wjpmr, 2022, 8(6), 16-21

SJIF Impact Factor: 5.922

WORLD JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.wjpmr.com

Research Article

ISSN 2455-3301

WJPMR

SPLIT THICKNESS SKIN GRAFTING IN IRRUA, EDO STATE, NIGERIA

[1]*Oluwafemi Olasupo Awe

[1]Plastic Surgery Unit, Department of Surgery, Faculty of Clinical Sciences, Ambrose Alli University, Ekpoma, Edo State, Nigeria and Department of Surgery, Irrua Specialist Teaching Hospital, Irrua, Edo State.

***Corresponding Author: Awe Oluwafemi Olasupo**
Plastic Surgery Unit, Department of Surgery, Faculty of Clinical Sciences, Ambrose Alli University, Ekpoma, Edo State, Nigeria and Department of Surgery, Irrua Specialist Teaching Hospital, Irrua, Edo State.

Article Received on 28/03/2022 **Article Revised on 18/04/2022** **Article Accepted on 08/05/2022**

ABSTRACT

Introduction: skin grafting is a very common procedure by the surgeons. It is seen as been innocuous and simple but may be very distressing to the patient if not properly done. There is need for auditing of this procedure, so that there could be improvement in surgical technique and better outcome. This will make the procedure more appealing to patients. **Methodology**: this is a 5-year clinical audit of the patients that underwent split thickness skin grafting at Irrua Specialist Teaching Hospital (ISTH), Irrua, Edo State, Nigeria. The patient data were retrieved from the case-notes, operating theatre register and clinic register. The data obtained include the bio-data, indication for the procedure, duration of the procedure, post-operative complication and dressing material. Epidermolysis was not considered as a complication on its merit in the study. The data was analyzed using the SPSS version 22**. Results**: 217 patients had split thickness skin grafting done during the period of review. The age ranges from under 1 year to 95 years, with the mean age of 34.97 years and median age of 30 years. There was male preponderance. There were 119 (54.8%) males and 98 (45.2%) females with male to female ratio of 1.2: 1. Trauma was the commonest indication for the procedure accounting for 46.1% followed by chronic leg ulcer 24.0% and then burns 12.9%. The duration for the procedure had minimum of 30mins and maximum of 205mins. The mean duration of surgery was 66.8mins and the median was 60mins. Co-morbidity was present in 46 (21.2%) patients. Diabetes mellitus was the main co-morbid condition present in 30 (65.2%). Complications were observed in 37.8% of the patients. 124 had multilayered petroleum gauze (sofra-tulle) dressing for the donor site and the rest with single layered polyurethane (Op-Site) dressing**. Conclusion**: The post- operative complication rate was very significant and there is need to develop a standard protocol to reduce this. There is also need to determine whether there is significant difference in outcome with respect to the type of donor site dressing, rate of infection and hospital stay in the future.

KEYWORDS: split thickness, skin grafting, indications, complications, Irrua, Nigeria.

INTRODUCTION

Skin grafting is one of the common procedures done in surgical practice. It is done not only by the Plastic surgeon but also by the general practitioners, the general surgeons, the orthopaedic surgeons and some other subspecialties in surgery that create and manage wound in one way or the other. Skin grafting has been part of surgery since antiquity. It has been one of the modalities of managing wounds. In skin grafting, there is the primary wound which is the indication for the surgery. This is also called the recipient site. There is the secondary wound created by the surgeon while taking the skin graft. This is also called the donor site. The anticipated outcome for skin grafting is to have an uneventful healing or re-epithelization of the donor site within 2-3 weeks depending on the thickness of the graft taken and adherence and consolidation of the graft to the bed of the recipient site. Skin graft could either be a partial(split) thickness skin graft or a full thickness skin graft. The split thickness skin graft is also called the Thiersch graft and the full thickness is also called Wolfe graft. The split thickness could either be thin (0.02mm-0.03mm, intermediate (0.03-0.045mm) or thick (0.045-0.075mm) depending on the thickness of the part of the dermis involved. The split thickness graft can be harvested from any part of the body while the full thickness is limited to the areas we there is loose skin. The equipment used for the harvesting of the split thickness skin graft is called Dermatome. The dermatome could either be manual or powered. The power dermatome could be powered by electricity/battery or compressed air. It was the manual dermatome that was used in this study (Fig. 1). Usually the donor site of the full thickness graft is closed by direct closure. The donor site of the split thickness graft is expected to re-epithelized over a short while, usually 10-14 days. There many dressings that have been used

on split thickness skin graft donor sites.[2-4] These dressings include Honey[5], Povidone-iodine foam (Betafoam), Hydrocellular foam (Allevyn), Petroleum gauze, polyurethane film (Op-Site) as in Fig. 2. In this procedure, patients' selection is very important to reduce failure rate and complications to the barest minimum. Auditing this seemly innocuous procedure will assist in improving the outcome and focusing on need for attention to detail. This study is with reference to the split thickness skin graft that were done in ISTH, Irrua during the period of under review.

