The Principles and Practice of Primary Endonasal Rhinoplasty

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Abstract: The purpose of this article is to provide a guide for plastic surgeons, regardless of experience level, seeking to improve his/her endonasal rhinoplasty skills and comfort level. We have presented the advantages of our technique and its unifying principles and demonstrated how endonasal rhinoplasty can be used to achieve safe, anatomical, and predictable outcomes. Endonasal rhinoplasty is a separate thought process from open rhinoplasty and should not be viewed as a competing but rather parallel technique that is broadly applicable to many nasal deformities.

We have described the basic goals of all rhinoplasties and highlighted 2 false assumptions that are responsible for most adverse rhinoplasty outcomes and 4 anatomical deficits that surgeons must recognize preoperatively to maximize function, proportion, and contour. Finally, the majority of primary rhinoplasties can be performed with 1 of 2 operative strategies that depend on the relationship of the dorsum to the lower nose. Because surgeons often presume that they will not be able to "see well enough" in endonasal rhinoplasty or worry they have not been adequately trained in the technique, we have provided a step-by-step guide to help overcome such fears and help these surgeons to achieve results that will exceed their patients' goals.

Key Words: closed rhinoplasty, endonasal rhinoplasty, rhinoplasty, spreader grafts, primary rhinoplasty, dorsal graft, tip graft, radix graft

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Endonasal rhinoplasty is an operation that allows the surgeon to change nasal shape, symmetry, proportion, and support and make skeletal alterations largely under direct vision. It is a different thought process than modern open techniques, just as liposuction is a different process than abdominoplasty. Endonasal rhinoplasty focuses on skin surface changes: the skeleton, altered through focused access, becomes the means to reshape it. The effects of reduction and augmentation depend on the ability to judge how the skin sleeve reacts intraoperatively. This is the anatomy that the patient sees, and it determines the success of the surgical result.

THE SHEEN LEGACY

Only 40 years ago, virtually every rhinoplasty was endonasal. There was general consensus that patients with failed results could not be helped. Augmentation was rare and reserved for limited surface defects. That has all changed so completely that it is easy to forget many of our rhinoplasty concepts came from a single mind. The Sheen lexicon is now ours: middle vault collapse, the inverted V deformity, "parentheses deformity," the patient's aesthetic, the "ethnic nose," low radix/disproportion, and many more; aesthetic ideals defined in practical, not artistic, parameters; skeletal preservation, especially for thick-skinned patients; no osteotomy; the narrow nose; the straight dorsum; inadequate tip projection; camouflage for asymmetry; the 2 surface concept in alar wedge resection; the low-to-high osteotomy; and the big ones: dorsal and tip grafts for supratip deformity, spreader grafts; short nasal bones; alar cartilage malposition, the middle crus; the "shield" tip graft, crushed cartilage grafts, and ear cartilage as a donor site.[1–3]

The techniques presented are our articulations of Sheen's techniques. We have added a superstructure that places primary and secondary deformities into a recognizable framework, identifies 4 anatomical keys to avoiding secondary deformities, and creates a pattern for surgical planning based on that anatomy and on surface relationships.

THE THOUGHT PROCESS

The goals of nearly every rhinoplasty are to achieve a straight profile with adequate tip projection and an optimal airway. Nearly all postoperative deformities result from failure to diagnose anatomic deficits, assess tissue characteristics, or recognize functional/structural interrelationships, not because the surgeon could not see well enough.

Surgeons and patients spot excesses easily: too big, too wide, or too long. It is deficits that are harder to see. Failure to understand 2 false assumptions and diagnose 4 anatomical deficits creates 3 characteristic patterns that account for all types of secondary deformities: deformities from soft tissue contraction, skeletal contraction, or imbalance.

TWO FALSE ASSUMPTIONS

Underlying much rhinoplasty theory are 2 foundational principles that are both incorrect.

