A Prospective Study Comparing Polyurethane Film Dressing with Petroleum Gauze Dressing on Split Thickness Skin Graft Donor Sites in Suburban Hospital in Nigeria By Awe, Oluwafemi Olasupo

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Abstract

Introduction: Split-thickness skin grafting is a very significant procedure in surgery and it is frequently done. This procedure has been part of the armamentarium of the reconstructive surgeon since antiquity. Many of this procedure, are carried out with the outcome of the primary wound in focus, without considering the possible distress associated with the donor sites.Methodology: This is a prospective study comparing the outcome of two types of dressing used for donor sites of the split-thickness skin graft. Informed consent was taken directly from the patient. All patients were adult to allow for qualitative assessment of some parameters like itching. The details obtained from the patient include the bio-data, indication for surgery, duration of healing, and complications. These were analyzed using SPSS version 22. A p-value less than 0.05 were considered to be statistically significant.

Index terms— donor sites, split-thickness skin graft, polyurethane film, petroleum gauze.

Abstract-Introduction: Split-thickness skin grafting is a very significant procedure in surgery and it is frequently done. This procedure has been part of the armamentarium of the reconstructive surgeon since antiquity. Many of this procedure, are carried out with the outcome of the primary wound in focus, without considering the possible distress associated with the donor sites.

Objective: To compare the outcome of the donor sites following the polyurethane dressing and the multi-layered petroleum gauze dressing in a Suburban Hospital in Nigeria.

1 Introduction

kin grafting is one of the most frequent procedures performed by surgeons (including general surgeons, orthopedic surgeons, plastic surgeons and others). The donor site is the secondary defect in the skin created by the surgeon to harvest skin graft to cover the primary defect. It is one of the options in the reconstructive ladder. The skin graft could be either full-thickness or split/partial thickness skin graft depending whether the whole or part of the dermis was harvested with the overlying epidermis. The donor site split-thickness skin graft is expected to heal (re-epithelized) uneventfully from the remnant of the skin appendages left. The split thickness skin graft donor site is comparable to a partial thickness burn wound and it is expected to heal before 14 (fourteen) days after the surgery and any healing after 14 days is considered to be morbidity[1]. This should be without pain, delay, or abnormal scarring (Fig 1 **??** & b). There have been some factors identified to affect the outcome of the donor site. These factors include the technique and the depth of the skin harvested, the dressing material used, and patient's factors like co-morbidity, cigarette smoking, and nutritional status. It has been proven that the type of dressing contributes immensely to the rate of healing/ re-epithelization, associated pain, frequency of change of dressing, and complication rate[2]. The less these last three factors, the more skin grafting are acceptable

to the patients. Many studies have compared different types of dressing and measure the primary outcomes[3]??. The cost of dressings and availability are very key factors in the choice of dressing. There have been few of these studies done in the developing countries and among the color-skinned, especially Africans.

Dressings that were involved in these studies include hydrocellular foam (Allevyn), Alginates, petroleum-gauze-antibiotic, Polyurethane, etc. This study is to compare the primary outcomes of the donor site using multilayered petroleum gauze dressing and Polyurethane film (single-layered dressing). It has been identified that there is epithelial layer in-growth into the multilayered petroleum gauze dressing that results in repeated trauma during the change of dressing whenever there is need. There is also a problem with wound review because the wound cannot be reviewed unless it is removed. The polyurethane dressing is a transparent semi permeable film which allows for wound review without any need for a change of dressing (Fig. **??**). This dressing is more convenient for the patient and also allows for a bath. However, there could be an accumulation of serum or hematoma underneath the dressing, which may predispose to infection. These two types of dressing methods are the ones used in our unit for the management of the donor sites of split-thickness skin graft.

2 Fig. 1a

Fig. **??**b Fig. **??** II.

