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A Comparison of Postoperative Wound Infection Rates After Preoperative Hair Removal with Clipper vs Razor in a Tertiary Care Center: Prospective Comparative Cohort Study

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ABSTRACT

Introduction: Surgical site infections (SSIs) are a common postoperative complication associated with increased morbidity and healthcare burden. The method of preoperative hair removal is a modifiable risk factor, with razor shaving known to cause skin trauma and increase infection risk. This study aimed to compare SSI rates following preoperative hair removal using clippers versus razors in a tertiary care setting.

Methods: This observational comparative longitudinal study was conducted in the Department of Surgery at a tertiary care center. A total of 110 adult patients undergoing elective clean or clean-contaminated surgeries were included and divided equally into two groups based on hair removal method: clipping and shaving. Data were collected using a structured proforma, and SSI was assessed within 30 days postoperatively using CDC criteria. Statistical analysis was performed using SPSS version 23, with Chi-square test applied and $p < 0.05$ considered significant.**Results:** Out of 110 patients, 28 (25.5%) developed SSI. The incidence was significantly higher in the shaving group compared to the clipping group (36.4% vs 14.5%, $p = 0.031$). Most infections were superficial (64.3%). Skin irritation was also significantly more common in the shaving group (60.0% vs 29.1%, $p = 0.002$). Higher SSI rate was observed in Class II wound.

Conclusion: Clipper-based hair removal is associated with a lower risk of surgical site infections compared to razor shaving. Adoption of clipper use in preoperative preparation can reduce SSI rates and improve surgical outcomes.

Keywords: *Clipping; Hair Removal; Infections; Surgical Wound; Razor Shaving*

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INTRODUCITON

Surgical site infections (SSIs) represent a significant and potentially preventable complication following operative procedures, contributing substantially to patient morbidity, mortality, and healthcare costs. [1] Preoperative skin preparation reduces microbial load and infection risk. While hair removal was traditionally done with razors to aid antisepsis, evidence now shows that the method is a key modifiable risk factor for SSIs, with razor shaving causing micro-abrasions that facilitate bacterial colonization. [2] In contrast, electric clippers with guarded heads are designed to remove hair without directly contacting the skin, thereby minimizing trauma and reducing the potential for breaching the skin's integrity. This physiological distinction has significant clinical implications. Major guidelines, including those from the Centers for Disease Control and Prevention (CDC) and the National Institute for Health and Care Excellence (NICE), strongly recommend against razor shaving and endorse the use of electric clippers if hair removal is necessary. [3,4] The body of evidence supporting this recommendation is largely built upon systematic reviews and meta-analyses that have consistently found a lower risk of SSIs associated with clippers compared to razors. [2,5]

This study compares surgical site infection rates following preoperative hair removal using clippers versus razors in a tertiary care setting, aiming to validate guideline recommendations and identify areas for improving clinical practice.

METHODS

This observational comparative longitudinal study was conducted in the Department of Surgery at Birat Medical College Teaching Hospital. IRC was obtained from IRC Birat Medical College with IRC number of 126-2082/83. The sample size was calculated using the formula:

$n = Z^2 [P_1(1-P_1) + P_2(1-P_2)] / (P_1-P_2)^2$, based on previous studies, yielding a total sample size of 110 patients, with 55 patients in each group. [6]

Adult patients undergoing elective clean or clean-contaminated surgeries requiring preoperative hair removal were included and divided into two groups based on the method used: razor shaving and clipper use. Patients undergoing emergency surgery, contaminated or dirty procedures, those with active infections, or those with immunocompromising conditions were excluded.

Patients were allocated into the two groups by an alternate allocation method, in which the first eligible patient was assigned to the razor shaving group, the next eligible patient to the clipping group, and this sequence was continued throughout the study period.

