

PRE-OPERATIVE HAIR REMOVAL WITH TRIMMERS AND RAZORS AND ITS IMPACT ON SURGICAL SITE INFECTIONS IN ELECTIVE INGUINAL HERNIA REPAIR

John S. Kurien¹, Sansho E. U², Adarsh I. Nath³, Sandeep A. Varghese⁴

¹Professor and HOD, Department of General Surgery, Government Medical College, Kottayam.

²Associate Professor (CAP), Department of General Surgery, Government Medical College, Kottayam.

³Junior Resident, Department of General Surgery, Government Medical College, Kottayam.

⁴Assistant Professor, Department of General Surgery, Government Medical College, Kottayam.

ABSTRACT

BACKGROUND

Despite major advances in infection control interventions, health care-associated infections (HAI) remain a major public health problem and patient safety threat worldwide. The global data suggests that the SSI incidence rate varies from 0.5 to 20% depending upon the type of operation and underlying patient status. Several factors preoperative, intraoperative & postoperative, determine the occurrence of surgical site infections, Preoperative hair removal is considered as a risk for the development of surgical site infections. The objective of the study is to find out the difference in the incidence of surgical site infections in patients undergoing pre-operative hair removal by shaving with Razor blades and hair trimmers prior to elective inguinal hernia surgery.

MATERIALS AND METHODS

Written informed consent from 160 patients with no significant comorbidities planning to undergo elective inguinal hernia surgery at the general surgery wards in Government Medical College Kottayam and who were willing to participate in the study were to be obtained. 80 of them to undergo pre-operative hair removal with hair trimmers and 80 to undergo preoperative hair removal by shaving with razor blades on the day prior to the surgery randomised into two groups. During their stay in the post-operative ward the surgical wounds of the patients were examined daily for the development of erythema, pain, discharge, induration and gaping of the wound. The daily findings were noted down till the patient was discharged from the ward. The patients were again reassessed 2 weeks later, when they came for review in the Surgery OPD after their discharge from the ward; finally the patients were examined on the 30th day post-surgery to look for the clinical features of surgical site infections.

RESULTS

Out of the total 160 patients who were studied, 29 (18.1%) of them had post-operative infection within 30 days, in the form of erythema, induration, discharge and gaping. Most of the symptoms of surgical site infections were during the initial 3 days (69%), with the most common symptom being erythema (18.1%) followed by induration (12.5%). Gaping (0.6%) and discharge from wound (3%) were very minimal. Those individuals who had undergone preoperative hair removal with trimmers (11.2%) had a lower incidence of surgical site infection when compared to those with razors (20%). The difference was statistically significant, with a p value of 0.024 by Chi-Square tests. The difference in erythema (p- 0.024) and induration (p-0.017) between the two groups was also found to be statistically significant. Other factors, namely type of surgery, age of the individual and sex did not have a statistically significant difference.

CONCLUSION

In this study there is evidence of definite reduction in surgical site infection rates when trimmers were used for pre-operative hair removal than razors in elective inguinal hernia surgery. The difference is statistically significant (p Value – 0.024).

KEYWORDS

Preoperative Hair Removal; Razors; Surgical Site Infection; Trimmers.

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Corresponding Author:

Dr. Sansho E. U,

Associate Professor (CAP),

Department of General Surgery,

Government Medical College, Kottayam.

E-mail: elavumkal@gmail.com

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BACKGROUND

Despite major advances in infection control interventions, health care-associated infections (HAI) remain a major public health problem and patient safety threat worldwide. The global data suggests the Surgical Site Infections (SSI) incidence rate varies from 0.5 to 20% depending upon the type of operation and underlying patient status.¹ Surgical site infections are the 3rd most common cause of hospital acquired infections in India, amounting to increased duration of hospital stay, morbidity and increased health care

expenses.² In India, the incidence of SSI has previously been reported to vary between 3.03% to 22.41% in studies from different geographic areas.³

SSI rates have been reported to range from 2.5% to 41.9% with significantly higher rates in developing countries. Besides, the surgical mortality in developing nations is 10 times higher than developed countries and deaths attributed to anaesthesia are 1000-fold higher. In a recent meta-analysis report of 220 international studies investigating SSI rates in developing countries, the cumulative incidence ranged from 0.4 to 30.9 per 100 patients and from 1.2 to 23.6 per 100 surgical procedures, while the pooled cumulative incidence was 11.8 per 100 patients.⁴

The incidence of SSI also varies more widely between surgical procedures suggesting the type of surgery to be an important determinant. The INICC comparison revealed that the SSI rates amongst hospitals in limited-resource countries including India were significantly higher after abdominal surgeries, cardiothoracic surgeries, and ventricular shunt when compared to those in the US hospitals.⁵

Several factors preoperative, intraoperative and postoperative, determine the occurrence of surgical site infections (e.g.; smoking, diabetes, other comorbidities, duration of surgery, preoperative skin preparation.⁶ most of the factors has been extensively studied and researched upon. For a Surgical Site Infection, microbial contamination of the surgical site is a prerequisite.

