

Post Burn Contracture of Lower Face and Neck, Cervicomenal Reconstruction With Triangular Dermal Fat Flap: A New Approach

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Abstract- Deformities of burn scars in the chin and upper neck are a tragedy for patients and pose a great challenge to plastic surgeons due to limited available methods for the reconstruction of three-dimensional appearance. In this paper, we present a new technique for the correction of cervicomenal angle with a dermal fat flap. Fourteen patients ages 18 to 24-year-old with extensive neck deformities were enrolled in the study. During the operation, first, we deepithelialized a triangular scar area in the upper neck, then created a dermal fat flap and flip it up to the chin, restoring the chin shape and volume, after that for subsequent reconstruction of cervicomenal angle, after releasing skin from lateral sides of the triangle defect, we approximated the AB and AC line to the upper edge of the defect by V-Y advancement. The remaining defect is covered with a full-thickness skin graft. In all cases, the chins were reshaped with a dermal fat flap. The mean cervicomenal angle was $144\pm 14.6^\circ$ preoperatively, which was reduced to $108.9\pm 6.15^\circ$ postoperatively. The neck and chin were preserved with better contours. This is a new technique that has never been described before in the literature, and it is innovative compared to the traditional techniques. Good cosmetic outcomes make this technique preferable for all burn neck deformities with an obtunded cervicomenal angle.

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Introduction

The skin of the face and neck is commonly exposed to flame burns, boiling water, steam, and caustic agents. Wound healing in the burn is a complex process of inflammation, granulation, remodeling of the tissue, and hypertrophic scars (1). Morbidity related to hypertrophic scars and contractures, which are well-known sequelae after burns, have remained high. Post-burn neck contractures make cervicomenal angle blunting, Chin retrusion, and Lower lip traction. These abnormalities not only affect the movements of the neck but also can affect the function of the lower face (2). The associated functional, aesthetic, and psychological impairments may lead to significant morbidities (3).

The cervicomenal angle is the critical anatomical area in the neck, and it is a key point of facial

reconstruction. The angle is formed by the intersection of two lines: the first line is from the gnathion to the hyoid bone, and the second line is from the hyoid bone to the sternal notch (4).

The ideal cervicomenal angle is 105 to 120 degrees (5). The obtuseness of the angle and chin retrusion is a common problem in cervical burn scar, mainly due to the traction force from soft tissue deficiency. The traction force can also extend to the lip, create yoke deformity. In severe neck contractures, various reconstructive approaches can be used for the treatment of neck contracture to restore normal neck contour and function (6). These surgical treatments include skin grafts, locoregional flaps, distant flaps, and free flaps (7-10). These methods, with some advantages and disadvantages, can cover the burn area with normal skin, but correction of neck and chin contour and cervicomenal angle still

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remains challenging.

In this paper, we present a new technique based on the ascending dermal fat flap by one-staged flap transposition for correction of cervicomental angle and modify the chin and neck contour.

Materials and Methods

This is a prospective study with a new technique with fourteen patients with lower face and neck contracture scar by flame burn. The patients' consent forms were filed for all patients preoperatively. The cervicomental angle of a patients measured preoperatively. All patients underwent reconstruction using our new technique between 2012 and 2014, in the Department of Plastic a Reconstructive Surgery, 15 Khordad Hospital of Tehran. The study design and scope were approved by Shahid Beheshti University of Medical Sciences Ethics Committee.

Procedure technique

This is a new technique which has never been described before in the literature and it is innovative compared to the traditional techniques. This flap has a triangular shape (Figure 1 A). Which its apex (A point) lies caudally close above thyroid cartilage on the maximal point of contractors. For determining B and C point on skin surface, we connect a point to about 2 cm lateral to the lip commissures of each side, so pointing B and C on the lower mandibular border. First, we deepithelialized

the triangular area to remove the scars (Figure 1 B). Afterward, the incisions over BA and CA lines were done for releasing the dermal layer and subcutaneous fat to creating a triangular dermal fat flap (Figure 2). A' point lies on pogonion, the most prominent point of the chin in the midline, B' and C' points are the corresponding point on the periosteum of lateral sides of chin after fixing of A to A'. After that, we undermine the skin above this area toward the chin and rotate triangular dermal fat flap over its base (BC line), fixing A to A' on the symphyseal periosteum, B to B' and C to C' on periosteum with polydioxanone 4-0, absorbable sutures (Figure 1 C). This dermal fat flap created a projection to resolving the chin retrusion and releasing the traction force to the lower lip. For subsequent reconstruction of cervicomental angle, after releasing skin from lateral sides of the triangular defect, we approximated the AB and AC line to the upper edge of the defect by V-Y advancement flap. If there was a remaining defect in that area, we would cover it with a full-thickness skin graft from the supraclavicular or medical arm area (Figure 3 and 4). Flaps temperature, color, and capillary blanching time were monitored. If a skin graft was used, immobilization of the graft was performed with tie-over dressing for five days postoperatively. The patient was then asked to attend the outpatient department regularly. During this period, the results were evaluated with respect to the range of extension, complication, overall cosmetic appearance (i.e., color match, flap texture, maintenance of contour, and donor site morbidity). The results were assessed graded in the follow-up period.



