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SERIAL DE-BULKING OF PETROLATUM GAUZE DRESSING OF SPLIT THICKNESS SKIN GRAFTING DONOR SITES IN LOW RESOURCE HOSPITAL

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ABSTRACT

Introduction: Split thickness skin grafting is one of the reconstructive options available to surgeons after a soft tissue loss. It is a common procedure performed by most Surgeons. Donor site morbidities has been the major drawback in the acceptance of this procedure to the patients. Any technique that will significantly reduce the donor site morbidity will be well appreciated. **Aim**: To know if there is a significant reduction in the rate of morbidity in petrolatum gauze dressing of split thickness skin grafting with serial de-bulking and topical antimicrobial application **Methodology**: this is a prospective study comparing the rate of morbidities in patients with serial de-bulking of petrolatum gauze dressing and the control group. Group A had serial de-bulking on day 5, 10, and group B had none until review on day 14. The patients are serially allocated into each group with all the odd number patients in Group A while all the even number patients in Group B. These are the patients that have indication for skin grafting and accepted to be part of the study. Patients with medical co-morbidities were excluded from the study. The P-value < 0.05 is considered statistically significant. **Results**: 50 patients were involved in the study with 25 patients in each group. All the patient had donor sites on the unilateral thigh, though the extent of the donor was not considered in the study. The male to female ratio of 1.35:1 in group A and 1.5:1 in group B, with P-value of 0.54. The age mean age 45.6years in group A while the mean age 43.5years in group B, the P-value of 0.35. Trauma is the commonest aetiology in the study in both groups, followed by necrotizing fasciitis. Wound delay and wound infection were 20% and 12 % in group A and 40% and 28% in group B respectively. The P-value of 0.034 and 0.015 for delay wound healing and wound infection respectively. **Conclusion**: serial de-bulking and application of topical antimicrobial agent reduces the donor sites morbidity significantly.

KEYWORDS: split thickness skin grafting, donor sites, petrolatum gauze dressing, serial de-bulking, povidone iodine.

INTRODUCTION

Skin grafting is one of the methods of providing soft tissue cover. This has been practiced by General Surgeons, Orthopedic Surgeons, Plastic Surgeons and Family Physicians. However, most of these procedures are done recently by the Plastic Surgeons in our clime.[1] Though it is minor surgery in most cases, it can lead to serious morbidity in patient especially those that have donor sites complications/ morbidity. Skin grafting are two (2) types depending on the extent of inclusion of the dermis i.e. split thickness or partial thickness skin grafting and full thickness skin grafting. The split thickness graft comprises of the epidermis and part of the dermis while the full thickness skin graft comprises of the epidermis and full complement of the dermis. The split thickness skin grafting is more frequently done and donor sites can be from any part of the body. The full thickness donor sites are only limited to part where there are skin folds or redundant skin. The donor sites healing have been a major concern for the surgeon and the patients because it is an iatrogenic wound expected to heal without any complication or morbidity. Several dressing agents and technique have been use to achieve this goal.[2-5] Feldmann DL et al[2-3] had categorize these types of dressing into 5 i. e. open, semi-open, occlusive, semi-occlusive and biological. Some of these dressing materials and technique are expensive and not readily available in a low resource economy like ours and majority of the patients are not covered in the newly introduced National Health Insurance Scheme. These patients are involved in out-of-pocket payment for their health care and cannot afford the new near ideal dressing material for the donor site. Most of these patients can only afford the readily available petrolatum gauze dressing (semi-open dressing) with the attendant high delay wound healing and wound infection.[6] This

dressing is applied intra-operatively and are expected to remain intact until 14-21 days when it is removed or falls off on its own. There is a high index of suspicion of delay in wound healing or wound infection if there is significant pain and tenderness between 5-7 post-operative day. It is expected that the wound should have re-epithelized by this time. Wound infection can result from exogenous or endogenous micro-organisms. However, the majority of the organisms that resulted in wound infection in split thickness skin graft donor sites are of endogenous in origin especially from the surrounding skin flora. When there is need for change of this dressing in the ward, aseptic protocol for wound dressing must be strictly followed.[7-8] The conventional method of wound dressing result in offensive odour from stale blood or purulent discharge from the donor site. The serial de-bulking of the dressing eliminates most of the odour and reduce the wound infection by removal of the outmost part of the dressing and application of sterile povidone iodine soaked gauze. which must be done aseptically.

