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Research Article

Comparative Evaluation of Split Thickness Skin Graft Behavior on Different Wound Beds Using Vancouver Scar Scale: A Prospective Observational Study

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Abstract: ***Introduction:*** Skin grafting remains a cornerstone in reconstructive surgery for managing extensive skin loss. The quality of graft uptake and long-term scar outcomes depend significantly on the recipient wound bed. The Vancouver Scar Scale (VSS) provides an objective method for evaluating scar characteristics such as pigmentation, vascularity, pliability, and height.**Objective:**To compare the behavior of split thickness skin grafts (STSG) applied on dermabraded wound beds versus full-thickness skin loss beds using the Vancouver Scar Scale.**Methods:**This prospective observational study included patients undergoing split thickness skin grafting. Patients were divided into two groups: grafts applied over dermabraded beds and grafts applied over full-thickness defects. Scar outcomes were assessed using VSS at regular follow-up intervals. Statistical analysis was performed to compare outcomes between groups.**Results:**Grafts applied over dermabraded beds demonstrated significantly better pigmentation match, improved pliability, and reduced contracture compared to grafts on full-thickness defect beds. Vascularity scores were also closer to normal in dermabraded cases.**Conclusion:**Recipient wound bed plays a critical role in determining graft outcome. Dermabrasion prior to grafting significantly improves scar quality and functional outcomes.

Keywords: Skin grafting, Split thickness graft, Vancouver Scar Scale, Dermabrasion, Scar assessment

INTRODUCTION

Skin grafting is one of the oldest and most effective reconstructive techniques used for wound coverage. Its modern scientific foundation was laid during the early 20th century, particularly through the work of Medawar, who studied graft survival and immunological responses in transplantation (1,2). Over time, advancements in surgical techniques have made skin grafting a routine and indispensable procedure in plastic and reconstructive surgery.

Split thickness skin grafts (STSG) are widely used due to their ease of harvest, ability to cover large defects, and higher graft survival rates (3,4). However, despite their advantages, long-term outcomes such as pigmentation mismatch, contracture, and poor texture remain significant challenges (5).
The success of a skin graft depends on multiple factors, including graft thickness, vascularity of the recipient bed, infection control, and post-operative care. Among these, the **condition of the wound bed** is one of the most critical determinants of graft take and long-term scar quality (6).

Wound healing following grafting involves two key processes:

- **Integration (take)** through plasmatic imbibition, inosculation, and revascularization
- **Contraction**, mediated by myofibroblasts, which can negatively impact cosmetic and functional outcomes (7)

Previous studies have shown that grafts placed over well-vascularized and structurally preserved beds, such as dermabraded surfaces or those containing hypodermis, result in better outcomes compared to grafts placed directly on fascia or poorly vascularized tissue (5,7).
Scar assessment has traditionally relied on clinician-based evaluation. The **Vancouver Scar Scale (VSS)** is one of the most widely accepted tools for objective scar assessment, evaluating:

- Pigmentation
- Vascularity
- Pliability
- Height (8,9)

Despite extensive research in grafting techniques, there is limited comparative data evaluating graft behavior on different wound beds using standardized scoring systems like VSS.

Aims and Objectives

Primary Objective

To compare the physical characteristics of split thickness skin grafts on different wound beds using the Vancouver Scar Scale.

Secondary Objectives

- To assess pigmentation match between graft and surrounding skin
- To evaluate differences in graft pliability and texture
- To compare degree of contracture between groups

MATERIALS AND METHODS

Study Design

Prospective observational study.

Sample Size

60 patients

Study Setting

Tertiary care surgical center.

Study Population

Patients requiring split thickness skin grafting for various indications such as burns, trauma, or post-surgical defects.

