



## Outcome of Early Excision Followed by Skin Grafting on Deep Dermal and Full Thickness Burns

Mohammad Abul Kalam Azad<sup>1\*</sup>, Mohd. Fazle Rubby<sup>2</sup>, Romana Parvin<sup>3</sup>, Md. Toriqul Islam<sup>4</sup>, Istiaq Sultan<sup>5</sup>, Mohammad Morshed Kamal<sup>6</sup>, Maherun Nesa<sup>7</sup>, Ahmedur Rahman Sabuj<sup>8</sup>

<sup>1</sup>Registrar, Department of Plastic Surgery, Sheikh Hasina National Institute of Burn and Plastic Surgery, Dhaka, Bangladesh.

Email: azad.plasticsurgeon@gmail.com,

ORCID ID: 0000-0001-8780-5255

<sup>2</sup>Medical officer, Upazilla Health Complex, Sarail, Bangladesh.

Email: drfazlerubby@gmail.com,

Orcid ID: 0000-0002-4788-2747

<sup>3</sup>Assistant Professor, Department of Burn Plastic & Reconstructive surgery, Enam Medical College& Hospital, Dhaka, Bangladesh,

Email: romanacomc1675@gmail.com,

Orcid ID: 0000-0002-0103-6035

<sup>4</sup>Resident Surgeon, Department of Plastic Surgery, Sheikh Hasina National Institute of Burn and Plastic Surgery, Dhaka, Bangladesh,

Email: toriqssmc33@gmail.com,

Orcid ID: 0009-0007-3326-4810

<sup>5</sup>Assistant Surgeon, Department of Plastic Surgery, Sheikh Hasina National Institute of Burn and Plastic Surgery, Dhaka, Bangladesh,

Email: istiaq.sultan@gmail.com,

Orcid ID: 0009-0004-0630-2672

<sup>6</sup>Assistant Professor, Department of Plastic Surgery, Sheikh Hasina National Institute of Burn and Plastic Surgery, Dhaka, Bangladesh,

Email: morshedkamal41@gmail.com,

Orcid ID: 0009-0001-1872-3771

<sup>7</sup>Registrar, Department of Plastic Surgery, Sheikh Hasina National Institute of Burn and Plastic Surgery, Dhaka, Bangladesh,

Email: drmaherun@gmail.com,

Orcid ID: 0000-0002-3299-7939

<sup>8</sup>Assistant Registrar, Department of Plastic Surgery, Sheikh Hasina National Institute of Burn and Plastic Surgery, Dhaka, Bangladesh,

Email: sabuj.mmc@gmail.com,

Orcid ID:0000-0002-6304-3299

\*Corresponding author

Received: 16 October 2023

Revised: 12 November 2023

Accepted: 26 November 2023

Published: 31 December 2023

### Abstract

**Background:** Burn injury is a significant cause of morbidity and mortality throughout the world. Burn injuries perhaps represent the widest spectrum among various forms of trauma. Treatment of burn wounds is always challenging due to high mortality, morbidity, and long duration of hospital stay. Early excision may reduce mortality, morbidity, and hospital stay. This study is aimed to observe the clinical outcome of early excision followed by skin grafting on deep dermal & full thickness burns. **Material & Methods:** This was a prospective observational study and was conducted in the Department of Plastic Surgery of Dhaka Medical College Hospital, Dhaka, Bangladesh during the period from August,2017 to June,2019. In our study, we included 60 patients with deep dermal and full-thickness burns who required skin grafting. **Results:** In our study, we found that the majority 55(91.7%) of patients were alive with good, satisfactory outcomes followed by 3(5.0%) death and 2(3.3%) patients took DORB during the study period. Almost half (41.8%) of patients were in the satisfactory group of wound healing followed by 16(29.1%) good and 16(29.1%) in poor group where other procedures were taken for wound healing. 13 (23.6%) patients had scars in the donor site. The mean hospital stay was 23.26±10.24 days. **Conclusions:** Early excision and skin grafting have become the standard procedure for most of the deep dermal and all full-thickness burns. Early excision is an effective option for coverage of deep dermal and full-thickness burn patients concerning graft take, post-graft complication, and length of hospital stay.