False Assumption 1: The Skin Is Passive and Will Follow Any Skeletal Change

Because the skin is not a tablecloth but has its own contraction vectors, failure to recognize skin limitations results in postoperative deformities from soft tissue contraction. This is characteristically a low dorsum, blunt tip, elevated supratip, and retracted columella and/or alar rims; and occurs when the skin sleeve cannot adapt to the shape and size of the reduced skeleton, the end product of which is supratip deformity (Fig. 1). Nasal contour is the product of both skeletal shape and its investing soft tissues, and is therefore why surgeons need a reliable real-time assessment of nasal adaption to skeletal changes.

False Assumption 2: Changes in One Nasal Region Do Not Affect Other Areas

The nose reacts to reduction and augmentation as a system of 2 interrelated layers. The deep layer is composed of the upper lateral cartilages, nasal bones, and septum. The superficial layer is the skin sleeve containing the lower lateral cartilages and their lining (Fig. 2). This layered arrangement explains why the nose shortens after dorsal reduction: the tip cartilages are contained within the skin sleeve.

FOUR COMMON ANATOMIC DEFICITS THAT PREDISPOSE TO UNFAVORABLE RESULTS

Only 4 anatomic deficits in the primary nose, if unrecognized, predispose to secondary deformities: low radix/dorsum, narrow middle vault, inadequate tip projection, and alar cartilage malposition[4] (Table 1).

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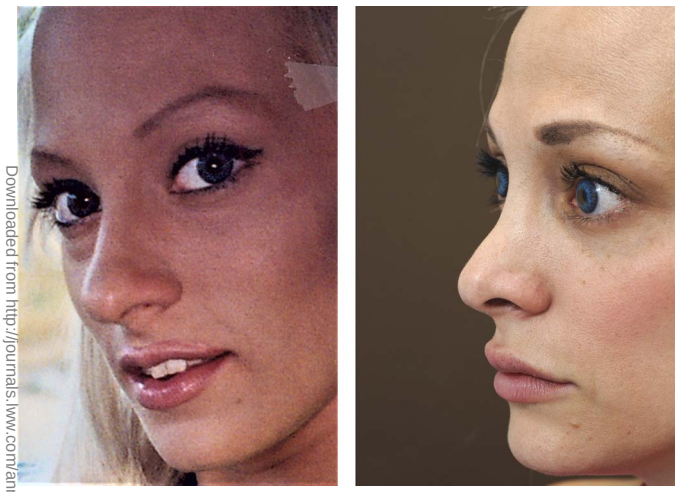

FIGURE 1. Secondary deformities from soft tissue contraction. Left, Preoperative photograph before any nasal surgery. The dorsum is straight. Right, After 3 reduction rhinoplasties, the soft tissues have scarred and collapsed. Although the underlying skeleton is straight, the patient's soft tissues cannot contract sufficiently to show its shape (false assumption one). The resulting shape is a low dorsum with a thick, contracted tip lobule and elevated supratip. The nose seems larger, although the skeleton is smaller. full color online

Each yields an unfavorable result, which can be avoided by incorporating their correction in the surgical plan.

Low Radix or Low Dorsum

A low radix or low dorsum begins caudal to the level of the upper lash margin with the patient's eyes in primary gaze (32% of primary patients and 93% of secondary patients in one series[4]). First described by Sheen, the low radix creates an imbalance where the upper nose seems too small for its nasal base.[2] When the dorsum is raised, the nasal base appears smaller (Figs. 3, 4) and the nose often lengthens. The opposite is also true: when the dorsum is lowered, the nasal base appears larger and the nose shortens. Thus a primary benefit of radix or dorsal grafts is the ability to optimize nasal balance.

When the preoperative nasal base is large, the surgeon has 2 options: tip reduction or dorsal/radix augmentation to balance the base. Because the skin sleeve has limited contractility, variations of the latter option are often more predictable, especially for thicker nasal tissues. Failure to recognize the low radix or low dorsum leads to deformities from imbalance (Fig. 5).

