CME

Positioning the Nasal Tip in Rhinoplasty

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Learning Objectives: After studying this article, the participant should be able to: 1. identify and evaluate the anatomical landmarks of the nasal tip position using standardized assessment criteria. 2. Describe the anatomical structures contributing to nasal tip appearance, explaining their roles and variations. 3. Evaluate the limitations of the tripod concept in nasal tip repositioning and identify cases where alternative approaches may be necessary. 4. Develop a surgical plan for correcting nasal tip position based on detailed anatomical analysis.

Summary: This continuing medical education article offers an in-depth review of nasal tip positioning in rhinoplasty. It provides a comprehensive review of techniques for optimizing nasal tip projection, rotation, and symmetry. The article discusses the assessment of nasal tip position and the popular tripod concept and its role in conceptualizing the dynamics of nasal tip position. Nasal anatomy is reviewed as related to tip stability and positioning. Surgical approaches for modifying projection, rotation, and deviation of the nasal tip are discussed and compared. This review aims to enhance understanding and application of these techniques in both primary and revision rhinoplasty, providing practical insights for improving surgical outcomes for both new and experienced rhinoplasty surgeons. *(Plast. Reconstr. Surg.* 156: 606e, 2025.)

Achieving optimal nasal tip position is crucial to success in rhinoplasty. The projection, rotation, and deviation of the nasal tip must be carefully evaluated and adjusted to achieve a harmonious balance with the rest of the face.

This article provides a comprehensive overview of nasal tip positioning. After reviewing this article, the reader should have a good understanding of the ideal nasal tip position, the relevant anatomy and its impact on nasal tip position, the maneuvers available to the rhinoplasty surgeon for positioning the nasal tip, and the limitations in the tripod concept when planning repositioning of the nasal tip in rhinoplasty.

ANATOMICAL CONTRIBUTORS TO NASAL TIP POSITION

There are multiple anatomical structures that interact to support and position the nasal tip (Fig. 1). Understanding and evaluating their contributions will help surgeons to take the necessary steps to modify and stabilize tip position for the long term.

The first stabilizing factor is the skin's attachment to the underlying cartilaginous framework, specifically, the suspensory ligament of the tip, which connects the skin and the cephalic margins of the lower lateral cartilage (LLC) domes.[1] This ligament and other minor attachments to cartilages are disrupted during surgery to allow repositioning of the LLCs.

With respect to the cartilages themselves, the LLCs define the overall nasal tip. The upper lateral cartilages (ULCs) provide stability and support through fibrous attachments between the ULCs and LLCs, known as the scroll area.[1–3] The scroll area is often divided during rhinoplasty to help mobilize the LLCs. In addition, the relationship between the LLCs and the pyriform aperture contributes to tip support. This support depends on the lateral sesamoid complex ligament, also

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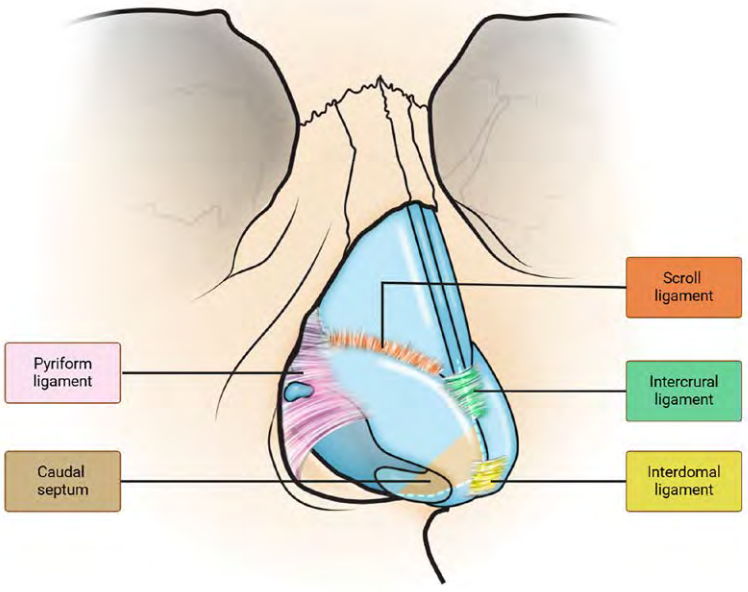

Fig. 1. Important anatomical contributors to the nasal tip position.

known as the pyriform ligament, and its attachments along the craniocaudal axis relative to the pyriform aperture.[1]

The prominence of the caudal septum and the anterior septal angle directly affect the columella and the domes, impacting both projection and rotation.[1,4] The anterior septal angle is also attached to the suspensory ligament of the tip, contributing to its impact on tip rotation.[1,4]

Lastly, the depressor septi muscle can influence nasal tip dynamics, contributing to a plunging tip.[1] Overactivity of this muscle can cause the tip to droop during smiling or other facial expressions, necessitating division of the muscle.

