

# Total Nasal Reconstruction with a Nonlaminated Vascularized Free Temporal Fascia as the Lining

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**Summary:** Various methods to generate the lining for a full-thickness nasal reconstruction have been reported. We used bilateral septal mucoperichondrial flaps, the distal portion of an expanded median forehead flap, and a nonlaminated vascularized free temporal fascia flap as a lining during total nasal reconstruction of a total full-thickness nasal defect in a 45-year-old woman with a nasal squamous cell carcinoma. In the first step of the two-stage surgery, a tissue expander was inserted into the forehead simultaneously with tumor resection. In the second step, the expanded median forehead flap, cartilage graft, bilateral septal mucoperichondrial flaps, and short pedicle vascularized free temporal fascia transfer were performed. Total nasal reconstruction could be completed without any skin graft or skin paddle of the free flap. Epithelialization of the mucosa on the transferred vascularized free temporal fascia without contracture deformity of the nasal cavity was confirmed by endoscopic examination after 8 years of follow-up. In the surgical procedure described, the facial skin, including the lining of the nostril rim, and the mucous membrane of the nasal cavity were reconstructed using facial skin and mucous membrane without long-term contracture, respectively. (*Plast Reconstr Surg Glob Open* 2019;7:e2583; doi: [10.1097/GOX.0000000000002583](https://doi.org/10.1097/GOX.0000000000002583); Published online 30 December 2019.)

## INTRODUCTION

In total nasal reconstruction, it is very important to secure sufficient size for the inner cavity to preserve the breathing function. Various methods to generate the lining for a full-thickness nasal reconstruction have been reported.<sup>1-10</sup> Although we believe that it is ideal to cover the deep portion of the nasal cavity with a mucous membrane, septal flaps are not sufficient for all external nasal defects.<sup>1-3</sup> We used a combination of surgical procedures including bilateral septal flaps, the distal portion of an expanded median forehead flap, and a vascularized free temporal fascia flap without prelamination as a lining for total nasal reconstruction with the expectation of mucosalization on the well-vascularized durable tissue in a small area in a 45-year-old woman requiring total nasal reconstruction. The inside of the reconstructed nose was completely covered by mucosa, and there was no contracture

interfering with breathing or causing severe deformity in an 8-year follow-up examination. Details of the surgical methods and endoscopic findings during the long-term follow-up are presented.

## CASE

Total resection of the full-thickness of the external nose was performed in a 45-year-old Asian woman with nasal squamous cell carcinoma (Fig. 1). The patient refused reconstruction with a free forearm flap because of the risk of hypertrophic scar at the donor site. A rectangular tissue expander (size: 50 × 90 × 50 mm<sup>3</sup>, capacity: 150 ml) was inserted at the time of tumor resection. After complete expansion of the expander was obtained and complete resection of the tumor was confirmed by pathological examination, the second step of the reconstruction was performed.

Bilateral septal mucoperichondrial flaps, the distal portion of the folded expanded median forehead flap, and a free vascularized free temporal fascia transfer without skin paddle were used for the lining. Septal mucoperichondrial flaps based upon the nasopalatine artery were elevated bilaterally (Fig. 2A), and the lining of the cephalad portion of the full-thickness defect was reconstructed using these flaps (Fig. 2B, pink). The area 15 mm from the nostril rim was reconstructed with the folded expanded median forehead flap (Fig. 2B, green). The remaining area, which could not be covered by these flaps, as well as the donor site

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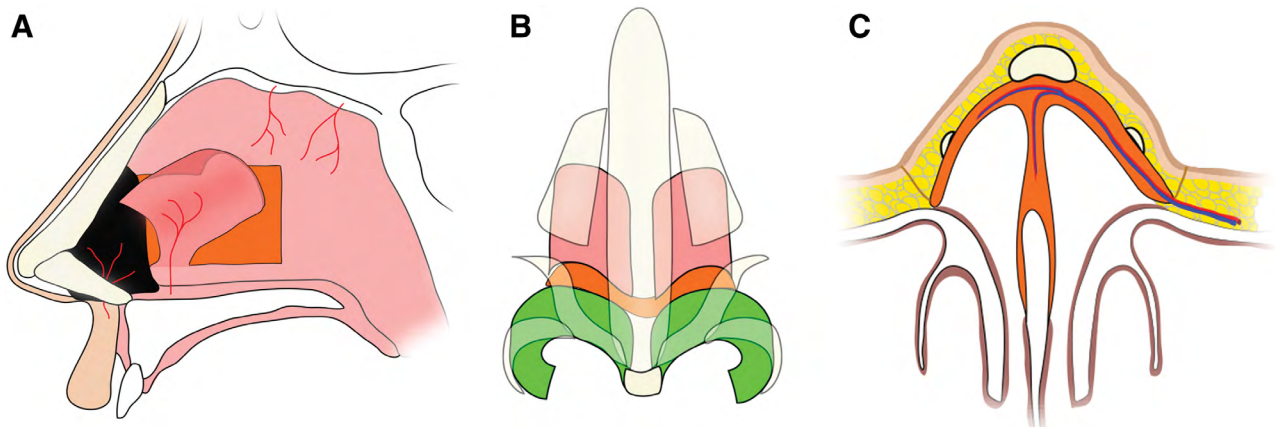


