Nasal Reconstruction: An Overview and Nuances

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ABSTRACT

Nasal reconstruction continues to be a formidable challenge for most plastic surgeons. This article provides an overview of nasal reconstruction with brief descriptions of subtle nuances involving certain techniques that the authors believe help their overall outcomes. The major aspects of nasal reconstruction are included: lining, support, skin coverage, local nasal flaps, nasolabial flap, and paramedian forehead flap. The controversy of the subunit reconstruction versus defect-only reconstruction is briefly discussed. The authors believe that strictly adhering to one principle or another limits one's options, and the patient will benefit more if one is able to apply a variety of options for each individualized defect. A different approach to full-thickness skin grafting is also briefly discussed as the authors propose its utility in lower third reconstruction. In general, the surgeon should approach each patient as a distinct individual with a unique defect and thus tailor each reconstruction to fit the patient's needs and expectations. Postoperative care, including dermabrasion, skin care, and counseling, cannot be understated.

KEYWORDS: Nasal reconstruction, lining, support, full-thickness skin graft, local nasal flaps, forehead flap

For the plastic surgeon, nasal reconstruction is the most frequent and most challenging referral after Mohs micrographic surgery. A prominent and defining feature of the face, the nose is a composite structure composed of skin, lining, cartilage, muscular subcutaneous tissue, septum, and bone. All components, including cover, support, and lining, must be restored appropriately to provide an aesthetic and a functionally sound reconstruction. Operative decisions must be made keeping in mind the effects of late scar healing. From the outset, a well-tailored and thorough plan is paramount; however, the surgeon and patient should allow for flexibility, including additional stages if necessary.

When approaching any nasal defect, it is equally important to accurately assess the patient as it is to assess the defect. The healthier, compliant, and understanding patient is easier to approach with any plan, regardless of the number of stages that will ultimately produce the best result. In other words, some patients are better candidates for multiple stages than are others for a variety of reasons. Therefore, it is important to provide appropriate reconstructive algorithms that are individualized to each patient. Adhere to principles, not dogma. The patient should have an active role in the decision making, particularly if it involves undertaking a complex multistage procedure. For example, an elderly, home

oxygen dependent, and/or active smoker would not be well served by complex multistage procedures. A simple full-thickness graft will suffice as cover for many patients. However, advanced age does not necessarily imply significant comorbidity. One must accurately assess the patient and be cognizant not to allow reconstructive decision making to be influenced by age alone.

It is our current preference to perform the vast majority of nasal reconstructive surgeries under local anesthetic, with a short period of propofol sedation prior to injection of the local anesthetic. Almost all of these are performed as outpatient procedures in an accredited outpatient surgery center.

SUBUNIT AND DEFECT-ONLY RECONSTRUCTION

To be a competent and versatile practitioner of nasal reconstruction, we believe the surgeon should be well versed in the principles of both subunit and defect-only reconstruction and understand the arguments presented for both. Although the subunit principle is central to aesthetic nasal reconstruction,[1] many authors have proposed reasonable modifications while achieving very good results. In contrast, other authors have demonstrated equally good results by approaching nasal reconstruction, at least initially, from a defect-only approach. As there are appropriate candidates for either approach, choosing should be considered on a case by case basis.[2–4]

Simply put, we believe adherence to the subunit principle is more important in the lower third subunits: tip, ala, columella, and soft triangles. Defect-only reconstruction is certainly reasonable at the medial canthal area as well as at the sidewalls and dorsum. Dermabrasion and careful tailoring of flap edges to defect edges are key principles in defect-only reconstruction.

More controversial, however, is consideration of defect-only reconstruction at the lower portions of the nose. Regarding the tip, we tend to adhere to a modified subunit principle, as it is quite possible to place a scar at the midline of the tip. The midline tip scar after dermabrasion (and often without) is well camouflaged. In other words, reconstruction of the hemitip as a zone is quite acceptable. In contrast, excision of a remaining healthy hemitip and reconstruction of a full tip seems excessive in some cases, without yielding vastly improved results.

