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Research Paper: Comparing Three Different Methods of Dressing for Skin Graft Donor Site

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ABSTRACT

Background: There are various methods to dress the Skin Graft Donor Site (SGDS), but some are very expensive and not available in Iran. This study aimed to compare three different dressings for the management of the SGDS.

Methods: Ninety-six patients participated in the study, and they were randomly divided into three groups. Donor sites were dressed with one of these methods: Vaseline gauze or method A, mupirocin 2% or method B, and nitrofurazone or method C. In each method, the dressing layer was covered by 5 layers of dry gauze. The three groups were compared regarding the epithelialization time, infection, pain, and cost.

Results: The epithelialization time was significantly longer in group A compared with groups B and C ($P<0.05$), but there was no significant difference between groups B and C ($P<0.05$). There was no significant difference between the three groups in infection and pain at rest, activity, and dressing time ($P<0.05$). There was a substantial difference between the three groups in the cost of dressing as method A was cheaper.

Conclusion: Due to the lower cost of Vaseline gauze and no significant difference in infection, dressing adhesion to the skin, and amount of pain between three dressing methods, Vaseline gauze is a preferred method to skin graft donor site dressing.

1. Introduction

Burns and related injuries are still one of the most important health problems due to their high rate of complications, prognosis, large number, long treatment duration, and the functional, psychological, and social effects [1, 2].

Split-Thickness Skin Graft (STSG) has made a significant revolution in burn care [3] and accepted as a reconstructive procedure with a lot of benefits, such as less healing time and scar [4]. So it is widely used for wound cover [5].

Skin Graft Donor Site (SGDS) is an annoying problem for patients, and they usually complain about the donor site due to the risk of infection, pain, and poor cosmetic outcomes [6]. Partial-thickness wounds are created in

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SGDS that must be treated by re-epithelialization. The epithelialization takes 10-14 days to complete [7, 8]. Various dressings have been suggested for managing these wounds [9].

We designed this study due to the lack of new drugs, their high costs, and the lack of specific treatment protocol in Iran. Our study aimed to compare three different dressings of Vaseline gauze, mupirocin 2% ointment soaked mesh gauze, and nitrofurazone soaked mesh gauze. We intended to determine the best method of dressing the donor site considering the epithelialization time, pain, infection, and cost.

2. Materials and Methods

Individuals with inclusion criteria were recruited by a non-random sample method. Then, the random allocation was done to form study groups. In this study, a block randomization method (including quadruple blocks) was used.

Between March 2018 and March 2019, 96 patients with the second- and third-degree burns lesser than 20% TBSA (total body surface area) who were operated in any kind of reconstructive operations with STSG donor sites were included in this clinical trial study. Patients with diabetes mellitus, aged over 60 or under 16 years, under active immunosuppressive therapy, unable to estimate the amount of the pain, pregnant, burns greater than 20%, and the first- and fourth-degree burns degree were excluded from the study.

The patients were divided into three equal groups. A manual dermatome was used to harvest an STSG from the thigh in a standard manner at 0.36–0.43 mm thickness, and the donor sites were dressed with one of the following methods intraoperatively:

Group A, Vaseline gauze, which was covered by 5 layers of gauze,

Group B, mupirocin 2% ointment soaked mesh gauze, which was covered by 5 layers of dry gauze,

Group C, nitrofurazone, soaked mesh gauze, which was covered with 5 layers of dry gauze.

Patients were followed after operation for three days, and then the dressing was changed once daily to check the wound until epithelization. The same surgeon performed the donor site dressing. Wound epithelization was visually evaluated by the study researcher, who was unaware of the dressing group.

The skin donor site was assessed for the dressing time, infection, pain, dressing cost, dressing adhesion to the donor site, and hospitalization duration (until healing donor site). Visual Analog Scale (VAS) score was used to assess pain at rest, dressing, and activity.

If the clinical symptoms of erythema, exudate, fever, or increased pain were spotted, the patients would be evaluated for infection by wound swab and culture.