**Fig. 1.** Preoperative and postoperative facial features. A, Preoperative image of a 45-year-old woman with a nasal squamous cell carcinoma. B, Favorable appearance of the reconstructed nose was maintained at 8 years after surgery.

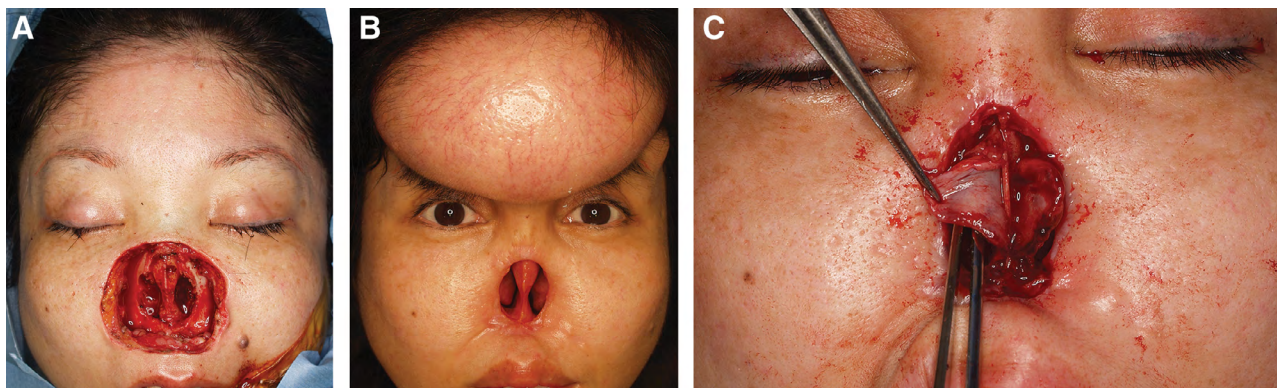
defect created by elevation of the septal flaps were covered by the vascularized short pedicle free temporal fascia flap, without accompanying skin (Fig. 2, orange). The temporal fascia needed was narrow and long ( $25 \times 80 \text{ mm}^2$ ) and was divided to fit the shape of the defect. During the division, care was taken to not injure the branch of the superficial temporal artery and vein (Fig. 2C). The vascular vessels of

the flap were anastomosed to the left terminal branch of left facial artery and vein.

As a framework, cartilage from the seventh and eighth ribs was used to reconstruct the dorsum of the nose, lateral wall, nasal tip, and columellar strut (Fig. 2B). Auricular cartilage was used to reconstruct the shape of the alar cartilage. The inner surface of the framework was completely covered



**Fig. 2.** Reconstruction of the lining. A, Septal mucoperichondrial flap based on the nasopalatine artery were elevated bilaterally. The defect after flap elevation (orange) was covered with the vascularized temporal fascia. B, In frontal view, the lining of the nose was covered with the septal mucoperichondrial flap at the cephalad portion (pink), the folded median forehead flap (green), and the temporal fascia at the residual defect (orange). C, The vascularized temporal fascia was divided to fit the shape of the defect.



**Fig. 3.** Pre- and intraoperative findings of two stage surgery. A, Immediately after total external nasal resection, including resection of the frontal portion of the nasal septum. B, The patient's forehead was relatively small. C, After complete expansion of the expander at two months after tumor resection.

by vascularized tissue. The proximal part of the expanded median forehead flap was used as the covering flap. Intraoperative photographs are shown in Figures 3 and 4.