One of the pre-operative risk factors that has not been extensively studied is pre-operative hair removal and its impact on surgical site infections. Hence the following study is being undertaken to assess the impact of preoperative hair removal on Surgical Site Infections. Latest Indian study on this topic showed a definite decrease in the incidence of Surgical Site infection with the use of trimmers for hair removal.

Aims and Objectives

This study aims to find out the difference in the incidence of surgical site infections in patients undergoing pre-operative hair removal by shaving with Razor blades and hair trimmers prior to elective inguinal hernia repair.

MATERIALS AND METHODS

This prospective study was carried out in the Department of General Surgery of Government Medical College, Kottayam from March 2016 to March 2017 after getting ethical committee clearance. 160 patients aged 20 – 60 yrs. with no significant co morbidities who underwent elective hernia repair surgery at the general surgery wards in our institution and who gave informed written consent were included in the study. 80 of them underwent pre-operative hair removal with hair trimmers and 80 underwent preoperative hair removal by shaving with razor blades on the day prior to the surgery randomly. All the patients underwent elective inguinal hernia surgery and during their stay in the post-operative ward the surgical wounds of the patients were examined daily for the development of erythema, pain,

discharge, indurations, gaping of the wound. The daily findings were noted down till the patient was discharged from the ward.

The patients were again assessed 2 weeks later, when they were reviewed in the Surgery OPD after their discharge from the ward; finally, the patients were examined on the 30th day post-surgery to look for the clinical features of surgical site infections.

During every phase of the study the personal details of the patients participating in the study was kept confidential.

Inclusion Criteria

Patients who underwent elective inguinal hernia repair in the department of General Surgery in Kottayam Medical College without any significant comorbidities.

Exclusion Criteria

Patients with deep or organ space infection, immunocompromised patients, diabetics, and patient who underwent emergency hernia repair were excluded from the study.

Data entry was done using Excel and analysis was carried out using SPSS.

DATA ANALYSIS AND RESULTS

The study included 158 male patients and 2 female patients. Majority of the individuals in the study belonged to age more than 50 years. Most common inguinal hernia surgery being done at our institution is Lichtenstein's tension free mesh repair which accounted for almost 70% of the total cases in the study, Followed by Rives preperitoneal mesh repair, which accounted for 28%. Equal number of individuals underwent preoperative hair removal with razors and trimmers (80/80).

The Surgical Site infection rate following elective inguinal hernia repair at our institution is 18.1%, which is in accordance with the national incidence rates (12%-23%)(Figure 1). In the entire study population, erythema of the wound was noted in 29 out of 160 patients (18.1%). Induration was noted in 20 patients (12.5%). Significant discharge was seen in 5 patients (3.1%) and gaping was noted in 1 patient. Commonest symptom (erythema) was detected during the postoperative day 1-3. (Table 1)

Our study shows a statistically significant association between mode of pre-operative hair removal and postoperative Surgical Site Infection. (Table 2) Association between preparation and erythema (Figure 2), preparation and induration (Figure 3) preparation and discharge and, preparation and gaping were separately analysed. There were statistically significant difference favouring the hair removal using trimmers in case of erythema (Table 3) and induration (Table 4). Association between preparation and discharge or gaping did not show any statistically significant difference. Association between type of surgery and postoperative infection also showed no statistically significant difference.

Erythema was seen in 20 patients who underwent hair removal with razors as compared to 9 patients who

underwent hair removal with trimmers ($p=0.024$) (Table 3). Induration was seen in 15 patients who underwent hair removal with razors as compared to 5 patients who underwent hair removal with trimmers ($p= 0.017$) (Table 4).

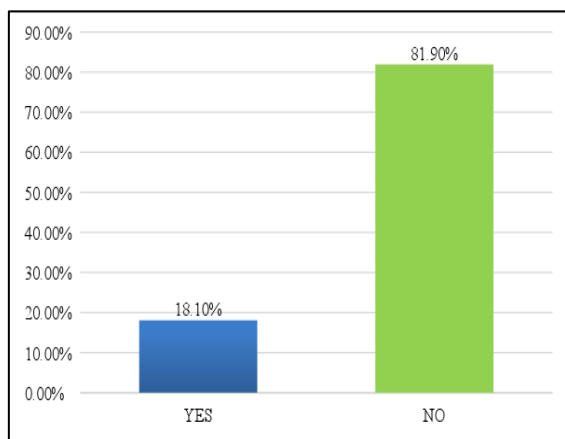


Figure 1. Distribution of Study Subjects Based on Postoperative Infection

Surgical Site infection rate following elective hernia repair surgery at our institution (18.1%).