TABLE 1. The 4 Common Anatomic Deficits That Predispose to Unfavorable Results

Deficit	Threat	Treatment
Low radix or low dorsum	Imbalance	Dorsal or radix graft
Narrow middle vault (or >2 mm roof resection)	Internal valvular obstruction	Spreader or dorsal grafts
Inadequate tip projection	Supratip deformity	Tip grafts
Cephalic position of the lateral crura or excessive reduction	External valvular obstruction	Maintain sufficient lateral crural width, lateral crural repositioning, or alar wall graft

Narrow Middle Vault

A narrow middle vault can be defined as any upper cartilaginous vault that is at least 25% narrower than the upper or lower nasal thirds, giving the frontal view an hourglass appearance (present in 38% of the primary patients and 87% of the secondary patients in one series[4]). Described by Sheen in conjunction with short nasal bones,[5,6] narrow middle vault places the patient at high risk for internal valvular obstruction. Internal valvular obstruction may exist preoperatively or may more commonly be produced by dorsal resection. Resection of even 2 mm of the cartilaginous

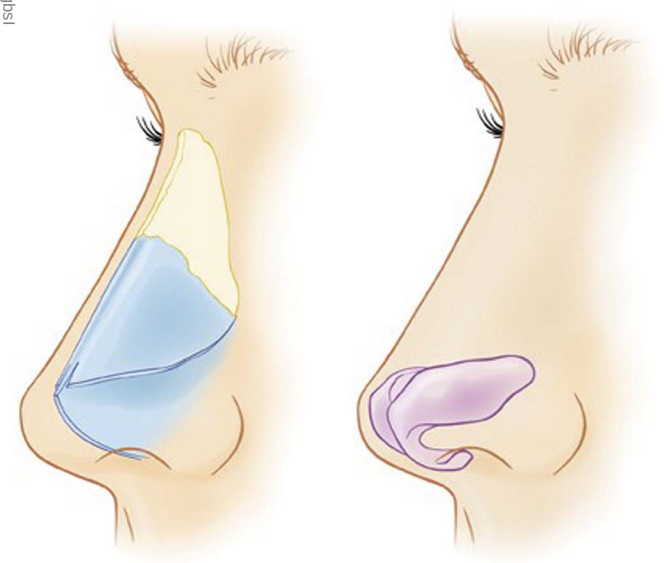

FIGURE 2. The functional nasal layers. Composite nasal anatomy is divided into the (left) deep layer and the (right) superficial layer. It is critical to notice that the alar cartilages are contained within the skin sleeve and are thus superficial to the remaining skeleton, explaining why the nose shortens or lengthens when dorsal height decreases or increases, respectively. Reprinted with permission from Constantian.[1] full color online

FIGURE 3. Secondary deformity from soft tissue contraction. Left, Preoperative view of a patient before any nasal surgery. Notice that the whole dorsum is straight and low compared with the size of the nasal base. Right, After 3 reduction rhinoplasties, the dorsum is lower, the nose has shortened (remember the functional nasal layers), and contours have blunted. Patients will commonly complain that the nose seems larger. full color online

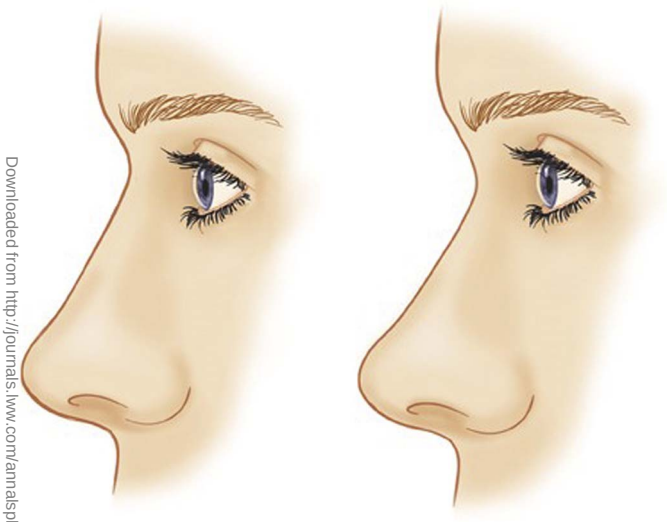

FIGURE 4. Effect of dorsal height on nasal base size. Both lower noses are the same size, but the one on the right seems larger because the radix begins at the lower, not upper, lash margin. This is only an optical illusion, but one that can help the surgeon correct deformities of nasal disproportion with dorsal or radix grafts. Reprinted with permission from Constantian.[1] full color online

roof ablates the stabilizing confluence that brace the middle vault, which can collapse toward the anterior septal edge and reduce the nasal airway by 50%.[7] The narrow middle vault is treated with spreader or dorsal grafts. The importance of the internal valve was demonstrated in a study of 600 consecutive patients undergoing surgery for airway obstruction between 1991 and 2007 by the senior author, reported in 1996 and 2009.[1,7] This study showed that internal valvular reconstruction by dorsal or spreader grafts doubles nasal airflow, regardless of whether a simultaneous septoplasty is performed. Both spreader and dorsal grafts are equally effective in supporting the internal nasal valves.[7]

