Nasal Tip Recontouring in Primary Rhinoplasty

The Endonasal Complete Release Approach

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Objective: Surgery of the nasal tip is a particular challenging aspect of rhinoplasty. We describe a surgical concept in nasal tip surgery that is novel in certain aspects. It combines maneuvers that are typically reserved for the open approach with the minimally invasive concept of endonasal rhinoplasty.

Methods: Integral to the concept are the complete dissection and delivery of the lateral crus, repositioning of the dome, placement of alar strut grafts that extend far medially, and lateral advancement of the lateral crus.

Results: This concept of nasal tip recontouring through the endonasal complete release approach is illustrated in detail. Representative cases are displayed, and outcomes in a population of 100 consecutive young female primary rhinoplasty patients are presented.

Conclusions: The concept allows for excellent cosmetic and functional outcomes through a minimally invasive approach with preservation of a naturally soft nasal tip. Patient comfort is maximized by reduced swelling, avoidance of nasal packing, and obliteration of external incisions.


Surgery of the nasal tip is a particular challenging aspect of rhinoplasty. One hallmark of advanced surgery of the nasal tip is a versatile and individualized approach that is based on intricate analysis of anatomy. As excellent results are attained with greater reliability and patients' expectations become more sophisticated, greater efforts are expended to maximize patient comfort while achieving consistently favorable results. Patient awareness increasingly includes avoidance of nasal packing, measures to reduce edema, and avoidance of external incisions.

Prominent authors recommend less invasive approaches, such as the transcartilaginous route, for simpler irregularities, while more extensive approaches, such as the endonasal delivery or the open approach, are suggested for more complex deformities. However, there is great variability in the choice of approach. The surgeon's training, experience, and personal preference frequently outweigh other influences, such as pathologic characteristics. While debate between proponents of the open and the endonasal approach continues, most experts agree that the technical expertise of the surgeon offsets the aptitude or limitations of the approach used. It is hence stressed that the purpose of the present study is not to contribute yet another argument to this debate. We would rather present technical aspects of an evolution of surgical techniques that have emanated from open nasal tip modifications and have eventuated in an advanced concept of endonasal tip refinement.

Methods

After analysis of the senior author's (H.G.G.) long-term postoperative results, it became apparent that the correction of certain nasal tip deformities generated particularly favorable results. These deformities required more complete dissection of the lower lateral cartilages (LLCs) and included the boxy and the markedly overprojecting nasal tip. Maneuvers associated with these remarkably positive results included a modified endonasal delivery approach combined with a transvestibular approach and complete lateral release of the LLCs, recontouring of the domes with suture techniques, and placement of long and strong alar strut grafts.

A retrospective medical chart review identified 100 consecutive rhinoplasties that fulfilled the following inclusion criteria: female patient; age range, 18 to 45 years; primary sur-
gery performed by the senior author (H.G.G.); documentation of a minimum follow-up of 12 months; availability of preoperative and postoperative photographs; nasal tip deformity corrected; use of endonasal complete release approach; and use of nasal tip recontouring techniques.

Because the cosmetic results were favorable, we applied these more complex techniques—with some modifications—to different and less pronounced deformities of the nasal tip, including the bifid tip, the underprojected tip, the bulbous or poorly defined tip, and the asymmetric nasal tip. Continuous observation of consistently favorable results after correction of these deformities led to a different way of approaching nasal tip deformities altogether: rather than analyzing the deformities of the LLC in isolation and selecting corrective strategies to isolated anatomical aspects, the desired shape of the dome and lateral crus was envisioned and shaped in its entirety. Certain aspects of the aesthetic ideal of the nasal tip are particularly relevant to the present concept:

The lateral and basal views allow for relatively straightforward analysis and correction, since these 2 perspectives permit 2-dimensional study and modification. Dorsal height, degree, and position of the supratip break, nasal tip rotation, configuration of the infratip lobule, and columellar show are easily appreciated in the profile. Likewise, the basal view allows for 2-dimensional appreciation of deviations and thickening of the columella, widening of the nasal base, the configuration of the nasal valves, and the width and configuration of the nasal tip.

