# Superficial circumflex iliac artery perforator flap for tongue reconstruction

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**Objectives.** With microvascular reconstruction, different perforator flaps have been introduced for the treatment of head and neck defects. In light of this, the superficial circumflex iliac artery perforator (SCIP) flap was assessed for reconstruction after partial and hemiglossectomy.
**Study Design.** A total number of nine patients who received SCIP flap reconstruction for tongue defects were included in this study. Details on clinical features were collected, and postoperative functions and esthetic results were analyzed.
**Results.** All the SCIP flaps survived, and postoperative speech and swallowing functions were generally found to be acceptable during follow-up. In addition, subjective questionnaire appraisals from patients were favorable.
**Conclusion.** The SCIP flap may present a good alternative for reconstruction of partial or hemiglossectomy defects. (Oral Surg Oral Med Oral Pathol Oral Radiol 2016;121:373-380)

Tongue cancer, like other head and neck malignancies, is often considered a complex and refractory malignancy prone to recurrence and metastasis.[1] Surgical intervention remains the primary treatment modality for the treatment of such neoplasms, but it often results in soft tissue defects necessitating reliable reconstructive procedures.[2] Reconstructive approaches with a variety of flaps have been applied for better functional results in these patients, although each has its pros and cons.[3]

Radial forearm free flap (RFFF) is one of the many free flaps introduced for reconstruction of partial tongue defects. Despite its ease of harvesting, pliability, and large-caliber pedicle vessels, inherent donor site morbidity is still a main area of concern.[4,5] To avoid this shortcoming, the anterolateral thigh flap (ALTF) has become increasingly popular among reconstructive surgeons because of its versatility and minimal donor site morbidity.[6-8] Thinned by removing the deep subcutaneous fat, the ALTF can be tailored to a specific hemi- or subtotal glossectomy defect, for which previously a RFFF would have been used.[9] More recently, inspired by the "angiosome concept" of Taylor[10] and the guidelines of "perforator-flap planning" by Blondeel,[11] other perforator choices, such as the deep inferior epigastric artery perforator flap[12] and the medial sural artery perforator flap,[13] have been used for reconstructing head and neck defects, especially intraoral ones. In search of an ideal flap for repairing intermediate tongue defects, we shifted our attention toward the well-concealed groin region. Superficial circumflex iliac artery perforator (SCIP) flaps, first reported in 2004 by Koshima,[14] have now been raised to reconstruct defects after partial or hemiglossectomy in 9 patients. In this article, we share our experiences and technical "pearls and pitfalls" obtained during the management of these cases.

## MATERIALS AND METHODS

This clinical study was conducted at the Department of Oral & Maxillofacial − Head & Neck Oncology and the Department of Plastic and Reconstructive Surgery in the Shanghai Ninth People's Hospital from April 2013 to March 2015. Ethics approval was granted by Institutional Clinical Research Supervision Committee. Prior informed consent of SCIP reconstruction was obtained from each patient. The inclusion criteria for

## Statement of Clinical Relevance

Apart from conventional reconstructive approaches, the superficial circumflex iliac artery perforator flap is introduced to all surgeons interested in tongue reconstruction. A favorable aesthetic and functional outcome of reconstructed tongue and donor site can be expected.

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**Table I.** General characteristics of patients with SCIP flap reconstruction

| *No.* | *Age* | *Gender* | *BMI* | *Waist* (cm)* | *Stage* | *TDC* | *ND* | *Airway management* | *Adjuvent therapy* | *Follow-up (mo)* |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 65 | Male | 24.6 | 83.3 | T2 N0 M0 | PG | SOND | Nasotracheal intubation | None | 18 |
| 2 | 36 | Female | 24.3 | 79.1 | T3 N0 M0 | HG | SOND | Nasotracheal intubation | None | 16 |
| 3 | 48 | Female | 22.1 | 75.3 | T2 N1 M0 | PG | SOND | Nasotracheal intubation | None | 15 |
| 4 | 43 | Female | 21.8 | 74.8 | T2 N0 M0 | PG | SOND | Nasotracheal intubation | None | 14 |
| 5 | 53 | Female | 27.6 | 89.5 | T2 N1 M0 | PG | SOND | Nasotracheal intubation | None | 13 |
| 6 | 49 | Male | 29.2 | 93.2 | T2 N0 M0 | PG | SOND | Nasotracheal intubation | None | 13 |
| 7 | 50 | Male | 26.0 | 85.1 | T3 N1 M0 | HG | SOND | Tracheotomy | Post-RC | 11 |
| 8 | 35 | Female | 23.3 | 78.4 | T3 N1 M0 | HG | RND | Tracheotomy | Pre-C + Post-RC | 9 |
| 9 | 24 | Male | 24.7 | 82.6 | T3 N0 M0 | HG | SOND | Nasotracheal intubation | None | 6 |

*BMI,* body mass index; *TDC,* tongue defect classification; *ND,* neck dissection; *SOND,* Supraomohyoid neck dissection; *RND,* Radical neck dissection; *Post-RC,* postopeartive radiotherapy; *Pre-C + Post-RC,* preoperative chemotherapy + postoperative radiochemotherapy.
*Waistline circumference.

