Original Research Paper

Volume-10 | Issue-2 | February - 2020 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Plastic Surgery

# TECHNICAL CONSIDERATIONS IN POST BURN NECK RECONSTRUCTION

**Dr. R. Ramkumar** MBBS MS MCH., Formerly Assistant Professor of Plastic Surgery, Kilpauk Medical College, Senior Consultant Plastic Surgeon, Chennai Meenakshi Multispeciality Hospital, Chennai 600004.

**Dr. K. Mahadevan*** MBBS MS MCH., Associate Professor in the Department of Burns, Plastic & Reconstructive Surgery, Kilpauk Medical College, Chennai 600010. *Correspondence Author

**ABSTRACT** **Background**: Neck contractures occur when the deep dermal burns were allowed to heal spontaneously. We are revisiting the technical and aesthetic principles in the reconstruction of post burn neck contracture.

**Methods:** A total number of 18 patients have undergone reconstructive procedures for post burn neck contracture during the period of Jan-2010 to Dec-2013 in the Department of Burns, Plastic and Reconstructive Surgery, Kilpauk Medial College, Chennai.

**Results:** 17 patients were treated with split thickness skin grafting (SSG) while one patient was treated with single sheet full thickness skin graft (FTSG) to cover the neck raw area following contracture release. All patients were advised postoperative splinting. The maximum follow up was 18 months. We did not have recurrence of neck contracture in our series.

**Conclusion:** Neck contracture is the result of deep burn in the neck treated without surgery or inadequate rehabilitation and splinting at the time of wound healing. Neck reconstruction is done commonly with SSG. The disadvantage is cosmetically less appealing and recurrence. FTSG is more technically demanding than SSG but provides a better cosmesis and functional outcome. Flaps can offer an excellent solution in recurrent contractures provided the donor areas are uninjured.

**KEYWORDS :** Post burn neck reconstruction, Split thickness skin graft, Full thickness skin graft

## INTRODUCTION:

Contracture deformities are common complications following a burn injury. Neck contractures occur when the deep dermal burns in the neck region heal spontaneously. The anterior cervical region is prone for stretching leading to excess scar formation and flexion contracture. Severe mentosternal neck contracture cases are common in deep burn patients treated without surgery. The standard management strategy is contracture release and skin grafting followed by postoperative splinting of the neck. Perforator based flaps can be utilized when uninjured skin is present. Microsurgical free flaps can be utilized to cover the neck raw area after contracture release. In this article we have described the technical points to be observed in release and reconstruction of post burn neck contractures. Full thickness skin graft technique is also revisited. Aesthetic aspects of neck reconstruction are also considered in this article.

## AIM:

To revisit the technical and aesthetic principles of reconstruction of a post burn neck.

## MATERIALS AND METHODS

Period of study: Jan-2010 to Dec-2013. Total number of patients- 18
Patient inclusion criteria- All of them were having band or broad[1] scars with varying severity of neck flexion deformity. All were managed with skin grafting.

Exclusion criteria-All patients with linear and band type scars who were treated with Z plasties or local advancement flaps.

The patients were seen and operated by the authors in the Department of Burns and Plastic Surgery, Kilpauk Medial College, Chennai.

**Figure 1 A Patient with a broad post burn neck scar**

Physical assessment included

1. Type of scar- mature or immature scar
2. Width of scar- linear, Band and Broad
3. Severity of Neck flexion deformity- Mild, Moderate and Severe

(Mild- scar appears in neck extension only with loss of mentocervical angle[1],Moderate- scar appears in resting position with neck extension upto 85-95 degrees, Severe- Neck is already in flexed position with neck extension less than 85 degrees)

4. Whether contiguous areas are involved in the scar (Lower face or anterior chest) which increase the chance of a contracture recurrence)
5. Availability of donor sites (for split thickness or full thickness skin grafting)

## RESULTS:

Suicidal burns was the most common aetiology found in 12 out of 18 followed by accidental burns in 6 patients. The age group varied from 3 to 37 years. 7 patients had undergone skin grafting in the acute burn period. 10 had severe and 5 had moderately severe contracture while 3 had mild contracture type.[1] The classification presented by Makboul M et al.[1] in his article in the Indian Journal of Burns is used here as it has a simple classification system. Out of 18 patients 4 were male and 14 were female.