As emphasized by Tortiùi and others, the frontal and oblique views are most critical. These views unmask even minor disproportions and imperfections, especially of the transitions of the nasal tip to adjacent subunits. Features of the ideal nasal tip are reflected in cases 2 and 3 and include a somewhat angulated transition from the interdomal plane to the alar lobule. This angulation takes place lateral to the nasal tip defining points. The alar lobule and rim remain relatively straight. An unfavorable scenario observed in noses that were previously operated on is that the domes have been overly narrowed with suture techniques. The result is concave deformation of the medial aspect of the lateral crus. As the lateral aspect of the lateral crus remains convex, the resulting S-shaped defect generates an accentuated demarcation of the transition from the nasal tip to the alar lobule (case 1). The extreme of this deformity gives the look of a rounded and pinched nasal tip.

The vertical cross-sectional profile of the lateral crus may also show overaccentuated bowing. In essence, any greater deviation of the lateral crus from a plane structure in both the medial to lateral dimension and in the cephalic to caudal crosssectional dimension is likely to generate a deviation from the aesthetic ideal. However, the risk of overcorrecting the lateral crus and producing an alar lobule that is too straight has been found to be negligible. The inherent soft-tissue memory of the alar lobule and the varying thickness of the overlying skin preserve a natural-appearing soft curvature to the alar lobule even when the underlying lateral crus has been straightened with strong grafts.

The supra-alar fold represents another important landmark in the analysis of the nasal tip in the frontal and oblique view. This fold should be soft and only slightly visible. An accentuated supra-alar fold creates an unnaturally deep demarcation between the nasal sidewall and the alar lobule. Overzealous resection of the cephalic margin of the LLC is one important cause of deepened supra-alar folds. Frequently, such overresection is performed in an effort to compensate for excessive nasal tip volume. It must be stressed, however, that nasal tip volume is determined to a great degree by the 3-dimensional configuration of the domes and lateral crus. Sufficient height and strength of the lateral crus are important characteristics of a harmonious nasal tip with adequate alar folds. Very conservative resection of the cephalic margin of the LLC with the primary purpose of releasing the fibrous connections between the upper lateral cartilage (ULC) and the LLC is often sufficient to achieve the desired nasal tip contour.

In summary, an aesthetically pleasing nasal tip correlates almost invariably with certain shapes and features of the underlying LLC:

- The domes assume an approximated and symmetric position to generate a narrow, bifid, and defined nasal tip.
- A straight lateral crus creates a smooth and uninterrupted transition from the nasal tip to the alar lobule.
- The central pedestal provides for adequate nasal tip projection without producing a firm nasal tip or a thickened columella.
- Adequate height of the lateral crus prevents the (sometimes late) formation of a deepened alar groove.
- Sufficient structural strength of the lateral crus reduces the risk of alar and nasal valve collapse.

The present concept was initially applied to correct the boxy and the markedly overprojected nasal tip. It emanated from the motivation to deproject and reshape the nasal tip through an endonasal approach while preserving the anatomic continuity of the LLC.

To deproject the central pedestal, extensive retrodisplacement of the entire nasal tip–columella complex is typically achieved through the tongue-in-groove technique. After connecting the right intercartilaginous incision with the hemitransfixion incision to a T-shaped incision and completion of dorsal undermining, bilateral anterior septal tunnels are extended to expose the dorsal edge of the septum. Division of the ULC from the septum mobilizes the nasal tip effectively. The columellar base is also extensively undermined to completely free the anterior nasal spine and to transect all fibers of the depressor septi muscle. Reduction of the dorsal edge of the septum and appropriate shortening of the caudal end sets the reference to place the nasal tip in the desired position. Once the nasal tip–columella complex has been retrodisplaced, concomitant mass movement of the neighboring soft tissues ensues. The result is ballooning of the ala and widening of the columellar base.

