

Severe Mentosternal Contracture Release and Reconstruction with Anterolateral Thigh Flap: A Case Series

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ABSTRACT

Background: Post-burn contracture (PBC) of the neck is one of the most common burn sequelae and may cause restriction of neck movement and mouth closure, breathing difficulties, and cosmetic disfigurements, making its management a challenging surgical procedure.

Case: Two patients, a 37-year-old female and a 14-year-old male, presented with difficulty in straightening the neck and were diagnosed with post-burn mentosternal contracture Onah classification type III; both underwent contracture release and defect reconstruction using anterolateral thigh (ALT) flap with defect sizes of 10 cm x 8 cm on the right side and 15 cm x 8 cm on the left side, elevated 1–5 mm. The surgeries went uneventful and, at one-month follow-up, both patients showed increased neck mobility with viable flaps.

Conclusion: The aims of contracture release and reconstruction in PBC are to restore cervical mobility and improve appearance, and ALT flap represents an excellent option that provides good pliability, thin skin, less hair, good donor-site recovery, acceptable skin color match, minimal donor-site morbidity, and an adequate amount of tissue to cover large post-release defects when local flaps are unavailable or suboptimal due to burn injury.

Keywords: Burns, Contracture, Neck Injuries, Free tissue flaps.

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INTRODUCTION

The management of burn and its sequelae is a challenging procedure for the burn teams. In order to properly reintegrate burn survivors into society, addressing the problems of debilitating post-burn sequelae has grown increasingly important. One of the most typical burn sequelae is post-burn contracture (PBC). Burn wounds that have pathological scarring might develop contractures or hypertrophic scars. After burn injuries, hypertrophic scarring was reported to occur between 8% and 67% of all burn cases. Burn scar contractures were shown to be more common in between 38 and 54% of cases.¹

Numerous issues are brought on by anterior neck contractures, such as lip ectropion (oral

incontinence, drooling), micrognathia, flexion deformity with limited extension, restriction of lateral flexion and rotation, headaches and neck pain, breathing difficulty, sleeplessness, depression, and poor aesthetic appearance.^{2,3} Even though there is a variety of reconstruction techniques to treat neck contractures, such as split-thickness skin grafts (STSG), local flaps, local flaps combined with STSG, expanded local flaps, thin pedicled flaps, free flaps, and expanded free flaps, the used were limited and unsatisfactory outcome frequently occurs.^{4,5,6} One of the problems in neck contracture is that the defect's exact size is larger than the anticipated size due to the nearby tissues' contraction.⁸ Therefore, reconstructing this

region still presents a challenging task for most surgeon.

The anterolateral thigh (ALT) flap is a versatile flap that may be used to reconstruct soft tissue from any defect in the body. The ALT flap is an excellent option that offers a good recovery, acceptable skin color match, and restoration of neck anatomic function. The benefit of ALT flap over other options such as local flap is able to provide an adequate amount of tissue to cover defects after contracture release and hidden donor sites.^{2,8} There were still limited reported cases regarding the use of an ALT flap for post-burn contracture in the neck. This study aimed to report a case of contracture release and defect reconstruction with an anterolateral thigh (ALT) flap in post burn neck contracture.

CASE REPORT

Case 1

A 37-year-old female presented with difficulty in straightening her neck. Her chin

felt pulled when looking up and turning right and left. The patient also complained of difficulty in closing her mouth, the saliva was often flowing. The patient had undergone six previous surgeries consisting of debridement and split-thickness skin graft (STSG) surgery due to burn injury grade IIAB-III 22% in the neck and trunk region due to flame. She also had a history of contracture release and defect reconstruction in the lower lip region with a transpositional flap from the mental region.

Physical examination revealed normal vital sign. There were scar in oral commissure, post-burn deformity in both ears, and limited active range of motion (ROM) in the neck (90° flexion; 140° extension; 50° rotation to the right and left; 45° lateral flexion). There were STSG and scar in anterior and posterior trunk, both upper extremities, and both and lower extremities (Figure 1).