The Tripod Concept

The Anderson tripod concept is a well-established framework for understanding the dynamics of the nasal tip position when various surgical maneuvers are applied.[5,6] The tripod is a representation of the paired LLCs, wherein the 2 lateral crura form separate cephalic-lateral legs, and the adjoining medial crus forms the caudal medial leg (Fig. 2). Adjusting the length and orientation of each leg of the tripod enables precise control over nasal tip projection and rotation.[5,6] Understanding the tripod concept provides surgeons with a framework from which they can approach nasal tip analysis and surgical planning. However, as we will discuss below, this concept only holds true when the domes are not recreated in a new location. For example, if a deprojection of the tip is done through resection of the medial crura, the tip does not have to rotate caudally. Domes can be recreated more laterally than their original position to prevent caudal rotation or even to cephalically rotate the tip.

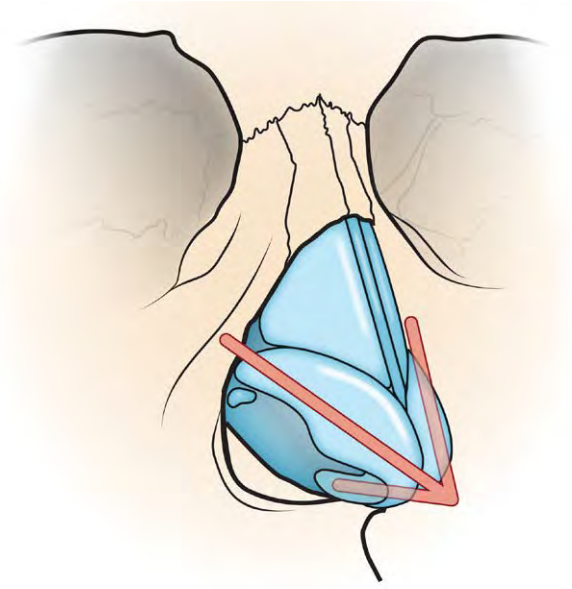

Fig. 2. Schematic representation of the Anderson tripod theory of LLCs.

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Ideal Nasal Tip Position

To evaluate the nasal tip position the surgeon must assess the projection, rotation, and deviation.[7] For tip projection and rotation, the lateral view is most useful.[7,8] When assessing the patient for nasal tip deviation, the frontal and basal views are best.[7,8] Evaluate 3 broad questions: is the tip (1) overprojected, underprojected, or acceptable? Is the tip (2) cephalically rotated, caudally rotated, or acceptable? Is the tip (3) deviated or midline? Once the analysis is complete, one can deduce the anatomical contributors to the current position of the tip. We recommend a systematic approach to nasal analysis, similar to the one described by Brito et al.[8]

There have been several descriptions in the literature defining the ideal positions for nasal tip projection and rotation.[1–3,9–12] Although these ideals provide helpful guidelines, the current authors caution against universally applying them, as they do not account for variations in sex, ethnicity, or patient preference.

Two common methods for assessing the nasal tip include (1) assessing the position of the nasal tip relative to the upper lip and (2) the Goode method.[1,9,10] For the first method, a horizontal line is drawn from the nasal tip to the alar-cheek junction and a perpendicular line is drawn from the most projecting part of the upper lip through the first line (Fig. 3, *left*). An adequately projected tip should have 50% to 60% of the nose anterior to the line drawn from the upper lip.[1,9,10] For the Goode method, 3 straight lines are drawn: from the (X) radix to the nasal tip, (Y) radix to the alar-cheek junction, and (Z) a perpendicular line that crosses from the nasal tip through line B (Fig. 3, *right*). The ratio of line Z:X should be approximately 0.55:1 to 0.5:1.[1,9,10] We prefer using the radix as a reference point, as it is easier to find on clinical examination compared with the originally described method which uses the nasion as the reference point.

