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Reconstruction of a Multi-Subunit Nasal Defect

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An otherwise healthy 46-year-old woman was referred for Mohs micrographic surgery for an infiltrative basal cell carcinoma of the right ala (Figure 1). Complete excision of the tumor required four stages, resulting in a final defect measuring 2.5 × 1.5 cm and involving the right nasal supratip, ala, alar crease, and nasal sidewall (Figure 2). At the nasal supratip, the excision resulted in a partial-thickness defect. At the right nasal ala, the tumor penetrated to the level of the alar cartilage but did not involve the cartilage itself, and the perichondrium was intact. The patient requested a single-stage procedure for the repair. How would you reconstruct this multi-subunit nasal defect?

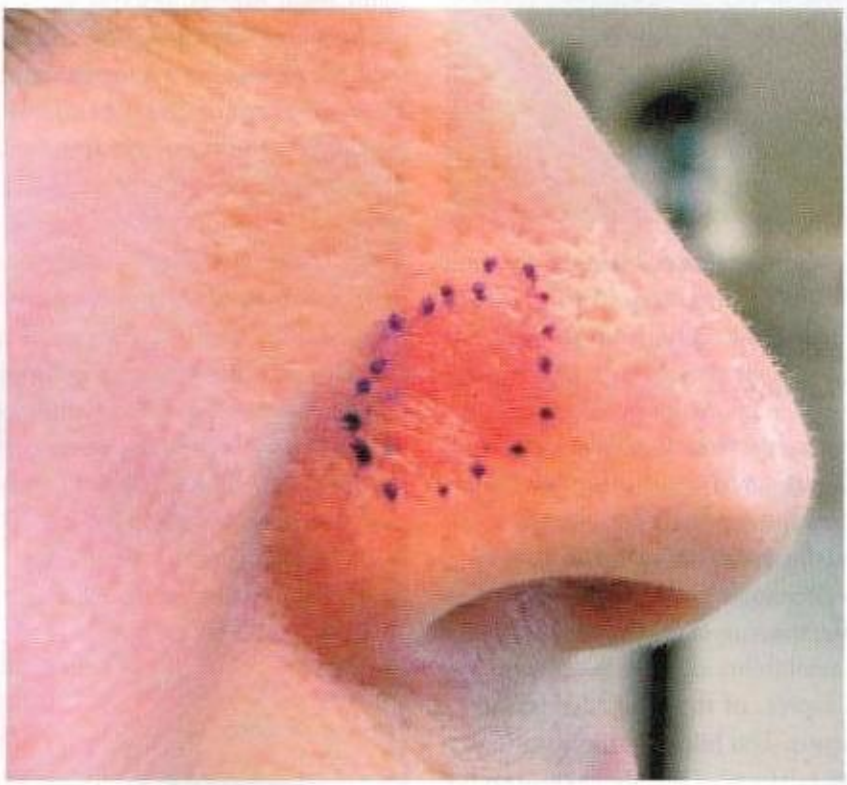

Figure 1. Initial clinical presentation of an infiltrative basal cell carcinoma of the right ala.

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Figure 2. Defect involving the right nasal supratip, nasal ala, alar crease, and nasal sidewall.

Reconstruction Options

Reconstruction of surgical defects on the nose is often challenging, particularly when it involves the nasal ala, because of the tendency for elevation of this free margin. Defects that involve multiple cosmetic subunits present an even greater challenge because of the differences in skin texture and structure. The limited availability of mobile adjacent skin on the distal aspects of the nose adds to the difficulty of the repair. The bilobed transposition flap is often used for defects of the lower third of the nose[1,2] because it provides excellent tissue match and limits the repair to the nasal cosmetic subunit. It is usually recommended for nasal defects smaller than 1.5 cm in diameter, but it has been used successfully in selected cases with larger defects, in which it requires adequate laxity from the upper two-thirds of the nose to avoid nasal distortion.[3] The construction of a bilobed flap to cover the large defect in our patient would likely have resulted in blunting of the alar crease and possible nasal distortion and was thought not to be the ideal option. A full-thickness skin graft is also an option for nasal defects and may provide an excellent cosmetic outcome, but because of the depth of this defect, a contour irregularity would likely have resulted. A delayed full-thickness skin graft, after allowing 2 to 3 weeks of granulation tissue formation to fill the depth of the defect, may have resulted in a good cosmetic outcome[4–6] but would not have been practical for this patient because she desired an immediate single-stage procedure. The paramedian forehead flap and the cheek melolabial interpolation flap are ideal two-stage procedures for larger multiunit nasal defects, because the forehead and the medial cheek skin are good color and texture matches for defects on the caudal third of the nose. These are versatile and dependable flaps and provide minimal donor site morbidity. For multi-subunit defects, staged interpolation flaps may result in blunting of the alar crease. Furthermore, interpolation flaps are not single-stage procedures, as the patient requested. A single-stage nasolabial transposition flap[7] could have been used, but this flap is prone to pin-cushioning, and it predictably flattens the alar groove and often requires a secondary procedure to reintroduce the concavity of this area.[8] An island pedicle flap based in the nasolabial fold was therefore developed and sutured into place, with secondary intention healing occurring on the very distal area of the partial-thickness defect near the supratip of the nose.

