Cosmetic Rhinoplasty

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Learning Objectives: After studying this article, the participant should be able to: 1. Perform a systematic nasofacial analysis. 2. Identify the underlying anatomical cause of specific external nasal findings. 3. Recognize the interrelated effects of operative maneuvers. 4. Develop an appropriate operative plan to address patient concerns.

Summary: The rhinoplasty operation is one of the most challenging procedures in plastic surgery, and requires a combination of surgical judgment, knowledge of anatomy, technical skill, and lifelong study. A foundation must be built on clearly defined patient goals and an accurate diagnosis, based on known ideals and their anatomical correlation. It is important to recognize the definitive impact of each operative maneuver to achieve predictable outcomes. This article provides a problem-based approach to common cosmetic nasal deformities. *(Plast. Reconstr. Surg.* 151: 315e, 2023.)

The complexities of the rhinoplasty operation have been well-documented for an astonishing 5000 years. The origins, rooted from reconstructive procedures, were described in Egyptian hieroglyphs in 300 BCE and Indian Sanskrit in 600 BCE. However, the first cosmetic rhinoplasty was not described until John Roe's correction of the "pug nose" in 1887. Even still, present-day rhinoplasty experts are continually evolving their technique.[1] A simple PubMed search for the term "rhinoplasty" yields 11,384 results. Consistent principles include the establishment of patient goals, accurate diagnoses, and the application of known anatomical relationships. This article provides a problem-based approach to the common cosmetic nasal deformities.

GOAL-ORIENTED ANATOMICAL TECHNIQUE

Thorough communication and a precise analysis optimize operative planning and overall results. The standard medical and nasal history is obtained. Asking the patient to prioritize their three main nasal aesthetic concerns facilitates the subsequent discussion.[2] If the patient's goals are not achievable, the surgeon should explain the limitations, and often, a second in-person or virtual visit assists in determining candidacy. The patients must have reasonable expectations and social support, and be able to mentally handle complications if they arise.

The external nasal examination should be systematic and include the assessment of facial proportions (Fig. 1). Table 1 outlines the components of the nasofacial analysis.[2,3] It is important to remember that the "ideals" vary with gender and ethnicity.[4–8] (**See Table, Supplemental Digital Content 1**, which displays common characteristic findings in ethnic rhinoplasty and operative consideration, ***http://links.lww.com/PRS/F591***.) The internal examination should evaluate the turbinates, septum, internal valve, and potential collapse on inspiration.

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Table 1. Comprehensive Nasofacial Analysis and Ideals

Component	Description	Ideals[a]
Frontal		
Horizontal proportions	Short/long forehead, midface, chin	Equal thirds
Vertical proportions	Right/left facial dominance	Right = left facial width
Fitzpatrick skin type	Fitzpatrick types I–VI	—
Nasal skin	Thin/thick skin; sebaceous/nonsebaceous	Moderate thickness, nonsebaceous
DALs	Symmetric/asymmetric; narrow/wide	Smooth/symmetric lines from medial brow to TDPs; waist width = philtral column width = TDP width
Nasal deviation	Deviation of bones, midvault, or tip; C, reverse-C, S-shaped	Nose bisected by line from midglabella to menton
Bony base width	Narrow/wide	Bony base width = 80% alar base
Nasal bone contour	Slope; prominences; depressions	Smooth/symmetric slopes
Nasal bone length	Short/long	Nasal bone length = ⅓ nasal length
Cartilaginous midvault	Narrow/wide; depressions; inverted-V	Symmetric; continuous with nasal bones
TDPs	Distance; definition; symmetry	Distance of TDPs: 6–10 mm
Nasal tip shape	Bulbous (types I–III[31]); boxy (types I–III[25]); ball; parentheses; pinched	Diamond shape; lateral crura point to lateral canthus
Infratip lobule	Long/blunted; types I–V[20]	Infratip bisection: aligned with nostril apex and ½ distance from TDPs and columellar break[20]
Alar rims	Symmetry; retraction; steep; flat	Seagull in flight
Alar base width	Narrow/wide	Alar-facial grooves = intercanthal width = palpebral fissure width = 31–33 mm[85]
Lateral		
Nasofrontal angle	Acute/obtuse	Female patients: 134°; male patients: 130°
Radix projection and vertical position	Deep/shallow; high/low vertical position	Projection = 9–14 mm from cornea = 15 mm from nasion to medial canthus[33] = 2.8× ideal nasal length[86]; vertical position = between supratarsal crease and upper lash line
Nasal length	Short/long	Length = radix-tip = stomion-mention = ⅔ midface
Dorsal contour	Low/high; hump; scooped; saddle; polybeak	1 mm (male patients) or 2 mm (female patients) posterior to line from radix to tip[33]
Supratip break	Present/absent	Female patients: present; male patients: absent
Tip projection	Under/over	Tip projection = 0.67× ideal nasal length = 50%–60% of tip anterior to lip = alar base width[86]; Simons[87]: subnasale-tip = subnasale-white roll; Baum[88]: 2:1 to perpendicular line from nasion to subnasale; Powell/Humphreys[89]: nasion-tip:subnasale-tip = 2.8:1; Goode: alar groove-tip:nasion-tip = 0.55–0.6[90]; Crumley[91]: 3:4:5 ratio
Tip rotation	Under/over; ptotic	NLA = 90°–95° (male patients), 95°–105° (female patients); CLA = 30°–45°
Columella-alar-nostril relationship	Hanging; retraction; types I–VI[92]	Columellar show = 2–4 mm; nostril bisected at apices
Lip length	Normal, prominent, deficient	Subnasale-stomion = ½ stomion-menton; philtrum:upper vermilion ratio = 2–3:1
Chin projection	Under/over	Nose-lip-chin tangents
Basal		
Tip shape	Triangular; boxy; bulbous; ball	Triangular
Columellar lobular proportion	Short/long columella/lobule	Columella:lobule = 2:1
Basal aesthetic lines	Medial crural flare; deviation; types I–IV[93]	Smooth concave lines; slight flare at base
Nostril shape	Symmetry; short/long; narrow/wide; collapse; types I–VII[94]	Axis: 45° angle to columella; tear-drop shape[93]
Alar base	Narrow/wide	Alar base width = intercanthal distance; alar base forms equilateral triangle with rims
Alar flare	Types I–III[85]	Alar flare ~3 mm lateral to alar base[85]

DAL, dorsal aesthetic lines; TDP, tip-defining point; F, female; M, male; NLA, nasolabial angle; CLA, columellar-lobular angle.
[a]Ideals vary with gender and ethnicity.

