Original Article

Comparative Study of Early Excision and Skin Graft versus Late Skin Graft in Burn Patients

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ABSTRACT:

Introduction: *Burn results in disruption of functional integrity of tissues caused by a pathological influx of energy. Depending upon the depth of the tissue damage, the burn may be superficial, partial-thickness and full-thickness burn. Full-thickness burn involves the epidermis and the entire dermis as well. Though early burn excision and skin grafting was first introduced by Wilms in 1901 and applied to large burns by Janzekovic in 1970, it gained widespread popularity in recent years. Presently it is a well-accepted procedure. The purpose of this study is to evaluate the outcome of early excision & skin grafting versus late skin grafting in the burn patients.* ***Methods:*** *This study was carried out in the Department of Plastic Surgery and Burn unit, Dhaka Medical College Hospital, Dhaka, between April 2013 to March 2014. The enrolled patients divided randomly in two groups, the group I- early excision and skin graft and group II- late skin graft.* ***Results:*** *Mean age of study population was 6.7(±2.1) years in group I and 8.10(±1.66) years in group II; with a range of 3 to 12 years. Males were predominant, 17(56.67%) in group I and 18(60%) in group II. Overall male: female ratio was 1.4:1. The cause of burn in group I- 09(30%) were electric burns and 21(70%) were flame burns; in group II- 3(10%) were electric burn and 27(90%) were flame burns. In group I mean percentages of skin graft take on 5th day was 97.90%(±4.55) and 91.0%(±8.44) in group II ($p < 0.05$), that was statistically significant. On 10th day mean skin graft take was 97.7% and 90.0% in group I and group II respectively.* ***Conclusion & Recommendation:*** *Early excision and skin grafting have become the standard procedure for most of the deep dermal burns. This study showed a significant difference in favor of early excision and skin grafting over delayed skin grafting in respect to graft take, post graft complications and length of hospital stay.*

Keywords*: Skin graft, Early excision, Burn and skin graft*

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INTRODUCTION:

Burn results in disruption of functional integrity of tissues caused by a pathological influx of energy.[1] The source of energy may be thermal, chemical, electric or radiation. Depending upon the depth of the tissue damage, burns may be superficial, partial-thickness and full-thickness burn. Superficial bum involves the epidermis only. Partial-thickness

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burn involves the entirety of the epidermis and a portion of dermis. A partial-thickness burn is further divided into superficial and deep, based on the depth of the dermal injury. A superficial partial-thickness burn is typically pink, moist and painful to touch. Deep partial-thickness burn involves the whole of the epidermis and extends into the reticular portion of the dermis. Full-thickness bum involves the epidermis and the entire dermis as well.[2] Early burn excision and skin grafting gained widespread popularity in recent years. Presently it is a well-accepted procedure.[5] Wilms was the first person who practised excision of small areas of deep burn and their immediate coverage by skin grafting in 1901. The results in terms of healing were excellent. Extremely limited donor area in extensive burns was encountered .[5]

So far, there is no study regarding the early excision & skin grafting in deep partial-thickness & full-thickness burn in the burn & plastic surgery unit of Dhaka medical college. Therefore, this study has been designed to know the outcome of early excision & skin grafting in deep partial-thickness & full-thickness burns versus late skin graft in the burn patients.

METHODS AND MATERIALS:

This is a prospective observational study, done from April 2013 to March 2014, in the Department of Plastic Surgery & Burn Unit, Dhaka Medical College Hospital, Dhaka. Patients who were admitted in the Department of Plastic surgery & Burn unit, underwent the early excision & skin grafting or late skin grafting, were included in the study.

In Group-I, (Early excision) there were 30 patients; and in Group-ii, (delayed graft)- 30 patients. Patients were selected by some specific criteria. After admission in the Department of plastic surgery & burn unit of Dhaka Medical College Hospital, all patients with burn less than 25% TBSA and requiring operative treatment were included in this study as per selection criteria and exclusion criteria. At least thirty cases of burn patients were managed by early excision and skin grafting. Both flame burns and electric burns were included in both groups (fig I & II).

Figure1: Pre and post-operative case of an electric burn of the right hand

Figure 2: Pre and post-operative case of a flame burn

RESULTS:

Mean age was 6.7(±2.1) years in group I and 8.10(±1.66) years in group II, the minimum age was 3 years and the maximum age was 12 year. Distribution of cause of burn: in group I, 09(30%) were electric burns and 21(70%) were flame burns; in group II, 3(10%) were electric burn and 27(90%) were flame burns.

