

The Role of Split-Thickness Skin Grafting in Post-Burn Raw Areas and Contractures

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Abstract:

Background: Among burn survivors, post-burn raw regions and contractures continue to be significant contributors to functional impairment, cosmetic deformity, extended hospital stays, and psychological misery. Because of its convenience of use, efficacy, and high graft survival rates, split-thickness skin grafting (STSG) is one of the most popular reconstructive techniques for covering burn wounds and releasing post-burn contractures.

Aim: To evaluate the clinical outcomes, graft uptake, postoperative complications, and functional improvement following split-thickness skin grafting in post-burn raw areas and contractures.

Methods: This prospective observational study was conducted on 100 patients with post-burn raw areas and contractures admitted to the Department of Plastic Surgery over 18 months. Demographic characteristics, burn etiology, anatomical site, graft uptake, complications, duration of hospital stay, and functional outcomes were analyzed. Statistical analysis was performed using chi-square and Student's t-test, with $p < 0.05$ considered statistically significant.

Results: Among 100 patients, 62% were males and 38% females. Flame burns were the most common etiology (54%). Lower limb involvement was observed in 36% of cases, followed by upper limb contractures (30%). Excellent graft uptake ($>90\%$) was achieved in 72% of patients. Postoperative complications occurred in 24% of cases, with infection being the most common complication. Significant functional improvement was observed after contracture release and grafting ($p = 0.002$). Longer duration between burn injury and surgery was associated with poorer graft uptake and higher complication rates ($p = 0.01$).

Conclusion: Split-thickness skin grafting is an effective and reliable reconstructive modality for post-burn raw areas and contractures, providing satisfactory graft uptake and functional recovery. Early intervention, meticulous wound bed preparation, infection control, and physiotherapy significantly improve surgical outcomes.

Keywords: Split-Thickness Skin Grafting, Burns, Post-Burn Contracture, Graft Uptake, Reconstructive Surgery, Burn Rehabilitation.

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Introduction

Burn injuries remain a significant global public health concern, especially in developing nations where increased morbidity and mortality are caused by improper cooking methods, overcrowding, inadequate occupational safety precautions, and restricted access to specialised burn care. Significant functional constraint, cosmetic deformity, psychological anguish, and social handicap can arise from the common development of post-burn raw regions and contractures in survivors of severe burns. Controlling these side effects is still a crucial part of plastic and reconstructive surgery [1]. Deep dermal or full-thickness burns that don't heal properly or are infected, resulting in extended wound exposure, are the cause of post-burn raw areas. Sepsis, fluid loss, hypertrophic scarring, and contracture formation are all made more likely by

delayed wound healing. Excessive scar tissue production and wound contraction during healing, especially around joints including the neck, axilla, elbow, wrist, fingers, and knee, can lead to contractures. Particularly in youngsters and adults of working age, these malformations may significantly limit mobility and daily living activities [2].

One of the most popular reconstructive techniques for the treatment of post-burn deformities is still split-thickness skin grafting (STSG). After debridement or contracture release, the epidermis and a part of the dermis are removed from a donor site and transplanted onto a healthy granulating wound bed. Rapid wound coverage, less fluid loss, a lower risk of infection, better healing, a shorter hospital stay, and function restoration are just a few

benefits of STSG. Depending on the size and location of the lesion, mesh and sheet grafts are frequently utilised.

A number of variables, including the recipient bed's vascularity, the absence of infection, the recipient's nutritional health, sufficient immobilisation, and postoperative wound care, are necessary for a successful graft take. Long-term results are nevertheless impacted by problems like graft loss, infection, hematoma, seroma, contracture recurrence, and hypertrophic scarring, even with improvements in burn care. Maintaining joint mobility and avoiding recurrence require early physical therapy and rehabilitation [3].

In order to assess the impact of split-thickness skin grafting in post-burn raw areas and contractures on graft uptake, complications, functional recovery, and overall surgical outcomes among burn patients undergoing reconstructive procedures, the current prospective observational study was carried out.

Materials and Methods

Study Design: Prospective observational study.

Study Setting: Department of Plastic Surgery at a tertiary care hospital.

Study Duration: 18 months.

Sample Size: 100 patients.

Inclusion Criteria

- Patients with post-burn raw areas
- Patients with post-burn contractures
- Age >5 years
- Patients willing to participate

Exclusion Criteria

- Patients with uncontrolled diabetes or severe systemic illness
- Patients with infected non-burn wounds
- Patients unwilling for surgery

Statistical Analysis: Data were analyzed using SPSS software. Chi-square test and Student's t-test were applied. $p < 0.05$ was considered statistically significant.