Fig. 1

Fig. 2

METHODOLOGY

This is a retrospective study of the patients that had split thickness skin grafting from July 2012 to June 2017. These are the patients that presented to the Plastic Surgery Unit of Irrua Specialist Teaching Hospital, Irrua during the period under review. Irrua Specialist Teaching Hospital is strategically located on the Benin – Abuja Expressway which is one of the main corridors connecting the southern to the Northern part of the country. This hospital is a 350-bed tertiary facility that services the central and the northern part of the Edo State, Nigeria and part of the adjoining states. The details of these patients were obtained from the case-notes, and operating theatre register. The extracted data include the following i.e. age, gender, indication, duration of surgery, duration of healing, donor site dressing, and complication. The data was analyzed using SPSS version 22.

RESULTS

There were 217 patients that had skin grafting done in the Plastic Surgery unit, Department of Surgery, Irrua Specialist Teaching Hospital, Irrua during the period of review between the July 2012 and June 2017. The age of the patient that had split thickness skin grafting during the period range from under-1 year to 95 years, with the mean age of 34.97 years and median age of 30 years. There was male preponderance. The youngest under-1yr patient presented with scald involving the anterior trunk and the 95 year old patient was a man with Chronic recurrent leg venous ulcer. There were 119 (54.8%) males and 98 (45.2%) females with male to female ratio of 1.2: 1. Fig.3 below shows the age-sex distribution of the patients. Trauma was the commonest indication for the procedure accounting for 46.1% (100) followed by chronic leg ulcer 24.0% (52) and then burns 12.9% (28) as shown by the Table 1. Malignancies are also very important indication in this study.

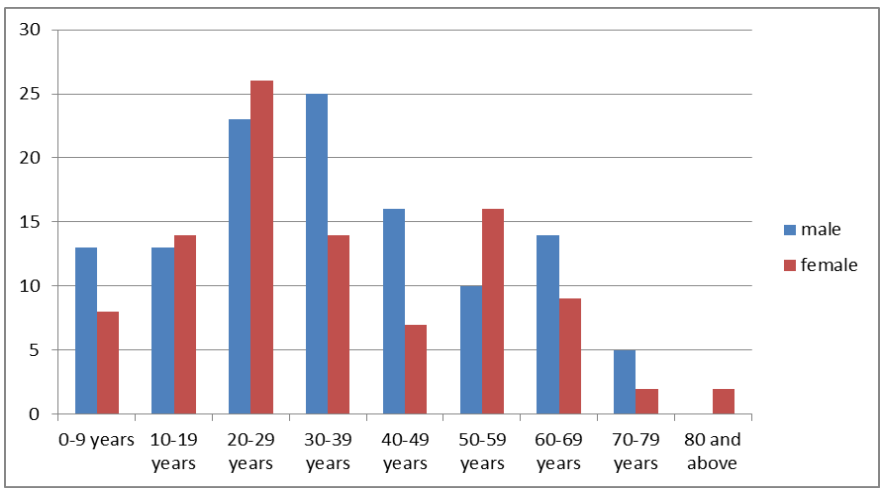

Fig. 3: the age-sex distribution of the patients.

Table 1: The indications for split thickness skin grafting.

indication for surgery					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	trauma	100	46.1	46.1	46.1
	chronic leg ulcer	52	24.0	24.0	70.0
	burns	28	12.9	12.9	82.9
	diabetic foot ulcers	12	5.5	5.5	88.5
	Necrotizing fasciitis	7	3.2	3.2	91.7
	malignancy	11	5.1	5.1	96.8
	others	7	3.2	3.2	100.0
	Total	217	100.0	100.0	

The duration for the procedure had minimum of 30mins and maximum of 205mins. The mean duration of surgery was 66.8mins and the median was 60mins. Co-morbidity was present in 46 (21.2%) patients [Table 2]. Diabetes mellitus was the main co-morbid condition present in 30 (65.2%). Complications were observed in 37.8% (82) of the patients. 66 patients had delayed healing (healing after 21 days in both recipient and donor sites), 51 patients graft loss, while there was hypertrophic scar in 47. 124 had multilayered petroleum gauze dressing for the donor site and the rest with polyurethane 1-layered dressing.

