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MANAGEMENT OF POST BURN CONTRACTURE OF NECK IN A TERTIARY BURN CARE CENTRE

Plastic Surgery

Nangineedi Nagaprasad Professor in Department Of Plastic Surgery, Osmania General Hospital, Hyderabad.

Karthik G B* Senior resident in Department Of Plastic Surgery, Osmania General Hospital, Hyderabad.
*Corresponding Author

ABSTRACT

Background: Post burn contracture is one of the most common problems in our country and usually seen in lower socio-economic people. Burn contractures of the neck can produce a significant impact on quality of life by reducing a patient's ability to perform activities of daily living **Methods:** A prospective study was conducted with a sample size of 30 patients with post burn neck contracture conducted for a duration of 24 months. After meticulous surgical planning, patients underwent contracture release and split skin grafting/z-plasty followed by rigorous splintage and physiotherapy. **Results:** Majority of the patients were in the age group of 11-30 years (63%).70% of the patients sustained burns in the range of 21-40% and 80% were due to flame burns.46.66% (14) of patients had severe contracture while 13.33% (4) had extensive mento-sternal adhesions. 90% of the patients underwent release + SSG while 10% underwent z-plasty. Postoperatively cervico-mental angle of 100-120 degrees was achieved **Conclusion:** Skin grafting is a simple, reliable and safe operation however postoperative splinting is necessary. The use of skin grafts continues to deliver excellent results with adequate restoration of cervico-mental angle.

KEYWORDS

Post Burn Contracture Neck, Skin Graft, Cervico-mental Angle

INTRODUCTION

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. As these contractures cause major functional and cosmetic problems with resultant economic and psychosocial implications, operative correction is generally recommended, particularly in children in whom they can cause growth imbalance in the head and neck area.

After release of the contracture the resulting raw area needs a suitable covering. The methods range from the use of split-thickness skin graft, local manipulation of tissue by z-plasty advancement, fasciocutaneous, myocutaneous flaps and free micro vascular flap. VAC assisted closure or reduction of the wound coupled with use of artificial dermis is reported. Tissue expander to generate more local skin also has its role.

MATERIALS AND METHODS

Source of data:

This is a prospective study conducted in the Department of Plastic and Reconstructive Surgery at Osmania General Hospital, Hyderabad conducted over a duration of 24 months during 2018-2020.

Method of data collection:

Data was collected from patients who were admitted in surgical wards of Osmania General Hospital with a diagnosis of post burn contracture of neck. Sample size of a minimum of 30 patients fulfilling the inclusion criteria were a part of this study conducted for a duration of 24 months.

Inclusion criteria:

- Patients admitted with diagnosis of post burn neck contracture
- Patients of all age group above 1yr are included

Exclusion criteria:

- Infected cases of post burn neck contracture
- Patients with sinus and fistula formation over neck contracture

METHODOLOGY

Detailed clinical history is elicited from all the patients at the time of admission. Preoperative evaluation was done with a view to assess fitness for surgery and anesthesia. An anesthesiologist reviewed all these patients prior to surgery to decide the fitness for general anesthesia and surgery and the type of anesthesia.

Surgical planning:

Measurements in neck contracture

- Fixed reference points
- Preparation of template to assess amount of skin loss
- Degree of extension, flexion and lateral movements
- Cervico-mental angle

The reference points are:

- Centre of the lower lip or the incisor teeth to the Symphysis menti
- Symphysis menti
- Angles of the mandible on either side
- Shoulder joints on either side
- Upper border of the sternum
- Mento-cervical angle in degree

The concept of measurements in management of neck contracture has been adopted for the following reasons.

- This will be a guide to assess the amount of soft tissue coverage that would be required after the release.
- A template can be obtained by measuring these fixed points on a comparable normal human. The vertical extent is calculated by measuring the mento-sternal distance.
- Then the reference points on each side are connected by a line and the horizontal measurement is made across these lines at the level of the seventh cervical vertebrae. The raw area following release is estimated by comparing these distances with those between similar points marked on another individual of approximately the same height and stature.

- In general, the technically most feasible operation is favoured if functional and aesthetic results are good and post-operative risks for recurrent mentosternal contractures are low.

Operative procedure:

- The lines of contracture and proposed incisions are marked on the patient pre-operatively. In mild to moderate contractures where neck extension is possible, patient is intubated and general anesthesia is given.
- In severe and extensive contractures, where neck extension is not enough to intubate, tumescent fluid is infiltrated into and all around the scar with the patient being awake and incisional scar release is done to achieve extension of neck and facilitate intubation and further procedure is done under general anesthesia. Infiltration with tumescent fluid would ease the dissection and minimize bleeding.
- Incisional or excisional release is done in subplatysmal plane till full extension is obtained and the defect is created by dissection through the scar to underlying normal tissue. Fish mouth cuts were made at suitable intervals to avoid a straight line and also to ensure complete release.
- After careful hemostasis, good thick sheet of split thickness skin graft was harvested. The graft was fixed to the defect edges using staples or absorbable sutures, taking care to feed the graft into the

small triangular defects following release incisions. If the graft was in pieces, care was taken to place the junction line horizontally and avoid a vertical line to prevent recurrence of contracture.