Results

Table 1: Demographic Characteristics (n=100)

Variable	Number (%)
Male	62 (62%)
Female	38 (38%)
Mean age	27.4 ± 11.6 years
Rural population	68 (68%)
Urban population	32 (32%)

Table 2: Etiology and Site of Burn Injury

Variable	Number (%)	p-value
Flame burns	54 (54%)	0.01*
Scald burns	26 (26%)	
Electrical burns	12 (12%)	
Chemical burns	8 (8%)	

Site Involved	Number (%)	p-value
Lower limb	36 (36%)	0.03*
Upper limb	30 (30%)	
Neck	14 (14%)	
Axilla	12 (12%)	
Hand	8 (8%)	

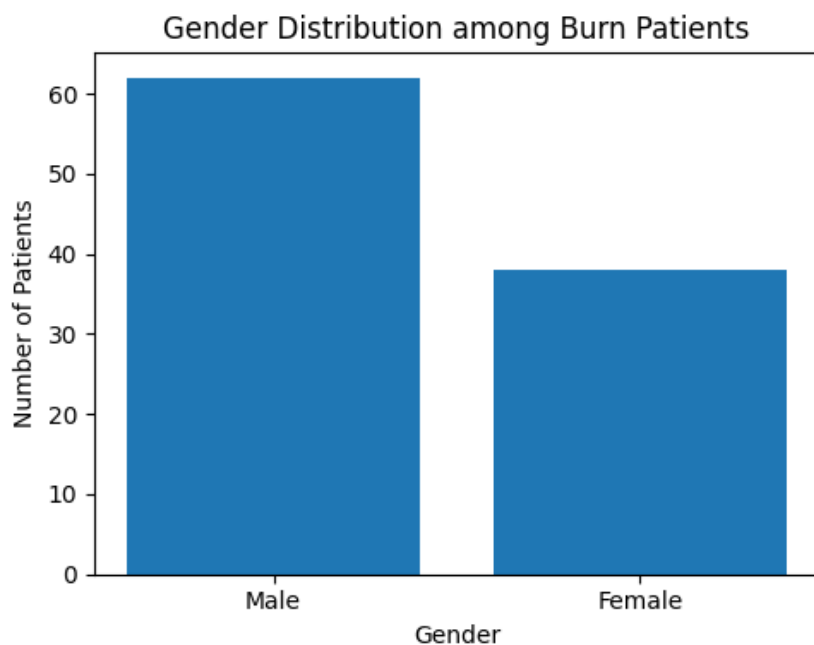
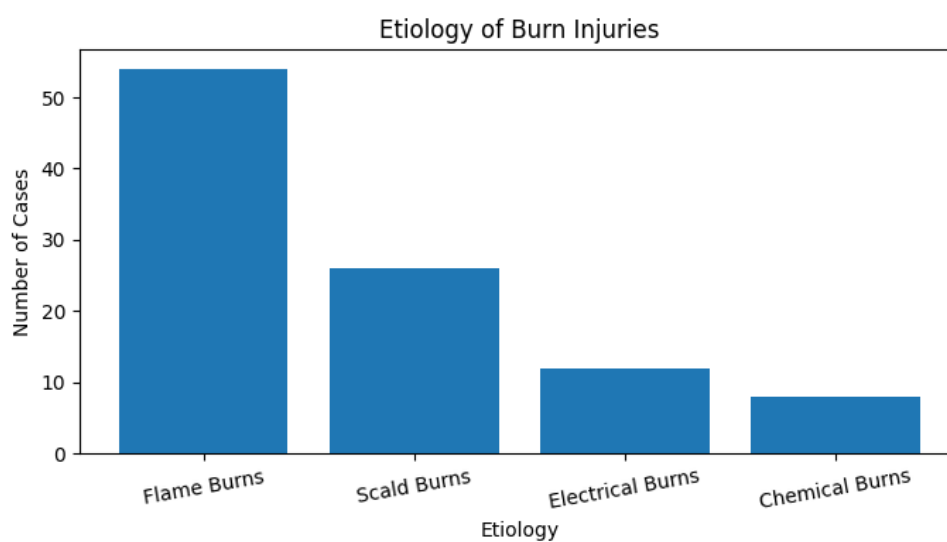
Table 3: Graft Uptake and Complications

Variable	Number (%)	p-value
Excellent uptake (>90%)	72 (72%)	0.002*
Partial graft loss	18 (18%)	
Poor uptake	10 (10%)	