Widening of the columellar base is addressed by resection of intercrural soft tissue and rasping of the anterior nasal spine. Retrograde dissection of a shallow columellar pocket allows the surgeon to fine tune the alar-columellar relationship. Deep dissection of this pocket is avoided to preserve a portion of the membranous septum. Thus, the physiologic softness of the nasal tip–columella complex is better maintained. The new, deprojected nasal tip is secured in position, and the columellar base is gently compressed with resorbable septocolumellar mattress sutures.

When this tongue-in-groove maneuver is insufficient, additional deprojection is achieved through reconfiguration of the 3-dimensional shape of the LLC and by repositioning of the domal angle. This requires complete mobilization of the LLCs through a modified approach. We term this the endonasal complete release approach. The vestibular skin is elevated off the undersurface of the lateral crus after a marginal and an intercartilaginous incision (Figure 1). Subsequently, the superior surface of the lateral crus and the lobular segment of the medial crus is dissected, and the piriform ligament is transsected laterally. Then, the LLC is mobilized into the nasal vestibule (Figure 2). This completes the endonasal complete release approach, which represents a combination of the transvestibular approach of Fuleihan, the delivery approach, and lateral release of the lateral crus. The medial extent of delivery is variable and typically extends to 5 mm medial of the domal angle. (In exceptional cases, it can be extended to complete expla-
This approach attains important effects. As the tension-banding effect of the soft-tissue attachments to the lateral crus is eliminated on both surfaces, the shape-memory of the cartilage is substantially reduced. Reshaping of the cartilage can now be achieved more reliably and with less grafting material. Medially, the dome and the lobular segment of the medial crus are completely accessible for reconfiguration.

For deprojection, the domal angle is placed in a new, more medial position. Analogous to the “lateral crural steal” of Foda and Kridel,3 this maneuver may be termed “the medial crural steal” (Figure 3). The medial crural steal relies on the principle that the lateral crus is advanced laterally, and a new domal angle is created medial to the original dome. As shown in the color coding scheme (Figure 3), additional distance is recruited from the medial crus, the length of the original central pedestal is reduced and the nasal tip deprojected. Medial advancement of the domal angle by 2 to 3 mm is typically sufficient and should not exceed 4 mm. In the infrequent case in which even further deprojection is required, we resort to shortening of the medial crura (Lipsett maneuver). The new dome is created by conservative superficial surface scoring of the cartilage, placement of 2 horizontal intradomal mattress sutures and an alar strut graft. This maneuver may also be performed in an asymmetrical fashion in order to correct nasal tip asymmetries (Figure 4).

It must be noted that this maneuver creates additional problems. First, the laterally repositioned original dome causes a convex kink, similar to the lateral crural convexity observed in the boxy nasal tip. Second, medial crural recruitment renders the lateral crus longer. This additional length of cartilage must be compensated for to avoid ballooning of the ala. Third, the vertical height of the neodome may be insufficient. These problems are addressed as follows. First, alar strut grafts are fashioned from septal cartilage and sutured to the undersurface of the lateral crus. As shown in Figure 5, it is crucial that these grafts extend far enough medially to effectively straighten the original domal angle. When these grafts are insufficient, as shown in Figure 6 (case 1), the original dome creates a con-
vexity that causes the nasal tip to acquire an overly rounded appearance and the alar rim to assume an S-shaped deformity.

Because the tension banding effect of the soft tissue has been eliminated on both surfaces of the LLC, thinner material is often sufficient to straighten the LLC with alar strut grafts. We frequently recommend split septal cartilage for this purpose, which effectively reduces the amount of septal cartilage harvest.

