IBOM MEDICAL JOURNAL
Vol.19 No.3 | July - September 2026 | Pages 611-618
www.ibommedicaljournal.org

Prospective study comparing serial debulking strategy and traditional method for graft donor site management: impact on length of hospital stay

Rijami Godwin Ekpo[1], Maurice E. Asuquo[2], Roseline Duke[3]

[1]Division of Burns, Plastic & Reconstructive Surgery, Surgery Department, University of Calabar Teaching Hospital, Calabar.
[2]Oncology and Colorectal Unit, General Surgery, Surgery Department, University of Calabar Teaching Hospital, Calabar.
[3]Department of Ophthalmology, University of Calabar Teaching Hospital, Calabar.

Abstract

Skin graft donor site morbidity can be devastating and often time leads to prolonged duration of length of hospital stay. The use of serial debulking strategy in the management of skin graft donor site wounds was found to be associated with decrease burden of donor site morbidities and shorter duration of length of hospital stay.
The study was a prospective Quasi -experimental research. The participants were assigned into two groups based on non-randomised criteria.
Results: sixty-seven patients participated in the study. Twenty-seven (27) were managed with the traditional approach and the remaining forty (40) were managed using the serial debulking approach. The mean duration of re-epithelization of the donor site wounds were 32.7± 5.6 days for the s traditional approach and 19.6±2.6 days for the serial debulking strategy.
The mean length of hospitalization ±SD (days) were 58.1±3.7 for traditional approach and 34.8 ±2.8 for the serial debulking strategy and both methods were equally statistically significant.
Conclusion: The innovative serial debulking strategy for the management of skin graft donor site wound have been found to be associated with less donor site morbidities, faster and satisfactory re-epithelization of donor site wound and a significant shorter duration of length of hospital stay.
Therefore, we advocate the use of serial debulking strategy in the management of skin graft site wounds while calling for further research to compare serial debulking strategy and use of advance dressing materials for management of skin graft donor site wounds.

Keywords: Skin graft, serial debulking, donor sites, length of hospital stay, quality of life.

Introduction

Split thickness skin grafting is the transplant of free partial thickness skin referred to as split skin from one part of the body (the donor site), to another part of the body (the recipient site), in the same individual (autograft) or transplant of partial thickness skin from one individual to another individual of the same species (allograft)[1,2]. It is a standard care of choice for management of extensive burn injuries, large cutaneous wounds that cannot be closed primarily by re-approximation of wound edges including cutaneous defects following traumatic injuries, post tumour excision defects and in reconstruction of damaged mucosal membranes example buccal mucosal membrane; and for provision of lining

Corresponding Author:

Dr. Rijami Godwin Ekpo
Division of Burns, Plastic & Reconstructive Surgery, Surgery Department, University of Calabar Teaching Hospital, Calabar, Nigeria

rijigodwin@unical.edu.ng

DOI: 10.61386/imj.v19i3.1186

within the genital tract as in vaginal reconstruction[2,3].

The harvest of the split thickness graft which comprises of the epidermis and varying thickness of the dermis creates a secondary defect called the donor site defect or skin graft donor site wound.

These donor site wounds present a major concern to the attending surgeon who does everything possible to ensure faster and satisfactory healing of these wounds. The donor site wounds heal by the process of epithelization. This process occurs following replication, proliferation and migratory activities of epithelial cells at the wound edges and other skin appendages within the partial thickness wounds including basal keratinocytes, hair follicles, sweat glands and sebaceous glands[1,3].

This method of healing also referred to as quaternary wound healing is associated with little or no complications. The development of complication at this sites leads to donor site morbidities. These complications may be grouped into shorter term and long term complications[4-8].

Recall that the expected trajectory for donor site healing ranges from 7 to 21 days. Complications arising within this period may be referred to as short term consequences. They include pain, itching, infection, bleeding and delayed healing[9,10].

