

Correction of Cocaine-Related Nasal Defects

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Background: Cocaine abuse causes nasal defects ranging from minor septal perforation to loss of dorsal support, potentially leading to collapse of the entire nose. The authors review the defects caused by frequent insufflation of cocaine, outline representative internal and external nasal deformities, and detail the surgical methods available to correct these deformities.

Methods: The patient must be cocaine-free for several years and committed to remaining free of cocaine use permanently. Next, a clear definition of the existing deformity and precise plan of surgical correction should be established. Surgical correction involves adequate dissection of the soft tissues and cephalic release and caudal advancement of the nasal lining, with a complete and waterproof separation of the nasal cavity from the external reconstructive site. Using costal cartilage, a tongue-and-groove technique is used to elongate the nasal frame. Kirschner wires may be used for costal cartilage graft fixation; avoiding penetration of the nasal cavity is critical. Maxillary defects are restored with cartilage and bone grafts. To address notching of the alae, V-to-Y caudal advancement flaps of the nasal lining and alar rim grafts are used. Tip projection and definition are restored with a columella strut with or without a tip graft.

Results: The surgical outcome is gratifying and does not necessarily require external skin or nasal lining graft, or local or regional flaps. Reconstruction of massive septal perforation is unnecessary, as the nasal form can be restored without repair of this defect. The key to success is avoiding postoperative infection.

Conclusion: Correction of cocaine-related internal and subsequent external nasal defects is extremely challenging and requires a clear understanding of the patient's psychology and nasal abnormality. (*Plast. Reconstr. Surg.* 121: 1015, 2008.)

Recreational use of cocaine has become a common form of drug abuse in the United States. Although cocaine can be administered through a variety of routes, the intranasal route is the most common.¹ This preference for insufflation exposes the nasal mucosa to the intense vasoconstrictive effects of cocaine and the myriad of caustic additives with which it is often mixed, thus causing varying degrees of damage to the nasal tract.² These adverse effects were first recognized by Owens in 1912 and range from a pinhole perforation to different degrees of mucosal ulceration, destruction of septal cartilage, and in extreme cases, destruction of nasal and maxillary bones.³

Repeated constriction of the blood vessels of the nasal mucosa leads to soft-tissue and osteocar-

tilaginous necrosis. The exposed septum may soon become infected, and if left untreated, the ensuing chondritis causes a septal perforation of varying size. With each repeated cocaine insufflation, this perforation expands. The perforated septum loses its supportive function and subsequently the nose collapses, retracts, and becomes shorter.⁴

There have been sundry methods proposed to reconstruct the nose damaged by repeated cocaine insufflation. Some of these require the use of microvascular techniques, with an assortment of flaps, to repair larger septal defects.^{5,6} Because the use of these flaps commonly hinders the normal function of the airway because of the bulk of the flap, septal perforation of considerable magnitude should not be corrected until an extremely thin flap can be discovered. In this article, we

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propose techniques that use basic and complex principles of aesthetic and reconstructive rhinoplasty to restore dorsal support and form to the nose without necessarily repairing large septal perforations.

PATIENTS AND METHODS

A prudent analysis of the deformity begins with careful assessment of the patient's psychological status. Understanding the patient's reasoning and motivation to undergo surgery and, more importantly, their commitment to living cocaine-free is crucial to the long-term success of the surgery. Otherwise, the attained gratifying reconstructed nose can easily be destroyed by further insufflation of cocaine. Therefore, it is imperative to ensure that the patient has been cocaine-free for several years before undertaking this reconstruction procedure and is committed to continuing a lifestyle free of cocaine use.