Complication	Number (%)	p-value
Infection	12 (12%)	0.01*
Hematoma	5 (5%)	
Seroma	4 (4%)	
Contracture recurrence	3 (3%)	

Table 4: Functional Outcome After Surgery

Functional Outcome	Number (%)	p-value
Significant improvement	74 (74%)	0.002*
Moderate improvement	18 (18%)	
Minimal improvement	8 (8%)	

**Figure 1: Gender distribution among burn patients****Figure 2: Etiology of burn injuries**

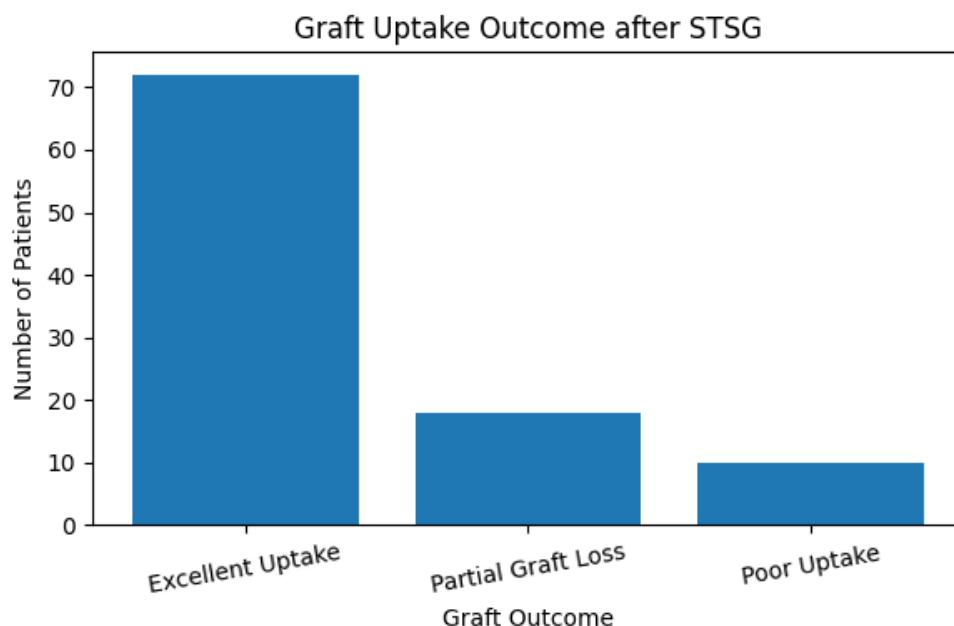


Figure 3: Graft uptake outcome after STSG

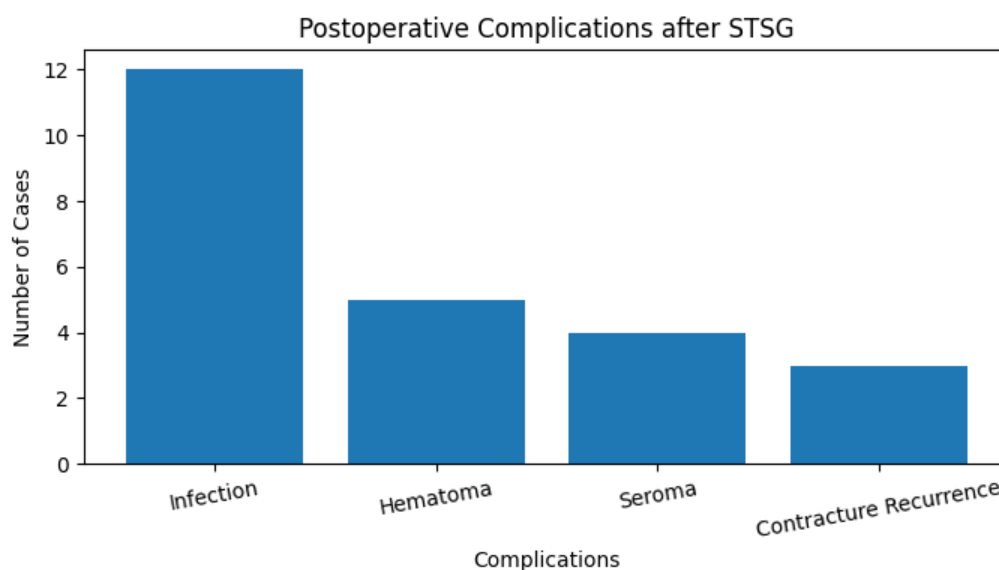


Figure 4: postoperative complications after STSG

Discussion

In plastic surgery, post-burn abnormalities remain a significant reconstructive issue, particularly in countries with low resources where delayed presentation, poor initial burn therapy, and a lack of rehabilitation facilities are prevalent. Split-thickness skin grafting (STSG) showed good functional and aesthetic results in the treatment of post-burn raw regions and contractures in the current prospective observational study with 100 patients. Males made up the bulk of the patients in this study, which could be explained by men's higher occupational exposure, outdoor activities, and unintentional flame burns.