The most common method for assessing nasal tip rotation is the nasolabial angle. The angle is calculated by drawing a line from the midpoint of the nostril aperture to a line perpendicular to the Frankfort horizontal plane, which is defined as a line from the inferior orbital rim to the supratragal notch (Fig. 4).[9] For women, an ideal nasolabial angle typically ranges from 95 to 105 degrees, and for men, it ranges from 90 to 95 degrees.[1,9,13]

Figures 5 through 7 show representative patients in the senior author's (R.G.R.) practice who underwent open rhinoplasty. Figure 8 shows a Gunter diagram to outline the procedures that the senior author uses to address for a commonly presenting primary rhinoplasty patient with an overprojected and overly caudal rotated nasal tip.

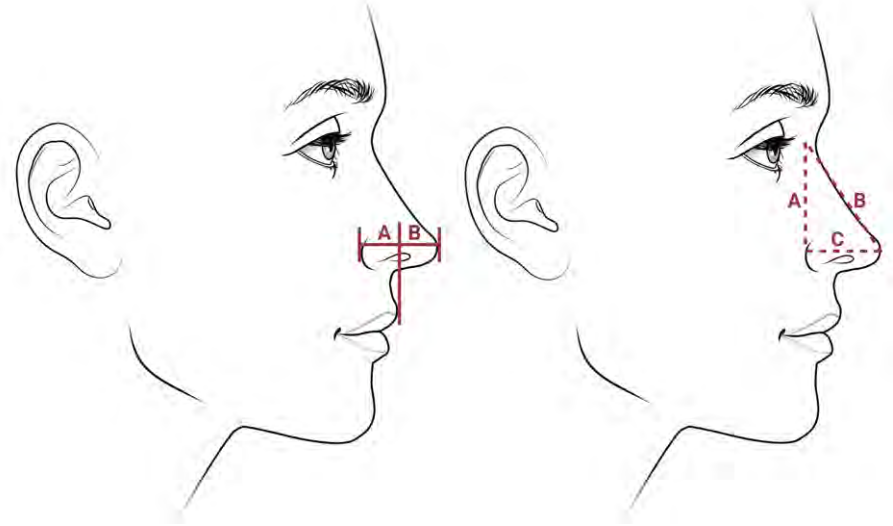

Fig. 3. Methods for assessment of nasal tip projection. (*Left*) A vertical line is drawn from the most projecting part of the upper lip perpendicularly through line AB, which is a horizontal line from the alar-cheek junction to the tip of the nose. The line A to AB ratio is 50% to 60% in an ideally projected nasal tip. (*Right*) Line A crosses from the radix to alar-cheek junction, line B crosses from the radix to nasal tip, and line C perpendicularly crosses from the nasal tip through line B. The line C to B ratio is 0.55 to 0.5:1 in an ideally projected nasal tip.

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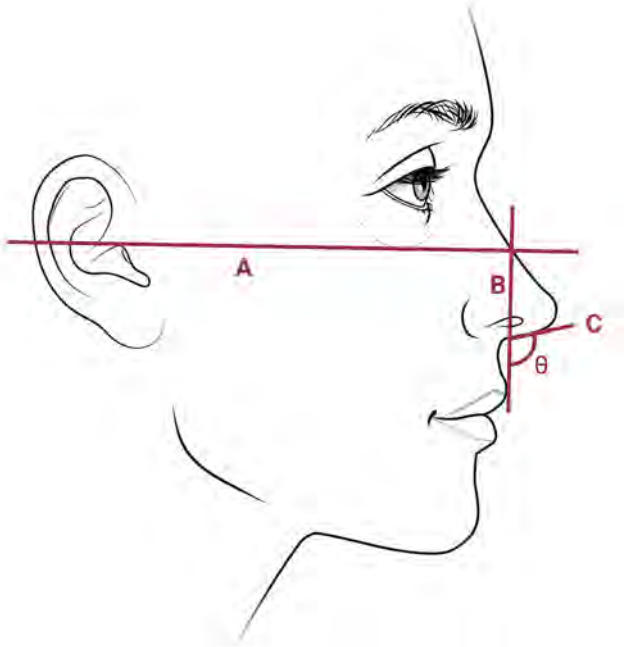

Fig. 4. Methods for assessment nasal tip rotation. Line A represents the Frankfort horizontal plane. Line B is drawn perpendicular to the Frankfort horizontal plane. Line C is drawn parallel to the columella, from the midpoint of the nostril aperture along the long axis of the nostril. The ideal tip rotation angle (θ) is close to 105 degrees.

