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A Case Series

A Comparative Study of Early Excision and Grafting Versus Delayed Grafting in Patients with Deep Dermal Burns

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Abstract:

Background: Deep dermal burns frequently necessitate surgical intervention to ensure prompt wound closure and minimize consequences. The ideal timing for excision and grafting is still a subject of controversy, especially in resource-constrained environments.

Objective: AIM: The aim of this study is to compare the outcome in patients managed with early excision and auto-grafting versus delayed auto-grafting.

Methods: This prospective observational study comprised 20 patients with deep dermal burns, categorized into two groups: early excision and grafting (within 7 days of damage, n = 10) and delayed grafting (after 7 days, n = 10). The evaluated outcomes were graft take percentage, length of hospital stay, incidence of wound infection, and duration till full wound healing.

Results: The early excision cohort demonstrated a superior mean graft take (92% vs 78%), reduced hospital duration (14.3 ± 2.1 vs 21.6 ± 3.4 days), diminished infection rate (10% vs 40%), and expedited wound healing (18.2 ± 2.5 vs 27.4 ± 4.1 days) relative to the delayed grafting cohort.

Conclusion: Timely excision and grafting in deep dermal burns correlate with enhanced graft viability, diminished infection rates, abbreviated hospital stays, and expedited wound healing relative to postponed grafting.

Keywords: Deep dermal burns, early excision, delayed grafting, skin graft, burn management

Introduction

Burn injuries continue to be a major source of morbidity globally, especially in underdeveloped nations [1]. Deep dermal burns, which injure the reticular dermis, frequently do not heal autonomously and typically necessitate surgical intervention by excision and skin grafting. The timing of excision and grafting is essential in influencing patient outcomes [2].

Timely excision and grafting, usually conducted within the initial week post-injury, seeks to expeditiously eliminate necrotic tissue, diminish bacterial burden, and facilitate quick wound healing [3]. Delayed grafting permits the delineation of

devitalized tissue; nonetheless, it may lead to prolonged inflammation, infection, and a protracted hospital stay [4].

Notwithstanding increasing data favouring early excision, delayed grafting persists due to patient instability, resource limitations, or tardy referrals [5]. This study aimed to compare early excision and grafting with delayed grafting in individuals with deep skin burns and evaluate their effects on clinical outcomes.

Materials and Methods

Study Design and Setting

This was a prospective Comparative study in Department of Plastic and reconstructive Surgery Unit of a PMCH in Patna.

Sample Size

A total of 20 individuals with deep dermal burns were included in the study.

Duration of study: June 2023 to May 2024

Inclusion Criteria

The patients' ages varied from 20 to 30 years, the burn area percentage ranged from 20% to 40%, and the percentage of area resurfaced by skin grafting was between 5% and 10%.

Exclusion Criteria

- Patients with comorbidities such as diabetes, hypertension, blood disorders, heart conditions, connective tissue problems, and scars from prior burn injuries
- Patients with inhalation injuries, electrical burns, chemical burns, radiation burns, and superficial skin burns.
- Burns as an element of multiple traumas

Group Allocation

20 Patients were divided into two groups of 10 patients each.

- Group I included those patients who underwent early excision and grafting within 5 days of burn injury.
- Group II included those patients who were treated conservatively and the residual raw area was grafted 3 weeks or more after sustaining the burn

Statistical Analysis

Data were presented as mean ± standard deviation or as percentages. Group comparisons were conducted utilizing suitable statistical techniques, such as the independent t-test and chi-square test. A p-value less than 0.05 was deemed statistically significant.

Results

Figure 1: Clinical presentation at the time of admission showing deep dermal burns of the upper limb.

Table 1:

	Early excision and grafting(n=10)		Delayed grafting (n=10)	
	Number	**Percentage**	**Number**	**Percentage**
Male	**7**	**70**	**8**	**80**
Female	**3**	**30**	**2**	**20**

Figure 2: Pre-operative clinical appearance of burn wounds

Table 2:

Post graft duration of hospital stays	Early excision and grafting (n=10)		Delayed grafting (n=10)	
	Number	Percentage	Number	Percentage
=< 7 days	6	60	5	50
7-14 days	2	20	3	30
>14 days	2	20	2	20

Figure 3: Day 3 comparison showing pre-operative wound and post-operative split skin graft application.

Table 3:

Organisms cultured	Early excision and grafting (n=10)		Delayed grafting (n=10)	
	Number	Percentage	Number	Percentage
Pseudomonas	2	20	3	30
Klebsiella pneumonia	-		-	
Staphylococcus aureus	-		1	10
MRSA	-		-	
Candida albicans	-		-	
E. coli	-		-	
None	8	80	6	60

Figure 4: Post-operative Day 7 showing graft uptake with mesh graft and staples in situ.