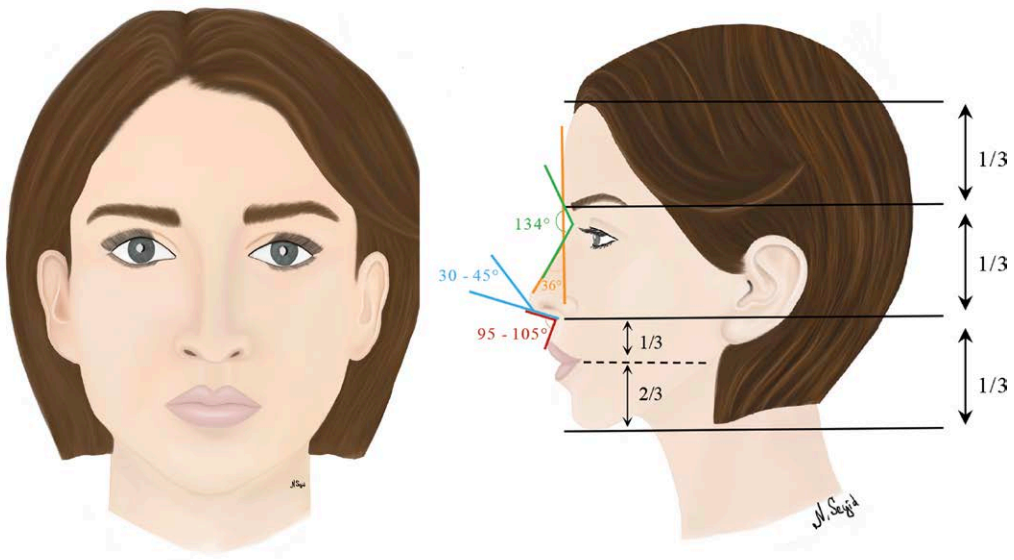

Fig. 1. A primary objective of the cosmetic rhinoplasty is maintaining appropriate facial proportions. It is important to also understand gender and ethnic variations. The female ideals are shown on frontal view (*left*) and on profile view (*right*).

The operative plan must appreciate the cumulative effects of each surgical maneuver on the intertwined anatomical components.[9] The relationships of the structural framework, soft-tissue planes, and vascularity should be clearly understood (Fig. 2). The sequelae of edema and scarring should also be accounted for, and defensive techniques may be indicated. For example, alar rim grafts may be placed to prevent notching after tip plasty. Both open and closed approaches are advocated, each presenting advantages and disadvantages.[10] (**See Table, Supplemental Digital Content 2**, which displays open versus closed rhinoplasty, ***http://links.lww.com/PRS/F592***.) Several diagnosis-based algorithms have been described. (**See Table, Supplemental Digital Content 3**, which displays diagnosis-based algorithms, ***http://links.lww.com/PRS/F593***.) The operation proceeds in the cephalic to caudal direction consistent with that described by Sheen and Sheen.[11]

PHOTOGRAPHIC DOCUMENTATION

Consistent, high-quality patient photographs are essential for operative planning and outcomes assessment. They should be taken with reproducible lighting, angles, and camera settings.[12] The classic sequence includes an anteroposterior, right and left lateral, right and left oblique, and basal views. The lateral view should be oriented along the Frankfort horizontal or the natural facial plane. The oblique view is taken at 45 degrees without neck rotation. The nasal tip may be aligned with the midpupillary line or

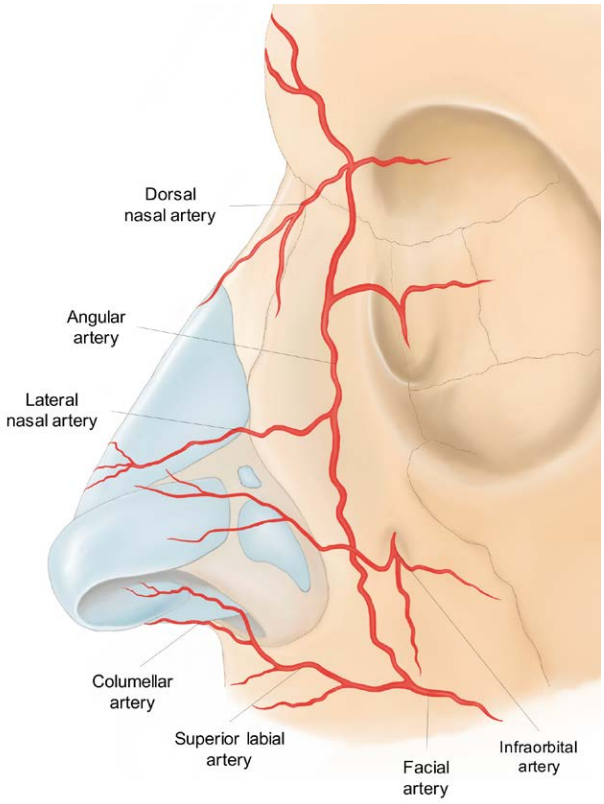

Fig. 2. The blood supply to the external nose.