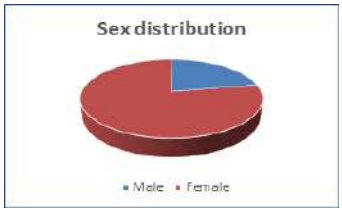



**Figure 2. Sex distribution**

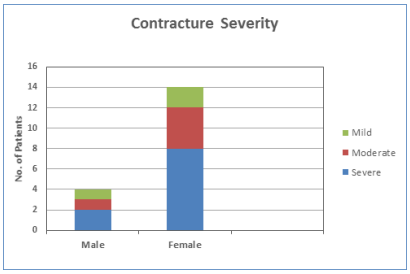


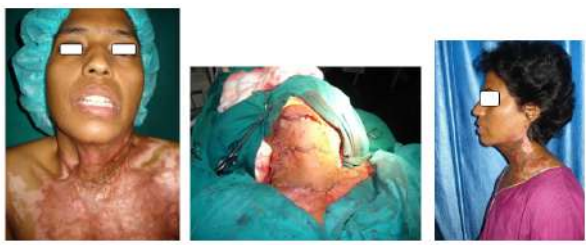

**Figure 3. Severity of neck contracture**

17 patients were treated with split thickness skin grafting after release of the contracture. One patient was treated with Single sheet full thickness skin graft to cover the entire neck raw area following contracture release.

All patients were advised postoperative hard collar for one year to prevent recurrence of neck contracture. The maximum follow up was 18 months. We did not have recurrence of neck contracture in our series.

**Patient 1. (A) Severe neck contracture**

**(B) Release and skin grafting done**



Patient 2. (A)Broad scar contracture | (B )Zig zag junction line and split skin graft | (C) Good contour postoperatively

Patient 3.(A) Preoperative | (B) Postoperative

The defect margin is made into a Zig Zag line to minimize recurrence of contracture. Care is taken to keep the lateral defect margin at or beyond midlateral lines. Good hemostasis is mandatory to prevent hematoma and graft loss which paves the way for recurrence of contracture.

Full thickness skin grafting of the entire neck area in a 30 year old female patient with severe recurrent neck contracture (Picture 4).

Patient 4.(A) Area of neck scar to be excised is marked. | (B) Entire neck region scar is excised

**(C) Full thickness skin graft harvested from left iliac and lower abdomen area after taking a pattern**

**(D) Defattened full thickness skin graft**

**(E) Immediate postop**

**(F) After 2 weeks**

The entire neck area burn scars were excised upto the midlateral lines. The defect extended from the lower border of the mandible superiorly and suprasternal notch inferiorly and measured approximately 22x17 cm. The pattern of the defect was taken and full thickness skin graft was harvested from the left iliac and lower abdomen areas. The graft was thoroughly defatted and applied over the raw area and anchored. Postoperatively there was 100% graft take. A few areas of epidermal loss settled well. Good aesthetic outcome was obtained with well-defined cervico-mental angle, absence of contracture and good neck movements. Cervical splinting was advised as there was scarring in the contiguous areas of the anterior chest.

**DISCUSSION:**

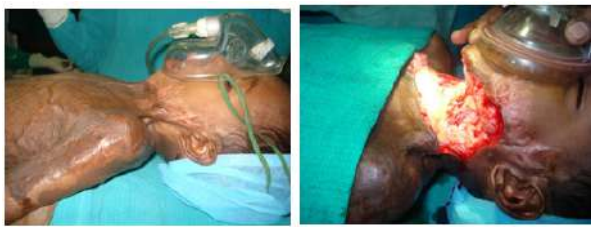
The appearance of the face, neck and hands is significant to a person as these areas are relevant in social and occupational settings.

Preoperative physical assessment included the type of scar whether mature or immature scar, width of scar whether linear, Band and Broad, severity of Neck flexion deformity whether mild, moderate and severe, whether contiguous areas are involved in the scar viz., lower face or anterior chest which increase the chance of a contracture recurrence and availability of donor sites for split thickness/ full thickness skin graft or perforator flap or a free flap.

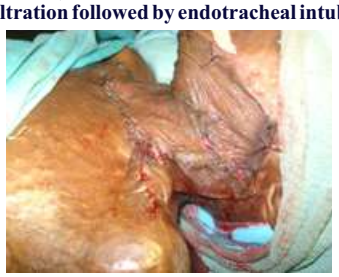
Mild contracture scar appears in neck extension only with loss of mento-cervical angle, moderate contracture scar appears in resting position with neck extension upto 85-95 degrees, and in severe contracture, neck is already in flexed position with neck extension less than 85 degrees. Though many classification systems are available for grading post burn neck contractures, we found the classification system proposed by Makboul M et al.[1], in the Indian Journal of Burns to be simple and accurate in our series.

Immature scars tend to bleed more intra and postoperatively and surgery is generally postponed for 6 months to one year after the acute burn to allow for scar maturation. However, in cases of severe contracture, surgery will have to be offered to relieve the deformity.

As mentioned earlier, all our cases treated by skin grafting were included in the study to analyse the results including functional and aesthetic outcome. The post burn neck deformity patient offers unique anaesthetic challenges and the unit should be equipped for it. Preoperative anaesthetic assessment takes note of the difficult airway due to the flexed neck and any associated microstomia. An awake intubation without induction and muscle paralysis may be necessary. The surgeon can facilitate the intubation by dividing the anterior neck scar under tumescent infiltration to assist the anaesthetist.