Data were collected using a structured proforma, including demographic details, comorbidities, ASA score, surgical variables, hair removal method, and postoperative outcomes. Surgical site infection was assessed within 30 days postoperatively using CDC criteria. Data were analyzed using SPSS version 23, with categorical variables expressed as frequencies and percentages and associations tested using the Chi-square test. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 110 patients were included in the study, with equal distribution between the two groups: 55 patients underwent preoperative hair removal using clipping and 55 patients using razor shaving. Overall, 28 (25.5%) patients developed surgical site infection (SSI), while 82 (74.5%) did not develop SSI. Among the clipping group, 8

(14.5%) patients developed SSI, whereas in the shaving group, 20 (36.4%) patients developed SSI. The difference was statistically significant (χ^2 test, p = 0.031) as shown in Table 1.

Table 1: Relation of SSI with two different methods of hair removal (n=82)

Methods of hair removal	SSI No	SSI Yes	Total	P value
Clipping	47 (85.5%)	8 (14.5%)	55	0.031
Shaving	35 (63.6%)	20 (36.4%)	55	
Total	82 (74.5%)	28 (25.5%)	110	

Among the patients who developed SSI, 18 (64.3%) had superficial SSI and 10 (35.7%) had deep incisional SSI. The distribution showed a higher number of infections in the shaving group but was not statistically significant ($p = 0.56$, Fisher's exact test) as shown in Table 2.

Table 2: Type of SSI in two different methods of hair removal (n=28)

Type of SSI	Clipping	Shaving	Total	P Value
Superficial	5	13	18	0.56
Deep incisional	3	7	10	
Total	8	20	28	

Skin irritation was observed in 49 (44.5%) patients, of which 33 (60.0%) belonged to the shaving group and 16 (29.1%) to the clipping group, indicating higher irritation with shaving which was statistically significant ($p = 0.002$, χ^2 test) as shown in Table 3.

Table 3: Skin irritation with two different methods of hair removal (n=110)

Methods of hair removal	Irritation No	Irritation Yes	Total	P Value
Clipping	39 (70.9%)	16 (29.1%)	55	0.002
Shaving	22 (40.0%)	33 (60.0%)	55	
Total	61 (55.5%)	49 (44.5%)	110	

Among patients without skin irritation, 17 (27.9%) developed SSI, whereas among those with irritation, 11 (22.4%) developed SSI. No significant association was found between skin irritation and SSI ($p = 0.52$, χ^2 test) as shown in Table 4.

Table 4: Association of skin irritation with SSI (n=110)

Skin irritation	SSI No	SSI Yes	Total	P value
No	44 (72.1%)	17 (27.9%)	61	0.52
Yes	38 (77.6%)	11 (22.4%)	49	

When analyzed according to wound class, SSI was observed in 17 out of 91 Class I wounds (18.7%) and 11 out of 19 Class II wounds (57.9%). The infection rate was significantly higher among Class II wounds compared with Class I wounds ($p < 0.001$, Fisher's exact test), indicating that wound class was significantly associated with surgical site infection.

Table 5: SSI in different wound classes (n=110)

Wound class	SSI No n (%)	SSI Yes n (%)	Total	P value
Class I	74 (81.3 %)	17 (18.7%)	91	<0.001
Class II	8 (42.1 %)	11 (57.9%)	19	
Total	82 (74.5 %)	28 (25.5%)	110	

To further assess the role of preoperative hair removal method in relation to wound class, the distribution of Class I and Class II wounds according to clipping and shaving was analyzed, as shown in Table 6.

Table 6: Distribution of wound class according to method of hair removal (n+110)

Wound class	Clipping n (%)	Shaving n (%)	Total
Class I	47 (51.6%)	44 (48.4%)	91
Class II	8 (42.1%)	11 (57.9%)	19
Total	55 (50.0%)	55 (50.0%)	110

Among Class II wounds, SSI was proportionally higher in patients who underwent razor shaving compared with clipping, as shown in Table 7.

