



## MANAGEMENT OF POST BURN CONTRACTURE OF UPPER LIMB

## General Surgery

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## ABSTRACT

Post Burn contracture is one of the most common complications of burns. Although the incidence of mortality and morbidity associated with burns has decreased drastically over the recent past, the significant physical and aesthetic trauma associated with post burn scars and contractures is still a challenge for the medical fraternity.

## AIMS AND OBJECTIVES

- To evaluate the epidemiological factors in patients with post burn contractures involving the upper limb.
- To evaluate the outcome of various treatment modalities available for the correction of the deformities secondary to post burn contractures involving upper limb.

**MATERIALS AND METHODS:** This study entailed a prospective study of 40 patients admitted in Department of Surgery Government Medical College, Jammu with post burn contractures involving the upper limb for a period of 12 months i.e. from 1st November 2017 to 31st October 2018. The patients were assessed as regards the cause, duration and severity of the contractures and treatment modality was planned accordingly.

**RESULT:** In our study of management of post burn contracture involving the upper limbs, maximum number of patients were in the age group between 21-30 years (32.5% cases). Males outnumbered the females (62.5% cases). School going children accounted for the maximum number of cases (30%) followed by housewives (27.5%). Domestic burn injuries were cause of post burn contractures in majority of the cases (75% cases). Flame burns were the cause of post burn contractures in majority of the cases (70%). The right upper limb was involved by post burn contracture in majority of the cases (65%). The hand was the most common anatomical site of post burn contracture (35% cases) followed by elbow (20% cases). Split skin grafting was the mode of coverage after release of post burn contractures in 75% of the cases. Post operative splintage and physiotherapy comprised one of the most important component of management of post burn contractures. In the management of post burn contracture of the upper limb the aim of the procedure is to achieve a good functional restoration of the involved part with a durable coverage with minimal complications and morbidity involving the donor area.

**CONCLUSION :** Post burn contractures are inevitable even with the best of treatment because they depend upon the depth of burn injury. Burn contracture hinder joint mobility resulting in functional impairment and reduced quality of life. Axillary contractures limit the range of abduction, flexion contractures of elbow limit the mobility of the upper extremity. Post burn contracture of digits can result in flexion contractures, burn syndactyly, metacarpophalangeal extension contracture, contractures of the wrist or claw hand. In the management of post burn contractures of upper limb the aims to achieve a good functional restoration of the involved part with a durable coverage with minimal complications involving the donor area.

## KEYWORDS

Post burn contracture, upper limb, treatment modality

## BACKGROUND

Post burn contracture is one of the most common complications of burns. Although the incidence of morbidity and mortality associated with burns has decreased drastically over recent past, the significant physical and aesthetic trauma associated with the post burn scar and contractures is still a challenge for medical fraternity. In developing countries like India, the estimated annual incidence of burn injuries is approximately 6 to 7 million every year<sup>1</sup>. The incidence of post burn contracture is inversely proportional to the standards of the initial management<sup>2</sup>. Thermal injury is the most common form of burn injury, with electrical injuries making up to 3% of admissions to major burn units<sup>3</sup>. There is a marked correlation between the severity of burn and its sequelae as loss of work hours, disability and significant psychological morbidity<sup>4</sup>. A healed burn patient may be left with scars having varying degrees of functional and aesthetic components. Preventive strategies allowing uncomplicated healing of burns using early grafting and primary excision and grafting are key to prevent post burn contractures<sup>5</sup>. Post Burn contractures of the upper extremity are better prevented than treated, but many patients still suffer from this disability, especially after suboptimal primary care of major burns<sup>6</sup>. Post Burn contractures are inevitable even with best of treatment because they depend upon the depth of burn injury. Except for the superficial dermal burns, all deeper burns as second degree deep dermal and full thickness burns heal by scarring<sup>7</sup>. Post Burn contracture is a cause of significant morbidity in India even though its occurrence can be reduced significantly by comprehensive post burn injury care including surgical intervention<sup>8</sup>. Post burn axillary contracture is a challenging problem to the reconstructive surgeons owing to wide range of abduction that should be achieved<sup>9</sup>. Postburn contractures of digits can result in a flexion contracture, boutonniere deformity, burn syndactyly, metacarpophalangeal extension contracture, wrist