**Keywords:-** Early excision, Skin grafting, Deep dermal burns, Full-thickness burns



## INTRODUCTION

Burn injury is a significant cause of morbidity and mortality throughout the world. Burn injuries perhaps represent the widest spectrum of among various forms of trauma. Burns occur in all age groups and may range in severity from very minor requiring no treatment to extremely severe requiring the highest level of intensive treatment.<sup>[1]</sup> Burn is a public health problem, accounting for an estimated 265,000 deaths annually throughout the world. In Bangladesh, around 173,000 children under 18 years sustain burn injuries. The burden of burning is unevenly distributed throughout the world. The majority of these deaths occur in low- and middle-income countries, and almost half occur in the South Asia region including Bangladesh.<sup>[1]</sup>

The incidence of burn injuries varies from country to country, typically peaking during the country's holiday period. According to the most recent statistics compiled by the World Health Organization and the World Fire Statistics Center, fires caused 6.6 million major burn injuries and 400,000 deaths.<sup>[2]</sup> In our country, we have no definitive Data regarding Burn Prevalence per year. In Bangladesh, flame burn is quite common in both urban and rural setups.

Early excision, which involves removing burn eschar and closing the incision right away, was thought to be one of the best treatments for lowering mortality after a significant thermal injury in the early 1940s.<sup>[2]</sup> Due to the high likelihood of infection and blood loss that accompanies severe burns, this method had not previously been feasible. At the Birmingham Accident Hospital, Douglas Jackson and associates developed this procedure in a series

of pilot and controlled trials from 1954 to 1959. They began with the immediate fascial excision and grafting of small burn areas and eventually covered up to 65% of the TBSA with autograft and homograft skin.<sup>[3]</sup>

Early excision of the slough in extensive deep burn is associated with relatively good outcomes, less mortality, and less scar-associated morbidity. Flame burn is a mixed burn with variable depth at different areas of the body. Moreover, early excision reduces the catabolic response and immune suppression.<sup>[4]</sup> Early excision is the single most important wound care tool to reduce bio-burden and promote healing. Without adequate excision or debridement, a wound is persistently exposed to cytotoxic Chemicals and competes with bacteria for scarce resources such as oxygen and nutrition. Traditional procedure of spontaneous separation of dead tissues by regular dressing with the appearance of good granulation tissue takes at least 3-4 weeks and this procedure increases hospital stay as well as treatment cost. Besides, post-operative complications like hypertrophic scar, keloid, and itching are common in this type of management.<sup>[4,5]</sup>

Developments in wound excision have coincided with advancements in skin grafting procedures. A Swiss medical student named J. P. Reverdin successfully replicated skin grafts in 1869.<sup>[6]</sup> George David Pollock made the technique well-known in England in the 1870s.<sup>[7]</sup> The technique attracted a lot of interest in Europe, but due to the wildly inconsistent outcomes, it was soon discredited. In 1914, J.S. Davis revived this method and described using "small deep skin grafts," which subsequently came to be known as pinch grafts.<sup>[8]</sup> During the 1930s, split-thickness skin grafts gained

popularity, partly because of more dependable and advanced instruments. The 'Humby knife', the first trustworthy dermatome, was created in 1936 but was difficult to use. A constant split-thickness skin transplant could be obtained thanks to the adjustable dermatome that E.C. Padgett invented. It also offered cosmetic benefits.<sup>[9,10]</sup> Padgett also devised a system to divide skin grafts into four groups according to their thickness.<sup>[11]</sup> The meshed skin graft, developed in 1964 by J.C. Tanner Jr. and associates, revolutionized wound grafting; however, alternative materials and methods of wound closure were required to make timely excision and immediate wound closure feasible in burns that covered more than 50% of the TBSA.<sup>[12]</sup>

In previous such studies, deep dermal burns were not included because of overestimation of spontaneous healing and difficulty in assessing burn depth and the interface between dead and viable dermis. Secondarily healed deep dermal and full-thickness burns are associated with gross contracture, functional limitations, and an increased prevalence of hypertrophic scars and keloids. So present study is designed to address the outcome based on morbidity and mortality in both deep dermal and full-thickness burns after early excision followed by coverage with split-thickness skin graft.

