

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

Dr. Ramraj Goyal<sup>1</sup>, Dr. Surendra Mertia<sup>2\*</sup>

1, Senior Consultant, 2. Consultant, Department of Surgery, Navjeevan Hospital, Jodhpur

\*Corresponding author - Dr. Surendra Mertia

Email id – [surendramertia@gmail.com](mailto:surendramertia@gmail.com)

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### ABSTRACT

**Background:** Burn injury is still the common cause of trauma especially in low- and middle-income countries. Deep partial-thickness and full-thickness burns that are not treated with early excision and grafting can be disabling, as these deep injuries often lead to burn scar contractures unless provided with adequate positioning and splinting. **Material & Methods:** The present cross-sectional observational study was conducted at department of surgery of our hospital. 50 subjects with post burn contractures of either age or sex, who were satisfying the inclusion and exclusion criteria were included and the patients who refused to give consent were excluded. **Results:** In present study, skin grafting STSG done in 28 (56%) cases. Contracture release with STSG with flap cover was performed in 8 cases (16%), contracture release with K wire insertion with coverage was performed in 9 cases (18%) and Z plasty was performed in 5 cases (10%). Post operatively, 47 patients (94 %) had a good surgical outcome the flaps and grafts were taken up. Functional restoration was satisfactory in 47 (94%) with complete range of motion patients while in 3 patients (6%), range of motion was not optimal. **Conclusion:** Proper planning of reconstructive procedures, rehabilitation, restoration to pre-injury status and return to society are the goals that the treating team hopes to achieve.

**Key words:** Management, Outcome, Post burn contracture.

### INTRODUCTION:

Burn injury is still the common cause of trauma especially in low- and middle-income countries (1). Deep partial-thickness and full-thickness burns that are not treated with early excision and grafting can be disabling, as these deep injuries often lead to burn scar contractures unless provided with adequate positioning and splinting. Burn scar contractures are severely disfiguring, painful, and itching. As such thing, patients with burn scar contractures which interfere with activities of daily living are often marginalized and experience difficulties in receiving education and securing work (2). There are a number of therapies to reduce contractures including intra-

lesional corticosteroid injection, antihistamines, hydrotherapy, dynamic or static splinting, laser therapy, compression therapy, and surgical excision and reconstruction.

Generally, contractures arise where adequate burn care has not been applied. Even though scar management has been instigated in a vigorous manner, the contracture may also occur secondary to split-thickness skin grafting to the burn wounds. Another point, the contracture does not only occur due to skin loss but also may result from the differential growth pattern between burn scar and surrounding tissues (7). The most powerful treatment

option for contracture release is a surgical procedure. The defect should be replaced with the donor tissues matching texture, color, and pliability. Skin flaps including free flaps meet these criteria to replace scar tissues and repair the resulting defect post release, providing superior functional outcomes (8–10)

The incidence of post-burn contractures is extremely high in our country. Quite often, they are not only multiple in each subject but also very severe and diffuse. The burn subjects are treated by a variety of service providers who aim at closing the raw wounds and this leads to invariable development of wound contraction and scarring.

## MATERIALS & METHODS

The present cross-sectional observational study was conducted at department of surgery of our multispecialty hospital. The study duration was of six months from August 2017 to January 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 start of study. From each and every patient included in the study, initially Informed individual consent was taken. The subjects with post burn contractures of either age and sex were included and the patients who refused to give consent were excluded. All the subjects with post burn contractures presenting in the OPD and satisfying the inclusion and exclusion criteria were included for the study. Demographic and other required general information such as name, age,

gender, address, date of admission or discharge and duration of hospital stay.

Relevant detail medical history such as chief complaints in chronological order, mode of injury, time of onset of contracture, site of contracture. Relevant general and specific medical examination. Details of the subjects in terms of details of site of contractures and subsequent medical evaluations done were recorded. Details of surgical procedures done and there outcome were recorded. Data analysis was carried out using SPSS v22. All tests were done at alpha (level significance) of 5%; means a significant association present if p value was less than 0.05.

