A Research Study Assessing the Acceptance and Aesthetic Results of Split-Thickness Skin Grafts, Determined by The Timing of The Initial Postoperative Dressing

Abhishek Sharma

Faculty Medical Superintendent, Director of Plastic Surgery Services, Department of Plastic Surgery, ALL IS WELL Multispecialty Hospital, Burhanpur, Madhya Pradesh, India

Received: 2025-08-16; Received in revised form: 2025-09-28; Accepted: 2025-10-09

Abstract

Background: Skin grafting is a procedure designed to restore the integrity of the skin. The primary reasons for skin graft failure include seroma, hematoma, and infection. These complications hinder the graft's adherence and revascularization, raising the risk of graft rejection, especially during the early postoperative period and affecting the aesthetic outcome later.

Objective: The purpose of this study is to analyze graft acceptance and rejection due to seroma or infection, as well as the timing of the first check dressing on the third day compared to the fifth day, and assessing the aesthetic outcome.

Methods: A comparative and prospective study was conducted at our institution from June 2023 to July 2025 involving 200 patients who underwent split-thickness skin grafting (STSG) and were divided into two groups. In Group A, the initial postoperative dressing was applied on day 3, while in Group B, it was done on day 5. The second postoperative dressing occurred two days after the first. The skin-grafted area was evaluated for incidence of seroma, infection, and the percentage of graft uptake and rejection, using both culture sensitivity testing and clinical observation.

Results: The findings indicated that the average graft uptake in Group A was 88.5%, compared to 81.93% in Group B during the first dressing, with a better aesthetic outcome in Group A. During the second dressing, Group A showed 88.24%, while Group B showed 78.03%.

Conclusions: Performing the initial postoperative dressing on the third day after skin grafting significantly enhances graft acceptance and the final aesthetic outcome.

Keywords: Split-Thickness Skin Grafting; Graft Uptake; Graft Failure; Aesthetic Outcome; Timing Postoperative Dressing

Citation: Shama A. **A Research Study Assessing the Acceptance and Aesthetic Results of Split-Thickness Skin Grafts, Determined by The Timing of The Initial Postoperative Dressing.** *Acad J Surg*, 2025; 8(3): 86-91.

Introduction

Skin grafting is a surgical technique that helps restore skin continuity, particularly effective for treating large ulcers, and causes minimal complications at the donor site [1]. The survival of a skin graft relies on a series of processes that lead to vascular independence. Initially, serum imbibition takes place within the first 48 hours, followed by inosculation that occurs in the next 48 to 72 hours, and angiogenesis starts after 72 hours [2]. Disruptions to this process, such as mechanical shear forces, can adversely affect graft uptake and result in fluid accumulation beneath the graft [3]. Many studies have looked into the factors that influence the success of split-thickness skin grafts. The most common reasons for graft failure include seroma, hematoma, movement (shear), and infections at the site where the graft is placed

*** Corresponding author**: Abhishek Sharma
Faculty Medical Superintendent, Director of Plastic Surgery Services, Department of Plastic Surgery, ALL IS WELL Multi-specialty Hospital, Burhanpur, Madhya Pradesh, India (PIN: 450331)
Email: drabhisheksharma7@gmail.com

[4]. In the early postoperative period, these issues can significantly impact graft uptake by preventing it from adhering properly to the wound bed and hindering revascularization. Dressings help stabilize the graft by creating a moist, sterile environment that protects against shear forces and prevents fluid from accumulating beneath the graft. Thus, the surgical dressing is vital for ensuring a successful graft take during the postoperative phase [5]. Hematoma and seroma that develop beneath the graft within the first 1 to 3 days after surgery can disrupt adherence and impede revascularization, negatively affecting graft take. Checking the graft during this initial dressing period can help drain seroma and hematoma, allowing for reapplication if the graft has shifted, which can enhance revascularization and improve graft survival rates. The risk of infection can also be assessed, and prompt action can be taken if the graft is inspected in a timely manner [6]. There is a noticeable gap in research on this topic, especially regarding how the first postoperative dressing impacts graft uptake and survival, with only a few studies addressing the timing of the initial dressing. Consequently, our research aims to assess the importance of graft uptake observed during dressing changes on the 3rd and 5th days post-surgery, as well as the early and late complications related to grafting in patients receiving split-thickness skin grafts and the aesthetic outcome later.

Methods

This research was a prospective, comparative analysis carried out in the plastic surgery department. Ethical approval was obtained for this study from the institution's committee of ethics, and patients' consent was secured. The study involved 200 patients undergoing split-thickness skin grafts for various underlying conditions, all of whom met the established inclusion and exclusion criteria.