Regarding the ala, the reconstruction is a little more complicated. In general, we do adhere to the subunit principle in alar reconstruction, but imagine a 70% alar defect with sparing of 2 mm of alar rim skin. In this case, we would plan completion excision of the subunit to the sidewall-alar junction, extending to the tip-alar junction, and finally to the alar-cheek junction. However, we would likely leave the native alar rim remnant intact due to this area being integral to nasal contour and rim support.

A final point is that the surgeon must consider what the implications are for the patient and surgical stages if strict adherence to subunit principle is advocated. For instance, a 50% alar and sidewall defect may be well served by a small cheek advancement in addition to a nasolabial flap. However, if the subunits undergo completion excision, larger and/or additional flaps may be needed. Using a forehead flap instead of a nasolabial flap may appear to be a better option from one point of view, but the forehead flap may require more stages and add additional morbidity that some patients are reluctant to embrace. Again, we stress the importance of tailoring reconstruction to each individual patient. Because excellent results can be achieved in defect-only reconstruction, particularly with the use of dermabrasion, we advocate a tempered and individualized approach to these concepts.

NUANCES

The nose is a complex structure composed of nine specific subunits. The geometric patterns include the relatively flat nasal dorsum and paired nasal sidewall planes making the upper two thirds of the nose (Fig. 1).

These regions abut the lower third composed of the nasal tip, columella, and paired ala and soft triangles. It should be noted that the lower third units are essentially biconvex multilayer structures with distinct borders. For example, where the alar border abuts the nasolabial groove, the eye perceives a distinct junction between the nose and cheek. If these borders are disturbed or distorted, particularly in the later stages of healing, it can be extremely difficult to correct such a defect. One of the goals of nasal reconstruction is symmetry; therefore, all measurements and design considerations should be compared with the contralateral side when possible. The symmetry and interface considerations are good reasons to consider using templates and fine millimeter measurements when designing flaps, especially for alar and tip defects.

With the exception of poorly designed and executed flaps, failure to provide adequate lining is the most critical error made in forehead flap nasal reconstruction, the reason being that lining flaps such as the ipsilateral mucoperichondral flap and bipedicled lining flap are technically challenging to raise and transfer with adequate surface area and vascularity. Furthermore, many publications include nice diagrams of these flaps; but few include intraoperative photographs of proper technique. This, we believe, can hamper the new practitioner from being able to translate concept to reality in performing his or her first lining flap (Fig. 2).

In addition, it is important to note that with heminasal and alar-tip full-thickness defects, lining must be adequately restored to prevent the eventual pin-cushioning and notching deformities that result
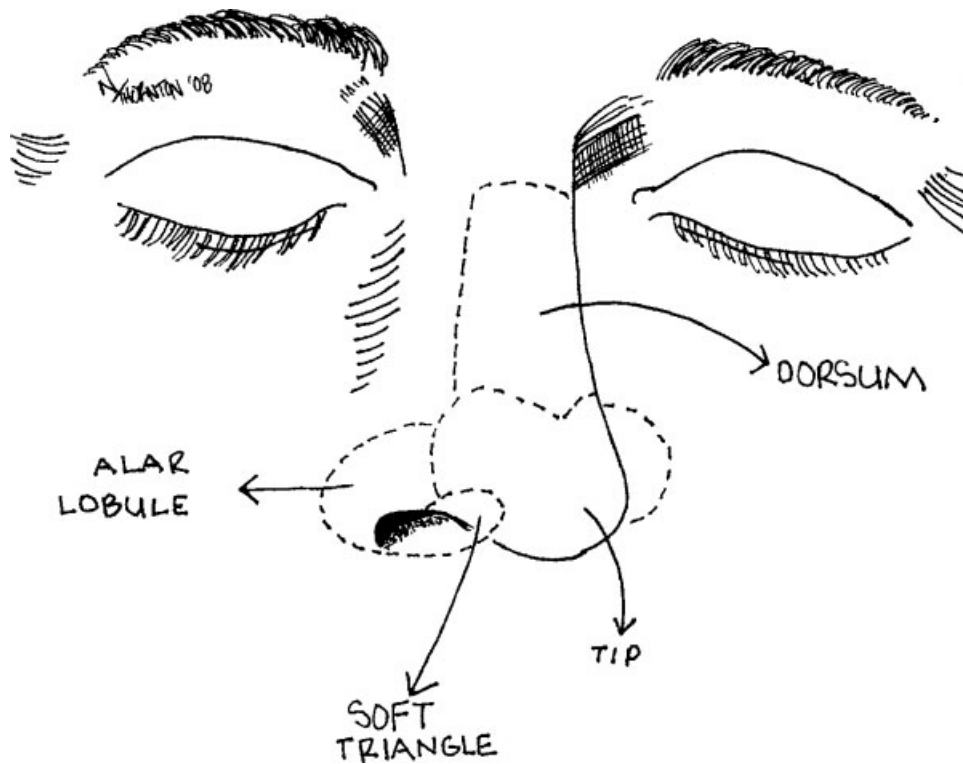
Figure 1 The nasal subunits.