contracture or claw hand<sup>10</sup>. The mainstay of treatment of post burn hand contractures include complete surgical excision of the scar tissue and resurfacing of the resultant soft tissue defect, most commonly with full thickness skin grafts. If scar contracture release result in major exposure of tendons or joints distant tissue transfer may be required<sup>11</sup>. Reconstruction of post burn contracture of fingers is a formidable challenge for the plastic surgeons for it is important to restore length, function and provide good quality skin cover<sup>12</sup>.

TABLE 1: AGE DISTRIBUTION

| AGE GROUP | NO. OF PATIENTS | Percentage |
|-----------|-----------------|------------|
| <10       | 5               | 12.5%      |
| 11-20     | 7               | 17.5%      |
| 21-30     | 13              | 32.5%      |
| 31-40     | 10              | 25%        |
| 41-50     | 3               | 7.5%       |
| >50       | 2               | 5%         |
| TOTAL     | 40              | 100%       |

Out of a total of 40 patients, maximum number of patients were in the age group range of 21-30(32.5%) with mean age of 27 years. The youngest patient was 4 years old and the oldest was 59 years old( Table 1). There were 25 males (62.5%) and 15 females (37.5%) in our study, with male to female ratio of 1.6. Most of the patients were school going children (30%). Housewives were next to be affected in the study group (27.5%) followed by in service patients (25%) and labourer constituting 17.5% of the patients. Most of the burn injuries were sustained at home (75%) whereas burn injuries at work place accounted for the rest of the cases (25%). Flame burns accounted for maximum number of post burn contractures (70%); whereas electric burns and scald burns accounted for 15% of the cases each. Right

upper extremity was involved in majority of the cases (65%); whereas the left upper extremity was involved in the rest of the cases (35%). Out of 40 patients in the study group, post burn contracture involved only one anatomical site in 29 patients (72.5%) whereas post burn contracture involved two or more anatomical sites in 11 patients (27.5%). Hand was the most common site of post burn contracture (35%), followed by elbow (20%) and axilla (18%). Post burn contractures involving both axilla and elbow accounted for 13% cases whereas post burn contractures involving elbow and hand were present in 10%. Post burn contractures involving axilla, elbow and hand were observed in 5% of the cases.

**Table 2: MODALITY OF TREATMENT**

| MODE OF TREATMENT                          | NO. OF CASES | PERCENTAGE |
|--|--------------|------------|
| RELEASE WITH SPLIT THICKNESS SKIN GRAFTING | 30           | 75%        |
| RELEASE WITH FULL THICKNESS SKIN GRAFTING  | 7            | 17.5%      |
| CROSS FINGER FLAP FOR FINGER CONTRACTURES  | 3            | 7.5%       |
| TOTAL                                      | 40           | 100%       |

75% of the cases underwent release of contracture and coverage with split thickness skin grafting; whereas 17.5% of the cases underwent release of contracture and coverage with full thickness skin grafting. 7.5% cases requiring release of post burn hand contractures involving fingers required cross finger flap due to exposed flexor tendons at release (Table 2).

Out of 40 patients treated for release of post burn contractures involving upper limb, there were complications in 4 cases only. 3 patients had partial graft loss which was managed by dressings only. Graft donor site hypertrophy was noted in one case which was managed by application of Silicone cream, Silicone gel sheet and pressure garment.

**GRADING OF RESULTS**

- Results were assessed on the basis of
- Release of contracture
- Settling of skin Graft/ flap
- Any donor site morbidity.

**The Criteria for results-**

**GOOD**—Adequately released burn contracture with almost full range of motion, well settled graft/ flap with no morbidity involving donor site.

