

# MANAGEMENT OF SPLIT SKIN GRAFT DONOR SITE IN THE WEST AFRICAN SUB REGION: SURVEY OF PLASTIC SURGEONS' PRACTICE

## GESTION DES SITES DONNEURS DE GREFFE DE PEAU MINCE EN AFRIQUE DE L'OUEST : ENQUÊTE SUR LA PRATIQUE DES CHIRURGIENS PLASTICIENS

Olawoye O.A.,<sup>1,2</sup> Ademola S.A.,<sup>1,2</sup> Iyun A.O.,<sup>2</sup> Michael A.I.,<sup>2</sup> Oluwatosin O.M.<sup>1,2</sup>

<sup>1</sup> Department of Surgery, College of Medicine, University of Ibadan, Nigeria

<sup>2</sup> Department of Plastic, Reconstructive and Aesthetic Surgery, University College Hospital, Ibadan, Nigeria

**SUMMARY.** Split skin graft (SSG) is one of the most commonly performed operations on any Plastic Surgery service. Rate of donor site healing is affected by various factors including the type of dressing applied. The aim of this study was to survey the practice of plastic surgeons in the sub region with respect to management of SSG donor site and see how it conforms to international standards. Structured questionnaires on various aspects of the harvest and management of SSG donor sites were administered to plastic surgeons during the 53<sup>rd</sup> annual conference of the West African College of Surgeons (WACS) at Lome, Togo in March 2013. The data were analyzed using descriptive statistics. There were 47 respondents out of 55 plastic surgeons from four West African countries, which represented 85.4% of registered participants at the plastic surgery section of the conference. All the respondents performed SSG regularly, and the thigh was the most commonly used donor site. Different types of paraffin gauze remained the most commonly used primary donor site dressing. Only 17% of the respondents apply a topical local anaesthetic agent on the donor site. The choice of SSG donor site dressing in the sub region was driven mainly by availability. Concerted efforts must be made to access newer wound care products for optimum management of this commonly performed operation.

**Keywords:** donor site management, skin grafting, skin graft donor site, split skin graft

**RÉSUMÉ.** Les greffes de peau mince font partie des opérations les plus fréquemment réalisées dans tout service de chirurgie plastique. La qualité de cicatrisation du site donneur dépend de plusieurs facteurs, dont le type de pansement utilisé. Le but de cette étude est d'enquêter sur la pratique des chirurgiens plasticiens en Afrique de l'Ouest, vis-à-vis de la gestion du site donneur de peau mince et de vérifier si elle est en accord avec les standards internationaux. Des questionnaires structurés sur les différents aspects du prélèvement cutané de peau mince ont été remis aux chirurgiens plasticiens pendant la 53<sup>e</sup> Conférence annuelle des chirurgiens du Collège des Chirurgiens de l'Afrique de l'Ouest (WACS) à Lomé, Togo en Mars 2013. Les données ont été analysées à l'aide de statistiques descriptives. Ont été recueillies 47 réponses sur 55 chirurgiens plastiques de 4 régions de l'Afrique de l'Ouest, soit 85,4 % des participants inscrits à la section chirurgie plastique de la Conférence. Toutes les réponses émanaient de chirurgiens pratiquant des greffes de peau mince de façon régulière et la cuisse était la zone la plus communément utilisée. Différents types de pansements à la paraffine étaient le plus souvent utilisés en première intention. Seulement 17 % des réponses signalaient l'utilisation d'un topique anesthésiant local sur le site donneur. Le choix de pansement du site donneur dépendait principalement de sa disponibilité. Des efforts concertés doivent être faits pour avoir accès aux nouveaux produits cicatrisants, afin d'obtenir une meilleure prise en charge de ce type d'intervention couramment pratiquée.

**Mots-clés:** gestion du site donneur, greffe de peau, greffe de peau mince

### Introduction

Split skin grafting (SSG) is one of the most frequently used reconstructive techniques with a wide range of applications for the coverage of soft tissue and skin defects, making it valuable not only for plastic and reconstructive surgery but for other surgical specialties as well.<sup>1</sup> It is one of the options on the lower rung of the reconstructive ladder for covering cutaneous defects. The simplicity of the procedure coupled with the relatively inexpensive and readily available instrumentation has

made it a very popular reconstructive option in many low- and middle-income countries. It involves the harvest of sheets of skin comprising of the epidermis and varying thickness of the dermis from a donor site to resurface a defect on the recipient site. It is important that both the donor and recipient wounds heal in a timely fashion without complications.