Figure 1. Post-Burn Neck Contracture

Currently, the patient was diagnosed with post-burn mentosternal contracture Onah classification type III; post debridement + STSG in the facial, anterior trunk, upper and lower extremities region; post commisuroplasty + defect closure reconstruction with jumping man flap; diffuse flexion contracture in the anterior neck region; linear contracture of the left and right anterior axilla region; joint stiffness of the left and

right thumb region; post-burn deformity of the left and right auricle region; and history of lower lip contracture release + defect closure with transpositional flap from mental regio + full-thickness skin graft (FTSG). The patient was planned for contracture release and defect reconstruction surgery with ALT flap.

Surgical technique

The patient was in supine position with general anesthesia. We disinfected the operating field with povidone iodine, then narrowed it with sterile drapes. Two teams worked concurrently to remove the contracture tissue and harvest the ALT flap.

Contracture release

Incision design was carried out in the left neck region (Figure 2a). We performed pehacaine infiltration injection and layer-by-layer incision. We then identified and preserved the superior thyroid artery, anterior jugular vein, and common facial vein. Excision of the contracture tissue in the mentale-colli region was performed, a defect measuring 12 cm x 10 cm was obtained

Harvesting flap

Flap design was carried out in the left anterolateral femur region according to the size of the defect. We then injected Pehacain, performed incision according to design, deepening layer by layer as deep as the fascia until 1 artery and 2 lateral femoral circumflex veins of the descending branch were identified. The Doppler was positive. We then performed ligation, control of bleeding, elevation of ALT flap, and inseting flap to close the defect

Anastomosis

We performed end-to-end anastomosis of one superior thyroid artery with one lateral circumflex femoral artery descending branch, two lateral circumflex femoral veins descending branch with anterior jugular vein, and common facial vein with non-absorbable monofilament thread 8.0. We then checked the patency of the anastomosis before suturing the flap with a non-absorbable monofilament 4.0 thread. ALT donor in the left femur region was sutured with absorbable multifilament 2.0 thread and non-absorbable monofilament thread 3.0. We installed 6 pieces of handcoen drain on the flap. Finally, we treated the wound with tulle and sterile gauze.

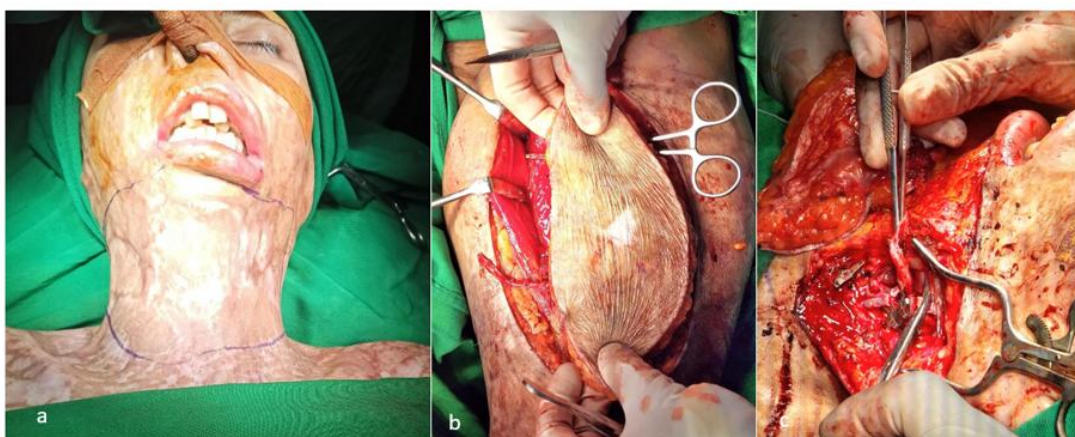


Figure 2. Intra-operative image of contracture release and ALT Flap surgery. a) flap design
b) flap elevation c) anastomosis

Outcome

The surgery went uneventful. One-month follow-up revealed that the flap was still viable, with matching skin color, and no sign of infection. The donor region in the left femur was healed properly with epithelization.