Inclusion criteria

Participants in this study were both male and female, aged between 18 and 70 years. Those receiving split-thickness skin grafts to treat raw surfaces or ulcers were included, with culture sensitivity tests showing no growth.

Exclusion criteria

Patients undergoing a second graft or re-grafting, those with exposed tendons, active infections, visible bones, multiple ulcers, or multiple treatment sites were excluded from this study. A comprehensive physical examination, history collection, preoperative tests, and management of coexisting conditions were conducted for all patients. Reporting followed STROBE guidelines [7].

Procedure

The recipient site was meticulously prepared using strict aseptic techniques. After administering anesthesia, a split-thickness graft was harvested from the thigh area with Humby's knife, then modified, meshed, and placed onto the prepared ulcer bed. A skin stapler was used to secure the graft in position. Once the graft was in place, efforts were made to remove any blood or serum accumulation. Antibiotic-impregnated tulle was then used to cover the grafted area initially, followed by sterile dressings and pressure bandages. The donor site was also dressed. If the graft was located near a joint, the limb was immobilized with a POP slab, and antibiotic-impregnated tulle along with pressure bandages were applied. Routine postoperative care was carried out.

Postoperative care

Patients were divided into two groups, A and B, based on the timing of the initial dressing application, with Group A receiving it on the third day and Group B on the fifth day. The grafted area was assessed for graft uptake percentage by measuring the graft's surface area, checking for the presence of seroma, noting the color, evaluating graft adherence, slough, and any signs of rejection. The percentage of graft uptake was calculated using the following formula:

Percentage of graft uptake = area of graft uptake × 100 / total area of graft

The assessment of graft rejection and acceptance was based on the total area of the graft. Any sloughs present were removed, and seromas were drained in a sterile environment, with samples sent for culture and sensitivity analysis. Antibiotic-impregnated tulle and sterile dressings were used to cover the grafted area. The second dressing was applied on day 5 for Group A and on day 7 for Group B, with observations documented. The percentages of graft rejection and uptake were calculated during both the first and second postoperative days [8].

Data entry and analysis

The data entry and analysis were performed using Microsoft Excel and SPSS (Statistical Package for the Social Sciences) software (version 20) [9]. Categorical variables, such as group (A and B), slough formation, and infection or seroma formation, were

reported as proportions. Continuous variables were presented as mean (SD), while categorical variables were presented as counts. To evaluate the relationship between continuous variables and the groups (A and B), the Mann–Whitney U test and the unpaired t-test were used, depending on the normality of the continuous variables' distribution. The Chi-square test or Fisher's exact test was utilized to analyze the association between categorical variables based on the cell values. A p-value of less than 0.05 was considered statistically significant [10].

Results

Our study group consisted of 74% males (n = 74) and 26% females (n = 26), with Group A comprising 86% males (n = 86) and 14% females (n = 14). The average age in Group A was 43.7 years, while Group B had an average age of 42.9 years. In this study, 22% of the participants were diagnosed with diabetes, and trauma was identified as the leading cause of the raw area, accounting for 57%. The demographic information of our study is detailed in Table 1.

Discussion

In addition to using the grafting technique, effective management after surgery is crucial for the successful integration of the graft with the vascular system. The absorption of the skin graft is negatively influenced by several factors. The most frequent causes of graft failure include the formation of seromas, shearing forces, and infections. However, conducting an early assessment and changing the initial dressing during the immediate postoperative period can help drain hematomas and seromas,

Table 1: Demographic data of our study population

Factors	Group A (N%)	Group B (N%)	Total (N%)
Sex			
Male	74(74)	86(86)	160(80)
Female	26 (26)	14(14)	40 (20)
Cause of ulcer			
Traumatic	66 (66)	48 (48)	114 (57)
Post-infective/debridement raw area	16(16)	30(30)	46(23)
Others	18 (18)	22 (22)	40 (20)
Co-morbidities			
Absent	72 (72)	74 (74)	146 (73)
Diabetes alone	22(22)	22(22)	44(22)
Others (hypertension, venous disease, arterial disease)	6 (6)	4(4)	10 (5)
Recipient sites			
Upper limb	16 (16)	12 (12)	28 (14)
Lower limb	68(68)	66(66)	134 (67)
Other	16 (16)	22 (22)	38(19)

Table 2: The graft uptake values on the first dressing day of the participants in groups A and B.

Variables	Day 3, group A	Day 5, group B	P Value
POD 1 percentage of graft uptake	88.50 (+/-11.17)	81.93 (+/13.36)	0.02

Table 3: Graft uptake values on second dressing day of group A and group B participants.

