

## Shaving before Surgery- Merits & Pitfalls

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### ABSTRACT

**Background:** The aim of this study is to determine the SSI rate in preoperative shaving versus non shaving of hair prior to surgical procedure and to determine if shaving is necessary or not. **Methods:** The study was carried out on 100 patients of age group 20 to 60 years admitted in Department of General Surgery, Government Medical College & Rajindra Hospital, Patiala. Patients was divided at random into two equal groups of 50 cases each. Study group A: Hair was not shaved before operation. Study group B: The operation site was shaved a night before surgery. **Results:** Out of 50 pts in group A(non-shaving) 4 pts developed SSIs. Out of 50 pts in group B(shaving) 9 pts developed SSIs. P-value is significant. **Conclusion:** It was concluded that shaving of the operative site has no role in prevention of postoperative wound infection even in cases/areas with heavy growth of hair at the operative site, the infection rate was not influenced by preoperative shaving preparation. Moreover, we did not experience any mechanical hindrance in making the incision. Care was, however, taken at the time of closure of wound to prevent hair being entangled in the sutures.

**Keywords:** Surgical site infection, SSI, shaving, non-shaving, wound infection.

### INTRODUCTION

Removal of hair from the intended site of surgical incision has traditionally been part of the routine preoperative preparation of patients undergoing surgery to facilitate adequate exposure to the site and preoperative skin marking. Furthermore, suturing and the application of wound dressings can be complicated by the presence of hair. Also, hair has been associated with a lack of cleanliness and the potential to cause surgical site infection (SSI). Hair removal inversely increases the risk of SSI by causing microscopic trauma of the skin. To minimize the potential of skin trauma, the use of clippers instead of razors has been proposed for preoperative hair removal.

Clippers cut the hair close to the skin without actually touching it, whereas razors involve a sharp blade drawn directly over the skin. The third method for hair removal is the application of depilatory creams containing chemicals. However, significant harm was seen when hair removal with razors was compared with clipping.<sup>[1]</sup> Surgical site infection (SSI) is a dreaded complication of surgery, and the ability to identify risk factors for patients can be beneficial for managing patient expectations as well as optimizing good clinical outcomes.<sup>[2]</sup>

Infection at or near surgical incisions within 30 days of an operative procedure contributes substantially to surgical morbidity and mortality each year. SSI accounts for 15% of all nosocomial infections and among surgical patients, represents the most common nosocomial infection.<sup>[3]</sup> The postsurgical infection leads to increased length of postoperative hospital stay, drastically escalated expense, higher rates of hospital readmission, and jeopardized health outcomes. Accordingly, the first step in the treatment of SSIs is in their prevention. 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.<sup>[4]</sup>

Several patient characteristics have been shown to have a significant, independent association for SSI prediction. These include but are not limited to, diabetes, cigarette smoking, obesity, and coincident remote site infections or colonization.<sup>[5]</sup>

In addition to wound classification, emergency procedures, long procedure length, the use of nonabsorbable suture, foreign bodies, copious use of subcutaneous electrocautery, excessive blood loss and hypothermia have all been correlated with increased risk of SSI.<sup>[6]</sup> Minimal access surgery has reduced the wound access trauma and incidence of SSIs.<sup>[36]</sup>

Routine preoperative shaving was not shown to decrease the risk of SSI in laparotomies in 2

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randomized controlled trials and has been implicated in higher rates of infection.<sup>[7,8]</sup>

### AIM

The aim of this study is to determine the SSI rate in preoperative shaving versus non shaving of hair prior to surgical procedure and to determine if shaving is necessary or not.

### MATERIALS AND METHODS

This prospective comparative study was carried out on 100 patients of age group 20 to 60 years admitted in department of General Surgery, Government Medical College & Rajindra Hospital, Patiala who were to undergo various operative procedures.

