Nasal reconstruction with the cheek island pedicle flap

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Background: Reconstruction of the lower third of the nose can be challenging. Maintaining the nasal subunit symmetry and providing good tissue match with regard to color, sebaceous quality, and thickness is essential. For extensive defects in this area, paramedian forehead flaps are often considered.

Objective: Our purpose was to develop the technique of preparing and executing the cheek island pedicle flap, as well as to define the limitations and "pitfalls" of the flap.

Methods: The cheek island pedicle flap is described.

Results: The cheek island pedicle flap can provide excellent cosmetic results in reconstructing defects of the lower third of the nose. The flap dynamics are predictable, and anticipated complications are described.

Conclusion: The cheek island pedicle flap provides an excellent alternative to the paramedian forehead flap for reconstruction of extensive defects of the lower third of the nose.

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Reconstruction of nasal defects involving the lower third of the nose can be challenging. The goal is to maintain the normal contour of the alae, nasal tip, and alar grooves as well as nasal subunit symmetry.1 Tissue matches with regard to texture, color, and thickness is another goal. The nasal defect location, size, depth, and extent of involved underlying cartilage influence the appropriate reconstruction. Approaches include full-thickness skin grafts, regional cutaneous flaps (transposition, advancement, rotation, and island pedicle), paramedian forehead flaps, and cheek island pedicle flaps. The status of nasal cartilage also influences the reconstruction. The presence of perichondrium allows engraftment of skin grafts. However, if absent and cartilage is exposed, tissue coverage with skin flaps is required. In addition, if cartilage is missing, a cartilage graft may be needed to provide adequate alar structural support.2

For extensive nasal defects of the lower third of the nose that involve multiple subunits, coverage from distant flaps is often needed. Commonly reported is the use of the paramedian forehead flap that can provide an excellent reconstructive outcome.2 For less extensive defects, we have found the two-stage cheek island pedicle flap to be effective. This procedure has also been described as a two-stage nasolabial transposition or cheek interpolation flap, or a direct cheek flap.3-5 Both the paramedian forehead flap and cheek island pedicle flap occur in a staged fashion, and each requires a second procedure of taking down the base of the flap and inserting the flap at the nasal site.

The cheek island pedicle flap can provide advantages with regard to ease of closure of the donor site, overall less extensive surgery for the patient, a technically more manageable reconstruction with the patient under local anesthesia, and a more favorable patient acceptance during the healing phase. We describe our experience with the cheek island pedicle flap. The technique of harvesting, attaching, and revising the flap is detailed. In addition, the pitfalls and limitations we have experienced with this flap are described.

ILLUSTRATIVE CASE

A 68-year-old woman had a recurrent basal cell carcinoma of the nasal tip. Mohs micrographic surgery was performed with a resulting symmetric defect involving the nasal tip, supratip, and dorsum. A cheek island pedicle flap was the chosen reconstructive option. A paramedian forehead flap was also considered.
FLAP PREPARATION

A template is made of the nasal defect size with a nonstick bandage material. The distance from the base of the planned pedicle flap to the nasal defect is then determined with a piece of cotton gauze (Fig. 1, A). When this distance is being calculated, minimal tension is placed on the gauze. This distance is then extended from the base of the pedicle to the distal portion of the flap (Fig. 1, B). The defect template is placed symmetrically in the lower portion of the planned flap over the melolabial groove. An S-plasty or standard ellipse is designed and outlined in the melolabial and nasofacial sulcus. This extends inferiorly in anticipation of the redundant tissue (dog-ear) required to facilitate the donor site closure. In addition, including this tissue when initially harvesting the flap provides additional length to the flap that may be needed if the flap dynamics do not occur as planned. The island pedicle flap is harvested by incising to the level of fat the entire perimeter of the flap. The distal two thirds of the flap are then sharply dissected from the underlying fat and muscle. The pedicle base includes muscle and adipose tissue. The flap is dissected free toward the base until the donor portion of the flap can lie in the wound with minimal tension on the flap base (Fig. 1, C and D). The donor site wound edges are undermined broadly and closed in a layered fashion. The pedicle flap is based as a random axial pattern flap with musculocutaneous perforators (levator labii superioris alaeque nasi and levator labii superioris muscles) from the alar branch of the superior labial artery or transverse facial artery, which are branches of the facial artery. Caution is taken when dissecting the flap at the base to ensure that the base is not severed too narrowly, which would compromise the flap’s vascular supply. The flap tip is then trimmed to fit and match the normal contour of the nasal subunits. If necessary, the nasal defect should be deepened to accommodate the flap. The flap tip is thinned but not excessively because vascular compromise of the dermal plexus may occur. The flap tip is then secured in the defect with interrupted or running epidermal sutures, or both (Fig. 1, D). The pedicle is then protected by coating with a layer of antibacterial ointment and wrapping it with a moist, gauze-impregnated dressing. Wound care is directed at the flap tip and the donor site with no disturbance of the pedicle itself. Sutures are removed after 1 week from the donor and recipient sites of the flap (Fig. 1, E). At this time, the impregnated gauze is also changed to accommodate wound exudate.