Alar Cartilage Malposition

Alar cartilage malposition refers to cephalically rotated lateral crura whose long axes run toward the medial canthi instead of the lateral canthi, and was first recognized by Sheen as an aesthetic deformity that produced a round or boxy tip lobule with characteristic "parentheses" deformity on frontal view.[5] Initially believed to be a rare deficit, malposition is actually present in approximately 50% of primary patients and 80% of secondary patients[5] (patient 1 below).

Malposition has 2 ramifications that are not aesthetic. First, the abnormal cephalic position of the lateral crura places them at risk if an intracartilaginous incision is made at its normal location, which will transect the rotated lateral crus instead of reducing it. In addition, most malpositioned lateral crura do not provide adequate external valvular support, and so are a leading cause of external valvular incompetence.[5,8,9]

The treatment of lateral crural malposition requires either resection and relocation or supporting areas of external valvular collapse with autogenous grafts. Approximately 50% of patients presenting with external valvular obstruction have alar cartilage malposition.[8] Like cartilaginous roof resection, failure to recognize malposition contributes to deformity from skeletal contraction. Thus only 2 decisions are needed to develop a tip strategy: whether the lateral crura are orthotopic or cephalically rotated (which determines external valvular stability), and whether the tip is projecting (which determines treatment of the tip lobule).[2,9]

Failure to recognize a narrow middle vault or malposition leads to deformities from skeletal contraction. As the skeleton reacts to resection, surface changes appear such as inverted-V deformities, knuckled domes, and buckled or retracted alar rims (Fig. 6). These common manifestations of valvular deformation and incompetence can be avoided with spreader/dorsal grafts (internal valves) or by preserving adequate lateral crura or supporting areas of collapse with alar wall grafts (external valves).[8] Either method doubles airflow.[1,7]

Inadequate Tip Projection

An inadequately projecting tip does not project to the level of the anterior septal angle (present in 31% of the primary patients and 80% of the secondary patients in one series[4]) (Fig. 7). Tip projection is necessary for a straight profile and depends on the length of the alar cartilage middle crura.[2] It is important to recognize that lower nasal size (volume) is not the same as tip projection. The former reflects skin volume; the latter reflects cartilage strength.

FIGURE 5. Left, Secondary deformities from imbalance presurgical view. The dorsum is adequate height compared with the size of the nasal base. Right, Dorsal and tip reductions have worsened the imbalance. full color online

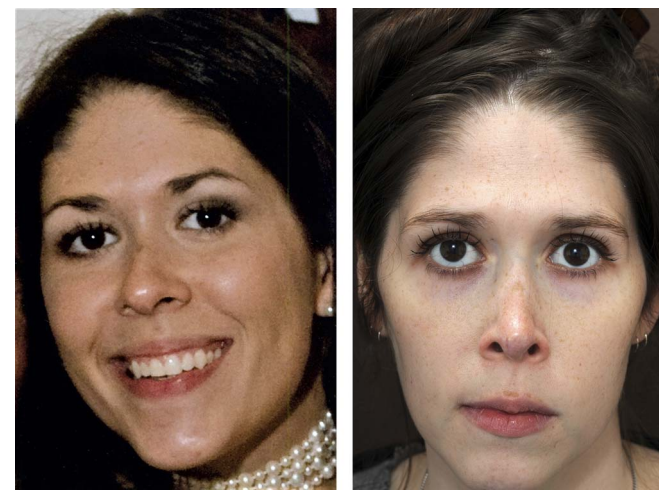

FIGURE 6. Secondary deformity from skeletal collapse. Left, Preoperative view. The patient has a narrow middle vault and malposition, predisposing to valvular collapse with nasal reduction. Right, Dorsal reduction creates an inverted-V deformity; lateral crural reduction decreases alar wall support, so the rims retract. Rhinomanometric measurements would predict that the patient has lost 75% of her airway from the resulting internal and external valvular incompetence.[7] full color online