Patients were divided into two equal groups of 50 cases each. Total 150 patients were assessed for eligibility. 50 patients were lost for not meeting inclusion criteria, death, failed follow up, poor compliance. Study was considered complete when each group completed 50 patients each.

1. Study group A: Hair was not shaved before operation.
2. Study group B: The operation site was shaved a night before surgery.

#### Inclusion criteria:

1. All patients in the age group of 20-60 yrs.
2. Elective Surgical Procedure.
3. Willing to give consent

#### Exclusion Criteria:

1. Patients who had skin infections prior to surgery.
2. Patients who had diabetes mellitus.
3. Immunocompromised patients.

Shaving is the commonest and cheapest method of hair removal. This 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.

Detailed information about every patient was included in study and was recorded in the proforma. In both groups, the operative site was cleaned first with savlon (cetrimide-chlorhexidine) and then painted with Povidine-Iodine solution. Any technical problem if encountered during incision making and closure of wound was observed and special care was taken to prevent hair being entangled in the sutures or incision. All wounds were examined on alternate days till 1 week and then weekly post operatively, in the wards till the patient was discharged, for any evidence of local infection (pain and redness, surgical site seroma, pus discharge and stitch abscess), surgical site wound dehiscence. All the patients were followed up regularly upto one month for any evidence of infection. The results, so obtained were analysed statistically, compared and conclusions were drawn.

### RESULTS

[Table 1] shows the incidence of SSI in reference to age of the patients. Incidence of wound infection was more in older age group (50-60) in both groups. P value was significant and it shows that surgical site infection rate is directly proportional to age.

[Table 2] shows that both groups incidence of SSIs was more in contaminated surgical procedures. P value was significant which shows that incidence of SSIs is more in control group as compared to study group as per type of wound was concerned.

**Table 1: Relation of surgical site infection with age of the patients**

Age (Years)	Study Group A			Study Group B			X <sup>2</sup>	p value
	Patients	No. of SSI	%age of SSI	Patients	No. of SSI	%age of SSI		
21-30	18	1	5.56%	19	3	15.79%	16.09	0.022
31-40	10	1	10%	10	1	10%		
41-50	13	1	7.69%	11	1	9.09%		
51-60	9	1	11.11%	10	4	40%		
Total	50	4	8%	50	9	18%		

**Table 2: SSI in relation with type of wound**

Type of Surgery	Study Group A			Study Group B			X <sup>2</sup>	p value
	Patients	No. of SSI	%age of SSI	Patients	No. of SSI	%age of SSI		
Clean	34	1	2.94%	33	1	3.03%	5.88	0.015
Clean-contaminated	14	2	14.29%	16	7	43.75%		
Contaminated	2	1	50%	1	1	100%		
Total	50	4	8%	50	9	18%		

**Table 3: Relationship of wound infection with duration of operation in present study**

Duration of Surgery (Mins)	Study Group A			Study Group B			X <sup>2</sup>	p value
	Patients	No. of SSI	%age of SSI	Patients	No. of SSI	%age of SSI		
≤30 min	5	1	20%	4	0	0%	4.90	0.027
31-60 min	19	0	0%	18	0	0%		
61-90 min	14	0	0%	14	3	21.43%		
91-120 min	12	3	25%	14	6	42.86%		
Total	50	4	8%	50	9	18%		

**Table 4: Incidence of SSI**

Surgical Site Infection (SSI)	Study Group A		Study Group B	
	Patients	Percentage	Patients	Percentage
SSI(+)	4	8%	9	18%
SSI(-)	46	92%	41	82%
Total	50	100%	50	100%
X2	4.40			
P-value	0.036			

[Table 3] Incidence of SSIs is more in control group as compared to study group as per duration of operation was concerned.

[Table 4] shows presence or absence of surgical site infection in study group and control group. Incidence of SSIs in study group is 8% and in control group is 18%. P-value was significant which show that incidence of SSIs is more in control group as compared to study group.