Day of Findings	Number of Subjects*	%
< 3 Days	20	69.0
3 - 14 Days	8	27.6
> 14 Days	1	3.4
Total	29*	100.0

Table 1. Distribution of Study Subjects Based on day of Findings

Table shows the post-operative day during which the symptoms of surgical site infection were noticed & diagnosed, commonest symptoms were detected during the postoperative day 1-3.*number of subjects having SSI.

Preparation	Postoperative Infection		Total	Chi-Square Value
	Yes	No		
Trimmers	9 11.2%	71 88.8%	80 100.0%	5.096 P=0.024 Significant
Shaving	20 25.0%	60 75.0%	80 100.0%	
Total	29 18.1%	131 81.9%	160 100.0%	

Table 2. Association between Mode of Preparation and Postoperative Infection

This Table shows a significant association between mode of pre-operative hair removal & Post Op SSI.

Preparation	Erythema		Total	Chi-square value
	Yes	No		
Trimmers	9 11.2%	71 88.8%	80 100.0%	5.096 P=0.024 Significant
Shaving	20 25.0%	60 75.0%	80 100.0%	
Total	29 18.1%	131 81.9%	160 100.0%	

Table 3. Association between Mode of Preparation and Erythema

Erythema was seen in 20 patients who underwent hair removal with razors as compared to 9 patients who underwent hair removal with trimmers.

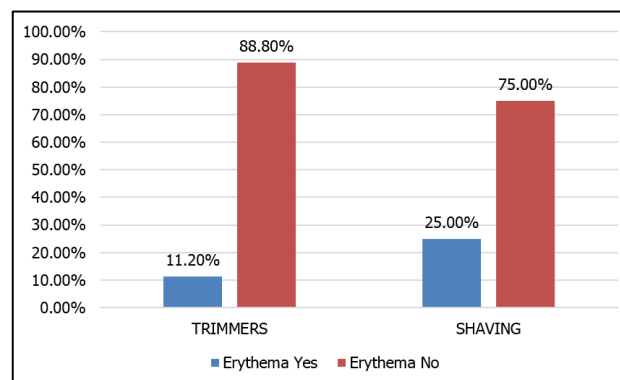


Figure 2. Association between Mode of Preparation and Erythema

Development of erythema was 11.2% when trimmers were used where as it was 25% when razors were used.

Preparation	Induration		Total	Chi-square value
	Yes	No		
Trimmers	5 6.2%	75 93.8%	80 100.0%	5.714 P=0.017 Significant
Shaving	15 18.8%	65 81.2%	80 100.0%	
Total	20 12.5%	140 87.5%	160 100.0%	

Table 4. Association between Mode of Preparation and Induration

Induration was seen in 15 patients who underwent hair removal with razors as compared to 5 patients who underwent hair removal with trimmers. The Difference is statistically significant.

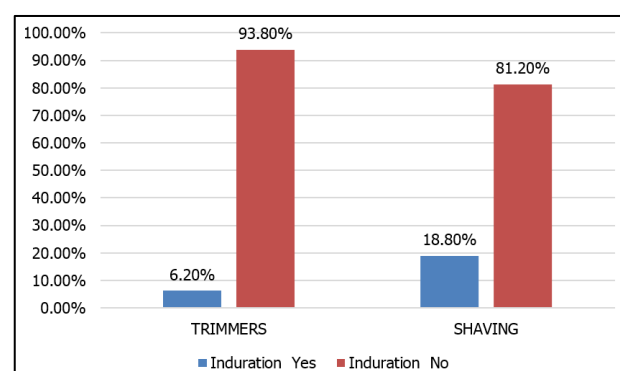


Figure 3. Association between Preparation and Induration

Induration was only 6.2% when trimmers were used in contrast to razors where it was 18.8%.

DISCUSSION

The risk of Surgical Site Infection is markedly increased when a surgical site is contaminated with 10^5 organisms per gram. The endogenous flora of the patient's skin, mucous

membranes, or hollow viscera is the source of pathogens for most Surgical Site infections. When mucous membrane or skin is incised, the exposed tissues are at risk for contamination with endogenous flora. The abrasions produced over the skin, during pre-operative hair removal with razor blades predispose to superficial surgical site infection.