The long term complications are numerous with far reaching negative consequences including disfiguring scars, prolong hospital stay especially among the elderly, increase expenditure of personal and institutional resources, aesthetic dissatisfaction, emotional stress and depression[10,11]. Some of the patients serve as breadwinners for their families and may be contributors to the national income pool. These morbidities may impact negatively on the patient's physical and psychological well being, and directly impact on patient's quality of life (QoL). It is therefore very important to address these complex challenges associated with skin graft donor site morbidity in order to optimise surgical outcomes and improve post surgical quality of life (QoL)[2,4].

However a number of risk factors have been identified and are known to delayed healing or lead to skin graft donor site wound complications. They include age of the patient and associated co-morbidities example hypertension, diabetes mellitus, renal insufficiency, cardiovascular diseases, smoking and nutritional status of the patient[12-16].

The primary concerns of the surgeon are the prevention of skin graft donor site morbidity and the healing of the primary defect, as the donor site has the potential for physical complications as well as psychological complications. The combined physical and psychological effects lead to altered body image, reduced functionality and dissatisfaction with one's physical appearance[5,6]. In addition, patients who suffer prolonged recovery following skin graft donor site morbidity also experience extended rehabilitation process which is associated with prolonged discomfort, and necessitating further expenses and loss of man hours and resources.

Therefore, it is important to take adequate measures to help prevent the development of these complications. Some of such measures include identification of the risk factors, meticulous wound care which involves wound protection, moisture management, infection prevention and patient education. Also important is the advocacy and application of the new treatment modality.

Patients & Method

The study was designed as a single centre prospective, Quasi-experimental research and was carried out at the University of Calabar Teaching Hospital Calabar, South-South Nigeria.

The study period covered a three year period from June 2021 to March 2024. A proforma was designed and used to record details of patient's bio-data, clinical data and relevant investigations.

The participants were assigned into two groups. They all had the same pre-operative preparation and intra-operative care including dressing of the split thickness skin graft donor site wounds. What differed was the post-operative management approaches to the donor site dressing.

Peri-operatively, the eligible patients recruited into block A and Block B underwent the following stages: administration of anaesthesia through either spinal anaesthetic block or general anaesthesia, the skin preparation of patient's donor site(s) before the recipient site(s). draping of the patient(s) with exposure of the operation site(s). The harvest of the split thickness skin grafts from the donor-site(s) was then accomplished using an hand held dermatome (humby knife).

Effort was made to have control on the depth of the harvest for the purpose of consistency. The dimensions for the size and depth of donor site wounds were recorded. The size calculated using the linear ruler method in centimetre square. The depth was estimated with the calibrations on the hand held dermatome in millimetres. The donor site wounds were dressed using four-layered dressings of non-adherent layer, a capillary layer, an absorbent layer and finally a splinting layer using a crepe bandage.

All patients had similar post-operative antibiotics, analgesic and instructions including elevation of the limbs where applicable.

Post operatively, patients in Block A had their split graft donor site wounds inspected traditionally on the 14th day post operatively. The healing wound(s) were cleaned with normal saline and further management was determined by the clinical state of the wound. Subsequent management completed the cycle of traditional method of management. Patients in Block B who received the serial debulking strategy for their skin graft donor site wounds had their first approach to the wound management on the 4th day post-operatively. The splinting layer and possibly in some cases the gamgee layer were removed on the 4th day post-operatively.

Subsequently layers were removed sequentially every 2-3 days until the last non-adherent layer. Any additional management if indicated was determined after taking down the last non adherent layer, which was in most instances left to fall off on its own or subtly removed about 10-12th day post operatively.

The drugs and post operative cares for the recipient sites and the holistic management of the patient proceeded as usual. The various outcomes for patients in Block A and Block B were noted and documented accordingly for analyses.

The coding for the sizes of donor site wounds was entered as follows:

Small size wound equivalent to wound area < 20cm by 20cm.

Medium size wound equivalent to wound area > 20cm by 20cm.

Large wound equivalent to wound area > 30cm by 30cm.

Extensive wound equivalent to wound area > 40cm by 40cm.

These figures were adopted for this study as there is no single, universal standard definition for the categories of wounds.