Revision of the flap can be done at 3 weeks (Fig. 1, F and G). Engraftment can be assessed by applying constriction at the base of the flap with a hemostat. If engraftment has occurred, the normal color of the flap will be maintained.

At revision, the base of the flap is first severed from the cheek. The resultant defect should be in the melolabial groove or nasofacial sulcus. The cheek defect is then undermined and closed in the usual fashion. The distal portion of the flap is then severed at a distance about 1 cm from the anticipated border of the nasal defect is covered by the flap. Too aggressive initial shortening of the flap edge may result in an inadequate amount of flap tissue available for the insert. All granulation tissue in the defect is removed to accommodate a deep inset of the flap flush with the defect edges. The flap is then thinned and trimmed to provide a normal contour of the nasal subunits. It may be necessary to incise into, and undermine, a portion of the already attached flap to provide enough thinning and contouring. The flap is then sutured in place under some tension, creating minimal stretch and a slight concave configuration of the flap. No tension, or a loosely inset flap, is more susceptible to the trap-dooring phenomenon. Sutures are removed at 1 week.

Additional cases of lower nasal defects repaired with this flap are shown (Fig. 2, A-D). Fig. 2, A and B illustrates a defect favoring one ala in addition to the nasal tip, supratip, and dorsum.

ANTICIPATED FLAP AND NASAL DYNAMICS

It is common for the nasal tip to be deviated toward the side of the flap postoperatively (Fig. 3, A); this will resolve when the flap is severed if an appropriately sized flap has been placed. In addition, during engraftment it is common to have partial collapse of the nasal vestibule on the side of the harvested flap (Fig. 3, A). This too will correct with time. This is most likely from the tension, weight, and pressure created by the flap.

Most important, the contracture of the wound edge and flap tip must be anticipated and accommodated. During the 3-week period of flap engraftment, noticeable wound edge contracture may occur. In addition, the sutured and nonsutured portions of the flap tip can also contract significantly. At times, the
unsutured portion of the flap, just proximal to the sutured portion, can contract so that the flap edges approach one another in a cylindrical configuration. When the flap is being revised, it may be necessary to incise and undermine a portion of the engrafted flap, as well as undermine the wound edges, to provide a more relaxed, better contoured flap, and a more accommodating nasal defect for the flap. Removing the nasal defect granulation tissue under the unsecured portion of the flap is necessary to facilitate these dynamics. Otherwise, it may appear that the flap that was used for the nasal defect was too large, with resultant trapdoor ing or pincushioning of the flap. In contrast, excessive wound and flap contraction and insetting a flap that is too small can result in an asymmetric nasal tip, retracted alar rim,
and/or partial collapse of the ala, causing nasal stenosis (Fig. 3, B and C).

