

Supraclavicular Island Flap for Head and Neck Reconstruction

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Abstract

Post-surgical defect and reconstruction is always a challenge for the oral and maxillofacial surgeon to achieve satisfactory aesthetic and functional results. There are various options ranging from local flaps, skin grafts to microvascular flaps. The skin match to the face and neck is better in the shoulder region. The main blood supply to this flap is the supraclavicular artery. The supraclavicular is a branch of the transverse cervical artery. The supraclavicular flap has several advantageous properties which has rendered it a preferred flap for the reconstruction of the lower face and neck for many reconstructive surgeons.

Keywords: *Supraclavicular Flap; Supraclavicular Artery; Reconstruction of Head and Neck Defect*

Introduction

The supraclavicular island flap has recently gained popularity as a definitive option in head and neck reconstruction. The beginnings of the supraclavicular artery flap date back to Kazanjian and Converse when they described the acromial flap [1]. The supraclavicular flap has several advantageous properties which has rendered it a preferred flap for the reconstruction of the lower face and neck for many reconstructive surgeons. Pallua and his colleagues are credited with the first description of the flap as a "supraclavicular artery island flap" and with modification which eventually lead to the establishment of this flap as a true contender in head and neck reconstruction. Since this description, there have been several publications in the literature describing the reliability of the flap in several options for reconstructing head and neck defects as well as in the anterior chest region [2]. The supraclavicular flap has several advantageous properties which has rendered it a preferred flap for the reconstruction of the lower face and neck for many reconstructive surgeons. One of the main advantages is that it is a thin and pliable flap. The use of this flap in the multiply operated and often vessel-depleted neck makes it a very attractive option for these challenging cases [3,4].

Anatomy

Principle blood supply to the flap is through the supraclavicular artery which is a branch of transverse cervical artery. The artery passes 3.0 ± 0.7 cm above the clavicle at a distance of 8.2 ± 1.7 cm from the sternoclavicular joint and approximately 2.1 ± 0.9 cm dorsal to the sternocleidomastoid muscle [5]. The mean diameter

of the artery is 1.5 mm. The venous drainage to the flap consists of two veins. One runs along the artery as a venae comitantes and eventually drains into the transverse cervical artery, while the other is a branch of the external jugular vein and drains into the subclavian vein. The skin area that can be harvested with this flap ranges from 10 - 16 cm wide to 22 - 30 cm long. The distal end of this flap can extend to the midportion of the deltoid with a slight anterior placement. The design of the skin flap is usually fusiform [5].

Flap harvest

At the beginning of each case, shoulder bumps are placed under the donor shoulder site to improve exposure. The neck and the entire arm and hand circumferentially are prepared with sterile Betadine. Intraoperatively, a Doppler signal is confirmed in the triangular fossa bordered by the clavicle as well as the sternocleidomastoid and trapezius muscles. A 6- to 7-cm-wide elliptical island flap can be designed over the shoulder and supraclavicular region to include the proximally auscultated signal. The flap is dissected from distal to proximal in a subfascial fashion toward the pedicle using electrocautery. Once in the pedicle vicinity, switch to blunt bipolar forceps, as with a perforator flap dissection. After the pedicle has been identified, the proximal skin island is divided so that the island flap has ample room to rotate. The length, vessel diameter, and location of the pedicle entering the flap island are the limiting factors with regard to tissue volume that can be transferred. Intraoperatively, trim the distal tip until healthy bleeding tissue is noted. We routinely design the distal flap tip to include

skin from the mid-deltoid area. All flaps were de-epithelialized and reduced in size to fit the ablative defect proportionally. Other groups have recommended a “tunneled” technique to minimize scarring and donor site morbidity, with acceptable results. However, since many of these patients already have neck incisions from prior surgery, we do not hesitate to connect the proximal skin island flap to this previous incision. Tunneling of the supraclavicular island flap under radiated tissue or areas of previous scarring is not recommended. The scar band may impair blood flow to the distal flap, where the transferred tissue is often needed the most. Flap in-setting and pedicle visualization also become easier. Skin necrosis at trifurcation sites has not been observed. Which flap in-setting technique to use is the surgeon’s preference. Buried flaps are not monitored, because the flap has both an artery and a vein originating from its parent vessels. The donor-site closure is performed after flap in-setting. Wide undermining, both anteriorly and posteriorly, is usually required. A shoulder drain is not necessary because the dead space is closed snugly. Any flap that is wider than 8 cm may be difficult to close, and skin grafting should be performed without hesitation. Though a scar may be noticeable when the patient is shirtless or wearing a tank top compromised shoulder function was not observed in this series. It should be noted that other investigators have stated that the vessel caliber and pedicle length are variable and not always present. Even though the supraclavicular flap has previously been used as a free tissue transfer flap, we advise planning for the use of a contralateral supraclavicular artery flap or more traditional regional or free flaps as a second option, since these vessels can be small, injured, scarred, or absent [6].