Table 6: Association of hair removal method with SSI among Class II wounds (n+19)

Hair removal method in Class II wounds	SSI No	SSI Yes	Total	SSI percentage
Clipping	5	3	8	37.5%
Shaving	3	8	11	72.7%
Total	8	11	19	57.9%

Subgroup analysis among Class II wounds showed that SSI occurred in 3 out of 8 patients in the clipping group and 8 out of 11 patients in the shaving group. Although the percentage of SSI was higher among patients undergoing razor shaving, this finding should be interpreted cautiously due to the small number of Class II wounds. Fisher's exact test was used for this subgroup analysis because of the small cell counts.

DISCUSSION

The present study demonstrated a significantly higher incidence of surgical site infection (SSI) in patients undergoing preoperative hair removal with razors compared to clippers (36.4% vs 14.5%, $p = 0.031$). This finding highlights the importance of hair removal method as a modifiable risk factor for SSI. Razor shaving produces microscopic skin abrasions that disrupt the epidermal barrier, thereby facilitating bacterial colonization and increasing the risk of postoperative infection. [5]

These findings are consistent with previous studies. Adisa et al. reported significantly higher SSI rates in patients undergoing razor shaving compared to alternative methods, attributing this to increased skin trauma. [7] Similarly, Omolabake and Ozoilo observed higher postoperative wound infection rates with razor use compared to clipper-based hair removal. [6,8] Karegoudar et al. also demonstrated that non-razor methods are associated with lower SSI rates due to reduced skin injury. [9] Furthermore, a Cochrane review by Tanner et al. concluded that avoiding razor shaving significantly reduces the incidence of surgical site infections. [10,11]

In the present study, the majority of infections were superficial (64.3%), followed by deep incisional infections (35.7%), which is consistent with existing literature indicating that superficial SSI accounts for the majority of postoperative infections. [12,13] Although the distribution of SSI types between the two groups was not statistically significant, the higher overall burden of infection in the shaving group remains clinically important. Skin irritation was significantly more common in the shaving group compared to clipping (60.0% vs 29.1%, $p = 0.002$), supporting the biological mechanism of razor-induced skin trauma. Similar findings have been reported in previous studies where shaving resulted in increased skin injury compared to clipping. [7,9] However, no significant association was found between skin irritation and SSI in this study. This suggests that visible irritation alone may not reliably predict infection risk, which is influenced by multiple perioperative factors including aseptic technique, antibiotic prophylaxis, and host immunity. [8,12]

The study also demonstrated a significantly higher incidence of SSI in Class II wounds compared to Class I wounds ($p < 0.001$), which is expected due to higher microbial contamination. This finding is consistent with established evidence identifying wound classification as a major determinant of SSI risk. [12]

The present study also found that wound class was significantly associated with surgical site infection. Class II wounds had a higher infection rate compared with Class I wounds. This finding is expected because Class II wounds are clean-contaminated wounds and therefore have greater microbial exposure during surgery. On further subgroup analysis, Class II wounds managed with razor shaving showed a higher proportion of SSI compared with those managed with clipping. This supports the possibility that razor shaving may further increase infection risk in wounds that already have a higher baseline contamination risk. The findings of this study agree with international guidelines. The World Health Organization, CDC, and NICE guidelines all recommend avoiding razor shaving and advocate the use of clippers when hair removal is necessary to reduce SSI risk. [1,3,4]

These results provide important local evidence supporting global recommendations and highlight the need for strict adherence to evidence-based preoperative practices in tertiary care settings.

CONCLUSIONS

Preoperative hair removal using razors is associated with a significantly higher incidence of surgical site infections compared to clipper use. Clipping minimizes skin trauma and thereby reduces the risk of postoperative wound infection, making it a safer and more effective method for preoperative hair removal. The study also highlights that higher wound class is an important contributor to increased SSI risk. These findings support current international guidelines and emphasize the need for strict adherence to clipper-based hair removal protocols to improve patient outcomes and reduce preventable surgical complications.

CONFLICT OF INTEREST

None

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None

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