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Is there any difference between shaving versus clipping versus depilatory gel of hair removal for skin preparation before surgery in respect of wound infection?

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ABSTRACT

Aim: Postoperative wound infection is still the most developing complication after surgery and globally responsible for almost %25 hospitalizations requiring complications after surgery. Several significant parameters to minimize Surgical Site Infection (SSI) evaluated and published in many articles, reviews, and guidelines. We aim to investigate the SSI outcomes of 3 different hair removal procedures before surgery, including skin preparation, in this original research article.

Material and Method: 314 patients enrolled in this study were males aged 18 and 65, admitted to the outpatient clinic with unilateral inguinal hernia, and were eligible for Lichtenstein tension-free open hernia repair using mesh.

Results: Wound infection has occurred in 6 patients from Group-1 (4.83%), 8 patients on Group-2 (7.92%), 4 patients on Group-3 (4.49%). There are no statistically significant between Group1 and Group-3 ($p>0.05$) when the wound infection rates of Group-2 statistically significantly higher than Group-1 and Group-3 ($p<0.05$).

Conclusion: In the light of our study, we suggest either clipping on the table or usage of depilatory gels to maintain hair removal, including preoperative skin preparation.

Keywords: Surgical site infection, hair removal, hernie

INTRODUCTION

Postoperative wound infection is still the most developing complication after any kind of surgery and globally responsible for almost %25 hospitalizations requiring complication after surgery (1-3). The occurrence of a surgical site infection(SSI) leads to cost-effective charges, elongated hospitalization, and even mortality, especially on immunocompromised patients (4,5).

The effect of hair removal at the surgical site on SSI rates is unknown (6). Apart from the groups that recommend not removing hair, some groups remain neutral on this issue or advocate the need for hair removal (7,8). Several significant parameters to minimize SSI were evaluated and published on many articles, reviews, and guidelines (1,8-11). In this original research article, our aim is to investigate the SSI outcomes of 3 different procedures for hair removal before surgery, including skin preparation.

MATERIAL AND METHOD

Ethical approval was obtained from the Hitit University Non-interventional Research Ethics Committee (Date: 01.11.2021, Decision No: 2021-81). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki. This is a retrospective study aiming to inference the results of 3 different methods of preoperative hair removal after Lichtenstein tension-free open hernia repair with prolene mesh. 314 patients enrolled in this study who were male aged between 18 and 65, who admitted to the outpatient clinic with unilateral inguinal hernia and were eligible.

Inguinal hernia patients may require emergency surgery (12). These patients were excluded from the study because hair cleaning could not be performed. Patients excluded from the study who had scrotal, incarcerated ischemic or necrotic bowel tissue, perforation/infection, or femoral hernia; and prior laparoscopic/open inguinal hernia repair. Inguinal hernia patients may require emergency surgery.

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Preoperative Hair Removal

Group-1: Hair removal with the clipper on the table immediate before surgery starts by the medical attendant

Group-2: Hair removal by the patient himself at home with a razor by shaving 24 hours before surgery

Group-3: Hair removal by the patient himself at home with depilatory gel 24 hours before surgery

After skin disinfection with povidone iodine and prophylactic antibiotherapy applied (50 mL sterile saline with 1 g intravenous cefazolin), the incision has started centering 1 cm upper and latitude of the inguinal ligament, originated from the pubic bone and reaching out 4-5 cm upper of the midinguinal line. Subcutaneous tissue has passed through pudendalis superficialis and epigastrica superficialis branches of these vessels. The Scarpa fascia is dissected to the aponeurosis of the external oblique muscle, then exposure of the external inguinal ring and inguinal ligament completed. The external oblique aponeurosis incised from external inguinal ring to upper-lateral for 5-6 cm. Nervus ilioinguinalis has been secured from secondary trauma. Skin flaps prepared and context of spermatic cord with cremaster muscles hanged up to ensure the security of these structures and help the exposure of area of herniation. Polypropylene mesh has augmented for herniorrhaphy. The patchy edges of the mesh rasped to maintain the optimal adaptation to the prepared area. The mesh has been fixed with 3.0 polypropylene stitches.

Hemostasis secured and spermatic cord layers and other anatomical structures have closed concordantly with the anatomic plane.

The patients have been assessed in respect of early and late postoperative complications and hernia recurrence.

The Ki-square test has used for statistical analysis was performed by using the software package SPSS 17.0 (IBM Corp. Armonk, NY). A difference with $p<0.05$ was considered statistically significant.

RESULTS

A total of 314 patients diagnosed with a unilateral primary inguinal hernia were included and evaluated retrospectively by the patient records. 124 of 314 had immediate removal by clipper on the table (Group-1); 101 of 314 had hair removal by shaving one day before surgery (Group-2); 89 of 314 had hair removal by depilatory gel one day before surgery (Group-3).

Groups were evaluated by demographic parameters (mean age: 50.8 years ±4.3 vs. 55.1 years ±8.8 vs. 52.5±6.6 years for Group-1, Group-2 and Group-3 respectively ($p>0.05$).

The median duration of operation was 60.9 min ±7.1 on Group-1, the median duration of operation was 55.9 min ±11.4 on Group-2 and 58.7 min ±9.9 on Group-3 ($p>0.05$).

Mean hospital stay for all patients was one day, and no statistically significant difference has detected between groups.

None patients participating in this study suffered any intraoperative or postoperative major complication.

