

Original Article**Outcome of Early Excision versus Delayed Excision and Grafting in Burn Less than Twenty Percent Body Surface Area****Kamal Raj Pathak^{1*}, Surendra Jung Basnet², Shankar Man Rai²**¹Department of Burns and Plastic Surgery, National Academy of Medical Sciences Kathmandu, Nepal, ²Department of Burns, Plastic and Reconstructive Surgery, Nepal Cleft and Burn Center, Kirtipur Hospital, NepalArticle Received: 17th May, 2023; Accepted: 25th August, 2023; Published: 31st December, 2023DOI: <https://doi.org/10.3126/jonmc.v12i2.61347>**Abstract****Background**

Burn injuries are a significant public health concern associated with high morbidity and mortality. Surgical interventions, including early excision and grafting or delayed excision and grafting are crucial for deep burns. This study compares graft take, number of procedures, duration of stay, and burn wound infections between early excision and grafting and delayed excision and grafting groups.

Materials and Methods

A comparative study was conducted at a burn referral center from January 1st to March 31st, 2020. Eighty-six patients (43 in each group) with deep burns covering 10-20% TBSA were included. Early excision and grafting and delayed excision and grafting groups were determined by the timing of the first operation (within or beyond 7 days post-injury). Parameters compared included graft take, number of grafting procedures, duration of stay, and graft site infection.


Results

Both groups had a mean age of 42.6 years, with predominantly female populations. The mean total body surface area % of burn area was 15%. Early excision and grafting and delayed excision and grafting groups showed comparable outcomes in graft take (90.6% vs. 88.16%), mean duration of hospital stay (16.72 vs. 16.53 days), number of surgical procedures (1.3 vs. 1.4), and graft site infection (23.3% vs. 30.2%).

Conclusion

Graft take, duration of hospital stay, number of surgical procedures, and graft site infections were comparable in Early excision and grafting and delayed excision and grafting groups for burns covering less than twenty percent body surface area. Delay in excision and grafting did not significantly impact outcomes in smaller burns, providing valuable insights for managing delayed burn presentations.

Keywords: *Burn, Hospital stay, Infection, Skin grafting*

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Introduction

Burn injuries contribute significantly to global mortality, causing approximately 180,000 deaths annually and representing the second most prevalent injury, contributing to 5% of disabilities [1]. The management of burns necessitates surgical intervention to prevent/control infections, preserve viable tissue, maintain form and function, provide wound coverage, facilitate early rehabilitation, and reduce mortality. Early excision and grafting, as outlined by Z Janzekovic [2] in 1970, have become the standard of care for burn injuries, preventing complications such as wound colonization, burn sepsis, multiorgan failure, and death [3-7].

However, resource-limited countries face challenges in implementing timely interventions due to the overwhelming burden of burns exceeding healthcare capacities. Skin grafting, a critical aspect of burn care, involves placing skin on excised burn wounds to prevent fluid loss, regulate temperature, protect against infections, and prevent severe contractures. This procedure is particularly crucial for deep partial thickness and third-degree burns, where key dermal elements necessary for normal healing are compromised.

Delays in reaching healthcare facilities, attributed to factors like difficult terrain, poor transportation, and inadequate referral systems, result in delayed resuscitation, increased risk of wound infection, poor graft take, and elevated mortality rates. The study aims to explore the impact of timing on burn excision and grafting outcomes, comparing early interventions with delayed ones. Conducted in adult patients with less than 20% total body surface area burns to exclude major systemic effects, the research examines differences in graft take, duration of hospital stay, infection rates in grafted areas, and the number of required surgical procedures. Insights from this study are crucial for refining patient management strategies, enhancing counseling practices, estimating costs associated with hospital stays and surgeries, and understanding the likelihood of repeated grafting procedures and infections in both early and delayed intervention scenarios.

Materials and Methods

The study employed a retrospective comparative analysis design to assess the outcomes of burn patients undergoing early excision and grafting versus delayed excision and grafting. Conducted at the Nepal Cleft and Burn Center over the period from January 2020 to March 2020, the study obtained ethical approval from the Institutional Review Board of the National Academy of

Medical Sciences (NAMS). Patient consent was waived due to the retrospective nature of the study and the utilization of anonymized data. Inclusion criteria encompassed patients over 18 years with a deep burn area of more than 10% TBSA and less than 20% TBSA, while exclusion criteria involved electric, prior operation for the current burn, active pregnancy, medication for other illnesses, non-consent, inhalation injury, burn with other injuries, and incomplete treatment. Sample size was calculated with reference to similar study by M Ayaz et al [8] using formula, $n_1 = \frac{(z_1^2 + z_2^2)(Z_1 + Z_2)^2}{4^2}$, $n_1 = \frac{(5.6^2 + 7.5^2)(1.96 + 0.84)^2}{4^2} = 42.88$ where n_1 is the number of patient needed in each arm of the study population, $z_1 = 5.6$, $z_2 = 7.5$, $Z_1 = 1.96$ (@95%), $Z_2 = 0.84$ (@80%), $= 96.8-92.8 = 4$. Total of 86 patients were included in this study. With a sample of 43 subjects per group the study has power of 80% and significance level of 0.05.