Proper flap size is important in preventing nasal vestibule collapse, as is the use of cartilage grafts. Cartilage grafts are most often required when a significant amount of alar cartilage is missing. We have also found the use of cartilage grafts to be of benefit when cartilage remains but anticipated wound fibrosis and contracture will affect alar support. Specifically in cases with a large defect in which both
a large flap is required and significant wound base and edge contraction is expected, the weight of the flap in combination with the wound healing dynamics place an increased physical stress on the ala, thereby causing some degree of alar collapse and decreased aperture of the nasal vestibule. This nasal vestibule collapse can be most noticeable with deep nasal inspiration, especially in the supine position (Fig. 3, C).

Donor sites for harvesting cartilage include the crura of the antihelix for small defects near the distal edge of the alae nasi cartilage or when a small sup-
port strut is desired just proximal to the alar rim. When a larger piece of cartilage is needed, the posterior aspect of the conchal bowl provides ample donor tissue. Both donor sites can be closed in a simple fashion. The cartilage portion of the defect does not have to be closed for proper wound healing to occur. The donor cartilage is then secured with absorbable sutures into the defect. Burget and Mennick\(^2\) have described various principles of cartilage grafting.

**FLAP PITFALLS AND LIMITATIONS**

The most severe acute complication is vascular compromise of the flap (Fig. 3, D). This flap is a random-based flap with musculocutaneous perforators from the levator labii superioris alaeque nasi and levator labii superioris muscles providing a hardy vascular supply, but without a single axial artery.\(^6\) If the base of the flap is dissected too vigorously or constricted excessively when directing and twisting the flap toward the nasal defect or if excessive tension is created by stretching the flap, vascular compromise may occur. In addition, judicious thinning of the distal flap must also be done to maintain the subdermal plexus. In addition, because this is a random pattern flap, other factors (e.g., cigarette smoking, atherosclerotic vascular disease) that may impair vascular flow or tissue oxygenation can more readily cause vascular compromise, in contrast to an axial-based or a more broadly based flap under similar circumstances. In one patient (Fig. 3, D) who refused a paramedian forehead flap and was unable to refrain from heavy cigarette smoking (two to three packs per day), autoamputation of his flap occurred because of vascular insufficiency. This patient then had subsequent revision of the nasal defect with a full-thickness skin graft, and this too necrosed.

Another limitation of the cheek island pedicle flap is that it is insufficient to provide coverage to the entire lower third of the nose including the columella as provided by the paramedian forehead.

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**Fig. 3.** A, Nasal tip deviation toward flap and partial collapse of the right nasal vestibule at time of flap placement. B, Asymmetric defect of lower third of the nose with partial loss of the alar rim. C, Nasal tip deviation and partial vestibule collapse at 4 months after operation. D, Flap necrosis in a smoker, with eventual autoamputation.
flap. However, it can provide significant coverage for defects involving the majority of the nasal tip, supratip, and/or one ala, alar groove, and alar rim.

DISCUSSION

We have found the cheek island pedicle flap to be useful in the reconstruction of nasal defects of the lower third of the nose that involve the nasal tip or one side of the nose. Other investigators have reported similar good outcomes. This flap more commonly has been referred to as the cheek or nasolabial interpolation flap. We use the term cheek island pedicle flap to denote complete, full-thickness incision, to the level of fat, around the entire perimeter of the flap. This procedure allows greater flap mobility by providing a pivoting motion at the flap base.

Technically, the flap is easy to prepare from the cheek and move to the nasal defect. Often, there is ample donor skin from the cheek and the resultant suture line is well camouflaged in the melolabial groove and nasofacial sulcus. In contrast to the paramedian forehead flap, the entire forehead defect may be unable to be closed primarily and a resultant defect occurs that heals by second intention or requires grafting. Nonetheless, the resultant paramedian defect is often acceptable.

Patients' acceptance of the cheek island pedicle flap is high. In contrast to the paramedian forehead flap, in which the engrafting flap is in the central portion of the face and visible to the patient during the ensuing 2 to 3 weeks, the cheek island pedicle flap is in the lower portion of the face and is much less noticeable to the patient. Wound care may be similar, but psychologically, the patients appear to be more mobile and less limited by the cheek island pedicle flap. In addition, wound healing can be more rapid with the cheek donor site.

