

# Preoperative Shaving with Razor Blades Versus no Preoperative Shaving in Elective Inguinal Hernia Repair: Impact on Surgical Site Infection

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## ABSTRACT

**Background:** Body hair could be removed for various reasons including religious, aesthetic, cultural, medical or as a part of preoperative preparations of surgical patients. It is a common tradition or routine in surgical practice to remove body hair preoperatively as its presence can interfere with the surgical incisions, wound closure and the application of adhesive wound dressings. Hair is also perceived to be associated with poor personal hygiene and the removal of body hair is thought to reduce the risk of surgical site infection (SSI). However, there are studies which claim that preoperative hair removal is deleterious perhaps by increasing the incidence of SSI, and should not necessarily be carried out. **Objectives:** To determine the rate of surgical site infection associated with preoperative shaving of the operative site with razor blade versus no preoperative shaving in elective inguinal hernia repair, and to determine patients' levels of satisfaction with each preoperative method. **Methods:** We enrolled sixty consecutively consenting patients who met the inclusion criteria for elective inguinal hernia repair in this study. Thirty patients received preoperative hair removal with razor while 30 patients did not. We assessed postoperative surgical site infection on post-operative days 3, 7, 14, 21 and 30. Statistical analysis was done using the statistical package for social sciences (SPSS) version 17. The results obtained were presented in tables, bar charts and pie charts. P-value of <0.05 was considered statistically significant by chi-square test. **Results:** Out of 60 patients who were recruited for the study, 3(5%) had postoperative surgical site infection (2 in the shaved group (6.7%) and 1 in the unshaved group (3.3%)) within 30 days in form of mild erythema. The difference, however, was not statistically significant with P-value of 0.554. **Conclusion:** This study showed no advantage of preoperative shaving with razor over no preoperative shaving in elective inguinal hernia repair with respect to prevention of surgical site infection. There was slightly higher surgical site infection rate associated with preoperative shaving, but the difference is not statistically significant.

**Keywords:** Preoperative shaving, No preoperative shaving, Razor, Surgical site infection.

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## INTRODUCTION

Body hair could be removed for various reasons including religious, aesthetic, cultural, medical or as a part of preoperative preparations of surgical patients. The preoperative preparation of patients for surgery has traditionally involved the routine removal of body hair from the intended surgical wound site.<sup>1</sup> Hair is removed as its presence can interfere with the making of surgical incisions, the suturing of the wound and the application of adhesive wound dressings.<sup>1,2</sup> Hair is also perceived to be associated with poor personal hygiene and the removal of hair is thought to reduce the risk of surgical site infection (SSIs).<sup>3</sup> However, there are studies which claim that preoperative hair removal is deleterious as it may cause SSI, and should not necessarily be carried out.<sup>4,6</sup>

Three methods of hair removal are currently used: shaving, clipping and chemical depilation. Shaving is the most common and cheapest method of hair removal, even in our environment. This method uses a sharp disposable 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. Shaving and clipping can be carried out in the operating theatres, anaesthetic rooms, wards or patient's home by theatre staff, ward staff, or by patients themselves.

During the process of shaving, the skin may experience microscopic cuts and abrasions. It is believed that micro-organisms can enter and colonize these cuts and contaminate the surgical wound causing postoperative wound infections.<sup>7</sup> In addition, abrasions may ooze exudates, which may provide a culture medium for micro-organisms.<sup>8</sup> Despite the CDC recommendation that hair should not be removed preoperatively unless the hair at or around the incision site will interfere with the operation, hair removal is still routinely done in many tertiary health centres.<sup>9</sup>

There have been instances where disagreement ensued between the ward nurses and the theatre nurses because patients who were admitted to theatre

for surgical procedures were not shaved. The attending surgeon may then order that the operative site be shaved, even when the patient is already under anaesthesia. This obviously contaminates the operative site/field, delays the surgery, and extends period of anaesthesia. The question is whether all this is necessary, when it is still debatable whether shaving or no shaving has any impact on postoperative surgical site infection.

