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# Comparative Study of Early Skin Grafting and Non-Grafting in Second Degree Burns

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**Original Research Article**

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**Abstract:** Early excision and grafting of small burn wounds is an accepted treatment. Early excision of burn injuries greater than 30% total body surface area (TBSA) in adults, however, has not been universally accepted. In this comparative study held at New Burn Unit, Department of General Surgery, G.R. Medical College and JAH group of hospitals, Gwalior, 100 patients whose age ranged from 15 to 50 years with 10% to 30% total body surface area (TBSA) burns were divided into two groups of 50 each with one group treated with conventional burn treatment and other with early skin grafting. Considerable difference (reduction of 34%) was seen in hospital stay between the patients of grafting and the non-grafting group. Early–delayed split skin graft was found to statistically significantly reduce the length of stay and occurrence of infection as opposed to late or non-split skin grafting. The mean duration of stay in grafting group was 16.9 days and 25.9 in the non-grafting group. No statistically significant relation could be established for occurrence of contractures due to loss in follow up of patient. This study showed that SSG is possible and the few patients who underwent early grafting showed good outcomes, shorter hospital stay and lower infection rates. Reduction in contracture formation may have been determined if follow up was achieved.
**Keywords:** Early excision, Split skin grafting, Burn injury.

## INTRODUCTION

Skin grafting is a surgical procedure in which skin or skin substitute is used on an excised burn or non-healing wound [1]. The purpose of skin grafting is to permanently replace the damaged or missing skin or to provide temporary wound coverage.

The aim is to protect the body from fluid loss to avoid changes in temperature regulation and infections. The skin graft also prevents the development of severe contractures and plays a major role in the management of burns [2]. For superficial thickness burns (2nd degree type A) skin grafting is not required because the burns heal with little or no scarring within 14 to 21 days if not infected[3-5]. Deep partial thickness burns (2nd degree type B) and third degree burns show loss of key dermal elements that are critical for wound healing, these burns will require skin grafting because when left to heal without any intervention, they will lead to scarring and contracture formation[6,7]. Contractures limit the mobility and normal function of the affected body part. To optimize the outcome, skin grafting should be performed as soon as clinician realizes the wound will not heal within 14 days[4].

In this prospective study early skin grafting of second degree burns in patients were compared to those having same burn area but did not undergo grafting procedures. The two groups were selected because they had same burn management protocol and were compared in various aspects like wound healing, infection rate, post-operative stay etc.

## MATERIALS AND METHODS

### Study design

Comparative study

### Source of data

100 patients admitted at New Burn Unit, Dept. of General surgery, J.A. Group of hospitals and G.R. Medical College, Gwalior during period February 2016 to March 2017.

### Inclusion criteria

- Patients having second degree burns having burn surface area 10-30%.
- Age more than 15 years but less than 50 years.
- Informed consent duly signed by patient and their guardians.

**Exclusion criteria**

- Patient having age less than 15 years and more than 50 years.
- Old infected burn.
- Patients with co-morbid conditions (malnutrition, anemia)

**Method of collection of data**

After ethical approval from ethical committee this study was conducted on 100 patients divided into two groups each containing 50 patients admitted in New Burn Unit, Dept. of General surgery, J.A. Group of hospitals and G.R. Medical College, Gwalior during study period. The study comprised of 100 patients admitted with 10-30% superficial to deep partial thickness burns. One group will undergo grafting within 7 days of day of incidence. Other group will undergo conventional method of treatment (serial dressing and debridement).

**Follow up**

The patients were followed up for a period of 3 months. The follow up was done at surgery O.P.D. Madhav Dispensery G.R. medical college. Follow up essential to look for the late complications.

**OBSERVATION AND RESULTS**

A total of 100 patients of 10 to 30 percent burns admitted in new burn unit, department of surgery J.A. group of hospitals Gwalior were included in this study from period February 2016-March 2017. The patients were divided into two groups of 50 each and on comparison following results were obtained.

