

Technical Note  
Reconstructive Surgery

# Use of facial vein graft with vascularized composite auricular helical rim flap for alar rim defects

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**Abstract.** Nasal alar defects lead to facial disfigurement, and nasal ala reconstruction is an important treatment option. The vascularized composite auricular flap based on the superficial temporal artery is an ideal option for a full-thickness nasal alar defect. However, the pedicle length and the discrepancy in artery diameter between the recipient vessel and flap pedicle continue to be major problems for free auricular composite tissue transfer. Considering that the angular artery is occasionally absent and the course of the infraorbital segment of the facial vein is constant, there are often no suitable vessels around the recipient site for anastomoses to the short pedicle of the flap. In the absence of a suitable recipient artery, an infraorbital segment of the facial vein measuring 2.5 cm in length was taken as a graft for the anastomosis of the superficial temporal artery and superior labial artery. End-to-end anastomosis was performed easily. The flap was inset to reconstruct the contralateral ala. The facial vein graft for anastomosis of the superficial temporal artery and branch of the facial artery is a reliable and easy method to resolve the problem of a short pedicle and large artery discrepancy for nasal ala reconstruction with a vascularized composite helical rim flap.

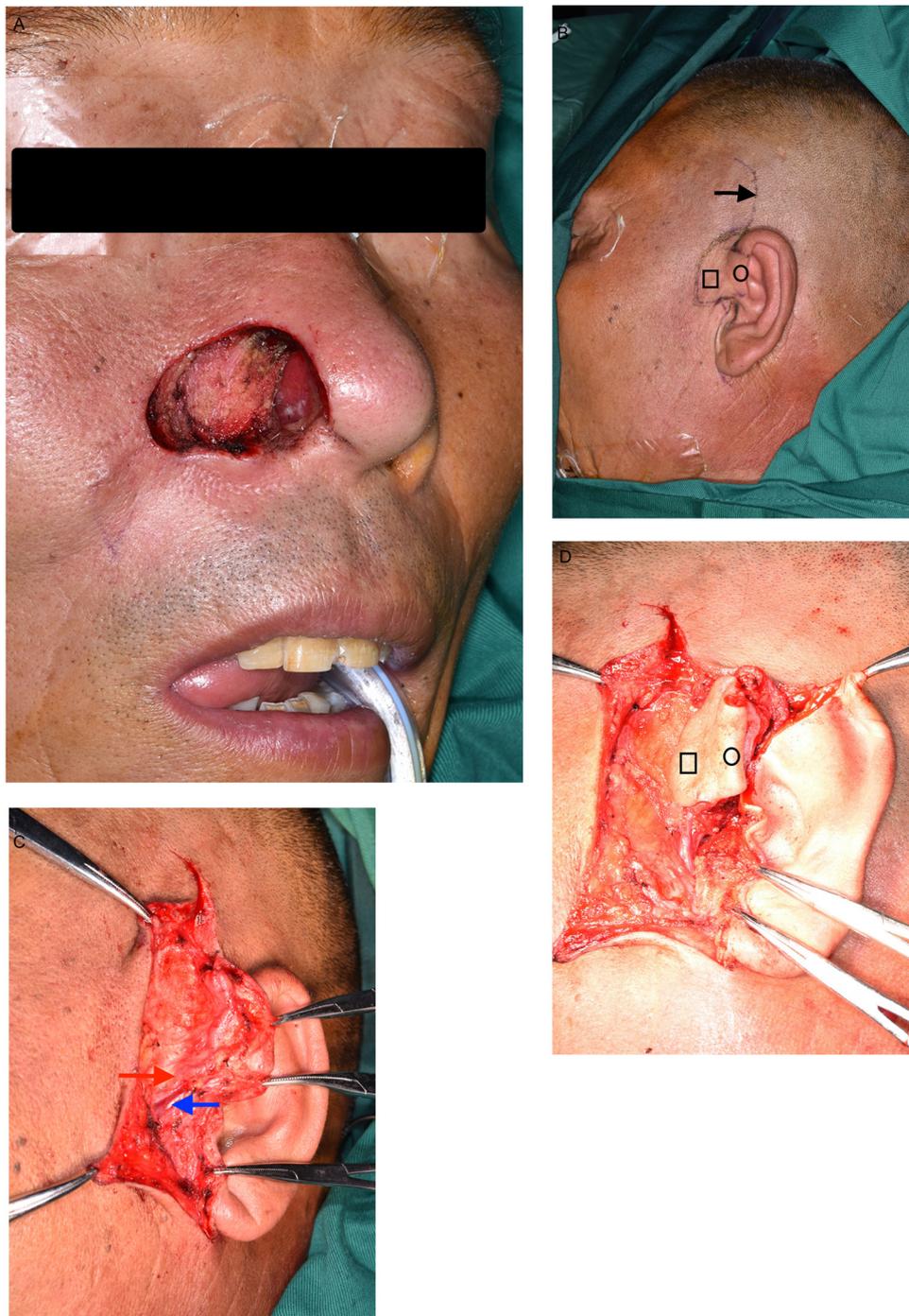
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The repair of a full-thickness nasal alar defect is a considerable challenge given the complexity of its unique anatomy and great aesthetic importance. The vascularized composite auricular flap based on the superficial temporal artery, which was first described in 1984<sup>1</sup>, is an ideal reconstructive option due to its close contour and

