

## A PROSPECTIVE STUDY OF POST BURN CONTRACTURE: INCIDENCE, PREDISPOSING FACTORS, MANAGEMENT, AND OUTCOME?

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### ABSTRACT

**Background:** Burn injury is among the prevalent cause of trauma especially in the scenario of middle- and low-income countries. Disabling outcomes are reported if the full-thickness and deep partial-thickness burns are not managed with early excision and grafting. Full-thickness and deep partial-thickness burns if not managed with adequate splinting and positioning then they often lead to burn scar contractures. **Material & Methods:** The present cross-sectional observational study was conducted at the department of surgery of our tertiary care hospital. Fifty subjects with post-burn contractures who give consent with post-burn contractures of either age and gender were included in the study, and the patients who refused to give consent were excluded. **Results:** Split-thickness skin grafting (STSG) conducted in 28 (56%) patients. Burn contracture release with K wire insertion along with coverage was performed in 9 patients (18%), contracture release with split-thickness skin grafting with flap cover was performed in 8 patients (16%), and Z plasty was done in 5 patients (10%). Postoperatively, out of total of 47 cases (94 %) had a good postoperative outcome, and the grafts and flaps were taken up. **Conclusion:** We concluded from the present study that due to significant advances in postburn care in the last decades the postoperative functional outcomes are improved with better quality of life.

**Keywords:** Management, Outcome, Post-burn contracture.

### **INTRODUCTION:**

Burn injury is among the prevalent cause of trauma especially in the scenario of middle- and low-income countries (1). Disabling outcomes are reported if the full-thickness and deep partial-thickness burns are not managed with early excision and grafting. Full-thickness and deep partial-thickness burns if not managed with adequate splinting and positioning then they often lead to burn scar contractures (2). These burn scar contractures are severely painful, disfiguring and itching. Along with that these burn scar contractures interferes with daily routine activities of living and imposes difficulties in performing or

securing work and receiving an education (3). There are a number of rehabilitation therapies to reduce contractures which includes intra-lesional corticosteroid injection, hydrotherapy, antihistamines, compression therapy, laser therapy, dynamic or static splinting and surgical excision with reconstruction (4).

Generally, burn scar contractures have arisen where adequate post-burn care has not been provided. Although the burn scar contractures management has been studied in previous researches, burn scar contracture may occur secondary to the split-

thickness skin grafting applied to the burn wounds (5). These burn scar contractures do not only occur because of skin loss, but they can also occur as a result of the differential growth pattern of surrounding tissues and burn scar (6). The operative management is the most powerful treatment option for burn scar contractures release. The defect which occurs should be overcome with the donor tissues of matching pliability texture and color. Hence, skin flaps and free flaps which meet the above-stated criteria is used to repair the resulting post contracture release defect, replace scar tissues and providing superior functional restoration (7).

In India, the incidence and prevalence of post-burn contractures are extremely high. In many patients, burn contractures are multiple and also presented very severely and diffuse (8). The patients with burn injury are managed with a variety of treatment procedures including operative management which aims at the closure of raw wounds and minimize the development of wound contraction, scarring, and formation of contractures. The present study aims to study the magnitude and precipitating factors of burn contractures and their management.

## **MATERIALS & METHODS**

The present cross-sectional observational study was conducted at the department of surgery of our tertiary care hospital. The study duration was of one year from September 2017 to August 2018. A sample size of 50 was calculated at 95% confidence interval at 10% acceptable margin of error by epi info software version 7.2. Clearance from Institutional Ethics Committee was taken before the start of the study. From every patient enrolled in the study, a written informed individual consent was taken. The subjects who give consent with post-burn contractures of either age and gender were included in the study and the patients who did not give consent were excluded. All the patients with post-burn contractures attending to the OPD enrolled based on inclusion and exclusion criteria

for the present study. Demographic history including name, age, gender, etc. and other required general information of patient's address, date of admission or discharge and duration of hospital stay was recorded.

Relevant detailed medical history was also recorded such as chief complaints in chronological order, mode of injury, site of contracture and time of onset of contracture. All patients were subjected to general physical medical examination. Details of the subject's subsequent medical evaluations were also recorded. Details of surgical procedures were recorded and thereafter outcome were assessed. Data analysis was carried out using SPSS v22. All tests were done at alpha (level significance) of 5%; means a significant association present if the p-value was less than 0.05.

## **RESULTS**

In the present study, the surgical procedures performed on the study participants include a complete release of contractures which was followed by resurfacing with skin flaps and grafts. In the present study, multiple resurfacing procedures were done which were a single procedure or in combination with other contracture release procedures with split thickness skin grafting (STSG) conducted in 28 (56%) patients. Burn contracture release with K wire insertion along with coverage was conducted among nine patients (18%), followed by contracture release with split-thickness skin grafting with flap cover was performed in 8 patients (16%) and Z plastic was done in 5 patients (10%). Postoperatively, out of total of 47 cases (94 %) had a good postoperative outcome, and the grafts and flaps were taken up. Only in 3 cases, there was minimal graft loss observed, but that did not require any surgical intervention, and there was complete healing reported with dressings. (Table 1)

**Table 1: Distribution of study participants according to the type of surgical intervention & outcome**

Type of surgical intervention & outcome		No. of patients (n=50) (%)
<b>Type of surgical intervention</b>	Z plasty	5 (10)
	Contracture release+STSG	28 (56)
	Contracture release + flap cover +/-STSG	8 (16)
	Contracture release with K wire insertion with coverage	9 (18)
<b>Surgical outcome</b>	Good graft take	47 (94)
	Complication (minor graft loss)	3 (6)