METHOLOGY AND MATERIALS

This is a prospective study that was done at the Plastic Surgery Division of the Department of Surgery, Irrua Specialist Teaching Hospital, Irrua, Edo State, Nigeria for a period of 30 months between July 2017 and December 2019. This is one of the Federal Tertiary Hospital situated in the Sub-urban part of the Country. It is purposefully situated along one of the three main corridors that connect the southern part of the country to the northern part and receives a significant numbers of the trauma victims along this corridor. The hospital mainly serves the people of the Edo Central and Edo north Senatorial districts and the adjacent States of Ondo, Delta, Ekiti and Kogi. The patients involved in the study, are those that presented to the Plastic Surgery Division and had indication for split thickness skin grafting. The exclusion criteria are mainly patients presenting with medical co-morbidities and malignancies. These patients had their haemoglobin concentration, serum protein and wound biopsy for microscopy, culture and sensitivity done before the surgery and considered appropriate and adequate for operation. The patients were recruited and allocated into the groups serially without any other consideration. The following data were collected from the patient: the biodata, the occupation, the aetiology of the wound, delayed wound healing and wound infection and the micro-organism isolated. These data were analyzed using the SPSS and the P-value less than 0.05 was considered to be statistically significant. Normal healing of the donor sites in this study is accepted to have taken place when the wound had healed on or before 14 days after the procedure. This is considered so because the split thickness skin grafting donor site is said to be similar to a superficial partial thickness skin burns which is expected to epithelized within 14 days' post injury. All the donor sites are dressed with 4 layered convectional petrolatum dressing consisting of the innermost non adhesive petrolatum impregnated gauze, followed by 10% povidone iodine soaked gauze to serve as both topical antimicrobial and capillary layer, then the absorbent layer of Gamgee and the outermost layer of crepe bandage to keep the dressing in place. In group A, the donor sites dressing had serial de-bulking on day 5 and 10, before complete removal of the dressing on day 14. The donor sites dressing in group remained intact until day 14 when the wound was reviewed. Any of the donor sites that had not healed at day 14 will be considered to be delayed wound healing if it healed by day 21, this may be due to the depth of the skin harvested or the patient genetic make-up. However, the wound beyond day 21 is considered to be due to infection and wound biopsy was done for microscopy, culture and sensitivity. The manual dermatome was used in all patients, to harvest skin from the donor sites. The serial de-bulking means the removal of the Gamgee or the absorbent and the capillary gauze layer until the level that is adherent to the wound, then fresh layer of povidone iodine is applied and retained by a new crepe bandage. As the healing progress, the layers of dressing will be less adherent to the wound and less dressing will be retained.

RESULTS

There were 50 patients, involved in this study. 25 patients were in each of the group. Group A has 11 females and 14 males with male to female 1.35: 1 while the group B had 10 females and 15 males with male to female ratio of 1.5:1, with P-value of 0.54. Therefore, there is no statistical difference in the gender distribution of the two groups. The age range from the 10years to 75years in this study, the group A had an age range from 12 - 75 years while the group B had age ranging from 10 - 71 years. The age range in both groups are similar and also the sex distribution is similar in both groups. The peak of the age distribution was in the fourth and fifth decade of life which account for 58% of the patients as shown in Fig. 1. The occupation of these patients is as shown in Fig. 2 below. The commonest occupation in this group are the farmer followed by civil servants and the least were traders. The aetiology of the indication for the split thickness skin grafting were analyzed and displayed in Fig. 3 below. Trauma was the aetiology for indication for the procedure in majority of the patients, and followed by necrotizing fasciitis in both groups of patients. However, the next of these were was burns in group A and chronic venous ulcer in group B.

