

VERSATILITY OF SUPRACLAVICULAR FLAP IN NECK, FACE, AND UPPER CHEST REGION COVERAGE

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ABSTRACT

Objective: The objective is to analyze the utility of the island supraclavicular flap in a region where skin graft cannot be used and free flap is not feasible. We assessed complications and functional outcomes.

Study Design: Prospective descriptive study.

Place and Duration of Study: The study was done at plastic and reconstructive surgery department CMH Rawalpindi during the period of 03 year from October 2011 to October 2014.

Material and Patients: An island supraclavicular artery flap was used to reconstruct oncologic, and post burn neck contractures release defects. 30 patients were included in the study. Doppler probe was used to help with localization of vascular pedicle.

All the patients with scarring in both shoulder regions, history of radiation to neck and undergoing radical neck dissection were excluded.

Results: A total of 30 patients were included 20 (66.6%) male and 10 (33.3%) were female. Oncologic resection was followed by immediate reconstruction with island supraclavicular artery flap. Post burn contractures were released and covered by a pedicled supraclavicular artery flap. The recipient sites were neck, face, oral and upper chest region. The average harvest time was 1 and half hour. Donor site was closed primarily in 22 (73.3%) while 8 (26.6%) require skin grafting.

Post burn contractures needed scar management with intralesional steroid, pressure garments and scar revision with Z-plasty in 4(13.3%) cases. 1 (3.3%) flap failed completely and the defect was covered with a skin graft. We had 01 (3.3%) mortality due to respiratory obstruction, despite adequate flap perfusion for 24 hours. Minor complications included, partial flap loss, seroma, and haematoma formation. In addition hypertrophied scar, spreading scar and keloid formation occurred at the donor site 18 (60%).

Conclusion: Island supraclavicular artery flap with an easy learning curve is a reliable flap. It has a good colour and texture match with minimal donor site morbidity. It is an excellent choice for neck coverage after post burns contracture release and an attractive alternative to free flap for oral/ facial defects.

Keywords: Post burns contracture, Supraclavicular flap.

INTRODUCTION

Post oncologic resections defect in neck, facial, oral and upper chest region necessitate a dependable local, regional, or free flap not only for aesthetic but also for functional reasons.

Local flaps are often not of adequate size, while regional muscle flaps (e.g., pectoralis major, trapezius, and latissimus flaps) are both bulky as well as associated with significant donor-site morbidity. Microsurgical free flaps (e.g. forearm, anterolateral thigh, parascapular, and TAP flaps) are ideal, but require technical expertise and increased operative time.

Post-burn neck contracture, which is a major social issue, not only causes cosmetic and

functional problems, but also psychological disturbance to the patient. Its coverage is usually with sheet grafts, which are not suitable and may result in recurrence.

Since the colour / texture match and neck mobility are the primary concern the shoulder is ideal site.

MATERIAL AND PATIENTS

A prospective descriptive study done at plastic and reconstructive surgery department CMH Rawalpindi during a period of 03 years from October 2011 to October 2014.

An island supraclavicular artery flap was used to reconstruct oncologic, and post burn neck contractures release defects. 30 patients were included in the study. Doppler probe was used to help with localization of vascular pedicle.

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All the patients with scarring in both shoulder regions, history of radiation to neck and undergoing radical neck dissection were excluded. A probability cluster random pattern sampling technique was used.

Data was collected from hospital admission and discharge book and follow up

point 3 cm above the clavicle, 8.2 cm from the sternoclavicular joint and 2.1 cm dorsal to the sternocleidomastoid muscle.

The incision is taken down to the desired mark laterally over deltoid muscle. The flap is then raised in the subfascial plane from lateral to medial side. At the outlined medial edge of

Table-1: Head and neck oncologic patient demographics.