**FAIR**--- Satisfactory results from patient's as well as Clinician's point of view but less than normal.



**Plate 1: Pic Showing Post Burn Hand Contracture (mutilated Hand)**



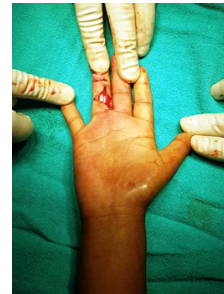
**Plate 2: Pic Showing Intraoperative Release Of Contracture**



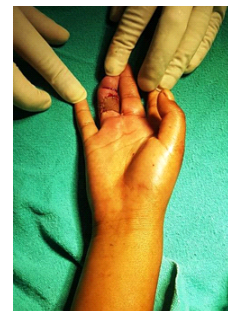
**Plate 3: Pic Showing Release Of Contracture With Stsg**



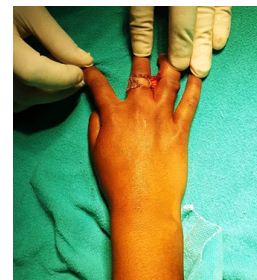
**Plate 4: Pic Showing Post Electric Burn Contracture Ring Finger**



**Plate 5: Pic Showing Intra Operative Release Of Contracture With Exposed Tendon**



**Plate 6: Pic Showing Post Operative Cross Finger Flap (volar View)**



**Plate 7: Pic Showing Post Operative Cross Finger Flap (dorsal View)**

**DISCUSSION**

An analysis of 40 cases of post burn contracture involving upper limb requiring contracture release and coverage for restoration of function and aesthetics was done. Age varied from 4 to 59 years with a mean age of 27 years. Saleh Y et al<sup>13</sup> in the study involving post burn mutilated

hand with various contractures noted that the mean age of the patients was 24.5 years. Males were affected more than females. Males constituted 62.5% of the study group whereas females accounted for rest of the patients. **Tyagi A et al**<sup>14</sup> in their study of clinical profile of patient with post burn contracture noted that 48.8 % of the patients were males and 51.2 % were females. In our study, out of 40 patients, school going children accounted for maximum number of patients (30%) whereas housewives accounted for 27.5% of cases. In service and labourers formed the rest of the study group. The findings go well with study conducted by **N Kola et al**<sup>15</sup>. Flame burns constituted maximum number of patients (70%) whereas electric burns and scald burns accounted for 15% each. The findings of studies done by **Karki D<sup>o</sup> et al** and **Samagandi S et al**<sup>16</sup> goes well with the finding of our study. In our study, the right upper extremity was afflicted by postburn contractures in 65% cases; whereas the left upper extremity was involved in 35% cases. **Peter J. Stern et al**<sup>17</sup> in their study on postburn contractures of hand in children noted that the right-hand contractures were more (57.19%) than the left (42.81%). In our study, hand was the most common site of contracture (35%), followed by elbow (20%) and elbow (18%). Contractures involving both axilla and elbow accounted for 13% cases whereas contractures involving elbow and hand were present in 10% of cases. Contractures involving axilla, elbow and hand were observed in 5% of the cases. **Iwagwu FC et al**<sup>18</sup> in their review on use of skin grafts in postburn contracture release noted that the contractures involved upper extremity more than the lower extremity. In our study, 75% of the cases underwent release of the postburn contractures with STSG, 17.5% cases underwent contracture release with FTSG. 7.5% cases involving release of postburn finger contractures required cross finger flaps due to exposed flexor tendons at release. **Hayashida K et al**<sup>19</sup> in their review on surgical treatment algorithms for postburn contractures have stressed upon the role of STSG, FTSG and local flaps for reconstruction of various postburn contractures. In our study, there was partial graft loss in 3 cases (7.5%) which was managed by dressing only. One case (2.5%) had graft site hypertrophy which was managed by silicone cream, silicone sheet and pressure garments. The findings of study done by **Iwagwu FC et al**<sup>18</sup> are consistent with our study.

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