from its failure. We recommend providing the nasal lining, skeletal elements, and external cover in a single operation to ensure even healing. Essentially, what this means is that the lining and skeletal elements (i.e., usually cartilage grafts) heal best (and with less contraction) when the lining flaps and cartilage grafts are placed against the raw side of a well-vascularized forehead flap or nasolabial flap. A possible exception to this recommendation is the forehead flap prefabrication technique that is described later. If the reconstruction is a major one (i.e., involving all three elements) and the coverage flap must be staged later than any earlier procedures for any reason, then it is best to start with lining. These infrequent and difficult cases usually involve exposed bony and cartilage framework of the bony pyramid and septum often in the context of a patient with some comorbidities. In these cases, one must achieve lining coverage of the septum and bony pyramid first with flaps and grafts. Once completed, return to the defect with appropriate cover and more skeletal elements for the tip and ala. In these difficult cases, additional lining will probably be needed again at the later stages. Thus, the principle remains that results are best when the lining and cover are completed during the same operation.

LINING

Lining reconstruction options will be discussed in this section and are presented according to order of size of defect.

A distal portion of a forehead flap can be folded to provide lining and accurate reconstruction of the alar rim. This can be performed to a distance of 1 cm on smokers and possibly up to 1.5 cm on nonsmokers. Regardless, the severity of the effects of smoking on

Figure 2 This photograph demonstrates the consequences of inadequate lining reconstruction.

vascularity creates some unpredictability. Therefore, even a short folding of a distal forehead flap is susceptible to necrosis in an active smoker. In general, distal flap folding for lining should be used with caution in smokers.

Accurate yet aggressive distal thinning overlying an adequate cartilage graft rim reconstruction can provide ideal reconstruction of the alar turn-in. For larger alar defects and true heminasal defects, this will be inadequate lining reconstruction. It is important for the surgeon not to try to "stretch" the capabilities of the turned-in forehead flap in these cases. In fact, the true surface area needed for interior alar and tip lining are easy to underestimate. If this is the case, the mucosal lining from the septum and possibly the remaining vestibule will have to be recruited.

If there is any remaining upper vestibule/midvault lining, it can be used as a bipedicled advancement flap as described by Burget and Menick.[5] The flap is based medially at the junction of the anterior vestibule lining with the septum and laterally at the piriform aperture. The amount of tissue that can be harvested with this flap is actually modest. In reality, ~5 to 10 mm of vertical height is as much as this flap will provide. We also recommend that the bipedicled lining flap donor defect be back-grafted with skin to prevent secondary internal contraction and resultant notching/in-turning at the alar rim. The bipedicled lining flap, therefore, is best used for lining of isolated alar defects that are no more than 1 cm in vertical height and possibly up to 1.5 cm in transverse width.[6]

The ipsilateral mucoperichondrial flap is the workhorse of nasal reconstruction lining options. This septal mucosal flap is based medially and anteriorly on the septal branch of the superior labial artery with flap elevation begun posteriorly along the septum. Dimensions of elevation are determined by defect size; but it is advisable to be generous with flap size during elevation. The superior and inferior cuts are then made, and the flap is swung anteriorly and laterally to provide lining at the ala and ipsilateral hemitip.[6]

There are a couple of important nuances to this lining flap that deserve consideration. The first point is that the flap will require a later division, as it partially to completely obstructs the involved nasal airway. This can be generally done at the time of division and inset of the forehead flap. Alternatively, if an intermediate thinning stage of the forehead flap is planned, then this is also an opportune time to divide the mucosal lining flap.