Defining tip projection using the tip lobule and the anterior septal angle has practical value: adequately projecting tips do not need increased support, whereas inadequately projecting tips do. Because an inadequately projecting tip depends on dorsal height and not intrinsic cartilage support, the surgeon must augment middle crural length. Failure to recognize inadequate tip projection leads to deformity from soft tissue contraction (Fig. 1).

The 4 Deficits in Practical Application

None of these 4 anatomical deficits always requires treatment, yet each deficit provides a cautionary sign. At least 1 of these 4 anatomic traits was present in each of the 150 secondary patients in one series. Some 78% of the secondary patients and 58% of the primary patients had 3 or all 4 traits.[4] The most common grouping in both primary and secondary patients is the triad of low radix, narrow middle vault, and inadequate tip projection (40% and 28%, respectively).

THE PRINCIPLES OF SURGICAL CORRECTION

Recognizing the anatomical excesses is usually easy. The patient points them out: too big, too wide, or too long. Both excesses and deficits, all visible on the surface, allow the surgeon to set a surgical plan preoperatively. The need for dorsal, radix, alar wall, or tip grafts need never be a surprise. The only decisions made intraoperatively are therefore not qualitative but only quantitative.

Every surgical step is optional and should be done for a specific reason. Some surgeons prefer to deliver the tip and use sutures in endonasal rhinoplasty,[10] whereas others have adopted preservation techniques.[11] Instead of relying on internal sutures or struts, one can reduce excesses and augment deficiencies (low radix, inadequate tip projection, or valvular incompetence [caused by narrow middle vault or malposition]) to simulate naturally occurring anatomy.

SURGICAL DETAILS

The following steps can be applied to both primary and secondary deformities, with the only difference being available donor sites. Access is achieved through unilateral or bilateral intercartilaginous incisions using a #15 blade and dissection with Joseph scissors (see video, Supplemental Digital Content 1, http://links.lww.com/SAP/A712). Dorsal reduction is performed with a rasp for the bony vault and a #11 blade

FIGURE 7. Tip projection reflects alar cartilage (middle crural) strength sufficient to support the tip independent of dorsal height. Left, Inadequately projecting tips hang from the septal angle. Right, Adequately projecting tips support themselves independently. Projection was created by lengthening the middle crura with tip grafts only (no sutures or struts). full color online

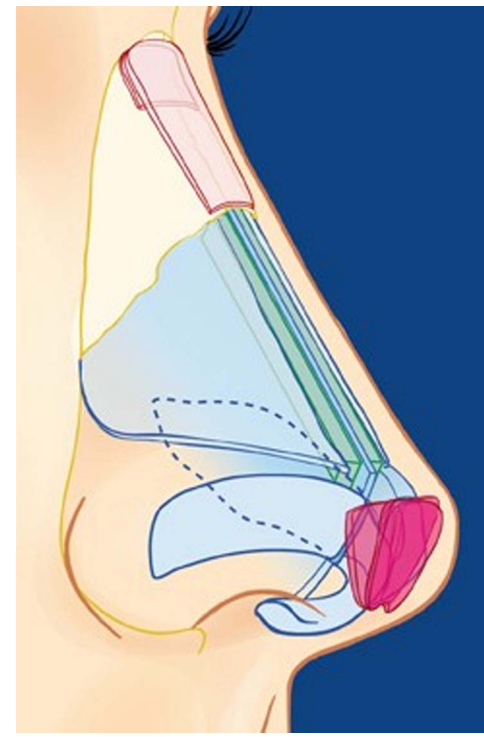

FIGURE 8. Schematic showing radix, spreader, tip graft strategies, our typical strategy when the dorsum is high relative to the base. The dorsum was reduced and the lateral crura were relocated. Reprinted with permission from Constantian.[1] full color online

(with the tip broken off to protect the skin) to resect the cartilaginous dorsum. The lateral crura are trimmed retrograde; usually no more than 2 to 3 mm of the cephalic margin is removed (see video, Supplemental Digital Content 2, http://links.lww.com/SAP/A713). Alternatively, an infracartilaginous incision can be used to relocate each lower lateral cartilage if cephalically rotated and sufficiently deforming (patient 1). Less deforming but malpositioned lateral crura may be narrowed (leaving at least 10 mm) and the unsupported alar walls grafted.

