

Repair of a Large, Exposed-Cartilaginous Nasal Tip Defect Using Nasalis-Based Subcutaneous Pedicle Flaps and Full-Thickness Skin Grafting

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Large full-thickness nasal tip defects after Mohs surgery present a challenge to the reconstructive surgeon. The interpolated paramedian forehead flap is the standard modality to repair such defects, especially when exposed cartilage is present.¹ Despite providing an excellent cosmetic outcome, some patients are reluctant to undergo this procedure due to the associated temporary deformity, the permanent forehead scar, and the need for at least two stages to achieve a successful outcome.

A 62-year-old Caucasian man was referred for Mohs micrographic surgery for an infiltrative basal cell carcinoma on the nasal tip. Complete excision of the tumor required five surgical stages, resulting in a 2.3 × 2-cm defect through which exposed alar cartilages and upper lateral cartilages could be seen (Figure 1). How would you reconstruct this defect?



Figure 1. Surgical defect after Mohs micrographic surgery, measuring 2.3 × 2 cm. Exposed alar cartilages and upper lateral cartilages can be seen.

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Resolution

The patient was an ideal candidate for the interpolated paramedian forehead flap, but refused to undergo the procedure. Given the depth of the defect and presence of exposed nasal cartilage, a full-thickness skin graft alone would have been unlikely to provide adequate coverage. We therefore designed nasalis-based subcutaneous pedicle flaps to restore the nasal contour and provide a vascular bed suitable for grafting.

An incision was made along both alar grooves extending to the nasofacial sulcus to facilitate exposure and superolateral dissection. Nasalis-based subcutaneous pedicle flaps were elevated by dissecting first along the subdermal plane, followed by dissection along the subperiosteal plane (Figure 2). The midline aponeurosis connecting the two elevated nasalis muscles was then divided, and careful dissection and judicious back-cutting of each pedicle along its superolateral margin were performed to maximize tissue movement. The right and left subcutaneous flaps thus created were rotated and advanced inferomedially to the defect margin and secured to the underlying cartilage with 4-0 polyglactin absorbable sutures. The medial aspects of each subcutaneous flap were then sutured together in a corset fashion to completely line all previously exposed nasal cartilage (Figure 3). The overlying cutaneous flap was then advanced inferiorly to the tip-supratip aesthetic subunit junction and secured. Finally, a full-thickness skin graft was harvested from the supraclavicular area and used to line the tip.

At the time of suture removal 1 week later, complete survival of the graft was noted. Superiorly directed force vectors resulted in approximately 5 mm of nasal tip elevation immediately postprocedure; however, this had diminished significantly after 1 week and had nearly completely resolved after 2 months. Six months after the procedure and 6 weeks after manual dermabrasion, the area showed a smooth contour without indentation or irregularities (Figure 4).

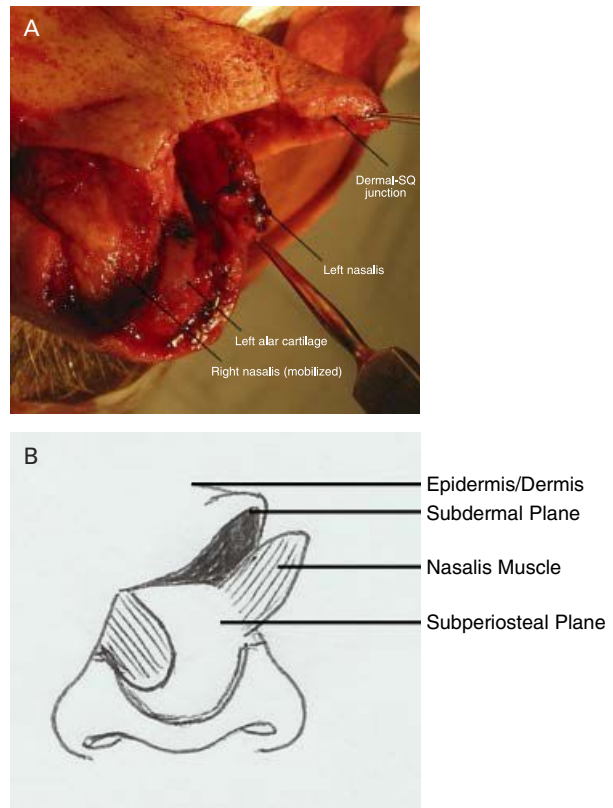


Figure 2. Intraoperative photograph (A) and schematic (B) showing elevation of nasalis-based subcutaneous pedicle flaps, created by dissecting first along the subdermal plane, followed by dissection along the subperiosteal plane. The nasalis muscle on the patient's right side has already been dissected and rotated into position. The lower skin hook on the photograph points to the left nasalis muscle, which is being elevated.

Discussion

Combined full-thickness nasal tip and supratip defects represent a challenge to the reconstructive surgeon. The usual treatment of choice remains the paramedian forehead flap. Limitations for the use of this procedure, however, occasionally require alternative methods to reconstruct such defects.