There are varying results of studies in literature comparing the impact of preoperative hair removal with razor and no preoperative hair removal on surgical site infections in craniotomies<sup>10-11,12</sup> and episiotomies.<sup>13,14</sup> There is, however, paucity of similar studies in elective inguinal hernia repair, a common general surgical procedure performed in the groin, which is also a hair-bearing part of the body. Although there are studies on the impact of different methods of preoperative hair removal in elective inguinal hernia repair on SSI, there is paucity of studies comparing the outcome of preoperative shaving with razor and no shaving in elective inguinal hernia repair with respect to surgical site infection.

Surgical site infection is a menace to successful surgical practice as it adds unwanted financial stress to the patient and the hospital due to occasional repeated surgeries to eradicate the infection, and the attendant prolonged hospital stay. Though it may not be possible to avoid surgical site infection in all surgical interventions, reducing its incidence to the barest minimum by any measure (preoperative, intraoperative or postoperative) especially in elective cases, would produce a result much desired by both the patients and the managing team.

The objectives of this study were to determine the rate of surgical site infection associated with preoperative shaving of the operative site with razor blades versus no preoperative shaving in elective inguinal hernia repair, and to determine patients' levels of satisfaction with each preoperative method.

## MATERIALS AND METHODS

The study was done at the Imo State University Teaching Hospital (IMSUTH), Orlu, Imo State, a major tertiary health care facility, serving as a referral centre in the state.

The ethical clearance to perform the study was obtained from the ethical committee of the hospital. The nature of the study and the potential complications were explained to the patients that were recruited for the study and informed consent was obtained from each participant.

The study is a prospective randomized controlled study comparing shaving with razor and no shaving in elective inguinal hernia repair. The study was conducted within a period of one year (between January 2019 to January 2020). Sixty (60) Consecutively consenting adult patients ( $\geq 18$  years) booked for elective inguinal hernia repair at IMSUTH, Orlu, who met the inclusion criteria were randomized into two groups, group A (shaved) and group B (unshaved), using simple balloting method (sealed envelopes with equal options for the two groups under investigation).

Full history taking, detailed clinical examination and appropriate laboratory investigations were done.

Group A patients were shaved with razor blade held in a plastic handle. This was done by the theatre nurse in a screened portion of the theatre corridor, next to the operating room (OR). Surgery was done under general or spinal anaesthesia while hernia repair was either Lichtenstein mesh repair or modified Bassini repair. Prophylactic antibiotic (ceftriaxone) was given as a single dose to all patients who had Lichtenstein mesh repair, while patients for modified Bassini hernia repair were not given any prophylactic antibiotic. The surgical intervention was standardized for the two groups. Postoperative surgical site infection was assessed on postoperative days 3, 7, 14, 21 and 30. Wound infection was graded according to the Southampton grading of wound infection<sup>25</sup> as follows:

Grade 0 - Normal healing

Grade 1 - Bruising/mild erythema

Grade 2 - Severe erythema with other features of inflammation at or around the wound.

Grade 3 - Serous or bloody discharge

Grade 4 - Presence of pus or deep infection or tissue breakdown or significant haematoma.

Exclusion criteria included immunosuppressive illness, patients on steroids, jaundiced patients, uncontrolled diabetic patients, malnourished patients, patients with ongoing sepsis and obstructed or strangulated hernias.

Patients' levels of satisfaction were determined by asking the patients to rate how satisfied they were with each of the preoperative measures (as very satisfied, moderately satisfied or not satisfied) considering the discomfort or pain felt during the removal of adhesive dressings.

Data collected were entered into spreadsheet Excel, and statistical analysis was done using the Statistical Package for Social Science (SPSS) version 17. Chi-square was used to test for association between categorical variables, and the results obtained were presented in tables and, where appropriate, in figures. P-value  $<0.05$  was considered statistically significant.

## RESULTS

Sixty (60) patients who met the inclusion criteria were recruited for the study.