malar eminence, with or without a small segment of cheek show. Additional views are the smiling lateral view for dynamic tip depression and the cephalic view for nasal deviation.[12,13]

IDEAL NASAL TIP

The ideal nasal tip has a diamond shape, with its width demarcated by the tip-defining points, which correlate to the caudal portion of the domes.[14] The superior limit of the tip is established by the supratip depression, which is a reflection of the relative recession of the cephalic dome and septum (Fig. 3). The inferior limit is the infratip convexity denoted by the columellar-lobular breakpoint. The tip-defining points are typically separated by 5 to 9 mm, with the wider dimensions reserved for male patients and certain ethnicities.[3] The cephalic domes are separated by 2 to 3 mm at their apex. The domes project approximately 2 to 9 mm (mean, 5.7 mm) superior to the anterior septal angle and are positioned 3 to 9 mm (mean, 5.5 mm) caudal to the anterior septal angle.[15–17] Others report that the tip projects 6 to 10 mm above the dorsal septum.[16,18] The infratip breakpoint defines the columellar-lobular angle, which is approximately 30 to 45 degrees. On basal view, this breakpoint is visualized as the medial crura diverge to become the middle crura, establishing the angle of domal divergence. Also, the columellar-lobular breakpoint lies within 1 to 2 mm of the nostril apex.[14,19,20] Ideal tip aesthetics are achieved when the lateral crura flatten lateral to the dome and remain everted along their length.[2]

TIP REFINEMENT

The technique for tip refinement depends on the analysis, skin thickness, and cartilage strength. Reversible, nondestructive approaches, such as suturing and grafting, may be preferred over scoring or resection. Each surgical maneuver is methodical, with an understanding of the three-dimensional effects. Tebbetts' description

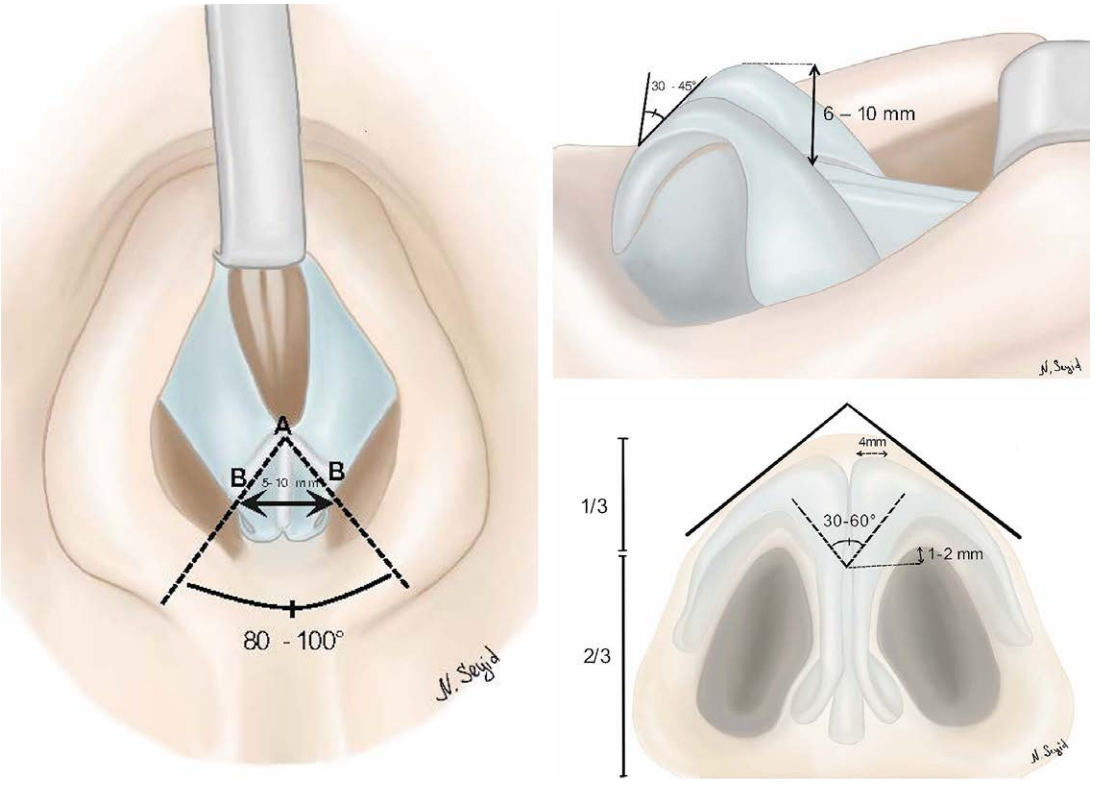

Fig. 3. (*Left*) The tip diamond shape is formed by the (*A*) supratip break, (*B*) tip-defining points, and (*C*) infratip breakpoint. (*Above, right*) On profile view, the domes project approximately 6 to 10 mm above the septum. The infratip rotation is indicated by the columellar-lobular angle, ranging from 30 to 45 degrees. (*Below, right*) On basal view, the tip is triangular. The domes diverge at an angle ranging from 30 to 60 degrees. The point of divergence sits within 1 to 2 mm of the nostril apex. The individual domal width is approximately 4 mm.

of the force vector rhinoplasty revealed the importance of sequencing in suture placement.[21] This algorithm begins with setting the nasal base with a medial crural fixation suture at the angle of divergence. Then, a medial crural flare control suture is placed 2 to 3 mm above the caudal border. Overtightening results in columellar soft-tissue protrusion and may be avoided with debulking the intervening tissue. Next, the lateral crura are everted and the tip is narrowed with lateral crural spanning sutures. Dome-spanning sutures then recreate the domes. Lastly, tip projection control sutures and tip rotation sutures are placed, analogous to the columellar septal sutures described by Joseph.[21–24] (**See Table, Supplemental Digital Content 4**, which outlines suture techniques used in cosmetic rhinoplasty, ***http://links.lww.com/PRS/F594***.) Other suture algorithms have been popularized by Guyuron, Daniel, Gruber et al., and Rohrich and Adams.[23,25–28] They generally recommend performing medial crural sutures with or without a strut to stabilize the base, transdomal sutures, interdomal sutures, lateral crural convexity sutures, and then tip rotation sutures. The sequence is tailored to the individual, but the algorithms provide a helpful guide (Fig. 4).