Table 1: Percentages of skin graft

	Study group		
	Group I	**Group II**	**P-value**
Percentages of skin graft take on the 5th day	97.90(±4.55)	91.0(±8.44)	<0.001
Percentages of skin graft take on 10th day	97.91(±4.59)	90.0(±9.09)	<0.001

Table 2: Immediate postoperative complication

Complications	Study group		Total	P-value
	Group I n=30	Group II n=30		
Seroma	06	18	24	0.003
Hematoma	03	00	03	0.23
Wound infection	01	07	09	0.02

Table 3: Late complications of grafted areas after 1 month

Late complications	Study group		Total	P-value
Pigmentation	Group I	Group II		
Hypo pigmentation	21(70)	20(66.7)	41	0.95
Hyper pigmentation	06(20)	07(23.3)	13	
No abnormality	03(10)	03(10.0)	06	
Itching				
Yes	24(80)	21(70)	45	0.37
No	06(20)	09(30)	15	
Pain				
Yes	03(10)	18(60)	21	<0.001
No	27(90)	12(40)	39	

This Table shows complications of grafted areas after 1st month. The incidence of pain is higher in group II than group I, ($p < 0.05$) that is statistically significant. The mean duration of hospital stay after operation- in group I was 17.66(±7.34) days and 21.66(±6.65) days in group II, which shows hospital stay was reduced in group I than in group II ($p<0.001$) and that was statistically significant.

DISCUSSION:

In the present study, the mean age of the study population was 6.7(±2.1) years in group I and 8.10(±1.66) years in group II. The minimum age was 3 years and the maximum age was 12 years. Males were predominant. There were 17(56.67%) male patients in group I and 18(60%) in group II. Overall male-female ratios were 1.4:1. In a study by Mohammadi AA et al., there were 13 men and 12

women in the group I (delayed excision group).[4] The mean age was 16.6±6.68 years. In group II (early excision group), there were 14 men and 11 women with a mean age of 30.1 ±10.38 years.[4] Omar and Hassan studied 12 men and 8 women in early excision group. The mean age was 23 ± 7 years. In delayed excision group, there were 13 men and 7 women with a mean age of 25 ± 8 years.[1]

In this study, the mean percentage of burn was 16.50(±5.55) in group I and 17.60(±2.84) in group-II. In a study by Kirn DS, and Luce EA, the average total body surface area was 23.6 percent for the early excision group and 20.9 percent for the conservative management group.[5] In Omar and Hassan's study in 2010, the mean surface area of burn allowed for early excision was 26%, which is similar to TBSA in our study (26 and 23% for early excision and skin grafting, and conservative group respectively).[1] This average percentage enabled us to interfere safely and to excise burn eschar within the first three burn days. Regarding the second point, excision was done tangentially to achieve punctate bleeding points.

In the present study, the mean haemoglobin level of the patients was 10.19(±1.08) mg/dl in group I and 9.60(±1.03) mg/dl in group II (p<0.05). Mean serum albumin level was 2.85(±0.64) mg/dl in group I and 2.49(±0.67) mg/dl in group II (p<0.05). Mean sodium level was 134.80(±1.74) mmol/dl in group I and 123.0(±29.89) mmol/dl in group II (p<0.05). The mean potassium level was 4.11(±0.51) mmol/dl in group I and 3.35(±0.57) mmol/dl in group II (p<0.05). Omar, M.T.A and Hasan, A.A. in 2010 also showed a similar type of biochemical changes.[1]

Regarding the cause of the burn, in group I, 09(30%) patients had electric burn and 21(70%) with the flame burn, in group II, 10% had electric burn and 27(90%) sustained flame burn. Mohammadi AA et al., in their study reported the most common cause of burns was flame with a frequency of about 65.3%.[4] In another study, Omar and Hassan showed flame as the most common cause of burns with a frequency of about 72.5%.[1]

In our study, 21(80%) patients required blood transfusion in group I and 30(100%) patients required blood transfusion in group II and that was statistically significant (p<0.05). One of the main concerns regarding early excision procedures is blood loss and its consequences because the procedure essentially relies on bleeding to determine the endpoint.[6] Ong YS et al., showed that the blood transfusion requirement is significantly higher in the early excision group.[7]

In this study, the mean percentage of skin graft take on the 5thpost operative day was 97.90(±4.55) in group I and 91.0(±8.44) in group II (p <0.05) and that was statistically significant. The mean percentage of skin take on 10th POD was 97.91(±4.59) in group I and 90.0(±9.09) in group II (p <0.05) and that was also statistically significant. Mohammadi AA et al., showed the percentage of graft takes 73 (±17) in group I and 85 (±12) in group II.[4]