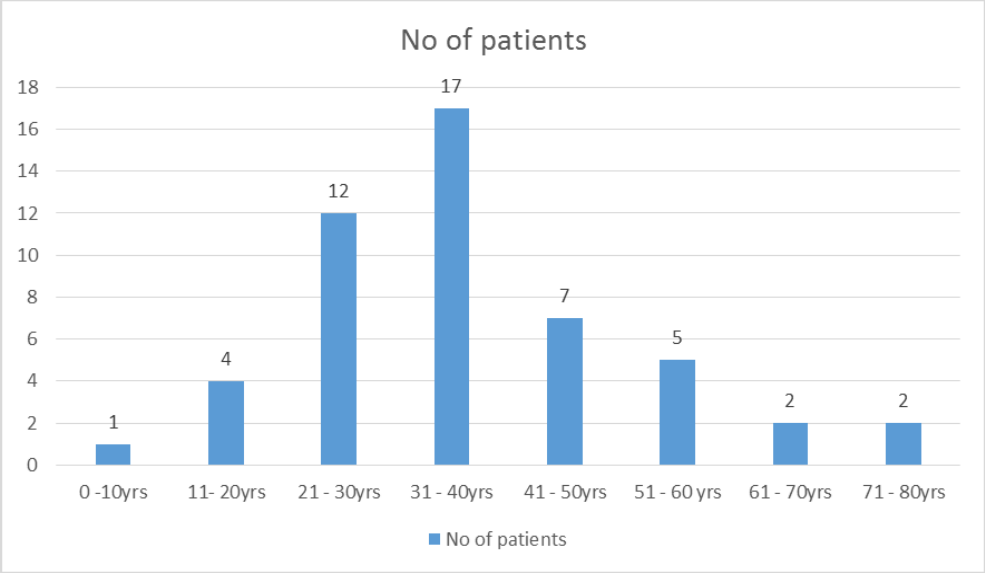

Fig. 1 The Age Distribution of the Patients.

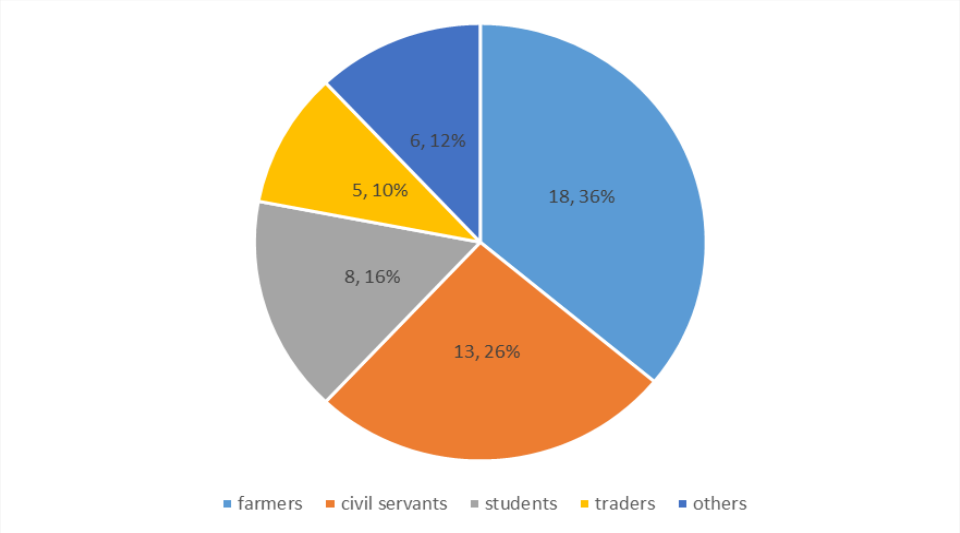

Fig. 2 Occupation of the patients.

