### **Original Research Article**

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### An observational study to evaluate improved graft acceptance and viability after single dressing on 15<sup>th</sup> postoperative day in cases of split thickness skin graft (STSG)

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### ABSTRACT

**Background:** After split thickness skin graft (STSG), it's a routine practice to change recipient site dressing on 5<sup>th</sup> post-operative day and frequent dressing thereafter. The repeated change of recipient site dressing may interfere in graft acceptance. It's also an effort to evaluate cost-effectiveness and graft acceptance after single dressing of recipient site at the end of 2 weeks.

**Methods:** In the study group, 120 patients were operated for STSG. The recipient site dressing was done on 15<sup>th</sup> postoperative day. Observations were made regarding presence of residual ulcer at the recipient site. The results were compared with rate of residual ulcers at the recipient site in control group. The control group was comprised of 134 patients of STSG operated by the same surgeon in the previous year. Their dressing of recipient site was first changed on 5<sup>th</sup> post-operative day and multiple times thereafter. The results in both the groups were correlated with comorbidities affecting wound healing.

**Results:** The rate of residual ulcer at recipient site in both the groups was comparable with better cosmetic result and cost-effectiveness associated with the study group. In both the groups, common co-morbid factors were observed to be responsible for residual ulcers at the recipient site.

**Conclusions:** After appropriate preparation of recipient site and in absence of co-morbid factors, the single 1<sup>st</sup> dressing of recipient site on 15<sup>th</sup> post-operative day gives better cosmetic outcome. This is also cost-effective as compared to the traditional practice of frequent multiple change of recipient site dressing.

Keywords: Split thickness skin graft, Donor site, Recipient site, Time of dressing, Skin graft rejection

### **INTRODUCTION**

Care of wounds caused by varied etiology and pathogenesis consumes significant financial and resources of the healthcare system, with about £5.0 billion spent annually in caring for patients with wounds in the United Kingdom alone. This demands special attention to further optimize the current wound coverage strategies.<sup>1,2</sup> A skin graft is a thin sheet of skin harvested

from a donor site. Depending on the thickness, it may include epidermis and part of dermis (split thickness skin graft-STSG) or epidermis and dermis (full thickness skin graft-FTSG).<sup>3</sup> The STSG is often used for covering skin and soft tissue defects.<sup>4</sup> Post-operative dressing is of utmost importance after performing STSG. Over the years, the improvement in final results after STSG performed by single surgeon was thought provoking to evaluate the significance of post-operative dressing. In

the literature, various types of non-adhesive dressing materials have been described which improve wound healing at donor site and decrease the postoperative pain.<sup>5,6</sup> However, there is no fixed described protocol regarding time of 1st dressing and frequency of recipient site dressing after STSG. It is important to decide frequency and need for change of dressing after STSG as multiple dressing may disturb the graft, hamper wound healing and compromise cosmetic result. It is noticed that the viability and the graft acceptance improved remarkably by appropriate preoperative preparation of the recipient site. The etio-pathogenesis and the location of the recipient site also play an important role in the final outcome after STSG.7 In last few years, as the success rate of STSG gradually improved, we realized the importance of leaving graft undisturbed, providing conducive environment for graft acceptance and avoiding multiple dressings. So we decided to evaluate the results of single postoperative dressing on 15<sup>th</sup> day in cases of STSG. In this study we have evaluated 120 cases of STSG performed by single surgeon with single postoperative dressing on 15th post-operative day.

### **METHODS**

This is a short term observational study to assess the results of single dressing on 15th postoperative day in 120 patients operated for STSG from June 2016 to February 2017. The results were compared with that of previous practice of multiple change of dressing from 5<sup>th</sup> postoperative day onwards at the recipient site. The control arm for this case study was primary and secondary STSG operated in the preceding year (Table 1). The number of dressings done and graft acceptance rates of previously operated cases were recorded from the case papers. For the purpose of comparison, data was collected from case papers of 132 patients operated for STSG in the past whose recipient site dressing was changed on 5th postoperative day and multiple times thereafter. The various indications for STSG were similar in both the study groups which make them compatible for comparison.