### Objective of the study

The main objective of the study was to observe the outcome of early excision followed by skin grafting on deep dermal and full-thickness burns.

## MATERIAL AND METHODS

This was a prospective observational study and was conducted in the Department of Plastic Surgery of Dhaka Medical College Hospital, Dhaka, Bangladesh during the period from August,2017 to June,2019. In our study, we included 60 patients with deep dermal and full-thickness burns who require skin grafting.

These were the criteria to be eligible for the enrollment in our study: a) Patients aged not more than 70 years; b) Patients with TBSA burn less than 30%; c) Patients with deep dermal and full thickness burns ; d) Patients with wound excision that could be done within 3rd to 7th burn day; e) Patients who were willing to participate were included in the study. And a) Patients with old infected burn wound; b) Patients with scald burn & poly trauma; c) Patients with significant co-morbidity like DM; d) Patients taking aspirin, clopidogrel, warfarin, heparin; e) Patients with any history of acute illness (e.g., renal or pancreatic diseases, ischemic heart disease etc.) were excluded from our study.

**Deep dermal burn:** Deep dermal burns are characterized by the early (within hours) development of extensive blisters, which usually rupture early to expose deep damaged dermis. The exposed reticular dermis may be pale in color due to damage to dermal blood vessels, or red due to extravasation of red blood cells from damaged vessels.

**Full-thickness burns:** Destroy both layers of skin - (epidermis and dermis) and may penetrate more deeply into underlying structures. These burns have a dense white, waxy, or even charred appearance. The sensory nerves in the

dermis are destroyed in a full-thickness burn, and so the sensation to pinprick is lost.

**Skin graft:** Skin grafting is a type of graft surgery involving the transplantation of skin. The transplanted tissue is called a skin graft.

**Early Excision:** 3th to 7th Post Burn Day

**Tangential excision:** Thin layer sequential excision of all nonviable tissue, until a viable tissue level is reached.<sup>[13]</sup> Or excision of the necrotic surface of a burn, taking repeated slices parallel to the skin surface using a skin graft knife.<sup>[14]</sup>

**Fascial Excision:** Excision of burned tissue and subcutaneous tissue down to the layer of muscle fascia.<sup>[15]</sup>

### **Surgical Procedure:**

- Selection of Burn patients with deep dermal and full thickness burn, clinically.
- Tangential & Fascial excision of all deep dermal and full thickness burns up to punctate bleeding point or a bed of viable tissue.
- Adequate hemostasis is critical to minimize hematoma formation and ultimately graft loss. Soaked gauze in an epinephrine solution (1:100000) are mainstay of hemostasis, combined with topical pressure and cauterization when necessary.
- Coverage of wound with Split Skin graft.
- Evaluation of wound postoperatively. (1st dressing at 5th postoperative day)
- Follow-up up to 3 months at 15-day intervals.

### **Outcome of skin graft:**

- Good: Excellent graft adhesion, No infection, No Skin loss.

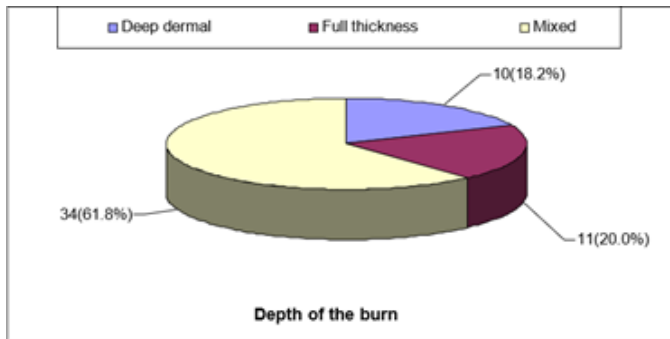
- Satisfactory: Marginal or partial graft loss managed by secondary healing.
- Poor: Significant or total graft loss managed by skin grafting or others, Infection managed by incision and drainage, debridement; Skin grafting may be needed.