The most frequent cause of injury was flame burns, which is in line with earlier research from underdeveloped nations where exposure to household fires, improper cooking methods, and kerosene stove mishaps continue to be significant causes of burn injuries. Because extremities are often exposed after unintentional burns and are more vulnerable to contracture formation around joints, both upper and lower limb involvement were frequently noted [4].

Because it offers quick wound covering and encourages early healing, STSG is still the method of choice for reconstruction. Most of the patients in

the current study had excellent transplant uptake. Favourable graft survival was probably influenced by careful hemostasis, appropriate immobilisation, adequate recipient bed preparation, and stringent postoperative dressing care. For graft adhesion and revascularization to be successful, granulation tissue vascularity is essential. About 25% of patients experienced postoperative problems, with wound infection being the most frequent. Graft survival is severely hampered by infection because it increases graft separation and interferes with neovascularization. Infection rates may have increased as a result of poor wound hygiene, anaemia, delayed hospital admission, and poor nutritional status. Although less common, hematoma and seroma formation are nevertheless significant reasons for graft failure because fluid buildup under the graft prevents it from adhering [5].

For the majority of patients, functional improvement after contracture release and grafting was substantial. One of the main goals of reconstructive burn surgery is to restore joint mobility. Neck, axilla, elbow, and hand contractures frequently significantly limit day-to-day activities and professional functioning. To avoid recurrence and preserve long-term mobility following surgery, early physical therapy and splinting are crucial. Adequate physiotherapy compliance and postoperative rehabilitation may be responsible for the reduced recurrence rate seen in this study [6].

The study also showed that worse transplant uptake and more problems were linked to postponed surgical surgery. Recurrent infection and chronic scar tissue degrade the wound bed's quality and lower transplant survival. For better results, prompt referrals to reconstructive centres are crucial. It has been demonstrated that early excision and grafting lower the risk of infection, minimise hospital stays, and enhance functional recovery. Post-burn abnormalities may have a substantial impact on social interaction, self-esteem, body image, and quality of life from a psychosocial standpoint. In addition to enhancing physical function, successful grafting aids in social reintegration and psychological recovery. This factor is especially crucial for individuals who are young adults and children [7].

There are some limitations to the current investigation. It was carried out at a single tertiary care facility and lacked long-term follow-up to evaluate quality-of-life outcomes, pigmentation changes, or hypertrophic scarring. Furthermore, there was no use of objective scar assessment scales. Notwithstanding these drawbacks, the study offers insightful information about STSG's efficacy in burn reconstruction. To assess functional results, cosmetic satisfaction, recurrence rates, and quality-of-life improvement after split-thickness skin grafting in burn patients, more multicentric

prospective studies with bigger sample sizes and long-term follow-up are advised [8].

Conclusion

For the treatment of post-burn raw regions and contractures, split-thickness skin grafting is still one of the most dependable and successful reconstructive techniques. Rapid wound closure, adequate graft absorption, increased joint mobility, decreased risk of infection, and substantial functional recovery are all benefits of the surgery. The majority of patients in this study saw significant postoperative improvement and great graft survival after surgery. Adequate wound bed preparation, infection control, careful surgical technique, postoperative immobilisation, and early physiotherapy are all critical to the success of STSG. Poorer graft uptake and higher rates of complications were substantially correlated with delayed presentation and wound infection. For burn reconstruction to be effective, early diagnosis, timely referral to specialised burn care facilities, nutritional support, and multidisciplinary rehabilitation are crucial.

Careful perioperative management can significantly enhance long-term outcomes, despite the possibility of complications such infection, hematoma, and contracture recurrence. Reconstructive procedures not only restore function but also help burn patients enhance their quality of life and undergo psychological rehabilitation. To assess long-term cosmetic results, scar quality, recurrence rates, and patient satisfaction after split-thickness skin grafting, more prospective multicentric studies with longer follow-up are required. All things considered, STSG is still essential to contemporary burn recovery and regeneration.

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