Second, the effective length of the lateral crus is reduced through advancement into a pocket dissected lateral to the piriform aperture. This maneuver is related to the established lateral crural transposition technique. However the new, laterally advanced position of the LLC is allowed to “position itself” within the generously dissected lateral pocket. It is not forced into an inferior position. The reinforced LLC supports the nasal valve effectively because it bridges the fibromuscular soft tissues of the nasal ala and reinforces its central aspect, which is most prone to collapse.

Figure 5. Reconfigured lower lateral cartilages. A, Schematic illustration. The new domal angles (†) are created by conservative anterior scoring (small red arrowheads) and are fixated with intradomal horizontal mattress sutures. The original domal angle is strengthened with alar strut grafts (blue). B, Corresponding intraoperative photograph. Subsequent placement of an intradomal suture (not shown) will set the width of the domes.

Figure 6. Case 1. Insufficient alar strut grafts. Alar strut grafts that do not extend far enough medially may allow for persistence of the original domal angle. This results in the appearance of an overly rounded tip and an S-shaped curvature of the alar rim. Placement of an interdomal suture may accentuate this deformity. A, Schematic illustration of the incomplete straightening effect of alar strut grafts that do not sufficiently stent the original domal angle. B, Corresponding postoperative basal view.

Figure 7. Applications of nasal tip recontouring through the endonasal complete release approach. The concept of nasal tip recontouring may be applied to various deformities. The boxy nasal tip (A) and the bifid tip (B). Once the lower lateral cartilage has been reshaped and secured with intradomal sutures and alar strut grafts, the alar lobule is gently stented and compressed with soft silicone foil (purple) (C).

Case 1 (Figure 6) illustrates the effects of insufficient alar strut grafts, which results in incomplete stenting of the medial aspects of the lateral crus. A pinched appearance of the nasal tip is observed. Case 2 (Figure 8) illustrates the correction of an asymmetric nasal tip. The different heights of the nasal tip defining points are reflected on the frontal view. Moreover, the middle vault shows a deficiency on the right. The patient complained of predominantly right-sided nasal obstruction, which correlated with right-sided inspiratory nasal valve collapse.

After release of the ULCs from the septum, the combined bony and cartilaginous hump was resected. Bilateral paramedian, deep straight lateral, and percutaneous transverse osteotomies resulted in closure of the open roof. The middle vault was subsequently reconstructed by suture fixation of asymmetric spreader grafts between the dorsal edge of the septum and the preserved ULCs. Nasal tip reconfiguration was achieved by fixation of alar strut grafts and placement of intradomal sutures and an interdomal suture.

Case 3 (Figure 9) illustrates the correction of a boxy and ptotic nasal tip. The weak anterior septal angle was reinforced with a septal extension trans-
plant, and the nasal tip defining points were created according to the principles of nasal tip recontouring as described herein. This included repositioning of the domes and placement of alar strut grafts and intradomal and interdomal sutures.

Patient satisfaction was documented in the medical charts as follows:

- Completely satisfied with entire appearance of the nose: 92 of 100 patients
- Satisfied with appearance, but noticed minor imperfection, declined revision: 4 of 100 patients
- Requested revision for cosmetic imperfection: 4 of 100 patients
- Among 8 imperfections: 6 of 8 dorsal irregularities, 2 of 8 nasal tip asymmetries.
- Not satisfied with the feel to touch and softness of the nose: 17 of 100 patients after 3 months, 2 of 100 after 12 months
- Two patients noted a persistently firmer tip of the nose after 12 months. Both patients had a columellar strut placed.
- Need for nasal packing: 1 of 100 patients

The primary intent of the present study is the detailed technical description of a modified approach and a defined surgical concept. Both are the result of an evolution of techniques that was influenced by prominent authors: Rowe-Jones and van Wyk and Daniel propagate suture-based complete strip techniques to modify the nasal tip. These authors favor the open approach for optimal exposure and achieve complex rearrangement of the nasal tip by repositioning maneuvers, including transposition of the lateral crura. Proponents of the endonasal approach, including Tardy, Pastorek and Ham, and Tasman and Palma favor less complex skeletal rearrangement through the endonasal approach. Fuleihan describes access and manipulation of the LLC through the transvestibular approach, and Palma and Khodaei describe the delivery of the lateral crura.