Figure 3. One-month follow-up after contracture release and reconstruction with ALT flap after surgery

Case 2

A 14-year-old boy presented with pain and difficulty when straightening his neck due to burn scars on the mouth, chin, and neck. The patient suffered burns to his chest and both armpits due to a fire 10 years ago. After the wounds healed, scarring appeared which made it hard for the patient to move his neck and lift his right and left armpits. Another complaint was that the patient finds it difficult to open and close his mouth so that saliva continues to flow, accompanied by difficulty in speaking. Previously, the wound was treated at Bajawa Hospital for 2 months with NaCl 0.9%, Burnazin ointment, tulle, and sterile gauze. However, the patient discontinued burn treatment due to cost constraints. Initially the wound had improved but sometimes secreted fluid accompanied by pain and itching. Currently the patient was mobilizing independently with good oral intake. During

the burn incident, the patient was sitting approximately 1 meter from the stove in the kitchen. When the patient's father was pouring kerosene into the stove, then suddenly the fire from the stove grabbed the patient's face, body, and both hands and right thigh. After the incident, the patient went straight to the bathroom and flushed his face, neck, hands and thighs with running water for about 1 minute. At the time of the incident the patient was wearing a T-shirt, shorts and footwear. There was no history of systemic disease, allergy, previous surgery, or smoking.

Current physical examination revealed diffuse contracture scar size 10x8 cm on the right side and 15x8 cm on the left side of the neck, elevated 1-5 mm, with hyperpigmentation and hypopigmentation. There was drooling and post burn ear deformity. The neck active ROM was limited (flexion 60°; extension 30°, 60° rotation to the

right and left, lateral flexion 70°). The Vancouver scar scale was nine. In anterior trunk, there was diffuse contracture scar size 20x30 cm, with retracted nipple, hyperpigmentation and hypopigmentation. At axillary region, there was linear contracture scar from anterior axilla to wrist joint at ulnar side, size 2x60 cm in right axilla and 2x15 cm in left axilla, with hyperpigmentation and hypopigmentation. The Vancouver scar scale was nine. At right femur region, there was scar size 15x10 cm, with hyperpigmentation and hypopigmentation. The Vancouver scar scale was six.

The patient was diagnosed with postburn mentosternal contracture ONAH classification Type III, dermogen type diffuse flexion contracture at neck, chest, and both upper limb regions, desmogen type linear contracture at right and left axillary region, and auricle deformity in both ears. The patient was planned for excision of hypertrophic scar, neck contracture release, and close defect reconstruction with ALT free flap. The surgery went uneventful and the flap was viable after two-weeks follow up.



Figure 4. a) Two week follow up after severe contracture release and reconstruction with ALT flap, b) donor site appearance

DISCUSSION

The aims of contracture release and reconstruction in PBC are to remove the scar, restore cervical mobility, enhance appearance, and prevent recurrent contracture.² There are two types of skin contracture: intrinsic and extrinsic. Extrinsic contracture was managed with tissue release, whereas intrinsic contracture requires tissue replacement. The use of silicone gel, intralesional steroid injections, splints, bandages, elastic clothing, and avoiding using pillows when sleeping for at least two months has been suggested as nonsurgical method to reduce contractures. In the case of neck contractures, nonsurgical

methods were not effective, therefore a surgery is needed.^{4,6} Contracture release may produce a large defect that is not sufficiently covered with a local flap. In addition, burn injury may destroy the surrounding skin, limiting the availability of local flaps. A free flap can be a solution for this defect.^{2,7}

The anterolateral-thigh flap has been the workhorse of flap in microvascular surgery. ALT flap is an excellent option for post contracture release defect that offers good pliability, thin skin, less hair, good recovery in the donor site, and acceptable skin color match. The pedicle vessels of the flap are long and wide, therefore patient repositioning is

unnecessary. ALT flap has several benefits compared to other options. The local flap may have poor skin color and texture due to burn injury, and is unavailable in case which involves two-thirds of the anterior neck. Radial forearm free flap (RFFF) was not possible in this case due to the wide defect. Latissimus dorsi (LD) flap was also impossible because of the burns in the LD region. ALT flap is able to provide an adequate amount of tissue to cover defects after contracture release. In addition, the ALT flap has a hidden donor site. The benefit of ALT flap from STSG is better aesthetic outcomes, less immobility period, and doesn't require pressure dressings.^{8,9,10}

