ORIGINAL ARTICLE

A SINGLE CENTRE, RANDOMIZED CONTROL TRIAL OF DONOR SITE WOUND DRESSINGS AFTER SPLIT-THICKNESS SKIN GRAFTING

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Background: Split-thickness skin grafting (STSG) is a widely employed technique for repairing wounds, such as ulcers, trauma, or in reconstructive surgeries. The objective was to compare the efficacy of different dressing materials for healing donor-site wounds after split-thickness skin grafting. **Methods:** A single center, randomized controlled trial was conducted at the Department of Plastic Surgery, Civil Hospital Karachi, Pakistan, over a period of six months. The study included patients aged 18 years and above, of both genders, who underwent single donor-site wounds after split-skin grafting with a surface area larger than 10 cm^2. The eligible patients were randomly divided into six groups: Film, Alginate, Gauze, Hydrofiber, Hydrocolloid, and Silicone. Pain, itching, scarring, complications, and patient satisfaction were evaluated after 12 weeks using standardized assessment scales. **Results:** The median time to complete wound healing and re-epithelialization varied among the different dressing groups, with hydrofiber and silicone dressings demonstrating the shortest healing time. Statistical analysis revealed a significant difference in the median time to complete wound healing among the dressing groups (p-value=0.019). However, no significant differences were observed in pain, itching, scarring (POSAS observer and patient), or patient satisfaction among the different dressings (p-value>0.05). **Conclusion:** Although the dressing type did not significantly affect pain, itching, scarring, or patient satisfaction, variations were observed in the time to complete wound healing. These findings contribute to the selection of appropriate donor site dressings for optimizing outcomes in split-skin grafting procedures.

Keywords: Dressing types, donor site, itching, pain, patient satisfaction, scarring, split-thickness skin grafting, wound healing

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INTRODUCTION

Split-thickness skin grafting (STSG) is a widely employed technique for repairing wounds, such as ulcers, trauma, or in reconstructive surgeries.[1] However, this procedure results in a secondary wound at the donor site, which can impede the healing process.[2] Despite the sterile and controlled conditions under which donor-site wounds (DSW) are created, they can still cause significant burdens and complications throughout the healing process. These complications include pain, itching, cosmetic inconveniences, and the risk of infection.[3]

The primary goal of managing donor-site wounds (DSW) is to facilitate rapid and uncomplicated re-epithelialization while minimizing discomfort, pain, and hospitalization duration.[1,4] Various dressings, including gauzes, modern silicone dressings, films, alginates, and hydrofibers, have been found suitable for this purpose according to the literature.[2,5–8] However, there is significant variation in the management of DSW among healthcare providers and surgical centers, and the lack of well-defined guidelines contributes to this inconsistency.[4,5,9] Dressing DSW, particularly in individuals with compromised wound healing, such as the elderly or diabetics, can be particularly challenging.[2]

Previous study has shown that hydrocolloid dressings resulted in faster re-epithelialization compared to other treatments (median 16 versus 23 days; p=0.001). Pain levels were minimal and reduced when film dressings were used. Infection rates were also lower in patients treated with dressings other than gauze (18 vs 76%; RR=2.38; 95% CI=1.14 to 4.99). However, patients who received film dressings on their scars expressed lower satisfaction with overall scar quality.[5]

The study asserts that the risk and impact of donor-site morbidity are often underestimated. Split-thickness skin grafting is considered as the

standard of care for wounds that have a healing duration of more than 2-3 weeks, and there are numerous approaches described in the literature to enhance graft outcomes.[10] However, there is currently a lack of studies from Pakistan that specifically describe the outcomes of donor site dressing following split-thickness grafting. Therefore, this study aims to assess the effectiveness of different donor site dressings and their adverse outcomes. Additionally, the satisfaction of patients with the donor site dressing will be observed. The findings of this study will provide valuable insights into the dressing practices in split-thickness skin grafting specific to the study's patient cohort, aiding healthcare providers in selecting appropriate donor site dressings.

MATERIAL AND METHODS

It was a single-centre randomised controlled trial conducted at the Department of Plastic Surgery at Civil Hospital Karachi, Pakistan for six months. An open epi sample size calculator was used to estimate the sample size by taking statistics of infection as 18% in gauze dressing, confidence level as 95% and margin of error as 8%. The calculated sample size was 89≈90 patients. Patients aged 18 years and above of either gender underwent single donor-site wounds after split-skin grafting and a surface area larger than 10 cm^2 were included in the study. Patients on chemotherapy or corticosteroids were excluded from the study. Non-probability consecutive sampling was employed.

The study was conducted after getting approval from the Institutional Review Board of the Dow University of Health Sciences. Signed informed consent was also obtained from eligible study participants before the enrolment in the study. All eligible patients were randomly divided into groups six groups, namely Alginate, Film, Gauze, Hydrocolloid, Hydrofibre and Silicone. Randomization was performed by an independent investigator who was not responsible for patient recruitment. For random allocation of the dressing type, a computer-generated list of random numbers was used. A number from 1-6 was assigned to each dressing type and allocation was performed using that number obtained from a computer-generated list. This study does not allow for the blinding of patients or care providers.