If necessary, a transfixion incision is made and the cartilaginous and membranous septa are trimmed as needed to shorten the nose. Once the dorsal line is set, spreader graft tunnels are developed using a Cottle elevator. Thus the septal dissection and spreader graft tunnels do not connect.

A Killian incision is used to perform a septoplasty and harvest graft material, leaving 15 mm dorsal and caudal struts. The struts are not stripped of their mucoperichondrial attachments to minimize negative effects on septal cartilage.[12] All grafts are inserted in limited pockets without the need for suture fixation. Spreader grafts are inserted into tight tunnels along the previously undissected dorsal strut and can be used to correct asymmetries (patient 1, Fig. 8), using unilateral or, more commonly, asymmetric bilateral grafts (see video, Supplemental Digital Content 3, http://links.lww.com/SAP/A714, which demonstrates spreader and dorsal grafts). Indicated dorsal or radix grafts are placed next. The low radix must always be assessed relative to nasal base size: if the base is small, dorsal resection improves balance, and radix grafts are unnecessary. Radix and dorsal grafts should not be too short or too narrow and must fit the defect[1] (see video, Supplemental Digital Content 4, http://links.lww.com/SAP/A715).

Alar wall grafts are placed to support unstable alar walls, and placed through separate vestibular incisions in separate pockets to conform to the surface defects (see video, Supplemental Digital Content 5, http://links.lww.com/SAP/A716, which demonstrates alar wall grafts).

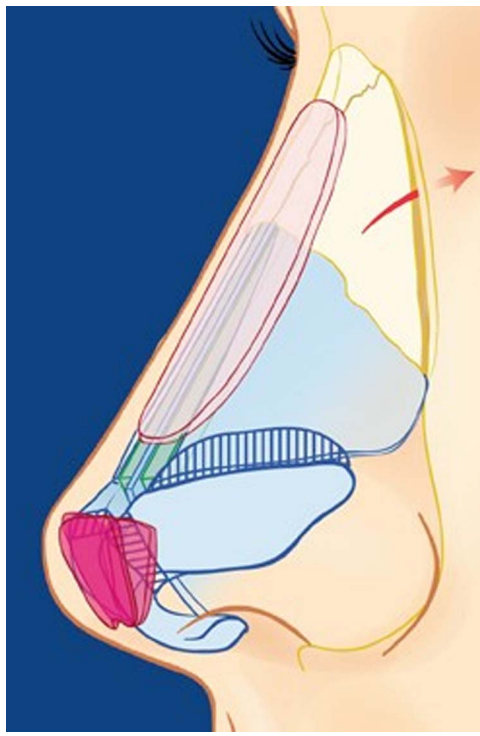

FIGURE 9. Schematic showing dorsal graft, tip graft strategies, our typical strategy when the dorsum is low relative the base. The bony vault shoulders were rasped to allow narrowing, lateral crura conservatively reduced, and osteotomies performed. Reprinted with permission from Constantian.[1] full color online

The tip lobule, still undissected, can be accessed through an infracartilaginous incision. Depending on patient requirements, multiple crushed and/or solid tip grafts are placed to create optimal projection and contour (see video, Supplemental Digital Content 6, http://links.lww.com/SAP/A717, which demonstrates tip grafts). The most common technical mistake is to place tip grafts too low, so care should be taken to maximize projection by inserting grafts sufficiently high in the tip lobule. Osteotomies are performed through bilateral pyriform aperture incisions if needed (see video, Supplemental Digital Content 7, http://links.lww.com/SAP/A718), before closure and dressings.