Case Report

Case I

A 38 year old female patient walked into our institution with a complaint of a non-healing ulcer in the lower back tooth region for 6 weeks. Patient first noticed the ulcer 6 weeks back which was not painful and used to bleed while brushing. Patient doesn’t give any history of deleterious habits. On examination patient had an ulceroproliferative lesion in the right buccal mucosa extending superiorly from the upper gingival region opposite to the occlusal plane of the upper molars to the lower gingivobuccal sulcus (GBS) and antero-posteriorly from the mesial of the lower second premolar to the retromolar trigone. On palpation the lesion was tender and submandibular lymph nodes were palpable. An incisional biopsy was done and the histopathological report came as squamous cell carcinoma. A supraomohyoid neck dissection was planned with wide excision. And reconstruction of the soft tissue defect with a supraclavicular flap was planned because the patient had a medical history of chronic obstructive pulmonary disease due to which the Pectoralis Major Myocutaneous Flap could not be performed.

Figure 1: Pre-operative clinical intra-oral photograph showing a non-healing ulceroproliferative lesion in the right buccal mucosa.

Figure 2: Coronal and axial CT scan depicting the epicenter of the lesion (arrows) is in the buccal mucosa without

Figure 3: Intraoperative photographs showing the markings for incision for the supraclavicular flap and neck dissection.

Figure 4: Intraoperative photograph showing the supraclavicular artery pedicle and the island flap after flap elevation.

Case II

A 45 year old male patient presented to the department of oral and maxillofacial surgery of our institution with a complaint of non-healing ulcer in the right lower back tooth region for 2 months. Patient gave a history of tobacco chewing habit for 20 years. On examination patient had an ulcerative lesion in the right lower alveolus in the region of lower mandibular right second molar with palpable submandibular lymph node which was nontender and firm and fixed. CT shows. Incisional biopsy was done and the report came as well differentiated squamous cell carcinoma. Patient was planned for a condyle sparing hemi-mandibulectomy with radical neck dissection. And reconstruction using a composite fibular flap. But during the surgery the anastomosis was not successful So an on table decision was taken to use the supraclavicular flap for soft tissue coverage of the graft.

Figure 5: Pre-operative clinical photograph showing the ulcerative lesion in the right lower second molar region.

Figure 6 and 7: Pre-operative radiographic images shows an infiltrative lesion showing infiltration in the alveolar bone of the right mandible.

Figure 8 : Intra operative pictures showing the reconstructed mandible using the left fibula.

Figure 9 : Intra operative pictures showing the incision marking for the supraclavicular flap.

Figure 10 : Intra operative pictures showing the elevated supraclavicular flap.

Discussion

Supraclavicular artery island flap has become a reliable, technically simple for head, neck and face and also of post- surgical defects. There are various modifications of the flap which has been described which are tunneled island flap, bilateral supraclavicular flap, extended flap, prefabricated delayed flap, pre-expanded flaps and osteocutaneous flaps.

Supraclavicular artery island flap a safe reliable technically simple thin pliable fascio cutaneous regional flap. It can be considered as a first line reconstructive option for patients with head and neck defect [7].

Good color and texture match to the skin of the face and neck make the Supraclavicular artery island flap excellent for covering cutaneous defects [8].

In our experience mean flap length was 5.8 cm in width and 18.6 cm in length. All donor-site defects were closed by primary intention. The flap dimensions are similar to other reports using the SAI flap for reconstruction of post ablative oncologic defects of the head and neck.

In our experience we also realized that time taken for harvesting the Supraclavicular artery island flap is much less when compared to harvesting of most of the other regional flaps in the head and neck region.

Complications

Donor-site complications with the Supraclavicular artery island flap are minimal. Reconstruction of complex 3-dimensional defects with a Supraclavicular artery island flap may be limited by the rotational nature of the flap. This is particularly evident in defects of the tonsil that extend to the base of the tongue or the palate, where folding of the flap is needed for optimal reconstruction of these defects may not be possible with a tethered rotational flap. Likewise, this problem can be encountered in large defects of the anterior floor of the mouth and the tongue, with extension to the tongue base. In cervicofacial defects, the skin paddle must be rotated 180° at its base to place the skin paddle externally. This rotation must be performed loosely so that kinking of the vessels do not occur [9].

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Conclusion

This flap should be viewed as an important part of the reconstructive algorithm, but one should continue to assess the needs of the patient and identify the tissue which will best meet those needs [8]. It is a well-tolerated reliable fasciocutaneous regional flap for head and neck reconstruction. It provides a perfect match to the skin of head and neck region. Reach of the flap is limited to mid face. Donor site should not be exposed previously to trauma or radiotherapy. It also is an excellent choice of flap for salvage procedures.

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