Case series by Sarkar et al evaluated eleven patients with anterior neck contracture who underwent ALT flap reconstruction in a tertiary hospital in India during 2005-2010. The average operating time was 6.5 hours. Nine flaps survived well. Two flaps had partial necrosis which was successfully managed with STSG. Distal epidermal loss occurred in two flaps and was treated conservatively. After five years of follow-up, there was a significant improvement in neck mobility.²

Another case series is by Lellouch et al who reported their four years of experience in using ALT flap for post-burn neck contracture. The ALT flap was designed in a butterfly shape with the identified perforator placed in the middle of the design. One year after surgery, the ALT flap underwent liposuction to enhance the appearance of the neck further. At 4 years follow-up, the neck extension was improved from 83°-90° to 120°.⁷

Complications in ALT flap surgery can occur due to excessive defatting and a far distance from the perforator to the flap design. To minimize the operation time and decrease the risk of prolonged anesthesia, two teams can work simultaneously in contracture release and harvesting flaps.¹

The limitation of this study is the short follow-up time. Longer follow-up is needed to evaluate the long-term result of the ALT flap for post-contracture release of the neck.

CONCLUSION

Post-burn contracture involving more than two-thirds of the anterior neck may produce a large defect that is not sufficiently covered with a local flap. In addition, burn injury may destroy the surrounding skin, limiting the availability of local flaps. A free flap can be a solution for this defect. ALT flap is an excellent option that offers a good recovery, acceptable skin color match, and restoration of neck anatomic function. The benefit of ALT flap over other option such as local flap is able to provide adequate amount of tissue to cover defect after contracture release and hidden donor site.

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DISCLOSURE

The authors declare no conflict of interest related to this study.

REFERENCES

1. Baar ME. Epidemiology of Scars and Their Consequences: Burn Scars. In: Téot, L, Mustoe TA, Middelkoop E, Gauglitz GG. Textbook on Scar Management. Springer, Cham. 2020
2. Sarkar A, Raghavendra S, Naiyer MG, et al. Free thin anterolateral thigh flap for post-burn neck contractures - a functional and aesthetic solution. *Ann Burns Fire Disasters*. 2014;27(4):209-14.

3. Ali H, Pervez M, Khyani I, Sami W, Muneeb D. Post-burn neck contracture: effectively managed with supraclavicular artery flap. *Ann Burns Fire Disasters*. 2019;32(4):301-307.
4. Mody NB, Bankar SS, Patil A. Post burn contracture neck: clinical profile and management. *J Clin Diagn Res*. 2014;8(10):NC12-NC17.
5. Onah II. A Classification System for Postburn Mentosternal Contractures. *Arch Surg*. 2005;140(7):671–675.
6. Akita, S., Hayashida, K., Takaki, S. et al. The neck burn scar contracture: a concept of effective treatment. *Burn Trauma*. 2017;5:22.
7. Lellouch AG, Ng ZY, Pozzo V, Suffee T, Lantieri LA. Reconstruction of post-burn anterior neck contractures using a butterfly design free anterolateral thigh perforator flap. *Arch Plast Surg*. 2020;47(2):194-197.
8. Goel A, Shrivastava P. Post-burn scars and scar contractures. *Indian J Plast Surg*. 2010;43(Suppl):S63-S71.
9. Bali ZU, Özkan B, Keçeci Y, Ertaş N, Yoleri L. Reconstruction of burn contractures with free anterolateral thigh flap in various anatomic sites. Farklı anatomik bölgelerdeki yanık kontraktürlerinin serbest anterolateral uyluk flebi ile rekonstrüksiyonu. *Ulus Travma Acil Cerrahi Derg*. 2021;27(3):337-343.
10. Acartürk TO, Bengür FB. Reconstruction of burn contractures of the anterior neck with pre-expanded free anterolateral thigh flaps. *Injury*. 2020;51 Suppl 4:S63-S67.