All the cases were operated by the single surgeon  $(2^{nd}$  author) of this article. The observations, data analysis and review of the literature have been done by both the authors of the article.

The patients in the study group were operated for STSG for various indications as described in Table 1. There were 22 cases of trauma with variable extent of skin loss on the upper and lower extremity without exposure of underlying structures like fractured bone, nerve, vessel and tendon. After debridement, the tissue defect was covered by primary STSG on day one of trauma. After excision of malignant tumor, the tissue defect created in 10 patients was covered with primary stsg. The tissues defect after raising fascio-cutaneous flap was covered by primary STSG in 10 patients. There were 10 cases of post burn contractures), operated by release of joint contracture and tissue defect covered by STSG (Figure

1). One case of congenital anomaly (simple syndactyly of hand) received primary STSG after corrective surgery.



Figure 1: Post-burn scar across left elbow, results of scar excision and STSG at the time of 1st single dressing of 15th post-operative day.



Figure 2: Post-debridement for necrotizing fasciitis resulted in large wound over the left leg, results on 15th day after STSG.



# Figure 3: Preoperative and postoperative image of venous ulcer.

Twenty patients with diabetic foot infection who had undergone surgical debridement were operated for secondary STSG. There were 15 cases of ulcer of lower extremity (Figure 2) due to debridement of affected area in non-diabetic patients. There were 20 cases of nonhealing ulcer due to peripheral vascular disorder (PVD) (15 cases of venous ulcer (Figure 3) and 5 cases of ischemic ulcers). Two cases were operated for lower limb non-healing ulcer in HIV positive patients and 10 cases of large wound due to debridement of the eschars in burn patients were operated by secondary STSG.

The cases of chronic ulcer due to post debridement and PVD were grafted once the tissue edema had significantly subsided by limb elevation and necessary medications to improve the tissue perfusion. The cases selected for STSG in post-malignant tumor excision tissue defect were of malignancy of breast, scalp and squamous cell carcinomas on face and lower limb.

The patients with clean traumatic wounds, post fasciocutaneous flap defects, post tumor excision tissue defects and syndactyle of the hand, were selected for primary STSG. In these cases, the floor of the tissue defect was formed by well vascularised tissue such as muscle, white glistening viable fascia, peritoneum or periosteum over the bone. The remaining patients were operated by secondary STSG after appropriate preparation and treatment of the patient for systemic (Ex. Diabetes, anemia, hypoproteinemia etc.) and regional (Ex. Infection, edema, vascularity etc.) co-morbidities.

The donor site of all the cases were covered by nonadhesive dressing material like vaseline gauze, over which thick layer of Gamzee roll was covered.

The recipient site of the skin graft was covered by Vaseline gauze and then a layer of squeezed wet gamzee pad and then multiple layers of thick gamzee roll were wrapped. The plaster was applied for immobilization of the extremity wounds crossing the joints /wherever necessary. The patients received antibiotics against gram positive, negative bacteria and anaerobes depending upon the condition of the wound/ ulcer bed. Both the donor and recipient site entire dressing were removed on completion of 2 weeks after the surgery and no dressing was reapplied. The patients were advised daily bath to the healed donor and recipient site by antiseptic solution and regular coconut oil massage. The patients were advised to wear pressure garment to both the recipient and donor site of STSG, from the third week to prevent hypertrophic scar and splint to prevent contracture.

### RESULTS

In the control group, data of 132 patients was observed regarding healing of the wound at donor and recipient site. Any record of residual ulcer on  $15^{\text{th}}$  post-operative day was considered as incomplete healing. In this group, it was observed that on  $15^{\text{th}}$  post-operative day, 12 (9%) and 33 (25%) patients had residual wound at the donor and recipient site respectively (Table 1).

The observations of the study group at the end of 2 weeks after STSG are summarized in Table 1. A residual ulcer or tissue defect was found at donor sites in 10 patients (8%) and recipient sites in 20 patients (17%). The donor site of all the patients except 3 cases of large diabetic ulcer (15%), 2 of HIV positive (100%) and 2 cases of malignant tumor excision (20%) and 3 cases of fresh post debridement burn wounds patients (30%) were epithelized on 15<sup>th</sup> postoperative day. The donor site of all these 10 patients with residual non epithelized wound healed completely in a period of next 7 to 10 days.

