing the microbial skin burden reduces the risk of surgical site infection (SSI)[10]. The prevention of surgical site infections encompasses meticulous operative technique, timely administration of appropriate preoperative antibioticsa variety of preventive measures aimed at neutralizing the threat of bacterial, viral fungal contamination posed by operative staff, the operating room environment the patient's endogenous skin flora[12]. As per research

analysis, one application of chlorhexidine is found to possess better antiseptic properties in preparing surgical site which is found to possess better efficacy and cost-effective comparing other antiseptic methods. Alcohol- based Solutions are quick, sustained sturdy with a broad spectrum of antimicrobial activity. These properties made it ideal in extended open surgeries with the potential for infection with surgical spillage, for per cutaneous procedures with indwelling catheters and for prosthesis implantation when minimizing skin colony counts so as to stop infection from the hardware.

When using these products care should be taken in two ways

- allow drying time and
- remove excessive hair from the field which can delay the vaporization ability of alcohol.

Findings of this study in conjunction with previous reports of general surgery and gynaecology further support that the utilization of an antisepsis protocol of twenty-two Chlorhexidine- the alcohol-based solution should be used as antisepsis protocol for all the procedures.

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