Wound infection has occurred in six patients from Group-1 (4.8%), eight patients on Group-2 (7.92%), four patients on Group-3 (4.49%). There are no statistically significant between Group-1 and Group-3 ($p>0.05$) when the wound infection rates of Group-2 statistically significantly higher than Group-1 and Group-3 ($p>0.05$) (**Table**). The bacteria isolated in all 18 patients with wound infections were gram-positive staphylococci (*S. aureus* in 12 patients, *S. epidermitis* in 6 patients). Superficial wound infection developed in all patients with SSI. Deep wound infection did not develop in any patient.

Superficial wound infection dissolved with basic antibiotherapy of all patients except three patients (2 from Group-2, 1 from Group-1). Three patients had developed wound infection requiring parenteral antibiotherapy, which dissolved after ten days of treatment.

The rate of patients in need of analgesics during the follow-up did not differ significantly ($p>0.05$).

No recurrence has detected in both groups after 9.8 months of follow-up.

Table 1. Demographic characteristic and wound infections

	Group-1 (n=124)	Group-2 (n=101)	Group-3 (n=89)	p value
Age, mean, years	50.8 (4.3)	55.1 (8.8)	52.5 (6.6)	0.856
Duration of operation, median	60.9 (7.1)	55.9 (11.4)	58.7 (9.9)	0.756
Hospital stay, day	1	1	1	
Complications	none	none	none	
Wound infections	6 (4.8%)	8(7.9%)	4 (4.4%)	0.008
Recurrence (after 9.8 months)	none	none	none	

DISCUSSION

One of the most significant quality indices of health is the rate at which hospital diseases spread(13). Preoperative skin preparation is described as the sanitization of microorganisms from the skin at the utmost level. The aim is to minimize colonization of the skin of the surgical area and clearly minimize the SSI rates after surgery (14,15).

Hair removal of the surgical area or surgery has been a very important and principal part of preoperative skin preparation. Besides prevention of infection, hair removal would help the suturation of the skin, cleaning the area after the operation, eases the wound exposure on follow-up, and applying wound dressings. Additionally, hair removal can be considered as the removal of bacterias that colonized on the hair, so it helps to reduce wound infection rates postoperatively (14,15).

On the other hand, for example, on cranial operations, hair removal has also been the major part of preoperative surgical site preparation for both SSI reducing effects and Easing postoperative follow-up and dressing, but some recent investigations suggest that there is an increasing trend to avoid hair removal and again some other studies suggest there is no statistically significant difference on SSI development related with hair removal (16-19).

On the contrary, a recent consensus statement of Orthopedics Research Society resulted in the suggestion of hair removal with a strong consensus of 92% suggesting clipper method for hair removal (20).

We designed this retrospective study from this point of view to aim whether hair removal itself or different techniques of hair removal could affect the development of SSI.

It is suggested that hair removal with shaving 24 hours before surgery leads to minor abrasions, which form a ideal environment for bacterial overgrowth and may lead to increase postoperative SSI instead of minimizing (21), on the other hand, if shaving is the only option, it is important to perform immediately before surgery on tablet o avoid bacterial colonization in those micro-exfoliated skin parts (22-24).

Upon immediate shaving is not feasible at busy surgical centers, depilatory gels are to suggest feasible as a broad using cosmetic product (22-26). Depilatory gels may be a good option for shaving if applied appropriately with a user manual to prevent these micro-exfoliations of skin and a very feasible option to apply the areas which are not easy to reach and clean properly (24,27).

Seropian et al. (28) in their study comparing the application of razor and depilatory cream, showed that the infection rates were higher in the application of razors (5.6% and 0.6%, respectively). Similarly, in another study, the infection rate was reported as 10.4% in patients who shaved with a razor. In the same study, the infection rate in the application of depilatory cream was found to be 3.9% (29). These results were supported by seven randomized controlled trials comparing razor and cream hair removal in a meta-analysis. There were a total of 1420 patients in these seven studies. While the infection rate was 10% in patients who shaved with a razor, the infection rate was 7% in patients who were applied epilation cream. However, no statistical difference was found between the groups as a result of the meta-analysis (30).

Although depilatory cream reduces postoperative wound infection rates, it has been suggested that patient-related factors may contribute to wound infection (endogenous and exogenous) as well as preoperative epilation method. In our study, there was the highest rate of wound infection after preoperative razor blade use. Depilation with depilatory cream has been adequately done so that the incidence of skin injuries and skin reactions is much lower, and the high rate of postoperative wound infection that accompanies skin injuries caused by razor shaving can be minimized by the use of depilatory creams. Skin injuries from razor shaving are known to be impacted by the quality of the personnel, but several studies have demonstrated that even skilled shaving can cause injuries, particularly in body crevices, over scars and other skin problems, and in an agitated patient (28).

Our study has limitations. Although being retrospective is the most important limitation, the short follow-up period can also be counted as a limitation. The other limitation of our study was that subgroup analyzes were not performed for markers that would affect the wound. It was from a single center and was overwhelmingly white. We did not collect data about patient feedback or any adverse events that may have been related to study group assignments other than SSIs. The fact that it is a big, contemporaneous, and properly implemented clinical trial is one of the study's merits. The study's pragmatic design and implementation closely resemble real-world practice, making it more generalizable to various surgical populations.

CONCLUSION

The results of our study showed that depilatory gels are a very good alternative to clipping on-table and very promising to be easily applied, simple and non-abrasive aspects. On the contrary, shaving, especially 24 hours before surgery, has been found very associative with significantly higher rates of postoperative SSI development. In the light of our study, we suggest either clipping on the table or usage of depilatory gels to maintain hair removal, including preoperative skin preparation.

There is no person/organization supporting the work financially and the authors have no relationship based on self-interest.

ETHICAL DECLARATIONS

Ethics Committee Approval: Ethical approval was obtained from the Hitit University Non-interventional Research Ethics Committee (Date: 01.11.2021, Decision No: 2021-81).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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