



A Prospective Study of Evaluation of Different Methods of Preoperative Hair Removal And Their Relationship To Postoperative Wound Infection

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INTRODUCTION - Wound site infections are a major source of postoperative illness, accounting for approximately a quarter of all nosocomial infections. The prevention of surgical site infections encompasses meticulous operative technique, timely administration of appropriate preoperative antibiotics, and a variety of preventive measures. As part of the antiseptic steps taken to reduce postoperative wound infection, different methods of hair removal are employed when preparing patients for operations.

OBJECTIVES - The present study was a prospective comprehensive study carried out on 1000 patients undergoing elective surgeries over a period of two years (2012 & 2013), in M. G. Hospital, Department of Surgery attached to Dr. S.N. Medical College , Jodhpur. This study aimed to evaluate the relationship of different methods of preoperative hair removal to postoperative wound infection.

METHODOLOGY - Consecutive consenting patients scheduled to have elective surgery (clean and clean contaminated) were randomized into four groups as per preoperative hair removal method used. Details of the procedures were recorded and patients were then assessed for postoperative wound infection.

RESULTS-In the present study overall rate of SSI was 19.40%. The maximum rate of SSI was found in razor group (28.25%) that is followed by clipper group 15%, cream group 13% and minimum rate of SSI was found in No Hair Removal group 8%. This difference in rate of SSI in different methods of Hair removal was statistically significant.

CONCLUSION- Hairs should not be removed preoperatively unless the hair at or around the incision site will interfere with the operation. If removal of hair is necessary then it should be done immediately before surgery, and preferably with clippers or cream.

Key words – surgical site infection, preoperative hair removal, clipper, razor

INTRODUCTION

Wound site infections are a major source of postoperative illness, accounting for approximately a quarter of all nosocomial infections. Postoperative wound infection may lead to significant morbidity, patient discomfort and increased cost of surgical care¹. In the United Kingdom, it is estimated that postoperative wound infections cost the National Health Scheme about one billion pounds annually [National Audit Office 2004]².

The prevention of surgical site infections encompasses meticulous operative technique, timely administration of appropriate preoperative antibiotics, and a variety of preventive measures aimed at neutralizing the threat of bacterial, viral, and fungal contamination posed by operative staff, the operating room environment, and the patient's endogenous skin flora.

As part of the antiseptic steps taken to reduce postoperative wound infection, different methods of hair removal are employed when preparing patients for operations. Hair is perceived to be associated with a lack of cleanliness, and the removal of hair has been thought to reduce the risk of surgical site infections³.

The preparation of patients for surgery has traditionally included the routine removal of body hair from the intended site of surgical incision. Having a hairless surgical site may ease surgery, the application of dressings and reduce potential infection as hair is a source of bacteria, but the process of removing hair might cause primary infection because of microscopic cuts to the skin. This review will assess the relative benefits and

harms of hair removal, the different methods of hair removal, and the effect of timing.

Three methods of hair removal are currently used- razor shaving, clipping and chemical depilation.

Shaving method uses a sharp blade, held within the head of a razor, which is drawn over the patient's skin to cut hair close to the surface of the skin.

Depilatory creams are chemicals which dissolve the hair itself. This is a slower process than either shaving or clipping, as the cream has to remain in contact with the hair for between 5 to 20 minutes. In addition, there is a risk of irritant or allergic reactions to the cream, so patch tests should be carried out 24 hours before the cream is applied for the first time.

Clippers use fine teeth to cut hair close to the patient's skin, leaving short stubble that is usually around one millimetre in length. The heads of clippers can be disposed of between patients to minimise the risks of cross infection. Clippers, when used correctly, should not cut into the patient's skin, potentially explaining the differences in infection rates observed in shaving and depilatory creams.

During the process of shaving, the skin may experience microscopic cuts and abrasions. It is believed that micro-organisms are able to enter and colonise these cuts, thus contaminating the surgical incision site and causing SSIs. In addition, abrasions may exude tissue fluid, which provides a culture medium for micro-organisms⁴. Since clippers do not come into contact with the patient's skin, they are thought to reduce the risk of cuts and abrasions.

