Journal of Diabetic Association Medical College 2022;6(1)24-28

Original Article

Comparison between Two Methods of Preoperative Hair Removal with Surgical Site Infection

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Abstract

Background: Surgical site infections (SSI) are one of the major complications that develop in surgical patients and are the most common nosocomial infection in patients undergoing surgery, carrying significant morbidity and mortality rates. Several measures are taken to reduce surgical site infection. Removal of hair is also important for a surgery that helps the surgeon in operation and also after postoperative period during bandaging. Several methods of hair removal are present as razor shaving, depilatory method, clipping etc. Razor shaving is the most popular method of hair removal from operative site of preoperative patients in developing country like Bangladesh that can cause preoperative skin abrasion that may be source of skin infection and can induce surgical site infection.

Objective: To determine whether preoperative razor shaving or depilatory method of hair removal is preferred to reduce postoperative wound infection. In addition the study also considered variables under comparisons were age, sex, BMI & Hb%, condition of wound, type of operation, length of incision, duration of operation, pre-operative hospital stay as well as status of wound healing.

Method: This crosssectional comparative study was conducted on 100 patients of which in case of 50 patients' preoperative hair removal were done from operation site by razor shaving and in 50 patients' preoperative hair removal were done from operation site by depilatory method. Outcome variable was wound infection.

Results: Wound infection was compared of both groups of patients. Total 19% wound infections were detected. Among the group-I (who had razor shaving), 41 (82%) patients had satisfactory healing and among the Group-II (who had hair removal by depilatory method), 40 (80%) patients had satisfactory healing. There is no statistically significant difference of wound infection between the two groups of patients.

Conclusion: There is the same outcome of surgical site infection in case of preoperative hair removal by razor shaving and preoperative hair removal by depilatory method.

Keywords: Razor shaving, depilatory method, wound infection.

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Introduction

Postoperative wound infection may lead to significant morbidity, patient discomfort and increased cost of surgical care[1]. In the United Kingdom, it is estimated that postoperative wound infections cost the National Health Scheme about one billion pounds annually[2]. As part of the antiseptic steps taken to reduce postoperative wound infection, different methods of hair removal are employed when preparing patients for operations and many of these have been previously evaluated[3-5]. The most popular methods are the use of razor blade, clippers, and depilatory creams[6].

In many developing countries such as Bangladesh, the age-long practice of preoperative razor shaving is still popular. However, studies reviewing hair shaving, the commonest and most economical method of hair removal, have noted its association with a greater risk of wound infection.[3,7,8]

Furthermore, the psychological effect of hair removal on patients undergoing cranial surgeries has led to doubts about the necessity of hair removal.[4,9] These among other reasons make the practice of hair removal controversial today with both proponents and opponents.[3,7] Those who

advocate the practice of preoperative hair removal do so in the belief that presence of hairs can interfere with skin incisions and the subsequent closure as well as the application of adhesive drapes and wound dressings[10]. In Bangladesh, in many tertiary institutions, routine preoperative shaving to remove hair from the operative site and its surroundings, particularly when access would be through a hair-bearing area of the body, has been the practice. Patients for elective operations are usually shaved with a razor blade by nursing staff in the hospital on the morning of surgery. As razor shaving cause skin abrasion and greater risk of wound infection, this study is conducted to evaluate the relationship of preoperative razor shaving or depilatory method hair removal with postoperative wound infection. Outcome variable is wound infection.

Materials and Methods

This comparative cross-sectional study was conducted among 100 conveniently selected patients who have undergone elective operation in the Department of Surgery of Prime Medical College Hospital from 1st January 2017 to 31st December 2017. A sample of 50 in each study group (a total of 100 patients) was collected by considering 5% significance level, 9% precision level and considering the incidence of 10% wound infection in clean-contaminated opeeration[11].

Among the total respondents, preoperative hair removal were done from operation site by razor shaving in 50 patients who were renamed as Group-I and in Group-II, other 50 patients' preoperative hair removal were done from operation site by depilatory method.

Patient selection and preparation:

Patients of elective operations who fulfilled inclusion and exclusion criteria were given an arbitrary number. Each odd number of patient was included as group-I and even number of patient was included as group-II. All the patients were assessed before operation by history taking, physical examination and necessary investigations. Hb%, RBS, serum urea and creatinine were estimated of each patient to exclude anaemia, diabetes mellitus, uraemia respectively. Patients BMI were measured by measuring height and weight of the patient and calculating BMI.