Variables	Day 3	Day 5	P Value
POD 2 percentage of graft uptake	88.24(+/-16.61)	78.03(+/14.04)	0.00

Table 4: Seroma formation on the first dressing amongst groups A and B participants.

POD 1 seroma	Day 3 N (%)	Day 5 N (%)	Total	P Value
Absent	18 (18)		44 (22)	
Present	82 (82)		156 (78)	0.335
Total	100 (100)		200(100)	

Table 5: Formation of seroma on the second dressing day among the participants in groups A and B.

POD 2 Seroma	Group A Day 3 N (%)	Group B Day 5 N (%)	Total	P value
Absent	94 (94)	88 (88)	182 (91)	0.296
Present	6 (6)	12 (12)	18 (9)	
Total	100 (100)	100 (100)	200(100)	

Table 6: The postoperative comparison of infection rate in group A and group B, via positive culture/sensitivity of the grafted area.

Groups	Post operative infection rate according to culture and sensitivity N (%)	Clinical evidence of infection (slough) N (%)
A	46 (45)	16 (15)
B	50(50)	20(20)

Table 7: Rejection of graft values in groups A and B on the first postoperative dressing.

Variables	Day 3 group A (%)	Day 5, group B (%)	P value independent
POD 1: percentage of graft rejection	5.87	11.25	0.02

Table 8: Second postoperative dressing and rejection of graft values in groups A and B participants.

Variables	Day 3 (%)	Day 5 (%)	P-value independent test
POD 2 percentage of graft rejection	11.87	21.99	0.00

allowing for the reapplication of the graft if it becomes compromised. This enhances revascularization and increases the chances of graft survival and better aesthetic outcomes.

Converse et al. observed that the serum beneath a free skin graft provides nourishment during the first two days, after which revascularization begins to take hold [5]. Therefore, it is vital to quickly drain any hematomas, clots, or seromas that develop under the graft. If this procedure is performed within the first 24 hours, there is a 100% chance of saving the graft. It is advisable to carry out this intervention the following day or within two days, depending on the condition of the graft during the first dressing assessment [6]. Research on how the initial postoperative dressing affects graft uptake has been limited. Our study analyzed 200 patients who received split-thickness skin grafts for ulcers of various origins to gain insights into graft uptake and its connection with postoperative dressings and aesthetic outcomes.

Graft uptake

On the first day after the operation, graft uptake in Group A ranged from 70% to 98%, with an average of 88.48%. In contrast, Group B had a graft uptake between 50% and 95%, averaging 82.2%. The average graft uptake was significantly higher in Group A compared to Group B, with a p-value of 0.02.

On the second postoperative day, Group A showed an average graft uptake of 88.14% (range: 80%–100%). Meanwhile, Group B's uptake ranged from 3% to 94%, with a mean of 78.02%. This difference was statistically significant, with a p-value of < 0.001. Thus, we concluded that patients who received early postoperative dressing demonstrated significantly better graft uptake. Various studies were reviewed, focusing on graft uptake related to the first and second postoperative dressings performed on the 3rd and 5th days (Table 9). In a study by Ünal S et al., conducted from 2003 to 2005, wounds were assessed at the end of the 5th postoperative day after split-thickness skin grafting. They reported a mean graft uptake of 60.46 ± 19.34 in the group that received traditional moist wound dressings [11].

A study by Majid I in 2013 indicated that the first dressing change after split-thickness skin grafting occurred on the 3rd postoperative day. The graft was deemed successful when the grafted skin was fully attached and epithelization was visible at the edges. Out of 16 patients, 1 had a 60% graft take, 3 had a 90% take, and 12 achieved a 100% graft take, with a mean uptake of 95.62%. Nearly complete graft take (90% or higher) was noted in 90% of cases after a preparation period of 2 to 8 weeks [12]. The average

Table 9: Comparing data of graft uptake from different studies when dressings done on the 3rd and 5th days.

Name of the study	First postoperative day done following skin grafting	Mean graft uptake (%)
Ünal S et al. [11]	5th POD	60.46
Majid I [12]	3rd POD	95.63
Maher [13]	3rd POD	83.35
De Gado F [14]	5th POD	85.90
Our study	3rd POD/5th POD	88.24/78.03

Table 10: Effect of postoperative dressing on graft uptake in relation to local factors.

Groups	Post-operative dressing	Local factors Seroma N(%)	Local factors Infection N(%)	Final percentage of graft uptake
A	First	82 (82)	46 (45)	88.24
B	First	74(74)	50(50)	78.03

Figure 1: Uptake of skin graft in a group A patient and aesthetic outcomes

Figure 2: Uptake of a skin graft in a group B patient and aesthetic outcomes

graft uptake on the 3rd day in our study was 88.14%. In contrast, the group that had their dressing changed on the 5th day experienced an uptake of 78.02%. These results were statistically significant and consistent with the studies mentioned earlier.