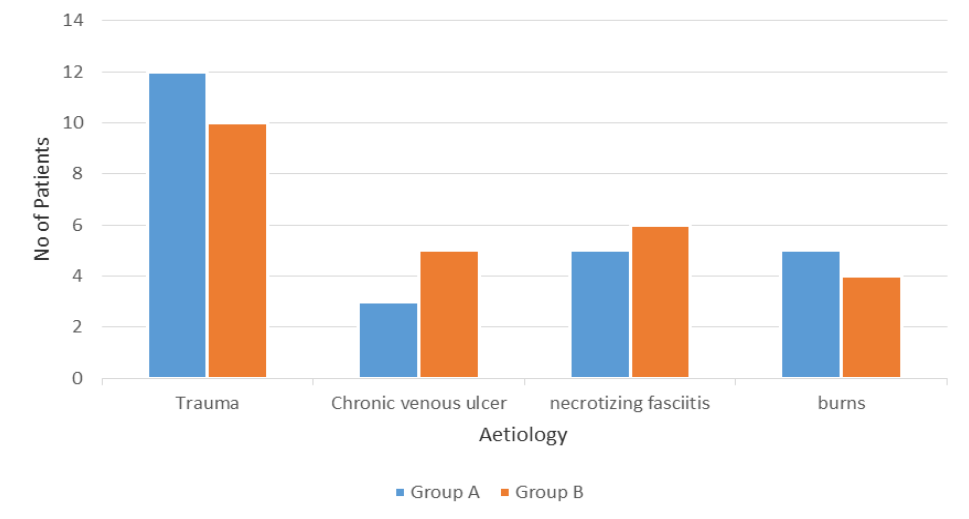

Fig. 3 The aetiology of the ulcers.

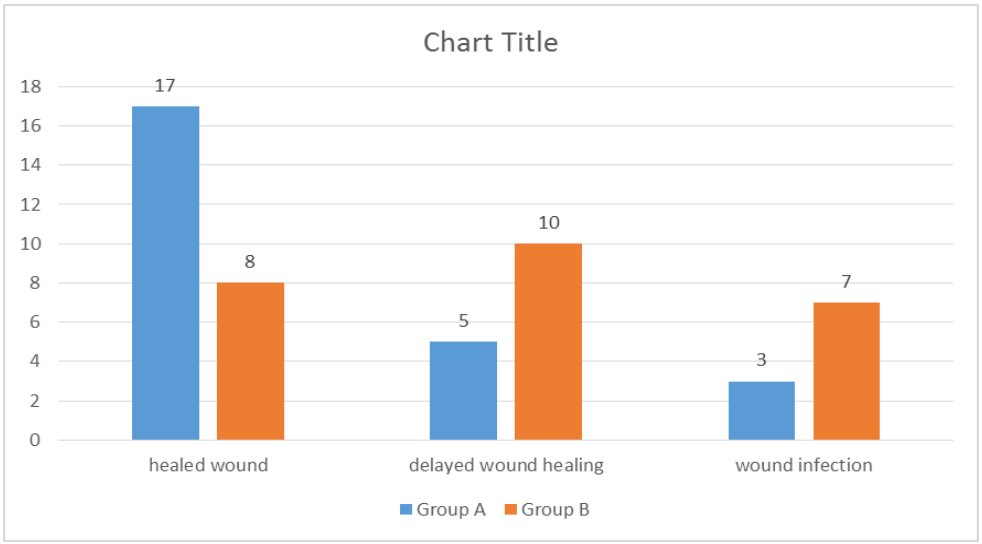

Fig. 4 Chart showing the healed wound, delayed wound healing and wound infection in the group A and Group B respectively.

As shown above in Fig. 4, more than twice the patients in Group A had healed donor sites wound on or before 14 days after the operation compare to Group B. Delayed wound healing and wound infection are far less in the Group A. 68% of the patients in the group A had healed donor site on or before day 14 as expected in normal donor site wound compared to 32% in group B with a P-value of 0.002. The patients with delayed wound healing and wound infection were 20% and 12 % respectively in group A and 40% and 28% in group B. The P-value was 0.034 and 0.015 for delay wound healing and wound infection respectively. The patients were follow-up to the post opereative day 60, 2(8%) patients had hypertrophic scaring and itching, in the patients that had normal healing, 9(60%) patients had hypertrophic scaring and itching among the patients that had delayed wound healing and all the patients with wound infection had hypertrophic scaring and itching. There is a direct correlation between delayed wound healing and wound infection with development of the hypertrophic scar and itching.