In the present study, all study participants have followed up after 3weeks and 6weeks duration from surgery. After the three weeks follow up, 7 (14%) cases were undergoing K wire removal and were scheduled for physiotherapy. Physiotherapy along with night splintage was scheduled for 21 (42%) patients, and only physiotherapy alone was scheduled for 22 (44%) patients. After 6weeks follow up, two study participants were admitted for contracture release at another site. There were 7 study participants, who had been scheduled for physiotherapy in previous follow up visit, but they did not follow the instructions given to them hence, these cases were recalled and reappointed for counseling and further follow-up advice. The rest of the 37 study participants were showed the desired outcome and had satisfactory results. (Table 2)

In the present study, functional restoration was optimal in 47 (94%) patients with the complete range of motion while in three patients (6%) the range of motion was not satisfactory. These were the study participants who were not following the physiotherapy schedule and splint age instructions accordingly. These patients were rescheduled and counseled about the need for proper physiotherapy for the better outcome. (Table 3)

**Table 2: Distribution of patients as per the Follow-up course post procedure.**

Follow up course		No. of patients (n=50) (%)
<b>3weeks follow up</b>	K wire removal+physiotherapy	7 (14)
	Physiotherapy alone	22 (44)
	Physiotherapy with night splint age	21 (42)
<b>6weeks follow up</b>	Re-admission (for contracture release at another site)	2 (4)
	Physiotherapy restressed	7 (14)

**Table 3: Distribution of patients according to the range of motion (ROM) satisfaction.**

Range of motion	No. of cases (n=50) (%)
<b>Satisfactory</b>	47 (94)
<b>Non-satisfactory</b>	3 (6)

## DISCUSSION

In the present study, multiple resurfacing procedures were done which were the single procedure or in combination with other contracture release procedures with split thickness skin grafting (STSG) conducted in 28 (56%) patients. Burn contracture release with K wire insertion along with coverage was conducted

among 9 patients (18%), followed by contracture release with split-thickness skin grafting with flap cover was performed in 8 patients (16%), followed by contracture release with split-thickness skin grafting with flap cover was performed in 8 patients (16%) and Z plasty was done in 5 patients (10%). Postoperatively, out of total of 47 cases (94 %) had a good postoperative outcome, and the grafts and flaps were taken up. Only in 3 cases, there was minimal graft loss observed, but that did not require any surgical intervention, and there was complete healing reported with dressings. A study conducted by Iwuagwu FC et al. among 129 study participants who underwent for skin grafting for burn contractures, reported that full-thickness skin grafts were employed in 81 cases (63%) and split-thickness skin grafts employed in 26 (20%) patients. Both methods employed on different occasions operated 22 (17%) patients. It was published that for the same region, split-thickness skin grafts reports being more release of the burn contracture and satisfactory outcome than full-thickness skin grafts (9).

In the present study, all study participants were followed up after 3weeks and 6weeks duration from surgery. After the three weeks follow up, 7 (14%) cases were underwent K wire removal and were scheduled for physiotherapy. Physiotherapy along with night splintage was scheduled for 21 (42%) patients, and only physiotherapy alone was scheduled for 22 (44%) patients. After 6weeks follow up, two study participants were admitted for contracture release at another site. There were 7 study participants, who had been scheduled for physiotherapy in previous follow up visit, but they did not follow the instructions given to them hence, these cases were recalled and re-appointed for counselling and further follow-up advice. The rest of the 37 study participants were showed the desired outcome and had satisfactory results. A similar study conducted by Adu EJ among 68 study participants who underwent for skin

grafting for burn contractures, reported that seventy-one operative procedures were implemented which includes contracture release and flap repair among 33 patients followed by full-thickness skin graft among 23 patients and followed by partial thickness skins grafting and splinting in 6 patients (10). Another similar study conducted by Saaiq M et al among 213 study participants who underwent for skin grafting for burn contractures, reported that the various surgical procedures were employed alone or in combination included split-thickness skin grafts and full-thickness skin grafts in 91 patients, Z-plasty in 66 patients, supraclavicular artery flaps in 15 patients, abdominal flaps in 3 patients and posterior interosseous artery flap in one patient. 174 (83%) patients reported satisfactory graft take and 17 (8.9%) patients reported poor graft take (11).

In the present study, functional restoration was optimal in 47 (94%) patients with a complete range of motion while in three patients (6%) the range of motion was not satisfactory. These were the study participants who were not following the physiotherapy schedule and splint age instructions accordingly. These patients were rescheduled and counseled about the need for proper physiotherapy for the better outcome. In a study conducted by Balumuka DD et al. among 58 study participants who underwent for skin grafting for burn contractures of axilla and shoulder, reported that there was a high incidence (52%) ( $p=0.007$ ) of recurrence of contractures among study participants (12). Another study conducted by Kraemer MD et al. among 53 study participants who underwent for skin grafting for burn contractures, reported that the optimal functional restoration was observed in 88% patients while only 12% of the patients reported the unsatisfactory outcome. They also reported that the unsatisfactory result was observed in 33% of patients with contractures of the neck (13).

## CONCLUSION

We concluded from the present study that due to major advances in postburn care in the last decades the postoperative functional outcomes are improved with better quality of life and mortality rates have gone down significantly. Proper selection reconstructive procedures result in complete rehabilitation and providing superior function restoration to pre-injury status and minimum contracture reoccurrence.

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