3 Methodology

This was a prospective study carried out in the Plastic Surgery Unit, Department of Surgery of the Irrua Specialist Teaching Hospital, Irrua, Edo State, Nigeria, between January 2017 and December 2018. Thirty-three (33) consecutive patients were co-opted into the study after fulfilling the criteria. The indications for the splitthickness skin grafting include trauma, chronic leg ulcers, burn, necrotizing fasciitis, etc. All the patients had the following investigation done: complete blood count, wound biopsy for histopathology, microscopy, culture and sensitivity, serum protein, and fasting blood sugar level. The patients had informed consent. All patients included this study were above the pediatric age to be able to effectively measure some qualitative parameters like pain and itching. Most of the patients had regional anesthesia, especially spinal because most of the donor and recipient sites were on the lower limbs while the rest had general anesthesia. The donor sites were from the anterolateral aspect of the thigh harvested with the aid of manual dermatome (Fig. **??** Hurmby's knife). Initial hemostasis was achieved with adrenaline (1:200,000) solution and compression bandaging for 5mins before the application of the dressing. The multilayered petroleum gauze dressing comprises of i) Innermost petrolatum gauze as the non-adherent layer ii) Gauze dressing soaked in povidone-iodine as the capillary layer iii) Gam-gee layer as the absorbent layer and iv) The outermost bandage as the retention or adhesive layer. The polyurethane dressing is a transparent semi-permeable self-adherent dressing called 'OPSITE' (Fig. 4). The duration of dressing was also assessed using a stop-watch (in seconds) after hemostasis has been achieved in both groups. The patients' donor sites were not reviewed until the 7 th day after the operation to check for strike-through, pain, and discharge. The presence of these may indicate infection and the need for a change of dressing. If there was no complaint, the wound reviewwas at 14 th day after the operation when the donor site is expected to have re-epithelized.

Exclusion criteria include a) The patients with hematocrit level less than 11g/dl, b) Those with serum protein less than 3.5g/dl, c) The patients who didn't want to be part of the study. d) Those lost to follow-up before six months. The patients were placed consecutively into two groups depending on the dressing used for the donor sites. The first group had single-layered polyurethane dressing while the second had multilayered petroleum gauze dressing.

4 Results

Sixty-seven (67) patients had split-thickness skin grafting during the period under review, however, 33 patients (49.25%) with 47 donor sites were involved in the study. The age of the patients ranges from 23 to 68 years with the mean age of 42.21 years SD 14.14, the median age of 40 years. There were 21 (63.6%) males and 12 (36.4%) females involved with M: F of 1.75: 1. 16 patients were in the polyurethane group while the remaining 17 patients were in the multilayered dressing group. The polyurethane group consists of 23 donor sites with seven (7) of the patients had bilateral donor sites, while the multilayered petroleum gauze dressing group had 24 donor sites with also seven (7) patients having bilateral donor sites (Fig. **??**). The indications for the procedure include the following: excision of malignant lesions, burn injury, trauma, necrotizing fasciitis, chronic leg ulcer, and diabetic foot ulcer. Trauma has the highest incidence with 11 (34%) patients and the least being necrotizing fasciitis with 2 (6%) patients (Fig. **??**).

Fig. **??**: Types of Dressing Materials 48.9% of all the donor sites only require a single dressing, which was done during the procedure. In polyurethane group, 65.3% had only one dressing done, the remaining 34.7 % required twice or thrice dressing while it was 33.3 % of the multi-layered group that had only one dressing and remaining 66.7 had multiple dressing up to eight (8) times (Table 1).The cost of dressing of each of the donor site in the polyurethane group was #3000 (US$8.33) and #2500(US$6.95) for the multilayer group. The average cost of dressing in the IV.

5 Discussion

Skin grafting is a very frequent procedure and has been practiced by many physicians, because of this, it is considered as a minor surgical procedure. Though, not usually associated with mortality, it can lead to significant morbidity if appropriate techniques are not strictly followed. Skin graft can be broadly divided into full-thickness and split-thickness skin graft. However, the split thickness skin graft can be further subdivided into thin, intermediate and thick depending on the thickness of the dermis associated with the graft. Only a few The key equipment needed for the splitthickness skin graft is the dermatome, and used in the harvesting of the graft from the donor site. The dermatome can be manual or powered. The power dermatome may be by electricity, battery, or compressed air. The power dermatome has a significant advantage over the manual in the following ways: a) the power dermatome can be used to harvest skin from any part of the body, and b) the thickness of the graft can be accurately determined by the settings on the machine. In this study, the manual dermatome was used for the harvesting of all the skin grafts because it is the only dermatome available in the hospital. This was similar to that done in South eastern Nigeria?. Another equipment of note is the skin-mesher. The meshing machine is needed when the skin graft available is not adequate, and there need for expansion. This machine expands the skin graft by placing regular fenestrations on the graft. The next is the skin boards that are used to maintain flat presenting surface while harvesting with a manual dermatome. It is also used to spread skin before application to the recipient site.