Depending on the thickness of the SSG, the donor site wound should completely re-epithelialize within 7 to 21 days.<sup>2</sup> Despite the simplicity of the procedure, significant morbidity can attend the donor site, resulting in delayed wound healing

Corresponding author: Dr. O.A. Olawoye, Department of Surgery, College of Medicine, University of Ibadan, Ibadan, Nigeria. Tel.: +234 8023582683; email: yinkaolawoye@yahoo.co.uk

Manuscript: submitted 28/04/2017, accepted 29/04/2017.

and prolonged patient hospitalization with increased cost of care. In addition, late complications such as dyschromic and hypertrophic scars or keloids may attend the healing. The initial method of SSG donor wound management is critical to the outcome. Optimum local care and cover for these donor site wounds should promote wound healing and be cost-effective, while preventing adverse events or even complications, such as pain, discomfort, infection and scarring.<sup>3</sup> Pain and discomfort, in particular, have been reported to occur more often in donor site wounds than in the actual recipient site.<sup>2,4,5</sup>

There is no other place where this is so important as in developing countries where most of the financial burden of health care is borne by individual patients through out of pocket payments rather than through organized health insurance schemes. There is a wide range of wound care products available for the management of split skin graft donor site with a far greater variety available to practitioners in developed countries. These dressings include occlusive hydrocolloid sheets, adhesive fabrics, polyurethane semi-permeable transparent films, foam, nanocrystalline silver and alginate dressings. Skin graft donor sites produce significant amounts of exudate that require an absorbent dressing in order to prevent maceration of the surrounding skin.

Polyurethane semi-permeable films are self-adhesive, vapour-permeable sheets. They utilize the principle of moist wound dressing and have gained considerable clinical acceptance since their introduction. Because the films are devoid of an absorbent layer, it is important to achieve satisfactory hemostasis of the donor site before they are placed on the wound. The hydrocolloids also utilize the principles of moist wound healing. These products are occlusive sheets of hydrocolloid polymer on a layer of polyurethane foam that forms a gel-like layer at the wound surface.<sup>6</sup> The foam layer absorbs secretions from the wound and makes a secondary dressing unnecessary.

Nanocrystalline dressing is an effective antimicrobial barrier dressing. The nanocrystalline coating of silver rapidly kills a broad spectrum of bacteria. Some of the formulations consist of three layers: an absorbent inner core sandwiched between outer layers of silver-coated, low adherent polyethylene net. Nanocrystalline silver protects the wound site from bacterial contamination while the inner core helps maintain the moist environment optimal for wound healing. Slow-release nanocrystalline silver dressings play an important part in the treatment of infected wounds by reducing bacterial burden and inflammation. Nanocrystalline silver has been found to be a broad-spectrum antimicrobial agent effective against gram-negative and gram-positive bacteria (including those that are multi-drug resistant), yeast, fungi and viruses.<sup>7,8</sup>

Many of these products are not readily available in developing countries, and where they are available, they are rather expensive and the general population cannot afford them. It is hoped that as the economic indices of these countries improve, accessibility to these products will become easier and plastic surgeons will have wider dressing options to choose from in order to maximize the advantages of these dressings while minimizing the potential challenges of delayed healing, pain and scarring of the widely used paraffin dressings.

There is a large body of literature on SSG donor site management from developed countries contrary to a rather sparse collection from the developing world. The authors are not aware of any previous study on this subject among plastic surgeons practicing in the West African sub region, hence the aim

of this study was to survey the practice of plastic and reconstructive surgeons in this region with respect to their choice of dressing material for the management of split skin graft donor site and the reasons for their choice.

## Materials and methods

Structured questionnaires on various aspects of split skin graft harvest and donor site management were administered to plastic and reconstructive surgeons during the 53<sup>rd</sup> annual general meeting and scientific conference of the West African College of Surgeons at Lomé, Togo in March 2013.

The questionnaire was previously validated and structured to obtain information on the country of residence of the surgeon and the frequency with which each surgeon performed split skin graft in his practice. Other questions included the most commonly employed donor site, the instrument most often used for split skin graft harvest, the use of skin mesher, the most commonly employed donor site dressing and the practice of topical application of local anaesthetics for local pain control. The most important reason for their choice of donor wound dressing was also sought.

Respondents' voluntary completion of the questionnaire implied consent to participate in the study.

