Original Article

A study of surgical wound infection grade during follow up period in the patients who received preoperative skin preparation with aqueous Povidone iodine only versus in combination with alcoholic Chlorhexidine

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Abstract

Introduction: Despite many advances in the surgical techniques in the past few years, post–operative wound sepsis still remains a major problem. Although only occasionally a cause of mortality, it is a frequent cause of increased morbidity leading to prolonged hospitalization of the patient. Wound infections occur in approximately 5% of patients undergoing major abdomina[l] surgery. **Aims and Objectives:** To Study of Surgical Wound Infection Grade during Follow up Period in the Patients who Received Preoperative Skin Preparation with Aqueous Povidone Iodine Only Versus in Combination with Alcoholic Chlorhexidine **Methodology:** This was a comparative study conducted on 100 patients in two groups. Aarupadai Veedu Medical College and Hospital, Puducherry at Department of General Surgery. 100 Patients (50 in each Group) undergoing clean elective surgery with no focus of infection on the body admitted in the department of General Surgery in Aarupadai Veedu Medical College and Hospital, Puducherry from 1st October 2013 to 31st August 2015The data collected in the present study is analyzed statistically by computing the descriptive statistics viz., Mean, SD, and percentages. The data is presented in the form of tables and graphs. The difference in mean is tested using z-test and the measures of association between the qualitative variables are assessed using chi-square test. **Result:** In our study we have observed that that the proportion of cases infected in Group I was 5 whereas in case of Group II was 1 and this difference in the proportion of wound infection rate between the two groups is found to be statistically significant ($z=4.16$; $p<0.04$). Out of 5 cases with growth in group I, only 3 had wound infection and the other 2 were ward acquired. Similarly the only infection in group II was ward acquired , has revealed that the proportion of infected cases after excluding the ward infection in Group I was 3 whereas in case of Group II it was none and this difference in the proportion of infected cases between the two groups is found to be statistically significant. Difference in efficacy between two antiseptic regimen, thereby making regimen in Group II much more clinically and statistically useful in reducing colonization of operative site and also in reducing postoperative wound infections. **Conclusion:** It can be safely concluded that this regimen should be followed in preoperative skin preparation in clean elective surgeries. Since the superiority of this regimen was proved in decreasing incision site colonization and postoperative wound infection, it is prudent to use this regimen in contaminated and emergency surgeries.

Keywords: Surgical Wound Infection Grade, Preoperative Skin Preparation, Aqueous Povidone Iodine, Alcoholic Chlorhexidine.

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INTRODUCTION

Despite many advances in the surgical techniques in the past few years, post–operative wound sepsis still remains a major problem. Although only occasionally a cause of mortality, it is a frequent cause of increased morbidity leading to prolonged hospitalization of the patient. Wound infections occur in approximately 5% of patients undergoing major abdomina[l] surgery.[1] In spite of the fact

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that different studies have been carried out by various workers pointing towards one or another as source of sepsis, yet it is still controversial to indict one and exonerate the other.[2,3,4,5]A confusion still prevails regarding the source of wounds sepsis. Hence there is a further need for systematic probe into the minute details of etiology of wound infection. Several factors contribute to the development of post-operative wound infections, some relating to the patient and some relating to the procedure itself.[6] A patient, who is undergoing any kind of surgery, faces a potential risk of getting infection from his environment – be it the operation theatre or be it the ward. Shooter (1956) and Blower (1960) pointed out the source of post-operative wound infection to be operation theatre and ward respectively.[3,7] Of course, patient himself cannot be excluded from being a source of infection. Burke (1963) found that in 50% of the operations the strains of staphylococcus aureus isolated were the same as those from patients nose and hence concluded the patient himself to be a source of infection.[8] Obviously, wound infection in a particular patient may be a result of multiple and diverse factors. Many techniques are there for skin preparation before surgery, the commonest being initial scrub with antiseptic soap solution, followed by painting the prepared area with antiseptic paint solution.[10] Price (1938) emphasized that skin bacteria live naturally in outer keratinized layers of epidermis and some of these bacteria, the residents, are difficult to eradicate by bathing with soap and water. He classified these skin micro-organisms into 2 types, the transients and the residents.[11] The Transients: The transient microorganisms are the contaminants from the environment, Though more likely to be pathogenic, they can easily be removed from the skin by taking a bath with soap and water, They are unable to multiply and die in a short time. The Residents: The resident microorganisms are commensals usually but some become opportunists when skin is injured, these residents are difficult to eradicate by bathing with soap and water. They may even continue to stay on skin surface in reduced numbers, particularly hiding under skin folds.[12] so this gives an idea that an attempt should be made to eradicate these resident microorganisms from the operation site. The adult human skin is covered with approximately two square meters of skin. It has been estimated that this surface area supports about 1012 bacteria. Cultures from the skin have frequently demonstrated the following microorganisms.[13] Risk factors for increased risk of wound infection[14] Malnutrition (Obesity, Weight loss), Metabolic disease (Diabetes, Uraemia, Jaundice) Immunosuppression (Cancer, AIDS, Steroids, Chemotherapy and radiotherapy) The two commonly used antiseptics are povidone iodine and chlorhexidine and this study is undertaken to compare the efficiency of povidone iodine alone and in combination with antiseptic agent containing alcohol and chlorhexidine against bacterial flora on the skin of operation site under conditions those encountered in operating rooms.