**Table 1: Socio-demographic characteristics of patients whose operative sites were shaved with razor and those whose operative sites were not shaved in elective hernia repair.**

Socio demographic Characteristics	Research group		Total	Chi-square	P-value
	Shaved(%)	Unshaved(%)			
<b>Sex</b>					
Male	26 (86.7)	30 (100.0)	30(93.3)	4.286	0.038
Female	4 (13.3)	0	4 (6.7)		
<b>Age</b>					
20 - 29	7 (23.3)	9 (30.0)	16(26.7)	3.448	0.631
30 - 39	3 (10.0)	4 (13.3)	7 (11.7)		
40 - 49	3 (10.0)	1 (3.3)	4 (6.7)		
50 - 59	7 (23.3)	6 (20.0)	13(21.7)		
60 - 69	8 (26.7)	5 (16.7)	13(21.7)		
70 +	2 (6.7)	5 (16.7)	7 (11.7)		
<b>Occupation</b>	6 (20.0)	3 (10.0)	9 (15.0)		
Civil Servant/Teacher	5 (16.7)	5 (16.7)	10(16.7)		
Trader	5 (16.7)	4 (13.3)	9 (15.0)		
Farmer	8 (26.7)	8 (26.7)	16(26.7)		
Student/Apprentice					
Artisan (Driver, Carpenter,Cyclist, Mason, Hair dresser)	5 (16.7)	7 (23.3)	12(20.0)		
Clergy	1 (3.3)	0	1 (1.7)		
Others	0	3 (10.0)	3 (5.0)		
<b>Marital Status</b>					
Married	24 (80.0)	18 (60.0)	42(70.0)	2.857	0.091
Single	6 (20.0)	12 (40.0)	18(30.0)		
<b>Educational Level</b>					
Primary	3 (10.0)	3 (10.0)	6 (10.0)	0.300	0.861
Secondary	13 (43.3)	11(36.7)	24(40.0)		
Tertiary	14 (46.7)	16 (53.3)	30(50.0)		

Table 1 shows the gender distribution, age distribution and other sociodemographic characteristic of the patients who participated in the study. There were 56 males (93.3%) and 4 females (6.7%). The age distribution ranged from 20 years to 70 years and above. The highest number of cases (16 patients; 26.7%) was performed on patients aged 20-29 years, while the least number of cases was performed in patients aged 40-49 years.

**Table 2: Description of the relevant medical history and clinical examination findings of patients whose operative sites were shaved with razor and those whose operative sites were not shaved in elective inguinal hernia repair.**

Relevant history	Research group		Total
	Shaved (%)	Unshaved (%)	
<b>Compliant</b>			
Inguinal Swelling	25 (83.3)	23 (76.7)	48 (80.0)
Inguinoscrotal Swelling	5(16.7)	7 (23.3)	12 (20.0)
<b>Duration of swelling</b>			
3 - 6 months	7 (23.3)	4 (13.3)	11 (18.3)
7 - 12 months	9 (30.0)	11 (36.7)	20 (33.3)
1 - 2 yrs	7 (23.3)	4 (13.3)	11 (18.3)
2 years +	7 (23.3)	11 (36.7)	18 (30.0)
<b>Reducibility</b>			
Yes	29 (96.7)	30 (100.0)	59 (98.3)
No	1 (3.3)	0	1 (1.7)
<b>Site of hernia</b>			
Right	20 (66.7)	18 (60.0)	38 (63.3)
Left	10 (33.3)	10 (33.3)	20 (33.3)
Bilateral	0	2 (6.7)	2 (3.3)
<b>Extent of hernia</b>			
Limited to the groin	25 (83.3)	23 (76.7)	48 (80.0)
Descends into the scrotum	5 (16.7)	7 (23.3)	12 (20.0)
<b>Clinical diagnosis</b>			
Right inguinal hernia	16 (53.3)	13(43.3)	29 (48.3)
Left inguinal hernia	9 (30.0)	9 (30.0)	18 (30.0)
Right inguinoscrotal hernia	4 (13.3)	5 (16.7)	9 (15.0)
Left inguinoscrotal hernia	1 (3.3)	1 (3.3)	2 (3.3)
Bilateral inguinoscrotal hernia	0	2 (6.7)	2 (3.3)
<b>ASA Grading</b>			
Grade I	24 (80.0)	22 (73.3)	46 (76.7)
Grade II	6 (20.0)	8 (26.7)	14 (23.3)
<b>Medical Condition</b>			
Hypertension	2 (6.7)	8 (26.7)	10 (16.7)
Diabetes	0	2 (6.7)	2 (3.3)
HBP + Diabetes	3 (10.0)	0	3 (5.0)
None	25 (83.3)	20 (66.7)	45 (75.0)
<b>Type of hernia repair</b>			
Lichtenstein Mesh Repair	15 (50.0)	15 (50.0)	30 (50.0)
Modified Bassini Repair	15 (50.0)	15 (50.0)	30 (50.0)