Table 2: co-morbidity among the patients.

co-morbidity					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	none	171	78.8	78.8	78.8
	diabetes mellitus	15	6.9	6.9	85.7
	sickle cell anaemia	3	1.4	1.4	87.1
	malignancy	9	4.1	4.1	91.2
	others	19	8.8	8.8	100.0
	Total	217	100.0	100.0	

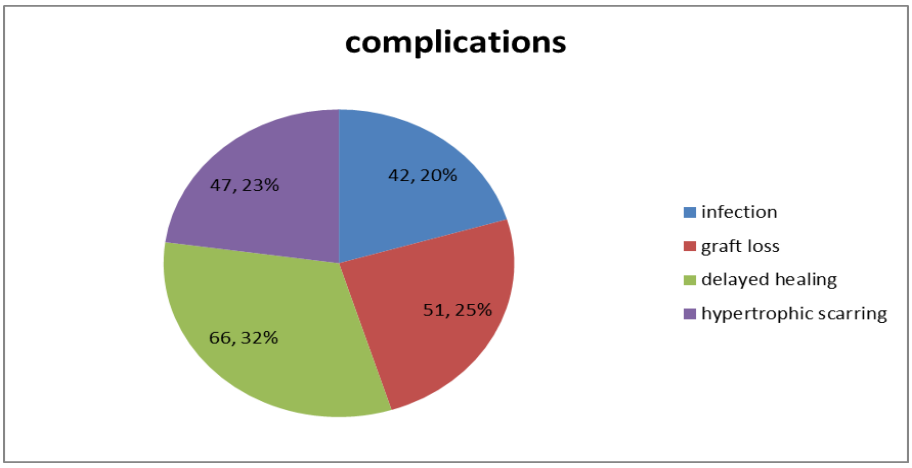

Fig.4: Complications of the Split Thickness Skin Grafting.

DISCUSSION

Skin grafting is simply the transfer of the skin from the one part of the body to another part of the body without the vascular supply. The common type is the autogenous type, where the donor is also the patient. In few cases of homologous donor especially cadaveric skin has been used in extensive burn patients. Also, heterogenous donor skin has been used as form of dressing for major burn injury before appropriate skin is available. Skin graft can be divided broadly into two (2) types depending on the component of the skin involved. I) the full thickness skin graft: this involve the whole component of the skin i.e. both epidermis and dermis, and the underlying subcutaneous fat is gently scrapped off. Ii) the split thickness skin graft: this only involves the epidermis and part of the dermis. The split thickness skin graft can be subdivided depending on the varying thickness of the dermis involved into thin and thick split thickness skin graft. The most common of skin graft is the split thickness type.[1]

Split thickness skin grafting is one of the commonest procedures in surgery. It is done by most surgeons especially the general surgeons, orthopaedic sugeons and

the plastic surgeons. The split thickness skin grafting is only done by the plastic surgeons in the Hospital of this study. The patients with indication for this procedure are selected and optimized for good post-operative outcome. The following investigation are germane i.e. a.) full blood count: the hematocrit level is very important to assess the adequacy of the oxygen carrying capacity of the blood, b.) wound biopsy for culture and sensitivity: this is requested for to eliminate the possibility of the presence of β-hemolytic streptococcus organism, proteus mirabilis or pseudomonas aeruginosa which are absolute contraindication to skin grafting because they secrete hemolysin that result in the graft loss and lysis, c.) The serum protein is also essential to have a crude assessment of the nutrition status of the patient. This is very important for wound healing and good post-operative outcome. If there are presence of co-morbidity like diabetes, there must first be a good glycemic control, in hypertensive, the blood pressure must be control, so that bleeding will be minimal and the fibrin adhesion can take place followed at the stage of plasma imbibition. The disruption of this stage will prevent adherence and leads to graft loss.

Dermatome is the used to collect the skin graft from the site. There are two (2) main types i.e. the hand-held manual dermatome and the electric (power) dermatome. The power dermatome (Fig.3) could be driven by air or by electricity. There are also different type of the manual dermatome, this include Silver knife, Humby knife etc. The power dermatome has advantages over the manual dermatome in that the thickness accurately determined and graft can be collected from any part of the body. The manual dermatome needs a relative flat surface before the graft can be taken which significantly reduce the part of the body that can be used with easy (Fig. 4). Also the thickness of the skin graft depends on the settings of the knife and the pressure applied by the surgeon. This is operator dependent. This means that though the settings may be the same the thickness may vary with the pressure applied.