CEPHALIC ROTATION

Cartilage Resection Techniques

Excess caudal septum can be resected to allow more space for the tripod of the LLCs to rotate cephalically.[7] These cuts are usually performed in an angled fashion at the anteroseptal angle and should be done incrementally to avoid excessive tip rotation. Of note, it is important to release the relevant nasal ligaments to allow tip rotation to take place.

Less powerful than septal resection, but still common in rhinoplasty surgery, is cephalic resection of the LLCs. This maneuver is often performed not only to facilitate cephalic rotation of the tip, but also to make the LLCs more malleable and easily reconfigured with sutures, as it disassociates the ULCs from the LLCs at the scroll area.[14,15]

A less common maneuver is the caudal resection of the ULCs. This may be performed in combination with resection of the caudal septum and opens more space for the tripod to rotate cephalically.[9,16]

Cartilage Modification Techniques

In the lateral crural overlay (LCO), the lateral crura are dissected circumferentially from the mucosa in 1 region and transected. This allows the medial portion of the lateral crura to be overlapped and sutured to the remaining lateral portion. It helps achieve cephalic rotation of the tip and deprojection.[7,17] Larger overlaps may require complete dissection of the middle crura, as they will be lateralized, the tip slightly widened, and may necessitate creating new domes at a more medial location along the LLCs.[7,15,17] Large overlaps can sometimes push crura into the airway if not carefully done.[7,17]

If cephalic rotation is needed without deprojection, a lateral crural steal (LCS) technique can be used.[15] This technique involves circumferentially releasing the middle and lateral crura from soft tissue and underlying mucosa. The lateral crura are then medialized and sutured in the midline, and new domes are created.[15] This can define the tip, increase projection, and cephalically rotate the tip. The extent of rotation, projection, and definition depend on how the tip-defining sutures are placed and how much the lateral crura are advanced.[1,7,14,15]

Septocolumellar sutures can use the stability of the septum to position the tip. This involves placing sutures through the medial crura or membranous septum that are then sutured to the cartilaginous septum to increase or decrease projection, or cephalically rotate the tip.[9,18] One of the most common uses of this method is the tongue-in-groove (TIG) technique, which involves repositioning the medial crura cephalad to their usual location and securing them onto the septum as desired. This maneuver also helps to address hanging or dependent columellas.[10,19]

The last and most subtle of all adjustments to the tip rotation can be performed with tip-defining sutures, which include interdomal sutures, transdomal sutures, and lateral horizontal mattress sutures/Gruber sutures.[7,14,15] These can change the position of the tip-defining points without necessarily changing the nasolabial angle. When it comes to positioning the tip, these sutures are the final step.

CAUDAL ROTATION

Caudal rotation of the tip is less common in primary rhinoplasty and more commonly performed in revision rhinoplasty, as a tip that has been overly cephalically rotated is a possible stigma of rhinoplasty. The main difference between achieving cephalic versus caudal rotation is that in cephalic rotation, scar tissue and the cicatricial forces of healing do not counteract the

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Fig. 5. Example case of an overprojected nasal tip that underwent deprojection. A woman in her 20s is shown preoperatively and 1.5 years postoperatively. This patient had a dorsal hump, an overprojected nasal tip, a bulbous tip, and a drooping tip. Tip elevation, dorsal hump reduction, tip refineme t, and tip deprojection were performed.