Common tip deformities include boxy, bulbous, and ball-like tips. (**See Table, Supplemental Digital Content 5**, which outlines the management of common deformities. Solutions should be applied according to the concurrent nasal characteristics, ***http://links.lww.com/PRS/F595***.) Boxy, or rectangular, tips are associated with intradomal widths greater than 4 mm or wide tip points alongside an angle of divergence greater than 30 degrees.[25] The cause is related to rigid convex lateral crura or weak caudal support with splaying domes.[29] Bulbous tips, in contrast, are broad with less definition.[16,17] Ball tips have been grouped with bulbous tips but are rounder, and often associated with a "parenthesis deformity." Constantian found that having one of these three tip types increases the odds of cephalic lower lateral crura malposition by seven-fold.[29,30] The deformity is corrected with caudal repositioning of the lower lateral crura with or without lateral crural strut grafts. Onlay tip grafts also help triangulate the lobule.[17,30] When inelastic or thick skin is a factor, we prefer tip augmentation over aggressive defatting. The lateral convexities are initially treated with a cephalic trim.[14,16,17] At least 6 mm of lateral crura must be preserved to prevent alar weakening and cartilage fracturing. Resection toward the piriform can by limited, as there is less aesthetic benefit in this area. Inherently weak crura should not be resected but rather contoured with sutures, grafts, or lateral crural flaps (Fig. 5).[31] [**See Video 1 (online)**, which demonstrates a preservation approach to the cephalic trim. In cases of weaker lower lateral cartilage, a preservation approach to the lower lateral resection may be used.] Most nasal tips will require transdomal and interdomal sutures. Rigid crura can be shaped with convexity control sutures in underprojected tips or segmental resection in overprojected tips.[17,25,32,33] Studies have shown that the width of convexity control mattress sutures should be 6 to 8 mm with 5-0 thread.[34–36]

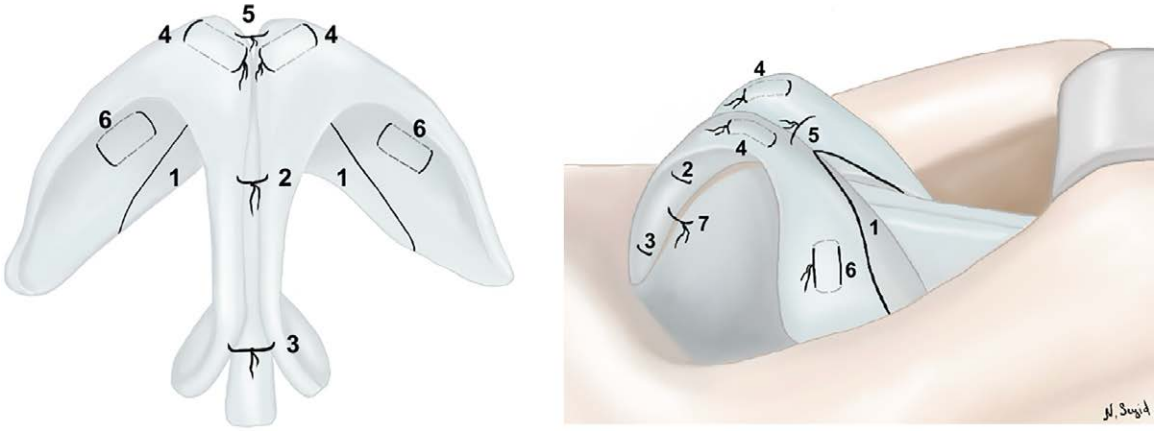

Fig. 4. The nasal tip contouring should be customized to the individual patient. (*Left*) A generalized approach may proceed with a (*1*) a cephalic trim, (*2*) medial crural fixation suture, (*3*) medial footplate suture, (*4*) transdomal suture, (*5*) interdomal suture, and (*6*) lateral crural convexity control suture. (*Right*) The (*7*) columellar septal suture is shown on profile view.

Fig. 5. Patient preoperative (*left*) and 3-month follow-up photographs (*right*). The patient underwent a cephalic trim with the lower lateral crura preservation approach and septal-medial crura suture placement for projection and rotation control.