Patients were searched for any focal source of sepsis. They have been informed about the purpose of data collection and written consent has been taken. They were asked to take a preoperative showering before the day of operation. In case of Group-I patients, shaving of the patient was done on the morning in the day of operation. In case of Group-II patients, hair removal from the operative site of the patient is done by depilatory method.Before operation hand scrubbing of the surgeon is done with aqua based povidone iodine. In all cases surgeon scrubbed his hand for 3 minutes. Skin preparation, draping and other aseptic procedures during operations were performed in both groups as standard method.

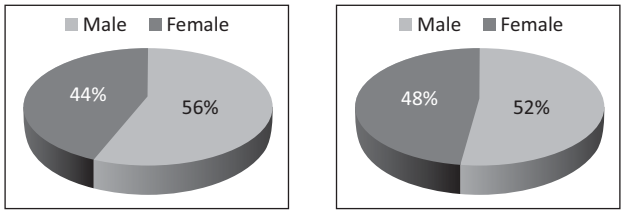
In all cases diathermy were used for haemostasis and drainage tube were inserted (if necessary) through a separate stab wound. If any discharge from the wound was present, it was collected and was sent for bacteriological examination and antibiotics were changed according to culture and sensitivity report. Adequate postoperative analgesia was ensured and patients were encouraged for early mobilization. Patients were followed up on 3rd to 7th postoperative day and regularly examined for surgical site infection on the basis of ASEPSIS score[12]. The potential for infection depends on a number of patient variables such as the state of hydration, nutrition and existing medical conditions as well as extrinsic factors, for example related to pre-, intra-, and postoperative care if the patient has undergone surgery. This often makes it difficult to predict which wounds will become infected. Consequently the prevention of wound infection should be a primary management objective for all healthcare practitioners.[13]

Results

Table 1: Distribution of both groups of patients by age

Age in years	Group- I (n= 50)		Group- II (n= 50)	
	Frequency	Mean (±SD)	Frequency	Mean (±SD)
17-30	18	21.3 (±10.1)	8	22.1 (±9.42)
31-40	16	36.4 (±6.22)	16	37.21 (±7.11)
41-50	14	43.5 (±8.41)	15	45.71 (±3.47)
51-50	2	52.1(±3.21)	11	54.21 (±4.25)
Total	50	35.56 (±10.88)	50	40.44(±10.66

The mean(±SD) age of group-I and group-II was 35.56(±10.88) and 40.44(±10.66) respectively.



Group-II Group-II

Figure 1: Pie diagram showing distribution of both group of patients by sex

Figure 1 shows that in the group-I, there were 28 (56%) male patients and 22 (44%) female patients. In the group-II, there were 26 (52%) male patients and 24 (50%) female.

Table 2: Distribution of both groups of patients by BMI and hemoglobin level

Parameters	**Group- I (n=50)** Mean (±SD)	**Group- II (n=50)** Mean (±SD)	**p value**
BMI (kg/m²)	19.72 (±1.73)	19.67 (±1.06)	> 0.05 [t = 0.2043,
Hb% (g/dl)	11.9 (±1.8)	12.1 (±1.5)	> 0.05 [t = 0.0785

Table-2 shows that the mean BMI of group-I patients was 19.72 (±1.73) and group-II was 19.67(±1.06). The difference of mean BMI of group-I and group-II patients was not statistically significant. The mean haemoglobin level of group-I patients was 11.9(±1.8) and group-II patients was 12.1(±1.5). The difference of mean haemoglobin level of group-I and group-II was not statistically significant

Table 3: Distribution of both groups of patients by condition of wound

Condition of wound	Group- I	Group- II	Total
Satisfactory healing	41 (82%)	40 (80%)	81 (81%)
Disturbance of healing	4 (8%)	5 (10%)	19 (19%)
Minor wound infection	3 (6%)	2 (4%)	
Moderate wound infection	2 (4%)	3 (6%)	
Severe wound infection	0 (0%)	0 (0%)	

Table 3 shows that after categorization of wound infection; out of 100 patients, 81 patients had found satisfactory healing and 19 patients had found from disturbance of healing to severe wound infection.