## Results

A total of 47 respondents out of 55 plastic surgeons registered for the Plastic Surgery section of the conference from four West African countries (*Fig. 1*)<sup>9</sup> completed the questionnaires. This represented an 85.4% response rate. All the respondents were practicing plastic and reconstructive surgeons in their respective countries. The number of respondents from each of the countries was fairly representative of the proportion of the population of plastic surgeons practicing in each country. A total of 83% of the respondents were from Nigeria, 10.6% from Ghana, 4.3% from Cote D'Ivoire and 2.1% from Burkina Faso.

All the respondents performed split skin grafting frequently (about one per week) and the thigh was the most commonly used donor site by all the surgeons. In addition, the other sites used with some regularity by the surgeons included the upper arm (23.4%), the in-step of the foot (14.9%) and the fore-



Fig. 1 - Map of West Africa.

arm (8.5%). The scalp was rarely used as a donor site by the respondents.

Regarding the question on over graft of the donor site in certain categories of patients, 21.3% of the respondents routinely practiced over graft of the donor site in elderly patients while 17% had a practice of applying topical local anesthetic solution to the donor site for local post-operative pain control.

In response to questions about instrumentation for split skin grafting, 93.5% routinely used the Humby knife or other modifications of it for skin harvest. However, 40.4% also had access to powered dermatome in their centers. 60% of the respondents also had facilities for skin mesher.

Regarding primary dressing for the donor site, the most commonly used dressing by all the respondents was paraffin tulle gauze dressing. In addition, other dressings occasionally used included polyurethane thin film by 42.6% of the respondents, adhesive fabric by 10.5% and alginate dressing by 8.5%.

When asked to give the most important reason for their choice of donor site dressing, availability of the dressing accounted for 72.3%, healing time 14.9%, scar quality 8.5% and convenience 4.3%.

The respondents were also asked to indicate the donor site healing time that they tell their patients to expect. There was a wide variation in respondents' answers to this question. Some respondents gave a single time while others gave a time range. The expected healing time ranged from 7 to 28 days. Of these, more than half (51.1%) indicated an expected healing time of 2 weeks, 23.4% gave a healing time of 3 weeks. 17.1% indicated a range of 2 to 3 weeks, 4.2% told patients 1 to 2 weeks and 2.1% gave a healing time of 3 to 4 weeks and 4 weeks, respectively.

## Discussion

The overall efficacy of various wound dressing agents is usually based on time to healing, associated pain, infection rate and expense.<sup>10</sup> Little attention has been placed on the effects of these dressings on cosmetic appearance and quality of the healed skin, and this has contributed to the choice of certain parts of the body usually covered with clothing as preferred SSG donor sites because of the possibility of less cosmetically acceptable scars following healing. It is believed that the ultimate cosmetic appearance of SSG donor sites is important to most patients and should take precedence over other considerations, as a donor area scar often represents added stress to the patient.<sup>11</sup> In no other group of patients is the final appearance of the healed skin following SSG harvest more important than in patients of African descent because of their higher propensity to develop fibro-proliferative disorders of wound healing such as keloids, dyschromia and hypertrophic scars. Hence the choice of donor site dressing must be informed by factors that promote optimal healing and prevent morbidity that may include pain, infection, delayed healing and cosmetically unacceptable scars. It is also desirable that the dressing of choice is cost effective and readily available, easy to apply, effective from its application to full re-epithelialization of the wound. In addition, the dressing should maximize patients' comfort without limiting their movement.

The ideal SSG donor site dressing should be easy to apply, promote rapid re-epithelialization and be pain free, infection free and relatively inexpensive. It must also be immunologically tolerated and above all result in good quality healed skin

with minimal scarring.<sup>11</sup> However, there is currently no dressing that meets all these criteria.<sup>12,13,14,15</sup>

Expectedly, when asked about the single most important determinant for their choice of donor site dressing, our survey revealed that plastic surgeons in the sub region placed availability (72%) ahead of healing time (15%), scar quality (9%) and convenience (4%). The reason for this may not be far-fetched, as many hospitals in the sub region do not have the luxury of diverse types of dressings. In a similar study among consultant and locum consultant plastic surgeons with the NHS/government practice in the British Isles, Geary and Tiernan<sup>16</sup> noted that pain was reported to be of prime importance when considering the properties of donor-site dressing. Healing time was the second, while scar quality was the third most important dressing property.

Similar to the study in the British Isles,<sup>16</sup> the thigh was the most commonly used anatomical site for split skin graft harvest by the respondents, and an overwhelming majority regularly used the hand-held knife, especially the Humby knife and its other modifications for split skin harvest, although more than a third of the respondents also had access to and used the electric dermatome with some regularity.