**Picture 5.(A and B) A child treated with scar release under tumescent infiltration followed by endotracheal intubation.**



**(C) Split thickness skin grafting completed under endotracheal anaesthesia.**

Fibre-optic intubation is a safe option and must be made available. All neck scar is excised and haemostasis should be perfect for immediate skin grafting. Tie over dressings are given for skin grafts and the neck is kept in extension with pillows under shoulders. Dressing is done on the 5th postoperative day. Skin grafts are inspected and dressing reapplied. Splinting of the neck[2] with a soft collar or a plaster slab initially for one week followed by a hard cervical collar is given and continued for 6 months and night time usage up to one year. Use of multiple split skin graft sheets to cover the raw area following release of neck contracture offers a standard and relatively technically less demanding solution compared with a perforator flap or a microsurgical flap or a full thickness skin graft. The disadvantages of split thickness skin grafting are poor appearance due to junctional scarring between the graft sheets and contracture recurrence.

A Flap offers a better solution to prevent recurrence. Availability of uninjured skin and flap thickness are the limiting factors for utilizing a flap. Perforator flaps have found favour among Burn surgeons. The supraclavicular artery perforator based flap can be used unilaterally or bilaterally. The disadvantage is a donor site deformity in the exposed areas of the lower neck and shoulder region. Microsurgical flaps are described and can be utilized where expertise is available. The advantages of a flap include excellent aesthetic improvement and no recurrence of contracture. The flap however cannot be utilized when the donor skin is involved in burn.

Full-thickness skin graft is an important method used in small defect sizes. With the established knowledge of the graft take through the margins as well as wound bed, FTSG for reconstruction of large-sized defects with satisfactory results are described in the literature[3]. Full thickness skin graft for entire face and neck reconstruction following excision of the post burn scar has been described[3,4] and needs to be considered when the patient has extensive scarring in the neck and flap cover cannot be done. Advantages include good contour lines due to limited thickness of a full thickness skin graft. Junctional scarring can be avoided. Recurrence can be minimized and aesthetic outcome optimized. Disadvantages include donor site skin grafting which may be necessary following harvest of a large sized graft and patchy graft loss due to underlying hematoma. The graft loss can be partial or full thickness. Lower abdomen skin can be removed as an abdominoplasty procedure and the graft utilized.

**Burn scar reduction strategies**

Post Burn scars are present in deep second- and third-degree burns. Crippling contractures can occur in the neck, upper limbs etc and prevent return to work and a normal social life[5]. The goal of the Burn surgeon should be to avoid severe burn wound scarring and contractures. Prevention of a post burn contracture starts in the management of ***acute burn***. Burn wound Excision and grafting[6] is started early from day 5 or day 7 (day 3 for eyelids). In Extensive burns involving 50 percent and above with limited donor areas, staged surgery with burn wound debridement followed by skin grafting can be done for critical areas like eyelids, neck and hands whereas other anatomic areas can be covered by allografts after debridement initially. After healing is achieved, neck splinting is paramount to prevent flexion contracture. With established contractures, appropriate post burn reconstruction is done with adequate ***Post operative rehabilitation***[7]**.** Post reconstruction rehabilitation includes daily physiotherapy, silicon gel sheeting, pressure garments and appropriate splints to help the patient to recover full function.

## CONCLUSION:

Neck contracture is the result of deep burn in the neck treated without surgery or inadequate rehabilitation and splinting at the time of wound healing. Neck reconstruction is done commonly with split thickness skin grafting. It is important to follow the technical details mentioned above to get the optimal result. The disadvantages are prolonged period of splinting, cosmetically less appealing and recurrence. Full thickness skin graft is more technically demanding than split thickness skin graft but provides a better cosmesis and functional outcome. Unconventional donor sites in the trunk and lower abdomen can be utilized. Flaps can offer an excellent solution in recurrent contractures provided the donor areas are uninjured.

## REFERENCES


1. Makboul M, El-Oteify M. Classification of post-burn contracture neck. Indian J Burns 2013;21:50-4
2. Fiona Procter. Rehabilitation of the Burn patient. Indian J of Plast Surg. 2010 Sep; 43(suppl): S101-S113
3. Osman OF, Emara Sh. Extended Use of Full-Thickness Skin Grafts, Employing Variable Donor Sites. World J Plast Surg 2018;7(2):159-165.
4. Mohamed Elsayed Mohamed*, Belal Abdullah Almobarak & Mohamed Ibrahim Hassan. Treatment of extensive post-burn deformities using extra-large sheets of full thickness skin grafts. Research Article - Clinical Practice (2017) Volume 14, Issue 4
5. Edgar D, Brereton M. ABC of Burns Rehabilitation after burn injury. British Medical Journal. 2004; 329:343-5
6. Bloemen MC, Van der Veer WM, Ulrich MM, Van Zuijlen PP, Niessen FB, Middelkoop E. Prevention and curative management of hypertrophic scar management Burns.2008;35:463-75
7. Richard R, Ward RS. Splinting strategies and controversies. Journal of Burn care rehabilitation 2005;26:392-6