Table 2 shows the relevant medical history and clinical examination findings of the patients under investigation.

The commonest presenting symptom was inguinal swelling. Forty eight (48) patients (80%) presented with inguinal swelling while 12 patients (20%) presented with inguinoscrotal swelling. Thirty (30) patients (50%) had Lichtenstein mesh repair while the remaining 30 patients (50%) had modified Bassini repair.

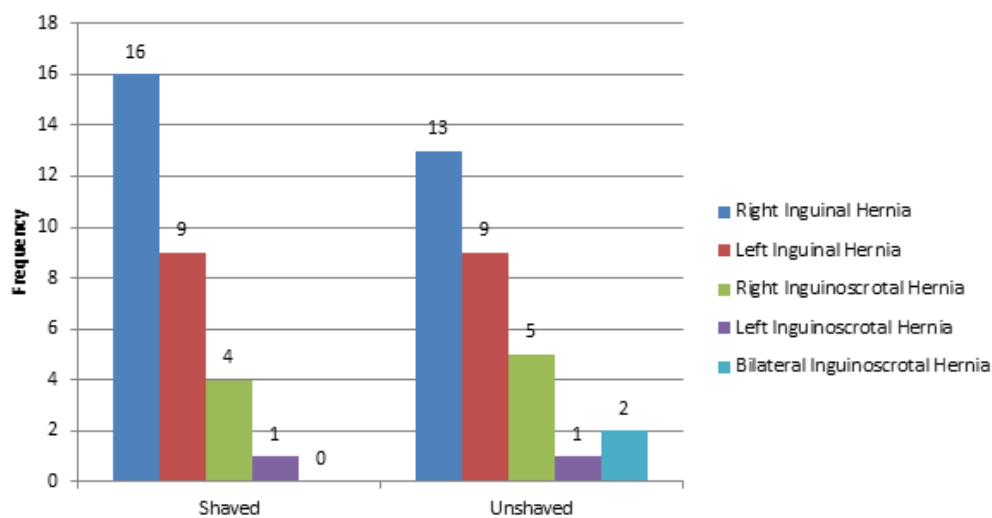


Figure 1: Clinical Diagnosis

Figure 1 shows the clinical diagnosis of the patients with respect to the location of the hernia and the extent of the hernia in the 2 groups of patients under investigation. When the 2 groups were added together, majority of the patients (29 patient; 48.3%) had right inguinal hernia.

**Table 3: The level of satisfaction between patients whose operative sites were shaved with razor and those whose operative sites were not shaved in elective inguinal hernia repair.**

Level of satisfaction	Research group		Total	Chi-square	P-value
	Shaved (%)	Unshaved (%)			
Very Satisfied	30 (100.0)	21 (85.0)		10.588	0.001
Moderately Satisfied	0	9 (15.0)			
Not satisfied	0	0			
<b>Preferred Preoperative Procedure</b>				4.286	0.038
Shaving	26 (86.7)	30 (100.0)	56 (93.3)		
No shaving	4 (13.3)	0	4 (6.7)		
<b>Reason for Preference</b>					
Pain following removal of adhesive dressing	0	19 (63.3)	19 (31.7)		
Shyness	4(13.3)	0	4 (6.7)		
Hygiene	14 (46.7)	9 (30.0)	23 (38.3)		
Routine to Shave	12 (40.0)	2 (6.7)	14 (23.3)	31.230	<0.001

