Original Article

COMPARISON OF POSTOPERATIVE SURGICAL SITE INFECTION AFTER PREOPERATIVE MARKING DONE WITH NON-STERILE STATIONARY GRADE MARKERS VERSUS STERILE SURGICAL MARKERS

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Abstract

Objectives: To compare the frequencies of post-operative surgical site infection after preoperative marking done with non-sterile stationary grade markers versus sterile surgical markers in the same patient.

Design: Randomized control trial.

Place and Duration of Study: The department of Plastic surgery, Mayo hospital, Lahore from August 2013 to August 2014.

Methods: This study was conducted after taking approval from the departmental ethical committee. Forty consecutive patients were included. A sterile surgical marker was used to mark one incision site while an alcohol based stationary grade marker was used to mark another incision site on the same patient. A standard preoperative, intraoperative and postoperative protocol was followed. Cultures were performed on swabs taken from the incision sites and surgical site infection was assessed for 30 days.

Results: The study included 40 patients; 17 males and 23 females. The mean age of subjects was 25.32 ±

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19.69 years with the minimum age being 2 years and the maximum being 63 years. No growth was seen in cultures taken from all the incision sites after skin preparation in the non sterile stationary grade marker group as well as the sterile surgical grade marker group. Also no surgical site infection appeared during the 30 day postoperative observation period in the non sterile stationary grade marker group as well as the sterile surgical grade marker group.

Conclusion: We recommend the use of non-sterile stationary grade markers for the purpose of preoperative surgical site marking as we found no difference in the rate of postoperative surgical site infection in both the non sterile stationary grade marker and the sterile surgical grade marker groups.

Key Words: Non sterile markers, surgical markers, surgical site sterilization, preoperative marking.

Introduction

The history of surgical site marking is shrouded in mystery. Otzi is the oldest known human being to receive medical or therapeutic tattooing around 3,300 BC.[1] We still have no clue regarding the first person who started this practice.

Nowadays, preoperative marking is an integral part of patient care undergoing surgical procedures.[2] Different health organizations including, The WHO,[3] the joint commission on accreditation of healthcare organizations,[4] the national patient safety agency of the UK,[5] and the American college of surgeons,[6] all advocate the use of mandatory surgical site marking. This practice became mandatory in U.S. in 2004[7] and in 2005, in Australia.[8]

Surgical site marking is being used in almost all surgical specialties and is routinely conducted in the surgeon's office, wards and in operation theatres. It is of paramount importance for the plastic surgeon because 'THEY THINK IN INK'.

Use of sterile markers are mandatory for pre-operative surgical site marking in the developed countries but still it is not a routine practice especially in the developing countries due to the high cost[9] as well as non availability. Possible surgical site contamination and how the ink film might be a hindrance in the preparation of the area beneath it; is a controversial matter.[10]

It is our observation that due to their affordability and easy availability non sterile stationary grade markers are commonly being used for preoperative surgical site marking. This practice and its effect on the surgical site infection rate is indeed a topic of interest. Literature is deficient regarding the infection rate of surgical site marking carried out in this way.

Our study aims to answer this question. As in our study we have compared non-sterile stationary grade markers with sterile surgical markers to find out which of the two contributes more to wound infection rate.

Patients and Methods

This randomized control trial was conducted at the department of Plastic surgery Mayo hospital Lahore from August 2013 to August 2014 after taking approval from the departmental ethical committee. Sample size was calculated keeping the expected rate of positive cultures in marked sites as 0.05 and the same for unmarked sites as 0.75. Taking 0.01 as level of significance and 0.99 power of test; a sample size of 18 was calculated for each group. Forty consecutive healthy (non-diabetic, non-immunocompromized) patients requiring marking on two sites were included in the study.