The study included a total of 86 patients, with 43 in each group (EEG and DEG) meeting the specified inclusion criteria. Patients were identified through the burn registry to ensure a representative sample. Data collection involved a comprehensive examination of patient demographics and relevant details, with outcomes including graft take, duration of stay, number of surgical procedures, and infection of the grafted area. Statistical analysis was conducted using SPSS statistical software (version 21, Chicago, Illinois), employing appropriate tests for continuous and categorical variables, with a significance level set at $p < 0.05$.

Results

Among the 86 patients included in the study, mean age of the patients was 42.6 years (Table 2) and 51 were females (Table 3). Both EEG and DEG groups had predominantly female population consisting of 27 (62.8%) and 24 (55.8%) respectively. The mean TBSA% of burn area was 15% with 14.7% deep burn with EEG group having 14.74% and DEG group having 15.47% TBSA. The mean operative procedure was 1.3 for EEG group whereas it was 1.4 for DEG group. The graft take on the 7th day following skin grafting was 90.6% in the EEG group and 88.16% for DEG group. The mean duration of hospital was 16.72 and 16.53 days in EEG and DEG group respectively (Table 1). The graft site infection was noted in 23.3% of patients in EEG group whereas for DEG group it was 30.2% of the patients (Table 4).



Table 1: Statistical analysis of early excision and grafting vs delayed excision and grafting groups

Variables	Mean	Std. Deviation	p-value
Age in years	DEG 42.67	19.82	0.986
	EEG 42.60	17.58	
Hospital Stay in days	DEG 16.53	7.78	0.936
	EEG 16.72	13.05	
No. of Operations	DEG 1.40	0.58	0.59
	EEG 1.30	0.96	
Graft take % for first procedure	DEG 88.16	9.33	0.247
	EEG 90.60	10.09	
Total TBSA %	DEG 15.47	3.95	0.382
	EEG 14.74	3.64	
Deep TBSA %	DEG 15.12	4.10	0.429
	EEG 14.40	4.30	

Two Groups are statistically not significant
 EEG- Early excision and grafting, DEG- Delayed excision and grafting, TBSA- Total Body Surface Area

Table 2: Study population with various variables

Patients (n=86)	Mean	Std. Deviation
Age (Years)	42.6395	18.62314
Total TBSA %	15.1047	3.79482
Deep TBSA %	14.7558	4.19506
Graft take % for 1 st procedure	89.3837	9.74036
Hospital Stay (Days)	16.6279	10.68374
No. of Operations	1.3488	.79361

TBSA- Total Body Surface Area

Table 3: Gender distribution among two groups

Groups	Sex	Total
Groups DEG	Count	43
	% within Groups	100.0%
Groups EEG	Count	43
	% within Groups	100.0%
Total	Count	86
	% within Groups	100.0%

P = 0.51
 EEG- Early excision and grafting, DEG- Delayed excision and grafting

Table 4: Infection post skin grafting

Groups	Absent	Present	Total
Groups DEG	Count	13	43
	% within Groups	30.2%	69.8%
Groups EEG	Count	10	43
	% within Groups	23.3%	76.7%
Total	Count	23	86
	% within Groups	26.7%	73.3%

EEG- Early excision and grafting, DEG- Delayed excision and grafting

Discussion

The central focus of our investigation centered on assessing the effectiveness of early excision and grafting (EEG) in comparison to delayed excision and grafting (DEG) for burn treatment, particularly within resource-constrained settings. Our results indicated a similar mean frequency of grafting procedures in both groups, signifying a comparable rate of surgical interventions between EEG and DEG. Graft take rates on the 7th postoperative day were akin, with the EEG group at 91% and the DEG group at 88%, aligning with existing literature on smaller burns. Notably, although the DEG group exhibited a slightly higher graft site infection rate (30.2%) compared to the EEG group (23.3%), this disparity lacked statistical significance. The mean duration of hospital stay demonstrated no significant variance between the two groups, underscoring the analogous clinical outcomes in terms of recovery time. Our findings are consistent with parallel studies conducted in Nepal. A retrospective study by Rai et al [4] in Nepal reported a median patient age of 29 years, predominantly females, mirroring our demographics. Similarly, graft take percentages in our study aligned with those observed by Dahal et al [5], highlighting the reliability of outcomes within the Nepalese context. Comparisons with studies conducted in India further fortify the external validity of our results. Goswami et al's [6] investigation in India reported a mean hospital stay of 14.9 days for the early excision group and 26.4 days for the late excision group, aligning with our findings. Puri et al [7], in another Indian study, corroborated this trend, emphasizing the necessity for efficient burn management strategies. Given shared healthcare challenges and patient demographics between our study and those in India, our results add to the accumulating evidence supporting the efficacy of early excision and grafting techniques.

