

A Clinical Study of Management of Post Burn Contracture of the Neck

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Abstract : Burns of the head and neck are often associated with aesthetic as well as functional deformities. The most common burn sequelae of this region is loss of cervico-mental angle as the chin progressively gets pulled down to the chest. These contractures affect the patient significantly causing not only functional limitations and aesthetic disfigurements but also pose a serious social and medical problem. Hence reconstruction of this area is challenging to both surgeons and anaesthesiologists. Skin graft is the most suitable option for coverage of the cervical defects after the release of the burn contractures to obtain a complete range of motion and to improve functional and aesthetic appearance. The aim of the study was to provide a simple option of treating cervical defects after release of burn contractures with skin graft to improve functional and aesthetic appearance and to give importance post operatively by providing cervical splinting, chin strap and massage with moisturizing cream to obtain a soft, supple, good skin texture and colour match. From August 2010 to August 2014, 40 patients with severe burn scar contracture of the neck were identified. 36 patients presented with severe contracture of the neck pulling the chin down to the chest wall. All these patients underwent correction of their burn scar contracture with split thickness skin graft. Four patients presented with a single band and underwent correction of their burn scar contracture with local flaps. Patients were evaluated for good functional and aesthetic results. The time from burn injury to reconstruction for all patients was 18 -20 months. The mean follow up for all patients was 2 years. All skin grafts survived without any complication. **Conclusion:** The management of cervical burns depends on severity and normal tissue availability. Majority of neck contractures are severe requiring skin grafts. Skin grafting is a simple, reliable and safe operation, and continues to deliver excellent results.

INTRODUCTION

Advances in the management of burns have made it possible to preserve many lives. As a result more patients survive the acute phase. This leads to increasing number of patients with post burn sequelae which is a common complication following burn injury.

Burn injury of the neck pose one of the greatest challenges to plastic surgeons and anaesthesiologist due to severe contracture and deformities of the neck characterized by limitation in neck extension^{1,2}. The traction forces caused by burn scar contracture may pull and cause severe flexion deformity, oral incompetence, ectropion of the lower lip and ectropion of lower eyelid. [Fig - 1]



Fig 1: Severe post burns neck contracture

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Post-burn neck contractures were classified according to the degree of deformity and the type of the scar^{3,4}. This provided guide lines for reconstruction of post burn contracture of the neck. The surgical procedures used to correct these contractures was using split thickness skin graft as a sheet graft to prevent re-contractures and to give good aesthetic results.

Importance was given to careful monitoring of all patients post operatively to obtain excellent results. The use of neck splints, chin strap, physical therapy and oil massage of the grafted area are part of post operative regimen to prevent subsequent contractures. To date these ideals are not uniformly accomplished in the reconstruction of cervical deformities.

MATERIALS AND METHODS

A clinical study was done on 40 patients with post burn flexion contracture of the neck, who were treated in our institute between August 2010 and August 2014. We clinically examined the type of neck contracture and accordingly a treatment plan was made based on the severity of contracture and functional impairment. Neck contracture ranged from a linear band to complete involvement of the anterior neck. The method of reconstruction used for linear scar contracture was local flaps and for contractures involving the complete anterior neck was release of contracture and resurfacing the defect with skin grafts.

Incisional or excisional release was done till full extension was obtained. Skin graft was the mainstay of treatment. It was applied immediately and held in position with skin staplers and tie-over. The neck was immobilised with a bulky dressing.

Patients were nursed in supine position. In grafted patients, the neck was maintained in extension with a shoulder support. The dressing was changed 9-10 days after surgery. At the next dressing, if the graft was well settled, lubricating oil was advised and a soft

cervical collar was given for 3 weeks. In case of graft loss, the area was dressed regularly till the wound healed. As soon as the grafts were adherent i.e. after 2-3 wks, a hard cervical collar and physiotherapy program was begun.

Post operative plan is crucial to achieve excellent results. Post-operative splinting using neck collar and chin strap was used for one year to prevent recurrence of contracture. All patients were advised regular massage with moisturizing creams or oil to obtain soft pliable skin which blends with patients colour and skin texture. Follow-up was done regularly to assess the post-operative results. The surgical technique used was according to the severity of the contracture⁵.

- **Grade 1** - Mild contracture; has full extension, no facial distortion, neck bands are present. Release of the linear band was carried out by Z-plasty. [Fig - 2]



Fig 2: Grade 1 Neck contracture – Pre op and Post op result after Z-Plasty

- **Grade 2** - Moderate contracture; able to extend the neck but facial distortion is noted particularly; lower lip ectropion with inferior displacement. Release of the burn scar contracture and thin split thickness skin graft was used for resurfacing the raw area. [Fig - 3]



Fig 3: Grade 2 Neck contracture – Pre op and Post op result after release with skin grafting

- **Grade 3** - Limited range of motion, unable to extend beyond neutral position, facial distortion present. Patient's neck is contracted in the flexed position and the chin and less frequently the lower lip is occasionally pulled down to the anterior trunk. Release of the burn scar contracture and the raw area was resurfaced using thin split thickness skin graft. [Fig - 4]



Fig 4: Grade 3 Neck contracture – Pre op and Post op after release and skin grafting with good mento cervical angle

- **Grade 4** - Unable to extend neck to neutral position, fusion of chin to the anterior chest wall, severe ectropion of the lower lip with severe facial distortion. Release of the burn

scar contracture and the raw area resurfaced with thin split thickness skin graft. [Fig - 5]



Fig 5: Grade 4 Neck contracture – Pre op severe mento-sternal contracture and Post op result after skin graft

RESULTS

Between August 2010 and August 2014, 40 patients with post-burn neck contracture were operated upon in our institute. 38 of the patients were females and two males. The age range was from 14 to 30 years. The degree of contracture was severe in thirty six patients, while four presented with neck band resulting in mild degree of neck contracture.