The coding for the depth of wound was based on the thickness of the split thickness skin graft harvested. This was recorded as follows:

1 represented depth of donor wound between 0.15 – 0.3mm.

2 represented depth of donor wound between 0.31 – 0.45mm.

3 represented depth of donor wound between 0.46mm – 0.6mm.

These figures are adapted from the thickness of the split thickness skin graft categorized as thin, medium thickness and thick split thickness skin graft.

Results:

A total of sixty-seven (67) patients participated in the study. Twenty-seven (27) of them were managed using the traditional method while the remaining forty (40) patients were managed using the innovative serial debulking strategy. The ages of the patients were between 6years and 70 years old. The mean age ±SD was 33.9±11.5 for those managed by the traditional method and 33.5±14.2 for those managed by serial debulking strategy (T-test 0.133; p-value 0.895). The ages distribution (chi-square=

Table 1: Socio-demographic characteristics and comorbidities of patients who received traditional and serial debulking management approaches in skin grafting

Variable	Management approach		Total N=67	Chi square	p-value
	Traditional n=27	Serial debunking n=40			
Sex					
Male	10(37.0)	23(57.5)	33(49.3)	2.700	0.100
Female	17(63.0)	17(42.5)	34(50.7)		
Age group/years					
<25	5(18.5)	9(35.0)	14(20.9)	.180	0.981
25-34	10(37.0)	14(35.0)	24(35.8)		
35-44	6(22.2)	9(22.5)	15(22.4)		
≥45	6(22.2)	8(20.0)	14(20.9)		
Mean age ±SD					
Highest education					
Primary	2(7.4)	4(10.0)	6(9.0)	FET,1.708	0.418
Secondary	10(37.0)	9(22.5)	19(28.4)		
Tertiary	15(55.6)	27(67.5)	42(62.7)		
Associated comorbidity					
No	15(55.6)	21(53.8)	36(54.5)	.019	0.891
Yes	12(44.4)	18(46.2)	30(45.5)		

0.180, p-value =0.981); the sex distribution (chi-square = 2.700, p-value=0.100); and the presence of co-morbidities (chi-square = 0.019, p-value = 0.891) between the two management strategies did not demonstrate statistical significance.

A comparison of the coding for size and depth of donor site wound between patients managed by the traditional method and those managed by serial debulking management approach during skin grafting demonstrated statistical significance (FET, 13.607, P-value = < 0.001) for the sizes of donor site wounds between the two groups and no statistical difference (FET, 1.792, p-value =0.522) for the various depths between the two groups.

Table 2: Comparison of coding size and depth of donor site between patients who received traditional and serial debulking management approach in skin grafting

	Management approach				
Variable	Traditional n=27	Serial debunking n=40	Total N=67	Chi square	p-value
Coding size					
Small	6(22.2)	13(32.5)	19(28.4)	FET,13.607	<0.001*
Medium	7(25.9)	16(40.0)	23(34.3)		
Large	6(22.2)	11(27.5)	17(25.4)		
Extensive	8(29.6)	0(0.0)	8(11.9)		
Depth of donor site					
1	25(92.6)	39(97.5)	64(95.5)	FET,1.792	0.522
2	1(3.7)	1(2.5)	2(3.0)		
3	1(3.7)	0(0.0)	1(1.5)		

*=statistically significant

The duration of re-epithelization/day (FET, 14.346, p-value = , 0.001) and the mean duration of re-epithelization ± days (T-test; 3.689, p-value = < 0.001) and the degree or extent of re-epithelization at day 14 ± SD% (T-test; 6.232, p-value = < 0.001); all demonstrated statistical significance between the two management strategies. Also a comparison of length of Hospital stay (days) (FET; 18, 505, p-value = < 0.001) and Mean length of hospitalization ±SD (day) (T-test; 3.115, p-value=0.003) between patients managed by traditional approach and patients managed by serial debulking strategy all demonstrated statistical significance (see fig).