## DISCUSSION

Post-operative wound infection remains a serious surgical problem despite the considerable attention devoted to various factors involved. Preoperative skin preparation (hair removal) is one factor that may influence the risk of wound infection. Although the origin of preoperative hair removal is obscure, the potential danger of hair in the operative field has been widely recognized almost from the time of Lister and Simmelweiss.<sup>[9]</sup> The preoperative shaving of the hair has been accepted as a routine part of preoperative preparation since the beginning of this century. However, the danger of trauma inflicted by razor preparation has also been recognized.

The present study was conducted to find out the effect, favourable or otherwise of withholding shaving of the operative site before operation.

In the group B (shaving), 9 patients got infected showing 18% incidence of infection and in the study group A (non-shaving) the infection rate was only 8%. The overall infection rate was 13%.

Various factors influencing the incidence of surgical site infection are as following:

### AGE:

In our study, the wound infection rate was found to be low in the younger age group as compared with the older age group in both the groups. This concord well with the findings of other studies. [Table 1]

Yoshikawa TT et al and Castle SC et al studied increasing immune dysfunction and accumulation of co-morbid conditions with increasing age.<sup>[10,11]</sup>

Pessaux P et al and Raymond D et al studied the increased prevalence of comorbid conditions, increased severity of acute illness, and a decreased host response to bacterial invasions in older patients as the real reasons older patients appear to have an increased risk of SSI.<sup>[12,13]</sup> Committee on Trauma, Division of Medical Sciences, National Academy of Sciences, National Research Council also reported that except at the extremes of life increasing age

shows an increasing infection rate. However, when the age group was studied adjusting against the other factors influencing the wound infection rate, it was observed that infection rate was influenced not only by age but also by other factors associated with age.<sup>[14]</sup>

### Type of surgery:

Contaminated wounds have a very high potential for infection. So much so, Billroth et al used the method of delayed primary closure for all the abdominal wounds in the management of contaminated and dirty wounds and it took many years to convince them that contaminated wounds could be closed primarily as advocated by Lister (Cruse and Foord).<sup>[15]</sup>

The present study showed that wound infection was more in the contaminated wounds (according to the wound classification) both in Group B (shaved) and Group A (not shaved). [Table 2]

Wound infection rate (50%) in the contaminated wounds was almost 17 times more than in the clean wounds (2.94%). Similarly in Group A also wound infection rate in the contaminated wounds was 100% which was almost 33 times of that in the clean cases where the infection rate was 3.03%.

The possible reason for wound infection in contaminated cases was probably wound contamination during surgery.

Rao AS et al and Tripathy BS et al observed in their study that incidence of SSI in clean cases was 3.03% and in clean-contaminated cases was 22.41% which is nearly comparable to our present study.<sup>[16,17]</sup>

The Trauma Committee of National Research Council also observed the incidence of wound infection in contaminated wounds to be almost five times than in the clean wounds indicating that factors other than airborne contamination were responsible for the majority infections in contaminated wounds.<sup>[14]</sup>

Hasselgren and Holm conducted a prospective study on 112 patients to know the sources and routes of post-operative wound infection and found that patient himself was a source of bacteria in all cases of wound infection. They concluded that surgical wounds can be contaminated both during surgery and post-operatively.<sup>[18]</sup>

### Duration of surgery:

After each operative procedure the length of operation time was recorded both in the study group A and in group B. As the duration of operation

increased a progressive increase in the infection rate was observed in the present study. [Table 3]

Alavi K et al, Sergeant G et al, Meakins JL et al, Tweed C et al and Malone DL et al studied that tissue concentrations of antibiotics will decrease as the procedure continues and may be inadequate if not re-administered during the surgical procedure.<sup>[19-23]</sup> Li GQ et al and Hoekstra LT et al studied that longer operative times may also mean increased surgical team fatigue and room for more technical errors.<sup>[24,25]</sup>

### **Shaving of the operative site:**

In the present study, it was observed that shaving of the operative site was associated with more risk of post-operative wound infection (18%), whereas less infection rate (8%) was seen in study group where no shave was done. [Table 4]

It was also observed that while shaving the site for operation, it was associated with visible injuries (nicks and scratches) in a significant number of patients which caused discomfort to the patients. Difficulty in shaving was also noticed in areas like groin, axilla and scrotum.