## RESULTS

In present study, the operative procedures performed on the patients comprised complete release of contractures followed by resurfacing with skin grafts and flaps. The various resurfacing procedures employed alone or in combination included contracture release with split thickness skin grafting STSG in 28 (56%) cases. Contracture release with STSG with flap cover was performed in 8 cases (16%), contracture release with K wire insertion with coverage was performed in 9 cases (18%) and Z plasty was performed in 5 cases (10%). Post operatively, 47 patients (94 %) had a good surgical outcome the flaps and grafts were taken up. In 3 patients there was minimal graft loss but that did not need any surgical intervention and there was complete healing with dressings. (Table 1)

**Table 1: Distribution of study participants according 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)

All cases were followed up after 3weeks and 6weeks from surgery. At 3weeks follow up, 7

(14%) patients underwent K wire removal and were advised physiotherapy. Physiotherapy and

night splint age was advised in 21 (42%) cases and physiotherapy alone was advised in 22 (44%) cases. At 6weeks follow up, two patients were admitted for release of contracture at another site. There were 7 patients, who had been advised physiotherapy in previous visit, but they were not following the instructions these patients were re-counseled and were asked to follow the advice. The remaining 37 patients showed satisfactory result and were happy with the outcome (Table 2)

Functional restoration was satisfactory in 47 (94%) with complete range of motion patients while in 3 patients (6%), range of motion was not optimal. These were patients who were not following the physiotherapy and splint age instructions properly. These patients were restressed about the need for proper physiotherapy. (Table 3)

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

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

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

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

## DISCUSSION

The purpose of every surgical operation is to carry out a stable coverage of the involved area and to avoid recurrence of contracture or chronic ulcers or breakdown. The various resurfacing procedures employed alone or in combination included contracture release with split thickness skin grafting STSG in 28 (56%) cases. Contracture release with STSG with flap cover was performed in 8 cases (16%), contracture release with K wire insertion with coverage was performed in 9 cases (18%) and Z plasty was performed in 5 cases (10%).

In a study done by Iwuagwu FC et al, a total of 129 patients underwent skin grafting for release of contractures as opposed to any other method of correction.<sup>7</sup> Full-thickness skin grafts were used in 81 patients (63%) and split-thickness skin grafts in 26 (20%). Twenty-two patients (17%) had both types used on different occasions. It was found that for the same site, release with split-thickness skin grafts was associated with more release of the contracture than with full-thickness skin grafts (43).

In the series by Adu EJ, seventy-one surgical procedures were performed including release and flap repair (33 cases), full thickness skin graft (23 cases) and partial thickness skins graft and splinting (6 cases).<sup>8</sup>

In a study conducted by Saaiq M et al, the various resurfacing procedures employed alone or in combination included STSG/FTSG (191 cases), Z-plasties (66), supraclavicular artery flaps (15), abdominal flaps (3) and posterior interreous artery flap” (1). Contracture release with Skin graft (41%) and local flap (46%) were the most common surgical procedures performed in the series conducted by Kraemer MD et al.<sup>5,9</sup>

Various types of operative procedures have been proposed to treat burn wound contractures. In the

selection of a surgical procedure, several factors must be considered, including the amount of scarring of the skin adjacent to contracture, anatomic area involved and the function needs of the patient. In this study, Post operatively, 47 patients (94 %) had a good surgical outcome the flaps and grafts were taken up. In 3 patients there was minimal graft loss but that did not need any surgical intervention and there was complete healing with dressings.

In the study by Saaiq M et al, the majority of patients (174=83%) had satisfactory graft take while (17=8.9%) had poor graft take.<sup>5</sup> In this series, cases were followed up for 3 and 6 weeks. At 3 weeks follow up, 7 (14%) patients underwent K wire removal and were advised physiotherapy. Physiotherapy and night splint age was advised in 21 (42%) cases and physiotherapy alone was advised in 22 (44%) cases. At 6 weeks follow up, two patients were admitted for release of contracture at another site. There were 7 patients, who had been advised physiotherapy in previous visit, but they were not following the instructions these patients were re-counseled and were asked to follow the advice.

In a study done by Balumuka DD et al, 58 patients underwent contracture release of axilla and shoulder. The study noted that there was a high incidence of recurrence of contractures (52%). The study postulated that the risk factors for recurrence were flame burn ( $p=0.007$ ), duration of PBC of more than a year ( $p=0.018$ ), and incomplete release of the contracture ( $p=0.002$ ).<sup>10</sup>

In our study, Functional restoration was satisfactory in 47 (94%) with complete range of motion patients while in 3 patients (6%), range of motion was not optimal. These were patients who were not following the physiotherapy and splint age instructions properly. These patients were restressed about the need for proper

physiotherapy. In the series by Kraemer MD et al, restoration was possible in 88% of the procedures while only 12% of the cases provided unsatisfactory result. Kraemer MD et al, also reported that the poorest result was that of the neck which had a 33% of the unsatisfactory release.<sup>9</sup>

## CONCLUSION

There have been major advances in burn care in the last three decades and the mortality rates have gone down significantly. The management has shifted to improvement of functional outcome and better quality of life. Proper planning of reconstructive procedures, rehabilitation, restoration to pre-injury status and return to society are the goals that the treating team hopes to achieve.

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