Extensive septal defects often lead to external deformities, including a foreshortened nose, with exposure of the nostrils, an inverted V deformity, and deviation of the external nose to the patient's dexterous side. This nasal deviation is commonly related to more extensive destruction and contraction of the nasal lining involving some of the lateral nasal wall and alar cartilages on the nasal side used more frequently for cocaine insufflation. Consequently, the nasal tip is pulled to the side where insufflation of cocaine has repeatedly taken place. This side is usually the patient's dexterous side, as the insufflation device is often held in the dominant hand. The alar bases are commonly asymmetrical and, although the alae are notched bilaterally, right-handed patients have more significant alar notching and deformities on the right side, whereas left-handed patients demonstrate these defects more severely on the left side.

Collapse of septal cartilage alters the dorsal alignment of the upper lateral cartilages and septum with the nasal bones. This creates the appearance of a bony hump on the profile view that might not have been present before the septal collapse and development of saddle nose deformity. Collapse of the nose frame also causes lateral distribution of nasal and perinasal skin, thus exaggerating the nasolabial fold and widening the alar base. The nose becomes shortened, with a varying degree of change in the nasolabial angle. Sometimes the columella is retracted, but despite this, alar notching results in exposure of the columella. The nasal tip projection is commonly diminished, the upper lip is frequently pulled ce-

phalically, and there is typically a deficiency in the nasal spine area.

On basilar view, there is often a more significant collapse of the ala on the dominant side, with the columella shifted externally toward the involved side. Particularly on the dominant side, nostril height is reduced along with a significant loss of columellar length. On internal examination of the patient's nose, one can find a small to massive perforation of the nasal septum. Frequently, a superimposed bacterial infection extends the defect. On occasion, there is extensive synechia lowering the anterior nasal vault and constricting the nasal valves. Commonly, there is an associated enlargement of the turbinates, although destruction of the turbinates can also be seen.

When examining these patients, the entire face should be analyzed thoroughly, paying particular attention to the perinasal region to identify any concomitant defects such as collapse of the maxillary wall. Soft-tissue cephalometric analysis of the life-size photograph will facilitate detection of nasal and facial flaws and will further abet definition of the intended aesthetic and reconstructive objective.⁷

Surgical Correction

The cocaine nasal deformity is corrected under general anesthesia to allow for harvesting of the costal cartilage and to provide a secure airway. The nose is initially injected with lidocaine (Xylocaine; AstraZeneca, London, England) containing 1:200,000 epinephrine. After establishment of some vasoconstriction as a result of the initial injection, the nose is infiltrated with 0.5% bupivacaine (Marcaine; AstraZeneca) with 1:100,000 epinephrine containing hyaluronidase to provide additional vasoconstriction and longer-lasting comfort without the systemic effects of epinephrine.

The open technique, using a step columellar incision, provides optimal exposure and allows for careful dissection of the nasal frame. On patients with an alar notching over 2 mm, a V-type incision is made and extended to the junction of the upper lateral cartilages with the lower lateral cartilages, rather than using a marginal incision. The vestibular lining is elevated as a flap for the subsequent V-to-Y caudal advancement of the alar rim as the incision is repaired. The tip and the dorsal soft tissues are elevated next. The caudal frame is preserved as much as possible and the dorsal skin is dissected meticulously to ensure that the nasal lining is not penetrated. The dissection is con-