**Table II.** Detailed information of SCIP flaps

| *Flap size (cm)* | *Flap thickness (cm)* | *Ped A (cm)** | *Ped V (cm) †* | *Cal A (mm)‡* | *Cal V (mm)§* |
|---|---|---|---|---|---|
| 5 × 7 | 1.2 | 8.5 | 8.5 | 0.7 | 1.1 |
| 5 × 8 | 0.7 | 8.0 | 8.0 | 0.6 | 1.2 |
| 5.5 × 6.5 | 0.9 | 8.0 | 7.0 | 0.7 | 1.4 |
| 6 × 6.5 | 1.1 | 8.4 | 9.2 | 0.5 | 1.0 |
| 5 × 7 | 1.4 | 11.0 | 10.0 | 0.9 | 0.8 |
| 6 × 6.5 | 1.6 | 10.0 | 9.0 | 1.2 | 1.4 |
| 5.5 × 9 | 1.3 | 8.0 | 8.0 | 0.8 | 1.2 |
| 6 × 8 | 1.1 | 9.0 | 9.5 | 0.8 | 0.9 |
| 5.5 × 8 | 0.9 | 8.0 | 8.5 | 1.0 | 1.0 |

*Arterial pedicle length.
†Venous pedicle length.
‡Caliber of artery.
§Caliber of vein.

patients were as follows: (1) primary tongue malignancy mandating partial or hemiglossectomy; (2) tongue defect size no less than 5 to 6 $cm^2$; and (3) absence of additional co-morbid medical conditions. Nine subjects were finally enrolled in this study. Preoperative imaging assessment was routinely performed to pinpoint the perforator locations and vessel directions. All the surgical reconstructive procedures were carried out by one of the authors (Y.H.) immediately after glossectomy and neck dissection.

General characteristics, as presented in Table I, were age, gender, body mass index, waistline circumference, histologic diagnosis, tumor−node−metastasis stage, adjuvant treatments, and follow-up periods. Tongue defects after tumor ablation were classified into two categories: half oral tongue with base of tongue involvement (i.e., partial involvement) and (2) half oral tongue without base of tongue (i.e., hemiglossectomy), according to Chang's defect assessment.[15] Postoperative complications following such surgical treatments were also reported. Detailed information is provided in Table II.

Speech and swallowing functions after a regular 6-month follow-up period were evaluated in all patients. Specifically, speech functions were judged by a speech language pathologist, who used Hirose's 10-point Japanese scoring system.[16] The score indicative of the degree of intelligibility can be interpreted as follows: normal (10-8 points), slightly impaired (7-5 points), and largely impaired (0-4 points). Deglutition was subjectively estimated on the basis of diet feedback from patients with the following classification: 3 (regular, unrestricted) diet, 2 (soft diet), 1 (liquid diet), and 0 (oral diet with tube-feed dependency). Tongue mobility was assessed with measurements of upward, protrusive, and lateral deviation distance on a 3-level scale, as previously described by Shin et al.[17] Tongue movements farther than 2 cm in 3 or 4 directions were graded as excellent, those farther than 2 cm in 1 or 2 directions were graded as good, those farther than 1 cm in 3 or 4 directions were graded as fair, and those with a grade below fair were graded as poor. A 2-level subscale questionnaire was designed to assess the patients' preferences for donor sites during preoperative consultation, and their satisfaction with scars and cosmesis of donor and recipient sites during postoperative follow-up (Table III).

## Flap design and surgical procedure

The vasculature for SCIP flaps is shown in Figure 1. Preoperatively, color duplex sonography (CDS) examinations were routinely performed by a sonologist for identifying the cutaneous perforators of the superficial circumflex iliac artery (SCIA). Because of inaccuracy in CDS mapping, computed tomography angiography (CTA) was used to assist in the delineation of the whole SCIA vasculature.[18] Vessel calibers of the SCIA were measured, and a compatibility check was performed in the neck for cervical recipient counterparts.

With the patient lying supine, preoperative markers were drawn along the line between the anterosuperior iliac spine (ASIS) and the symphysis pubis. The dominant perforator of SCIA was always located around 1.5 to 3 cm superomedial from the ASIS

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