structure to the recipient site<sup>2,3</sup>. However, the pedicle length and the discrepancy in artery diameter between the superficial temporal artery and a branch of the facial artery remain major problems with free auricular composite tissue transfer<sup>1</sup>. Several techniques, including a supermicrosurgery technique, reversed helical rim

flap, and graft of the descending branch of the lateral circumflex femoral artery with the venae comitantes, have been attempted to overcome these limitations<sup>3,4</sup>. In this study, an adjacent facial vein graft was used to lengthen the pedicle and to attempt to resolve the large discrepancy that exists between the diameter of



*Fig. 1.* (A) An alar defect after tumour removal. (B) Clinical image of the donor site: the pretragal incision line (black arrow), the pre-auricular skin (rectangle), and the root of the helical rim (circle). (C) The pretragal skin flap in the plane above the superficial temporal vessels was raised and the superficial temporal vessels were exposed through blunt dissection. Red arrow, the superficial artery; blue arrow, the superficial vein. (D) The flap was raised in a plane deeper than the superficial temporal vessels. Rectangle, the pre-auricular skin; circle, the root of the helical rim.

the graft vessel and the recipient vessel for the repair of nasal alar defects after oncological ablation. This report proposes a relatively simple microsurgical method for reconstruction of the nasal ala to facilitate the task of the reconstructive surgeon.

### Case presentation

A 53-year-old man presented to Peking University School of Stomatology with a diagnosis of recurrent squamous cell carcinoma of the skin measuring 1 × 1.5 cm

on the right nasal ala. The patient had undergone tumour ablation and had received a nasolabial flap to repair the nasal alar defect 6 months ago. Preoperative computed tomography (CT) and ultrasonography evaluations were conducted to

evaluate the tumour, metastases, and course of the facial artery and vein available between the mandible and medial canthus. There was no cervical metastasis, so only tumour resection was necessary. The course of the facial artery near the ipsilateral nasal ala had possibly been

disrupted by the first surgery. However, the course of the facial vein was intact. Single-stage oncological ablation and reconstruction were scheduled, with microsurgical reconstruction of the right ala using a vascularized composite helical rim flap.

**Surgical technique**

A wide resection was performed and an alar defect of  $3 \times 2 \times 0.5$  cm in size was obtained, which included the full thickness of the skin, mucosa, and lower lateral cartilage (Fig. 1A). A contralateral vascu-