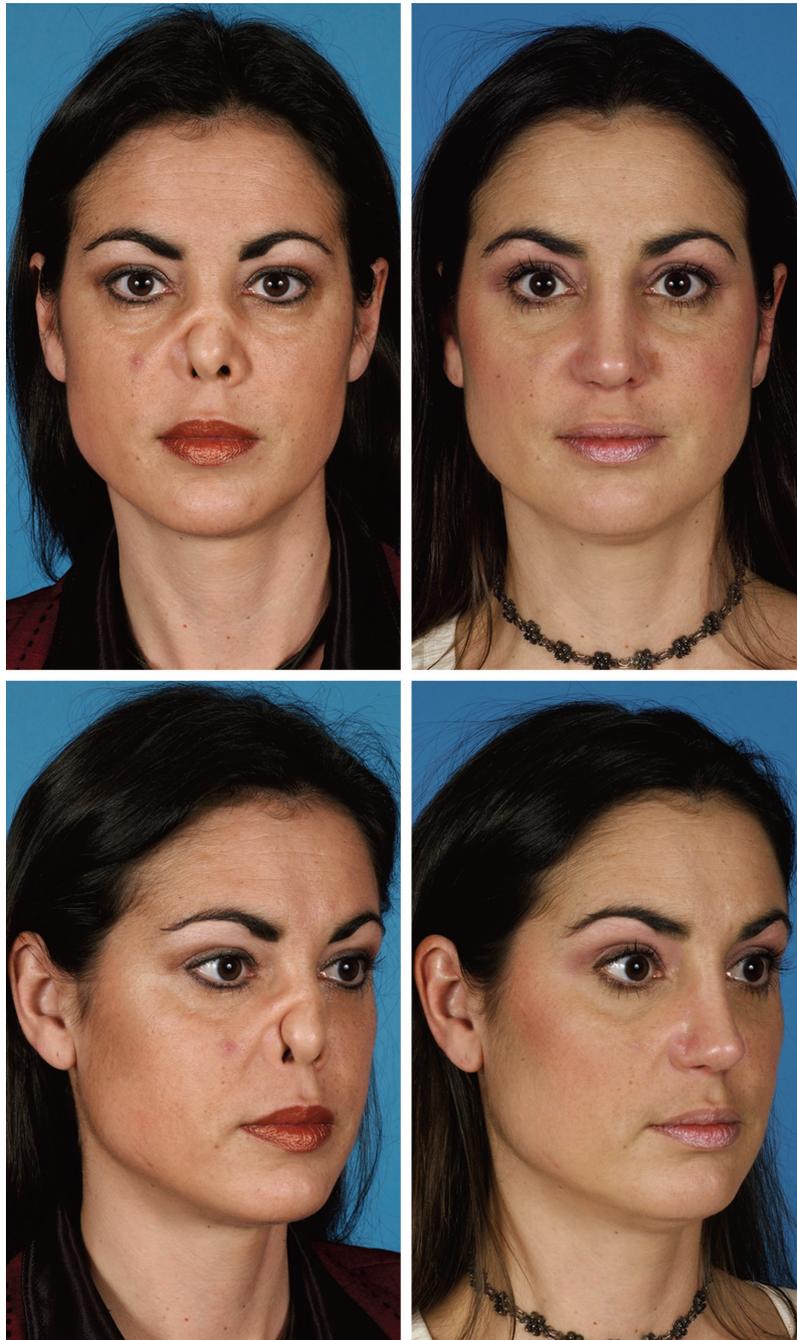


Fig. 1. Standard views of a patient demonstrating improvement in the nasal form 1 year postoperatively. This patient initially had an optimal alignment during surgery. However, she developed deviation to the left as a result of loss of left alar support. She underwent a second operation to improve the alignment of her nose and to reconstruct the right alar cartilage.

ducted carefully in the subperiosteal level up to the glabellar region and later advanced caudally to afford sufficient coverage of the reconstructed frame. The nasal lining is protected throughout the dissection, and any inadvertent penetration of the lining is repaired watertight.

To provide adequate elongation of the nose, the existing basal nasal frame is moved in the caudal direction with multiple-tooth forceps. If this requires more than minimal effort, the nasal lining is released cephalically under the nasal bones and advanced caudally and attached to the



Fig. 2. Additional views of the patient shown in Figure 1.

nasal cavity using 5-0 Monocryl (Ethicon, Inc., Somerville, N.J.). Occasionally, it is necessary to use burr holes in the bones to facilitate this repair. The goal is to avoid any open communication between the reconstructed area and the nasal cavity. If there is any dorsal bony hump, it is removed and the nasal bone osteotomy is performed only when absolutely necessary. The area is irrigated repeatedly and copiously using saline solution

containing 1 g/1000 cc of one of the first-generation cephalosporins.

