

# L-shaped Design of the Thenar Eminence Perforator Free Flap for Total Reconstruction of the Nasal Ala

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**Summary:** We introduce and evaluate a novel L-shaped perforator free flap from the thenar eminence for total nasal ala reconstruction, addressing both the inner and outer linings in complex nasal reconstruction cases. A 74-year-old man with a history of basal cell carcinoma and multiple failed local flap reconstructions underwent nasal ala reconstruction using the L-shaped thenar flap. The flap, based on the superficial branch of the radial artery, was designed to create a 3-dimensional nasal structure, and its viability was ensured using intraoperative Doppler monitoring. The L-shaped thenar flap successfully reconstructed the nasal ala, maintaining the shape and function of the nostril. The robust vascularization and the ability to incorporate structural cartilage minimized the risk of flap failure. The donor site morbidity was minimal, and the aesthetic outcome was satisfactory, with the flap providing adequate tissue for both the internal and external nasal linings. The L-shaped thenar flap is a viable and effective option for complex nasal ala reconstruction, offering reliable vascularization, sufficient tissue for comprehensive reconstruction, and minimal donor site complications. This technique provides a promising alternative for challenging nasal reconstructions, eliminating the need for separate cutaneous islands and allowing for the potential inclusion of a structural cartilage layer. (*Plast Reconstr Surg Glob Open* 2025;13:e6682; doi: [10.1097/GOX.0000000000006682](https://doi.org/10.1097/GOX.0000000000006682); Published online 4 April 2025.)

## INTRODUCTION

In nasal reconstruction surgery, factors such as the location, size, and depth of the defect, as well as iatrogenic influences, impact the ability to achieve complete repair using local flaps.<sup>1</sup> In these cases, free flaps are required to create a 3-dimensional block that resembles functions and aesthetics.

The L-shaped perforator free flap of the thenar eminence could be an alternative to performing a total reconstruction of the nasal ala.

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Received for publication October 23, 2024; accepted February 20, 2025.

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DOI: [10.1097/GOX.0000000000006682](https://doi.org/10.1097/GOX.0000000000006682)

## PATIENT AND METHOD

### Clinical Case

A 74-year-old man was referred for evaluation of a total right nasal reconstruction. He had basal cell carcinoma with multiple recurrences and reconstructions in another center, and follicular lymphoma stable in the follow-up.

Related to the full-thickness defect of the nasal ala, a left paramedian frontal flap was performed in 2018, a right paramedian flap in 2022, and a right nasolabial flap complemented with a left auricular cartilage graft in October 2022. All procedures failed.

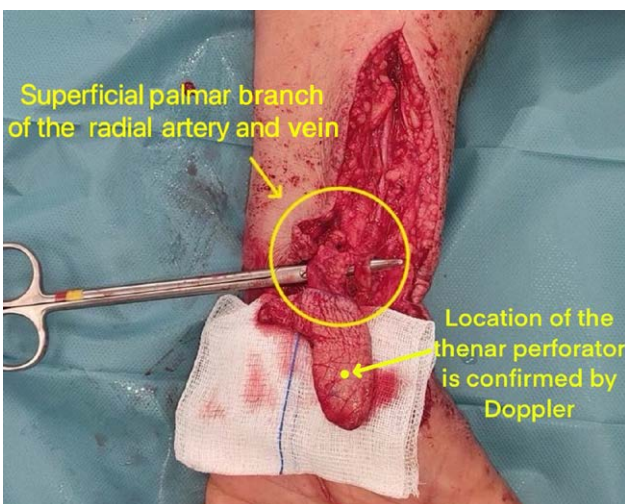
On exploration, the absence of the right nasal ala and the slight deviation of the tip of the nose to the right side was observed ([Fig. 1](#)). A thenar eminence perforator free flap was planned.

The flap was designed in an L-shaped pattern ([Fig. 2](#)) to fold both parts (horizontal and vertical) and create the inner and outer lining of the ala. The perforator vessels were identified using an intraoperative Doppler probe. These vessels were reaching the flap in the vertical aspect of the “L,” and the horizontal part

Disclosure statements are at the end of this article, following the correspondence information.



**Fig. 1.** Three red arrows show scars secondary to previous local flaps (2 frontalis flaps and 1 nasolabial flap), the defect of the right nasal ala, and the severe skin damage from sunny exposure. The white circle marks the remaining nasolabial flap, which did not repair the defect.



**Fig. 2.** The thenar free flap is centered on perforator vessels arising from the thenar vascular system. The horizontal part is parallel to the main wrist crease. We will fold it to create a 3-dimensional structure with 2 cutaneous surfaces. This figure shows the aspect of the flap after dissection and before creating the fold.

### Takeaways

**Question:** Can an L-shaped perforator free flap from the thenar eminence offer a viable solution for complex nasal ala reconstruction, particularly in cases where local flaps have failed?