The implications from the above shown that tables 3, 4 and 5 affirms positive test results which reject the Null hypothesis and confirm the Alternative hypothesis. The study further affirms that the serial debulking management strategy for the management of skin graft donor site wounds after split thickness skin graft harvest leads to faster and satisfactory re-epithelization of the donor site wound and a shorter duration of hospital stay.

Table 3: Comparison of re-epithelization between patients who received traditional and serial debulking management approach in skin grafting

	Management approach				
Variable	Traditional n=27	Serial debunking n=40	Total N=67	Chi square	p-value
Duration of reepithelization/days					
14-28	16(59.3)	38(95.0)	54(80.6)	FET,14.346	<0.001*
35-49	9(33.3)	1(2.5)	10(14.9)		
56-70	1(3.7)	0(0.0)	1(1.5)		
77-91	1(3.7)	1(2.5)	2(3.0)		
Mean duration of re-epithelization ±days	32.7±5.6	19.6±2.6	25.1±5.1	T-test; 3.689	<0.001*
Degree of reepithelization at day 14 ±SD %	70.0±13.1	88.8±11.4	81.2±15.2	T-test; 6.232	<0.001*

*=statistically significant

Table 4: Comparison of length of hospital stay between patients who received traditional and serial debulking management approaches in skin grafting

	Management approach				
Variable	Traditional n=27	Serial debunking n=40	Total N=67	Test statistics	p-value
Length of hospitalization/days					
≤30	3(11.1)	20(50.0)	23(34.3)	FET; 18.505	<0.001*
31-60	13(48.1)	17(42.5)	30(44.8)		
61-90	9(33.3)	1(2.5)	10(14.9)		
91-120	1(3.7)	1(2.5)	2(3.0)		
121-150	1(3.7)	1(2.5)	2(3.0)		
Mean length of hospitalization ±SD days	58.1±3.7	34.8±2.8	44.2±3.8	T-test; 3.115	0.003*

*=statistically significant

Table 5: Summary of significant tests comparing the two management approaches during skin grafting

Variable	Traditional approach n=27(%)	Serial debulking n=40(%)	Total n=67(%)	p – value
Duration of satisfactory re-epithelization at 14th day	1 (3.70)	20(50.0)	21 (31.31.34)	<0.001
Mean duration of re-epithelization ±days	32.7 ±5.6	19.6 ±2.6	25.1 ± 5.1	<0.001
Degree of re-Epithelization at day 14 ±SD%	70.0 ± 13.1	88.8 ± 11.4	81.2 ±15.2	<0.001
Mean length of Hospitalization ±SD days	58.1±3.7	34.8 ± 2.8	44.2 ± 3.8	<0.003

The implications from the above shown that tables 3, 4 and 5 affirms positive test results which reject the Null hypothesis and confirm the Alternative hypothesis. The study further affirms that the serial debulking management strategy for the management of skin graft donor site wounds after split thickness skin graft harvest leads to faster and satisfactory re-epithelization of the donor site wound and a shorter duration of hospital stay.

Discussion

A number of variables were analyzed in this study. The age and sex distribution, the socio-demographic characteristic and co-morbidities in the patients were analyzed for both study groups. The results did not significantly impact on the outcome of management approaches. Although other studies have shown that the extremes of ages affect wound healing. And also that male gender and old age impair re-epithelization rate and epithelial thickness in partial thickness skin graft donor site wound[11-14]. Several other potential risk factors are known to affect the healing processes of the skin graft donor site wound after split-skin harvest. They include age as already mentioned[11-13], co-morbidities example diabetes mellitus[14], human immunodeficiency virus infection, cardiovascular insufficiency, cigarette smoking, and autoimmune disease[13-15]. It is important to note these co-morbidities and to evaluate them in all patients undergoing skin graft procedure. The surgeon is expected to take appropriate measures to correct the dysfunctions and optimize the patient where necessary.