The costal cartilage is harvested next. In women, a submammary incision is used; in men, a lower chest wall incision over the tenth rib is preferred. The incision is deepened to the rectus muscle using the coagulation power of the electrocautery. The sixth or seventh rib is exposed on a woman and the tenth rib on a man, and the

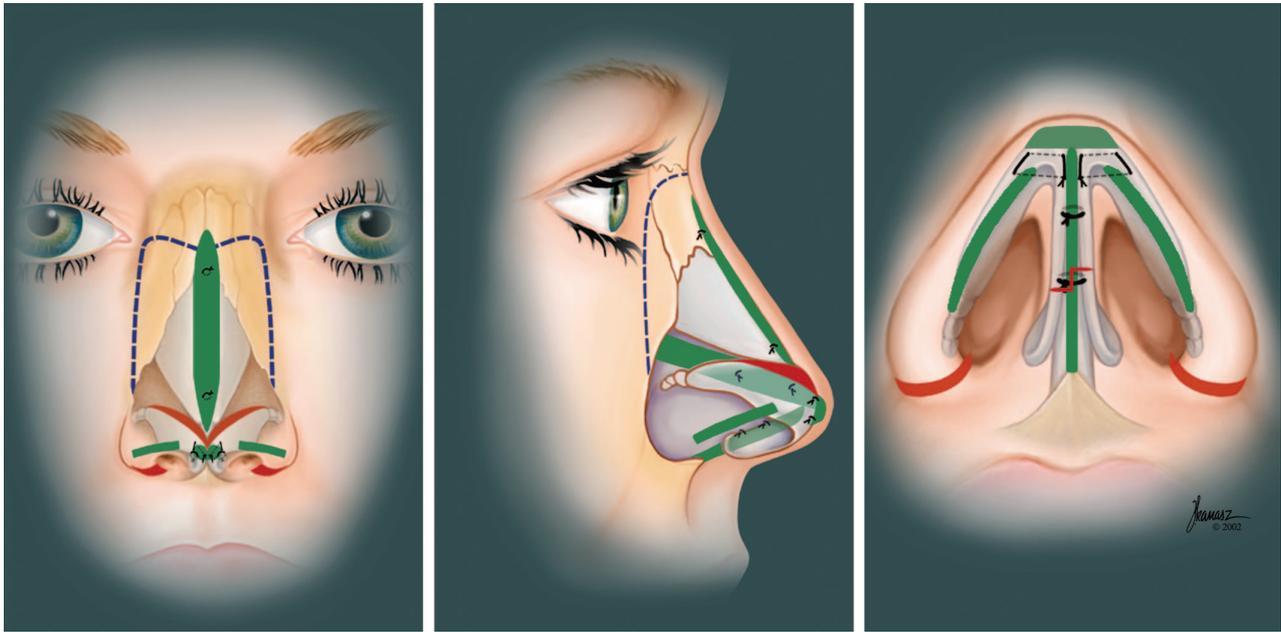


Fig. 3. Diagrams illustrating the maneuvers used on the patient shown in Figures 1 and 2.

costochondral junction is identified. The periosteum and the perichondrium are elevated and the incision is continued medially. A piece of rib cartilage is harvested medially with sufficient length to reconstruct the dorsal frame. The integrity of the pleura is ensured using the Valsalva maneuver. A suction drain is placed in position, and detailed repair is performed using a combination of 3-0 Monocryl, 5-0 Monocryl, and 5-0 plain gut. At this point, the existing dorsum is lowered cephalically and flattened enough to avoid irregularities, rocking, and dislodgement of the rib cartilage.