Skin grafts are yet another mainstay of lining reconstruction. Frequently, full-thickness skin grafting of the upper portion of a forehead flap in conjunction with a bipedicled mucosal flap to cover the lower portion including a cartilage graft with a small degree of alar turn-in (i.e., three separate techniques) to provide lining can achieve adequate lining for the true heminasal defect. Forehead flaps in conjunction with nasolabial flaps have also been described for nasal lining; however, these prove to be somewhat bulky in our experience. Simply skin grafting the raw side of a forehead flap is a viable lining option, but it can compromise the ability to place cartilage grafts at the same time. When doing this, one may risk cartilage graft exposure, loss of skin graft, or both.

For complete heminasal or total nasal reconstruction, some practitioners perform a prefabricated forehead flap reconstruction as described by Barton.[2] This has the advantage of establishing a healed construct prior to the defect. However, in our experience, the prefabricated forehead flap, including its lining and cartilage elements, is somewhat bulky and less malleable. The actual projection and shape of the prefabricated construct may not be as easily re-created at the forehead. It is our opinion that these prefabricated flaps usually require multiple revisions to reach the same results that can be achieved in less steps using lining flaps, grafts, and coverage flaps as described above.

SUPPORT

In addition to failures of lining, failure of adequate reconstruction of cartilaginous support frequently results in unsatisfactory nasal reconstructions. Consequently, we advocate the liberal use of cartilage grafts for reconstruction. Cartilage grafts are often required even if the native cartilage is not ablated at the time of initial Mohs resection. Certainly, if upper lateral cartilage, lower lateral crural, middle, or medial crural cartilages are removed with the extirpation, anatomic grafting should be done. It should be noted that although the anatomic normal alar rim contains no cartilage, an alar rim defect that is reconstructed without a nonanatomic rim graft has high risk of later deformity. This is especially true with alar rim notching, which can be hard if not impossible to correct. Therefore, depending on the defect location and size, anatomic and nonanatomic grafting must be done in nasal reconstruction. In addition, depending on the depth of the soft tissue defects, other sites for consideration of nonanatomic cartilage grafts are the dorsum and sidewalls.

The most frequent donor site for cartilage grafts is the ear. Auricular cartilage is accessed through anterior or posterior approach. Through either of these approaches, the entire flat portion and much of the vertical positions of the conchal bowl can be harvested. Great care must be taken in maintaining meticulous hemostasis when closing the donor site. Careful attention to obliterating potential space with through and through sutures or bolsters is essential. When these are done carefully, there is little risk of hematoma or skin necrosis.

Figure 3 A photograph of a cartilage graft being fit to size for nasal support.

The auricular conchal cartilage graft is well shaped and has a natural curve much like the nasal tip–alar junction and can be appropriately thinned. Only a small height segment is required (1 to 3 mm) for an alar rim graft to maintain shape and prevent notching. It is important to harvest enough transverse length of cartilage to provide a spanning length throughout the entire defect. The anterior and posterior segments of excess graft that are not visible are placed within subcutaneous pockets following the native alar curve. These junctions are sewn in place with through-and-through PDS or Vicryl sutures (Ethicon Inc., Piscataway, NJ) and tied to the inside of the nasal vestibule (Figs. 3 and 4).

Larger alar rim cartilage requirements can be met with either bilateral harvesting of conchal cartilage or septal cartilage harvest. We prefer septal harvest if we need larger pieces of cartilage or if a septal mucoperichondrial flap is to be lifted at the same time. For even larger cartilage requirements, rib cartilage can provide

Figure 4 A photograph of a cartilage graft sutured in place for alar support.

adequate cartilage for total or near-total nasal reconstruction. In women, the 5th rib cartilage can be accessed via a medial inframammary incision. The floating 12th rib is another good option. The need for rib cartilage comes into play mainly in total or near-total nasal reconstruction. We think of this option when a large dorsal onlay will be needed, particularly if a significant portion of the anterior septum has been taken with the extirpation.