Statistical analysis

All obtained data were analyzed in SPSS V. 23. The results are expressed as Mean±SD or number and percentage. The Kolmogorov-Smirnov test was used to assess the normal distribution of data. The Chi-square test, Fischer exact test, and ANOVA test were used to compare data between groups. P values of less than 0.05 were considered statistically significant.

3. Results

Ninety-six patients were enrolled in the study, 32 in each group. Table 1 lists the demographic data of study groups. There were no significant differences between the three groups concerning the sex, age, degree of burning, and average %TBSA.

Clinical symptoms of infection were discharge (group A: 1; group B: 0; group C: 1), erythema (group A: 2; group B: 1; group C: 1), and fever (group A: 1; group B & C: 0). Infection of the skin graft donor site occurred in 4 patients (4.2%); there were two infections in group A, one infection in group B, and one infection in group C. The difference between groups was not statistically significant (P=0.79).

Dressing adhesion to skin graft donor site, VAS score, and duration of dressing are presented in Table 2. The mean duration of hospitalization in group A was 17.96±1.4 days (range: 15-21 days), group B, 16.43±1.86 days (range: 13-20), and group C, 16.9±1.55 days (range: 14-20). This figure was significantly higher in group A compared with group B and C (P<0.05), but there was no significant difference between groups B and C (P=0.6).

Tables 3 and 4 present the epithelialization time and dressing cost. The duration of epithelialization in the Vaseline group was significantly higher than mupirocin 2% and nitrofurazone groups. Still, there was no significant difference between mupirocin 2% and nitrofurazone groups in this regard (Table 3). Dressing cost in mupirocin 2% group was significantly higher than the

Table 1. Demographic data of study groups

Variable		Group A (Vaseline)	Group B (Mupirocin 2%)	Group C (Nitrofurazone)	P
Age (y)		29.31±9.52	34.81±10.27	30.37±10.02	0.069
Sex	Male	17 (53.13)	18 (56.25)	20 (62.5)	0.74
	Female	15 (46.87)	14 (43.75)	12 (37.5)	
Degree of burning	II	12 (37.5)	14 (43.75)	13 (40.62)	0.89
	III	11 (34.3)	12 (37.5)	10 (33.33)	
	II & III	9 (28.13)	6 (18.75)	9 (28.13)	
Average %TBSA		11.21±4.65 (4-20)	11.59±4.54 (5-20)	11.31±4.48 (5-20)	0.07

Data are presented as Mean±SD or No.(%).

Table 2. Dressing adhesion to skin graft donor site, VAS score, and duration of dressing

Variable		Group A	Group B	Group C	P
Visual analog scale	Rest time	2.1±0.76	2.06±0.75	2.5±0.8	0.62
	Dressing time	3.71±0.85	3.59±0.75	3.71±0.88	0.78
	Activity time	2.87±0.79	2.96±0.78	2.93±0.8	0.89
Duration of dressing		15.15±3.51	15.28±4.02	14.93±3.02	0.92
Dressing adhesion	Low	12 (37.5)	15 (46.9)	16 (50)	0.06
	Medium	9 (28.1)	14 (43.8)	13 (40.6)	
	High	11 (34.4)	3 (9.4)	3 (9.4)	

Data are presented as Mean±SD or No.(%).

Table 3. The duration of epithelialization

Dressing	One-way Analysis of Variance		
	Epithelialization Time	F	P
Vaseline	14.03±1.12		
Mupirocin 2%	12.53±1.24	13.12	0.001
Nitrofurazone	12.77±1.44		

Dressing	Scheffe		
	Dressing	Mean Difference	P
Vaseline	Mupirocin 2%	1.5	0.001
	Nitrofurazone	1.31	0.001
Mupirocin 2%	Nitrofurazone	-0.18	0.84

Data are presented as Mean±SD.