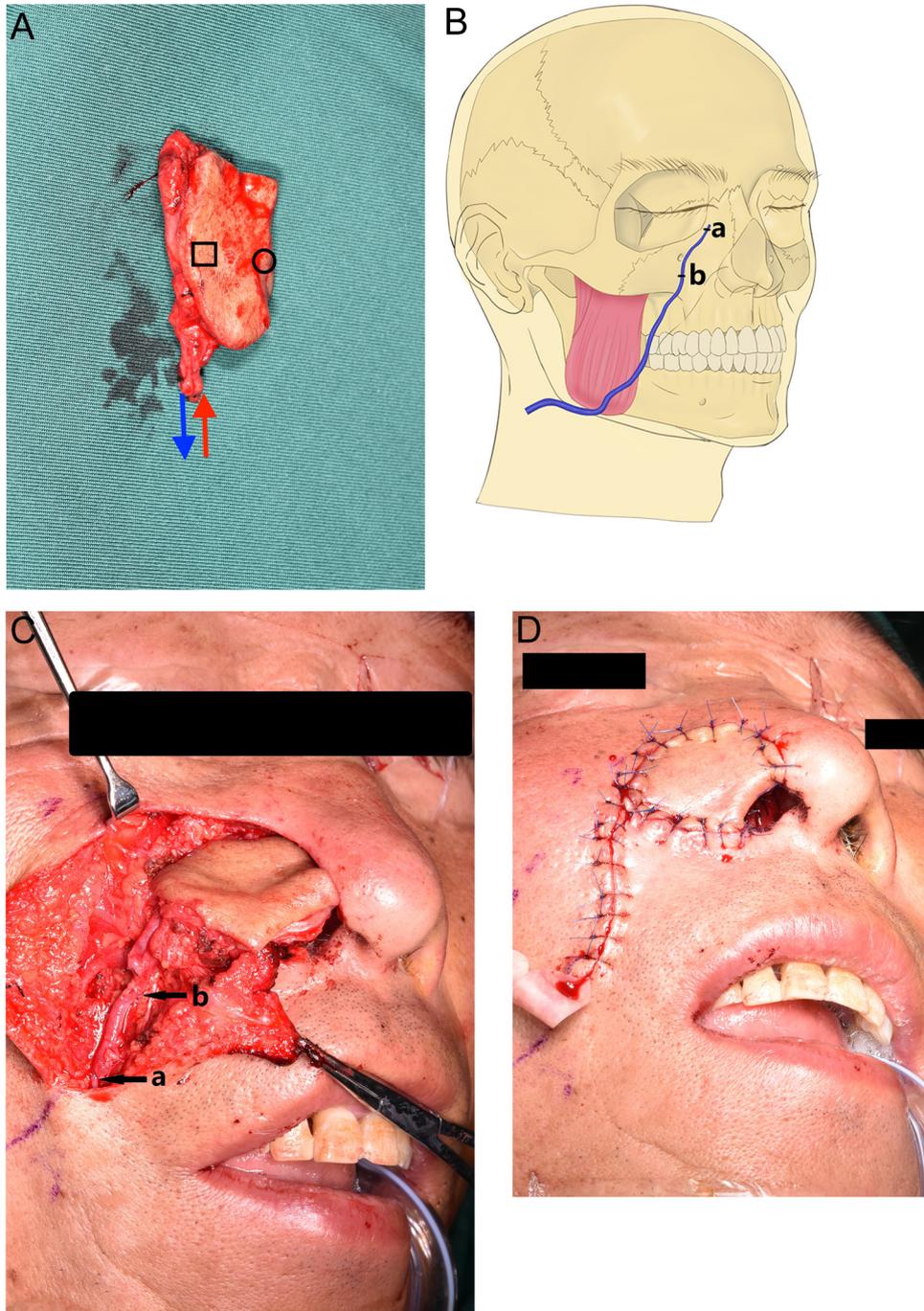


Fig. 2. (A) The vascularized composite auricular flap based on the superficial temporal artery was harvested. Rectangle, the pre-auricular skin; circle, the root of the helical rim; red arrow, blood flow direction from the superficial artery; blue arrow, blood flow direction from the superficial vein. (B) Schematic drawing of the facial vein. Infraorbital segment of the facial vein (a–b) taken as a graft. (C) The facial vein graft with a larger diameter (b) for the superficial temporal artery and a smaller diameter (a) for the superior labial artery was preferred to address the large discrepancy between the diameter of the flap and the recipient vessels and to lengthen the donor pedicle. (D) The repair of the nasal alar defect using the vascularized composite helical rim flap.

larized composite auricular helical rim flap was designed of the same size and shape as the defect (Fig. 1B). First, a pretragal incision was made and extended upward into the temple. A pretragal skin flap in the plane above the superficial temporal vessels was then raised and the superficial temporal vessels were exposed through blunt dissection (Fig. 1C). The distal ends of the superficial temporal vessels above the helical rim and the proximal ends of the superficial temporal vessels above the parotid gland were identified. Next, the distal ends of the superficial temporal vessels were cut and ligatured. The pre-auricular skin and the root of the helical rim fed by the branches from the distal ends of the superficial temporal vessels were cut according to the shape of the defect. The flap including the vessels, composite auricular helical rim and the branches was elevated above the dissection plane deep to the superficial temporal vessels by retrograde dissection from the distal ends to the proximal ends. At the same time, the branches from the superficial temporal vessels, which feed the flap, were protected meticulously (Fig. 1D, 2A).

An additional nasolabial sulcus incision was performed to identify the recipient vessels. The lateral nasal branch of the facial artery was absent, so the superior labial artery was dissected to about 0.6 mm diameter as the recipient artery. However, the calibre of the superficial temporal artery of the flap was about 2.1 mm. The ratio of the artery discrepancy between the recipient vessel and the flap pedicle was greater than 3:1.