Fig 5. Manual Dermatome (Humby's Knife)

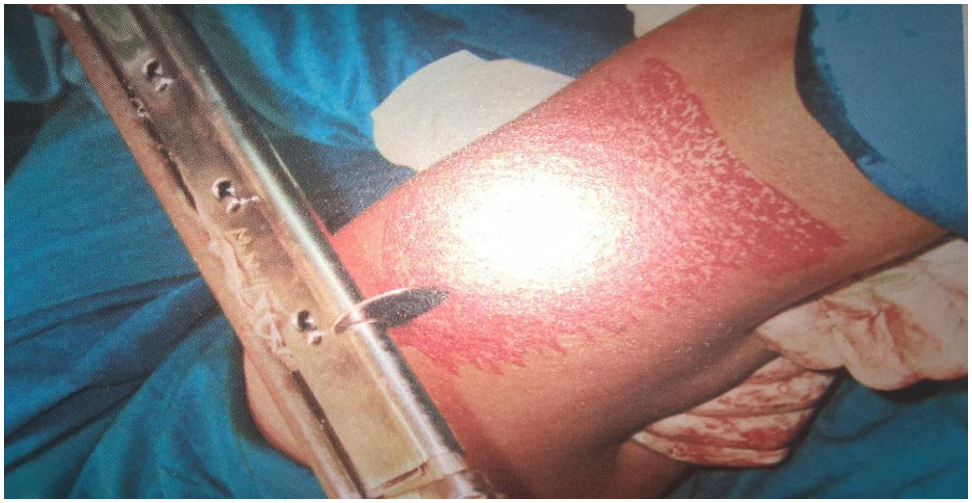

Fig. 6 Harvesting of Split Thickness Skin Graft from the anterior thigh.

Fig. 7 The 4-layered Petrolatum gauze dressing.

Fig.8 The Donor Site at 14th day.

DISCUSSION

Skin grafting has been a modality for the coverage of extensive wound for over 6 centuries. It has been considered as one of the commonest minor surgeries performed by general surgeons, trauma surgeons, orthopedic surgeons and plastic surgeons.[1] Split thickness skin grafting is a type of skin grafting, in which a split thickness graft is taking from a donor site from the same patient. This graft consists of the epidermis and variable thickness of the dermis. Donor site wound is comparable to abrasive wound or superficial partial thickness burn wound that expected to heal by re-epithelization. In many instances this donor site had become a nightmare to the patient and surgeons long after the recipient site had healed. It is primarily disturbing to the surgeon because it is an iatrogenic wound.

The problem of donor site morbidity had led to different studies on the most appropriate or ideal dressing for the donor sites wound.[2-5] The newer methods of dressings are not readily available in the west African sub region and when it is available it is not affordable to the patient. The study by Olawoye et al[8] found out that most of the surgeons in the sub region still the traditional four-layered petrolatum gauze dressing. 83% of the respondents in the survey used petrolatum gauze dressing and their reason was availability and affordability in 72.3%.

This necessitate the need to see how the petrolatum gauze dressing can be improved to reduce the morbidity. There are 2 common techniques with respect to this dressing i.e. the first group that had change of the wound dressing at regular interval of 5 days (day 5, 10 and 14) and the other group that had no change of dressing until the day 14. The first group had noticed that serial wound review and change of dressing leads to repeated trauma of the healing wound, hence delayed wound healing. The second group noticed that patient always complain of bad odour from the stale blood on the dressing or from the wound infection.

The serial de-bulking of the petrolatum gauze dressing was improvement over the two previous method of management. The dressing is removed down to the level that is adherent to the wound, usually removing the adsorbent layer and the topmost layers of the povidone soaked gauze. The few pieces of freshly povidone soaked gauze is replaced and new crepe bandage applied. This is done first on day 5, then repeated on day 10 also with few pieces of povidone soaked gauze above the petrolatum impregnated gauze (tulle-gras) and this will be completely removed on day 14. This method was able resolved the issue of repeated trauma and odour. It also takes care of wound infection because of serial application of povidone iodine soaked gauze. The adherent part of the dressing was not forcefully removed because it was considered to be functioning like the scab. The scab acts as a protective covering of the wound until re-epithelization is achieved underneath the scab. Any premature or forceful removal of the scab will traumatize the healing leading to a fresh wound. However, the serial application of povidone iodine (a topical antimicrobial agent) soaked gauze helps to prevent wound infection.