There is a plethora of dressings currently available for donor site management. These dressings are grossly grouped into moist and non-moist dressings based on the state of the dressing upon initial application. The moist dressings retain moisture, thus preventing desiccation of exudates. Examples of some of the most commonly used moist dressings include Kaltostat, Tegaderm and Aquacel Ag, while non-moist dressings include Bactigras, Jelonet, Sofratulle and Xeroform. Earlier systematic reviews<sup>12,13</sup> suggested that moist dressings provided better healing, less pain and lower infection rates compared with non-moist dressings. However, a more recent systematic review<sup>14</sup> concluded that there is no clear evidence of the superiority of wet dressings over dry ones.

Paraffin gauze or tulle dressings have remained the most commonly used primary dressing for SSG donor site in the sub region. The reasons seem obvious: they are readily available and relatively cheaper than most other dressings. Tulle dressings were the traditional and probably the only type of primary dressing available in many centers in the sub region for so many years before newer dressings such as hydrocellular, adhesive fabric and Kaltostat dressings were introduced into the market. Opsite is the second most commonly used dressing for donor site management in the sub region, while only about a tenth of the respondents occasionally use adhesive fabric or kaltostat dressings. The most frequent donor site dressing of choice on the British Isles was alginates followed by adhesive fabric.<sup>16</sup>

From existing prospective studies, alginates are associated with reduced healing time and less pain than paraffin gauze,<sup>17,18,19</sup> but adhesive fabrics are associated with even less pain and discomfort than alginates.<sup>20,21</sup>

As in other studies,<sup>22</sup> the practice of over grafting the donor site wound in the elderly and local pain control with the topical application of local anaesthetic agents on the donor site was practiced by a sizeable number of the respondents.

Expected healing times varied somewhat, however there was a clear indication that the majority of the respondents (95.8%) advise their patients to expect their donor site to be healed within three weeks.

In a recent publication by Yongqian et al.,<sup>23</sup> two types of

skin graft donor site dressings - paraffin gauze, a classic example of traditional dressing, and hydro cellular dressing which represents one of the newer dressings - were compared to re-grafting the donor site with thin split skin graft. As expected, the re-grafted donor site showed better outcome than paraffin gauze and hydro cellular dressing in terms of time to healing, pain score and scarring characteristics. The average time to re-epithelialization for the re-grafted donor site was 6.2 +/- 1.1 days compared to 11.1 +/- 2.1 days for hydro cellular dressing and 13.5 +/- 2.5 days for paraffin gauze. Likewise, pain score on days 2 and 5 for the re-grafted donor site was 2.3 +/- 0.8 and 1.9 +/- 0.8 respectively, whereas pain scores for the donor site dressed with paraffin gauze on days 2 and 5 were 3.8 +/- 1.4 and 5.9 +/- 2.1 respectively. This was much higher than the scores for hydro cellular dressing, which were 2.5 +/- 1.1 and 3.9 +/- 1.3 on days 2 and 5 respectively.

As for donor site scarring, the best outcome was obtained with re-grafted donor site, with Vancouver scar scores of 4.3 +/- 0.6 at six months and 2.5 +/- 0.6 at one-year post surgery. Paraffin gauze dressing gave the worst scar score of 11.8 +/- 0.4 at six months and 10.9 +/- 1.0 at one year, whereas hydro cellular dressing gave a much more acceptable scar than paraffin gauze, with scar scores of 7.4 +/- 0.6 at six months and 6.2 +/- 0.6 at one year. This clearly shows the superiority of hydro cellular dressing over paraffin gauze in terms of healing time, pain and donor site scarring.

With patients of African descent who have many more challenging problems with scarring and other fibroproliferative

disorders, it is imperative that surgeons have ready access to a wider array of dressings so that the healing of skin graft donor sites can be optimized.

Advocacy for improved governmental funding of health services in low- and middle-income countries needs to be sustained. Improvement in health infrastructure coupled with the introduction of functional and affordable health insurance schemes should pave the way for greater access of patients to effective health services with a sustainable range of equipment, consumables and products. When appropriate materials are available, surgeons are quick to adapt their practice to suit the needs of their patients along best practice guidelines.

## Conclusion

The most commonly employed split skin graft donor site dressing in the West African sub region is tulle dressing, and it would appear that the predominant reason for this choice of dressing is product availability. With improvement in the economy of many countries in the sub region and improved health care funding, access to newer and better dressings should be easier provided that there is a demand for them by practitioners.

