

Multistage Ala Nasi Repair with an Expanded and Prelaminated Forehead Flap: A Case Report

Nina Dabrosin, MD
Lars Bjørn Stolle, MD, PhD
Emir Hasanbegovic, MD

Summary: An 18-year-old man presented with a fast-growing tumor of the right ala nasi. We excised the tumor and histology report revealed a keratoacanthoma with clear margins. After surgery, the patient was left with a composite defect of 3×2 cm. For reconstruction, we used an expanded prelaminated forehead flap with a durable cartilage graft from the ribcage and a turnover flap for inner lining. Our technique had a pleasing end result and excellent patient satisfaction. (*Plast Reconstr Surg Glob Open* 2021;9:e3766; doi: [10.1097/GOX.0000000000003766](https://doi.org/10.1097/GOX.0000000000003766); Published online 13 September 2021.)

Composite defects of the alar wall are a challenge for the reconstructive surgeon, due to the alar wall's trilaminar construction: the skin coverage, the cartilage framework, and the mucosal lining. The skin coverage should preserve the natural nasal contours, and have similar texture and color to nasal skin; for this, the classic forehead flap is an ideal choice.¹ The supportive cartilage structure needs to be sturdier than the original nasal frame to sustain the tension from the healing forces from the adjacent flaps.² Lastly, the reconstructed nasal lining should remain thin to allow for sufficient airflow.³ The ultimate goal is to maintain facial symmetry and thus satisfactory cosmetic appearance and, most importantly, to maintain normal respiration. We present a case with a challenging composite alar defect and our multistage reconstruction.

Case Report

An 18-year-old man was referred to the Department of Plastic Surgery at Aarhus University Hospital with a fast-growing exophytic skin tumor on his right ala nasi, passing through the alar cartilage into the nasal cavity (Fig. 1). Before referral, the skin tumor was treated with intralesional methotrexate injections. Preoperative imaging showed no sign of lymph node metastases. Under local anesthesia, the tumor was excised with a margin of 5 mm. Histology revealed a keratoacanthoma with clear margins. After excision, the composite defect measured 3×2 cm encompassing the right ala and soft triangle.

From the Department of Plastic and Breast Surgery, Aarhus University Hospital, Denmark.

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To rebuild the trilaminar structure of the ala nasi, we performed a multistage reconstruction. First, we designed a forehead flap template in the frontal region and placed a tissue expander underneath in the subgaleal plane. The expander was filled to 55 ml over the first few postoperative weeks (Fig. 2A). To ensure a result with a natural bend and solidity of the ala nasi, we grafted cartilage from the right costal margin underneath the right rectus abdominis muscle for prelamination, placing the graft just underneath the dermis. Two months after the prelamination, the forehead flap was elevated and transferred to the nose. For reconstruction of the mucosal lining, we used a turnover flap from the adjacent right lateral sidewall. The donor site was closed directly. Three weeks after transposition of the flap, the pedicle was divided (Fig. 2B).

No complications to wound healing were observed or reported. No hematoma, infection, or deformity was observed at the donor sites.

The patient was satisfied with the final cosmetic appearance (Fig. 3). Six months postoperative there was no sign of relapse and there was minimal donor site morbidity. The patient's only complaint was a sensation of the flap stuffing the nasal vestibule. Clinically, there were signs of a small airway stricture, though with no effect on the patient's respiration.

DISCUSSION

Forehead flaps are the most common method for nasal reconstruction when local flaps are insufficient due to the complexity of the defect.¹ Tissue expansion of the forehead skin entails the use of forehead flaps for larger skin defects and the opportunity for direct suturing and thus improved donor site appearance and morbidity. Although the forehead flap is a well-known flap for nasal reconstruction after trauma, facial burns, and cancer,^{2,4-6} we believe our technique is unique in

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Fig. 1. Preoperative photograph.



Fig. 3. Clinical photograph 6 months after pedicle division.

that it provides the patient with a delicate appearance, whereas a prelaminated forehead flap usually results in a bulky appearance.⁷ To ensure the delicate appearance, we placed the cartilage graft just underneath the dermis and refilled the expander to further press the graft up against the dermis to gain definition to the border of the reconstructed ala for a more natural looking facial unit.

A multistage reconstruction like a prelaminated forehead flap may be a demanding procedure for the patient because it takes time before you can see the end result. To overcome this, the reconstructive surgeon may choose a one-stage approach like a helical rim free flap.⁸ Although



Fig. 2. Perioperative photographs. A, Expander placement in the frontal region. B, Three weeks after transposition of forehead flap.

the helical rim flap is suitable for large alar defects, we believe our patient's defect was too large (3 × 2 cm) for a satisfying cosmetic appearance at both the recipient and donor site.

The most common cartilage grafts for nasal reconstruction are the auricular concha and costal cartilage.² As the patient's defect was large, we chose a graft from the costal margin because it could supply a graft of adequate size. We also considered donor site morbidity and visibility; with our method, the patient was left with a mere scar on the abdomen, whereas if we chose either auricular cartilage or septal cartilage, the patient would have visible difference of his ears and plausibly weaker nasal framework. Also, costal cartilage has the advantage of endurance and a natural arch formation like the natural nasal ala.

Our greatest concern with the end result was the patient's airway stricture. We used a turnover flap for inner lining, which, by the scar tissues' healing forces, may have resulted in the stricture. Numerous options for inner lining reconstruction exist. If the inner lining defect is small, an obvious choice for reconstruction is a flap from the adjacent mucosa, though in our case the defect was too large.² A full thickness skin graft is a well-described option for inner lining although a skin graft is avascular and therefore attenuates the blood supply for the cartilage graft.^{2,9} Another choice is a modified folded forehead flap where the distal part of the flap is folded into the nasal cavity for inner lining. This method has been portrayed with sufficient cosmetic and functional results.⁹ Lastly, the reconstructive surgeon may consider a free flap for inner lining, but this option should be preserved for inner lining defects that include more than one nasal subunit.⁶

Although numerous techniques for nasal reconstruction exist, few studies describe the complication rate for forehead flaps. A previous study found that patients with composite defects had almost a double risk of developing a major complication compared with patients with only a skin defect¹⁰; these findings emphasize the complicated management of nasal reconstruction with composite defects.

Nina Dabrosin, MD

Department of Plastic and Breast Surgery
Aarhus University Hospital
Palle Juul-Jensens Boulevard 99
8200 Aarhus
Denmark
E-mail: nina.dabrosin@gmail.com

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PATIENT CONSENT

The patient provided written consent for the use of his images.

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