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Original Article

# Reconstruction of Post-Burn Contracture of Fingers

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## Abstract

**Introduction:** 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. Our aim is to study the appropriate reconstructive options for post-burn scar contracture (PBSC) of fingers and their functional outcome.

**Materials and Methods:** Totally, 48 cases of PBSC of fingers were reconstructed between September 2016 and April 2017 and were evaluated for their etiology, interval between burns and reconstruction, number of fingers involved, degree and type of contracture, reconstructive option chosen and performed and their functional outcome.

**Results:** Results were analyzed as per successful reconstruction, type of reconstruction and stages, return to activities, complications, and functional outcome.

**Conclusion:** In this series, decision behind the reconstructive option chosen is emphasized. In pediatric age group, full thickness graft has shown better results. Distant flaps were used only if necessary for it is bulky. The surgical outcome has shown improvement in function. Early intervention in acute burns by plastic surgeon can prevent such functional disabilities to a great extent.

**Key words:** Fingers, Post burns Contracture, Reconstruction

## INTRODUCTION

Hands are frequently considered a mirror image of mental state. Hands are involved in more than 80% of all severe burns. Although each hand represents <3% of the total body surface area, burns of the hand is classified as major injuries. Burns of the hand have devastating consequences not only for the functional outcome but also for the esthetic appearance.[1]

The statement of Guy Foucher that "hand surgery is also esthetic surgery" has never been truer than in the treatment of burned hands. Early initiation of physical therapy, splinting, passive exercises, topical treatment, early excision, and grafting where indicated and a multidisciplinary approach are the most important treatment principles.[2] Even if the acute burns is managed properly, post-burn deformities still occur and still remains the most common cause of skin contractures of the fingers.[3,4] Reconstruction of post-burn contractures of fingers poses a formidable challenge to the plastic surgeon for it is important to restore length, function, and provide good quality skin cover, particularly in children.[5,6]

The aim of our study is to study the appropriate reconstruction chosen for post burn scar contractures of fingers, to assess the results as per successful reconstruction, options chosen and performed, patient satisfaction, donor site morbidity, and complications. We also aim to study the functional and cosmetic outcome of our results.

## MATERIALS AND METHODS

Between September 2014 and July 2015, we have managed 48 patients of post-burn contracture of fingers in our institute. The group included 33 males and 15 females patients with age ranging from 1.5 to 72 years (average age - 36.75).

There were 23 adults and 25 children in our study, with 26 patients of right-hand involvement and 22 with

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left-hand involvement. The interval between burns and surgical treatment offered varied from 7 months to 23 years.

As per etiology of burns, the patients were classified as follows (Figure 1):

1. Scalds - 12
2. Flame burns - 10
3. Flash burns - 12
4. Electrical burns - 10
5. Camphor burns - 1
6. Cracker burns - 1
7. Chemical burns - 2.

The initial treatment offered in these patients was conservative in 40 patients and split skin grafting in 8 patients. 20 of them had treatment in government hospitals and 17 in private hospitals, and 11 had no treatment (Figure 2).

As per the following classification of post-burn scar contractures (PBSC), there were 36 type 3 flexion contractures, 10 type 4 flexion contractures, and 2 type 3 extension contractures.

| Grade | Clinical findings |
|---|---|
| 1 | Symptomatic tightness, ROM normal, and normal architecture |
| 2 | ROM mild decrease without affecting daily activities, normal architecture |
| 3 | Functional deficit noted early change in hand architecture |
| 4 | Loss of hand function with significant architectural distortion |

Subset classification:

A. Flexion contractures
B. Extension contractures
C. Combination of flexion and extension contractures.

The following were the reconstructive options chosen after contracture release:

1. Split thickness skin grafting - 16 (Figure 3)
2. Full-thickness skin grafting - 8 (Figure 4)
3. Z-plasty - 10 (Figure 5)
4. Flaps:
   a. Groin flap - 3 (Figures 6 and 7)
   b. Abdominal flap - 2 (Figure 8)
   c. Cross finger flap - 5 (Figure 9)
   d. Extended cross finger flap - 1
   e. Square flap - 1 (Figure 10)
   f. Posterior interosseous artery flap - 1 (Figure 11).
5. PBSC release and proximal interphalangeal joint arthrodesis - 1 (Figure 12).