Table 4: Distribution of both groups of patients according to the operation

Operation	Group- I	Group- II	p
Cholecystectomy	23	21	>.05
Gastro jejunostomy	16	18	
Choledecho lithotomy	4	4	
Resection & anastomosis	2	3	
Interval appendisectomy	5	4	

Table 4 shows that in the group- I, 23 patients had cholecystectomy, 16 had gastrojejunostomy, 4 had choledecholithotomy, 2 had resection and anastomosis of small gut and 5 had interval appendisectomy. In the group-II; 21 patients had cholecystectomy, 18 had gastrojejunostomy, 4 had choledecholithotomy, 3 had resection and anastomosis of small gut and 4 had interval appendecectomy. There is no statistically significant difference in between 2 groups of patients.

Table 5: Distribution of both groups of patients by length of incision of operation

Length of incision (cm)	Group- I	Group- II	p
7-8	15	16	>.05
9-10	14	16	
11-12	12	12	
13-14	6	4	
15-16	3	2	

Table 5 shows that among the group- I; 15 patients had 7-8cm incision, 14 had 9-10cm, 12 had 11-12cm, 6 had 13-14cm and 3 had 15-16cm. Among the group- II; 16 patients had 7-8cm incision, 16 had 9-10cm, 12 had 11-12cm, 4 had 13-14cm and 2 had 15-16cm. No significant difference is found between the lengths of incision of both groups of patients.

Table 6: Distribution of both groups by duration of operation

Duration of operations (in minutes)	Group- I	Group- II	p
41-50	21	18	>.05
51-60	6	9	
61-70	14	14	
71-80	3	4	
81-90	6	5	

Table 6 shows that among the group-I; 21 patients had duration of operation 41-50 minutes, 6 had 51-60 minutes, 14 had 61-70 minutes, 3 had 71-80 minutes and 6 had 81-90 minutes. Among the group-II; 18 patients had duration of operation 41-50 minutes, 9 had 51-60 minutes, 14 had 61-70 minutes, 4 had 71-80 minutes and 5 had 81-90 minutes. No statistical difference is found between the duration of operation of both groups of patients.

Table 7: Distribution of both groups of patients by preoperative hospital stay

Preoperative hospital stay (days)	Group- I	Group- II	p
6-10	4 (8%)	4 (8%)	>.05
11-15	16 (32%)	12 (24%)	
16-20	12 (24%)	14 (28%)	
21-25	12 (24%)	14 (28%)	
26-30	4 (8%)	4 (8%)	
31-35	2 (4%)	2 (8%)	

Table 7 shows that Among the group-I; 4 patients had preoperative hospital stay 6-10 days, 16 had 11-15 days, 12 had 16-20 days, 12 had 21-25 days, 4 had 26-30 days and 2 had 31-35 days. Among the group-II; 4 patients had preoperative hospital stay 6-10 days, 12 had 11-15 days, 14 had 21-25 days, 4 had 26-30 days and 2 had 31-35 days. There is no statistically significant difference between the hospital stay of both groups of patients.

Table 8: Distribution of both group patients by status of wound healing

Status of wound healing	Group- I	Group- II	p
Satisfactory healing	41	40	>.05
Disturbance of healing	4	5	
Minor wound infection	3	2	
Moderate wound infection	2	3	

Table-8 shows that in the group-I, 41 patients had satisfactory wound healing, 4 had disturbance of healing, 3 had minor wound infection and 2 had moderate wound infection. In the group-II, 40 patients had satisfactory wound healing, 5 had disturbance of healing, 2 had minor wound healing and 3 had moderate wound infection. There is no significant difference of wound infection between the two groups of patients.

Discussion

Preparation of skin prior to operation is also a causative factor of wound infection. In this study, both study and control group of patients were distributed according to age and there was no significant difference of age variation between the groups. Again, regarding BMI and Hb% no statistical difference was found between the groups of patients.

In this study, total infection rate was 19%. It is higher than the international standard. This may be due to overcrowding of the hospital. In a study, surgical site infection rate was 3.03% in clean surgeries and 22.41% in clean-contaminated surgeries[14]. In a study it has been observed that the small skin incision, if associated with prolong operation time, may increase the overall insult in pediatric cardiac surgery[15]. So in this study some of the confounding variables like length of incision, duration of operation, preoperative hospital stay were compared between two groups of patients, which showed no significant difference between the groups. In a study, it was concluded that duration of operations at least partially determined by hospital factors and consequently, should be used as a quality indicator to compare SSI infections between hospitals, rather than being used as a patient factor to adjust comparisons between hospitals[16].