**Findings:** This study demonstrates that an L-shaped thenar flap, based on the superficial branch of the radial artery, successfully reconstructed the nasal ala in a 74-year-old man. The study highlighted the flap's strong vascularization, minimal donor site morbidity, and favorable functional and aesthetic outcomes.

**Meaning:** The L-shaped thenar flap offers a promising alternative for nasal ala reconstruction, combining reliable blood supply with sufficient tissue coverage and minimal complications.

was nourished by interconnections of the thenar vascular system.<sup>2</sup>

After folding the flap, it was sutured to the lateral portion of the nostrils, leaving as the distal margin the horizontal part of the fold. The vertical part was used to create the inner lining (Fig. 3).

A subcutaneous tunnel under the scar of the nasolabial fold was created to reach the facial vessels below the corner of the mouth. End-to-end microanastomoses were performed between facial vessels and the radial artery and a concomitant vein. The latter measured 6 cm in length, facilitating the setting of the flap.

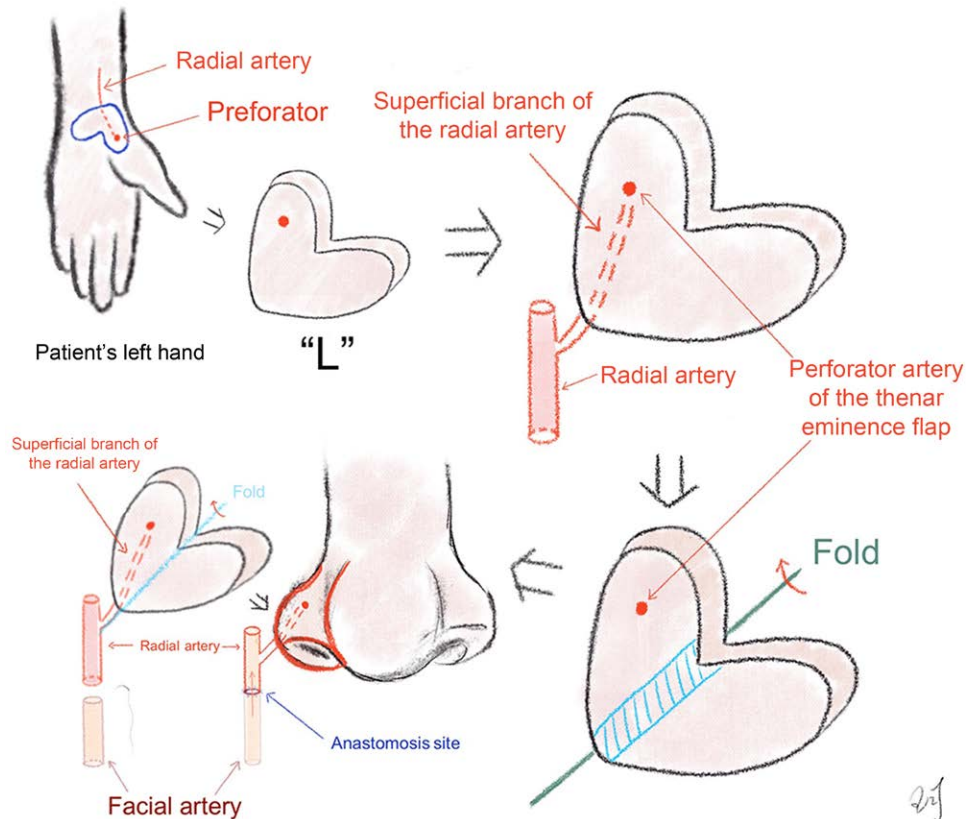
The flap did not collapse and maintained the shape of the nostril. At 6 months after the surgery, we observed correct architecture of the ala as well as right ventilation (Fig. 4). A cartilage graft was not required to maintain the shape of the nose, but this chance was available for the follow-up period if any retraction was detected.

### DISCUSSION

Total nasal reconstruction is considered challenging because addressing the 3 layers of tissue that make up the nasal structure is crucial. One-step surgery is recommended using a block of tissue for internal and external lining, but depending on the surgical anatomy of the selected flap, a second stage must be performed to debulk the flap, to use a free cartilage graft for the alar shape, or even to provide proper external coverage. An optimal internal lining provides a substrate for mucosalization, reducing problematic chronic crusting. The middle layer offers shape and structural support to the nose, preventing contraction of the internal nasal lining and airway collapse.<sup>3</sup> A suitable outer layer of skin ensures a good match with the face.