Surgical indication	No of patients (%)	Mean age (yrs)± SD	Mean hospital (days) ± SD	Donor site grafting (%)
PBC neck	11 (36.6%)	34±8.7	2±0	5 (16.6%)
Dermato fibrosarcoma scapular region	2 (6.6%)	46±2.8	2±0	1 (3.3%)
SCC cheek	7 (23.3%)	62±5.5	8±8	2 (6.6%)
SCC oral mucosa	8 (26.6%)	54±5.6	5.8±1	1 (3.3%)
CA Breast upper part	1 (3.3%)	58±1.4	3±0	0 (0%)
Electric face and mandibular region	1 (3.3%)	56±0	20±0	1 (3.3%)

Table-2: Postoperative complications and outcomes.

Surgical indication	No of patient (%)	Complications recipient site							Complication at donor site			Patient satisfaction
		Partial flap necrosis (%)	Seroma under flap (%)	Contracture at proximal end of flap (%)	Hypertrophic scar (%)	Partial graft loss (%)	Total flap loss (%)	Death (%)	Spreading scar (%)	Hypertrophied (%)	Keloid formation (%)	
PBC neck	11 (36.6%)	1 (3.3%)	1 (3.3%)	4 (13.3%)	1 (3.3%)	-	-	-	7 (23.3%)	1 (3.3%)	1 (3.3%)	excellent
DF Sarcoma	2 (6.6%)	-	-	-	1 (3.3%)	-	-	-	-	1 (3.3%)	-	good
SCC cheek	7 (23.3%)	1 (3.3%)	-	-	-	-	-	-	1 (3.3%)	-	1 (3.3%)	good
SCC oral mucosa	8 (26.6%)	-	-	-	-	1 (3.3%)	1 (3.3%)	1 (3.3%)	1 (3.3%)	3 (10%)	-	satisfactory
CA Breast upper portion	1 (3.3%)	-	-	-	-	-	-	-	1 (3.3%)	-	-	satisfactory
Electric burn face mandible	1 (3.3%)	-	-	-	-	-	-	-	1 (3.3%)	-	-	satisfactory
Total	30 (100%)	2 (6.6%)	1 (3.3%)	4 (13.6%)	2 (6.6%)	1 (3.3%)	1 (3.3%)	1 (3.3%)	11 (37%)	4 (13.6%)	2 (6.6%)	

proforma was given to patients.

After preoperative preparation of the patient, consent for surgery was obtained. The procedure was performed under general anesthesia with endotracheal intubation. The patient was placed in supine position with bag under shoulder. Entire neck, axilla, and shoulder region prepared with pyodine and draped. The flap was outlined. The triangle for localization of the supraclavicular artery as described by Pallua at the root of the neck was marked (Fig-1). The boundaries of the triangle are the dorsal edge of the sternocleidomastoid muscle medially, the external jugular vein posteriorly, and the medial part of the clavicle inferiorly. The skin landmarks for the supraclavicular artery exit point are the junction

the island flap, the skin is incised superficially, avoiding damage to pedicle at this point. Care is also taken not to damage the external jugular vein, which is an alternate source of flap venous drainage. The size of the flap ranged from 5-12 cm in width and 14-22 cm in length.

The elevated flap was then rotated from 90

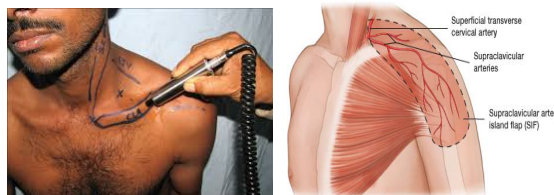


Figure-1: (Flap Marking).

to 180 degrees depending on the width of the defect. The flap was inset and fixed with

prolene 4/0 sutures with suction drainage. A light dressing and a soft neck collar was applied.

In case of intraoral usage 2nd incision in the neck for tunneling was made if not already made for neck dissection and suturing with 3/0 vicryl mattress was done.

The donor site was either closed after extensive mobilization primarily in two layers for flaps less than 7 cm in width. But for larger donor defects, skin graft was used.

Data was analyzed by SPSS version 16. Descriptive statistics was applied for both qualitative and quantitative variables. Frequencies and percentage were used for

The flap was used in (n-30) patients, including PBC neck 11 (36.6%) and post oncological defects 19(63.3%).