Most postoperative graft problems are under the surgeon's control and can be managed intraoperatively, which should be reassuring. "Visible grafts" are not a product of the procedure but rather a technical failure. The thought process of suiting skeletal support to its soft tissue cover is determined by graft substance, soft tissue characteristics, and the patient's aesthetic goals. Under thin skin or in the elderly patient and particularly at the radix, grafts must be contoured, crushed, and layered to fit the defect. Conversely, under thicker skin or where the skin sleeve is scarred (eg, tight dorsal tissues in a contracted saddle nose), grafts must be more substantial (thicker and more rigid) to produce the required support and surface effect. Tip grafts are always multiple; it is paradoxically easier to create tip symmetry and contour with multiple grafts than a single graft, a principle that Sheen recognized and described[2] early in his experience. Patients can determine their own postoperative tip aesthetics: fewer grafts produce more angular tips; multiple grafts produce rounder contours.

SURGICAL PLANNING AND CASE PRESENTATIONS

All preoperative plans can be made from examination of the internal nose and patient photographs; the entire plan can be set before surgery. Look for both excesses and deficits (low radix or low dorsum, inadequate tip projection, and valvular incompetence [narrow middle vault or alar cartilage malposition]). The patient sets the "normal" and the aesthetic goal during the consultation.[1,2,13] Only areas that directly impact patient concerns should be dissected, minimizing the chance of creating secondary deformities or the need for supporting grafts (eg, to the alar walls or soft triangles) to counteract the traumatizing effects of wider exposure.

The surgical strategy is selected based on the relationship of dorsal height to nasal base size: If the dorsum is higher than the base, use radix, spreader, and tip grafts (Fig. 8). If the dorsum is lower than the base, use dorsal and tip grafts (Fig. 9).

Patient 1: Dorsum High Relative to Nasal Base Size: Radix, Spreader, Tip Grafts

Diagnosis and Surgical Plan

This woman, with no history of prior trauma, has airway obstruction and would like a straight profile and improved symmetry. She believes that her lower nose is too prominent and dislikes her tip configuration and the grooves that demarcate it; this is her highest priority. Her dorsum is high relative to her lower nose.

The patient has septal deviation toward her right and internal and external valvular incompetence: the middle and lower sidewalls collapse upon inspiration (greater on the left than the right because that airway is larger: therefore inspiratory sidewall pressures are higher).

The diagnosis can be made from her photographs. On frontal view (Fig. 10, left), the bony and upper cartilaginous vaults are shifted to her right. The middle vault is narrow. Cephalic rotation of the lateral crura (malposition) is present. On lateral view (Fig. 11, left), the dorsum is high. The tip lobule is small and inadequately projecting. Her radix is low, so her lower nose seems disproportionately large even though she has inadequate tip projection. On inferior view (Fig. 12, left), her soft tissues are thin: the surface markings of the alar cartilage can be traced on the skin.

Directed Surgical Plan

Dorsal reduction will open the middle vault, necessitating spreader grafts, also independently indicated because of the narrow, asymmetrical middle vault. Relocation of the lateral crura, necessary to produce the degree of tip change that the patient desires, will support

FIGURE 10. Patient 1, radix, spreader, tip graft example. Left, Preoperative frontal view. Right, 2 ½ years postoperative frontal view. full color online

FIGURE 11. Left, Preoperative lateral view. Right, 2 ½ years postoperative lateral view. full color online

the external valves and change tip configuration. Septoplasty will partially open the airway and provide graft material. Spreader grafts will support the internal valves, radix grafts will provide better proportion, and tip grafts will create adequate projection.

Operative Steps:

Limited skeletonization over the nasal dorsum to the radix through a unilateral intercartilaginous incision; the nasal sidewalls are not dissected.

Dorsal reduction with a rasp and a knife.

Dissection and relocation of the lateral crura through infracartilaginous incisions.

Alar wall dissection limited to cartilage repositioning.

Transfixing incision with 2 mm trim of the cartilaginous and membranous caudal septa.

Major septoplasty, leaving 15 mm dorsal and caudal struts.

Bilateral spreader grafts, thicker on the patient's left side than right.

Layered crushed cartilage radix graft, 2 layers at cephalic end.