Another important factor analyzed that affects the healing of split thickness skin graft donor wound is the depth of the harvest. The depth and size of skin graft donor wound of a split thickness skin graft directly impacts on the rate of re-epithelization. This was clearly demonstrated in the study. The smaller or thinner the depth of the secondary defect, the faster was the rate of re-epithelization. This position has been supported by many authorities. This is explained by the fact that the thinner the split graft, the shallower the dermal wound. The shallower the dermal wound the more the skin appendages left behind. These skin appendages includes dermal hair follicles, sweat glands and sebaceous glands which plays a very important role in the epithelization process[2,11,16-19].

The next important risk factor affecting the rate of re-epithelization and length of hospital stay is the nature of dressing at the skin graft donor site wound. They are several wound dressings for the split thickness skin graft donor site wounds. The choice of a dressing material will largely be influenced by the cost of the dressing materials, availability of the dressing materials, the effectiveness, the ease of handling the dressing among other factors. The consideration of the above features becomes very important especially as there is no ideal dressing material. Essential features that an appropriate dressing material should have include; the dressing should promote rapid wound healing, reduce pain especially during dressing change, decrease scar abnormalities and be easy to handle.

The new dressing materials or advance dressings tend to provide an environment that encourages moist wound healing thereby accelerating re-epithelization and reduces the severity of pain.

The current trend is to replace the traditional dressings with the technologically advanced dressings with some experts providing more personalized management strategies. This makes the choice of wound dressing for the skin graft donor site dressing more complex. In this study, the use of primary non-adherent layer being the petroleum jelly impregnated tulle combined with a povidone iodine soaked gauzes dressing gives results similar to the newer products such calcium silver alginates, hydrocolloid, hydrogel foams etc.

These products are associated with faster and satisfactory re-epithelization of graft donor site wounds, which in turn leads to shorten hospital stay. The factors linked to prolonged hospital stay should be prevented as they also influence the family resources, the health facility as well as the economy of the nation too.

Conclusion

This innovative serial debulking strategy for the management of split skin graft donor site wounds has been found to be very rewarding. The management strategy is associated with faster and satisfactory re-epithelization of skin graft donor site wounds and a shortened duration of hospital stay thereby preventing other poor outcomes and harsh economic influences on the families and public health systems. There is need for a further research

and wider advocacy on its use.