The recipient's sites were neck/mandibular 12 (40%), face 7 (23.3%), intra-oral 8 (26.6%), and upper chest/scapular region 3 (10%) region. The average harvest time was 1 and half hour. The donor site was closed primarily in 22 (73.3%), while 8 (26.6%) require skin grafting (table-1).

Post burn contractures needed scar management with intralesional steroid, pressure garments and scar revision with Z-plasty in 4 (13.3%) cases (Table-2). One flap failed completely and defect was covered with a

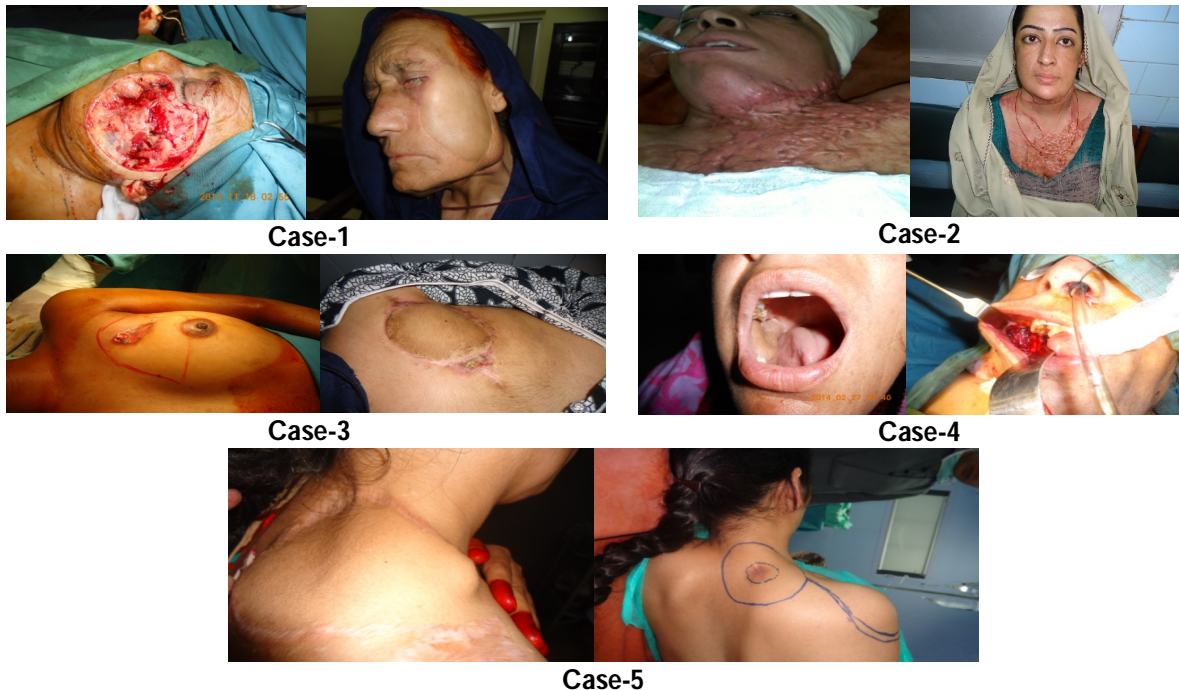


Figure-2: Case-1: (Cheek reconstruction), Case-2: (PBC neck, release and coverage), Case-3: (Recurrent CALT Breast reconstruction), Case-4: (Intraoral Reconstruction of SCC oral mucosa), Case-5: (Reconstruction after Dermatofibroma excision in scapular region).

qualitative variables while mean and S.D for quantitative variable.

RESULTS

An island supraclavicular artery flap was used to reconstruct oncologic defects and post burn neck contractures. A total of 30 patients were included 20 (66.6%) male and 10 (33.3%) were female. Complications and functional outcomes were assessed.

skin graft. We had one mortality due to respiratory obstruction, despite adequate flap perfusion for 24 hours. Minor complications included, partial flap loss, seroma, and haematoma formation. In addition hypertrophied scar 5 (16.6%), spreading scar 10 (33%) and keloid formation 3 (10%) occurred at the donor (table-2). The follow up period range from 2 months to 2 and half year.