Local factors and percentage of graft uptake

In this research, we found that infection rates and seroma development were lower in Group A compared to Group B, primarily due to significantly better graft uptake in Group A (Table 10). Broccoli et al. pointed out that the most common cause of skin graft failure was hematoma formation beneath the graft, as the blood clot obstructed the essential contact needed for revascularization between the graft and the bed [3]. Another common problem that impeded revascularization and contributed to graft loss was the shearing or movement of the graft on the bed. Our findings echoed these studies, showing the presence of seromas in both groups. We noticed that final graft uptake improved after evacuating seromas in Group A, which lowered the rejection rate and led to better outcomes.

Conclusion

In this study, the author discovered that performing an early postoperative dressing on the third day after a split-thickness skin graft (STSG) helped remove any excess seromas or hematomas that might have formed, significantly boosting the chances of successful graft absorption. The findings indicated that the success of skin grafting relies on how quickly and effectively blood flow is restored to the tissue receiving the graft. By promptly addressing hematomas, seromas, or infections as they arise, vascular perfusion is re-established, which increases the likelihood of preserving grafts, enhancing graft absorption, and achieving better aesthetic outcomes.

Funding

None to be declared

Conflict of interest

None to be declared

Acknowledgment

The author expresses gratitude to the staff of the Plastic Surgery Department and the institution for their direct or indirect contributions in assisting with the preparation of this paper.

References

1. Shimizu R, Kishi K. Skin graft. Plast Surg Int. 2012;2012:563493. https://doi.org/10.1155/2012/563493
2. Shenaq SM, Bienstock A, Kim JYS. Plastic and reconstructive surgery. In: Schwartz's principles of surgery. 8th ed. New York: McGraw-Hill; 2005. p.1792.
3. Broccoli N, et al. Step-by-step: skin grafting. J Oral Maxillofac Surg. 2020;78(10):e6-e10. https://doi.org/10.1016/j.joms.2020.07.025
4. Herskovitz I, Hughes OB, Macquhae F, Rakosi A, Kirsner R. Epidermal skin grafting. Int Wound J. 2016;13 Suppl 3:52-6 https://doi.org/10.1111/iwj.12631
5. Converse JM, McCarthy JG, Brauer RO, Ballantyne DL. Transplantation of skin: grafts and flaps. Reconstr Plast Surg. 1977;1:152-239.
6. Unal S, Ersoz G, Demirkan F, Arslan E, Tutuncu N, Sari A. Analysis of skin-graft loss due to infection: infection-related graft loss. Ann Plast Surg. 2005;55(1):102-6. https://doi.org/10.1097/01.sap.0000164531.23770.60
7. Cuschieri S. The STROBE guidelines. Saudi J Anaesth. 2019;13(Suppl 1):S31-S4. https://doi.org/10.4103/sja.SJA_543_18
8. Arif T, Sami M. Calculating area of graft required for vitiliginous areas during split-thickness skin grafting: a simple, accurate, and cost-effective technique. J Cutan Aesthet Surg. 2017;10(3):160. https://doi.org/10.4103/JCAS.JCAS_45_17
9. Coakes SJ. SPSS version 20.0 for Windows: analysis without anguish. Wiley Online Library. 2017.
10. Jankovic S. Tests for comparison of two groups: Student's t-test, Mann-Whitney U-test, and Chi-square test. Int J Biomed Health. 2022;10:134-6. https://doi.org/10.5455/ijbh.2022.10.134-136
11. Unal S, Ersoz G, Demirkan F, Arslan E, Tutuncu N, Sari A. Analysis of skin-graft loss due to infection: infection-related graft loss. Ann Plast Surg. 2005;55(1):102-6. https://doi.org/10.1097/01.sap.0000164531.23770.60
12. Majid I. Grafting in vitiligo: how to get better results and how to avoid complications. J Cutan Aesthet Surg. 2013;6(2):83-9. https://doi.org/10.4103/0974-2077.112668
13. Maher A. Establishing a consensus for the surgical management of chronic burn wounds: a randomized prospective comparative study. Egypt J Plast Reconstr Surg. 2009;33(1):31-7.
14. De Gado F, Chiummariello S, Monarca C, Dessy LA, Rizzo MI, Alfano C, et al. Skin grafting: comparative evaluation of two dressing techniques in selected body areas. In Vivo. 2008;22(4):503-8.