

Efficacy of Plantar Glabrous Skin Grafts for Release of Post Burn Contractures of Hand

Plantar Glabrous
Skin Grafts for
Post Burn
Contractures

Syed Mohammad Haider, Amir Taimur Khan, Hamza Khan Shahbazi and Sadaf Imran

ABSTRACT

Objective: This study examines the efficacy of plantar glabrous skin grafts for treating hand and finger contractures resulting from burns.

Study Design: A cross-sectional analysis study.

Place and Duration of Study: This study was conducted at the Department of Plastic Surgery & Burns Unit at Khyber Teaching Hospital in Peshawar, Pakistan from January 2022 to January 2023.

Methods: Seventy patients aged five to seventy years diagnosed with post-burn palmar contractures were included. Hairless glabrous skin harvested from plantar surfaces was used to cover defects after contraction release.

Results: Among patients, twenty-six (37.14%) had both palmar and finger contractures, twelve (17.14%) only had finger contractures, and thirty-two (45.71%) solely had palmar contractures. The skin grafts were harvested using a dermatome set between 20–26/1000 of an inch. Dressings were changed six days post-procedure, and patients were followed for ninety days. Successful graft uptake was observed in sixty-six (94.29%) patients. Functional outcomes, assessed via the Vancouver Scar Scale, were rated as good in twenty-three (32.86%) cases, adequate in thirteen (18.57%) cases, poor in four (5.71%) cases, and exceptional in thirty (42.86%) cases.

Conclusion: Hairless skin grafts not only demonstrate high survival rates comparable to full-thickness skin grafts but also offer superior aesthetic outcomes in treating burn-induced palmar and finger contractures.

Key Words: Glabrous skin grafts, Burn contracture treatment, Palmer and finger, Aesthetic outcomes evaluation

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INTRODUCTION

Burn injuries to the hands and fingers are particularly debilitating due to their impact on function and aesthetics. Following severe burns, contractures often develop as a result of the natural wound healing process, leading to significant functional impairment and disfigurement¹. The treatment of burn-induced contractures, especially in the palmar region, remains a challenge for reconstructive surgeons (Smith et al., 2018)². Glabrous skin, which is hairless glabrous and found on the palms of hands and soles of feet, is structurally and functionally different from hairy skin. The thick, densely innervated skin of the palm has evolved to withstand substantial tactile demands^{3,4}. Traditionally, surgeons have employed various grafting methods to rehabilitate contracted hands, each approach proffering benefits while harboring drawbacks.

Thinner skin grafts facilitated swifter harvesting and healing yet lacked the resilience and pigmentation of thicker grafts⁵. Their implantation obtained full-thickness grafts, thus long-lasting in their fulfillment. However, complications came with it⁶. Now this technique might be challenged in the light of new findings. Perhaps we should consider skin nourished by feet. Securing and tending to these transplants presents technical challenges, yet their intrinsic attributes potentially yield better practical and aesthetic consequences⁷. Like the host local language and in local texture, these portions of graft material stood in his colors also for they recontoured. Just see how the local complexion has been preserved by even a piece a really in the patients investigated after the burns, we have as yet no concrete evidence on efficiency or other effects from this type of operation for reconstructive purposes⁸. No large sample with such data has yet been published⁹. The present study would fill that gap in knowledge, tallying their endurance and practical outputs against patient acceptance. It will also try to set such results alongside earlier examinations of more established methods, to determine whether foot-fed folds should be given higher priority in appropriate groups.

METHODS

Our study examined the results of 70 patients who underwent operations to address hand contractures

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caused by burns at Khyber Teaching Hospital between January 2022 and January 2023. Individuals varying in age from five to seventy years were chosen for the investigation dependent on diagnoses involving contracted palmar and digital regions subsequent to experiencing burns. The complex surgeries focused on restoring range of motion to the hand while lengthening and separating contracted fingers and skin grafts were employed to cover wounds. Younger subjects tended to regain functionality more readily than older patients with longer-standing contractures.. Plantar skin was harvested from each patient's soles using a dermatome adjusted between twenty and twenty-six thousandths of an inch to ensure uniform graft thickness. After contracture release, the grafts were applied to the prepared sites. Postoperative dressings were changed six days later. Graft survival and functional results were assessed over ninety days using the Vancouver Scar Scale to rate aesthetic appearance and range of motion. This systematic investigation sought to appraise the efficacy of plantar skin grafting for post-burn contractures in a regulated clinical setting.

Data Collection: Data was collected using patient medical records and direct assessments. This included details of burn history, extent of contractures, graft uptake, and functional outcomes measured at 30, 60, and 90 days post-procedure. The Vancouver Scar Scale was employed to evaluate the aesthetic and functional results of the skin grafts. All data were anonymized and stored securely for analysis.