References

1. Wax MK, Pihman AL, Stepnick DW, Mayer AD, Smith RV. Split thickness skin grafts Jul 2023. Medscape. https:??emedicine.medscape.com>Dermatology.
2. Malachsy A, Izy-Chi Y, Qi Y, Elaine B, Hallen H, Sara H et al. Split thickness skin graft donor site morbidity: a Systematic review. Burns,2021; 47(7): 1525-1546.
3. Otene CI, Olaitan PB, Ogbonnaya IS, Nnabuko RE. Donor site Morbidity following harvest of split thickness skin grafts in south easten Nigeria. J West Afr. Coll Surg. 2011 Apr-Jun; 1 (2): 56-96. PMB:27182501; PMCD: PMC 4614977.
4. Hodea FV, Hariga CS, Bordeanu-Diacone-SCU EM, Cretu A, Dumitru CS., Ratoru VA et al. Assessing Dono site morbidity and impact on quality of life in free flap micosugery: an overview. Life, 2025; 15 (1): 36 https:??dio.org/10.3390/life 15010036
5. Mmahoney J. Complications of free flap donor sites microsurgery 1995;16: 437-444
6. Manek YB, Jajoo S, Mahakalkar C. A comprehensive Review scar outcomes in skin transfers techniques cureus 2024, 16. e53433.
7. Beldon P. What you need to know about skin grafts and donor site wounds. Wound Essentials. 2007; 2:149-155
8. Holden J. Top tips for skin wound Essentials. 2015; 10(2): 7-13
9. Mathes SJ. Plastic surgery volume1: in general principles (2nd edn) Elsevier: Philadelphia. 2006.
10. MC Gregor I, Mc Gregor A. Fundamental techniques in Plastic surgery and their surgical application (10th edn) churchchil livingstone: London. 2006.
11. Cusson D, Sullivan J, Few Q, Barnes, D. Suprathek Versus Hypafix in the management of split thickness donor site wounds in the early: A randomised controlled trail. OCT 2024 European burn journal.
12. Fatab M F, Ward CM. The morbidity of split-skin graft donor sites in the Elderly: the case for mesh grafting. 37 (2): 184-190.
13. Mehdi A, Abdolkhalegh K, Hamid B, Rayman A, Sam M. Comparison of the results of early excision and grafting between children and adults; a prospective comparative study. Bull Emerg trauma. 2017 jul; 5(3): 179-183.
14. Wehrens KM, Aroldussen CW, Bodi DI, Vander Hulst RR,. Clinical Evaluation of wound Healing in split skin graft Donor site using microscopic Quantification of re-epitheliazation. Adv skin wound Care. 2016 Jun; 29(6): 254-60. Doi:10.1097/01. ASW.0000481179. 88936.d4. PMD: 27171253.
15. Choi SK, Kim CK, Jo DI, Lee MC, Kim JN, Choi HG et al. Factors Associated with a prolong length of hospital stay in patfients with diabebtic foot: a single centre retrospective study. Arch plast surg. 2017; 44(6): 539-544
16. Seppala T, Grunthal V, Koljonen V. Skin graft healing among Elderly patients with Dermatoporosis- A case series@ the international Journal of lower Extremity wounds. 24. No1 (2025): 245-249.
17. Jansen P, Stoffels I, Klode J. Post Surgical Treatment of split skin graft donor site in Dermatological departments. The international Journal of lower Extremity wounds 2018; 17(1): 22-29. Doi:10.1177/1534734617747685 https:??doi.org/10.1177/1534734617747685.
18. Wax MK, Meyers AD, Phman AL, Ghanem TA. Split-Thickness skin grafts medscape Jul: 2023 emedicine. Medscape. Come/article/876290-overview?
19. Ribeiro RVE . Split-thickness skin graft donor site dressing: is it possible to establish the ideal dressing based on interpretation review Rev. Bras. Cir. Plast. 2018: 33(1): 119-129
20. Alhindi N, Quari S, Houriah H, Althagafi A, Samandar A, Alsuhaim A et al. Dressing influence on Re-epitheliazation Rate following split thickness skin graft harvest: network meta-analysis of randomized controlled trails. Plastic & Reconstructive surgery-Global open 13(5): p e6748, May 2025. Doi.10.1097/GOX 0000000000006748.
21. Hecker A, Lumenta DB, Brinskelle P, Sawatz I, Steiner A, Michelistch B et al. Randomized controlled trail of three advanced wound dressings in split thickness skin grafting donor

site- A personalized approach. J pers med. 2022 Aug 27; 12 (9): 1395. Doi:10.3390/jpm 12091395. PMP: 36134180; PMCD: PCM 9506097.

22. Yi Zhang TW, Ying L, Jisheng D, Tiafei Y, Hua X. Comparison of negative pressure dressing and conventional dressing in the management of skin grafts at the donor site of the latissimus dorsi flap January 2023 ISSN 1943-2704 Index Wounds. 2023; 35(1): E69-E73 doi:10.25270/wnds/22055.
23. Maduba CC, Nnadozie UU, Modekwe VI, Nwankwo EU. Comparing hospital stay and patient satisfaction in a resource poor setting using conventional and locally adapted pressure wound dressing with split skin graft: a comparative prospective study. Research/Volume 336, article 105, 18 june 2020 doi.10.11604//pamj.2020.36.105.19961 https://www.panafrican-med-journal.com/content/article/36/105/full/.
24. Choi SK, KIM CK, Ho DI, Lee MC, Kim JN, Choi HG et al. Factors associated with a prolonged length of hospital stay in patients with diabebtic foot: a single centre retrospective study. Arch plast surg. 2017; 44 (6): 539-544.
25. Kanapathy M, Mosahebi A. Comparative study on the donor site aesthetic outcome between epidermal graft and split-thickness skin graft Int Wound J. 2019; 16: 354-359 https://doi.org/10.1111/iwj/13039.