**Statistical Analysis:** All data were recorded systematically in preformed data collection form. Quantitative data were expressed as mean and standard deviation, and qualitative data were expressed as frequency distribution and percentage. Statistical analysis was performed by using SPSS 20 (Statistical Package for Social Sciences) for Windows version 10. A probability value  $<0.05$  was considered a level of significance. Ethical Review Committee of Dhaka Medical College Hospital, Dhaka, Bangladesh approved the study.

## **RESULTS**

[Table 1] shows the distribution of the study patients by demographic information. It was observed that almost one third (29.1%) patients belonged to age 20-29 years. The mean age was  $38.29 \pm 19.58$  years ranging from 16 to 80 years. More than half (52.7%) patients were male and 26(47.3%) were female.

[Table 2] shows the distribution of the study patients by Diagnostic Variable. It was observed that 35(63.6%) patients suffered from flame burn, followed by 14(25.5%) electric burn, 4(7.3%) other types of burn, and 2(3.6%) chemical burn. 11-20% TBSA involved in more than half (52.7%) of patients, followed by 22(40.0%) in  $\leq 10\%$  TBSA and 4(7.3%) in 21-30% TBSA. Among them 35(63.6%) patients was in  $\leq 5\%$  and 20(36.4%) patients was in 6-15% of Total deep dermal and full-thickness burn.



**Figure 1:** Distribution of our study patients by depth of the burn

[Figure 1] shows the distribution of depth of the burn. Among the study population, 34(61.8%) presented with mixed burns, followed by 11(20%) full-thickness burns and 10(18.2%) patients were deep dermal burns.

[Table 3] shows the distribution of study patients by treatment variable where two-thirds (58.2%) of patients received both conservative and surgical and 23(41.8%) only surgical management. Among them, almost three fourth (72.7%) patients underwent excision and STSG followed by 13(23.6%) only excision later STSG and 2(3.6%) early Excision, STSG along with Flap surgery was done. The study patients by

wound swab for C/S. It was observed that one-fourth (27.3%) of patients had an infection.

[Table 4] shows the distribution of the study patients by anesthesia, donor site & any morbidity at the donor site. It was observed that majority 22(40%) patients undergone general anaesthesia, 19(34.5%) spinal anaesthesia and 14(25.5%) regional anaesthesia. We found that the majority of 41(77.45%) patients donated their autologous skin from the thigh and 14(22.55%) patients from the leg. Among them, thirteen (23.6%) patients had scars in the donor site.

[Table 5] shows the distribution of the study patients by biochemical parameter, where The mean Sodium was  $136 \pm 4.73$  mmol/l in the pre-operative and  $136.05 \pm 5.7$  mmol/l in the postoperative period. The mean potassium was  $3.64 \pm 0.56$  mmol/l in the pre-operative and  $3.6 \pm 0.71$  mmol/l in the post-operative period. The mean Serum Albumin was  $2.88 \pm 0.49$  gm/dl in the pre-operative and  $2.85 \pm 0.62$  gm/dl in the post-operative period. The differences were statistically not significant ( $p > 0.05$ ) between the two groups.

**Table 1:** Distribution of the study patients by demographic (Age, Gender) information (n=55)

Demographic information	Frequency	Percentage
<b>Age (in years)</b>		
10-19	8	14.5
20-29	16	29.1
30-39	10	18.0
40-49	6	10.9
≥ 50	15	27.0
Mean±SD	38.29±19.58	
Range (Min-max)	16-80	
<b>Gender</b>		
Male	29	52.7



Female	26	47.3
--------	----	------

**Table 2:** Distribution of the study patients by Diagnostic Variable -Type of burn, Total Body Surface Area Burn, Depth of Burn (n=55)

Type of injury/Bum	Number	Percentage
Flame	35	63.6
Chemical Burn	2	3.6
Electric	14	25.5
Others	4	7.3
<b>TBSA</b>		
≤10%	22	40.0
11-20%	29	52.7
21-30%	4	7.3
<b>Total deep dermal and full thickness burn</b>		
≤5%	35	63.6
6-15%	20	36.4

**Table 3:** Distribution of the study patients by Treatment Variable (n=55)

Type of Treatment received	Number	Percentage
Surgical	23	41.8
Surgical and conservative	32	58.2
<b>Details</b>		
Excision	13	23.6
Excision and Skin Graft	40	72.7
Others	2	3.6
<b>Wound swab for C/S</b>		
<b>Growth</b>		
Yes	15	27.3
No	40	72.7