The hand held manual dermatome was used in all the cases in this study, so thickness of the graft is not accurately the same in all the patients. Though, the aim was to collect a thin split thickness skin graft, in all cases. This is similar to dermatome used in the study by Otene et al.[6]

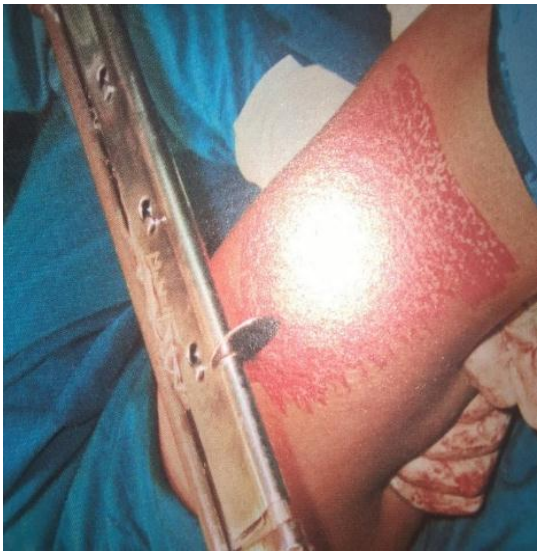

Fig. 4: Harvesting of split thickness skin graft using manual dermatome (Humby's Knife)

The split thickness skin grafting account for about two percent (2%) of all the surgical procedures in ISTH and about eleven percent (11%) of the plastic surgery procedures done during the period of review. This shows that is one of the common procedures.

There was a male sex predilection with male to female ratio of 1.2:1. This is less than the study in South-Eastern Nigeria.[6] The mean age in the study was 34.97years which higher than 28.9 years in the other study from Nigeria.[6] The young age and male predominance noticed in this study may be due to trauma being the major indication for this procedure. Some studies have had female predominance.[7-8] This usually depends on the major indication for the procedure. There some studies in which burns is the main indication for skin grafting. Burns in this study is the third commonest indication following after trauma and chronic leg ulcers. Other indications that have been mentioned in the literature include post-operative skin loss like in fasciotomy, coverage of the donor site in flap surgery, excision of large skin lesions etc. the donor in all the patients in this study was antero-lateral thigh which could be unilateral[6] or bilateral, depending on the size of the recipient site.

There are several dressing model for the donor site wound mentioned in several studies but the two main ones used in our study were multilayered petroleum gauze dressing and the single layered polyurethane

transparent semipermeable membrane.[9] Many studies have shown that the single layered polyurethane membrane has significant advantages over the traditional dressing. These include the ease of application, no need for change of dressing during review of the wound, less pain, less incidence of wound infection and short hospital stay.[10-12] Though this is not evaluated in this study, we found out that 124 (57.1%) had multilayered petroleum gauze dressing while 93 (42.9%) had polyurethane membrane dressing.

There is plethora of complications that are associated with split thickness skin grafting. It is not innocuous as it may seem. The complications could either be related to the skin graft at the recipient site or the healing of the donor site. The recipient site complications including the following: wound infection, graft loss, hypertrophic scarring, and delayed wound healing. These have been mentioned severally in different literatures. There are also donor site complications. These are more disturbing to the surgeon because the donor site wound is an iatrogenic wound. These include delay wound healing, hypertrophic scarring, itching and pain.[6] The complication rate in this study is 37.8%. The commonest complication was delayed wound healing in 66 (32%) patients. These complications could not be separated into either recipient site or donor site complications because this is a retrospective study. The delay wound healing (32%) could be as a result of infection[13], co-morbidity like diabetes, hypertension, prolong steroid use, malnutrition malignancy or human immunodeficiency virus.[14] Graft loss which is relatively high (25%) in this study could have been due to surgeon factors like inappropriate reverse placement of the graft on the bed and the patient's factors like hematoma or seroma lifting the graft, infection, shearing force during movement. Hypertrophic scarring was 23% I this study compared to 64% recorded by Rotatori et al.[15] the risk factors for hypertrophic scarring include thickness of the graft harvested from the donor site, the prolong duration of re-epithelialization, the race (especially in dark skinned), the location of the donor site (thigh has a higher rate of developing than other parts of the body)

CONCLUSION

skin grafting is very common procedure in surgery, with significant complication rate. Proper training of the residents in this procedure is vital to possibly reduce the complication rate. The use of power dermatome with accurate and uniform thickness of skin graft during harvesting may also reduce the complications. There will also be need to compare the outcome of donor site with regards to the dressing methods in black Africans in other to come to a conclusion of a preferred dressing method.