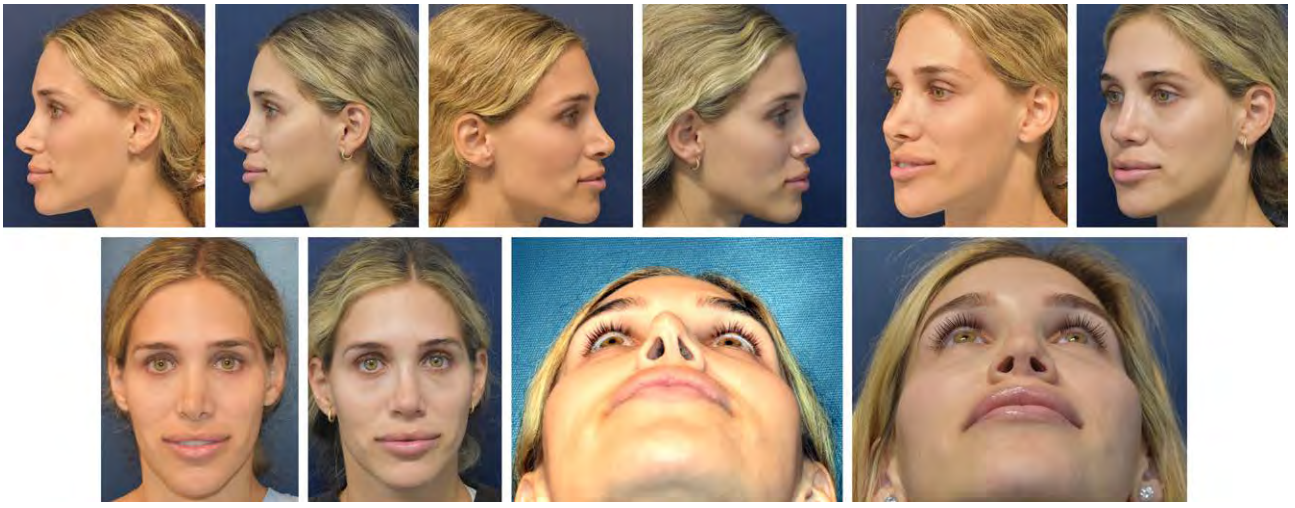

Fig. 6. Example case of an overly cephalically rotated nasal tip that underwent caudal rotation. A woman in her 20s is shown preoperatively and 1 year postoperatively. This patient had undergone a previous rhinoplasty that left her with an overprojected tip, tip asymmetry, extreme nostril asymmetry, an exaggerated supratip break, and a foreshortened overrotated nasal tip with overexposure of her nostrils. Revision rhinoplasty, with dorsal hump reduction, tip deprojection, hybrid mastoid fascia tip graft, and alar contour grafts using fresh frozen cadaveric cartilage, was performed. (From Datta S, Tugertimur B, Hanna SA, et al. Nasal tip deprojection in rhinoplasty. *Plast Reconstr Surg*. 2025;155:439–444.)

goals of the operation, but in caudal rotation they act as an opposing force. To achieve successful caudal rotation, the position of both the cartilage and the tip must be lowered, and the soft-tissue envelope must accommodate draping over the cartilage in its new position. In revision rhinoplasty, all scar tissue must be completely released before the surgeon can successfully push the soft tissue down. This is particularly critical to do in the scroll region between the ULCs and LLCs. Lastly, the technique must be powerful enough to counteract the cicatricial forces of healing and any remaining early healing tension in the soft tissues.

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Fig. 7. Example case of an overly caudally rotated nasal tip that underwent cephalic rotation. A woman in her 20s is shown preoperatively and 1 year postoperatively. This patient had undergone a previous rhinoplasty that left her with an overprojected elongated nasal tip, drooping tip, dorsal hump, and inability to breathe through her nose. Revision rhinoplasty, with dorsal hump reduction, tip elevation, and tip deprojection, was performed.

Structural Cartilage Graft Techniques

The extended spreader graft (ESG) is one of the most common methods for caudally rotating a tip and is our preferred technique. (**See Video 1 [online]**, which demonstrates the intraoperative placement of ESGs.) The key to an ESG lies in its extension inferior to the anterior septal angle.[20] Depending on the extent of caudal rotation necessary, and how much tension there is on the soft tissue, the caudal extent of the spreaders can be either simply used to push down the tip complex after securing the tip to the columellar strut, or it can be locked to the columellar strut for stronger extension, suturing the columellar strut between the 2 caudal ends of the spreader grafts.[20]

The septal extension graft (SEG) is another powerful technique, which uses a wider piece of cartilage to position the tip. It is typically only performed unilaterally and secured between the medial crura to position the tip at its desired position.[21] Unlike the ESG, which does not have to be locked into the tip complex, the SEG typically is, and therefore, it is important that the septum is midline, or else the tip will also become deviated.[21] Anytime the tip is locked to a cartilage graft that is connected to the septum, whether by means of a SEG or ESG, it remains more rigid long term.[20,21]