The frequency of dressing change and type of dressing was determined. Dressing was not required to be changed in patients allocated in alginate and hydrofibre. Among patients receiving film and hydrocolloid, twice weekly dressing change was recommended. Whereas, for gauze and silicone, every 10–14 days was recommended. The same bandage was used for each participant until the wound had healed completely. Only cotton gauze and bandages were allowed as secondary dressings to guarantee that all groups received equal treatment. An iodine-containing product was allowed to be added to a fresh primary dressing when a donor-site wound infection was suspected. Acetic acid was used to treat a Pseudomonas infection. All treatment groups were able to use additional washing or protection during dressing changes.

Following the complete healing of the wounds at the donor site, an evaluation was conducted to assess itching, pain, and scarring after 12 weeks. The intensity of pain was measured using a visual analogue scale (VAS) ranging from 0–10. A score of 0 indicated the absence of pain, while scores of 1–3, 4–7, and 7–10 denoted mild, moderate, and severe pain, respectively. Itching was evaluated utilizing a visual analogue scale (VAS) with a range of 0–10. A score of 0 indicated the absence of itching, while scores of 1–3, 4–7, and 7–10 represented mild, moderate, and intense itching, respectively. The assessment of scarring was carried out by both observers and patients, employing the Patient and Observer Scar Assessment Scale (POSAS). The scoring system for scar assessment ranged from 6 to 60, with a score of 6 indicating normal skin and 60 representing the most severe outcome. Any complications, such as clinical issues, hypergranulation, infection, or allergic reactions, were also documented. Additionally, patient satisfaction with the dressing was evaluated after 12 weeks using a Likert scale that ranged from "not at all satisfied" to "extremely satisfied."

SPSS version 24 was used for statistical analysis. Mean and standard deviation were used for the quantitative variables like age, weight, height, BMI, time of wound healing, pain score, and itching score. Frequencies and percentages were used for qualitative variables like gender, comorbidities, indication for split skin grafting, dermatome use, complications, and patient satisfaction. As the distribution of outcome variables were non-parametric, therefore Kruskal-Walis test was employed. The p-value of <0.05 was considered as significant.

RESULTS

The mean age of the study participants was 32.38±15.10 years ranging from 18–90 years. The majority of the participants were males (73.3%) and 26.7% were females. Of 90 patients, 16.7%

were current smokers, 20% had hypertension, 74.4% of the patients had ASA status-I. The most common indication for split skin grafting was traumatic wound (60%), followed by tumour excision (14.4%), respectively. Furthermore, the most frequent dermatome used was hand knife (91.1%), 6.7% had electric dermatome, and 2.2% had pneumatic dermatome. All of the patients had wound on the thigh site (100%), with donor site wound surface area as 41.70±17.66 cm^2 ranging from 20–100 cm^2. (Table 1)

The median time to wound healing complete re-epithelization was least in hydrofiber followed by silicon dressing. Moreover, there was a statistically significant median time to wound healing complete re-epithelization among different dressings with *p*-value=0.019. However, pain, itching, POSAS observer, POSAS patient and patient satisfaction had insignificant differences among different dressings with *p*-value>0.05, respectively. (Table 2)

In the film group, 4 patients had a clinical infection, in the gauze group, 2 patients had a clinical infection and in the hydrocolloid group, 3 patients had clinical infection, respectively. Whereas, hyperpigmentation was seen in 1 patient in hydro fiber group and 1 patient in the silicon group.

Table-1: Descriptive statistics of study samples (n=90)

Variables	Statistics
Age in years	32.38±15.10
Gender	
Male	66 (73.3)
Female	24 (26.7)
Smoking status	
Current smoker	15 (16.7)
Ex-smoker	2 (2.2)
Non-smoker	73 (81.1)
Hypertension	
Yes	18 (20)
No	72 (80)
ASA status	
I	67 (74.4)
II	23 (25.6)
Indications	
Burn wound	11 (12.2)
Chronic wound	3 (3.3)
Elective surgery	1 (1.1)
Post infection wound	7 (7.8)
Post keloid excision	1 (1.1)
Traumatic wound	54 (60)
Tumor excision	13 (14.4)
Dermatome	
Electric	6 (6.7)
Hand knife	82 (91.1)
Pneumatic	2 (2.2)
Donor site wound surface area (cm^2)	41.70±17.66
Data presented as n (%), Mean±SD	

Table-2: Comparison of outcomes between groups (n=90)

