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Technical Note
Reconstructive Surgery

Superficial circumflex iliac artery perforator flap: identification of the perforator by computed tomography angiography and reconstruction of a complex lower lip defect

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Abstract. The purpose of this article is to present our approach to the reconstruction of head and neck defects using the superficial circumflex iliac artery perforator (SCIP) flap with the aid of preoperative computed tomography angiography (CTA) mapping. We describe the reconstruction procedure of a lower lip defect with a SCIP flap in a patient who underwent resection for a lower lip squamous cell carcinoma (SCC). Preoperative CTA is an effective method for detecting and predicting the course of perforator vessels. The SCIP flap may provide a superior functional and aesthetic restoration in selected cases, with an inconspicuous donor site scar and lower donor site morbidity. We believe that the SCIP flap is a viable option for soft tissue reconstruction of defects in the head and neck region with the aid of preoperative CTA mapping.

Keywords: superficial circumflex iliac artery; perforator flap; computed tomography angiography; lower lip defect.

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The reconstruction of large lower lip defects after ablation for cancer has always been a difficult problem faced by almost every head and neck surgeon. Surgical defects in this region are associated with dramatic effects on appearance, speech, respiration, deglutition, and oral function, resulting in a significantly negative impact on the patient's quality of life.

Loco-regional flaps, such as the Abbe flap, are usually used to reconstruct partial defects of the lower lip. These flaps can achieve a satisfactory functional and aesthetic reconstruction for small defect closure. However, for cases where more than

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one-half of the lower lip is resected, reconstruction may not be feasible with these flaps. For cases like these, the advancements and developments made over the last three decades in free tissue transfer and microsurgical techniques have provided the opportunity to reconstruct larger lower lip defects. Nowadays the radial forearm flap and the anterolateral thigh free flap have gained worldwide popularity. These have become the workhorse soft tissue free flaps for the reconstruction of complex lower lip defects due to their relative ease of harvest and acceptable postoperative aesthetic and functional results.

The composite radial forearm–palmaris longus tendon flap is reportedly an excellent method for total lower lip reconstruction. However, major drawbacks of the radial forearm flap are the sacrifice of a major artery of the hand and a conspicuous donor site scar.[1] Compared to the radial forearm–palmaris longus tendon flap, the anterolateral thigh (ALT) flap, raised along with the vascularized fascia, has the following advantages: (1) sacrifice of a major artery in the hand is not required, and (2) the donor site can undergo primary closure with a less conspicuous scar than that resulting from the radial forearm flap. However, it still has the disadvantage of being thicker, especially when harvested in non-Asian patients.[2]

Since the concept of free-style free flaps was first presented, many new types of flap, including the superficial circumflex iliac artery perforator (SCIP) flap, have been reported. In 2004, Koshima et al.[3] were the first to mention the application of a SCIP flap based on the groin flap for the reconstruction of various limb defects. Since then, it has been used tentatively for the reconstruction of various defects in the trunk and the head and neck, as well as for managing penile defects.[3–7] Perforator flaps provide us with new alternative choices for reconstruction and have the added advantage of lower donor site morbidity.

Materials and methods

In this article, we present the case of a patient with a lower lip and oral commissure defect resulting from ablation for cancer, which was reconstructed with a SCIP free flap after preoperative computed tomography angiography (CTA) mapping.

Vascular anatomy of the superficial circumflex iliac artery

According to anatomical studies, the superficial circumflex iliac artery (SCIA) normally branches off the femoral artery or from a common trunk with the superficial inferior epigastric iliac artery (one-third of cases) and runs superolaterally to approach the anterior superior iliac spine (ASIS).[8,9] From the anatomical studies of Taylor and Daniel in 1975, the SCIA always arises within 5 cm of the inguinal ligament.[8] The sartorius muscle is the key to its dissection. Several cutaneous branches can be found at the inception of the dissection. The main vessel often remains deep beneath the fascia until the lateral border of the sartorius muscle is reached. In this case, the SCIA normally branches off the femoral artery and travels superficially and distally through the deep fascia of the sartorius muscle in the adipose tissue.

Preoperative CTA image

Due to the variable course and size of the pedicle, a preoperative evaluation was considered necessary. In this particular case we utilized CTA in order to acquire more precise information. By doing so, the entire course of the vessel could be outlined directly via a three-dimensional image reconstruction.

From the CTA image analysis, the right side SCIA was found to arise directly cranial to the femoral artery and extend towards the ASIS. The SCIA divided into superficial and deep branches medial to the sartorius muscle within the femoral triangle. There, the superficial branch took an angle after emerging from the bifurcation during its superficial course. The deep branch was longer and larger than the superficial one, as shown on the CTA image. The superficial branch measured 10.5 cm in length and 0.8 mm in diameter, while the deep branch measured 13.4 cm in length and 1.4 mm in diameter. Meanwhile, the main branch of the SCIA was about 1.9 cm in length and 2.1 mm in diameter. The SCIA was accompanied by a superficial cutaneous vein, which could be demarcated on the CTA image. The left side SCIA also arose directly cranial to the femoral artery, but it showed no superficial branch. This artery measured 10.0 cm in length and 2.2 mm in diameter. After evaluating the size (length, diameter) and course of the SCIAs bilaterally, a right-side superficial branch SCIP flap was chosen for harvesting due to the more acceptable characteristics of the vessels. At the same time, lower donor site morbidity was achieved by avoiding dissection of the artery in the deep layer (Fig. 1).

Flap harvesting

During the preoperative CTA examination, we marked the perforator position in the groin area. A 9 cm × 6 cm flap was designed along the vessel and extended beyond the ASIS in a superolateral direction (Fig. 2).

The first incision was made through the inferomedial border of the outlined flap and an attempt was made to detect the predetermined perforator. The superficial vein in the subcutaneous layer should be protected as an extra option for venous drainage. Afterwards the perforator vessel was exposed using a superfascial dissection. All other branches along the axial

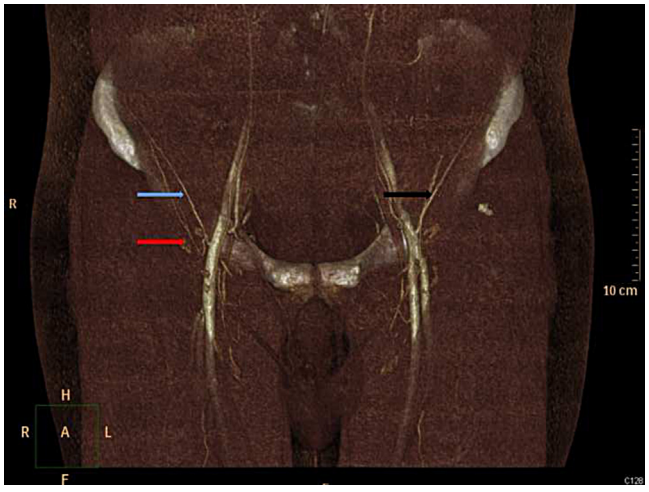

Fig. 1. Three-dimensional reconstruction of the groin region with CTA. Red arrow: superficial branch of the right side SCIA. Blue arrow: deep branch of the right side SCIA. Black arrow: deep branch of the left side SCIA (CTA, computed tomography angiography; SCIA, superficial circumflex iliac artery). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)