Again, in complex defects, the surgeon must ensure that the lining and support requirements are accurately met and reconstructed prior to addressing skin coverage.

SKIN COVERAGE

Accurate surface area, volumetric re-creation of the defect, and color match are the key principles of skin coverage. Whenever possible, the normal contralateral nasal subunits should be carefully outlined and pattern templates created to accurately gauge the surface area and volume of the defect. These can be rendered from a three-dimensional structure to a flat two-dimensional structure with the use of foil pattern templates. Midline reference points are used to accurately size the defect on the contralateral unresected nose.

SKIN GRAFTS

More straightforward full-thickness defects of the nasal sidewall and dorsum can be accurately reconstructed with color-matched skin grafts. These are usually harvested from the preauricular area, which provides ideal donor site closure. The postauricular area may be used as well, but the thickness and color match are not as ideal as the preauricular skin. Skin grafts are versatile for either subunit or defect-only reconstruction, particularly on the high lateral nasal sidewall where the underlying bone and periosteum inhibit graft retraction. This can provide ideal coverage at the medial canthu region and is our first choice for such defects.

If the practitioner opts for full-thickness grafting of the sidewall or dorsal defects, dermabrasion should be an adjunct step of the reconstruction. It should be offered beginning at 6 weeks after the initial reconstruction with entire subunit dermabrasion. It should be subsequently followed up to 3 times at 6-week intervals. This greatly improves the final graft appearance as well as the subunit appearance by obliterating the graft borders as well as improving the final color match.

Lower third skin grafting is, at best, a controversial subject in the plastic surgery literature. Over the past several years, we have expanded our indications for skin grafting of the lower third of the nose. For defects less than 1 cm involving one subunit on the lower third, we

Figure 5 Left: A thin, 8-mm tip defect. Right: 3 months after reconstruction with full thickness grafting and a single dermabrasion.

can repair these with color-matched, thickness-optimized skin grafts harvested from the forehead. We find that these small forehead skin grafts retain much of the texture and color matching that the forehead flap is known for. These grafts are accurately sized and sewn in place with through-and-through Prolene suture (Ethicon Inc., Piscataway, NJ). Despite occasional early signs of partial graft loss, our experience has been very favorable with these grafts both in restoring adequate volume contour and in good color match. Again, lower third defects larger than 1 cm are not considered candidates for this method of reconstruction. Full-thickness defects, defects involving cartilage, and those that directly abut the alar rim in a thin-skin patient are also not considered optimal candidates for full-thickness skin grafting. As with the nasal dorsum and sidewall skin grafts, dermabrasion is considered a mandatory adjunct to lower third full-thickness grafting (Fig. 5).

LOCAL FLAPS FROM THE NOSE
Local flap reconstruction, although well described, has evolved to have a relatively limited role in our practices. Bilobed flaps in particular, although demonstrated as useful adjuncts for serious practitioners, have in our experience been fraught with pin-cushioning at the flap tips, unattractive concavity of the adjacent flap donor site, and overall unpredictability with regard to results. Another common problem is that the bilobed flap almost always violates the subunit principle either at the donor site or the recipient site. Looking back at our results of these flaps (and other published examples), we find distortion of multiple nasal subunits, in particular, contour distortion of the nose from the lateral and oblique views. This reassessment of local flaps based from the nose itself has caused the nasal reconstruction surgeons at University of Texas Southwestern Medical Center to largely abandon the bilobed flaps as a reconstructive technique. It seems incongruent to violate the somewhat flat nasal sidewall to recruit tissue to reconstruct the biconvex nasal ala, as is required for bilobed flap reconstruction. Banner flaps as well as undermining and direct closure tend to be better adjuncts for small defects. These flaps, however, also have a tendency to create concavity at the donor site and pin-cushioning at the recipient site, but to a lesser degree than the bilobed flap. Great care must be taken to neither distort the alar rim nor significantly narrow the alar vestibule when any of these flaps are chosen for these regions. Ultimately, the Banner flap is best used for small defects of the supratip and tip. Direct undermining and closure should be considered for similar small defects of the tip and supratip as well as for the dorsum and sidewall. Often, with the smaller defects, simple closures look better than do local flaps.

