Suture Contouring of the Nasal Tip

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Scoring, morselizing, and resecting the alar cartilages in an attempt to modify the position and shape of the nasal tip may lead to postoperative distortions of the lobule. Contour grafts have the disadvantage of asymmetries, visible irregularities, and absorption. For these reasons, surgeons have adopted suture techniques as the primary method of contouring the alar cartilages. My philosophy in dealing with mild to moderate tip deformities consists of the following principles: (1) limited or no resection of cartilages; (2) no scoring or morselization of alar cartilages, which produces irreversible change and unpredictable results; (3) use of support grafts in the form of columellar struts and lateral crural battens to supplement structure and correct intrinsic alar cartilage weaknesses; (4) reliance primarily on the use of sutures to recontour and position the tip; and (5) limited use of contour grafts for situations that cannot be corrected with sutures and support grafts.

The last 2 decades have witnessed dramatic changes in the approach to rhinoplasty. The open approach was recognized as having merit in the early 1980s because it provided an opportunity to visualize the alar cartilages in relationship to each other and to the upper lateral cartilages. Subtle differences in symmetry and configuration were frequently appreciated. As with the endonasal approach, scoring, morselizing, and resecting alar cartilages were routinely performed, but with greater appreciation of the in situ changes occurring. This approach to modifying the alar cartilages to variable degrees decreased their intrinsic strength and often led to postoperative distortion of the lobule from wound contraction forces. The failure to consistently maintain the position and contour of the nasal tip achieved at completion of the rhinoplasty led to providing additional support in instances where destructive techniques were used. This was accomplished with cartilaginous grafts placed between or under the alar cartilages for support. Although highly successful, support grafts had the potential for displacement, warping, and malpositioning. In addition, the grafts did not entirely prevent excessive alar retraction or reliably predict the degree of tip rotation resulting from the routine resection of the cephalic portions of the lateral crura. These persistent deformities motivated a philosophy of preserving all or most of the alar cartilage and using contour grafts to alter the shape, projection, and position of the tip.

However, besides the inherent variability of structure grafts, contour grafts have the additional problem of extrusion and creation of visible irregularities and distortions. To alleviate the inherent disadvantages of contour grafts, suture modification of the alar cartilages was adopted in the latter half of the 1980s. McCollough and English,1 and Tardy and Chen,2 using an endonasal approach, introduced the concept of narrowing the tip with a single suture passed through the 2 intermediate and lateral crura. This bidomal spanning suture was termed a double-dome unit by McCollough and English, and a transdomal suture by Tardy and Chen. Subsequently, Daniel,3 using an open approach, implemented a separate “domal creation suture” to shape each dome. Tebbetts5 advanced these early approaches with sophisticated and somewhat complex suturing techniques that made use of permanent sutures when necessary to assist in lending support. Relying on sutures rather than contour grafts or de-
Structive manipulations preserves all structural integrity of the alar cartilages. It also provides a reversible and incremental intraoperative technique.

The adoption of suture techniques as the primary method of recontouring the alar cartilages has resulted in the emergence of a philosophy that I advocate in dealing with mild to moderate tip deformities. It consists of the following principles: (1) limited or no resection of the alar cartilages; (2) no scoring or morselization of the alar cartilages, which produces irreversible change and unpredictable results; (3) use of support grafts in the form of columellar struts and lateral crural battens to supplement structure and correct intrinsic alar cartilage weaknesses; (4) reliance primarily on the use of sutures to recontour and position the tip; (5) limited use of contour grafts for situations that cannot be corrected with sutures and support grafts.

**TECHNIQUES**

**ALIGNING AND STABILIZING THE MEDIAL CRURA**

Through an open approach, the alar cartilages and nasal dorsum are exposed. Symmetrical soft tissue elevation reduces the unequal forces applied to the alar cartilages by the nasal skin. Necessary alterations in the septum and bony and cartilaginous dorsum are usually accomplished prior to modification of the alar cartilages.

Suture contouring of the tip is a “ground up” progressive suturing technique adopted from the techniques described by Tebbetts and Daniel. A septal cartilage strut is usually placed between the medial crura. It serves the following purposes: (1) strengthens and provides a foundation for securing the medial crura; (2) when shaped correctly and of sufficient length, it enhances projection of the tip (this is accomplished by advancing the medial crura on the strut); (3) if the soft tissue at the columnellar labial angle is retracted or positioned posterior to the anterior facial plane, augmentation of this area can be accomplished with an L-shaped strut supplemented by separate septal cartilage prespine grafts. The medial crura are first positioned parallel in an anterior plane, and then in a superior-inferior position relative to each other. Doing this places the points of divergence of the intermediate crura precisely opposite each other.