In this study, group A were the patients who had serial de-bulking of the donor sites dressing, and application of povidone iodine soaked gauze on day 5, 10, 14 while the group B were those who had no change of the dressing until day 14. Subsequently, the wounds that were not completely healed were dressed twice weekly with tulle-gras and povidone iodine soaked gauze.

50 patients were recruited in the study and the male to female distribution in both were similar with P-value of 0.54 which is statistically not significant. The age range in both groups were also similar, so the type of patient in both group were similar. hence the result can be easily correlated. The age range was from 10-75 years, which similar to the spread of patients in the study by Otene et al[9] in Enugu, Nigeria.

Most of the patients in this study are in their fourth and the fifth decade of life, they are the young active adults who are most likely prone to one form of trauma. The trauma may be occupation-related especially in farmers and artisans. Some of them resulted from motor vehicular or motorbike accidents and assaults. The economy in this part of the country is mainly agriean and this may possibly explain the reason most of the patients in this study were farmers.

Necrotizing fasciitis was commoner than burns and chronic venous ulcers as the aetiology of the indication for the split thickness skin grafting in these patients. This may be due to the fact that the unit now manage most of its patients with chronic venous ulcers conservatively using compression bandaging. The necrotizing fasciitis may also be as a result of more people falling below the poverty line in the last few years in the country.

The hospital doesn't manage major burns due to unavailability of a dedicated burn ward/ intensive care unit. So many of the patient that who needed split thickness skin graft due to burn injuries are referred to a close-by tertiary facility with dedicated burn Centre.

Diabetic foot ulcers and ulcers from malignancies were excluded from this study because of the co-morbidity associated. These co-morbidities may actually affect interpretation of the results.

Normal wound healing in the study was considered as the donor site wound that healed within the 14 days after the harvesting of the split thickness skin graft (SSG)s. The harvesting was done using a manual dermatome (Humby's Knife Fig. 5) with the knob set between 0 and 1. This was expected to harvest thin split thickness skin grafts. Though, depending the pressure applied during

the harvesting the thickness may not be the same in the graft and from one graft to the other. The survey among the Plastic Surgeons in the West Africans Sub-region revealed that 93,5% use Humby's Knife to harvest SSG from the donor site (Fig. 6). A 4-layered petrolatum gauze dressing was applied immediately in the operating room (Fig. 7)

In the group A, there was serial de-bulking on the 5, 10 and 14-day post-operative as discussed above. Almost 70% of the donor site wounds had healed by 14th day (Fig. 8), when the whole dressing was removed compared to 32% in the group B. the rate of normal healing in the group A patients was comparable with that of hydrocolloids and alginate dressing in previous studies. This outcome of the patients in this study can actually be of significant help in improving the outcome in the low economic countries where petrolatum gauze dressing still remain the main type of dressing.

There is statistical significant reduction in delayed wound healing and wound infection in patients that had serial de-bulking of their wound dressing. This improvement associated with serial de-bulking of a petrolatum gauze dressing of a donor site of SSG can serve as bridge in the gap before the other newer wound dressing will be available and affordable in the West Africa Sub-region. Petrolatum gauze dressing is a non-moist dressing, so does not provide moisture that is needed for improved healing and re-epithelization. The serial application of povidone iodine soaked gauze at regular interval provide relatively some moisture which help in improving the rate of re-epithelization.

It has been documented in previous studies that improve healing actually leads to less complications like hypertrophic scarring and itching among others.[10-12] Similar to this, there was a significant reduction in hypertrophic scarring and itching in this study, when serial de-bulking was done. The shorter the duration of healing the less likely the possibility of developing complication of wound healing.

CONCLUSION

The ideal dressing for split thickness skin graft donor site has not been found, though several wound dressing materials had been tried. However, there is no consensus about the most preferable dressing. The commonest dressing in the west Africa Sub-region is the petrolatum gauze dressing, the modification of serial de-bulking has increase the rate of healing and reduced morbidity to an extent similar to the more expensive dressing materials that are not readily available in the sub-region.

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