The patients complained of tolerable pain at the donor site which started to subside from  $3^{rd}$  postoperative day and no patient complained of pain from  $7^{th}$  day of surgery. The patient with large wound over the lower extremity due to trauma (15/22) and large ulcer due to infection (10/15) were operated under spinal + epidural anesthesia and the epidural analgesia was continued for 48 hours after the surgery.

At the end of 2 weeks, in 20 patients out of 120, the recipient site was not completely healed. The recipient site was incompletely healed in patients with HIV infection (100%), infected post-burns wounds (70%), PVD (40%) and diabetes (15%).

Among patients with primary STSG (66), on 15<sup>th</sup> postoperative day, it was observed that residual ulcers were present at 2 donor sites and 5 recipient sites. Among patients who received Secondary STSG (54), 8 and 15 patients had residual wound at donor and recipient site respectively.

In the control group, the recipient site of both primary and secondary STSG cases show more residual ulcer cases as compared to study group due to repeated check dressing leading to shearing force on the graft. The recipient site residual ulcer of the control group healed in a period of 4 weeks from day 15 of its dressing leading to poor cosmetic result of scar and recurrent joint contractures in burn patients. The study group residual ulcer healed in a period of 10 to 14 days from day 15 of its dressing leading to better result in comparison to control group and better compliance from the patient. The thought of the concept of delayed dressing for recipient site ST skin graft had come to the mind while changing the dressing of skin graft after abdominal flap surgery. The literature and book search says usually the recipient site dressing was changed from day 5<sup>th</sup> to 10<sup>th</sup> postoperative day. But it was noticed that the repeated recipient site dressing causes shearing force on the graft, disturbs graft bed wound healing leading to the poor cosmetic and functional result. It was observed in all the cases that the graft was almost 100% accepted on only first dressing on 15<sup>th</sup> post- operative day (Images 1, 2, 3). There was small graft loss </= 1 cm at single or multiple sites. This was observed in cases of venous ulcer (5), ischemic ulcer (3), diabetic foot ulcer (3), HIV positive cases (2) and Fresh post debridement burn wounds (7). In all these 20 cases the graft rejected single/ multiple area was very small and it got epithelized in next 2 weeks from day of first check dressing. There were 10 cases of post-burn contractures which were treated by release of contracture and covering the tissue defect by STSG. In all patients, the dressing was changed directly on 15th

satisfactory cosmetic result.

| Control group (132)               |  |  |  | Study group (120)              |  |  |
|-----------------------------------|--|--|--|--------------------------------|--|--|
| Total<br>number<br>of<br>patients | Donor site<br>residual ulcer<br>on 15 <sup>th</sup> post-<br>operative day | Recipient site<br>residual ulcer<br>on 15 <sup>th</sup> post-<br>operative day | Type of cases  | Total<br>number of<br>patients | Donor site<br>residual ulcer<br>on 15 <sup>th</sup> post-<br>operative day | Recipient site<br>residual ulcer<br>on 15 <sup>th</sup> post-<br>operative day |
| 30                                | 1  | 5  | Wounds due to trauma                                     | 22                             | 0  | 0  |
| 12                                | 2  | 4  | Post malignant<br>tumor excision<br>defect               | 10                             | 2  | 0  |
| 13                                | 1  | 1  | Post-fascio-<br>cutaneous flap<br>defect                 | 10                             | 0  | 0  |
| 11                                | 0  | 4  | Post-Burn<br>contractures                                | 10                             | 0  | 0  |
| 0                                 | 0  | 0  | Syndactyle of hand                                       | 1                              | 0  | 0  |
| 27                                | 3  | 5  | Post debridement<br>ulcer for diabetic<br>foot infection | 20                             | 3  | 3  |
| 14                                | 0  | 2  | Post debridement<br>ulcer without<br>diabetes            | 15                             | 0  | 0  |
| 12                                | 1  | 4  | PVD-venous ulcer   | 15                             | 0  | 5  |
| 0                                 | 0  | 0  | PVD- Ischemic<br>ulcer                                   | 5                              | 0  | 3  |
| 1                                 | 1  | 1  | Leg ulcer in HIV positive patients                       | 2                              | 2  | 2  |
| 12                                | 3  | 7  | Burns - post<br>debridement<br>wounds                    | 10                             | 3  | 7  |
| 132                               | 12 (9%)  | 33 (25 %)  | Total  | 120                            | 10 (8 %)   | 20 (17 %)  |

