

Supraclavicular Artery Flap "its weightage in reconstructing burn neck contracture"

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Back ground: Flexion contractures of neck are a common sequel of deep burns. Severity varies from discrete linear bands to severe labiomental contractures leading to functional and cosmetic impairment. Use of local flaps can produce best restoration of form and function. **Objectives:** This study was meant to analyze clinical utility, advantages and any complications specific to islanded supraclavicular artery flap. **Patients and methods:** This was a descriptive study carried out at department of plastic and reconstructive surgery Mayo hospital Lahore between January 2005 and November 2006. Ten patients presenting with neck contractures with out evidence of trauma in supraclavicular fossae, shoulder and deltoid region were included in the study. History and physical examination details including extent of contracture and cosmetic impairment were endorsed. Essential preoperative workup was done accordingly including assessment by anesthetist. **Results:** Ten patients with varying severity of neck contractures were included in the study. Age range was 15-35 years. Average hospital stay was 10 days. Five patients had severe labiomental contractures. Eight patients reported neck wound appearing excellent at 6 months postoperatively. In contrast donor area appearance was reported satisfactory by 7 and poor by 3 patients at 6 months. **Functional** consequences were most with 6 patients having full range of motion (ROM) and 4 patients having limited but satisfactory ROM. There is no reported recurrence so far. **Conclusion:** Supraclavicular artery based islanded fasciocutaneous flap is a reliable reconstructive tool ideally suited to cover defects in the region of neck to restore form and function.

Key words: Artery flap, contracture, weightage, supraclavicular

Flexion contractures of neck are a common sequel of deep burns owing to thin pliable skin and flexion being the position of comfort in cases of burns involving the anterior neck. Despite the battery of preventive means, cases of neck contractures are on rise. Severity varies from discrete linear bands to severe labiomental contractures leading to limited range of motion and continuous aching of neck muscles and joints, sense of deformity, airway problems complicating endotracheal intubations, drooling of saliva and dental imbalance as lower anterior teeth lean outwards being not held in normal vertical position by musculature of lower lip¹. All these long term complications can be prevented by early surgical intervention in established neck contractures. Any surgical procedure used to treat these contractures should aim to incise and/or excise scar tissue and reconstruct the resulting wound in such a way that it leads to full functional recovery with minimal or no chances of recurrence². In addition, neck being part of patient's appearance, aesthetic outcome of the surgery should satisfy the patient. The obvious disadvantages of use of a graft has been unsatisfactory aesthetic outcome, requirement for prolonged immobilization and pressure (for several months in some cases) in order to get a good result and loss of graft due to movement of laryngeal cartilage during swallowing leading to recurrence³. Use of flaps can avoid many of these problems and local flaps have the advantages of colour and texture match. Local flaps can be random pattern flaps, adhoc perforator flaps, three musculocutaneous flaps based on trapezius muscle and fasciocutaneous flaps based on supraclavicular artery⁴.

This study was meant to analyze clinical utility, advantages and any complication specific to islanded supraclavicular artery flap.

Surgical anatomy

It is a fasciocutaneous island flap based on supraclavicular artery (superficial branch of transverse cervical artery which itself is a branch of thyrocervical trunk). Transverse cervical artery is constantly found in the triangle between dorsal edge of the sternocleidomastoid muscle, the external jugular vein and the medial part of clavicle. The artery runs across the lower part of posterior triangle of neck about 2-3 cm above the clavicle emerging at lateral border of inferior belly of omohyoid at a distance of 7-9 cm from sternoclavicular joint and approximately 2-3 cm dorsal to sternocleidomastoid muscle and divides into superficial and deep branches. The superficial branch pierces the deep fascia almost constantly at this point (pivot point) to supply the flap⁵. Exact site of emergence can be better identified with hand held Doppler. Injection studies have shown that flap can be raised with dimensions of up to 30 cm in length and 12cm in width⁴.

Patients and methods

This descriptive study was conducted at department of plastic and reconstructive surgery Mayo hospital and King Edward medical university Lahore over a period of one year during January 2005 to January 2006. Ten patients presenting with neck contractures with out evidence of trauma in supraclavicular fossae, shoulder and deltoid region were included in the study. History and physical

examination details including extent of contracture and cosmetic impairment were endorsed. Essential preoperative workup was done accordingly including assessment by anesthetist.