OVERPROJECTED NOSE

When tip over projection is suspected, one must determine whether there is pseudoprojection or true overprojection. The illusion may be created by proportional abnormalities as in maxillomandibular hypoplasia, angulated frontal bones, radix malposition, or a low dorsum.[37,38] A large, proportional nose appears more aesthetic than a small, poorly proportioned one. As such, in the presence of a caudally positioned radix or a relatively low dorsum, one may consider augmentation techniques rather than deprojection.[24,38] True tip overprojection is caused by long crura, a prominent anterior nasal spine, septal hypertrophy, or soft tissue.[37,39] Long medial crura often impart long narrow nares, thin alar rims, and a narrow columella.[40] Long lateral crura may result in a ptotic and underrotated tip. The cause is typically multifactorial.[39]

When planning for tip deprojection, it is important to understand the four primary tip support structures outlined by Janeke and Wright.[37,41] These include the piriform attachments to the lateral crura, scroll ligaments, interdomal ligaments, and septal attachments to the medial crura.[41] Others argue that the anterior septal angle and lower lateral cartilage strength play major roles.[42,43] The disruption of these support structures during operative exposure may result in intentional and unintentional outcomes.[24] One study found that a full transfixion alone reduces projection by 1.4 to 2.1 mm, depending on skin thickness.[44] Similarly, violation of the scroll support with a cephalic trim and anterior septal angle reduction will further

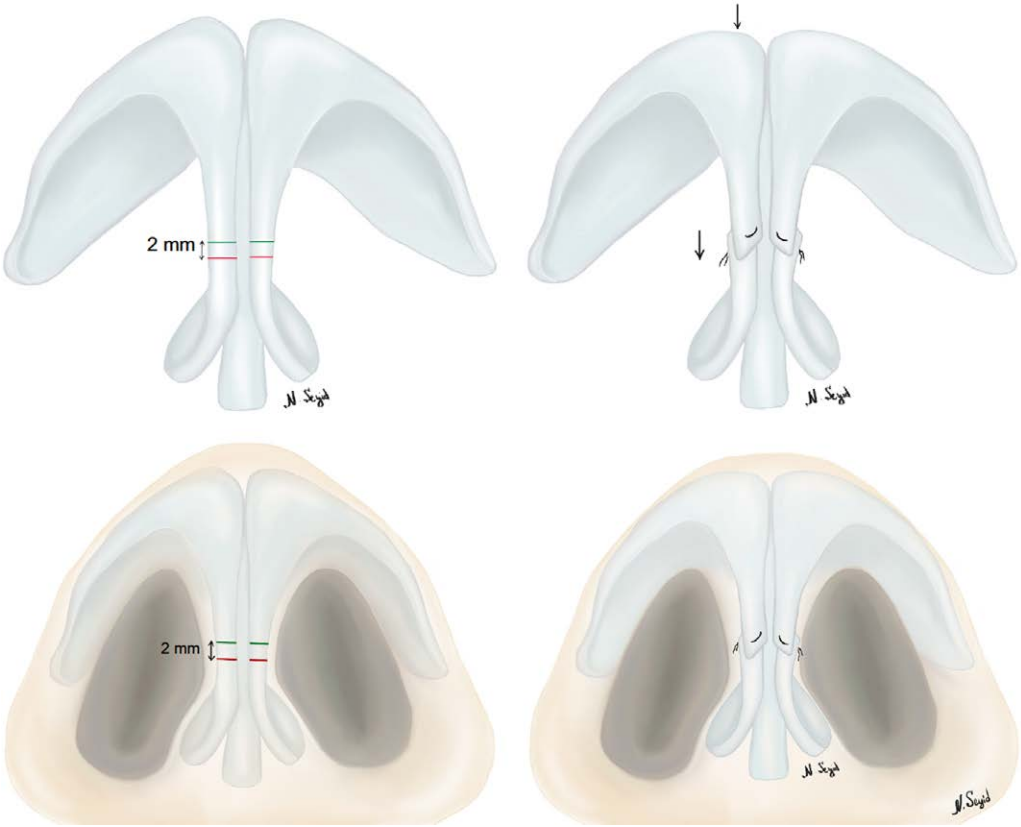

Fig. 6. The nasal tip can be deprojected with precise transection and overlap of the medial crura.

deproject the nose.[37,45] Petroff and associates caution against excessive operative deprojection, supported by their intraoperative and postoperative findings. Before any structural modification, projection was increased by 1.5 mm with local injection alone and then further compounded by edema. Regardless of operative intention, 70% of patients lost up to 2.4 mm of projection in the first 6 months. Projection was maintained with reinforcement of the medial crura in some form.[46]

The tripod concept introduced by Anderson in 1984 offers guidance for more significant projection requirements.[47] To obtain additional tip rotation with reduced projection, transection and overlap of the lateral crura may be considered. Conversely, to reduce tip rotation and projection, the medial crura may be treated analogously (Figs. 6 and 7).[22,39,48] [**See Video 2 (online)**, which demonstrates deprojection. In the setting of an appropriately rotated or overrotated nose, the middle limb of the tripod is transected and overlapped with suture reinforcement without removal of cartilage.] Overlap of both the medial and lateral crura deprojects without rotating.[39,49] Reduction of a prominent anterior nasal spine, as in the tension nose, also assists in correction.[50] Crural transection is discouraged unless resistant to other means. According to Tebbetts, the projection control suture can alter projection by 3 mm by adjusting the anchor point of the medial crura on the caudal septum (Fig. 8).[21] [**See Video 3 (online)**, which demonstrates controlling tip position by suture placement of the medial crura to the caudal septum through an open approach. Fixation of the medial crura to the caudal septum can provide many degrees of freedom for placement of the nasal tip through an open or closed approach.] Care must be taken to not create columellar retraction with overtightening. After deprojection, alar flare increases and may be treated immediately or delayed.[37] The alar sill excision offers an inconspicuous scar location (Fig. 9) relative to alar base resections. The trapezoidal excision is placed at the medial edge of the footplate and should not violate the sill.

NASAL TIP UNDERPROJECTION

An underprojected nasal tip may be congenital or acquired. A high dorsum and an absent supratip break may lead to an incorrect diagnosis.[51]

Fig. 7. Patient preoperative (*left*) and 10-month follow-up (*right*) photographs are shown. The patient underwent an open rhinoplasty with cephalic trim and nasal tip deprojection.