The anatomy of the nasalis muscle and its application to flap design have been described in outstanding detail by Papadopoulos and Trinei.² The main (transverse) body of the nasalis muscle arises from the maxilla and inserts with the muscle of the opposite side into the midline aponeurosis as it crosses the dorsum of the nose.³

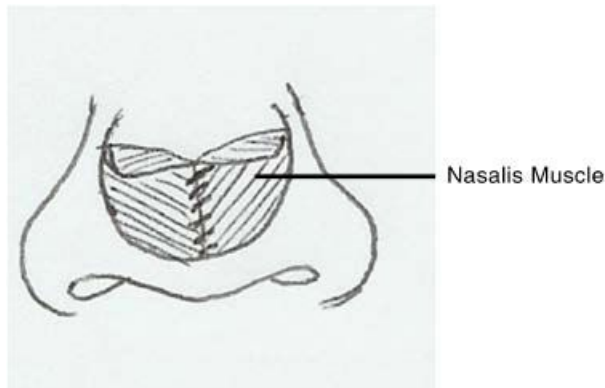


Figure 3. The right and left subcutaneous flaps are rotated and advanced inferomedially to the defect margin and secured to the underlying cartilage. The medial aspects of each subcutaneous flap are then sutured together in a corsetlike fashion to completely line all previously exposed nasal cartilage.

This aponeurosis joins and forms a broader fusion with the aponeurosis of the procerus muscle.² The muscle also inserts to some degree into the skin of the nasolabial sulcus.³ The nasalis muscle has a rich blood supply based on the nasal artery.

These anatomic considerations, and the concept that skin can be sustained by its underlying muscle through perforating cutaneous vessels, was exploited by Papadopoulos and Trinei² to design a superiorly

based myocutaneous island pedicle flap with bilevel undermining for reconstruction of nasal tip and supratip defects. Their technique relies on undermining that is carried out in two planes, a subcutaneous one (between the subcutaneous fat and nasalis muscle lateral to the flap) and a submuscular one (beneath the nasalis muscle and beneath the flap). This allows the surgeon to suspend the island of skin on two distinct muscular slings, which provides mobility and ensures proper arterial supply to the cutaneous component of the flap.² While extremely useful in the proper clinical setting, however, use of this flap is limited in large defects (especially those whose craniocaudal dimension exceeds 2 cm), in defects placed far distally on the nasal tip, and in patients with insufficient amounts of recruitable superior laxity. The patient presented here fit all of these criteria and was not considered a candidate for this repair option.

Building on these concepts and the principles of Papadopoulos and Trinei, we relied on the rich vascular supply of the nasalis muscle and the ability to create a vascularized sling following bilevel undermining to create purely subcutaneous flaps. These were then rotated and advanced inferomedially to provide both bulk to the deep defect, as well as a vascular bed suitable for grafting, which would



Figure 4. Appearance 6 months after the procedure. The patient underwent manual dermabrasion 6 weeks before this photograph.

not have been possible over exposed nasal cartilage. The technique has been described in the plastic surgery literature⁴ and, more recently, in an excellent case series in the dermatologic surgical literature.⁵ Our technique incorporates incisions along both alar grooves to facilitate exposure and superolateral dissection, which may be difficult to otherwise carry out safely when the defect is placed far distally on the nasal tip, as in this case.

Bilevel dermal undermining in conjunction with full-thickness skin grafting has been used to reconstruct defects of the nasal dorsum, with good results.⁶ More recently, Salmon and Stanway⁵ have published their experience with the nasalis flap and graft repair for denuded defects of the nose, utilizing either the nasalis anomalous or the nasalis transversus as the basis for the subcutaneous pedicle flap. Their series underscores the safety and reliability of the procedure. Of 26 patients undergoing reconstruction with the technique, 2 patients developed partial superficial graft necrosis involving less than one-third of the graft. In both cases, this resolved to leave a satisfactory contour and a small area of hypopigmentation. One patient developed postoperative infection, which resolved with oral antibiotics and without significant graft necrosis. In all patients, a natural contour was achieved following reconstruction.⁵

Several important technical aspects should be noted. It is important to carry the bilevel undermining sufficiently superolaterally to achieve maximum mobility without excessive back-cutting of the pedicle, which would compromise the flap's viability. Lateral dissection in the subcutaneous plane is likely to disrupt significant perforator vessels, and careful attention to hemostasis is required. This is partly the reason for extending incisions along the alar groove, as the necessary exposure for proper undermining and hemostasis would otherwise be difficult to achieve. In our experience, these incisions, which are closed without tension, generally heal with imperceptible scars. Patients must also be warned that the superior

tension vector created by advancing the subcutaneous pedicle flap to the distal edge of the defect may result in significant nasal tip elevation. Although it is likely for this deformity to self-correct to a significant extent, that may not always be the case.

In conclusion, we have described the use of nasalis-based subcutaneous pedicle flaps for reconstruction of a large full-thickness nasal tip defect after Mohs surgery. This technique effectively restores nasal contour and provides a vascular bed for successful full-thickness skin grafting, even in the setting of exposed nasal cartilage. Given its well-defined anatomic basis, ease of execution, and ability to be performed in a single stage, this technique may be a valuable repair option in patients who are not candidates for, or do not wish to undergo, multistage interpolated reconstructive procedures. Furthermore, nasalis myofascial flaps combined with full-thickness skin grafts may be a valuable alternative to provide lining or bulk for smaller nasal defects when local skin flaps are not indicated.

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COMMENTARY

The nose is the most common location for basal cell carcinomas, and dermasurgeons have become experts in the reconstruction of defects on the nose. There are numerous reconstructive options for defects on the nose. The goal of the surgeon is to pick the option that predictably yields the best functional and cosmetic outcome. The authors describe the use of bilateral “nasalis-based subcutaneous pedicle flaps” in reconstruction of a large, deep defect on the nose. This is essentially a double muscular hinge flap.¹ The nasalis muscles from each side are mobilized to replace a soft tissue defect and provide a vascular bed for a full-thickness skin graft. This is a viable alternative to a forehead flap. One can expect the graft to hypopigment over time, however. This is one of the drawbacks of a full-thickness skin graft that is typically not seen with a forehead flap.

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