Fundamental to the present concept is the intent to reshape the 3-dimensional configuration of the LLC while preserving its anatomic continuity. The complete lateral release of the lateral crus allows for profound corrections of LLC deformities while avoiding dome division. We observe a remarkable reduction of graft harvest and placement when compared with the open approach. Moreover, the present concept allows for enhanced preservation of the natural softness of the nasal tip because the membranous septum is preserved to a great degree. Nasal obstruction can be effectively relieved because the nasal valve is supported by the reinforced LLC. The present concept also allows the surgeon—in combination with other measures—to minimize edema and hematoma, to avoid nasal packing, to obviate external incisions, and thus to increase overall patient comfort.

**COMMENT**

**Figure 8.** Case 2 is representative of correcting asymmetries through the endonasal complete release approach. After release of the upper lateral cartilage, resection of the nasal dorsum, and closure of the open roof with standard ostotomies, asymmetric spreader grafts were suture fixated to correct the asymmetry of the middle third. The asymmetry of the nasal tip was addressed by repositioning of the domal angles, placement of alar strut grafts, and placement of fine, shaved cartilage grafts for camouflage. Preoperative and postoperative front (A and B) and three-quarter (C and D) views. Lateral views (E and F) highlight the reconfiguration of the nasal tip with correction of the ptotic appearance of the infratip lobule. Basal views (G and H) show bilaterally patent nasal valves as a result of the placement of the alar strut grafts.

**Figure 9.** Case 3 is representative of correcting a boxy nasal tip through the endonasal complete release approach. The original domal angles were straightened, and new domes were created through scoring and intradomal sutures as shown in Figure 7. Preoperative and postoperative frontal (A and B) and three-quarter (C and D) views.

- Submucous resection of inferior turbinates with preservation of mucosa and submucosa: 98 of 100 patients, 7 of 98 unilateral procedures
- Revision for persistent nasal obstruction: 3 of 100 patients
It is our impression that the young, female, primary rhinoplasty patient is typically well informed and may be more inclined to request an endonasal approach. This population represents most patients in the senior author’s practice. It seemed suitable to limit the analysis to this homogeneous patient population to best illustrate the applicability of the concept. Cartilages and soft tissues in females are softer and less voluminous, making them more amendable to reshaping without the need of overly thick (alar strut) grafts. These patients also typically request a natural feel and a nonoperated look of their nose, which correlates with conservative dorsal reduction and avoidance of too accentuated a supratip break.

Of course, results in facial plastic surgery are subjective and difficult to interpret. The reported outcome data carry important limitations and biases of a retrospective analysis. Moreover, the rate of revision surgery is a poor parameter of quality. We are open to performing even minor revisions to maximize patient satisfaction, typically 12 months after the initial surgery.

While nasal tip recontouring through the endonasal complete release approach is shown to generate excellent cosmetic and functional results in the present context and patient population, we do not think that these data should be used to reheat the debate between proponents of the open and the endonasal approach. It seems evident that the primary determinant of quality outcomes in rhinoplasty is the skill and experience of the surgeon, not the approach used.

In conclusion, all important approaches and maneuvers in rhinoplasty have been described before by the pioneers of this operation; accordingly, the present report does not claim to designate a new operation. It rather presents a combination of established techniques that form—to our knowledge—in some regards a novel concept to approach and correct the nasal tip. Its core intent is to apply maneuvers that are usually reserved for the open approach through an endonasal approach. It must be noted, however, that the present concept accentuates an important drawback of endonasal approaches: a shallow learning curve. With these limitations in mind, we feel that the concept of nasal tip recontouring through the endonasal complete release approach is shown to generate naturally soft nasal tips and excellent cosmetic and functional results in the young female primary rhinoplasty patient population.

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