Suture techniques that increase projection include medial crural fixation sutures, transdomal sutures, lateral crural steal sutures, and columellar septal sutures.[21] Transdomal sutures provide 1 to 2 mm of projection, contingent on the domal width.[24] Tip grafting, such as cap grafts or shield grafts, may be preferred when rotation is appropriate or for patients with thick skin. (**See Table, Supplemental Digital Content 6**, which outlines graft types, ***http://links.lww.com/PRS/F596***.) In the underprojected tip, additional support is frequently required in the form of columellar struts or septal extension grafts. [**See Video 4 (online)**, which demonstrates columellar strut graft placement. The tip projection, rotation, and stability can be reinforced with the strut graft placed between the medial crura.] Deformities associated with loss of projection are the plunging tip and the polybeak.[52]

UNDERROTATED NOSE

An underrotated nasal tip has an acute nasolabial angle or blunted columellar-labial angle. Diagnosis should reflect the projection, nasal length, and smile dynamic. If the nasolabial angle is appropriate, the "underrotation" may reflect supratip fullness, increased nasal length, or a prominent dorsum. Mild cases are amenable to

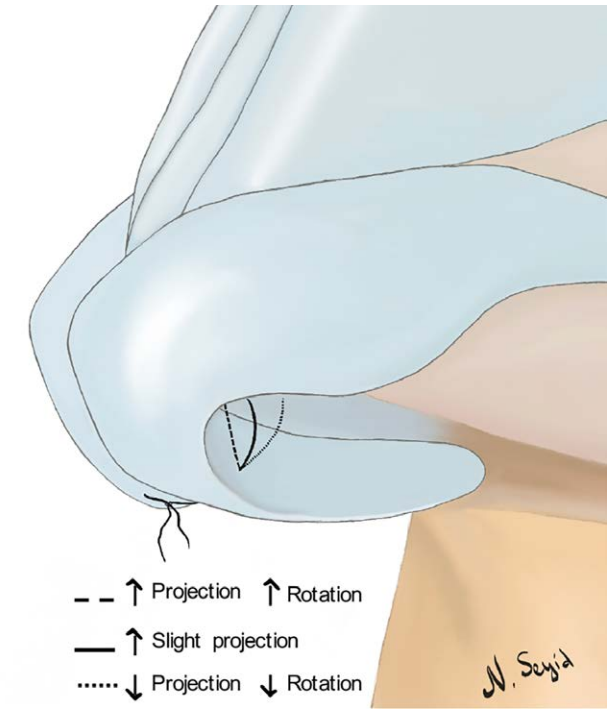

Fig. 8. The columellar septal suture may be adjusted to alter projection or rotation, or to improve columellar show.

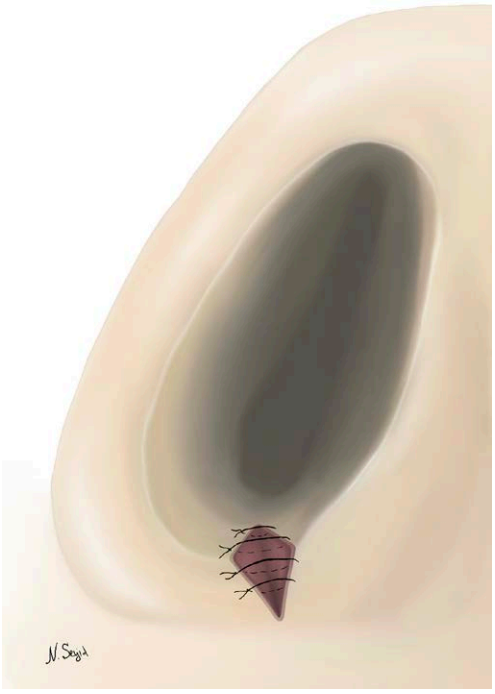

Fig. 9. The alar sill excision is trapezoidal. The medial aspect is aligned with the base of the footplate and should not cross the alar sill onto the upper cutaneous lip. A slight outward bevel helps to evert skin edges.

indirect techniques, such as caudal septal wedge resection, cephalic trim, hump reduction, or scroll resection.[51,53] A cadaver study suggested that a 25% reduction in lower lateral cartilage width through a cephalic trim increases the nasolabial angle by an average of 6.4 degrees.[54] Prominent cartilage of the upper lateral cartilage scroll may displace the lateral crura caudally. Thus, a cautious resection anteriorly may increase rotation while maintaining sidewall support posteriorly.[53] With a particularly acute nasolabial angle, one may consider more direct measures based on the relative strengths and lengths of the crura. The lateral crural overlay procedure is ideal for those with concurrent overprojection.[47,55] If the nose also lacks projection or the medial crura are deficient, options include a lateral crural steal, columellar strut, or septal extension graft.[33,56] Medial crural and footplate sutures lengthen the central tripod leg to add projection and support.[57] Cephalically oriented lateral crura may require repositioning, and a dynamic depressor nasi septi may warrant resection. The tip rotation suture was originally described for this purpose and is typically one of the final sutures.[33]

OVERROTATED NOSE

True tip overrotation is diagnosed by an obtuse nasolabial angle. A short nose or an obtuse columellar-lobular angle may be misleading. Overrotation may be present in revision cases as the effects of tip suturing, cephalic trim, and dorsal reduction culminate postoperatively. Furthermore, contraction of the nasal envelope over a reduced nose may lead to cephalic rotation and a shortened nose.[58] Correction often requires a sturdy septal extension graft to maintain caudal rotation. Gunter and Rohrich describe a technique for derotation in a shortened nose that does not require grafts. The envelope is widely undermined, and all the attachments of the lower lateral cartilage are released. Then, resection of caudal septum allows the footplates to relax and the nose settles into a caudal pocket.[59]

SHORT NOSE

A short nose should be distinguished from one that is overrotated but appropriate in length.[58] The illusion may also be created by the presence of a low dorsum, overprojected tip, or long upper lip.[60] The short nose often requires cartilage grafting to add length and support, and to combat soft-tissue contraction. In the presence of a deep caudally positioned radix, onlay grafts make the nose appear longer when placed caudal to the nasion.