Donor sites of this graft could be from any part of the body, but many studies have emphasized that as much as possible the graft should be harvested from areas that could easily be hidden with a cloth. Many surgeons have taken several skin grafts from the scalp to resurface burn injury to the head, face, and neck, especially the hair-bearing areas. Some have also harvested skin from the back and buttocks because the scars from these can be hidden even with bikinis. Hexcel et al? in their study, harvested split-thickness skin graft from the post-auricular skin to resurface the face, neck, and the upper chest.

Several types of dressing that have been used for donor sites, and many of these had been compared in various studies. The search for the ideal dressing for the split-thickness skin graft donor is still on. This dressing should be easy to apply, inexpensive, cause less pain, require minimal care, and reduced or nil morbidity [8][9][10] . The dressing materials that had been used include petroleum gauze, povidone-iodine foam (Betafoam)[11], Hydrocellular foam (Allevyn), Biobrane, Polyurethane foam, or film. These dressings have been classified into five (5) [12][13] .

The cost of dressing and availability of the dressing are very relevant in the provision of care for patients in the low-income and middle-income nations like Nigeria. Petroleum gauze and polyurethane film dressing are readily available and affordable for the patient as donor sites dressing. Many researches in the developed countries of the world, had compared these two dressings. The conclusion was that the primary outcome was better in the polyurethane group than the multilayered petroleum gauze group. ?´1 [4][5][6][7][8][9][10][11][12][13][14][15][16] Complications such as delayed healing pain, infection, hypertrophic scarring, hyper pigmentation, and itching were analyzed in many studies. Infection rate and hypertrophic scar notice by Otene et al? within the first one month was 17.5% and 4.0% respectively, while the infection and hypertrophic scar in this study 36.2% and 91.5%. The infection was assessed on or before the 14 th day after the operation. The higher rate of infection may be due to the hygiene of the patients, smaller sample size, and the use of wound swab for microscopy, culture, and sensitivity with a higher possibility of false positive. The incidence of infection was higher in wounds dressed with petroleum gauze in Kenya. 14 Similar outcome was observed in this study; 50.0% in the petroleum gauze group in comparison to 21.7% in patients dressed with polyurethane. Hypertrophic scar and itching have a very high incidence in this study; almost all the patients had hypertrophic scar and itching sometime during the period of the study. It has been discovered that there are risk factors that predispose the patient to persistent hypertrophic scarring. These include complexion (more in blacks), the depth of the donor site harvest, the total of autograft amount, the site of the donor, and longer time to epithelialization 17 .

V.

6 Limitation

The use of manual dermatome was a limitation because accurate reproducible thickness of graft could not be obtained. The sample size was relatively small and the results may not translate to the wider population. Compounding co-morbidities were also not excluded from this study.

7 VI.

8 Conclusion

Split-thickness skin grafting will remain a significant aspect of reconstructive surgery. Therefore, donor site dressing and management will remain very relevant. This study has established like that of others that the used of polyurethane dressing is superior in outcome to petroleum gauze dressing even in suburban communities. [1]