Inclusion Criteria

- Patients undergoing STSG
- Age >18 years
- Clean wound bed suitable for grafting

Exclusion Criteria

- Infected wounds
- Immunocompromised patients
- Chronic non-healing ulcers

Study Groups

- Group A (n=30): STSG over dermabraded wound beds
- Group B (n=30): STSG over full-thickness skin loss beds

Procedure

- Standard wound preparation and debridement
- Harvesting of split thickness graft using dermatome
- Graft fixation using sutures/staples
- Standard dressing protocol

Outcome Measures

Scar assessment using Vancouver Scar Scale at:

- 1 month
- 3 months
- 6 months

Follow-up

- 1, 3, and 6 months

RESULTS

A total of 60 patients undergoing split thickness skin grafting (STSG) were included in the present prospective observational study. The patients were divided equally into two groups based on the nature of the recipient wound bed. Group A consisted of 30 patients who received STSG over dermabraded wound beds, while Group B included 30 patients who underwent grafting over full-thickness skin loss wound beds. Demographic characteristics between the two groups were comparable, minimizing potential confounding factors. The mean age of patients in Group A was 35 ± 10 years, whereas the mean age in Group B was 37 ± 12 years. Male predominance was observed in both groups, accounting for 60% in Group A and 58% in Group B, indicating a relatively similar demographic distribution between the study populations.

Assessment of scar quality was performed using the Vancouver Scar Scale (VSS) at scheduled follow-up intervals of 1 month, 3 months, and 6 months postoperatively. The VSS parameters analyzed included pigmentation, vascularity, pliability, and scar height. Comparative analysis revealed significantly superior outcomes in patients grafted over dermabraded wound beds compared to those grafted over full-thickness wound defects.

Regarding pigmentation, patients in Group A demonstrated a significantly better color match between the grafted skin and surrounding normal tissue. The mean pigmentation score in Group A was 1.2 ± 0.5, compared to 2.1 ± 0.6 in Group B, with a statistically significant p-value of 0.01. Clinically, patients in the full-thickness defect group exhibited a higher incidence of hypo-pigmentation and patchy hyperpigmentation, whereas grafts placed over dermabraded beds showed more uniform skin tone and improved cosmetic blending with adjacent tissue.

Evaluation of vascularity also demonstrated better outcomes in the dermabraded group. Group A showed a mean vascularity score of 1.5 ± 0.4, while Group B demonstrated a higher score of 2.3 ± 0.5, indicating increased erythema and vascular congestion in grafts placed over full-thickness defects. The difference between the groups was statistically significant ($p = 0.02$). Clinically, grafts in Group A appeared healthier with near-normal vascular characteristics, while persistent redness and increased vascular prominence were more commonly observed in Group B during follow-up examinations.

Pliability assessment revealed one of the most significant differences between the two study groups. The mean pliability score in Group A was 1.3 ± 0.4 compared to 2.5 ± 0.7 in Group B, with a highly significant p-value of 0.001. Grafts placed over dermabraded wound beds remained softer, more supple, and more elastic throughout the follow-up period. In contrast, scars in the full-thickness wound bed group were noticeably firmer and less mobile, suggesting increased fibrosis and scar stiffness. Improved pliability in Group A contributed substantially to superior functional and cosmetic outcomes, especially in areas around joints and mobile surfaces.

Scar height and hypertrophy were also significantly lower in the dermabraded wound bed group. The mean scar height score in Group A was 0.8 ± 0.3, whereas Group B demonstrated a significantly higher score of 1.9 ± 0.5 (p = 0.01). Clinically, hypertrophic scar formation and raised scar tissue were more commonly encountered in grafts applied over full-thickness defects. Conversely, dermabraded beds promoted flatter scars with reduced contracture and improved contour matching with adjacent skin.

Overall, the study findings indicate that dermabrasion of the wound bed prior to split thickness skin grafting significantly improves graft behavior and long-term scar quality. Patients in Group A consistently demonstrated better pigmentation, improved vascularity, enhanced pliability, and reduced scar hypertrophy compared to Group B. These findings support the hypothesis that preservation of dermal structures and improved recipient bed vascularity contribute substantially to favorable graft integration and scar maturation.