Dressings that offer shorter healing time and are more comfortable with improved skin quality after healing, even if comparatively more expensive, would grant patients a better quality of life and should be sourced, stocked and used generously in the sub region.

## BIBLIOGRAPHY

- Atiyeh B: Commentary on: The properties of the ideal donor site dressing: Results of a worldwide online survey. *Ann Burns Fire Disasters*, 26(3): 141, 2013.
- Ratner D: Skin grafting. *Semin Cutan Med Surg*, 22: 295-305, 2003.
- Lars P, Kamolz LP, Giretzlehner M, Trop M et al.: The properties of the "ideal" donor site dressing: results of a worldwide online survey. *Ann Burns Fire Disasters*, 26(3): 136-140, 2013.
- Persson K, Salemark L: How to dress donor sites of split thickness skin grafts: a prospective, randomised study of four dressings. *Scand J Plast Reconstr Surg Hand Surg*, 34: 55-9, 2000.
- Feldman DL: Which dressing for split-thickness skin graft donor sites? *Ann Plast Surg*, 27: 288-91, 1991.
- The Joanna Briggs Institute: Split thickness skin grafting; Post harvest management. Evidence-based practice information sheets for health professionals, 6(2): 1.6, 2002. Available at <http://www.joannabriggs.edu.au>. Accessed on 23<sup>rd</sup> March, 2016.
- Fong J, Wood F: Nanocrystalline silver dressings in wound management: a review. *Int J Nanomedicine*, 1(4): 441-9, 2006.
- Rai M, Deshmukh S, Ingle A, Gade E: Silver nanoparticles: the powerful nanoweapon against multidrug-resistant bacteria. *J Appl Microbiol*, 112: 841-52, 2012.
- <http://www.freelargeimages.com/map-of-west-africa-695/> Accessed on 25<sup>th</sup> February, 2015.
- Morris WT, Lamb A: Painless split skin donor sites: a controlled double-blind trial of Opsite, Scarlet Red and Bupivacaine. *Austral N Z J Surg*, 60: 617-620, 1990.
- Atiyeh BS, Al-Amm CA, Naser AA: Improved healing of split thickness skin graft donor sites. *J Appl Res Clin Exp Ther*, 2(2): 114-21, 2002.
- Rakel BA, Bermel MA, Abbott LI, Baumler SK et al.: Split-thickness skin graft donor site care: A quantitative synthesis of the research. *Appl Nurs Res*, 11: 174-82, 1998.
- Wiechula R: The use of moist wound healing dressings in the management of split-thickness skin graft donor sites: A systematic review. *Int J Nurs Pract*, 9: 9-17, 2003.
- Voimeskos SH, Ayeni OA, McKnight L, Thoma A: Systematic review of skin graft donor-site dressings. *Plast Reconstr Surg*, 124: 298-306, 2009.
- Schreuder SM, Qureshi MA, Vermeulen H, Ubbink DT: Dressings and topical agents for treating donor sites of split-skin grafts: a systematic review. *EWMA Journal*, 9: 22, 2009.
- Geary PM, Tiernan E: Management of split-skin graft donor sites: results of a National Survey. *Clin Plastic Surg*, 39: 77-84, 2012.
- Attwood AI: Calcium alginate dressing accelerates split skin graft donor site healing. *Br J Plast Surg*, 42: 373-9, 1989.
- O'Donoghue JM, O'Sullivan ST, Beausang ES et al.: Calcium alginate dressings promote healing of split skin graft donor sites. *Acta Chir Plast*, 39: 53-5, 1997.
- Steenfos HH, Agren MS: A fibre-free alginate dressing in the treatment of split thickness skin graft donor site. *J Eur Acad Dermatol Venereol*, 11: 232-6, 1998.
- Giele H, Tong A, Huddleston S: Adhesive retention dressings are more comfortable than alginate dressings on split skin graft donor sites - a randomized controlled trial. *Ann R Coll Surg Engl*, 83: 431-4, 2001.
- Hornbrey E, Pandya A, Giele H: Adhesive are more comfortable than alginate dressings on split skin graft donor sites. *Br J Plast Surg*, 56: 498-503, 2003.
- Ablaza VJ, Berlet AC, Manstein ME: An alternative for split skin graft donor site. *Aesth Plast Surg*, 21: 207-9, 1997.
- Yongqian B, Chaofeng S, Xiping Z, Yuejun L et al.: Wound-healing improvement by resurfacing split-thickness skin donor sites with thin split-thickness grafting. *Burns*, 42: 123-130, 2016.