- Tie-over dressing with a layer of sofratulle was spread over the graft, packed with multiple layers of wet cotton squeezed dry to build a convex surface and the suture ends that were left long were tied over this dressing . A bulky dressing of dry gamjee pads were reinforced over this and secured with adhesive tapes. Patient was extubated under supervision as to not to disturb the dressing.

Post-operative management: Patients are nursed in supine position and the neck is maintained in extension with a shoulder support. A small rolled towel or a blanket is placed transversely beneath the neck.

The dressing is changed 5 days after surgery. Once the graft is well settled, local lubricating creams are advised and a customised neck collar (for 6 months) and chin neck pressure strap is given. As soon as the grafts are adherent i.e. after 2-3wks, an active and resistive dynamic and static self-exercise program is begun. Extension is the primary exercise performed besides alternate flexion, lateral rotation, and flexion on both sides and circumduction.

The splint was worn continuously day and night for about six months. Periodic inspection of the graft was made to look for any wrinkling. In our series a soft cervical collar initially followed by a hard collar served the purpose of effective splintage.

RESULTS

Majority of the patients were in the age group of 11-30 years (63%) with 60% of patients being females. 70% of the patients sustained burns in the range of 21-40 percentage and 80% were due to flame burns. 56.66% (17) of the patients underwent surgery after 6-12 months of burn injury and 30% (9) within 6 months after burns. 46.66% (14) of patients had severe contracture while 30% (9) had moderate contracture and 13.33% (4) had extensive mento-sternal adhesions. 80% of the patients needed contracture release under tumescent (60%) or ketamine (20%) before intubation. 90% of the patients underwent release + SSG while 10% underwent z-plasty. Postoperatively cervico-mental angle of 100-120 degrees was achieved. 56.66% (17) of patients were followed up for 6 months, 23.33% for <3 months and 20% for >6months. Postoperatively, 3 patients had graft loss among which 2 patients required SSG for the second time. 2 patients had recurrence due to poor compliance with splintage and physiotherapy. Patients wore soft cervical collar for two weeks with neck extension till stabilization of SSG followed by hard cervical collar for 3 months throughout the day and then 3 months overnight

Table 1: Severity of contracture

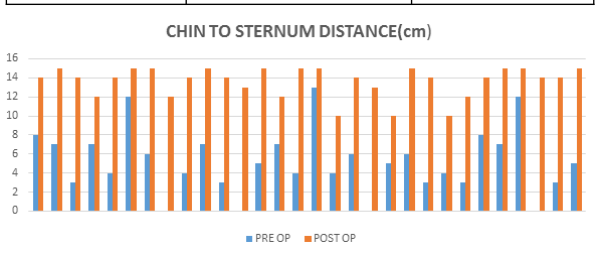
SEVERITY OF CONTRATURE	NUMBER OF SUBJECTS	PERCENTAGE
MILD	3	10%
MODERATE	9	30%
SEVERE	14	46.66%
EXTENSIVE	4	13.33%

Table 2: Type of anaesthesia

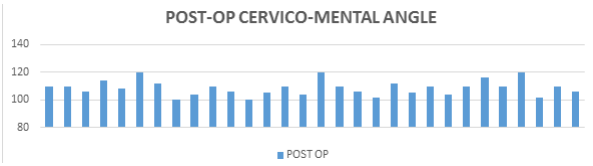
Need For Pre-Aneaesthetic Release		No. of patients	Percentage
Yes	Tumescent	18	60%
	Ketamine	6	20%
No		6	20%

Table 3: Type of surgery

SURGERY	NO. OF PATIENTS	PERCENTAGE
RELEASE + SSG	27	90%
Z-PLASTY	3	10%



Graph 1: Distance from chin to sternum pre and postoperatively



Graph 2: Post-operative restoration of cervico-mental angle

Case 1: A 35yr old male with 22% flame burns presented with mild pbc neck after duration of 4 months from burn injury. He underwent multiple Z-plasty.

Case 2: A 38yr old male with 34% flame burns presented with severe PBC neck after a duration of 9 months after burns. Patient needed contracture release under tumescent anesthesia before oral endotracheal intubation. Raw area was covered with SSG.

Case 3: A 24yr old male with 42% flame burns presented with severe PBC neck after a duration of 7 months after burns. Patient needed contracture release under tumescent anesthesia before oral endotracheal intubation. Raw area was covered with SSG.