Cartilage Modification Techniques

When deprojection is needed in addition to caudal rotation of the tip, either a medial crura overlay (MCO) or a medial crural resection (MCR) can be done.[15,22] Of note, this only rotates the tip of the nose caudally if the native domes of the middle crura are not recreated elsewhere along the LLCs. For example, in our deprojection technique, which involves a combination of MCR and LCS, the domes are recreated lateral to their original location, achieving deprojection without caudal rotation of the tip—in fact, the tip can even be rotated cephalically.[15] (**See Video 2 [online]**, which displays the intraoperative demonstration of our technique for nasal tip deprojection.) Finally, the TIG technique, although more commonly used to increase projection and cephalic rotation of the tip, can be used to slightly rotate the nasal tip caudally if the medial crura are angled such that the domes are brought caudally.[19]

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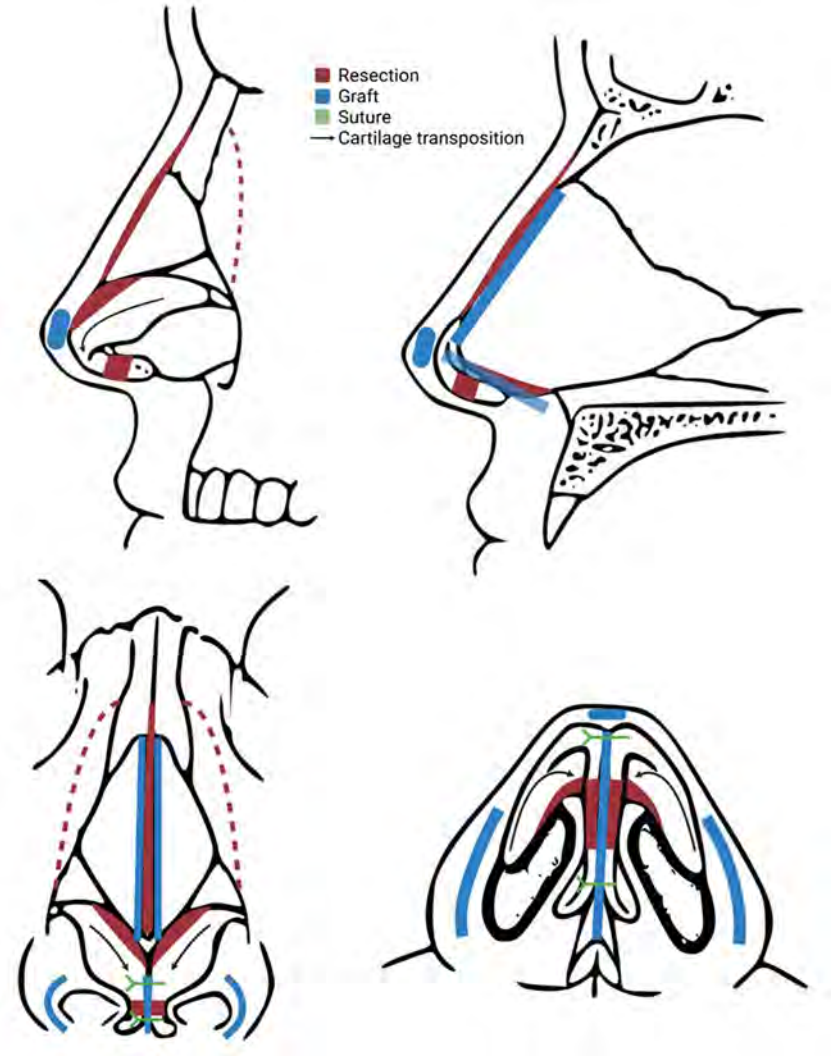

Fig. 8. Gunter diagram for a patient who underwent rhinoplasty with dorsal hump reduction, caudal septal trim, cephalic trim of LLCs, tip deprojection (medial crural resection, lateral crural steal, and interdomal and transdomal sutures) with symmetric spreader grafts and columellar strut graft, hybrid mastoid fascia and crushed cartilage tip graft, and morselized bone graft to the nasal dorsum.