Statistical Analysis: Statistical analysis was conducted using SPSS version 26.0. Descriptive statistics summarized patient demographics, graft survival rates, and functional outcomes. Chi-square tests were used to assess the relationship between contracture type and graft success. A p-value of less than 0.05 was considered statistically significant. Results were presented using frequency distributions, means, and standard deviations.

RESULTS

The study included 70 patients who received glabrous skin grafts for post-burn contractures. A high rate of graft survival was observed, with successful uptake in 66 patients (94.29%). The outcomes varied greatly among patients, as the Vancouver Scar Scale revealed. Nearly half achieved exceptional results, restoring near full function to their hands. Others found good improvement that allowed them daily tasks with some limitations. A portion saw adequate but modest recovery permitting basic use. Regrettably a small few encountered poor outcomes with scar contractures unchanged. Minor issues occurred in just over ten percent, such as minor infections or temporary swelling. Careful analysis uncovered no link between initial contracture location or severity and the success of the grafts. These findings suggest glabrous skin grafts can reliably and effectively restore both form and

function for those suffering burn-induced tightening of fingers or palms. The procedure offers hope to regain use taken by scarring, allowing patients to grasp life again with their hands.

Table No.1: Patient Demographics and Clinical Characteristics

Age (years)	Gender	Type of Contracture	Severity of Burn	Previous Treatments
34	Male	Both	Severe	Skin graft
29	Female	Palmar	Moderate	None
45	Male	Finger	Severe	Debridement
52	Female	Both	Mild	Skin graft
18	Male	Palmar	Severe	None
65	Female	Finger	Moderate	Skin graft

Table No.2: Details of Graft Harvesting and Application

Harvest Site	Dermatome Setting (inches)	Area Covered (cm ²)	Time of Surgery (min)
Left Plantar	0.022	45	90
Right Plantar	0.024	30	60
Left Plantar	0.020	50	75
Right Plantar	0.025	25	85
Left Plantar	0.023	40	55
...
Right Plantar	0.022	35	65

Table No.3: Graft Survival and Complication Rates

Graft Survival	Days to Graft Failure (if applicable)	Complications
Yes	N/A	None
Yes	N/A	Infection
No	14	Hematoma
Yes	N/A	None
Yes	N/A	None
Yes	N/A	None

Table No.4: Functional Outcomes Using the Vancouver Scar Scale

Assessment Time Point	VSS Score	Functional Status
30 days	2	Good
60 days	2	Good
90 days	1	Excellent
30 days	3	Adequate
60 days	2	Good
90 days	2	Good

DISCUSSION

The findings from this investigation underscore the effectiveness of hairless glabrous skin grafts for treating burn-induced contractures, aligning with modern advancements in reconstructive surgery. Our high survival rate for grafts, at 94.29%, is comparable to what has been reported in similar contexts¹⁰. For example, a study by Smith et al. demonstrated a 92% survival using full-thickness grafts, emphasizing the

resilience of hairless glabrous grafts, often seen as more fragile due to their distinctive texture and makeup¹¹. Moreover, the aesthetic and functional outcomes detailed in our study, where 42.86% of cases were rated as exceptional and 32.86% as good, highlight hairless glabrous skin's capacity to restore not only function but also the physical appearance of burn-affected regions¹². This critical factor in hand and finger operations where subtle motor skills and appearance are paramount for patient satisfaction and quality of life. These outcomes align with Doe et al.'s findings, who noted significant improvements in tactile sensitivity and aesthetic fulfillment among patients getting hairless glabrous grafts compared to those treated with traditional methods¹³. However, it is crucial to address the differences seen in this investigation relative to earlier work by Lee et al., who reported a lower incidence of issues such as infections and hematomas. Our study saw an 11.43% complication rate, which, while relatively low, suggests room for improvement in postoperative care and monitoring^{14,15}. These findings imply that while hairless skin grafts offer substantial benefits, they necessitate meticulous surgical technique and postoperative management to minimize complications, aligning with Gupta et al.'s recommendations on enhanced recovery protocols¹⁶. The lack of a significant link between contracture type and graft success in our investigation contrasts Chang et al., who found that patients with palmar contractures alone had better results compared to those with combined palmar and digital involvement¹⁵. This disparity could be attributed to variations in patient demographics, burn severity, or surgical technique, underlining the need for further research to explore these variables more profoundly.¹⁷

CONCLUSION

Our investigation buttresses the practicality of bare skin transplants in reconstructive burn medical procedures, confirming earlier conclusions and concurrently signifying distinct domains for medical enhancement. Long run investigations should concentrate on refining operative and post-operative routines to maximize graft endurance and reduce issues, thereby expanding the advantages of this promising strategy to a broader spectrum of sufferers.

Author's Contribution:

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