Two Adjacent Capillary Perforator Flaps? A Reconstruction of a Full-thickness Alar Defect

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Summary: Any aspect of nasal reconstruction poses a worthy challenge for every plastic surgeon. Most skin tumors affect older patients who also happen to have surplus skin. This is certainly a blessing in disguise for the reconstructive surgeon, enabling the use of local flaps to reconstruct the lost skin, like with like. We present a simple case of full thickness alar and partial lateral nasal defect for malignant melanoma, and how we were fortunate to reconstruct the defect successfully in a single operation using two adjacent local capillary perforator flaps: one for inner lining and the other for outer lining. A touch-up was performed after 3 months for improved cosmesis. A successful reconstruction is displayed with a video showing key steps of the procedure and results before and after a simple touch-up correction for improved appearance. This is a case of successful reconstruction of a full-thickness alar defect using a combination of two adjacent capillary perforator flaps. It is the first case to our knowledge where this combination is applied and displayed in a video demonstration. (Plast Reconstr Surg Glob Open 2022;10:e4515; doi: 10.1097/GOX.0000000000004515; Published online 21 September 2022.)

INTRODUCTION

Any aspect of nasal reconstruction poses a worthy challenge for every plastic surgeon. Fortunately, most skin tumors affect older patients who also happen to have surplus skin. This is certainly a blessing in disguise for the reconstructive surgeon, enabling the use of local flaps to reconstruct the lost skin, like with like.

MATERIAL AND METHODS

An 85-year-old woman presented with a malignant melanoma requiring a full-thickness resection for a free margin clearance offering most of the right nasal ala and distal portion of the alar cartilage leaving a hole through the mucosal lining of the lateral nose (Fig. 1). Fortunately, the nasal tip support, alar cartilage, and inferior most part of the ala were intact, and the patient had rich surplus of the adjacent cheek tissue.

The inner lining of the nose was first mended using a flip over circular island flap based on a narrow pedicle of underlying subcutaneous tissue. No visible perforators could be identified that are usually present in the area. (See Video [online], which displays the operative video of full-thickness nasal defect reconstruction using two adjacent capillary perforator flaps.) It was sutured in place using resorbable suture and then the adjacent nasolabial fold was released on the proximal subdermal pedicle where only minor threads of tissue were holding it in place. No sizable perforator was visualized, and the narrow subcutaneous pedicle was released sufficiently to allow for unhindered flap rotation. In this case, the skin was loose, allowing for sufficient mobility of the flaps when released from the attachment of the nasolabial crease and underlying muscles: levator anguli oris and zygomaticus minor. The procedure was recorded using a smartphone, and informed patient consent was acquired for presentation and publication.

The flaps healed well as shown in the operative video, showing signs of trapdooring in both the inner and outer flaps as expected. A minor debulking procedure was performed at 3 months and when the patient returned for a follow-up control 6 months after the initial procedure, she was more than pleased with the results, as shown in Figure 2.

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DISCUSSION

The anatomical foundation of perforator flaps revolutionized reconstructive microsurgery. Technological advances allow even smaller perforators to be utilized to supply free and pedicled perforator flaps of various areas of the body in a freestyle fashion. Vascularity of skin flaps is no longer believed to reside upon a random skin bridge as the impact of various perforators and perforasomes of the skin and subcutaneous tissue becomes better known. Keystone and island flap designs replace bulky skin bridges and the mystery of the axial flap, and flap ratio speculations become demystified as surgeons learn how to utilize this new freedom of pedicled perforator flaps.

Island flaps of the face are by no means new in the literature although their subdermal blood supply has largely been considered to be axial. The nasolabial flap is well known for its robustness and reliability for perioral and perinasal reconstructions, alike. Described as proximally or distally based in classical literature and presumed to be an axial flap. The modern nasolabial flap consists of the dense vascular network supplied by perforators of the underlying facial artery as it runs along the nasolabial fold, interconnected to form the richly vascularized network of arterioles of the malar area. We have applied each of these perforators as a pedicle to base a freestyle islanded nasolabial cheek flap upon it. It is fascinating to witness just how seemingly little blood supply is enough to sustain a sizeable flap, and this video is a demonstration thereof. Koshima et al. suggested that an aggregation of small perforators less than 0.3 mm and too small to qualify as a single blood supply were sufficient together to perfuse a flap and named it capillary perforator flap. In a similar quest, we asked ourselves whether a 1-mm perforator is sufficient to perfuse a whole deep inferior epigastric perforator (DIEP) flap; a vessel that would supply a small facial flap one-twentieth its size might be comparatively smaller. Although capillary perforator flap sounds like a catching terminology, the flap is more likely perfused by perforating arterioles, and venules are the mainstay of the small vascular network up until 30 microns, rather than true capillaries that are just the bridging component in between them at a length of 600 microns or just that above half a millimeter and only 8–10 microns wide. A capillary pedicle would, therefore, be a short one, and even if it existed, it is unlikely that such a flap would survive or be of any use. Arterioles and venules, on the other hand, are a different matter.

The blood supply of the nasolabial flap was published by Herbert in 1978, demonstrating the density of arterioles lateral to the angle of the nose. Being unaware of perforator flaps and angiosomes, he drew a different conclusion, perhaps aiming to please the Royal College of Surgeons in their quest of the axial pattern. Rohrich and Conrad made a tribute to the literature debating the perforator vascular supply based on a single-case observation that had only a subcutaneous pedicle of similar

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**Takeaways**

**Question:** Capillary perforator flaps—next level microsurgery or old wine in new barrels?

**Findings:** An illustrative video showing reconstruction of a full-thickness nasal defect utilizing two adjacent capillary perforator flaps on a narrow subcutaneous pedicle.

**Meaning:** The reliability of nasolabial skin vascularity allows for a wide range of small island flaps based on a narrow pedicle. Although capillary is a catchy term, the flaps are most likely based on an arteriolar network, certainly including capillaries.

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**Fig. 1.** An 85-year-old woman with alar defect after melanoma resection. (See Video [online], which displays the operative video of full-thickness nasal defect reconstruction using two adjacent capillary perforator flaps.)

**Fig. 2.** Follow-up consultation 6 months after debulking and 9 months after the initial operation (A-C). Sufficient reconstruction and no signs of recurrence.
“random” nature as Koshima’s capillary pedicle theory, and they emphasized rightfully the importance of cheek laxity as demonstrated in our case. Although seemingly contradicting, both theories appear to be right. A nasolabial flap is extremely robust and can be perfused on a perforator from the angular or facial artery or by a cluster of smaller interconnected vessels. We are right to question the importance of a skin bridge since a cluster of perforators, whether visible or not, appears to be the foundation of most local flaps otherwise considered random. In the presented case, we applied two adjacent flaps based on the same subcutaneous area and show just how robust the blood supply is without a random skin bridge or a sizable visible perforator, given sufficient laxity of the subcutaneous tissue.

In honor of the innovative gesture of Koshima et al., we refer to the flaps in this video report as capillary flaps followed by a question mark, as it might, perhaps, be more accurate to refer to them in the future as the new “random” of any size arteriolar and venular aggregation within the subcutaneous pedicle.

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HELSINKI DECLARATION
This report is in compliance with the Declaration of Helsinki and the Health Insurance Portability and Accountability Act.

PATIENT CONSENT
The patient provided written consent for the use of her image.

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