Surgically, patients were divided into 2 groups. Those with severe contracture (36 patients), and those with liner band (4 patients). Four patients with mild linear contracture of the neck were treated by multiple Z-plasty. 36 patients with severe contracture of the neck were treated by excising the scar and resurfacing the raw area with skin graft.

Z-plasty flaps survived without any skin loss or necrosis. In 30 patients, grafts survived and healed well. Six patients had patchy graft loss, but these healed uneventfully after few dressings. No major complications of the donor sites were seen. None of the 40 patients suffered from any complication related to anaesthesia. The average hospital stay was 10 days. The functional evaluation was done after an average of 6 months. All cases had normal extension after reconstruction.

Patients reconstructed with skin grafts underwent massage 2-3 times a day with moisturizing creams or liquid paraffin solution. Cervical collar and chin strap was continuously used for one year except during massage and bathing. The follow-up of patients continued for 2 years. The functional and cosmetic results were very good. Full range of neck movement was achieved with good neck contour and the patients were happy and completely satisfied. [Fig - 6]



Fig 6: Neck contracture – Pre op, post after release & skin grafting. Post op splinting and chin strap

Anaesthesia

Major anaesthesia related morbidity and mortality relate to the 'cannot ventilate and cannot intubate' situation, which has an incidence of 0.02% in such cases. Planning of anaesthetic technique starts from airway examination. A maxillo-

pharyngeal angle of $<90^\circ$, difficulty in direct laryngoscopy can be comparable to Cormack and Lehane classification Grades III and IV and decreases in atlanto-occipital distance is an established indicator of difficult intubation. Lateral cervical radiographic assessment can also be used to predict the difficult laryngoscopy.

Post-burn contracture patients can be operated by both regional (local) and general anaesthetic technique depending on the, age and weight of the patient, presence of any co-morbidities, skills and preference of operating surgeon, patient's consent and resources availability.

General anaesthesia with simple endotracheal intubation poses immense difficulty in terms of limited oropharyngeal space, decreased pharyngeal space, decreased atlanto-occipital extension and decreased submandibular compliance. Hence, advanced airway techniques like awake fibre optic intubations, LMA, ILMA, blind nasal intubation, retrograde intubation. Tracheostomy are adopted in the difficult airway algorithm.

In our case series, 31 of 40 patients were done under general anaesthesia of which four needed awake fibre optic intubation and 15 patients were done using LMA and ILMA. In 12 patients we could successfully intubate with endotracheal tubes.

Release of contracture under tumescent local anaesthesia along with Inj. Ketamine followed by intubation of the patient can be used for severe post burn neck contracture release. Reduced blood loss and reduced skin graft loss are additional benefits of this technique. Advantages of tumescent local anaesthesia includes hydro-dissection of the tissues, easily dispersible into the scar tissue, painless injection, good anaesthesia, less bleeding during and after surgery and good post operative analgesia in all patients. Only disadvantage of tumescent local anaesthesia is a wet surgical field. We adopted this technique in nine patients and successfully completed the surgery.

The ASA Task Force on Difficult Airway Management recommends a pre-formulated strategy for extubation of the difficult airway. The extubation strategy of the difficult airway should be adjusted to the type of surgery, the medical condition of the patient, and the experience and preference of the anaesthesiologist.

DISCUSSION

Facial and neck burns present quite a challenge for reconstructive surgeons. Burns to this region are often associated with aesthetic as well as functional deformities. Although splinting and compression can limit subsequent deformities, many patients who are neglected develop severe contractures. Often such contractures progress with loss of the cervico-mental angle as the chin progressively contracts down to the chest. The neck's flexibility is prone to the formation of contractures, which not only affects the movement of the neck but can also affect the function of the lower face. The chronic flexion contracture is often seen in deep extensive burns of the neck and this may be attributed to the flexion

position taken by the patient to minimize the tension on the neck and hence decreasing the pain sensation⁶.

Many classification systems were found in the literature, most of them were based on the severity of the contracture depending on what area of the anterior part of the neck is involved in the contracture⁷. In linear contracture, usually there is available healthy tissue, so local flaps such as Z-plasty can be used to break and lengthen the linear scar⁸. In severe contracture, skin graft is usually needed for resurfacing after release of the contracture. Skin grafts remain the standard method of treatment for severe cervical contractures⁹. The advantage is the ability to resurface large areas of the neck, ease of procedure and the ability to restore aesthetics of the neck¹⁰.

In post-burn neck contracture and scarring, the timing of reconstructive procedures should be as early as possible in order to avoid difficult intubation. Goals of treatment are no longer mere survival, but a meaningful and worthwhile life. Importance is given to post surgical program like splinting & massage to obtain excellent results. Although splinting was required from one year to two years, all patients ultimately had successful outcomes. We assessed function after 6 months of rehabilitation postoperatively by the range of motion and also determined the aesthetic results by the presence of colour match.

CONCLUSION

The management of cervical burns depends on severity and normal tissue availability. Few neck contractures are mild and can be corrected by local flaps as they have the advantage of colour and texture match. Majority of neck contractures are severe requiring skin grafts. Skin grafting is a simple, reliable and safe operation, but has disadvantage of hypertrophy and recurrence of contracture. However, post operative splinting is necessary. The use of skin grafts continues to deliver excellent results.

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