Figure 1. Schematic view of surgery design. A: operation designed with downward triangle B: the deepithelialization of the triangular area of the neck, C: point area of the rotational flap



Figure 2. Creation of a dermal fat flap



Figure 3. Lateral view of the young patient. A: preoperative view. B: postoperative view



Figure 4. Lateral view of the middle-aged patient. A: preoperative view. B: postoperative view

Results

Our reconstruction method was performed on 14 patients between 18 to 24-years-old with extensive neck deformity due to flame burn. All patients had deep hypertrophic scar in the chin, submental and upper

cervical regions, so there was insufficient healthy tissue available for local flap reconstruction. All patients had three years gap after-burn event for stabilization of scars.

Between 2012 and 2014, all patients underwent reconstruction using this new technique. The mean cervicomental angle was 144 ± 14.6 preoperatively, which

was reduced to 108.9±6.15 postoperatively (Table 1).

Table 1. Comparison of the mean cervicomenal (CM) angle pre-and postoperatively.

	Average	Standard Deviation	P
Preoperative CM angle	144°	14.6	
Postoperative CM angle	108.9°	6.15	
Correction	35.14°	17.13	0.001

The mean correction value was 35.14 degrees that were significant in the Wilcoxon test ($P=0.001$). During the mean follow-up of 12months (range from 9 to 18 months), two patients had early wound dehiscence, who treated conservatively. Wound dehiscence happened only in one case. Probably it was due to pressure in a graft on the inferior part, near the angle; so, treated with inserting additional skin graft in the inferior part of the defect.

Discussion

In adult extensive burns, the neck might be less attentive. Initial treatment is an attempt in resuscitation and management of other areas, which may result in the delay for start of treatment, and lead to severe contracture although the incidence is lower as compared to other joints in extremities (11).

Neck contracture characterized by a limited range of cervical motion may result in severe impairment of function and deterioration of esthetic. Cervical burn associated with lower facial and lower lip burns have impact on the face and chest, causing lip ectropion, micrognathia, and mandibular retrusion (12,13).

It makes a more complicated issue for reconstruction due to the specific three-dimensional (3D) shape of this area and the consequences of contracture. Not only the curve between lip and chin, but also cervicomenal angle and chin prominence have the main role on aesthetic contour. Unfortunately, the burn contractures sometimes obliterate all. The ‘visible hypothesis’ poses that socially visible scars, such as scars on the face, will be highly related to body image dissatisfaction because burn survivors with visible scars will experience more frequent stigmatizing reactions from others. The principal goal of facial burn reconstruction should be the restoration of a pleasing and tension-free facial appearance with appropriate movement and expression (14,15).

Face and neck reconstruction are considered one of the most important and most difficult surgeries in cosmetic and reconstructive surgery.

Up to now, several studies have been conducted on

the surgical treatment of burn scars on the face and neck, especially in adults using skin grafts, locoregional flaps, distant flaps, and free flaps (16-19).

While postoperative neck function is essential, the cosmetic appearance is also equally important, with special attention given to the cervico-mental angle.

Skin grafting is a simple procedure to efficiently replace the scar contractures, but it can just be cover for the burned area and can’t modify the cervicomenal angle. In addition, it is often complicated by severe graft contracture. Likewise, traditional or free flaps also just can cover the burn area, but they are often too bulky to allow reconstruction of the natural neck contour (20).

In this paper, we present a new technique based on the ascending dermal fat flap by one-staged flap transposition. This method not only corrects the blunt cervicomenal angle but also helps to improve extrinsic lower lip deformity and chin retrusion.

This technique has several advantages. We can do this by a one-stage simple and inexpensive technique that has a good result on the cervicomenal angle. The triangular shape of the flap, by folding the free end of the flap, helps to better contour and creating a good projection to resolve the chin retrusion and adding the optional V-Y advancement, creating more reliability for cervicomenal angle reconstruction. Also, released traction force on lower lip make better lips shape.

This method does not reflect the complexity of the free flap and the time-wasting of tissue expansion. Also, do not have neighborhood tissue insufficiency in the local flap. This simply acts as a skin graft by adding 3D contouring in the chin and cervicomenal angle.

In our suggested technique, the mean postoperative cervicomenal angle was 108.9±6.15° that falls within the normal range {105-120°}. The sufficient correction of angle (about 35) emphasizes the efficacy of the technique.

According to the matching principle, the most suitable donor site for neck reconstruction is the neck itself. However, in some cases like our patients, the coincidence of lower face and cervical scars and contractures with cervicomenal blunting can make reconstruction more challenging. So, we recommend a triangular dermal fat flap for correcting cervicomenal angle and face contour. Afterwhile, the remained burned skin can be reconstructed by a skin graft or any suitable type of skin flaps.

In conclusion, the Triangular dermal fat flap is a new reconstructive procedure. We believe that Good cosmetic outcomes make this technique preferable for the reconstruction of all burn neck deformities with an obtunded cervicomenal angle.

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