INCREASING PROJECTION

Structural Cartilage Graft Techniques

Increasing projection requires adding structure to the tip of the nose that is stable long term. A commonly discussed tool in rhinoplasty is use of a columellar strut. Although previously thought of as an instrument to increase tip projection, data show that it is more often associated with a decrease in tip projection.[23] However, it is critical in many rhinoplasty cases to unify the tip complex and add stability postoperatively, particularly in open rhinoplasty cases. By itself, the columellar strut does not rotate the tip. Thus, if rotation is desired, it needs to be combined with other techniques. However, 1 benefit is that it remains mobile once healed and is not stiff—a common postoperative concern with SEGs.[21,23–25] If the underlying septum is slightly deviated and cannot be fully straightened, a columellar strut allows the surgeon to decouple the nasal tip position and still keep it midline.[23–25] Of note, although the literature suggests that columellar struts may lose some projection postoperatively, in our experience, this largely depends on how the strut is placed, how firm it is, and the length of the strut relative to the final tip position.[15]

The SEG is a commonly used method to increase projection that also has the benefit of being secured to a strong base.[21] However, as

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mentioned above, it can only be used if the septum is midline. This technique has a slightly lower risk of projection loss postoperatively, but postoperative stiffness is a concern. Of note, pushing the LLCs upward with a columellar strut or SEG can increase the length of the nostril relative to the lobule, and may need to be combined with onlay tip grafts to maintain normal proportions.[21,23,26]

Cartilage Modification Techniques

The LCS technique, previously discussed in the cephalic rotation segment, can also be used to increase tip projection to a lesser degree than the techniques above.[15,27] Septocolumellar sutures may also be used to increase projection.[18] These may be done to secure the columella at a more anterior position along the caudal septum, such as in the TIG technique.[19] Lastly, interdomal sutures, in addition to narrowing the tip, can also slightly increase tip projection.[14] Transdomal sutures can also be used to narrow the width of each dome and refine the tip, but need to be used cautiously to avoid a pinched tip.[14]

Onlay Grafting Techniques

Increasing tip projection is also achievable through the use of onlay grafts.[28–31] These may add a few millimeters to the projection of the nose, but they also change the nostril-to-lobule ratio, by making the lobule larger relative to the nostril size. The ideal ratio of 2:1 of nostril to lobule should be kept in mind when using these grafts.[9] Onlay grafting should always be performed with soft-tissue grafts, and it is our preference to use mastoid fascia grafts directly under the nasal tip skin, even if it is combined with an underlying crushed LLC graft.[30,31] In our experience, LLC grafts alone tend to show through the skin after several years.

DECREASE PROJECTION

Cartilage Resection Techniques

Many patients with an overprojected nasal tip also have a tension nose, with the septum pushing the tip of the nose caudally. This finding is critical to palpate and assess at the time of consultation. If this is the primary diagnosis for tip projection, it can be addressed by component septal reduction to the desired height, which allows the domes to come down along with the septum to the desired height.[32]

Beyond the septal reduction, other areas that can be resected include the medial crura and the middle crura.[33] The MCR is our preferred technique for nasal tip deprojection. If combined with a LCS and repositioning of the domes, this technique can be achieved without having to caudally rotate the tip.[9] Middle crural resection is rare and typically is only used when the nasal tip aesthetics are far off from the desired goal and a complete recreation of the nasal tip complex is required.[33]

Cartilage Modification Techniques

MCO can be used to deproject the nasal tip.[22] If a columellar strut is placed between the medial crura, overlap is not necessary and leads to unnecessary widening of the columella. Similarly, a LCO can be used to deproject the tip, but this leads to cephalic rotation of the tip unless the domes are completely delaminated and recreated farther medially along the LLCs.

Septocolumellar sutures may be used for deprojection with repositioning of the medial crura relative to the septum.[18] However, this effect is slight unless there is an overlay or resection technique used simultaneously. In addition, as described before, it can lead to elevation of the columella in the cephalad direction, so it is best used in patients who already have more columellar show than ideal.

TIP STRAIGHTENING

Cartilage Modification Techniques

These techniques involve manipulating the existing LLCs through the previously discussed overlay, resection, and suture techniques with the aim of straightening the crooked nasal tip. Each of these techniques can be performed asymmetrically to account for any discrepancies in the LLC size, shape, and length. Although reshaping/suturing techniques alone may address symmetry, they do not improve tip support, and tip support techniques are often performed in combination with these techniques.