DISCUSSION

The reconstructive procedures following tumor ablation surgery and burn contracture release in, neck, face, oral and upper chest region should be easy, quick, with a short learning curve from surgeon point of view. Aesthetically gratifying, functionally acceptable, cost effective, and with minimal overall morbidity from patient perspective.

Reconstruction in head and neck and upper chest region is done with a variety of techniques ranging from skin sheet graft, local/regional flap to free flaps¹.

In a study performed by Adent et al, three techniques, grafts, free flap surgery and skin expansion were compared in terms of morbidity, neck motility, skin elasticity, matching and scar recurrence, full thickness skin grafting was seen to be the most adequate technique³. Angrigiani found cosmetically excellent results with the combined scapular-parascapular flaps in neck reconstruction². But we found supraclavicular flap cosmetically acceptable and functionally pleasing results with supraclavicular artery island flap.

Regional flaps like pectoralis major and the late dorsi may be too bulky for neck and face reconstruction⁴. Free flap with microvascular anastomoses also increases the complexity of surgery and requires technical expertise and longer hospital stay. For older patients with comorbidities, limited surgical time is desired, making free tissue transfer less attractive⁵. Free tissue transfer study by Hanasono et al. exposed that the average hospital stay is 9.6 days with an average of 2.8 days in an intensive care unit⁶. Where as in our experience the average hospital stay was 4 days with 1 day in ICU. We have found our flap to be of ample thickness harvested in 1.30 hrs, making it more appropriate dark horse in regional flaps as well as a good substitute of free flaps. Additionally average hospital stay was 4 day except one with electric burn to face and neck, who remained with us for 20 days due to initial burn management.

The above benefits lead to revival of this conveniently available, supraclavicular artery

flap in head, neck, and facial, oral and upper chest region defect coverage.

Toldt⁷, an anatomist, in an article cited by Gillies 1923 was the first to illustrate and name the vessel arteria cervicalis superficialis which originated as a branch of thyrocervical trunk. In 1949, the first clinical application of a flap from the shoulder ("charretera" or acromial flap) was performed by Kazanjian and Converse⁸. In 1979, the first anatomical studies were performed by Mathes and Vasconez, who described the vascular territory and clinical applications in head and neck reconstruction⁹. Lamberty and Cormock in 1979 correctly described the supraclavicular artery as a perforator that arises from the transverse cervical artery in 93% of cases or from the suprascapular artery in 7% of cases¹⁰.

Pallua et al in the beginning of 1990s relaunched this flap and popularized its use by performing detailed anatomical studies examining the vascularity of what is known today as supraclavicular island flap^{11,13}. We used his anatomic landmarks as a standard protocol in our flap raising.

This flap since its revival in the early 90s has been used at numerous location in head and neck, oral, base of the skull and upper chest region. Chiu et al has used for oncologic defects¹⁴, Jason P, et al for lateral skull base defects⁵, Mamoon Rashid et al¹⁵. Margulis A et al¹⁶ has utilized it for neck defect coverage. In our study, we have collectively utilized the experience of these, and found it to be remarkably efficient flap meeting all the basic criteria of an ideal flap to these areas.

The versatility of this flap in head and neck, facial, oral, and upper chest region has not been claimed in this study but also documented by many others¹⁷⁻²¹.