DISCUSSION

The success in treatment requires sound surgical judgment, technical expertise in combination with a thorough understanding of the pathophysiology of the burn wound, scarring, neck contracture formation and the alteration of skin texture and pigmentation. In addition to the plastic surgeon many disciplines such as skilled burn nursing, experienced occupational and physical therapy, and psychological and social support systems are required to successfully treat and care for patients with burns of the neck.

In this study of 30 cases, 36.66% (11) of the patients had burns in the range of 21-30 percent and 33.33% (10) of the patients in the range of 31-40 percentage of burns. In Saygin et al[1] study, the percentage of burns ranged from 10-60% with 27.7% in the range of 10-20 percent burns and 22.22% in the range of 31-40 percent burns. Flame burns is the cause of burns in 80% (24) of patients and scalds in 20% (6). In Saygin et al study, 88% was due to flame and 12 % due to scalds. In Al-Zacko et al[2] study, 75% was due to flame and 25% due to scalds. In Nikunj et al study[3], 86.3% was due to flame and 13.6% was due to scalds.

Majority of the patients i.e., 46.6% (14) have severe contracture, 30% (9) have moderate contracture, 13.3% (4) have extensive contractures and 10% (3) have mild contracture. In Nikunj Bhavesh Mody et al study, 45.5% of patients had moderate contracture, 22.7% had mild contracture, 18.2% had severe contracture and 13.6% had extensive contracture. In Makboul and El-Oteify[4] study, 56.42% had mild contracture, 33.57% had moderate contracture and 10% had severe contracture.

56.6% of the patients underwent surgery after 6-12 months of burn

injury, 30% within a duration of <6 months and 13.3% after >12 months of burn injury. In Nikunj Bhavesh Mody et al study, 55% of the patients underwent surgery after 6-12 months of burn injury while 36% after >12 months and 9% within a duration of <6 months. In Al-Zacko S.M et al study, 50% underwent surgery within a duration of <6 months while 33.33% of the patients underwent surgery after 6-12 months of burn injury and 16.66% after >12 months.

Since majority of cases were severe degree, only 20% (6) patients could be intubated before the release of contracture. 60% (18) and 20% (6) underwent release of contracture under tumescent technique and ketamine anaesthesia respectively before oral intubation with endotracheal tube. In Al Zacko et al, 12 patients with severe neck PBC patients were given ketamine, after which a release incision was made over the anterior PBC of the neck scar. Pawan Agrawal et al[5] used tumescent local anaesthesia and ketamine. Qazi Ehsan Ali et al[6] has used Airtraq laryngoscope for severe post burn neck contracture. Tumescent anesthesia proves to be safe and viable option in severe degree contractures with difficult intubation.

Out of 30 patients, 90% of patients underwent contracture release and split skin grafting whereas 10% of patients underwent z-plasty. In Nikunj Bhavesh Mody et al study, out of 22 patients that underwent contracture release, 86% were resurfaced with SSG and 14% with flaps. In Devi et al[7] study, out of 40 patients, 47.5% (19) patients had SSG, 15% (6) patients had z-plasty and 15% (6) patients had combination of z-plasty with SSG while the rest of the patients had flap cover. In Makboul et al study, 30 patients underwent contracture release and SSG whereas 110 patients underwent different types of z-plasty. In Kumar et al[8] study, contracture release followed by SSG was done in 70% (28) patients, flap cover and multiple z plasty in 15% (6) each. In Prema Dhanraj et al[9] study, out of 40 patients, 90% of patients underwent release and SSG while 10% underwent z-plasty. In Al Zacko et al study all 12 patients underwent SSG following release of pbc neck. In Saygin et al study, out of 18 patients with pbc neck, 11.11% underwent z-plasty and release + SSG each while remaining patients underwent flap cover. In Karn et al[10] study, out of 43 patients, after contracture release 46.51% were resurfaced with SSG and 25.58% with FTSG while 27.9% underwent z-plasty.

In this study, post-operatively cervico-mental angle of 100-120 degrees was achieved in all cases with significant improvement in chin to sternum distance on extension of neck. In Devi et al study, the cervico-mental angle ranging from 100 to 125 degrees was attained in all the cases. In Kumar et al study, in 78% of patients neck extension of more than 110 degree was achieved and lesser than 110 degree in 10%. In another 10%, the results were poorer with angle less than 90 degree.

CONCLUSION

Patients with post burn contractures of neck are effectively treated with contracture release under tumescent anaesthesia followed by oral intubation and resurfacing the raw area with SSG. Postoperatively adequate extension is achieved and cervico-mental angle is restored leading to satisfactory functional outcome in severe degree neck contractures. Postoperative splintage, physiotherapy as well as psychological and social support plays an important role in rehabilitation of the patient.

Skin grafting is a simple, reliable and safe operation however postoperative splinting is necessary. The use of skin grafts continues to deliver excellent results. Patience, persistence and perseverance are essential to accomplish successful reconstruction. The skilful application of basic surgical techniques to the reconstruction of post burn deformities can be gratifying to both patients and surgeons

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