**Table-2: Age distribution of patients in two groups**

| Age of the patients in years | Grafting | Non-grafting |
|---|---|---|
| 15 to 25 | 15 | 16 |
| 26 to 35 | 20 | 15 |
| 36 to 50 | 15 | 19 |
| Total | 50 | 50 |

Of the total of 100 patients taken in the sample, 50 were allotted to the grafting group in which 31 (62 %) were males and 19 (38 %) were females. Same distribution was seen in the non-grafting group

**Time of presentation to the hospital**

In this study of 100 patients of 10-30 percent burns, majority of the patients presented to the New Burn Unit within 24 hours of incidence (82 % in the grafting group and 76 % in the non-grafting group). Patients presenting up to day 7 of incidence were taken into the study.

**Table-3: The time of presentation to the hospital**

| Time of presentation to the hospital from the day of incidence | Grafting group | Non-grafting |
|---|---|---|
| Day1 | 41 | 38 |
| Day 2 | 03 | 04 |
| Day 3 | 01 | 01 |
| Day 4 | 01 | 02 |
| Day 5 | 01 | 01 |
| Day 6 | 01 | 01 |
| Day 7 | 02 | 03 |

**Causes of burns in patients**

According to the study, major cause of burns is flame or thermal burn (92% in the grafting group and 88 % in the non-grafting group). Attributable reasons for thermal burns included accidental fire during cooking, gas leak and accidents under influence of alcohol. Burns due to electrical injury was 2$^{nd}$ most common cause.

**Table 4: Causes of burns in study group**

| Cause of burn | Grafting | Non-grafting |
|---|---|---|
| Flame | 46 | 44 |
| Electrical | 04 | 03 |
| Scald | Nil | 01 |
| Chemical | Nil | 02 |

**Total burn surface area**

**Table-5: Total burn surface area (%) in grafting and non-grafting group**

| Total burn surface area (%) | Grafting | Non-grafting |
|---|---|---|
| 10-15 | 12 | 08 |
| 16-20 | 08 | 10 |
| 21-25 | 05 | 06 |
| 26-30 | 25 | 26 |

**Total duration of hospital stay**

Considerable difference (reduction of 34%) was seen in hospital stay between the patients of grafting and the non-grafting group. The mean duration of stay in grafting group was 16.9 days and 25.9 in the non-grafting group.

**Table-6: Total duration of hospital stay in grafting and non-grafting group**

| Duration of stay in days | Grafting | Non Grafting |
|---|---|---|
| 10-15 | 27 | 04 |
| 16-20 | 10 | 16 |
| 21-26 | 08 | 05 |
| 26-30 | 01 | 09 |
| 31-35 | 02 | 04 |
| 36-40 | 01 | 12 |

**Incidence of infection**

**Table-7: Comparison of incidence of infection in grafting and non-grafting group**

| | Grafting | Non-grafting |
|---|---|---|
| Infection present | 08 | 22 |
| Infection absent | 42 | 28 |

## DISCUSSION

Recently, early tangential excision and grafting has become the standard treatment for most deep dermal burns. The procedure requires experience and training, both in the selection of wound and performance of the procedure [8]. As a matter of fact, while the identification of full-thickness lesions is normally easy, the judgment between superficial and deep dermal burns in the first day after injury demands more experience. Indeed, the burn severity not only depends on the intensity and duration of the thermal agent but also on the thickness of dermis and infective events. An error in under evaluation with a delayed spontaneous healing leads to more scarring and need of secondary surgical corrections. Late surgical treatment of unhealed areas is again the cause of possible functional and cosmetic impairment. However, over evaluation exposes the risk of excessive removal of healthy tissues with iatrogenic damage. In fact, first and second degree burns heal spontaneously by closed wound treatment. Third degree burns demand local surgical treatment, usually according to the principle of delayed early excision and consecutive skin transplantation.

In this study, majority of the patients arrived to the New Burn Unit, J.A. Group of hospitals within 24 hours of post burn. This suggests that the early presentation of patients to the hospital makes it feasible to perform an early-delayed grafting at New Burn Unit in J.A. Group of hospitals. The study sample was 100 patients. They were divided into two groups of 50 each. In the total it was seen that most common cause of burns occurring to the patients presented were thermal (flame burn). Various reasons of thermal burn injury included flame burns while cooking, where the clothing of the patients caught fire, gas leak, explosion of stove etc.