The Procedure

An island pedicle flap (V to Y advancement flap) lateral to the defect was designed and outlined, with the inferior aspect of the flap designed to be sutured along the alar crease. Local anesthesia was given by injecting 6 mL of buffered 1% lidocaine

with 1:1,00,000 epinephrine in the area. An infraorbital nerve block for regional anesthesia of the donor site and the right side of the nose was also performed using 1.5 mL of the above anesthetic. Deep incisions were made inferiorly through the dermis along the melolabial fold line and superiorly along the cheek. A centrally based myocutaneous pedicle was developed using vertical undermining around the perimeter of the flap. At the tail of the flap, approximately 4 mm of skin was undermined and freed from any lateral or underlying attachment to allow for mobility. Similarly, the leading 3-mm edge of the flap was freed from any underlying attachments. The flap was then advanced into place, rotated approximately 30° in a clockwise direction, and sutured to the opposing edge of the defect using 4-0 poliglecaprone. The remainder of the deep aspect of this flap was sutured with slight insetting of the flap. The epidermal edge was next sutured in place with 5-0 polypropylene running sutures, including four simple interrupted sutures placed into the base of the defect at the leading edge of the flap (Figure 3). Sutures were removed on day 6, and granulation of the distal aspect of the defect occurred, with full re-epithelization by day 28. The final clinical outcome at 12 months demonstrated slight hypopigmentation in the area left to heal by secondary intention but otherwise good contour and no evidence of alar elevation (Figure 4).

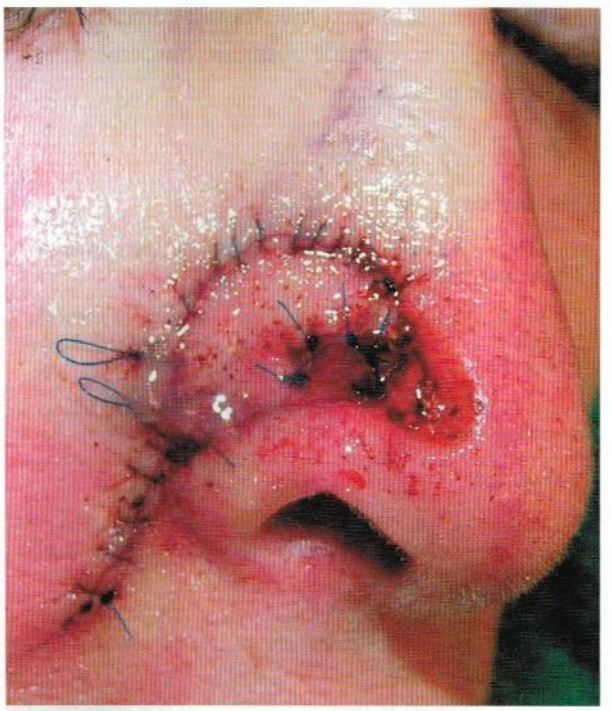

Figure 3. Immediate postoperative outcome with sutures in place and wound in the distal aspect of the defect left to heal by secondary intention.

Discussion

This case illustrates a common but challenging reconstruction of a large multi-subunit nasal defect. The goals of the repair in this cosmetically demanding case woman were to perform a single-stage procedure that would maintain the alar crease and the normal contour of the nose, avoiding any alar elevation. The island pedicle flap is particularly well suited to deeper wounds like this patient's, and it incorporates a healthy and protected vascular supply.[8] It is a versatile flap because it can be advanced as far as the motion of the deep subcutaneous or muscular pedicle allows. Because the flap must be deeply undermined vertically, thorough knowledge of the underlying anatomy is required. The nasolabial island flap is created from the skin and subcutaneous tissue superior and lateral to the nasolabial fold. The facial artery provides the blood supply to the area. At the level of the angle of the mouth, this artery gives the superior labial artery branch and then becomes the angular artery, which lies under the zygomaticus major, zygomaticus minor, and levator labii superioris muscles and is superficial to the buccinator muscle.[9] The lateral nasal artery also provides many skin perforators along the course to the alar area, which are also used as a blood supply for this island pedicle flap. A single perforator artery is able to supply a 2.5- to 5.0-cm flap.[10]

The island pedicle flap (V to Y advancement flap) is useful in alar defects because of the ability to recreate the alar groove with one edge of the triangular flap. Because it is a pushing type of flap, there is little risk of alar lateralization or elevation, although appropriate sizing and movement of the flap are nec-

Figure 4. Final clinical outcome at 6 weeks in frontal view (A) and at 12 months in lateral (B) and frontal (C) views.

essary to avoid these complications. Risk to alar valve patency is also not often observed.

Trapdoor deformity is a potential complication of the island pedicle flap. Minimally undersizing the flap, widely undermining the region around the primary defect, and inserting the flap by burying generous subcutaneous sutures have been found to minimize the risk for this deformity.[11] On the nose, undersizing the flap needs to be done judiciously, because it could lead to alar retraction. Also, movement limitation may be a concern when using the island pedicle flap, so careful planning is necessary. In our case, because of the movement limitation of the flap, the distal aspect of the defect was left to heal by second intention. Because this aspect of the defect was only partial thickness, the island pedicle flap was still a good option for the reconstruction.

It should be noted that, although the term "island pedicle flap" is appropriate to describe the design of the flap described, a "V to Y advancement flap" would be the most accurate procedural coding terminology for this type of adjacent tissue repair.

Conclusion

For many alar defects, the island pedicle flap may be an ideal choice. The island pedicle flap allows greater flap mobility and has a rich blood supply from the underlying vessels and musculature.[8] The nose and nasal ala are particularly well suited for this flap, because the margins of the flap can be hidden within the contour lines and aesthetic unit boundaries. Proper design and execution of an island pedicle flap are necessary to avoid trapdoor deformity and alar elevation.[8] In some cases, the trapdooring effect of this flap can also be used advantageously to restore a normal rounded alar appearance. Movement limitation of the flap should also be considered when planning the repair. In this case of a large and deep nasal defect involving multiple nasal subunits, the island pedicle flap resulted in an acceptable cosmetic outcome in a single-stage procedure.

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