**Table 4:** Distribution of the study patients by anaesthesia, donor site and scar in donor site (n=55)

Anaesthesia	Number	Percentage
Local	14	25.5
General	22	40
Spinal	14	25.5
<b>Donor site</b>		
Thigh	41	77.45
Leg	14	22.55
<b>Scar in donor site</b>		
Yes	13	23.6



No	42	76.4
----	----	------

**Table 5:** Evaluation of the study patients by Biochemical Parameter (n=55)

Serum electrolyte	Pre-operative	Post-operative	P value
Sodium (Na)	136±4.73	136.05±5.7	0.960ns
Range (Min-max)	130-147	122-146	
Potassium (K)	3.64±0.56	3.6±0.71	0.743ns
Rang (Min-max)	2.5-5.2	2.3-5	
Serum Albumin	2.88±0.49	2.85±0.62	0.778ns
Rang (Min-max)	1.9-4.29	1.4-4	

ns= not significant; P-value reached from paired t-test

**Table 6:** Distribution of the study population by wound healing, outcome, and hospital stay period (n=55)

Wound healing	Number	Percentage
Good	16	29.1
Satisfactory	23	41.8
Poor	16	29.1
Outcome		
Alive	55	91.7
Death	3	5.0
DORB	2	3.3
Hospital Stay	Day	
Mean±SD	23.26±10.24	
Range (Min-max)	13-45	

[Table 6] shows the distribution of the study population by wound healing, outcome, and hospital stay. It was observed that almost half (41.8%) of patients were in a satisfactory group of wound healing followed by 16(29.1%) in good and 16(29.1%) in poor wound healing where other procedures were taken for wound healing. We observed that 55 (91.7%) patients were alive with good, Satisfactory, and poor outcomes followed by 3(5.0%) death, and 2(3.3%) patients took DORB during the study period. The mean hospital stay was 23.26±10.24 (range 13-45) days in the study Population.

## DISCUSSION

In our study, we found the mean age was 38.29±19.58 years. Most of our patients were male (52.7%). 11-20% TBSA Involved more than half (52.7%) of patients, followed by 22(40.0%) in ≤10%TBSA and 4(7.3%) in 21-30%TBSA. Among them, two third (63.6%) of 35 patients were in ≤5%, and (36.4%)20 patient was in 6-15% of Total deep dermal And Full thickness burn. Two-thirds (58.2%) of patients received both medical and surgical and 23(41.8%) only surgical management. Among them, almost

three fourth (72.7%) patients underwent excision and STSG followed by 13(23.6%) only excision later STSG and 2(3.6%) early Excision, STSG along with Flap surgery was done.

Saaq et al did a study of 120 patients of either sex and all ages who had sustained deep burns of up to 40% of the total body surface area. Half the patients underwent early excision and skin auto grafting (i.e., within 4-7 days of sustaining burn injury) while the rest underwent delayed excision and skin auto grafting (i.e., within 1-4 weeks post-burn). Significant differences were found in favor of the early excision and grafting group concerning the various burn management outcome parameters taken into consideration, i.e. culture positivity of wounds, graft take, duration of post-graft hospitalization, and mortality.<sup>[16]</sup>

Research on Early Excision and Grafting versus Delayed Skin Grafting in Burns Covering Less than 15% of Total Body Surface Area; A Non-randomized clinical Trial, conducted by Ayaz et al concludes that in patients with burns covering less than 15% TBSA, early excision and grafting is associated with higher graft success rates compared to the delayed excision and grafting. However, length of hospital stays, itching, and scar formation are comparable between the two techniques.<sup>[17]</sup>

In this study, we observed that almost half (41.8%) of patients were in the satisfactory group of wound healing followed by 16(29.1%) in good and 16(29.1%) in poor wound healing. The mean hospital stay was  $23.26 \pm 10.24$  (range 13-45) days.