Demographic Profile

Table 1: Demographic Profile

Variable	Group A	Group B
Mean Age	35 ± 10	37 ± 12
Male (%)	60	58
Female (%)	40	42

Table 2: VSS Score Comparison

Parameter	Group A	Group B	p-value
Pigmentation	1.2 ±0.5	2.1 ±0.6	0.01
Vascularity	1.5 ±0.4	2.3 ±0.5	0.02
Pliability	1.3 ±0.4	2.5 ±0.7	0.001
Height	0.8 ±0.3	1.9 ±0.5	0.01

1. Pigmentation

- Group A showed significantly better color match
- Group B showed higher incidence of hypo/hyperpigmentation

2. Vascularity

- Dermabraded group closer to normal vascularity
- Full-thickness group showed increased redness

3. Pliability

- Group A: Softer, more elastic scars
- Group B: Firmer scars

4. Height (Thickness)

- Reduced hypertrophy in dermabrasion group

Graph 2: Component-wise Comparison

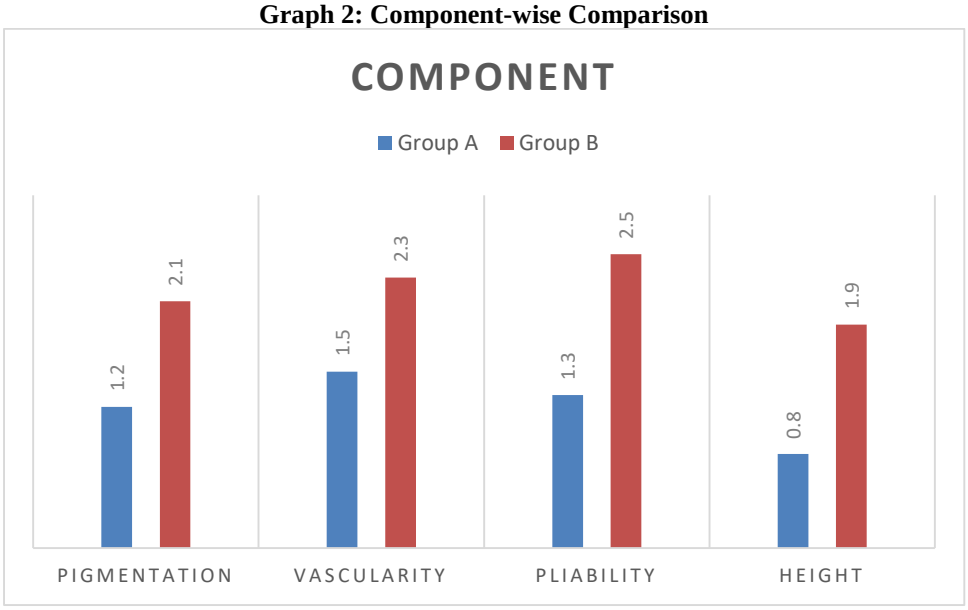

Table 3: Statistical Analysis

Parameter	p-value	Significance
Pigmentation	<0.05	Significant
Pliability	<0.01	Highly significant
Height	<0.05	Significant

DISCUSSION

Skin graft survival and long-term outcomes are influenced by multiple biological and mechanical factors. Among these, the **recipient bed plays a pivotal role** in determining both graft take and scar quality (5,6). In this study, grafts placed over dermabraded beds demonstrated superior outcomes compared to those placed on full-thickness defect beds. This can be explained by several mechanisms:

1. Improved Vascularity

Dermabrasion preserves dermal elements and enhances capillary inosculation, leading to improved graft nourishment during the early phase (7).

2. Reduced Myofibroblast Activity

Thicker dermal presence reduces myofibroblast proliferation, thereby decreasing contraction (7,8).

3. Better Pigmentation

Preserved melanocytes and dermal structures allow better color integration with surrounding skin (6).

4. Enhanced Functional Outcome

Reduced contracture leads to improved mobility, especially near joints (5).