Vascular hardiness of this flap needs to be approached with caution. We have found it to be successful with engraftment but have used extreme caution when preparing the flap. Because this is not a direct axial pattern flap, thinning of the flap is sometimes limited at the initial step. Further thinning of the flap can be done more aggressively when revision of the flap is performed and a portion of the flap has engrafted. In contrast, the paramedian forehead flap can be thinned aggressively to the level of dermis at time of flap insert. Nonetheless, cautious initial flap handling may be necessary with revisions done later.

As with any nasal defect that may result in cartilage loss, necessary cartilage support must be provided before any flap is placed over it. The potential for alar compression and vestibule constriction is not unique to such a reconstructive approach. In several patients we have combined cartilage structural supporting grafts at the time of placement of the cheek island pedicle flap. Engraftment of the cartilage graft with this flap appears successful.

A single-staged nasolabial flap procedure for reconstruction of defects similar to those in some of our patients is well described. This procedure in our experience works well for more laterally based defects (e.g., nasal sidewall, lateral ala). The advantages are obvious with a single-stage procedure and simpler wound care. This approach hastens quicker recovery. One limitation of this approach, in our experience, has been the blunting or obliteration of the nasofacial sulcus or the alar groove when repairing more inferiorly based alar defects. Others have reported similar problems with the need for revisions. Periosteal sutures, as illustrated in Zitelli's description can help minimize this problem. Field, in response to the report by Walkinshaw and Caffee, provides insight into better flap design, outcome, and the rare need for revision. However, even with this refinement, alteration of these prominent concave landmarks may still occur. The two-staged flap allows reproducible complete transposition over a greater portion of the nasal facial sulcus or alar groove and eliminates the blunting of these landmarks.

Finally, overall satisfaction by both patient and physician with this cheek island pedicle flap is high. The flap procedure can be performed with local anesthetic and is well tolerated by the patient. We have also performed paramedian forehead flaps with local anesthetic but find it to be less well tolerated and often use intravenous sedation for this method. In addition, there is less immediate and postoperative morbidity from bleeding complications and periorbital swelling and ecchymosis with the cheek island pedicle flap compared with the paramedian forehead flap.

REFERENCES


CORRECTIONS

In the case report by G. F. Webster, MD, PhD, R. L. Knobler, MD, F. D. Lublin, E. M. Kramer, MD, and L. R. Hochman, MD, entitled “Cutaneous Ulcerations and Pustular Psoriasis Flare Caused by Recombinant Interferon Beta Injections in Patients with Multiple Sclerosis” (J Am Acad Dermatol 1996;34:365-7 [February, Part 2]), the dosage of interferon beta was incorrect (p. 365, left-hand column, paragraph 3). The sentence as corrected reads:

“The dosage was 8 x 10^6 IU given every other day, administered subcutaneously by the patient.”

In the article by Madeleine Duvic, MD, Noreen A. Lemak, MD, John R. Redman, MD, Patricia J. Eifel, MD, Susan L. Tucker, PhD, Fernando F. Cabanillas, MD, and Razelle Kurzrock, MD, entitled “Combined Modality Therapy for Cutaneous T-cell Lymphoma” (J Am Acad Dermatol 1996;34:1022-9 [June]), one sentence in the introduction was printed with words missing (p. 1022, right-hand column, second paragraph, lines 7-9). The corrected sentence is as follows (added words in italics):

“Topical nitrogen mustard, however, has induced complete remissions lasting up to 14 years, which provides evidence for curative potential.”

In the brief communication by Ma. del Carmen Padilla Desgarennes, MD, Miguel Rubio Godoy, BSc, and Angelica Beirana Palencia, MD, entitled “Therapeutic Efficacy of Terbinafine in the Treatment of Three Children with Tinea Tonsurans” (J Am Acad Dermatol 1996;35:114-6 [July]), the last sentence was printed incorrectly. The statement as corrected reads as follows:

“On the basis of our experience with these three patients, we would advocate terbinafine as the established therapy for tinea capitis.”