Groups	Time to wound healing complete re-epithelization	Pain	Itching	POSAS Observer	POSAS Patient	Patient Satisfaction
Alginate (n=15)	20 (18–21)	5 (3–6.5)	4 (3.5–6)	20.5 (17.5–22)	39 (34.5–43)	3 (3–4)
Film (n=15)	21.5 (19.5–23)	5.5 (4–8)	5 (3.5–7.5)	20 (18–21)	39 (34.5–44.5)	3 (2–4)
Guaze (n=15)	20 (18–24)	5.5 (4–7)	6.5 (4–7)	18.5 (17–19)	36.5 (35–44)	3.5 (3–4)
Hydrocolloid (n=15)	20 (19–24.5)	6 (3.5–7)	6 (4–7)	20 (17.5–21)	36 (33–41)	3 (2.5–3.5)
Hydrofiber (n=15)	18.5 (17–20)	5 (4–5)	4.5 (4–6)	18.5 (17–20)	35 (31–41)	4 (3–4)
Silicon (n=15)	19 (18–20)	4 (3.5–5)	4 (3–4.5)	18 (17.5–19)	32 (31–40.5)	4 (3–4)
p-value	0.019	0.444	0.115	0.272	0.462	0.166

DISCUSSION

The human body is covered by a layer of skin that encompasses its entire external surface. This integumentary system serves as the largest singular organ within the human body. It plays a vital role as a protective barrier, shielding the body from various potential threats such as radiation, trauma, severe environmental conditions, and infections.[11,12] Additionally, it is involved in regulating body temperature and controlling the loss of insensible fluids. Following a wound, the restoration of an intact skin barrier becomes paramount to prevent infections, minimize wound contraction to maintain optimal function, reduce cosmetic disfigurement, and prevent volume depletion.[13] Although the initial practice of skin grafting dates back approximately 2000 years, significant advancements and widespread research on this concept were observed in the 20th century. Currently, grafting remains the most rapid and effective method for reconstructing extensive skin defects.[13]

Wound healing is a complex process that requires proper management and the use of effective dressings. Recent studies have shown promising results regarding the use of different dressings in promoting wound healing and re-epithelization.[14–16] In the current study, we found the median time to complete wound healing and re-epithelialization varied among the different dressing groups, with hydrofiber and silicone dressings demonstrating the shortest healing time. This finding suggests that these dressing materials may facilitate a more rapid re-epithelialization process, leading to faster wound healing. In the study by Ayaz *et al*. the faster rate of epithelialization was observed in collagen than in

vaseline gauze for donor site wounds. They also found a significant reduction in pruritus and pain in collagen dressing.[17] Sharma *et al*. also found that Collagen wound dressings is effective for a faster wound healing process.[13] In the study by Hu Z *et al*. found median time of healing was significantly lesser in patients with autologous skin cell suspension plus hydrocolloid dressings as compared to hydrocolloid dressings alone with *p*-value=0.001.[18] Kujur *et al*. found that dressings containing amorphous hydrogel with colloidal silver and paraffin gauze resulted in a significantly higher healing rate (78.6%) compared to conventional paraffin gauze (72.7%) and non-woven dressings impregnated with amorphous hydrogel (60%) on 10th day. They concluded that hydrogel dressing improves re-epithelization.[11] Other studies also showed that the complete healing time in hydrogel is 9.4 to 9.5 days on average.[11,19,20]

In the current study, we found insignificant differences in pain, itching, scarring, complications, and patient satisfaction among the different dressing materials. While Kujur *et al*. observed a notable reduction in pain scores on postoperative day 3 among patients using dressings with amorphous hydrogel containing colloidal silver and paraffin gauze (*p*=0.08). Karlsson et al. did not find any significant differences in healing times or scar outcomes among different dressings for DSW after STSG. Whereas they found significant differences in the satisfaction among the groups, the patients with hydrofiber dressing were the most satisfied, and the porcine xenograft-treated patients were the most satisfied with their scar appearance.[21] Hu Z *et al*. in a similar research found insignificant differences in post-operative pain, itching scores, and complications between patients with autologous skin cell suspension plus hydrocolloid dressings (experimental group) and hydrocolloid dressings alone (control group). However, patients and observers had more satisfaction with scars in the experimental group.[18] Kaiser *et al*. conducted a RCT and found an insignificant difference in pain score between nonadherent paraffin gauze and alginate/polyurethane film dressing.[14] Hecker *et al*. found that all three dressings, i.e., hydro-active nanocellulose-based, silver-impregnated, and ibuprofen-containing foam wound dressings were suitable for the treatment of STSG donor sites, but for a personalized approach, the ibuprofen-containing foam could be of particular interest to pain-sensitive patients, and silver-impregnated foam could be reserved for contaminated or infected wounds.[22]

Overall, while the present study provides valuable insights into the effectiveness of different dressing materials for healing donor-site wounds after split-skin grafting, it is important to consider these findings in the context of existing research. Variations in patient populations, sample sizes, assessment methods, and study designs can contribute to discrepancies among studies. Further research, including larger multi-center studies, is necessary to establish more comprehensive guidelines and recommendations for dressing practices in split-skin grafting procedures.

CONCLUSION

Although the dressing type did not significantly affect pain, itching, scarring, or patient satisfaction, variations were observed in the time to complete wound healing. These findings contribute to the selection of appropriate donor site dressings for optimizing outcomes in split-skin grafting procedures.

AUTHORS' CONTRIBUTION

SA: Literature search, data analysis, write-up. FA: Conceptualization of the study design. SI: Data collection, data interpretation. WS, BZ, SK: Proofreading.

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