Ong et al compared the early excision of burns with traditional treatment only in patients

without inhalational injury (RR 0.36, 95% CI 0.20 to 0.65). The blood transfusion requirement is significantly higher in the early excision group but the length of hospital stay was significantly shorter (WMD  $-8.89$ , 95% CI  $-14.28$  to  $-3.50$ ). There was no conclusive evidence of the difference between the two groups in terms of duration of sepsis, wound healing time, and skin graft taken.<sup>[18]</sup>

Mallick et al found that the mean duration of hospital stay was  $18.23(\pm 3.68)$  days on early excision and skin graft patients versus  $46.35(\pm 10.47)$  days on late skin graft patients, it was a comparative study of early excision & skin graft versus late skin graft in burn patient.<sup>[19]</sup>

A study by Aguayo-Becerra et al found that mortality was higher for burns caused by flame ( $p = 0.000$ ), full-thickness burns ( $p = 0.004$ ), inhalation injuries ( $p = 0.000$ ), burns affecting .30% of the body surface area ( $p = 0.001$ ), and burns associated with infection ( $p = 0.008$ ). Protein and lipid levels were lower in the patients who died ( $p, 0.05$ ). Albumin levels showed the highest sensitivity and specificity (84% and 83%, respectively), and the area under the receiver-operating characteristic curve (0.869) had a cut-off of 1.95 g/dL for mortality.<sup>[20]</sup>

Das et al applied a slightly different protocol for the management of acid burns, beginning with plain water irrigation of the wound, which effectively reduced burn depth and the requirement of surgical treatment. The application of hydrocolloid dressing for 48-72 hours helped with the assessment of the depth and the course of treatment. Early excision and grafting give good results but resultant acid



trickling creates a marble cake-like appearance of the wound separated by the vital skin. Excision with a scalpel and direct stitching of the wounds are often a good option. Observation of patients on follow-up revealed that wounds showed a tendency for hypertrophy. Application of pressure garments and other scar treatments were given in all cases unless the burn was highly superficial.<sup>[21]</sup>

Mohammadi et al did an RCT on 50 patients with hand burns and average burn size of less than 30% of total body surface area (TBSA). Deep second and third degree were randomly divided into early Excision and grafting groups (group I) and delayed grafting group (group II). The result was the most common site of involvement was the metacarpophalangeal (MCP) joint with frequency of 39% and 40% in groups I and II, respectively. There were no statistically significant differences between both groups regarding deformity severity, scar formation, sensation, major activities, and overall satisfaction.<sup>[22]</sup>

Since burn patient treatment has advanced significantly over the previous few decades, it seems more challenging to achieve large increases in survival rates in the future. Thanks to the remarkable developments in plastic and reconstructive surgery over the past century, numerous treatments have been developed to significantly improve the prognosis of these individuals. Despite these developments, we are still unable to completely restore

individuals to their pre-injury states. Therefore, improvements in psychological care, wound closure, and healing are needed to facilitate successful reintegration. Research on inflammation control, grafting, biomarkers, stem cells, and rehabilitation will continue to progress individualized care and create new therapeutic options for these patients.<sup>[23]</sup>

### Limitations of the study

Our study was a single-center study. We took a small sample size due to our short study period. We lost patients during our study period. After evaluating those patients, we did not follow up with them for the long term and do not know other possible interference that may happen in the long term with these patients.

### CONCLUSIONS

In our study, we found early excision and skin grafting have become the standard procedure for most of the deep dermal and all full-thickness burns. This study showed the significance of early excision on deep dermal and full-thickness burn patients concerning graft take, post-graft complication, and length of hospital stay. Biochemical parameters remain static between pre and post-operative periods among the study population.

So further study with a prospective and longitudinal study design including a larger sample size needs to be done to validate the findings of our study.