Local flaps, such as the frontalis one, can be folded to cover both nasal surfaces. However, extensive or complex support can result in a collapsed and shapeless nose,<sup>4</sup> or redundant tissue. With the improvement of microsurgical techniques, complex nasal reconstruction has become feasible, as evidenced by the increasing publications, mainly with flaps proceeding from the

## “L”-shaped design



**Fig. 3.** Diagram showing our flap design and tailoring. The blue area in the image presents the flap's crease. Part of the fold can be deepithelialized if required.

ear.<sup>5,6</sup> Another possibility is given by the radial free flap, particularly the prelaminated one,<sup>7</sup> which is used for internal lining. Another possible alternative, related to the radial vascular axis, is the thenar flap. In this anatomical area, there are several interconnections of varying sizes between the branches of the lateral and median thenar vessels, and a constant perforator arising from the superficial branch of the radial artery.<sup>8</sup> A fasciocutaneous flap, even sensate, based on the perforator vessels can be elevated. A skin paddle measuring  $3 \times 4$  cm<sup>9</sup> can be obtained. The donor area will be primarily closed, creating a vertical scar near the midline.

The novel L-shaped pattern provides a wider surface of the flap and facilitates the creation of the fold to obtain 2 layers, long enough to reconstruct the inner and outer surfaces of the nasal ala. Additionally, there is tissue available for touch-ups or reshaping the flap design in case of complications, such as retractions or collapse. Interestingly, the impact on the donor site is limited to the vertical thenar area, which can be grafted. The horizontal donor area can be closed directly without affecting the wrist's motility.

Although flap folding may compromise a reliable vascularized bed for placing primary support between the liner layers, the rich vascular network ensures good

vascularization and pliability. The hardness of the palmar skin is enough to maintain the curvature of the nostril, and Doppler control is useful to get information about the viability of the flap during elevation and tailoring. Other methods demand a manipulation of the ear that may alter its anatomy,<sup>6</sup> but our proposal can be sufficient to reconstruct the ala in a single stage or can be complemented with a conchal graft later on if alar retraction of airway collapse is detected. Then, sequelae for the ear are minor.

At the point where the horizontal and vertical aspects meet, 2 mm of the skin can be carefully deepithelialized, respecting the vessels that nourish the horizontal part of the flap, when a different setting is required.

The thenar flap is a classic technique for coverage of tissue loss of radial-side fingertips, but has been used rarely as a free flap.<sup>10</sup> Our design provides a flap with greater dimensions, 2 layers of skin, and a consolidated tissue that is able to maintain the alar shape.

## CONCLUSIONS

The original L-shape thenar free flap enables both external and internal coverage of the nasal ala, through folding. This approach ensures reliable vascularization

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#### DISCLOSURE

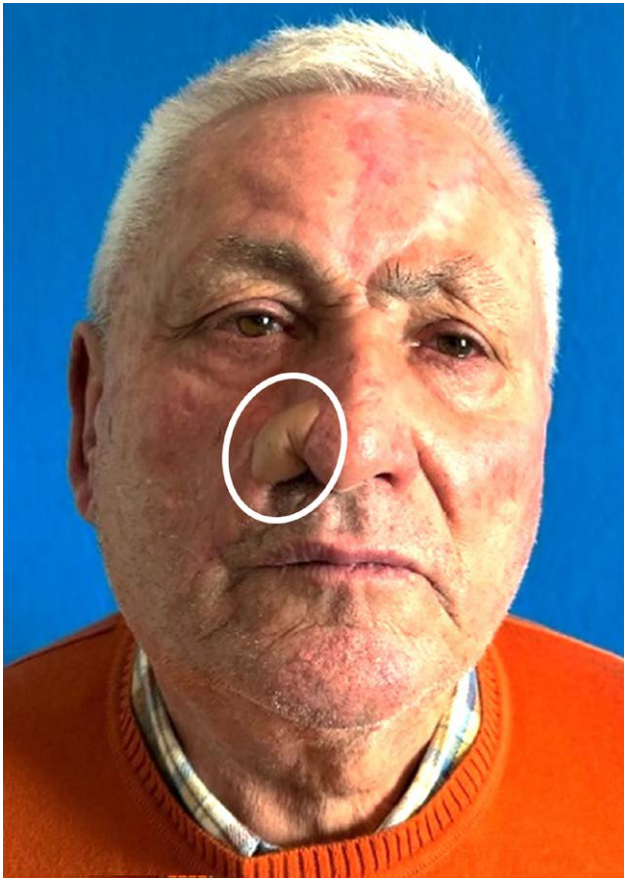
*The authors have no financial interest to declare in relation to the content of this article.*

#### PATIENT CONSENT

*The patient provided written consent for the use of his image.*

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**Fig. 4.** Final result. The image demonstrates the patient's condition 6 months postoperatively. The white dashed area represents the recipient site after reconstruction. The airway remains well maintained, with no signs of collapse or nasal lining contraction. A slight color difference between the surviving flap and the surrounding skin is observed, which is attributed to facial skin damage caused by sun exposure.

and allows for the inclusion of a structural cartilage layer, all within a single surgical procedure or in a second step.