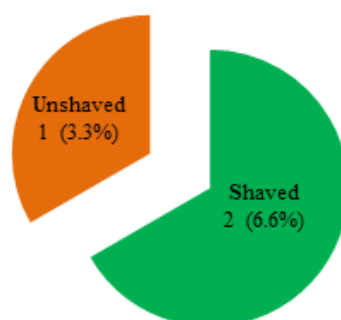
Table 3 shows the level of satisfaction among the 2 groups of patients under investigation. All the patients (100%) in the shaved group and 21 patients (70%) in the unshaved group were very satisfied with the procedure. Majority of the patients (56 patient; 93.3%) preferred to be shaved if they were to have the procedure again.

**Table 4: Comparative analysis of surgical site infection (SSI) between patients whose operative sites were shaved with razor and those whose operative sites were not shaved in elective inguinal hernia repair.**

Postoperative days/ Grades of Surgical Site Infection	Research group/ Type of repair				Total	Chi-square	P-value
	Shaved group (%)		Unshaved group (%)				
	Shaved Bassini repair	Shaved Mesh repair	Unshaved Bassini repair	Unshaved Mesh repair			
<b>Day 14</b>							
Healthy	14(46.7)	14(46.7)	15(0)	14(46.7)	57(95.0)	0.351	0.554
Mild Erythema	1(3.3)	1(3.3)	0	1(3.3)	3(5.0)	0	
Severe Erythema	0	0	0	0			
Serous or bloody discharge	0	0	0	0			
Presences of pus	0	0	0	0			

Table 4 shows the comparative analysis of SSI between the 2 groups of patients. Two (2) patients (6.7%) in the shaved group and 1 patient (3.3%) in the unshaved group had surgical site infection characterised by mild erythema, recorded on post-operative day 14.

**Figure 2**, Surgical site infection rate between the patients who received preoperative shaving with razor and those who were not shaved



**Figure 2: Surgical site infection rate between the patients who received preoperative shaving with razor and those who were not shaved.**

Figure 2 shows the surgical site infection rate for the two groups of patients under investigation. Two patients in the shaved group (6.6%) and 1 patient in the unshaved group (3.3%) had surgical site infection.

## DISCUSSION

This study is a randomized controlled study carried out between January 2019 – January 2020 on adult patients who met the inclusion criteria. It was done to evaluate the impact of shaving and no shaving of operative site on surgical site infection in elective inguinal hernia repair. Among the 60 patients recruited for the study, 56 (93.3%) were males, while 4 (6.7%) were females;  $P=0.038$ . This is in agreement with the existing literature evidence that inguinal hernia is commoner in males.<sup>15,17,18</sup>

The hernia cases recorded in this study showed a bimodal peak prevalence in the young adults (26.7% in patients aged 20-29 years), and 21.7% in patients aged 50-59 years and 60-69 years respectively. This is partly in agreement with the study by Ashindoitiang *et al*<sup>19</sup> who reported a peak prevalence in patients aged 60-69 years which constituted 21.3% of the population under investigation. This finding may be partly explained by the fact that the incidence of inguinal hernia increases with age as body tissues and muscles get attenuated and atrophic.

Few cases were performed in patients aged 70 years and above (7 cases; 11.7%). This is partly in agreement with the study by Ashindoitiang *et al*<sup>19</sup> who reported 16 cases (7.9%) in men aged 70 years and above; but in sharp contrast to the study by Jakob *et al*<sup>20</sup> who reported that patients aged 0-5 years and 75-80 years constituted the dominant groups of patients with inguinal hernia. This later study, however, captured all age group unlike this current study and the study by Ashindoitiang *et al* which involved only adult patients. The lower number of inguinal hernia repair in patients aged 70 years and above in this current study may be explained by lower life expectancy of our adult population.