DORSONASAL FLAPS
Dorsonasal flaps have become our procedure of choice for full-thickness defects of the nasal dorsum. As described by Rohrich et al,[7] the indications for dorsonasal flaps are defects less than 2 cm in greatest dimension, 1.5 cm from the alar rim, and above the tip-defining points. Essentially, this means these flaps function best at the smooth planes of sidewalls and the dorsum. It should be noted that these flaps are developed in the deep submuscular plane above the periosteum. This is essentially a degloving of the entire dorsum (and sidewall when needed) in order for sufficient laxity to be created. Our dorsonasal flaps are designed without the glabellar extension described by Rieger[8] but rather create a transverse cut across the radix as described by Rohrich et al.[7] We perform early as well as late postoperative dermabrasion to improve final scar appearance (Fig. 6).

Dorsal Nasal Flap

prior to reconstruction

preoperative marking

immediately after flap reconstruction

7 months postoperative

Figure 6   Top left: The preoperative tip defect after Mohs resection. Top right: The preoperative marking for the dorsonasal flap. Bottom left: Immediate postoperative sutures. Bottom right: Photograph at 7-month follow-up visit.

NASOLABIAL FLAP
Nasolabial flaps are ideal reconstructive modalities mainly used for alar defects. Good outcomes can be attained with either defect-only or subunit approaches. In addition, there are certain cases in which the nasolabial flap can be used for nasal tip defects; however, the vast majority of our alar reconstructions are accomplished with nasolabial flaps.

These flaps are designed as superiorly based flaps; we never use the inferiorly based flap. It is important to accurately place the donor scar of the flap within the nasolabial fold by drawing the lower border of the flap exactly at the deepest point of the nasolabial fold. The flap is then undermined superiorly and laterally only. No undermining is done inferiorly into the skin of the upper lip. We also dissect beyond the upper border of the flap into the upper cheek to create enough laxity for closure without creating upper lip distortion.

The natural cheek laxity can provide a great advantage in such cases, especially in the elderly. With accurate division and inset, these can provide excellent alar or tip reconstructions, particularly if these are full-thickness defects requiring cartilage replacement. It should be noted that the very soft and, over time, contractile skin of the nasolabial flap, although sometimes ideal for entire alar reconstructions, is not an adequate substitute for a midline forehead flap. We advise against stretching the indications of the nasolabial flap when use of a forehead flap is indicated.

As described by Burget and Menick,[6] the nasolabial flap is cut to be a millimeter in excess of alar defects. In our practice, however, we actually design the nasolabial flap a little smaller than the defect when doing defect-only reconstruction. When performing complete alar subunit reconstruction, we design them

Nasal tip reconstruction with a two stage nasolabial flap

Intraoperative defect (left)

Nasolabial flap reconstruction

6 months post-operative divide and inset

Intraoperative defect (left)

6 months post-operative divide and inset (right)

Figure 7 Top left: Intraoperative photograph of defect. Top middle: Nasolabial flap ready for division and inset. Top right: Photograph 6 months after division and inset. Bottom left: Intraoperative photograph of defect. Bottom right: Photograph 6 months after division and inset of nasolabial flap reconstruction.

the same size. For alar-tip defects, the largest error that we have found is designing them too large in surface area and bringing an excess amount of fatty tissue in depth. Our nasolabial flaps are carefully thinned to just under the dermal layer, preserving the subdermal plexus. The flap is inset under a slight degree of stretch to prevent the late pin-cushioning deformity. We have found this approach to work in this regard and have taken care not to extend the flap base superior to the lateral ala. The flap itself is carefully elevated over 80% of its maximum length, carefully thinned, donor edge refreshed, and then inset with 5-0 black nylon. Great care is taken to reverticalize the wound edges and to inset the flap within an appropriate amount of wound edge eversion. Nitropaste is applied to all regional flaps including nasolabial and midline forehead flaps for 24 hours postoperatively.