Table 4:

	Early excision and grafting (n=10)		Delayed grafting (n=10)	
	Number	Percentage	Number	Percentage
Graft take				
Good(>95%)	8	80	7	70
Fair(80-95%)	1	10	2	20
Poor(<80%)	1	10	1	10
Contracture				
No	10	100	8	80
Yes	0	0	2	20
Second operation				
No	9	90	7	70
Graft	1	10	3	30

Figure 5: Post-operative Day 21 demonstrating good graft healing and epithelialization.

Table 5

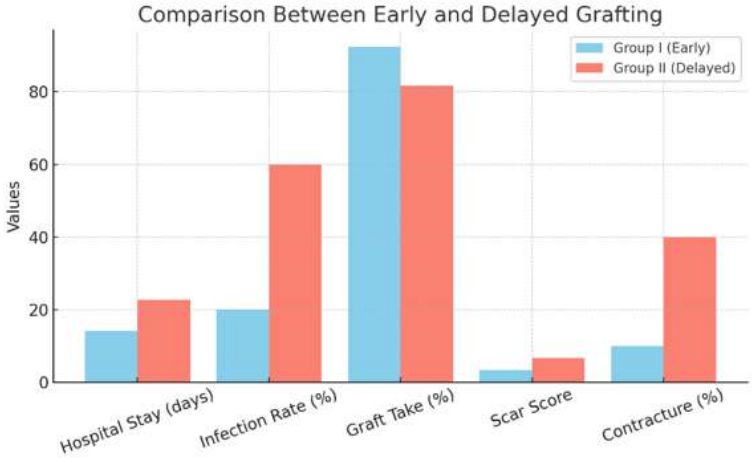
Vancouver scar Score	Early excision and grafting (n=10)		Delayed grafting (n=10)	
	Number	Percentage	Number	Percentage
0-3	9	90	5	50
4-8	1	10	3	30
>8	0	0	2	20

Table 6:

Parameter	Group I (Early)	Group II (Delayed)	P-value
Mean Hospital Stay (days)	14.2 ± 2.5	22.6 ± 3.1	< 0.01
Infection Rate	20%	60%	< 0.05
Graft Take (%)	92.4 ± 3.2	81.6 ± 5.5	< 0.01
Mean Vancouver Scar Score	3.4 ± 1.0	6.7 ± 1.5	< 0.01
Contracture Incidence	10%	40%	< 0.05

Figure 6: Sequential images showing progression from pre-operative stage to post-operative graft healing in gluteal region.

Figure 7: Post-operative Day 40 follow-up demonstrating complete graft maturation with satisfactory healing and improved cosmetic outcome.



Discussion

This study's findings indicate that early excision and grafting provide distinct benefits compared to delayed grafting in the treatment of deep skin burns. Patients who underwent early surgery demonstrated enhanced graft acceptance and expedited wound healing, attributable to the prompt excision of necrotic tissue and decreased bacterial colonization.

The markedly reduced hospital duration shown in the early excision cohort corresponds with prior research, underscoring both clinical and economic advantages. Delayed grafting correlated with elevated infection rates, likely attributable to extended exposure to the wound bed and heightened inflammatory response.

While delayed grafting facilitates clearer delineation of burn depth, the potential hazards of infection and extended hospitalization may surpass its advantages in appropriate individuals [6]. The limited sample size is a constraint of this investigation; nevertheless, the consistent tendencies revealed bolster the expanding corpus of evidence advocating for early surgical intervention [7].

Limitation

In this study, exact matching of the two groups with respect to initial topical management and fluid resuscitation could not be achieved, as these confounding factors were beyond the investigators' control in patients presenting with delayed admission. Graft take was assessed by gross clinical inspection, which introduces the possibility of observer bias. Additionally, long-term functional and cosmetic outcomes could not be evaluated due to the limited duration of follow-up.

Conclusion

Early excision and grafting in patients with deep dermal burns is associated with fewer infectious wound complications, reduced duration of hospital stay, and improved functional and cosmetic outcomes, thereby contributing to a reduction in overall treatment costs. Careful patient selection remains essential; as early surgical intervention may not be suitable for individuals with hemodynamic instability or extensive burn involvement. Furthermore, the availability of a dedicated burn care unit plays a pivotal role in optimizing outcomes, and both public and private healthcare institutions should prioritize the development of specialized burn care facilities to facilitate timely and effective management.

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