CONCLUSION

Island supraclavicular artery flap with an easy learning curve is a reliable flap. It has a good colour and texture match with minimal donor site morbidity. It is an excellent choice for neck coverage after post burns contracture release and an attractive alternative to free flap for oral facial defects. It is a versatile, under

utilized flap that can be included to head and neck reconstructive armamentarium.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

REFERENCES

1. Karacaoglan N, Uysal A. Reconstruction of postburn scar contracture of the neck by expanded skin flaps. *Burns* 1994; 20: 547-50.
2. Angrigiani C. Aesthetic microsurgical reconstruction of anterior neck burn deformities. *Plast Reconstr Surg* 1994; 93: 507.
3. Meltem Ayhan, Kamuran Z Sevim, Metin Gorgu. Treatment modalities in severe mentosternal synechia. *Int J Burn Trauma* 2013; 3(2): 87-95.
4. Ariyan S. The pectoralis major myocutaneous flap: A versatile flap for reconstruction in the head and neck. *Plast. Reconstr. Surg.* 1979; 63:73.
5. Jason P. Hunt Luke O. Buchmann. The Supraclavicular Artery Flap for Lateral Skull and Scalp Defects: Effective and Efficient Alternative to Free Tissue Transfer. *J Neurol Surg Rep* 2014; 75: e5-e10.
6. Hanasono MM, Sacks JM, Goel N, Ayad M, Skoracki RJ. The anterolateral thigh free flap for skull base reconstruction. *Otolaryngol Head Neck Surg* 2009; 140(6):855-860.
7. Gillies HD, "The tubed pedicle in plastic surgery. *The J Laryngol Otol* 1923; 38: 503-503.
8. KazanjianVH, ConverseJ, The surgical treatment of facial injuries, Williams & Wilkins, Baltimore, Md, USA 1949.
9. MathesSJ, Vasconez LO. The cervico-humeral flap. *Plast Reconstr Surg* 1978; 61: 7.
10. Lamberty BGH, Cormack GC. Misconceptions regarding the cervico-humeral flap. *Br J Plast Surg* 1983; 36(1): 60-63.
11. Pallua N, Machens H, Rennekampff O, Becker M, Berger A. The fasciocutaneous supraclavicular artery island flap for releasing postburn mentosternal contractures. *Plast Reconstr Surg* 1997; 99(7): 1878-1884.
12. Pallua N, Noah EM. The tunneled supraclavicular island flap: An optimized technique for head and neck reconstruction. *Plast Reconstr Surg* 2000; 105(3): 842-851.
13. Pallua N, Demir E. Postburn head and neck reconstruction in children with the fasciocutaneous supraclavicular artery island flap. *Ann plast surg* 2008; 60(3): 276-282.
14. ChiuES, LiuPH, FriedlanderPL. Supraclavicular artery island flap for head and neck oncologic reconstruction: indications, complications, and outcomes. *Plast Reconstr Surg* 2009; 124(1): 115-123.
15. Mamoon R, Muhammad ZI, Saad RS, Ahsan MB. The expansile supraclavicular artery flap for release of post-burn neck contractures. *J Plast, Reconstr Aesthet Surg* 2006; 59: 1094-1101.
16. Margulis A, Agam K, Ickson M, Dotan L, Yanko-Arzi R, Neuman R. The expanded supraclavicular flap, prefabricated with thoracoacromial vessels, for reconstruction of postburn anterior cervical contractures. *Plast Reconstr Surg* 2007; 119(7): 2072-7.
17. Hormozi AK, Shafii MR. Bilateral tunneled supraclavicular island flaps for simultaneous reconstruction of massive facial defect and intraoral lining. *J Craniofac Surg* 2010; 21(6): 1876-9.
18. Chen WL, Zhang DM, Yang ZH, Huang ZQ, Wang JG, Zhang B et al. Extended supraclavicular fasciocutaneous island flap based on the transverse cervical artery for head and neck reconstruction after cancer ablation. *J Oral Maxillofac Surg.* 2010;68(10):2422-30.
19. Chen WL, Yang ZH, Zhang DM, Huang ZQ, Fan S, Wang L. Reconstruction of major full cheek defects with combined extensive pedicled supraclavicular fasciocutaneous island flaps and extended vertical lower trapezius island myocutaneous flaps after ablation of advanced oral cancer. *J Oral Maxillofac Surg.* 2012;70(5):1224-31.
20. Kim RJ, Izzard ME, Patel RS. Supraclavicular artery island flap for reconstructing defects in the head and neck region. *Curr Opin Otolaryngol Head Neck Surg.* 2011; 19(4): 248-50.