Radix augmentation will also reduce the apparent intercanthal distance, which may be favorable or unfavorable.[61] True nasal length deficits may exist in the central dimension or laterally at the ala. The approach to the short nose described by Toriumi and Bared involves first elongating the central nose with septal extension grafts and/or extended spreader grafts. Then, the ala are advanced caudally through lower lateral cartilage repositioning, rim grafts, or auricular composite grafts.[58] Septal extension grafts also address rotation and spreader grafts provide resistance to soft-tissue contraction. Guyuron uses a "tongue-in-groove technique" for moderate to severe cases, consisting of extended spreader grafts with a columellar strut.[62,63] Dorsal onlay grafts may also be required in those central deficiencies.[58] Shield grafts can correct mild central length deficits alone or in conjunction with other techniques.[63]

LONG NOSE

The first step in treating the long nose is determining whether it is truly elongated or the result of relative disproportion. The nose may appear long in the presence of a ptotic tip, elongated septum, cephalically positioned radix, radix overprojection, high dorsum, or infratip excess.[14,61,64] In the case of radix malposition, caudal repositioning of the radix will create a shorter appearing nose. This may be done with grafts placed above the level of the nasion for a deep radix or through bony reduction caudal to the nasion in the overprojected radix.[61] Reduction of a dorsal hump also results in apparent shortening.[38] A common presentation is the long nose with a plunging tip, particularly in the Mediterranean and aging population. They are classified into two types based on the cause.[64] The tip may be pushed caudally by a prominent septum or long upper lateral cartilages, or the tip is subluxed from the anterior septal angle.[65] The former may be treated with septal resection or scroll resection. The latter may be approached in a manner similar to the underrotated nasal tip.[33,64] The long nose with appropriate rotation may suggest a tension nose deformity.[50]

DORSAL HUMP

The high dorsum may be reduced through a component dorsal reduction, composite resection, or a dorsal preservation push-down/let-down technique.[66–68] The component reduction allows for precision control and the preservation of the upper lateral cartilages and underlying mucosa.[66] [**See Video 5 (online)**, which demonstrates cartilaginous hump resection. The principles of component dorsal reduction are shown with sequential excision of the dorsal cartilaginous hump.] The composite reduction may be preferred with the potential for added efficiency. Anatomical studies have shown that the hump is made primarily of cartilage but is covered by a thin 4- to 14-mm bony cap. Rasping the bone first may improve visualization and cartilage preservation. Others argue that the rasp may damage the cephalic ends of the upper lateral cartilages, leading to destabilization.[69,70] However, there is no differences in the incidence of inverted-V deformities.[71] Preservation techniques maintain an intact dorsal roof by resecting the septum in conjunction with osteotomies. The push-down technique is indicated for humps smaller than 4 mm. Humps larger than 4 mm use the let-down technique, which requires a lateral maxillary wedge resection.[67,72] Despite advantages of dorsal preservation, hump recurrence may occur in 12% to 15%.[73] Some authors have noted potential dural disruption, internal nasal valve narrowing, and stepoff deformities.[68,72] Ultimately, the surgeon should perform the approach that delivers their best outcome. The dorsal reduction will result in a shorter and more rotated nose. The dorsal aesthetic lines and the apparent intercanthal distance also widen. Resection caudally will reduce tip support and result in slight deprojection.[9]

Resection-based approaches have stirred debate regarding midvault reconstruction. Concerns are related to the potential for an open roof deformity, inverted-V deformity, hourglass deformity, or valve collapse. A recent study found that without reconstruction, surgeons rated 25% of patients as having a "surgical appearance" in the series; however, layperson scores and overall patient satisfaction exhibited more positive results.[71,74] An expert consensus panel has recommended routine midvault reconstruction in the form of primary closure, spreader flaps, or spreader grafts. Primary closure is limited to small resections, straight septums, absent airway symptoms, and strong upper lateral cartilages. Otherwise, spreader flaps may be performed when there is at least 2 mm of upper lateral cartilage excess. Spreader grafts can be recessed and triangulated to prevent dorsal widening. Nasal bone length is also an important consideration, as shorter bones are associated with longer upper lateral cartilage and a greater risk for collapse.[71,75]

WIDE BONY BASE

The bony base width is ideally 80% of the alar base width, and the dorsal aesthetic lines should approximate the width of the philtral columns.[3] Osteotomies narrow wide bony bases and dorsal aesthetic lines but also address open roofs, deviations, and bony asymmetries. Particular caution is taken in those with excessively short or long nasal bones and large or anterior inferior turbinates.[38,75,76]

Lateral osteotomies may be performed through an internal continuous piriform approach or an external discontinuous approach. The external incision is 2 mm in length, parallel to the inferior orbital rim, and perpendicular to the frontal process of the maxilla.[2] The low-to-low subtype is indicated for wide open roofs with a wide nasal base and the low-to-high technique for milder cases. The low starting point is begun at the junction of the piriform and maxilla. The high starting point is 3 to 4 mm anteriorly, thereby preserving the Webster triangle (Fig. 10). As such, some argue that a high-to-low or high-low-high technique prevents airway narrowing. The low endpoint ceases at the medial canthus without ascending toward the nasomaxillary suture, often necessitating medial osteotomies for a controlled fracture, as in thick bone. Alternatively, a high endpoint may result in a stepoff requiring additional lateral osteotomies.[76–78] Medial osteotomies are also indicated in the absence of an open roof. They may be oriented in the medial oblique, paramedian, or transverse direction. Intermediate osteotomies correct markedly convex nasal bones but must be sequenced appropriately. Of note, dorsal onlay grafts provide another option to narrow the apparent width or to camouflage an open roof.[61]