Again, the ageing population in our environment are less willing to consent to surgery citing old age as a barrier; and, these days, most general practitioners can perform herniorrhaphy thereby reducing the number that remain untreated till old age.

The study showed that the commonest complaint of patients presenting with inguinal hernia is inguinal swelling (48 patients; 80%). This may later descend to the scrotum as seen in 12 patients (20%) in this study. This is in agreement with existing literature evidence that a lump in the groin is the commonest presentation of inguinal hernia.<sup>21</sup>

Inguinal hernia is said to be commoner on the right than on the left because of late descent of the right testis. This is in agreement with the findings in this study where 38 patients (63.3%) had right sided inguinal/inguinoscrotal hernia, 20 patients (33.3%) had left inguinal/inguinoscrotal hernia and 2 patients (3.3%) had bilateral inguinoscrotal hernia.

It has, for ages, remained a subject of controversy as to whether shaving or no shaving has any impact on surgical site infection. While some studies claim that shaving may reduce the risk of surgical site infection<sup>3</sup>, others claim that shaving is deleterious and, perhaps, may cause surgical site infection and should not necessarily be carried out<sup>4,5,6</sup>. This study showed a slightly higher surgical site infection rate among the shaved group (2 patients; 6.7%) than in the unshaved group (1 patient; 3.3%). The difference, however, is not statistically significant ( $P=0.554$ ).

This finding is in agreement with the report of the following previous studies: Seropian *et al*<sup>8</sup> who reported infection rate of 5.6% and 0.6% among the shaved and unshaved groups respectively; Cruse *et al*<sup>22</sup> who reported infection rate of 2.5% and 0.9% among the shaved and unshaved groups respectively; and Celik *et al*<sup>23</sup> who reported surgical site infection in 4 shaved patients and 1 unshaved patient in a study of 789 patients undergoing spine surgery.

Similar finding was also reported by Suchin D *et al*<sup>26</sup> who reported no statistically significant difference between the two groups ( $p > 0.05$ ) in a recent study. The finding in this current study, however, differs slightly from the finding in some other previous studies: Hoe *et al*<sup>24</sup> who reported infection rate of 5.08% and 5.6% in the shaved and unshaved group respectively; Kumar *et*



al<sup>12</sup> who in a 6 months study on 57 patients reported infection rate of 1.75% (1 patient) in the unshaved group and none in the shaved group, and Bhatti et al<sup>10</sup> who reported SSI in 3 unshaved patients and none in the shaved group among 100 patients who underwent Cranial surgery. Bhatti et al<sup>10</sup> reported that this result was comparable to published data where preoperative hair removal was performed.

There is paucity of report in literature on patient's level of satisfaction with preoperative shaving or no shaving. However, this study showed that among the patients who were shaved, all (100%) were very satisfied, none was moderately satisfied and none was unsatisfied, while among the unshaved patients, 21 (70%) were very satisfied; P=0.001. Most patients in the 2 groups (51 patients; 85%) showed preference for being shaved if they were to have the procedure again in future. The reasons for their preference of preoperative shaving include pain following the removal of adherence dressing, hygienic purposes and the fact that it is routine to shave operative site; P<0.001. This showed that no shaving of operative site has not gained acceptance among our patients as they are already used to shaving for hygienic purposes or as a routine before surgery.

### Limitations of the Study

Small sample size and a one-centre study is the main limitation of this study. A larger sample size in future studies will be more representative.

Also, due to time constraint (1 year study), it was not feasible to completely evaluate most of the patients who had mesh repair for the presence of deep incisional surgical site infection for a period of 1 year postoperatively, as recommended by CDC. This can be corrected in future studies by ensuring that such patients are followed up for at least one year postoperatively.

### CONCLUSION

The result of the study showed no advantage of preoperative shaving with razor blades over no preoperative shaving with respect to prevention of

surgical site infection in patients undergoing inguinal hernia repair. There was a slightly higher rate of SSI associated with preoperative shaving of operative site with razor in this study, but the difference is not statistically significant. However, in view of the small sample size, a multicentered study with a large sample size may be necessary.

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