MATERIAL AND METHODS

This was a comparative study conducted on 100 patients in two groups. Aarupadai Veedu Medical College and Hospital, Puducherry at Department of General Surgery.100 Patients (50 in each Group) undergoing clean elective surgery with no focus of infection on the body admitted in the department of General Surgery in Aarupadai Veedu Medical College and Hospital, Puducherry from 1st October 2013 to 31st August 2015. It includes; Patients undergoing clean elective surgery in department of general surgery. Clean surgery is defined as surgery in which no viscus was opened, Patients with no focus of infection anywhere on the body, afebrile and having normal WBC counts, Patients irrespective of their age and sex. Patients neither immunocompromised nor on any long term steroids. Patients undergoing mesh repair of hernia are also included while Patients undergoing emergency surgery, Immunocompromised patients and patients on long term steroids, Patients with septicemia and having focus of infection somewhere on the body manifested clinically by fever and increased total and differential counts, Patients suffering from malignancies or undergoing chemotherapy or radiation therapy, Clean contaminated and contaminated surgeries in which viscous was opened were excluded from the study, Patients with comorbid medical conditions like diabetes, hypertension etc. were excluded from the study. The data collected in the present study is analyzed statistically by computing the descriptive statistics viz., Mean, SD, and percentages. The data is presented in the form of tables and graphs. The difference in mean is tested using z-test and the measures of association between the qualitative variables are assessed using chi-square test. The inference is considered statistically significant whenever $p<0.05$.

RESULT

Table 1: Comparison of total number of infected cases in both the groups during follow up period

Follow up (wound infection grade)	Group I		Group II		Total	
	No.	%	No.	%	No.	%
Grade 0	45	90	49	98	94	94
Infected	5	10	1	2	6	6
Total	**50**	**100**	**50**	**100**	**100**	**100**

It was observed from this study (Table 1) that the proportion of cases infected in Group I was 5 whereas in case of Group II was 1 and this difference in the proportion of wound infection rate between the two

groups is found to be statistically significant (z=4.16; p<0.04).

Table 2: Relationship between microbiological report and post- operative wound infection rate

Microbiological report	Group I*			Group II**		
	No infection	Infection	Total	No infection	Infection	Total
No growth	43	2	45	48	1	49
Growth	2	3	5*	1	0	1**
Total	**45**	**5**	**50**	**49**	**1**	**50**

* z=15.4; df=1; p<0.001, ** z=0.02; df=1; p=0.8

It is noted from Table 2 that out of 5 cases with growth in group I, only 3 had wound infection and the other 2 were ward acquired. Similarly the only infection in group II was ward acquired. Ward infections were defined as infection occurring in patients with no growth in cultures from site of incision. This Observed Difference was statistically significant.

Table 3: Relationship between microbiological report and postoperative wound infection rate after excluding ward infection

Microbiological report	Group I*			Group II**		
	No infection	Infection	Total	No infection	Infection	Total
No growth	43	0	43	48	0	48
Growth	2	3*	5	1	0**	1
Total	**45**	**3**	**48**	**49**	**0**	**49**

* z=27.5; df=1; p<0.0001, ** 0

This study (Table 3) has revealed that the proportion of infected cases after excluding the ward infection in Group I was 3 whereas in case of Group II it was none and this difference in the proportion of infected cases between the two groups is found to be statistically significant.

Table 4: Comparison of number of cases with growth and wound infection due to difference in efficacy of antiseptic regimen used in each group

Variables	Group I	Group II
Growth	5	1
Infected	3	0

This difference is due to difference in efficacy between two antiseptic regimens, thereby making regimen in Group II much more clinically and statistically useful in reducing colonization of operative site and also in reducing postoperative wound infections

DISCUSSION

There is now increasing evidence that a higher proportion of surgical site infections may be caused by bacteria introduced into deeper skin structures at the time of incision. Proper skin disinfection might, therefore, be one of the keys to reduce the colonization of site of incision and, thus, preventing the development of subsequent infection. Several randomized, controlled trials investigating different regimens for skin disinfection prior to surgery found chlorhexidine in alcoholic solution more effective in reducing incision site colonization and subsequent wound infection when compared to povidone iodine. This may be explained in part by the greater effect of chlorhexidine on Gram-positive bacteria, especially on coagulase-negative Staphylococci, when compared to other disinfectants. Julia Langgartner *et al*. conducted a study which showed that skin disinfection with combination of PVP-iodine and propanol/chlorhexidine was associated with the lowest rate of microbial catheter colonization.[16] Similarly this study was done to prove that combination of povidone iodine and propanol/chlorhexidine was superior to povidone iodine alone for preoperative skin disinfection. In our study we have observed that that the proportion of cases infected in Group I was 5 whereas in case of Group II was 1 and this difference in the proportion of wound infection rate between the two groups is found to be statistically significant (z=4.16; p<0.04). Out of 5 cases with growth in group I, only 3 had wound infection and the other 2 were ward acquired. Similarly the only infection in group II was ward acquired. Ward infections were defined as infection occurring in patients with no growth in cultures from site of incision. has revealed that the proportion of infected cases after excluding the ward infection in Group I was 3 whereas in case of Group II it was none and this difference in the proportion of infected cases between the two groups is found to be statistically significant. Difference in efficacy between two antiseptic regimen, thereby making regimen in Group II much more clinically and statistically useful in reducing colonization of operative site and also in reducing postoperative wound infections**.** The study done by Brown *et al*.[15] compared post-operative wound infection rates after using either povidone iodine or alcoholic solution of chlorhexidine and it showed that postoperative wound infection rates were less in chlorhexidine group (Group I) (6.0%) than in povidone iodine group (Group II) (8.1%) although this difference was not significant.

CONCLUSION

It can be safely concluded that this regimen should be followed in preoperative skin preparation in clean elective surgeries. Since the superiority of this regimen was proved in decreasing incision site colonization and postoperative wound infection, it is prudent to use this regimen in contaminated and emergency surgeries.

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