Ong et al., performed a meta-analysis of data from six randomized, controlled trials published between 1966 and 2004 and compared early excision of burn wounds with wound dressing and grafting after eschar separation. They found a trend toward a reduction in mortality with early excision: 39 of 146 patients (27%) treated with excision died, as compared to 52 of 144 (36%) treated with wound dressing and late grafting (hazard ratio for early excision 0.73; 95% confidence interval 0.52 to 1.01). [7]

In this study complications of grafted areas as assessed after the first month, were hypopigmentation in 21 patients (70%) in group I and 20(66.7%) in group II, hyperpigmentation in six patients (20%) in group I and 07(23.3%) in group II, itching in 24(80%) patients in group I and 21(70%) in group II, pain in 03(10%) patients in group I and 18(60%) in group II, a hypertrophic scar in 06(20%) patients in group I and 18(60%) in group II. Pain and hypertrophic scar were higher in group II than in group I (p<0.05) and that was statistically significant (Table-3). Complications of grafted areas as assessed after 3rdmonth were, 21 patients (70%) with hypo pigmentation in group I and 24(80%) in group II, 05(16.7%) patients with

hyperpigmentation in group I and 06(20%) in group II; 24(80%) patients in group I with itching and 24(80%) in group II; 06(20%) patients with pain in group I and 18(60%) in group II; 06(20%) patients with a hypertrophic scar in group I and 18(60%) in group II. Pain and hypertrophic scar were higher in group II than group I ($p<0.05$) and that was statistically significant. Omar, M.T.A and Hasan, A.A. in 2010 also showed similar types of complications in their study.[1]

In the present study, seroma were more seen in group II and no patient developed a hematoma in that group (Table-2). Wound infection was also higher in group II, which was managed by proper drainage, dressing and antibiotic coverage. Excisional surgery was performed in the period from day 2 to day 7 post-burn in patients who did not have a significant infection in one to two stages.

In this study, mean duration of total hospital stay was 18.23(±3.68) days in group I and 46.35(±10.47) days in group II, which shows hospital stay was lesser in group I than in group II ($p<0.001$). The mean duration of hospital stays after the operation in group I was 17.66(±7.34) days and 21.66(±6.65) days in group II, which shows hospital stay was reduced in group I than in group II ($p<0.001$) that was statistically significant. Ong et al. also found that the length of hospital stay was significantly shorter in patients who had early excision. This is not surprising as patients who have their burns excised early tend to have their wounds covered earlier and hence have a shorter stay in hospital. [7]

In a study, Omar MTA and Hassan AA showed the duration interval between burn and graft was 4.9 (±1.86) days and 16 (±3.7) days for the early excision and grafting and the late grafting, respectively; and the mean hospital stay was significantly lowered in early excision and grafting group (16 days) compared to (24 days) in the delayed excision group. Early excision and grafting were introduced to reduce hospital stay, hospital cost and septic complications and to eliminate burn toxins.[1]

CONCLUSION:

Early excision and skin grafting have become the standard procedure for most of the deep dermal burns. This study showed a significant advantage of early excision and skin grafting over delayed skin grafting in respect to graft take, post graft complications and length of hospital stay.

REFERENCE:

1. Omar MTA and Hassan AA. Evaluation of hand function after early excision and skin grafting of burns versus delayed skin grafting: A randomized clinical trial. *Burns*. 2011; 37: 707–713.
2. Hudson DA, Renshaw A.'An algorithm for the release of burn contractures of the extremities.' *Burns*. 2006; 663-668.
3. Ulkur E, Acrkel C, Evinc R et al. 'Use of rhomboid flap and double Z- plasty technique in the treatment of chronic post-burn contractures.' *Burns*. 2006; 765-769.
4. Mohammadi AA. Bakhshaeekia AR. Marzban S, et al.'Early excision and skin grafting versus delayed skin grafting in deep hand burns (a randomized clinical controlled trial).' *Burns*. 2011; 37: 36–41.
5. Kirn, D.S., Luce, E.A.'Early excision and Grafting versus Conservative Management of Burns in the Elderly. *Plastic and reconstructive surgery*. 1998;1013-17
6. Monafo WW. 'Tangential excision.' *Clin. Plast. Surg.* 1974;1:591–6017.
7. Ong YS, Samuel M, Song C. 'Meta-analysis of early excision of burns.' *Burns*. 2006;32:145–50. DOI: https://doi.org/10.1016/j.burns.2005.09.005