Next, a piece of conchal cartilage is harvested using a posteromedial approach. The selected ear is infiltrated with Xylocaine containing 1:100,000 epinephrine medially and laterally. A postauricular incision is made and the skin and the perichondrium are dissected carefully off the conchal cartilage. An incision is made in the cartilage, and the lateral perichondrium is elevated from the conchal fossa. The conchal cartilage is harvested, encompassing the entire conchal fossa, leaving sufficient cartilage for support for the ear. Hemostasis is secured, and the wound is irrigated. A suture is brought through the upper portion of the conchal fossa, passed through the mastoid fascia, and brought out through the lower pole using 5-0 plain catgut. The postauricular incision is then repaired using running, locked, 5-0 plain catgut suture. A cotton dressing is applied to the conchal fossa and the previously placed suture is tied over it to eliminate any dead space at the donor site.

Using costal cartilage, a dorsal graft is fabricated, adhering to Gibson's principles. The medial crura are separated, pulled anteriorly using a pair of wide double hooks, and tattooed across the medial crura, and the domes are advanced equally and aligned perfectly. A columellar strut is carved using the costal cartilage. A Kirschner wire is placed longitudinally within the fabricated dorsal cartilage graft to minimize the potential for warping. The dorsal graft is then placed into position. Two Kirschner wires are inserted to affix the dorsal graft to the underlying nasal bones and the dorsal skin is pulled caudally to avoid entrapment of the soft tissues in a cephalic position. Although it is crucial to engage these Kirschner wires with the bones sufficiently, penetration of the nasal cavity is strictly avoided. The columellar strut is placed between the medial crura and fixed posteriorly to the anterior nasal spine using a 5-0 nylon suture. Anteriorly, the strut is placed in the groove at the caudal end of the dorsal graft and fixed into position with 5-0 nylon sutures. The medial crura are sutured to the columella strut using at least two 5-0 nylon stitches.⁸ Alar cartilage is rarely destroyed in this deformity. If necessary, it is replaced with a piece of conchal cartilage that is sewn to the ipsilateral medial crus–columella strut composite frame.⁹ Maxillary grafts are placed into position at this time if necessary. A temporary suture is placed in the columellar incision, and to stabilize the graft and prevent any rotational movement, the Kirschner wires are checked and reinserted if necessary. As mentioned above, extreme care is ex-



Fig. 4. Standard views of a patient demonstrating improvement in nasal form 10 months after a single-stage nose reconstruction to eliminate cocaine-related nose deformity.

exercised to avoid penetration of the nasal cavity with the Kirschner wires. Otherwise, bacteria may seed the graft through the pierced nasal lining when these wires are removed and cause a post-operative infection that may jeopardize reconstructive efforts.

If a tip graft is deemed necessary, it is prepared from conchal cartilage using the tip graft punch¹⁰ and is positioned and fixed using 6-0 Monocryl.

This will be followed by placement of alar rim grafts bilaterally. After conversion of the V-to-Y caudal advancement of the nasal lining flap, alar rim stents are placed and sewn into position, one internally and one externally. These are fixed into position using a 5-0 Prolene suture (Ethicon).⁹ These sutures are tied lightly to avoid necrosis of the nasal skin or lining. The columella incision is repaired using 6-0 fast absorbable catgut. An Aqua-

