

Superficial Ulnar Artery Perforator Flap

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Abstract: Superficial ulnar artery is a rare finding but shows significant surgical implications. Its thinness and pliability make this flap an excellent solution for soft tissue reconstruction, especially in the head and neck region.

We hereby report a successful free superficial ulnar artery perforator forearm flap transfer for tongue reconstruction. A 64-year-old man presenting with a squamous cell carcinoma of the left tongue underwent a wide resection of the tumor, left radical neck dissection, and reconstruction of the tongue and the left tonsillar pillar with the mentioned flap. No complications were observed postoperatively. The flap survived completely; no recurrence at 6 months of follow-up was detected.

Superficial ulnar artery perforator flap has shown to be a safe alternative to other free tissue flaps in specific forearm anatomic conditions.

Key Words: Free superficial ulnar artery perforator flap, perforator flap, tongue reconstruction, partial glossectomy, ulnar artery dissection

(*J Craniofac Surg* 2014;25: 1870–1871)

Ulnar artery (UA) flap is an excellent solution for soft tissue reconstructions, where a thin and pliable flap is needed.¹ A positive Allen's test, showing a UA unable to provide hand vascularization, is one of the most common circumstances that may lead surgeons to prefer a UA flap to the most common radial forearm flap. This flap has been the object of recent studies, both anatomic and clinical; the advantages of the UA flap are the relative absence of hair on the ulnar skin and an easier donor-site local flap closure with a more favorable donor-site scar.¹ The UA perforator flap variant has recently gained popularity.²

Various cadaveric studies have shown a variable UA course in the forearm anatomy. A specific entity was described in 2001 and identified as superficial UA (SUA).³ Clinical implications of SUA presence are multiple.⁴ A superficial position of the UA makes it more vulnerable to trauma; it can easily be mistaken for a vein. In radiodiagnostic procedures, SUA could lead to technical difficulties and intra-arterial injection. At last, during forearm surgery, SUA could be damaged for its unusual course.⁵

However, the presence of an SUA, instead of a traditional UA, is not just a disadvantage: harvesting of a skin flap based on this specific artery may mean an easier dissection because of the distance between this artery and the ulnar nerve.

We present a case of a patient with a squamous cell carcinoma of the tongue, where a positive Allen's test, in the preoperative planning, suggested us the use of a UA flap; Doppler preoperative study of the forearm vascularization showed us an anomalous course of the UA suggesting the presence of an SUA. An SUA perforator flap was harvested and transferred to the patient's tongue defect.

CLINICAL REPORT

A 64-year-old man presented with a biopsy-proven squamous cell carcinoma of the left tongue; a left posterior third partial glossectomy, including the left tonsillar pillar, was planned (Fig. 1), with a left radical neck dissection.

Preoperatively, results of the left forearm Allen's test indicated insufficient distal hand perfusion after the release of UA pressure. This result suggested to preserve the radial artery and oriented us for the use of an ulnar forearm flap. A handheld Doppler was used to mark the course of the UA and its perforators. The position of the main artery resulted more radial than normal, suggesting the possibility of an SUA (Fig. 2).

A skin island of 3.5×4.5 cm was planned on the distal third of the forearm, centered on a distal perforator of the UA.

During the surgery, the presence of SUA was confirmed (Fig. 3). Under tourniquet control, the free flap was harvested on the basis of SUA and 2 venae comitantes. This artery arose from the lower third of the brachial artery and ran superficial to the flexor muscles, leaving perforators during its course. Flaps were harvested on a single perforator (Fig. 4).

The vascular microanastomosis was performed between the SUA and the superior thyroid artery in an end-to-end manner and one of the venae comitantes in an end-to-side manner with the thyrolinguofacial vein trunk. Flap inset was completed with 4/0 Vicryl; the donor site was reconstructed by a radial artery perforator-based "Hatchet" flap involving most of the forearm volar skin. The patient's postoperative course was uneventful. At 6 months of follow-up, the patient showed no signs of local recurrence (Fig. 5).

DISCUSSION

The most common radial forearm free flap, first described by Yang et al⁶ in 1981, is the reconstructive tissue of choice for the majority of soft tissue defects; the free UA forearm flap, first described by Lovie et al¹ in 1984, can be considered an equivalent option. The free UA forearm flap has the same tissue characteristics of its radial counterpart and is even preferred because of its thinner subcutaneous layer and less hair-bearing skin. Flap survival rate and donor-site wound healing are similar. Anatomic studies by Sun et al⁷ demonstrated that UA has 2 main clusters of perforators in the proximal one third and distal one fourth of the forearm. Yu et al used these

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Received March 13, 2014.

Accepted for publication April 23, 2014.

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The authors report no conflicts of interest.

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ISSN: 1049-2275

DOI: 10.1097/SCS.0000000000001061



FIGURE 1. Mouth of the patient. Squamous cell carcinoma of the left posterior third of the tongue.

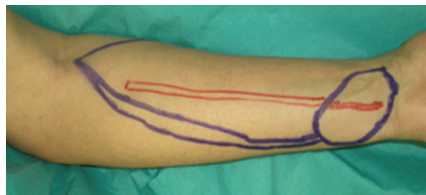


FIGURE 2. Forearm of the patient. Preoperative planning of the flap: UA course (red).

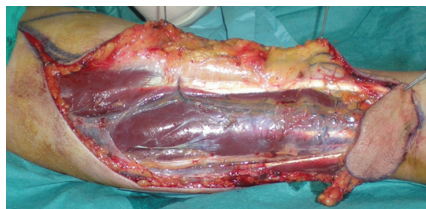


FIGURE 3. Forearm. Flap harvesting and SUA course.



FIGURE 4. Superficial UA with its distal perforator: harvesting the skin island.



FIGURE 5. Settled flap at 6 months of follow-up.

clusters to harvest free UA perforator flap in the repair of head and facial tissue defects.²

A specific variant of the UA was first described by Rodriguez-Niedenfuhr et al³ in 2001 and was named *superficial ulnar artery*. The SUA runs superficial to the forearm flexor muscles, deep to the brachial fascia and usually superficial to the median nerve, in a more radial position than the usual. Variations in its origin were described in a study by Senanayake et al⁴: the most common branching was from the lower third of the brachial artery. Incidence of SUA is approximately 0.7% to 7%.

Other studies demonstrated the inadequacy of Allen's test in the detection of an SUA and suggested the use of ultrasound Doppler to identify SUA in patients with a positive Allen's test.^{8,9}

When present, the SUA has been linked to several clinical and surgical implications.^{4,5} The presence of an SUA does not always need to be regarded as an adverse feature; its presence may facilitate reconstructive surgeons to use it in a free ulnar flap.

The first free SUA forearm flap was described by Devansh¹⁰ in 1996. The SUA is known to give several perforators and cutaneous branches anastomosed with each other to form a cutaneous branches chain. However, surgeons should be aware of artery and vein caliber differences: the mean diameter of SUA is 6.00 mm as compared with 6.21 mm of UA.¹¹

This is the first description of a successful free SUA perforator flap.

In conclusion, this flap has shown to be a safe alternative to forearm free tissue flaps in the forearm anatomic conditions described. The SUA is a rare finding but has significant surgical implication. Its perforators in the forearm are consistent and reliably support an SUA perforator flap. This flap is thin and pliable as well as easy to harvest and has minimal donor-site morbidity. The possibility to run in an SUA must be considered in all patients undergoing a free UA flap.

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