A sterile surgical marker was used to mark one incision site while an alcohol based stationary grade marker was used to mark another incision site on the same patient. A standard paint and drape protocol using 10% povidine – iodine paint was followed. Same team operated on both sites using a new set of sterilized instruments, surgical blade, gloves and drape sheets for each site. A standard dressing protocol was followed for both sites and the patient was put on a standard antibiotic regimen postoperatively.

Swabs from both incisions were taken using culture sticks and sent to the microbiologist at our hospital who performed the cultures on both Blood and MacConkey agar. The plates were reviewed every 12 hours for 72 hours.

Surgical site infection was defined as presence of three or more of the following signs: erythema, pain, warmth, swelling or pus discharge and was assessed in all the patients for both the sites for 30 days.

Results

The study included 40 patients; 17 males and 23 females. The mean age of subjects was 25.32 ± 19.69 years with the minimum age being 2 years and the maximum being 63 years. No growth was seen in cultures taken

from all the incision sites after skin preparation in the non sterile stationary grade marker group as well as the sterile surgical grade marker group. Also no surgical site infection appeared during the 30 day postoperative observation period in the non sterile stationary grade marker group as well as the sterile surgical grade marker group.

Discussion

Our results show that stationary grade markers are safe for preoperative site marking. Surgical site marking has now become a mandatory practice in almost all the plastic surgery practices. We have observed that some use sterile surgical grade markers while others use stationary grade markers for the purpose of preoperative marking. Very little data is available regarding the use of stationary grade markers for the purpose of marking.

A study published in 2005 by Cronin G et al,[11] concluded that preoperative marking of the surgical site did not affect the sterility of the surgical field. This study has its limitations as it was carried out only on volunteers and the cultures were taken only after skin disinfection was carried out which would indeed effect the results.

A study published in 2008 by Rooni J et al,[08] showed that before skin disinfection only 1 of the 20 marked forearms and 15 of the 20 unmarked forearms had bacterial growth on cultures. These results astoundingly imply that the non sterile marker ink itself might have some disinfectant effect nevertheless this study again was on volunteers and swabs were taken from over the ink surface and a surgical incision was never made.

The controversy lies in what is beneath this ink film which we have tried to address in our study in a clinical setting. The study most similar to ours shows all cultures taken from incisions to be negative after marking and skin disinfection.[10] We have also found similar results after the culture of swabs as no growths occurred in both the sterile as well as stationary grade marker groups.

None of the above studies have clinically evaluated the postoperative infection rates. To the best of our knowledge there is scarcity of literature comparing the postoperative infection rates between sterile and stationary grade marking sites in the same patient.

The use of stationary grade markers necessitates a general knowledge of the inks constituents. Almost all stationary grade markers contain solvents in their inks. Initially these solvents were toluene and/or xylene. Their use as solvents in inks has decreased as they have been shown to be harmful and toxic.[12,13]

The use of alcohol based solvents is increasing. We have used markers with propanol as solvent which is considered safe and even used in skin disinfecttants.[14]

This suggests that the inks in these markers may themselves be sterile rendering the marked sites sterile as has been previously shown.[8]

Currently we are conducting research over the sterility of the ink and are assessing which sterilization techniques can be used for these markers and are in the process of developing methods for its intraoperative use.

We would like to end the discussion by putting down certain limitations which exist in our study. First the sample size is small and studies with larger sample sizes should be done to confirm our findings. Second this is our experience at a single department and further multicentric studies are needed. Third the sites which were marked were mostly hands and face i.e., areas which are frequently washed and cleaned daily which might have been the cause of uneventful wound healing.

Conclusion

Literature and our study provide strong evidence that alcohol based non sterile stationary grade markers can be freely used for preoperative surgical site marking as we found no difference in the rate of postoperative surgical site infection in both the non sterile stationary grade marker and the sterile surgical grade marker group. Also these non sterile stationary grade markers are cheaper, readily available and their indelible ink resists erasure during skin preparation by scrubbing and povidine paint and we recommend the use of such markers for the purpose of preoperative surgical site marking.

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