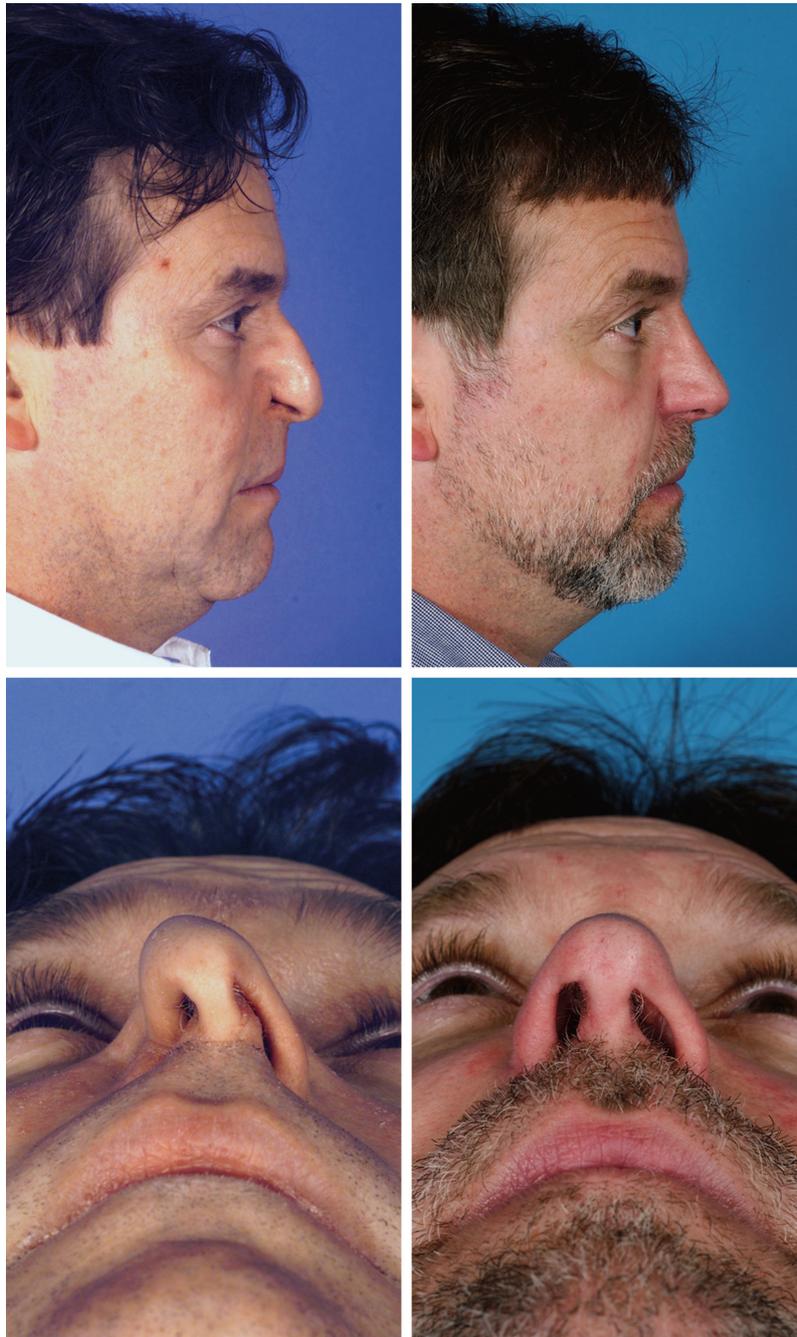


Fig. 5. Additional views of the patient shown in Figure 4.

plast dorsal splint (Smith & Nephew, Inc., Germantown, Wis.) is applied and kept in position for approximately 8 to 10 days. The Kirschner wires are removed in 3 weeks, during which time patients receive oral antibiotic prophylaxis.

DISCUSSION

Cocaine insufflation has the potential to cause an array of nasal defects that can drastically alter the user's appearance. These patients carry a

stigma of their disconcerting habit, and although they may have a deep desire to return to a drug-free and productive life, the abnormal appearance hinders their interactions.

The ultimate goal of the operation is to restore lasting normal form and function to the nose. Those who continue to abuse cocaine are not suitable candidates for this type of surgery, as further abuse will inevitably destroy the reconstructed frame. Therefore, a successful out-