## Table 1: Record from case sheets of STSG cases operated in control and study group with rate of residual ulcers at donor and recipient sites.

The 10 burn patients with eschar had large post debridement ulcers. The patients had hypo-proteinemia and marked tissue edema. The ulcer bed had profuse sero-sanguinous discharge. In these cases, only 3 patients had completely healed donor and recipient site on the 15<sup>th</sup> postoperative day. But in the remaining 7 cases of fresh burn cases with extensive raw area, there was soakage of the recipient site of STSG from day 7 which gradually increased. Therefore in these 7 patients initial dressing was changed on day 10 and then day 15. There was a small single area and multiple areas skin graft loss of  $\leq=2$ cm in these 7 burn cases on 15<sup>th</sup> postoperative day. The residual small wounds of these 7 burn cases were healed completely by secondary intention in further 2 weeks.

#### DISCUSSION

It was observed that acceptance of skin graft mainly depends on the nutrition of patient, good vascularity of the ulcer bed, absence of tissue edema, healthy granulation tissue and immobilization of the affected part till the skin graft settles down.

There is plenty of literature available about the healing of the donor site at 2 weeks after STSG. Various types of non-adhesive dressing are described in the literature<sup>5</sup>. Hence the same concept was applied to the recipient site in this study. To the best of the knowledge, no recent articles have been published about exact time of the 1<sup>st</sup> dressing and frequency of changing the dressing at the recipient site after STSG. Few books have mentioned that the recipient site dressing is changed from 7 to 10 days post-surgery depending upon the status of the recipient site dressing.<sup>8</sup> Another study has suggested early removal of dressing instead of multiple dressings to reduce hospital stay and costs.<sup>9</sup>

In various comparative studies about the recipient site graft take, initially the dressing was changed on 5<sup>th</sup> day.

However, the graft acceptance was assessed 2 weeks after the surgery.  $^{10}$ 

The basic purpose of STSG recipient site dressing is to achieve immobilization and provide healthy environment for the graft. Various dressing techniques (tieover/mould) are suitable for this purpose.<sup>11</sup> The dressing may need to be changed if it is soiled by discharge from the wound or external soakage. This is observed in patients such as post-burn wounds wherein early dressing is necessary to prevent maceration and skin graft rejection. The frequent or early change of dressing of recipient site may cause graft necrosis due to shearing force. The clinical appearance of the healed skin graft in all the operated cases indicates that the real secret of graft acceptance lies in the surgical skill, good wound bed, immobilization; single delayed dressing to reduce shearing force on the graft and patient guidance about the postoperative care of the operative site. The rate of STSG acceptance is not only linked to the size/shape of ulcer, but also on the condition of the ulcer bed, surrounding skin and co-morbidities in the patients.<sup>7</sup>

### CONCLUSION

The basic purpose of adequate size and thickness of STSG is to achieve complete healing of the ulcer with acceptable cosmetic outcome. The treatment should be target oriented and cost effective to minimize financial burden on patient and healthcare provider. With single 1st dressing of recipient site after STSG fulfills both the above mentioned criteria. From the study, we can draw the inference that if there is no soiling of the external dressing at either donor or recipient site by secretions from the wound, better cosmetic outcome will be achieved by single delayed primary dressing on 15th postoperative day. Appropriate case selection and optimum pre-operative preparation of the wound bed and patient, are the key factors to complete wound healing after STSG. This approach may not be acceptable in presence of uncontrolled co-morbidities affecting wound healing.

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