Table 4. The dressing cost

One-way Analysis of Variance			
Dressing	**Dressing Cost, Rial (US Dollar)**	**F**	**P**
Vaseline	133400±5660 (1.2 $)		
Mupirocin 2%	505000±188200 (4.16 $)	57.02	0.001
Nitrofurazone	329000±139600 (2.75 $)		

Scheffe			
Dressing	**Dressing**	**Mean Difference**	**P**
Vaseline	Mupirocin 2% Nitrofurazone	-37.15 -19.56	0.001 0.001
Mupirocin 2%	Nitrofurazone	17.59	0.001

Data are presented as Mean±SD.

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Vaseline and nitrofurazone groups, also dressing cost in the nitrofurazone group was considerably higher than the Vaseline group (Table 4).

4. Discussion

STSG is one of the most common techniques for the replacement of skin damaged following burns [10, 11] because it has many benefits such as fast healing, acceptable scar, and low complications [11-13]. A partial-thickness wound is created in the skin graft donor site that is healed by re-epithelialization. It takes 10-14 days to complete epithelialization [14, 15].

Dressing is an acceptable method to protect the wound and reduce the healing duration, pain, infection, and cost [2, 16]. Various studies reported that several dressings are appropriate for this aim, including classical gauzes, modern silicone dressing, alginates, and hydrofibers [17].

The findings of the current study showed that epithelialization was similar in the mupirocin 2% and nitrofurazone dressing. Still, in both dressings, epithelialization time was significantly shorter than the Vaseline gauze dressing.

Roberto Cuomo et al. found that epithelialization and recovery time in fibrillary tabotamp was better and faster than Vaseline gauze [18]. Hassanpour et al. reported similar results [4]. Also, Masella et al. showed that hydrocolloid dressing had the greatest re-epithelialization outcome [11]. Brolmann et al. demonstrated that hydrocolloid dressing is preferable to alginate, film, gauze, hydrofibers, and silicone dressing due to better and faster re-epithelialization [17].

Our result showed that the amount of pain was not significantly different between the three groups in dressing, resting, and activity time. However, the pain in the Vaseline dressing was slightly higher than mupirocin. Unlike our findings, Hassanpour et al. reported that pain severity was significantly lower in nitrofurazone dressing compared to Vaseline gas [4]. Beiraghi-Toosi et al. showed dressing with Vaseline gauze was less painful than fine mesh gauze [19]. According to Uysal et al. results, pain severity was the least in nitrofurazone dressing [20].

Our study demonstrated that the incidence of infection and dressing adhesion to skin with Vaseline was higher than mupirocin and nitrofurazone, but this difference was not statistically significant. Unlike our findings, Hassanpour et al. showed that dressing with nitrofurazone had the least secretion and infection [4]. Brolmann et al. found that the infection rate with gauze dressing was higher than other dressings such as hydrocolloid, hydrofibers, or silicone [17]. According to Roberto Cuomo et al. , the rate of infection in the fibrillary tabotamp dressing was lower than the Vaseline dressing [18].

The finding of the current study showed that the cost of Vaseline gauze dressing was significantly less than the other two methods. Different studies have demonstrated similar results [18, 19]. For example, Beiraghi-Toosi et al. reported the cost of dressing with Vaseline is low [19]. About the costs, Hassanpour et al. found no statistically significant difference between nitrofurazone and Vaseline gauze dressing [4].

5. Conclusion

Although epithelialization time and duration of hospitalization with mupirocin 2% and nitrofurazone are lower than Vaseline gauze, due to lower cost of vaseline gauze and no significant difference in infection, dressing adhesion to the skin, and amount of pain between three dressing methods, Vaseline gauze may be preferred as an alternative method to skin graft donor site dressing.

Ethical Considerations

Compliance with ethical guidelines

The Ethics Committee of Tabriz University of Medical Sciences (IR.TBZMED.REC.1398.278) and Iranian Registry of Clinical Trials (IRCT20190325043107N5) approved this study.

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Author's contributions

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Conflict of interest

The authors declared no conflict of interest.

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