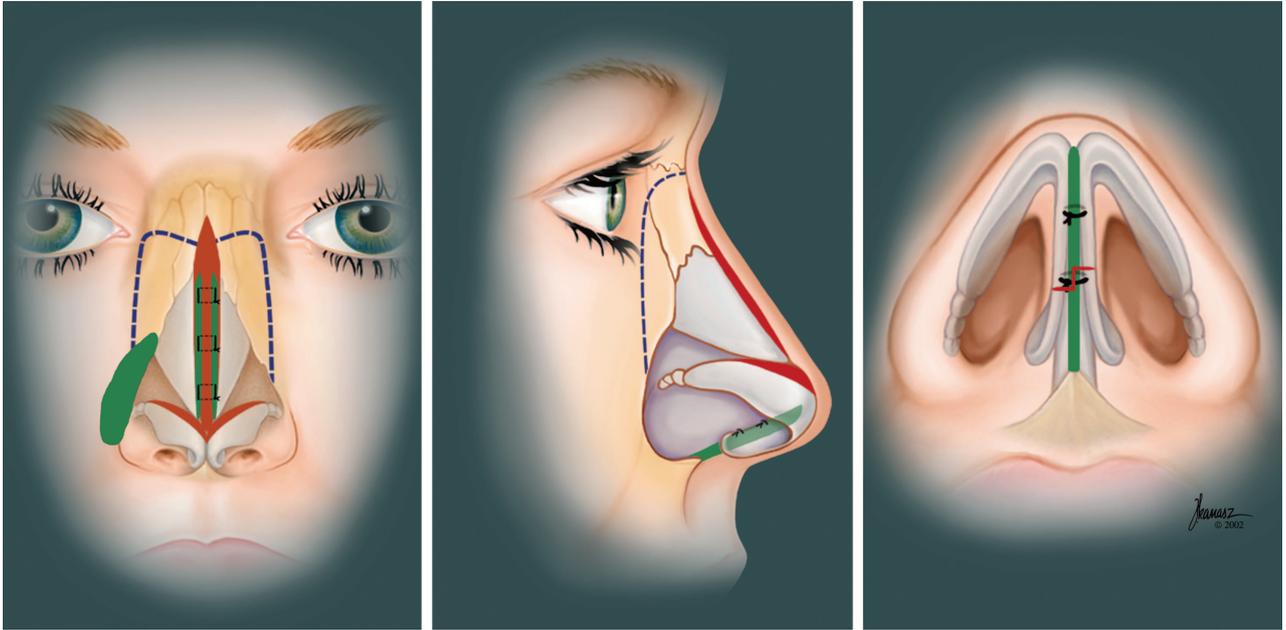


Fig. 6. Diagrams illustrating the maneuvers used on the patient shown in Figures 4 and 5.

come hinges on multiple factors, including circumspect clinical and psychological analysis, proper identification of the internal and external nasal defects, and full execution of basic principles and complex aesthetic and reconstructive rhinoplasty techniques.

Large septal defects beyond 3 to 4 cm in diameter do not lend themselves to an easy and successful reconstruction. Although microvascular techniques have made such a reconstruction feasible, use of radial forearm free flaps and pericranial flaps, among others, will result in a bulkier septum that compromises the nasal airway and may have deleterious effects on breathing. A fully repaired septum that constricts the airway because of its excessive thickness is less desirable than a perforated septum. In addition, most of these microvascular surgical techniques result in visible displeasing scars.^{5,6} For these reasons, justification of such an undertaking becomes an intellectual challenge. In our view, this type of reconstruction should be halted until an extremely thin flap can be discovered. Unless superiority in function of a septum repaired with a microvascular technique can be demonstrated, one should not embark on such a reconstructive journey without a comprehensive analysis.

Old procedures coupled with newer modifications of reconstructive techniques serve these patients successfully and provide a relatively normal nasal form and function. Because repair of

large septal perforations is not deemed justifiable, it would be an exaggeration to suggest that these patients have an optimal nasal outcome. However, dorsal support and form are restored without sacrificing patency of the nasal airway. These patients do become socially presentable and are no longer the subject of curiosity and questioning regarding their nasal deformity (Figs. 1 through 6). This report clearly illustrates the complexities of this operation and the importance of a comprehensive analysis and surgical approach to achieve gratifying but less than perfect results. It is important to inform the patients of this shortcoming and prevent unrealistic expectations.

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