Conflict of Interest: The authors have no conflict of interest to declare. No part of this research is sponsored by any corporate body.

Acknowledgment: I deeply appreciate the assistance of the consultants and the Residents in the Plastic Surgery Unit and the theatre staffs during the collation and analysis of the data.

REFERENCES

1. Adams DC, Ramsey ML. Grafts in dermatology Surgery: review and uptake on full and split thickness skin grafts, cartilage grafts, and composite grafts. Dermatol Surg, 2005; 3(8 Pt 2): 1055-67.
2. Demirtas Y, Yagmur C, Soylemez F, Ozturk N, Demir A, Management of Split thickness skin graft donor sites: A prospective clinical trial for comparison of five different dressing. Burns, 2010; 36(7): 999-1005. DOI: 10.1016/j.burns 2009.05.017
3. Terrill PJ, Goh RC, Bailey MJ, Split thickness skin graft donor sites: A comparative study of two absorbent dressings. J Wound Care, 2007; 16(10): 433-8.
4. Wiechula R. The use of moist wound healing in the management of split thickness skin graft donor sites: A systemic review. Int J Nurs Pract, 2003; 9(2): S9-17.
5. Subrahmanyam M. Honey Dressing Accelerates Split Thickness Skin Graft Donor Site Healing. Indian J Surg, 2015; 77(Suppl 2): 261-263. DOI: 10.1007/s12262-012-0789-9.
6. Otene CI, Olaitan PB, Ogbonnaya IS, Nnabuko RE. Donor Site Morbidity following harvest of Split Thickness Skin Grafts in South-Eastern Nigeria. J West Afr Coll Surg, 2011; 1(2): 86-96.
7. Sibanda M, Sibanda E, Johnson K. A prospective study of aetiological factors and outcome of management of lower ulcers. European Tissue Repair Society (ERTS) Annual Meeting, PISA 2006.
8. Falanga V, Eaglstein WH. Management of venous ulcers. Am Fam Physician, 1986; 33: 74-81.
9. Olawoye OA, Ademola SA, Iyun AO, Michael AI, Oluwatosin OM. Management of Split Skin Graft Donor Sites in the West African Sub Region: A survey of Plastic Surgeons' Practice. Ann Burns and Fire Disasters, 2017; 30(2): 146-9.
10. Weber RS, Hankins P, Limitone E, Callender D, Frankenthaler RM, Wolf P, Goepfort H. Split thickness Skin Graft Donor Site Management: A randomized prospective trial comparing a Hydrophilic polyurethane absorbent foam dressing with a petrolatum gauze dressing. Arch Otolaryngol Head Neck Surg, 1995; 121(10): 1145-9.
11. Cigna E, Tarallo M, Bistoni G, Anniboletti H, Trignano E, Totorelli G, Scuderi N. Evaluation of Polyurethane dressing with ibuprofen in the management of Split Thickness Skin Graft Donor Sites. In vivo, 2009; 23(4): 983-6.
12. Domseifer V, Lonic D, Gerstung TI, Herter F, Fichter AM, Holm C, Schuster T, Ninkovic M. the ideal split thickness skin graft donor site dressing: a clinical comparative trial of a modified polyurethane dressing and aquacel. Plast Reconstr Surg, 2011;

128(4): 918-24. DOI: 10.1097/PRS.06013e3182268c02.
13. Unas S, Ersoz G, Demirkan F, Arslan E, Tūtūncū N, Sari A. Analysis of skin graft loss due to infection: infection-related graft loss. Ann Plast Surg, 2005; 55(1): 102-6
14. Ongeti KW. Split thickness Skin Grafting in an Immunocompromised Patient at Kenyan National Hospital. Webmed Central Surg, 2012; 3(4): WMC003037.
15. Rotatori RM, Starr B, Peake M, Fowler L, James L, Nelson J, Dale EL. Prevalence and Risk Factors for Hypertrophic Scarring of Split Thickness Autograft Donor Sites in a Paediatric Burn Population. Burns, 2019; 45(5): 1066-1074. DOI: 10.1016/j.burns.2019.02.003