The flap was raised underneath the subcutaneous tissue through the same incision, and the facial vein of the infraorbital segment was found. The facial vein was intact from the buccal segment to the infraorbital segment. Fig. 2B shows a schematic presentation of the facial vein. The pedicle of the flap measuring 2 cm in length was not long enough to anastomose with the dissected superior labial artery. After the facial vein with a suitable length for anastomosis was retained, an infraorbital segment of the facial vein of 2.5 cm in length was taken as the graft, with a larger diameter of about 2 mm for the superficial temporal artery and a smaller diameter of about 1 mm for the superior labial artery (Fig. 2C).

End-to-end anastomosis was performed successfully. The flap was inset to match the contour of the contralateral ala (Fig. 2D). The donor site was closed with rotation and advancement.

The flap was monitored by inspecting its colour and contour. The flap survived without any complications. Moreover, no

serious donor site morbidity was observed postoperatively. The alar contour was satisfactory, and the patient was satisfied with the results.

## Discussion

The repair of a nasal alar defect is difficult because of the complex three-dimensional nature of the structure, the highly contoured nature of the nose, and the abundant free margin<sup>3,4</sup>. A small alar defect measuring less than  $1.0 \times 1.5$  cm can be restored using a free chondrocutaneous graft from the helix. However, a composite graft without a blood supply may not be suitable for larger defects of  $>2.0$  cm<sup>5</sup>. Hence, free tissue transfer is considered necessary to restore the delicate structures for larger full-thickness alar defects<sup>2,3</sup>.

The limitation of the vascularized composite helical rim flap for the repair of nasal alar defects is the absence of suitable vessels around the recipient site for anastomoses, including the short pedicle of the vascularized composite helical rim flap and absence of a recipient artery with a suitable calibre.

To lengthen the pedicle of the flap, techniques such as a reverse (retrograde) flow flap based on the distal end of the superficial temporal vessels and the descending branch of the lateral circumflex femoral artery applied as an interposition graft have been attempted<sup>3</sup>. The average length of the vascular pedicle of the flap was 6.5 cm. However, a longer incision in the scalp is required to harvest a reverse flow helical rim flap, and the reflux of the reverse superficial temporal vein is not enough as to loss the flap<sup>6</sup>. The descending branch of the lateral circumflex femoral artery applied as an interposition graft has been used to lengthen the pedicle of the flap<sup>3</sup>. Incisions similar to those for harvesting of the anterolateral thigh flap and in the submandibular area were also essential, likely resulting in more injuries.

The supermicrosurgical technique is another method to avoid the short pedicle of the helical rim flap<sup>4</sup>. However, the supermicrosurgical technique requires more skill and long recipient vessels for anastomosis.

Hence, a relatively simple method was needed to resolve the shortcomings of the flap. A vein graft is often used in such cases, i.e., those cases with a short pedicle of the flap and an artery discrepancy between the flap and recipient vessels. The facial vein is very close to the region to be reconstructed and can be harvested through the same approach as to the other recipient vessels. Therefore, the facial

vein might be the optimal interposition graft.

According to the results of anatomical studies, approximately 15–18% of people are missing the angular artery in the course of the facial artery<sup>7,8</sup>. However, the angular vein (the infraorbital segment of the facial vein) displays a constant course in relation to the adjacent anatomical structures<sup>9</sup>. A distance of 4.2 mm between the angular vein and the inferior orbital rim was measured, which provides anatomical support for the recipient vessels.

Furthermore, the ratio of the artery diameter discrepancy between the superior labial artery (0.6 mm diameter) and the superficial temporal artery (2.1 mm diameter) was greater than 3:1. A vein graft with a larger diameter on one side and a smaller diameter on the other side is preferred to resolve a large discrepancy between the diameter of the flap vessel and recipient vessel and to lengthen the donor pedicle<sup>10</sup>.

After the facial vein with a suitable length for anastomosis was retained, an infraorbital segment of the facial vein measuring 2.5 cm in length was considered as a graft for anastomosis of the superficial temporal artery in the flap and the superior labial artery. The facial vein graft was easy to harvest, and the calibre of the vein graft matched well with the superficial temporal and facial arteries. Moreover, there was no need to perform any additional incision to obtain an interposition graft, such as the descending branch of the lateral circumflex femoral artery.

The facial vein graft for anastomosis of the superficial temporal and facial arteries is a reliable and easy method to address a large discrepancy between the diameter of the graft vessel and the recipient vessel and to lengthen the donor pedicle for nasal ala reconstruction with a vascularized composite helical rim flap.

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## Competing interests

None.

## Ethical approval

Not required.

## Patient consent

Patient consent was obtained.

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