Operative details: Peroperative marking of the scar to be excised was done taking special care to design V-shaped edge at excision margin. Incision depth and excision width was meant to achieve full release and absolute hemostasis was secured¹. Template of the defect was made and flap designed accordingly marking course of the vessel in the centre and pivot point. Local anesthesia was infiltrated and flap raised, islanded and rotated to maximum of 180 degrees and stitched in place. Skin graft was used as an adjunct in reconstructing large defects not covered by unilateral flap. Suction drainage was used beneath the flap and removed after 48 hours. Donor site was either closed primarily or skin grafted. Flap was observed constantly for signs of ischemia. Stitches were removed between 7 to 10 days. Patients were followed up and functional and aesthetic consequences in terms of patient satisfaction and any complication specific to the procedure were noted.

Results

A total of 10 patients all females with varying severity of neck contracture were operated (Table 1). Age range was 15-35 years. Average hospital stay was 10 days. Functional and aesthetic issues in terms of patient satisfaction are addressed in tables 2 and 3. Complications in our cases are detailed in table 4. Three cases required graft as an adjunctive tool to cover neck-wound and none of these cases had graft loss.

Table 1 Severity of neck contractures

Type of contracture	No of cases
Sever. mentosternal	5
Moderate cervicosternal	3
Moderate heavy multiple bands	1
Mild discrete linear bands	1

Table 2: Wound appearance

Wound appearance	Recipient area appearance at			Donor area appearance at		
	1 mon	3 mon	6 mon	1 mon	3 mon	6 mon
Excellent	7	8	8	Nil	Nil	nil
Satisfactory	3	2	2	4	7	7
Poor	Nil	nil	nil	6	3	3

Table 3 Functional outcome

Range of motion	Number of cases
Free	6
Limited but satisfactory	4
Unsatisfactory	Nil

Table 4: Complications

Complications	Number of cases
Flap necrosis marginal	2
Flap necrosis complete	Nil
Hematoma	3
Wound infection	3
Recurrence	Nil
Loss of Graft at donor site	2
Wound dehiscence	1



Pre operative



Post operative



Preoperative



Postoperative



Postoperative side view

Discussion

The concept of reconstructive ladder has been changed to reconstructive triangle in which reconstructive tools are flaps, tissue expansion and free tissue transfer⁶. Determinants of selection of a particular tool are its safety and ability to restore form and function at both donor and recipient site. The challenges encountered in post burn neck contracture reconstruction are best addressed by this relatively new concept. However local studies in recent literature have still used thick split thickness graft with varying results. Good results have always required regular physiotherapy, massage and splint age with cervical collar or polyvinyl chloride neck extension brace³. Poor compliance to these measures has resulted in high recurrence rates, in some series as high as 89%^{7, 8}. Thus challenge of restoration of form and function in our majority of poor, illiterate and noncompliant patients is best served by local flaps.

The native tissue in the region of neck is thin and pliable. As a basic concept, first formulated by Gillies in 1920, the more adjacent the donor site, the better the skin will match the recipient site. Local flaps from adjacent

areas can be harvested in posterior neck and chest, anterior chest and shoulder. Various myocutaneous flaps based on trapezius and utilizing thick Para vertebral skin have been used in local and international studies with good functional results but limitations of texture match⁹. Flaps raised from anterior chest are bulky and harvesting the flap may cause problems because of scarring and breast distortion⁵. More over pattern of burn also limits the use of anterior chest skin.

So for thin, flexible and smooth hairless resurfacing with acceptable donor site camouflage, flaps raised from region of shoulder are the best choice. The concept of using this cervicohumeral skin as flap has evolved over last 150 years⁴. Pallua has clearly defined a reliable islanded cervicohumeral flap based on supraclavicular artery suitable for most neck reconstructions⁵. In our study we have successfully used this flap in severest form of the contractures. Patient satisfaction regarding appearance of the neck compared to pretreatment has been excellent in 8 and satisfactory in 2 cases with no unsatisfied patient. The problem has been with donor site appearance particularly in cases where donor site was skin grafted. However all the patients are able to conceal donor site and majority is satisfied. Functional outcome has been most encouraging with 6 patients having full range of motion (ROM) and 4 patients having limited but satisfactory ROM. No recurrence has occurred so far.

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