DEVIATED NOSE

Nasal deviation may be congenital or acquired. Differentiation is important, as a previously straight nose may not have the longstanding external deformational forces that contribute to recurrence.[79] The intranasal examination may reveal septal deviation, narrow valves, or enlarged turbinates. A patient's perception of their deviation may vary by their perceived midline (eg, dental midline, Cupid's bow, glabella); thus, it is paramount to clearly understand their viewpoint. The bony vault, cartilaginous vault, or tip may be independently or collectively deviated. Minor depressions, in the absence of a contralateral convexity, can be camouflaged with crushed cartilage. Midvault and tip

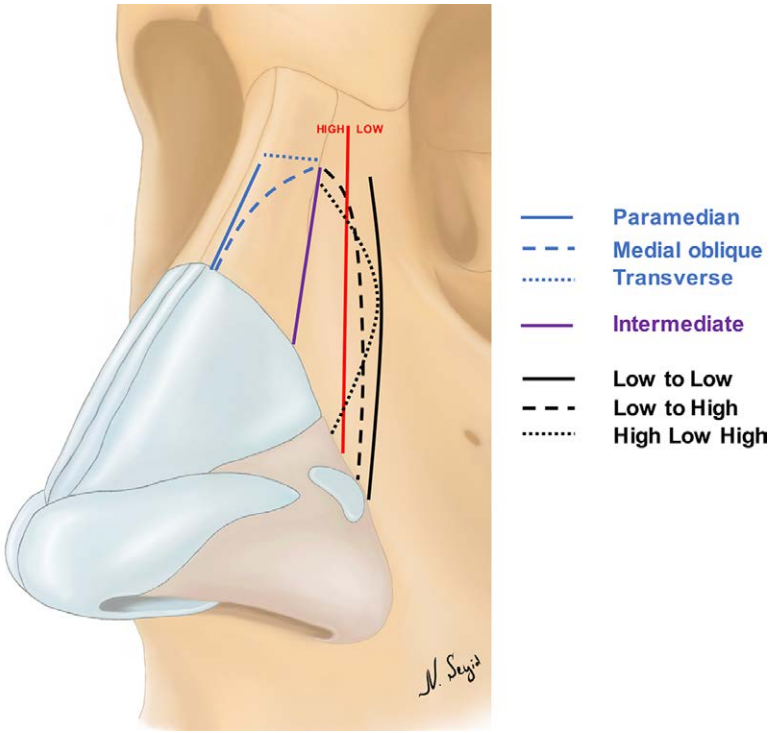

Fig. 10. Lateral osteotomies include the low-to-low, low-to-high, and high-low-high. Medial osteotomies include the paramedian, medial oblique, and transverse. Intermediate osteotomies are also pictured.

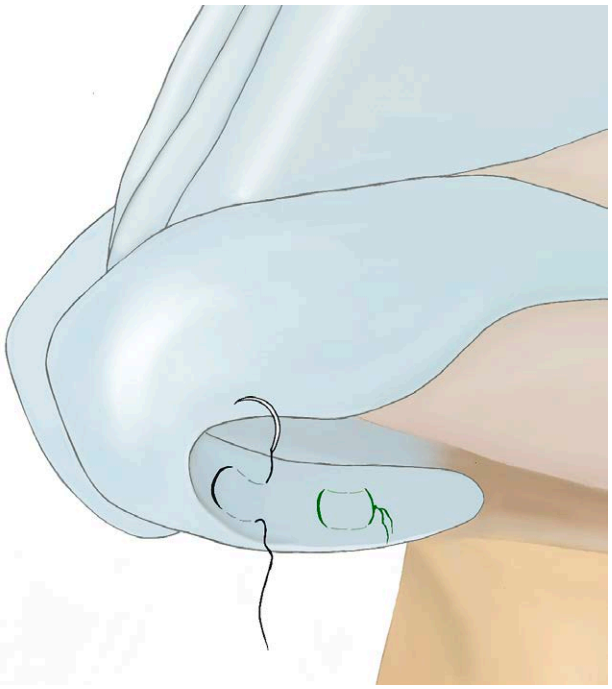

Fig. 11. The septal mattress sutures are placed to control deviation of the caudal septum. The horizontal mattress suture is placed parallel to the concavity with the knot on the convex side to straighten the curvature.

deviations are often associated with a septal component. A classification system for septal deviations has been well described and is based on the cephalocaudal and anteroposterior dimensions.[80–82] Correction depends on sequentially releasing all external forces acting on the septum, including all articulations and soft tissues. If the nose does not relax into its anatomical position, internal forces within the septum itself must be addressed with scoring, suturing, or buttress grafts.[82] The septal rotation sutures, or clocking sutures, assist in correction of the deviated dorsal strut.[80] Unilateral spreader grafts on the concave side may also be considered. The caudal strut can be relocated with the swinging door technique, doorstop technique, strut grafts, or septal mattress sutures (Fig. 11).[82–84] Experimental and clinical studies found that mattress sutures are most effective at a width of 10 mm with 4-0 suture.[35] Residual tip deviations related to discrepancies in the lower lateral cartilage lengths can be treated with transection and overlap on the contralateral side. The nasal bones are straightened with strategic osteotomies.[81]

CONCLUSIONS

The cosmetic rhinoplasty should focus on determining patient goals and establishing a proper diagnosis. A systematic nasofacial examination with knowledge of the ideals is essential to operative planning. It important to understand the dynamic effects of each operative maneuver.

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PATIENT CONSENT

Patients provided written informed consent for the use of their images.

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