The follow-up period was for up to 1 year.

The complications which faced were recurrent contracture in a patient who underwent split-thickness

**Figure 1: Various types of finger contractures**

**Figure 2: Post-burn scar contracture managed conservatively with physiotherapy**

**Figure 3: Post-burn scar contracture managed with split thickness skin grafting**

**Figure 4: Post-burn scar contracture managed with full thickness skin grafting**

**Figure 5: Post-burn scar contracture managed with z-plasty technique**

**Figure 6: Post-burn scar contracture managed with groin flap**

**Figure 7: Post-burn scar contracture managed with groin flap**

**Figure 8: Post-burn scar contracture managed with abdominal flap**

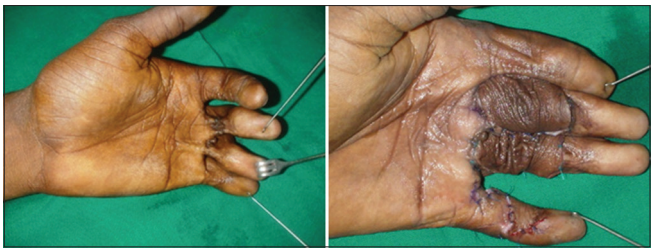

**Figure 9: Post-burn scar contracture managed with cross finger flap**

**Figure 10: Post-burn scar contracture managed with square flap**

**Figure 11: Post-burn scar contracture managed with posterior interrosseous artery flap**

skin graft who was not on proper physiotherapy and follow-up.

Patients who underwent flap surgery had to go through staged procedures such as flap division, syndactyly release. Flaps tended to be bulky excepting cross finger flap and were hyperpigmented.

## RESULTS

All 48 patients had adequate contracture release and good quality stable skin cover. Functional outcome of length

restoration, mobility, and return to work were good in all the patients. Flaps reconstructed in fingers tended to be bulky and hyperpigmented. There was minimal donor site morbidity in all the patients. In pediatric patients, full thickness graft was found to grow along with the patient and hence provides a good functional result.

## SUMMARY

There is no cookbook for reconstructing the burned hand. What is the finish line of surgical effort? Is it when patient tires becomes discouraged or ceases to come back? Unlike appendicectomy curing appendicitis, there is no single surgical procedure or series of procedures that cures burns. Ethics command us to tell and make patients understand the reality. The major goals are early independence and resumption of preburn lifestyle of patient.[7] A thoughtful surgical plan, timed goals, appropriate execution, and realistic patient gives the best chance of success in post-burn hand contracture management.

## CONCLUSIONS

Decisions behind appropriate reconstructive option play an important role in the outcome of management of post-burn contracture of fingers. Timing of treatment and maintaining the suppleness of joints before surgical procedure will improve the functional outcome.

As the fingers have an important functional role, grafts are better than flaps where possible and local flaps are better than regional flaps. In pediatric age group, full-thickness skin graft is a better option as the graft also grows along with the child.

Early intervention during acute burns and appropriate management with splints such as hayrake and banjo splints though cumbersome (Figure 13) can prevent such functional disabilities to a great extent.

**Figure 12: Post-burn scar contracture managed with pip joint arthrodesis**

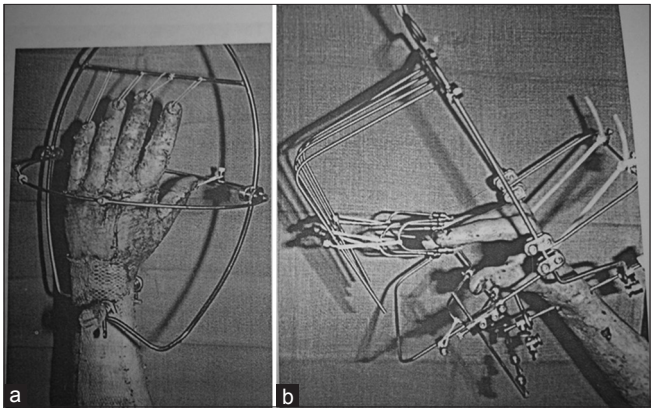


**Figure 13: Examples of banjo (a) and hayrake (b) splints**

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