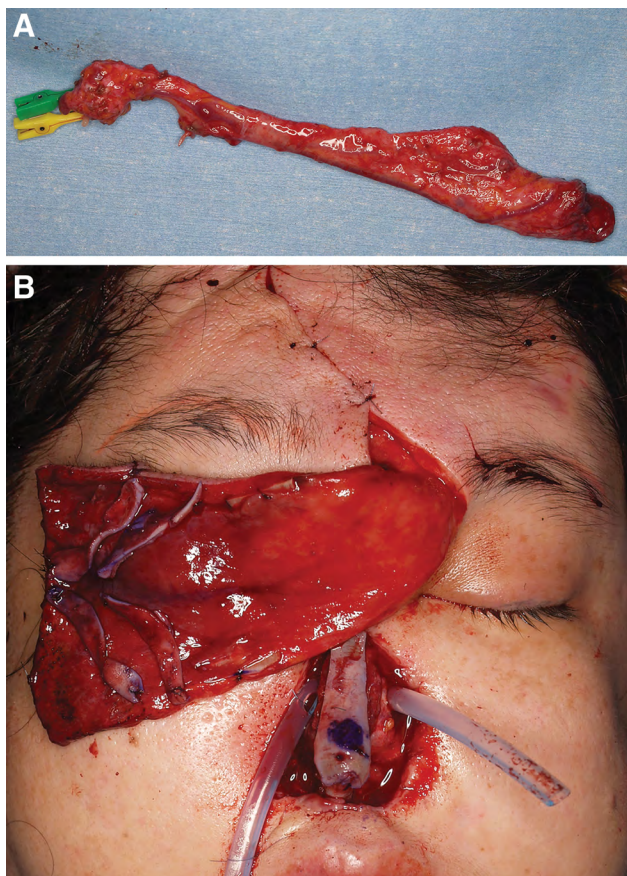
Several months after reconstruction, a debulking surgery was performed. At 8 years after reconstruction, an endoscopic examination of the reconstructed nasal cavity was performed (Fig. 1). The inner surface of the

nasal cavity was completely covered by mucosa, and the border of the flaps could not be identified (Fig. 5). The size of the inner nasal cavity was maintained without any contracture. The reconstructed nose maintained an aesthetically favorable shape without remarkable deformity.

#### DISCUSSION

The desired outcome of the total nasal reconstruction is that the reconstructed nose is maintenance-free and that no contracture is observed in the long term.

A septal mucoperichondrial flap is an ideal material option for reconstructing the lining of the nasal cavity; however, when the frontal area of the septum is resected and



**Fig. 4.** An elevated septal mucoperichondrial flap based upon the nasopalatine artery. A, An elevated free temporal fascial flap. B, Rib cartilages and auricular cartilages grafted as frameworks and an elevated expanded median forehead flap.



**Fig. 5.** Endoscopic findings of the left nasal cavity at 8 years after reconstruction. The nasal cavity was sufficiently wide and all raw surfaces were covered by mucosa. The border between the flaps could not be detected.

a bilateral reconstruction is required, there is not enough tissue for reconstruction of the whole defect.<sup>1-3</sup> In addition, there is a risk of fistula formation or contracture at the large bilateral donor site defect. To cover the entire defect of the inner nasal cavity as well as the donor site of mucoperichondrial flaps, we used a vascularized free temporal fascia flap, because it was thin and because the complex shape of the defect could be reconstructed with branched vascularized tissue by dividing the flap along the vascular branches.

In general, when the temporal fascia is used as a lining for nasal reconstruction, prelamination by a split-thickness skin graft is considered to prevent shrinkage and contracture in the long term.<sup>5-7</sup> In the surgical method described in this report, one of the areas onto which the temporal fascia was transferred was a narrow defect between the septal mucoperichondrial flap and folded expanded median forehead flap (Fig. 2B). The other area onto which the temporal fascia was transferred was the bilateral septal cartilage that was the donor sites of the mucoperichondrial flaps (Fig. 2A).

Brunetti et al.<sup>8,9</sup> reported a method of periosteal flap nourished by the supratrochlear pedicle to reconstruct the lining of heminasal defects.<sup>10</sup> Mucosalization of the periosteal flap without contracture was confirmed, and no cartilage exposure was observed in their case series. Because the patient in the present report had a completely external nasal defect and required a large area for the lining, the risk of contracture before mucosalization was considered for an extensive mucosal defect, and surgery was planned in combination with a mucosal flap so that the vascularized fascial flap had a narrow width. The fascial flap was also used to cover the vulnerable donor sites after bilateral mucosal flap elevation. As a result, mucosalization of the entire circumference of the reconstructed nasal cavity was achieved.

This is only a case report, and it is necessary to accumulate and verify sufficient cases in the future for the reproducibility of this surgical procedure. Further investigation is required to determine the maximum size of the non-laminated vascularized fascia onto which epithelium can spread without inducing nose deformity from contracture.

In summary, epithelialization of the mucosa without a contracture deformity of the nasal cavity was observed following total nasal reconstruction using bilateral septal mucoperichondrial flaps, the distal portion of an

expanded median forehead flap, and a non-laminated vascularized free temporal fascia flap as a lining. In the surgical procedure described here, the facial skin, including the lining of the nostril rim, and the nasal mucous membrane were reconstructed using facial skin and mucous membrane, respectively, which provided the most physiological acceptable condition. In addition, this procedure did not leave a contracture of the reconstructed nose and conspicuous donor site scar in the long-term follow-up.

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