The compared the infection rate of patients who had preoperative razor shaving and who had hair removal by depilatory method. In a study of Adewale *et al*[17] showed that postoperative wound infection is strongly associated with the presence and degree of skin injuries inflicted during preoperative hair removal commonly after shaving. It also shows that depilatory cream is superior to razor shaving for preoperative hair removal.In our study no statistical significant difference was found between the groups who had razor shaving and who had hair removal by depilatory method.In a study of Dingmei *et al*[18], no significant differences between shaving, clipping, no hair removal and depilatory cream were observed in the frequency of surgical site infections which is similar to our result. However, Judith *et al*[19] showed that there are probably fewer surgical site infections when hair is not removed compared with shaving with a razor (moderate-certainty evidence)

Conclusion

From this study, it may be concluded that there is the same outcome of surgical site infection of postoperative patients in case of preoperative razor shaving and preoperative hair removal by depilatory method from operation site. Again this study is done in a limited scale. Further study with large scale sample size may give more conclusive findings.

Conflict of Interest: No

References

1. Tanner J and Khan D (2008) Surgical site infection, preoperative body washing and hair removal. J Perioper Pract 18:237-243.
2. National Audit Office 2004 Improving patient care by reducing the risk of hospital acquired infection: A progress report. Report by the Comptroller and Auditor General. HC 876, Session 2003–2004 London, The Stationery Office.
3. Alexander JW, Fischer JE, Boyajian M, Palmquist J, Morris MJ (1983) The influence of hair-removal methods on wound infections. Arch Surg 118: 347-352.
4. Scherpereel B, Rousseaux P, Bernard MH, Guyot JF (1979) Preoperative non-shaving for neurosurgical operations. Neurochirurgie 25:244-245.
5. Ratanalert S, Saehaeng S, Sripairojkul B, Liewchanpattana K, Phuenpathom N (1999) Nonshaved cranial neurosurgery. SurgNeurol 51:458-463.
6. Tanner J, Woodings D, Moncaster K (2006) Preoperative hair removal to reduce surgical site infection. Cochrane Database Syst Rev 19: CD004122.
7. Long AE (1967) The unshaved perineum at parturition: A bacteriological Study. Am J ObstetGynaecol 99: 333-336.
8. Court-Brown CM (1981) Preoperative skin depilation and its effect on postoperative wound infections. J Royal Col SurgEdinb 26: 238-241.
9. Gil Z, Cohen JT, Spektor S, Fliss DM (2003) The role of hair shaving in skull base surgery. Otolaryngol Head Neck Surg 128: 43-47.
10. Horgan MA, Piatt JH (1997) Shaving the scalp may increase the rate of infection in CSF shunt surgery. PedNeurosurg 26: 180-184.
11. David JL. 2004. Wound infection. Bailey & Love's Short Practice of Surgery; 24th ed, London; Arnold, 129.
12. Wilson APR, Treasure T, Sturridge MF, Grungnerg RN. Scoring method (ASEPSIS) for postoperative wound infection for use in clinical trials of antibiotic prophylaxis: Lancet, 1986;8: 311-312.
13. Richard J Howard 1999. 'Surgical infection' Schwartz Textbook of Principles of Surgery, McGraw Hill company, 7th international edition, p132.
14. Lilani SP, Jangale N, Chowdhary A, Dave GB.

Surgical site infection in clean and clean-contaminated cases. Indian Journal of Medical Microbilogy 2005;23(4): 249-252.

15. Ando M, Takahashi Y. Short operation time: An important element to reduce operative invasiveness in Pediatric Cardiac operative invasiveness in Pediatric Cardiac Surgery: The annals of thoracic surgery 2005;80 :631-635.
16. Gasmeier P, Sohr D, Breier A, Behnke M, Geffers C. Prolonged duration of operation: an indicator of complicated surgery or of surgical (mis) management? Infection 2012;39(3) 211-215.
17. Adewale OA, Olukayode OL, Olusanya A. Evaluation of two methods of preoperative hair removal and their relationship to postoperative wound infection. *J Infect DevCtries*2011; 5(10):717-722.
18. Dingmei S, Yao Y, Weifei Y. Comparison of preoperative hair removal methods for the reduction of surgical site infections: a meta-analysis.J Clin Nurs2017 Oct;26(19-20):2907-2914.doi: 10.1111/jocn. 13661. Epub 2017 Mar 12
19. Judith T, Kate M. Preoperative hair removal to reduce surgical site infection.Cochrane Database Syst Rev2021 Aug 26;8(8):CD004122.doi:10.1002/ 14651858.CD004122.pub5.