This Study was done to identify the incidence of surgical site infection following elective hernia repair, and the difference in rate of surgical site infection, when the preoperative hair removal was done with razors and trimmers. Out of the total 160 patients who were studied, 29 (18.1%) of them had post-operative infection within 30 days, in the form of erythema, induration, discharge and gaping. Most of the symptoms of surgical site infections were during the initial 3 days (69%), with the commonest symptom being erythema (18.1%) and induration (12.5%). Gaping (0.6%) and discharge from wound (3%) were very minimal. Those individuals who had undergone preoperative hair removal by trimming (11.2%) had a lower incidence of surgical site infection when compared to those with razors (20%) with a significant p value of 0.024 by Chi-Square tests, Erythema in 9 (11.2%) patients who underwent hair removal by trimming and 20 (25%) patients who underwent hair removal by razors. This was statistically significant, with a p Value of 0.024. Induration was present in 5 (6.2%) patients who underwent hair removal by trimming and 15 (18.8%) patients who underwent hair removal by razors, which was statistically significant, with a p Value of 0.017. Incidence of discharge and gaping did not have statistically significant difference in the both sets of patients and symptoms of deep or organ space surgical site infection, did not have association with the preoperative preparation. Also, others factors, namely type of surgery, age of the individual and sex did not yield a statistically significant p Value.

Infection at or near surgical incisions within 30 days of an operative procedure, is called surgical site infection, which contributes substantially to surgical morbidity and mortality each year. Surgical site infection (SSI) accounts for 15% of all nosocomial infections and, among surgical patients, represents the most common nosocomial infection.⁷

The cornerstone is the lack of adherence to recommended infection control guidelines and suboptimal practices in many countries.⁸

Removal of hair from the intended site of surgical incision has traditionally been part of the routine preoperative preparation of patients undergoing surgery. Hair removal may be necessary 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. Apart from these practical issues, hair has been associated with a lack of cleanliness and the potential to cause surgical site infection (SSI) However, there is also the belief that hair removal inversely increases the risk of SSI by causing microscopic trauma of the skin.⁹

Three methods of hair removal are currently used; shaving, trimming and chemical depilation. 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.

Trimmers use fine teeth to cut hair close to the patient's skin, leaving a short stubble that is usually around one millimetre in length. The heads of trimmers can be disposed of between patients to minimise the risks of cross infection.

Depilatory creams are chemicals which dissolve the hair itself. This is a slower process than either shaving or trimming, as the cream has to remain in contact with the hair for between five and 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.¹⁰

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-organisms. Since trimmers do not come into contact with the patient's skin, they are thought to reduce the risk of cuts and abrasions.

Studies have been conducted comparing the efficacy of hair trimmers to that shaving with razor blades, first documented study in 1982 by Eugene R Balthazar MD, James D Colt MD, & Ronald Lee Nichols MD, Department of Surgery, Tulane University school of Medicine showed that there was no significant increase in the incidence rates of surgical site infections with the use of Hair trimmers.¹¹

In a prospective study that compared infection rates among 1,980 surgical patients whose hair was either shaved or trimmed pre-operatively, patients who were trimmed had a statistically significantly lower infection rate than patients who were shaved. These results support an earlier study of the effects of shaving versus trimming on infection rates among 1,013 patients undergoing elective surgery. Trimming decreased infection rates both at discharge and at 30-day follow-up. Cost savings of \$270,000 per 1,000 patients were estimated (in 1983 dollars) if trimming replaced shaving.¹²

A study comparing the clinical and cost outcomes of shaving and trimming found a moderate initial increase in hospital cost when converting from razors to trimmers, but concluded that substantial long-term cost savings could be expected due to the decreased incidence of postoperative wound infections. This study further recommended discontinuation of razor shaving because of its associated risk of infection.¹³

Study comparing the incidence of surgical site infections and pre-operative hair removal with surgical trimmers and shaving with razors has been conducted in VMMC & SJH (Vardhman Mahavir Medical College & Safdarjang Hospital), New Delhi in 2012. The results obtained after the study showed a definite decrease in the incidence of surgical site infections with the use of surgical trimmers when compared

to shaving with razors. Total of 200 individuals underwent the study, Group I= 100 & Group II= 100, Group I underwent preoperative hair removal by razor blades and Group II underwent hair removal by trimmers, The incidence of Surgical Site Infection in Group I was 7% (7 in 100), The Incidence of Surgical Site Infection in Group II was 1% (1 in 100), with a significant p value of <.05.¹⁴

The study also calls upon for similar study from different hospitals in the country so that a comparative analysis shall be helpful in the understanding of the area of study.

CONCLUSION

In this study there is evidence of definite reduction in surgical site infection rates when trimmers are used for pre-operative hair removal than razors in elective hernia surgery. Preoperative hair removal with trimmers had a statistically significant lower incidence of erythema and induration at the wound site when compared to use of razors. Other factors namely type of surgery, age of the patient and sex of the patient were not statistically significant. Therefore, preoperative hair removal with the help of trimmers should be recommended since this method significantly reduce the number of surgical site infections.

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