Beyond the regional confines of Nepal and India, our findings bear relevance to burn management practices on a broader global scale. In a comparable study by Ayaz et al [8], graft take outcomes were 97% for EEG and 93% for DEG in smaller burns. However, for larger burns, Saaq et al [9] found a significant difference, with a 90% graft take in EEG compared to 22% in DEG. Conversely, Puri et al [7] indicated that early excision and grafting within 5 days of burns resulted in a 91% graft take, while grafting three weeks or later yielded a higher take of about 96%, suggesting improved outcomes in the latter group.

A study from China by Xiao-Wu et al [3] underscored the importance of early excision in reduc-



ing infection rates, emphasizing the global implications of timely burn interventions. Peitsch et al [10], in their pediatric burn study, reported mean hospital stays of 35.3 and 49.1 days for early and late cases, respectively. Although our study demonstrated comparable hospital stays, the additional time from injury to the first surgery in the DEG group extended patients' suffering. In light of prevalent resource constraints and challenges in timely patient presentation in Nepal, our study contributes valuable insights into burn management strategies feasible within the existing healthcare infrastructure. Thus, our study contributes to the accumulating evidence shaping burn treatment protocols, fostering discussions on resource-efficient and globally applicable strategies.

Conclusion

Though early excision and grafting in acute burns remain the standard method of care, delay in this procedure doesn't significantly affect the outcome in smaller burns in select patients as seen in our study.

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Conflict of interest: None

References

- [1] World Health Organization (WHO). WHO factsheet on burns: March (2018) [Internet]. Available from: www.who.int/news-room/fact-sheets/detail/burns
- [2] Janzekovic Z, A new concept in the early excision and immediate grafting of burns, *J Trauma*. 10:12 (1970) 1103-8. PMID: 4921723.
- [3] Xiao-Wu W, Herndon DN, Spies M, Sanford AP, Wolf SE, Effects of delayed wound excision and grafting in severely burned children, *Arch Surg*. 137: 9 (2002) 1049-54. DOI: 10.1001/archsurg.137.9.1049. PMID: 12215159.
- [4] Rai SM, Karki B, Nakarmi K, Ghartimagar M, Nagarkoti K, Joshi KD et al, Retrospective study on early outcome of acute burn injuries treated at Nepal Cleft and Burn Centre of Public Health Concern Trust-Nepal, *J Nepal Health Res Counc*. 12:28 (2014) 195-9. PMID: 26032059.
- [5] Dahal P, Ghimire, S, Maharjan, NK, Rai SM, Baux's and Abbreviated Burn Severity Score for the Prediction of Mortality in Patients with Acute Burn Injury, *Journal of College of Medical Sciences-Nepal*. 11:4 (20-15) 24-27. DOI: <https://doi.org/10.3126/jcmsn.v11i4.14321>
- [6] Goswami P, Sahu S, Singodia P, Kumar M, Tudu T, Kumar A et al, Early Excision and Grafting in Burns: An Experience in a Tertiary Care Industrial Hospital of Eastern India, *Indian J Plast Surg*. 52:3 (2019) 337-342. DOI: 10.1055/s-0039-3402707. PMID: 31908372.
- [7] Puri V, Khare NA, Chandramouli MV, Shende N, Bharadwaj S, Comparative Analysis of Early Excision and Grafting vs Delayed Grafting in Burn Patients in a Developing Country, *J Burn Care Res*. 37:5 (2016) 278-82. DOI: 10.1097/BCR.0b013e31827e4ed6. PMID: 23816999.
- [8] Ayaz M, Bahadoran H, Arasteh P, Keshavarzi A, Early Excision and Grafting versus Delayed Skin Grafting in Burns Covering Less than 15% of Total Body Surface Area; A Non- Randomized Clinical Trial, *Bull Emerg Trauma*. 2:4 (2014) 141-5. PMID: 27162886.
- [9] Saaq M, Zaib S, Ahmad S, Early excision and grafting versus delayed excision and grafting of deep thermal burns up to 40% total body surface area: a comparison of outcome, *Ann Burns Fire Disasters*. 25:3 (2012) 143-7. PMID: 23467391..
- [10] Pietsch JB, Netscher DT, Nagaraj HS, Groff DB, Early excision of major burns in children: effect on morbidity and mortality, *J Pediatr Surg*. 20:6 (1985) 754-7. DOI: 10.1016/s0022-3468(85)80039-7. PMID: 3910786.