Some of the most impactful techniques in this category include LCO and MCO, which can dramatically adjust crural length and position.[15,17,22] However, if there is abundant excess cartilage, there is a potential for creating a visible or palpable stepoff. Furthermore, with these techniques there is no way to precisely remove specific areas of cartilage, as the entire crus is affected by the overlay. In these instances, lateral crural resection or MCR is more useful.[15,22] This is often performed in conjunction with lateral or medial crural strut grafts to help support the LLC after it is destabilized from the crural skeletonization.[34] If instead there is a need for reshaping without resection, an LCS maneuver can be performed to help symmetrize a mismatch in medial crural length.[15]

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Table 1. Rhinoplasty Maneuvers and Their Relative Ability to Project and Rotate the Nasal Tip

	Projection			Rotation		
Technique	**Increase**	**Decrease**	**Both**	**Cephalic**	**Caudal**	**Both**
Lateral crural steal	X X			X X		
Lateral crural overlap		X X		X X		
Lateral crural resection		X X		X X		
Medial crural resection		X X			X X	
Medial crural overlap		X X			X X	
Middle crural resection		X X				X
Tongue-in-groove			X			X
Caudal septal trim		X		X X		
Dorsal septal trim		X X				
Columellar strut			X			
Onlay grafts	X X			X		
Septal extension graft	X X					X
Extended spreader graft	X				X X	
Interdomal sutures	X			X		
Transdomal sutures	X					X
Septocolumellar sutures			X	X		

X, minor; X X, major.

Finally, interdomal and transdomal sutures can help address minor asymmetries in the LLCs.[14,15]

Structural Cartilage Graft Techniques

Structural support/grafting techniques are very versatile and especially helpful for when significant changes to the tip position, rotation, and projection are indicated. Each limb of the tripod and its component segments can be buttressed to help improve tip support and affect its position in 3-dimensional space. For the middle limb of the tripod, SEG, ESG, and TIG techniques help provide a strong and stable foundation that is needed for long-term tip support and maintenance of symmetry.[19–21] For the lateral limbs of the tripod, lateral crural strut grafts provide support to the nasal tip.[34] Finally, soft tip grafts can offer minor adjustments and are useful for fine-tuning tip contour or addressing smaller asymmetries after more impactful techniques are completed.[28–31]

When the caudal septum is deviated and contributing to suboptimal tip position, techniques that are directed toward the LLCs alone often will not be sufficient.[19–21] In these cases, repositioning the caudal septum on the anterior nasal spine such that it is in the midline is prudent. Where there is excess caudal septum preventing movement over the nasal spine, a resection of the septum should be performed to allow the caudal septum to be repositioned.

Table 2. Rhinoplasty Maneuvers for Addressing Nasal Tip Projection and Rotation and Their Associated Pitfalls and Complications

Technique	Complications
Lateral crural steal	Overrotation of tip, nostril asymmetry
Lateral crural overlap	Widening of tip, tip asymmetry, nostril asymmetry, cephalic overrotation of tip
Lateral crural resection	Overrotation of tip, alar retraction, nostril asymmetry
Medial crural resection	Widening of tip
Medial crural overlap	Widening of tip, drooping of tip
Middle crural resection	Widening of tip
Tongue-in-groove	Cephalic overrotation of tip, columellar retraction, stiffness of tip
Caudal septal trim	Cephalic overrotation of tip
Dorsal septal trim	Overexaggeration of supratip break
Columellar strut	Drooping tip, clicking of the strut against the anterior nasal spine
Onlay grafts	Graft visibility
Septal extension graft	Stiffness of tip, tip asymmetry
Extended spreader graft	Caudal tip rotation, widening of tip
Interdomal sutures	Tip asymmetry
Transdomal sutures	Tip asymmetry, overvisibility of the cartilage in the tip
Septocolumellar sutures	Cephalic overrotation of tip, columellar retraction, stiffness of tip

SUMMARY

Achieving optimal nasal tip positioning is crucial for success in rhinoplasty and requires a nuanced understanding of both anatomical factors and surgical techniques. Table 1 provides a comparison of all discussed maneuvers and their relative effect on nasal tip rotation and projection, and Table 2

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lists common complications with each maneuver. This article provides a thorough exploration of the methods for assessing and adjusting nasal tip projection, rotation, and alignment, emphasizing the importance of individualized treatment approaches. We advise against algorithmic approaches and suggest a patient-centric approach to addressing the nasal tip, wherein the decision to apply a certain technique to a particular patient is a clinical decision best made by the surgeon. Surgical strategies, including cartilage resections, structural grafts, and suture techniques, are essential tools for achieving desired outcomes in both primary and revision rhinoplasty. By integrating these approaches with careful assessment and patient-specific considerations, surgeons can enhance their ability to achieve precise and harmonious nasal tip positioning.

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DISCLOSURE

Dr. Reish is a consultant for MTF Biologics. The remaining authors have no relevant disclosures. No funding was received for this article.

PATIENT CONSENT

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

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