## REFERENCES

1. He S, Alonge O, Agrawal P, Sharmin S, Islam I, Mashreky SR, Arifeen SE. Epidemiology of Burns in Rural Bangladesh: An Update. *Int J Environ Res Public Health*. 2017;14(4):381. doi: 10.3390/ijerph14040381.
2. Cope O, Langohr JL, Moore FD, Webster RC. Expeditious Care of Full-Thickness Burn Wounds by Surgical Excision and Grafting. *Ann Surg*. 1947;125(1):1-22.
3. Jackson D, Topley E, Cason JS, Lowbury EJ. Primary excision and grafting of large burns. *Ann Surg*. 1960;152(2):167-89. doi: 10.1097/0000658-196008000-00001.
4. Billingham RE, Krohn PL, Medawar PB. Effect of cortisone on survival of skin homografts in rabbits. *Br Med J*. 1951;1(4716):1157-63. doi: 10.1136/bmj.1.4716.1157.
5. Argirova M, Hadjiski O, Victorova A. Non-operative treatment of hypertrophic scars and keloids after burns in children. *Ann Burns Fire Disasters*. 2006;19(2):80-7.
6. Alster TS, West TB. Treatment of scars: a review. *Ann Plast Surg*. 1997;39(4):418-32. doi: 10.1097/0000637-199710000-00014.
7. Freshwater MF, Krizek TJ. Skin grafting of burns: a centennial. A tribute to George David Pollock. *J Trauma*. 1971;11(10):862-5.
8. Rudolph R, Klein L. Healing processes in skin grafts. *Surg Gynecol Obstet*. 1973;136(4):641-54.
9. Padgett EC. Calibrated intermediate skin grafts. *Surg Gynecol Obst*. 1939;69:779-793
10. Padgett EC. Skin grafting and the 'three-quarter'-thickness skin graft for prevention and correction of cicatricial formation. *Ann Surg*. 1941;113(6):1034-1049.
11. Padgett EC. Indications for determination of the thickness of split skin grafts. *Am J Surg*. 1946;72(5):683-693.
12. Tanner JC Jr, Vandeput J, Olley JF. The mesh skin graft. *Plast Reconstr Surg*. 1964;34:287-292.
13. Shimizu R, Kishi K. Skin graft. *Plast Surg Int*. 2012;2012:563493. doi: 10.1155/2012/563493.
14. Jackson DM, Stone PA. Tangential excision and grafting of burns. The method, and a report of 50 consecutive cases. *Br J Plast Surg*. 1972;25(4):416-26. doi: 10.1016/s0007-1226(72)80087-0.
15. Jha S, Goyal P, Bhattacharya S, Baranwal S. Calcium Homeostasis Comparison in Thermal Burn Patients- Early Tangential Excision and Grafting versus Conservative Management. *Indian J Plast Surg*. 2020;53(3):381-386. doi: 10.1055/s-0040-1716474.
16. Saaiq 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*. 2012;25(3):143-7.
17. De La Tejera G, Corona K, Efejuku T, Keys P, Joglar A, Villarreal E, et al. Early wound excision within three days decreases risks of wound infection and death in burned patients. *Burns*. 2023;49(8):1816-1822. doi: 10.1016/j.burns.2023.06.003.
18. Ong YS, Samuel M, Song C. Meta-analysis of early excision of burns. *Burns*. 2006;32(2):145-50. doi: 10.1016/j.burns.2005.09.005.
19. Prasanna M, Mishra P, Thomas C. Delayed primary closure of the burn wounds. *Burns*. 2004;30(2):169-75. doi: 10.1016/j.burns.2003.09.028.
20. Aguayo-Becerra OA, Torres-Garibay C, Macías-Amezcu MD, Fuentes-Orozco C et al. Serum albumin level as a risk factor for mortality in burn patients. *Clinics*. 2013;68:940-5.
21. Das KK, Olga L, Peck M, Morselli PG, Salek AJ. Management of acid burns: experience from Bangladesh. *Burns*. 2015;41(3):484-92.
22. 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*. 2014;2(4):141-5.
23. Gacto-Sanchez P. Surgical treatment and management of the severely burn patient: Review and update. *Med Intensiva*. 2017;41(6):356-364. doi: 10.1016/j.medint.2017.02.008.

Source of Support: Nil, Conflict of Interest: None declared

**APPENDIX**



Photograph 1: Deep dermal burn on anterior abdominal wall

Photograph 2: per operative photograph after wound excision

Photograph 3: Immediate Post-Operative photograph of Split Thickness Skin Graft

Photograph 4: 5<sup>th</sup> POD of STSG

Photograph 5: at 8<sup>th</sup> POD during discharge