MATERIAL AND METHOD

The prospective study was carried out on patients undergoing elective surgeries for various reasons over a period of two years (2012 & 2013), in M. G. Hospital, Department of Surgery attached to Dr. S.N. Medical College and associated group of Hospitals, Jodhpur.

Consecutive patients who were undergone clean operation (like hernia repair, thyroid and breast surgery) and clean contaminated operation (like appendicectomy and cholecystectomy) with access through hair-bearing areas of the body had been recruited after obtaining an informed consent.

The following characteristics were recorded: age, gender, and wound class, type of procedure, laparoscopic versus open, date of surgery, discharge date, post operative stay and development of SSI in follow up period of 8 days. Patients of all age and both sex were included in four groups.

Routine investigations of all patients were within normal limits. No co-morbid condition was present in any of the patient included in this study. The different exogenous and endogenous factors affecting post-operative infection like pre-existing illness, nutritional status, pre-operative hospital stay of patient, air born contamination were kept more or less constant in all patients, except skin preparation method.

Hair was removed on the previous evening before surgery by different techniques.

Patients were grouped as -

- a) Group 1 : 400 patient- hairs were removed by clipper

- b) Group 2 : 100 patients - hairs were removed by cream
- c) Group 3 : 100 patients - hairs were not removed
- d) Group 4 : 400 patients- hairs were removed by razor

Hair removal of patients operated in surgical unit A was done by surgical clipper and depilatory cream and these groups were used as test group while hair removal done in other surgical units by conventional razor technique were considered as control group.

VEET cream, whose active ingredient is potassium thioglycolate, was used for depilation in this study.

Before commencement of the operation, the operative field was assessed for adequacy of hair removal, presence of skin injuries, erythema, rash, or other reactions.

One dose of antibiotic was given to all the patients of clean surgery with prosthesis and clean contaminated cases preoperatively at the time of induction of anaesthesia.

The type of operation performed, type of anaesthesia, method of skin closure as well as the suture materials used were then recorded for each patient by the surgeon. Postoperatively, wounds were inspected by us on the second, fifth and eighth days.

A modification of the Southampton wound infection scoring system was employed for grading infections when present.

- Grade I : presence of undue wound redness and swelling,

- Grade II : discharge of serous or haemoserous fluids from the surgical wound,
- Grade III : discharge of pus from the wound, and
- Grade IV: discharge of pus and wound dehiscence.

RESULTS

The 1000 patients were divided into 4 groups and study was conducted to compare the relative effects on SSI rates by different methods of hair removal (shaving, clipping, depilatory creams and no hair removal). Statistical analysis was done by spss version (16). Chi-square test was used for analysis of categorical data and t-test was used for analysis of numerical data. The p-value for significance level was set at 0.05.

In the present study age of the patients ranged between 2 to 87 years and mean age was 39.2 years. The overall rate of SSI in ≤ 40 yr and >40 yr of age groups was 17.3% and 22.5% respectively .So the present study shows that age influences the rate of SSI and increases in the elderly group .

Total numbers of clean cases were 514 (51.4%) and clean contaminated cases were 486 (48.6%). Overall SSI rate was 12.8% in the clean cases and 26.3% in clean contaminated cases (table 1).

Table 1: Distribution of SSI According to Type of Surgery

Type of Surgery	SSI	NO SSI	Total	Percentage
Clean	66	448	514	12.8
Clean Contaminated	128	358	486	26.3
Total	194	806	1000	

In clean surgery the rate of SSI was highest for razor (25.88%) followed by no hair removal (8%), clipper (6.45%) and lowest for cream (0%) (table 2). This difference in rate of SSI was statistically significant.

Table 2: Distribution of SSI in clean surgery

Group	Clean surgery			
	SSI	NO SSI	Total	Percentage
Clipper	14	203	217	6.45
Cream	0	27	27	0.00
No	8	92	100	8.00
Razor	44	126	170	25.88
Grand Total	66	418	514	12.84

In clean contaminated surgery the rate of SSI was highest in razor (30%) followed by clipper (25.14%) and then cream (17.81%) (table 3). But this difference was statistically not significant.