The nasolabial flaps are divided at a minimum of 3 weeks with no attempt made to replace the flap pedicle on the cheek. The donor site is simply excised. This simple excision of the donor bulge helps reestablish the upper nasolabial fold and creates a crisp alar-cheek junction. Mattress sutures can be helpful here. Primary dermabrasion is performed at flap inset followed by secondary dermabrasion of both the flap and donor scar 6 weeks postoperatively (Fig. 7).

FOREHEAD FLAP

Our gold standard for reconstruction of total nasal, heminasal, or larger tip defects is the paramedian forehead flap. No other tissue is as perfect a match for both color and texture. Indeed, if a "home-run" for one of these defects is to be achieved, it is most likely a result of the judicious use of the robust forehead flap.

The design of the paramedian forehead flap is predicated by the patient's defect as well as his or her forehead anatomy. Generally, the flap is designed contralateral to the defect to allow a normal and easy lay of the flap with minimal kinking at the pivot point (Fig. 8).

For male patients with high foreheads, the flap is maintained in an axial pattern throughout its entire length after Doppler identification of the vessels. In the nonsmoker, the flap can be maximally thinned to the subdermis all the way to its most distal point. Careful preoperative measurements with foil patterned templates are transferred to the forehead with reach ensured by use of an Esmarch tourniquet cut to fit as a template. Again, all the remaining lining and support requirements have been met prior to flap design and transfer.

Every attempt is made to minimize involvement of the hair-bearing scalp. However, in a smoker, to maintain an axial pattern, or when there is a large soft tissue requirement, the flap is brought into the hair-bearing area. The subsequent hair-bearing distal flap can

Figure 8 Intraoperative photograph of a heminasal defect. The nasal subunits are outlined. The forehead flap is best designed from the contralateral side of the defect to ensure an easy onlay and minimal kinking of the flap at the pivot point.

be treated with laser ablation or other modalities if required at a later date.

In the female patient, the flap is usually designed with a lateral or medial extension inferior to and along the hairline. The vast majority of the donor sites, if not fully closed, are left to heal secondarily. The flap is elevated transitioning from subdermal, to subcutaneous, to subgaleal, and then to subperiosteal planes for maximal capture of the supratrochlear and supraorbital perforators in the system. Careful hemostasis is achieved at the lateral borders and posterior surface of the flap prior to flap rotation. The flap is then inset with 5-0 vertical mattress suture. Again, nitropaste is applied to all regional flaps including nasolabial and midline forehead for 24 hours postoperatively. Careful attention is paid in confirming hemostasis prior to dressing. The posterior (open) surface of the flap can be grafted with allograft to minimize dressing change requirements.

At the time of flap division, the pedicle that would be discarded can be used to skin graft any remaining open forehead or can be grafted at the time of initial flap inset to minimize dressing care. Again, nitropaste is applied to all regional flaps including nasolabial and midline forehead for 24 hours postoperatively.

The forehead flaps are divided at the earliest 4 weeks postoperatively. The flap is left in place for a longer period if a large degree of flap edema is noted. Allow adequate time for the edema to resolve and satisfactory nasal contour to be reached before proceeding. We will, occasionally, perform an additional intermediate flap-thinning stage. As with the nasolabial flaps, forehead flaps are elevated and thinned to 80% of their maximum length and the wound edges are carefully reverticalized prior to flap division and inset. Primary

and late dermabrasion is performed at both the flap and the donor site.