Multiple crushed cartilage tip grafts.

No osteotomies.

FIGURE 12. Left, Preoperative inferior view. Right, 2 ½ years postoperative inferior view. full color online

FIGURE 13. Patient 2, dorsal graft, tip graft strategy. Left, Preoperative frontal view. Right, 4 ½ years postoperative frontal view of dorsal and tip graft strategy example. full color online

Postoperative Analysis

On frontal view (Fig. 10, right), the nose is more symmetrical. The middle vault is wider, alar walls are supported. On lateral view (Fig. 11, right), the dorsum is straight; the tip projects beyond the septal angle. The radix is slightly higher, diminishing the apparent size of the nasal base, although tip projection has increased. The tip lobule is larger, creating the illusion of a shorter nostril. On inferior view (Fig. 12, right), the alar walls are better supported. Despite the patient's thin skin, multiple crushed tip grafts are not visible, even at 2 ½ years. The columella remains narrow. Note that an alternative lateral crural plan would have been cephalic reduction and alar wall grafts to brace the unsupported posterior areas. However, because tip configuration was the patient's number 1 priority, her lateral crura were repositioned to create a more dramatic change.

Patient 2: Dorsum Low Relative to Nasal Base Size: Dorsal Graft, Tip Grafts

This patient, without airway obstruction, believes that her nose is too broad and her tip projects excessively. The dorsum is low relative to

FIGURE 14. Left, Preoperative lateral view. Right, 4 ½ years postoperative lateral view. full color online

FIGURE 15. Left, Preoperative inferior view. Right, 4 ½ years postoperative inferior view of dorsal and tip graft strategy example. full color online

the size of the nasal base. Dorsal width and "excess" tip projection are her highest priorities.

Diagnosis and Directed Surgical Plan

On internal examination, the septum is straight and internal and external valves are competent. One surgical strategy would be to narrow the nose and reduce tip projection. However, tip configuration is already very good, and tip reduction sufficient to bring it back to the dorsal line is likely to create supratip deformity. The preferred alternative strategy is to improve tip contour and raise the dorsum to reduce apparent nasal base size.

Operative Steps:

Narrow skeletonization over the dorsum and upper cartilaginous vaults and retrograde 2 mm reduction of the cephalic lateral crura through intercartilaginous incisions.

Footplate resection through short overlying incisions.

Rasp bony vault surface for graft adherence; rasp "shoulders" to allow narrowing with osteotomies. No height reduction.

Nasal sidewalls and alar rims not dissected.

No transfixing incision.

Separation and 2 mm resection of the upper lateral cartilage anterior edges from the septum to reduce middle vault width.

Septoplasty for graft material, leaving 20 mm dorsal and caudal struts.

Bilateral spreader grafts to control middle vault position.

Single layer crushed cartilage dorsal graft.

Multiple crushed cartilage tip grafts.

Bilateral low-to-high osteotomies through pyriform aperture incisions.

Postoperative Analysis

On frontal view (Fig. 13, right), the bony and upper cartilaginous vaults are now divergent and narrower than the lower third. On lateral view (Fig. 14, right), tip projection remains adequate; cephalic reduction has improved tip contour. The entire dorsal line is higher, improving dorsal/tip proportion. On inferior view (Fig. 15, right), the tip lobule is symmetrical. Tip grafts are not visible. Footplate resection has improved nostril contour. The columella remains narrow.

CONCLUSIONS

Each of 4 predisposing anatomical deficits predisposes to poor outcomes in rhinoplasty and creates only 3 patterns of secondary deformity. The majority of primary rhinoplasties can be performed with only 1 of 2 operative strategies that depend on the relationship of the dorsum to the lower nose. The nose that is equilibrated at the conclusion of the procedure is less likely to change during the healing process and therefore gives the surgeon increased control over the postoperative result. The ability to assess the effects of both skeletal change beneath a skin sleeve in its resting tension and position is a unique advantage of endonasal rhinoplasty. By focusing on limited exposure directed only to areas important to the patient, the surgeon can maximize form and function, limit the chance of iatrogenic deformity, and safely achieve patient goals while maximizing patient satisfaction.

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