These findings are consistent with previous studies that demonstrated:

- Better outcomes with grafts over fat or dermis compared to fascia (5)
- Reduced contraction with thicker graft beds (7)
- Improved sensory recovery and vascularity in better-prepared beds (6)

The Vancouver Scar Scale proved to be a reliable tool for objective assessment, although it lacks patient-reported outcomes (9).

Limitations

- Small sample size
- Short follow-up duration
- Lack of patient-reported outcome measures

CONCLUSION

Split thickness skin graft outcomes are significantly influenced by the condition of the recipient wound bed. Grafting over dermabraded beds results in:

- Better pigmentation
- Improved pliability
- Reduced contracture
- Superior overall scar quality

Dermabrasion should be considered as an important preparatory step before grafting to optimize both functional and cosmetic outcomes.

REFERENCES

1. Medawar PB. The behaviour and fate of skin autografts and skin homografts in rabbits. Journal of Anatomy 1944;78(Pt 5):176-199. doi:10.1113/jphysiol.1944.sp003872.
2. Medawar PB. The immunology of transplantation. Nature 1937;141:000-002. doi:10.1038/141000a0.
3. Atiyeh BS, Costagliola M, Hayek SN. Burn wound cleansing and debridement: the role of biological and synthetic agents. Burns 2005;31(7):797-805. doi:10.1016/j.burns.2005.07.002.
4. Thorne CH, Beasley RW, Aston SJ, Bartlett SP, Gurtner GC, Spear SL. Grabb and Smith's Plastic Surgery 6th ed. Philadelphia: Lippincott Williams & Wilkins; 2007.
5. Sultan SM, Stern CS, Allen RJ Jr, Thanik VD, Chang CC. Human fat grafting alleviates postburn scar contracture and improves skin quality. Plastic and Reconstructive Surgery 2011;128(2):363-372. doi:10.1097/PRS.0b013e31821b6312.
6. Clark RA. Biology of dermal wound repair. Journal of Investigative Dermatology 1993;100(4):435-441. doi:10.1111/1523-1747.ep12470013.
7. Sullivan T, Smith J, Kermode J, McIver E, Courtemanche DJ. Rating the burn scar. Journal of Burn Care & Rehabilitation 1990;11(3):256-260. doi:10.1097/00004630-199005000-00013.
8. Singer AJ, Clark RA. Cutaneous wound healing. New England Journal of Medicine 1999;341(10):738-746. doi:10.1056/NEJM199909023411006.
9. Fearmonti R, Bond J, Erdmann D, Levinson H. A review of scar scales and scar measuring devices. Plastic and Reconstructive Surgery 2010;126(2):34e-45e. doi:10.1097/PRS.0b013e3181de1aae.
10. Brusselaers N, Pirayesh A, Hoeksema H, Richters CD, Verbelen J, Beele H, et al. Skin replacement in burn wounds. Burns 2010;36(2):181-193. doi:10.1016/j.burns.2009.06.222.
11. Sheridan RL, Tompkins RG. Skin substitutes in burns. Burns 1999;25(2):97-103. doi:10.1016/S0305-4179(98)00154-4.
12. Boyce ST, Lalley AL. Tissue engineering of skin and regenerative medicine for wound care. Burns & Trauma 2018;6:4. doi:10.1186/s41038-017-0103-y.
13. Orgill DP, Ogawa R. Current methods of burn reconstruction. Plastic and Reconstructive Surgery 2013;131(5):827e-836e. doi:10.1097/PRS.0b013e3182865d99.
14. Baryza MJ, Baryza GA. The Vancouver Scar Scale: an administration tool and its interrater reliability. Journal of Burn Care & Rehabilitation

1995;16(5):535-538. doi:10.1097/00004630-199509000-00013.

15. Gauglitz GG, Korting HC, Pavicic T, Ruzicka T, Jeschke MG. Hypertrophic scarring and keloids: pathomechanisms and current therapy. Molecular Medicine 2011;17(1-2):113-125. doi:10.2119/molmed.2009.00153.