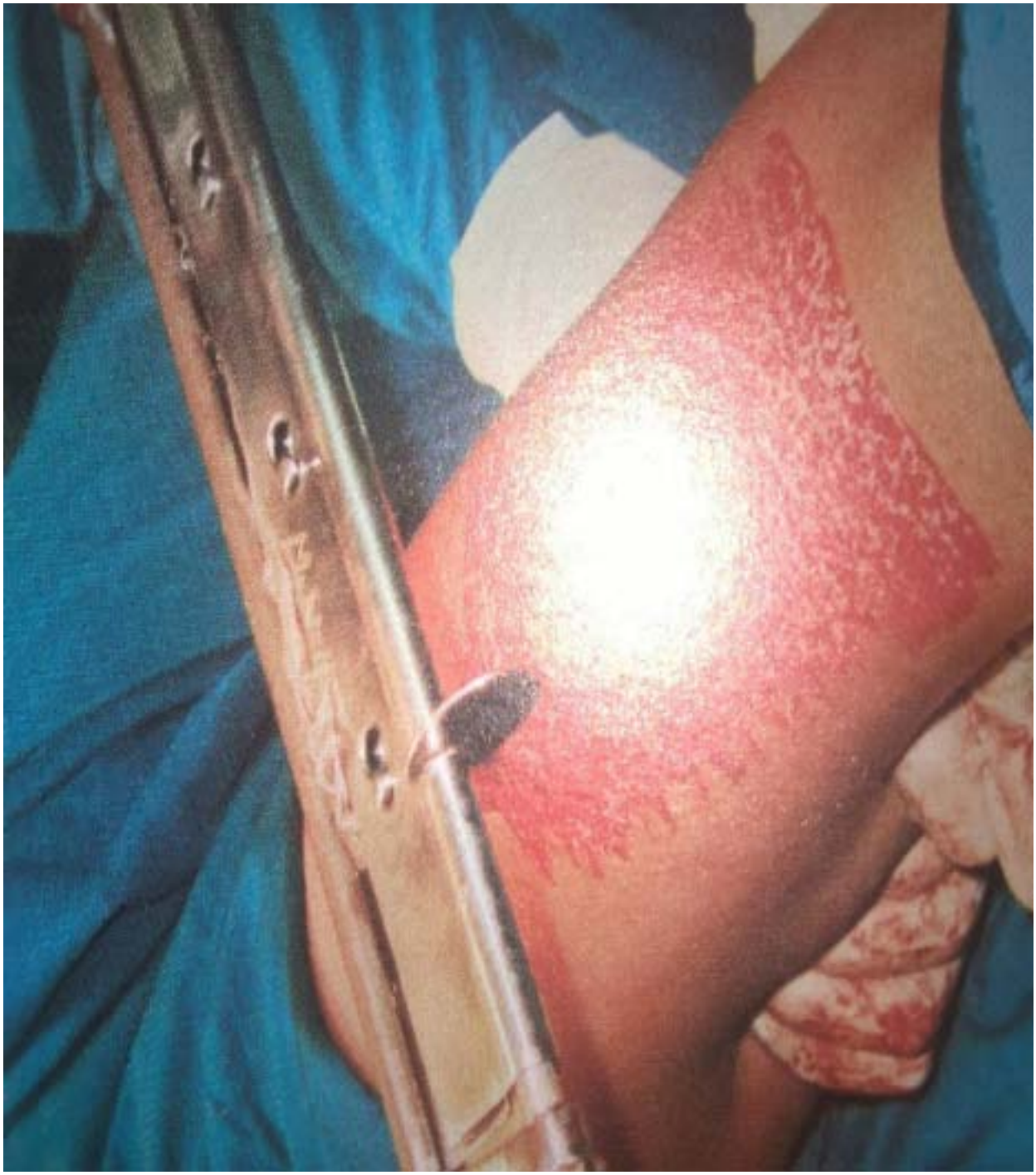

Figure 1:

Figure 2: Fig. 4

Figure 3:

2

Complications	Polyurethane (23)	Multilayered dressing (24)	Total (47)
1. Delay healing	8 (34.8%)	14 (58.3%)	22 (46.8%)
2. Infection	5 (21.7%)	12 (50.0%)	17 (36.2%)
3. Pain	7 (30.4)	14 (58.3%)	21 (44.7%)
4. Hypertrophic scarring	20 (87.0%)	23 (95.8%)	43 (91.5%)
5. itching	23 (100%)	24 (100%)	47 (100%)

Figure 4: Table 2 :

1

	Necrotizing fasciitis 2		Indications		
Year	6%	Malignancy			
2019		3 9%			
24			Trauma	Trauma	
	Diabetic foot ulcer 4		11 34%	Chronic leg ulcer	
		12%	Burns		
			Diabetic foot ulcer		
			Burns	Malignancy	
			5 15%	Chronic leg ulcer 8	Necrotizing fasciitis
			24%		

Figure 5: Table 1 :

.1 Conflict of interest

The author declares that there is no conflict of interest and no sponsorship of any kind for this study.

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