For complete heminasal and cheek defect reconstruction, the cheek defect is carefully reconstructed with a cheek advancement flap prior to design and development of the forehead flap. The medial borders of the cheek flap, therefore, define the most lateral borders of the defect to be fitted by the forehead flap. No attempt is made to reconstruct both the cheek and nasal defect with a forehead flap (Figs. 9 and 10).
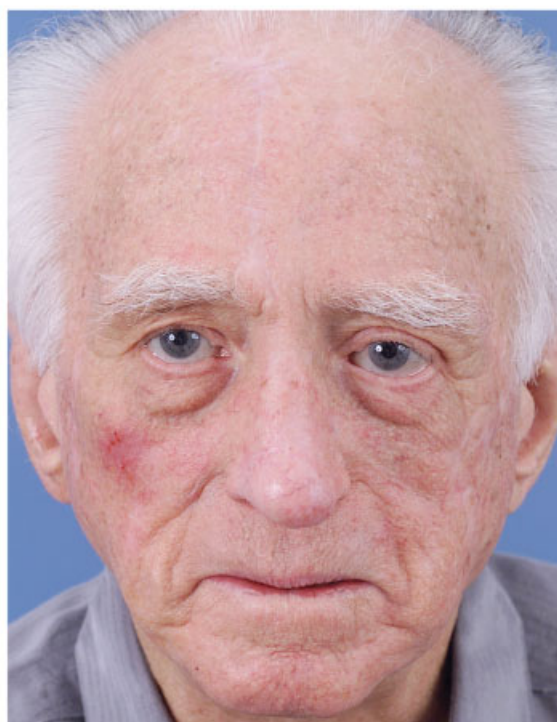
Moh's Reconstruction / Forehead Flap

intraoperative
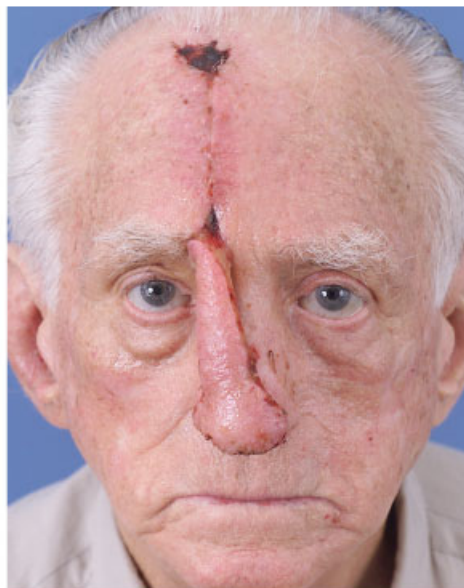
after flap surgery

6 months postoperative

Figure 9   Upper left: Preoperative heminasal defect. Upper right: The forehead flap 2 weeks after initial stage. Bottom: Photograph 6 months after division and inset of flap.

Forehead Flap

intraoperative

intraoperative flap location

after flap surgery

8 months post-operative division and inset

Figure 10   Top left: Preoperative defect. Top right: Intraoperative markings of forehead flap template. Bottom left: 3 weeks after initial flap surgery, the flap is ready for division and inset. Bottom right: Photograph at 8-month follow-up after division and inset.

CONCLUSION

The appropriate care of nasal reconstruction patients begins with a very careful evaluation of the patient, which includes an objective gathering of the patient's functional needs as well as their expectations, both in the long-term and short-term. Additionally, the patient's tolerance for single- or multiple-stage procedures should be determined. During preoperative planning, meticulous attention must be given to lining as well as framework requirements. One must ensure that these will be reconstructed fully prior to undertaking any procedures to provide skin coverage.

A wide range of techniques including defect and subunit reconstruction while using simple as well as more complex flap and multistaged procedures must be in the surgeon's armamentarium.

At the conclusion of the procedure and during the healing process, close postoperative follow-up is mandatory along with liberal use of postoperative adjuncts including dermabrasion, steroid scar injection, and topical silicone sheeting. Postoperative dermabrasion can easily be done in the clinic with only the use of topical anesthetic at 6-week intervals with up to 3 or 4 cycles of dermabrasion. Scar management therapy frequently includes topical silicone sheeting applied for a minimum of 12 hours a day for a 3-month period.

The follow-up period is also an excellent opportunity to have a frank discussion with the patient regarding etiology and preventative measures for skin cancer as well as a general discussion on skin care. With good technical execution and appropriate care, the post–Mohs resection referral for nasal reconstruction can become the most gratifying and grateful plastic surgery patient.

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