Table 3: Distribution of SSI in clean contaminated surgery

Group	Clean Contaminated surgery			
	SSI	NO SSI	Total	%
Clipper	46	137	183	25.14
Cream	13	60	73	17.81
Razor	69	161	230	30.00
Grand Total	128	358	486	26.34

SSI rates by different methods of hair removal were affected more in open surgery as compared to laparoscopic surgery. Out of 1000 cases, 783 cases were done by open surgery showed 21.84% infection rate as compared to 217 cases which

were operated laparoscopically and showed only 10.60% infection rate .

Use of stapler for skin closure showed more infection rate (27.3%) as compared to other suture material.

In the present study overall rate of SSI was 19.40%. The maximum rate of SSI was found in razor group (28.25%) that is followed by clipper group 15%, cream group 13% and minimum rate of SSI was found in No Hair Removal group 8%. This difference in rate of SSI in different methods of Hair removal was statistically significant. (Table 4, fig 1)

Table 4: Distribution of patients in different methods of hair removal

Group	SSI	NO SSI	Total	Percentage
Clipper	60	340	400	15
Cream	13	87	100	13
No Hair Removal	8	92	100	8
Razor	113	287	400	28.25
Total	194	806	1000	19.40

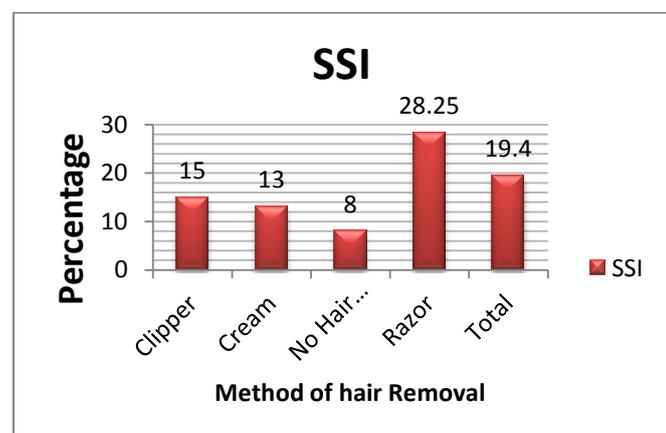


Fig. 1: Distribution of SSI in Different Methods of Hair Removal

Grade IV infection was significantly reduced with the use of clipper and cream as compare to razor. However, grade I infection remains prevalent in all method of hair removal.(Table 5) The post-operative stay was prolonged in cases with SSI (average 7.2 days vs. 4.3 days)

Table 5: SSI grades in different method of hair removal.

Grades	Clipper		Cream		No Hair Removal		Razor	
	SSI	%	SSI	%	SSI	%	SSI	%
Grade-I	46	76.67	9	69.23	6	75	61	53.98
Grade-II	11	18.33	2	15.38	2	25	37	32.74
Grade-III	2	3.33	2	15.38	0	0	9	7.96
Grade-IV	1	1.67	0	0.00	0	0	6	5.31
Total	60		13		8		113	

A comparison of rates of SSI between different methods of hair removal, as reported by various workers (including the present study) has been shown in table 6.

Table 6: Comparative study of rate of SSI as reported by different

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Reference	Razor	No Hair Removal	Clipper	Cream
Seropian4 1971	5.6%	-	-	0.6%
Court Brown5 1981	10.4 %	7.8%	-	3.9%
Alexander 6 1983	5.2%	-	4%	-

Balthazar ⁷ 1983	2%	-	1%	-
Thur de Koos ⁸ 1983	7.2%	-	-	7.7%
Goeau Brissonnie re 1987	22.44 %	-	-	17.64 %
KO9 1992	1.3%	-	0.6%	-
Jepsen & Bruttomes so ¹⁰ 1992	2.5%	-	1.7%	-
Adewale ¹ 1 2011	12.8 %	-	-	2.5%
Present Study 2013	28.25 %	8%	15%	13%

CONCLUSION

After analysing the results of present study, it is concluded that hairs should not be removed preoperatively unless the hair at or around the incision site will interfere with the operation. If removal of hair is necessary then it should be done immediately before surgery, and preferably with clippers or cream. All members of the surgical team must therefore understand the risk factors for SSIs and implement effective infection prevention strategies; proper preoperative hair removal is one of them.

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