Seven studies compare hair removal by razor with not shaving. Out of which five studies recommend not to shave patients pre-operatively and show an association between shaving by razor and increased rate of infection.

Court-Brown et al did a study in which they compared shaving, depilatory cream and no hair removal, found that SSI rate was lowest in no hair removal (7.8%) and highest in shaving group (12.4%).<sup>[8]</sup>

Miyagi et al conducted a retrospective analysis of unshaved patients undergoing a surgical procedure. The study comprised two groups, two cases were infected: one (1.6%) in the shaved group and one (0.8%) in the unshaved group. Nonetheless, the researchers argue that leaving the hair is safer than hair removal.<sup>[26]</sup>

Celik and Kara et al in their randomised controlled trial recommended that pre-operative hair removal is unnecessary. Post-operative infection developed in four patients in the shaved group and in one patient in the non-shaved group ( $P < 0.01$ ). The study concluded that shaving of the incision site pre-operatively may increase the rate of infection.<sup>[27]</sup>

Abouzari et al in their randomised controlled trial recommended that pre-operative hair removal is unnecessary. SSI rate in shaving group is 4.6% and in non-shaving group is 1.5%. The study concluded that shaving of the incision site pre-operatively may increase the rate of infection.<sup>[28]</sup>

Kattipattanapong et al in their randomised controlled trial recommended that pre-operative hair removal is unnecessary.<sup>[29]</sup>

Ilanovan et al, Rojanpirom et al, Horgan et al in their randomised controlled trial fails to show statistically significant differences in shaving or not

shaving before surgery that influence SSIs, but recommend avoidance of shaving if possible.<sup>[8,30,31]</sup>

Seropian and Reynolds observed that shaving of the operative site with razor potentially liberates the resident flora in the operative field and provide access and substrate for transient organisms. Moreover, it is not necessary to have visible injuries even a skilful razor preparation causes microscopic injuries that provide a portal of exit and entry, with the injured tissue serving as a substrate for bacterial growth.<sup>[32]</sup>

Alexander et al also found that even in clipping of hair nicks and scratches were present at the operative site.<sup>[33]</sup>

An alternative to razor preparation is the use of depilatory cream. However, Royal Australian College of Surgeons adopted a Policy on Infection Control in Surgery (July 1998) and recommended that depilatories are not recommended for hair removal because they can cause serious skin irritation and rashes in a significant number of patients, forcing the cancellation of the surgical procedure.<sup>[34]</sup>

Ananthakrishnan et al conducted a study and found that there was no increase in the incidence of wound infection even when shaving of the operative site was not done. Presence of the hair at the operative site did not hinder skin closure either. Present study also showed fewer infections in the study group and no difficulty was encountered while skin closure in the presence of hair.<sup>[35]</sup>

## **CONCLUSION**

- The overall infection rate was 13%.
- The infection rate in the group B (shaving done) was 18%.
- The infection rate in the study group A (not shaved) was only 8%
- More infection rate was observed in the higher age group in both groups.
- The Infection rate was found to be significantly high in the non-clean (clean-contaminated and contaminated cases) surgical procedures.
- The Infection rate was found to be significantly high when the operative time was more than 1hr.

The patients' comfort was far superior to those subjected to shaving with the usual practised method. Moreover, in our area where the Sikh population is dominating, shaving of hair also hurts their religious sentiments. The special points made by the patients were non-violation of religious sentiments, non-violation of privacy and avoidance of discomfort. However, the only difficulty which was faced by the patients was at the time of removal of dressings. So, the practice of surgery without shaving the hair from the operative sites is highly recommended as this prevents infectious complications and certainly is cost-effective also.

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