Patients of age group 15 to 50 were taken with majority patients belonging to the 26-35 years of age. The mean duration of stay was 16.9 days (17 days) in the grafting group and 25.9 days (26 days) in the late or non-grafting group. Performing the grafting early (within 7 days) showed reduction of 34 % in the mean hospital stay. In order to explore the differences in the duration of hospital stay in patients undergoing grafting and those who do not, an Unpaired T-test was performed. The test was conducted at significance level of 0.0001. The results indicated that the hospital stay in the late or non-grafting was statistically significantly higher than the grafting group.

The incidence of infection in the patients undergoing grafting was noted to be lower than the non-grafting group. The most common organism seen in the

wound pus culture was pseudomonas aeruginosa. To evaluate the difference in infection at burn site between patients who received grafting and those who do not, a Fischer exact test was performed. The test was conducted at the significance level of 0.0041. These findings of hospital stay and infection rates in this study are similar to previous studies. This was similar to a Meta analytic study carried out by Yee Siang Ong et al at department of plastic surgery, Singapore general hospital in 2005. Their study showed that the length of hospital stay was significantly shorter in patients who had early excision of burns compared to those who did not (standard mean deviation -8.89, 95% confidence interval of -14.28 to -3.50). Other study carried out by engrave *et al*. [9] Desai *et al*. We found that the length of hospital stay was significantly shorter in patients who had early excision. Total 95% confidence interval with chi-square value of 15.68 (p =0.0004). Subramanian [10], on the other hand, found that patients with early excision required a shorter duration of antibiotic treatment and less positive wound cultures, both being statistically significant.

Another study carried out by Mehdi Ayaz *et al*. at 1department of surgery, Shiraz burn research center, Ghotboddin hospital, shiraz university of medical sciences, shiraz, Iran showed found that the graft success rate was significantly higher in early elective grafting group when compared to non-grafting group (96.8±5.6 vs. 92.8±7.5; p=0.033). The duration of the hospital stay was comparable between two study groups. Another study carried out YY Vinita p *et al*. from the department of plastic surgery, Seth GS Medical College & KEM hospital, Mumbai, India and the department of community medicine, Chirayu Medical College, Bhopal, India. Showed the mean hospital stay in the patients who underwent early excision and grafting was 15.1 ± 4.1 days, whereas that in the patients who underwent delayed grafting was 36.2 ± 6.3 days (p = 0.001). Suggesting early excision and grafting decreases the hospital stay of burn patients.

The occurrence of the contractures and the hypertrophic scarring is a known complication seen in the burn patients. In this study the patients were followed up for 3 months so that a comparison could be made in the occurrence of these complications. Among the 50 patients of the grafting group, only 8 patients developed contracture/hypertrophic scarring. The occurrence of contracture/hypertrophic scarring was much higher in the non-grafting group where 20 out of 50 patients developed these complications. The difference was further evaluated by applying Fischer exact test (two tailed P value was 0.0135) which is considered statistically significant. The results were similar to the study conducted by Engrave *et al*. [9] who found more patients in the conservative treatment with hypertrophic scars.

## CONCLUSION

Early-delayed split skin graft was found to statistically significantly reduce length of stay and occurrence of infection as opposed to late or non SSG. Reduction in contracture formation and hypertrophic scar was seen in the grafting group as compared to the non-grafting group. This study shows that even if early delayed SSG were to be offered at J.A. group of hospitals there is need to carry out awareness campaigns to change people's attitudes towards the surgical procedure (SSG). This is an approved treatment world-wide which has not gained wide acceptance amongst patients presenting to J.A. group of hospitals that participated in this study. Patient attitudes and perceptions need to be changed as SSG currently is not seen as a curative treatment but as added injury to an already injured patient. This study showed that SSG is possible and the few patients who underwent early grafting showed good outcomes, shorter hospital stay and lower infection rates.

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