At this point, medial crural fixation is accomplished by placing a 5-0 horizontal mattress suture through both crura and the strut (Figure 1). This suture unifies and stabilizes the medial crura and equalizes initial projection of the domes. It is helpful to secure the position of the crura and strut with a needle placed through the structures to stabilize the positioning prior to placement of the medial crural fixation suture. The medial crural fixation suture is placed in the mid-portion of the crura to avoid obliterating the natural flair of the caudal borders. It is important not to place the suture above the point of divergence of the intermediate crura because this will narrow the angle of divergence, which may result in an elongated hanging infralobule. A second mattress suture through the medial crura and strut is placed at the base of the columella. These 2 sutures stabilize and align the base of the alar arches providing the foundation for subsequent suture contouring of the domes and lateral crura. By advancing the point at which the initial medial crural fixation suture pierces the strut, projection of the tip can be substantially increased. Sutures should remain deep to the thin skin covering the crura. This goal usually necessitates the limited dissection of skin away from the crura.

**CONTOUR OF THE DOME**

Placement of dome-defining sutures is the next step in suture contouring of the nasal tip. Many primary rhinoplasties require limited or no cephalic trim of the lateral crura, because lateral crural spanning sutures frequently allow the surgeon to narrow the supratip region of the lobule without removal of the cephalic aspect of the lateral crura. If the lateral crura are judged to give the lobule excess volume as a result of a large caudal-cephalic dimension, trimming the cephalic border may be indicated, maintaining a width of 0.6 cm or greater. Contouring and positioning the dome-defining points is critical to shaping the lobule.

Nondisruptive alteration of the domes can be achieved with individual dome-spanning sutures. These
consist of 5-0 horizontal mattress sutures individually placed between the intermediate and lateral crus of each alar cartilage (Figure 2). The sutures are inserted from medial to lateral beginning near the caudal border of the crura and finishing near the cephalic border. Hydrodissection of the vestibular skin assists in preventing penetration of the skin with the needle and exposing the suture to the nasal passage. The nasal vestibule is inspected with placement of each dome-spanning suture prior to tying. Each suture is tightened incrementally using a surgeon’s knot. The nasal skin is redraped to inspect the contour of the tip prior to completing the knot. Occasionally dissection of the vestibular skin away from the inner surface of the cartilages at the apex of the domes may be necessary to achieve proper suture placement. It is helpful to use forceps to straddle the dome and manually compress it while evaluating the resultant contour of the dome complex. This maneuver assists the surgeon in determining the precise placement and degree of tautness of the suture. Sutures are usually positioned 2 to 3 mm on either side of the desired tip-defining point. Placing the dome-spanning suture further apart will have the effect of recruiting more of the lateral and intermediate crura into the dome complex. This effect increases the intrinsic projection and size of the lobule.

The dome-spanning suture reduces the angle of divergence between the intermediate and lateral crura. As the suture is tightened, the angle narrows as does the width of the dome. Ideally this angle, referred to as the angle of domal definition by Daniel, should approach 90°. Each dome is shaped independently of the other. Incremental tightening of the dome-spanning sutures allows the surgeon to equalize the angle of divergence between the intermediate and lateral crura for the 2 domes to correct intrinsic asymmetries. Sutures tied too tightly can pinch the dome and result in an undesirable concave lateral crus. This on occasion can compromise the external nasal valve. Within limits, the dome-spanning sutures allow the surgeon to adjust the projection of the tip by recruiting greater amounts of the intermediate and lateral crura into the dome complex, while concurrently adjusting the width of the individual dome.

ADJUSTMENT OF INTERDOMAL DISTANCE

The interdomal distance is governed by the angle of divergence of the intermediate crura. Following placement of necessary dome-spanning sutures, the skin is redraped, and the interdomal width is assessed. The least complex method of reducing this width is a simple buried interdomal suture placed between the cephalic borders of each dome, as described by Daniel.7 When tied incrementally, it reduces the interdomal distance. By adjusting the point at which the suture passes through each cephalic border of the alar cartilages, discrepancies of alignment of the 2 domes in a cephalic-caudal relationship can be simultaneously corrected. This suture controls the ultimate width of the nasal tip, while the dome-spanning suture controls the width of each dome.

A second method of reducing the interdomal width is to place a spanning mattress suture between the intermediate crura to reduce their angle of divergence (Figure 3). This suture is similar to the medial crural mattress suture and is positioned superior to it. Increasing the tautness of the suture has the effect of decreasing the angle of divergence of the intermediate crura and the interdomal distance. Daniel7 notes that this second approach can on occasion result in an unnatural-appearing infralobule fullness and excessive height to the infralobule.

CONTOURING THE LATERAL CRURA

Contouring the lateral crura is the third stage of suture contouring of the nasal tip. Lateral alar convexities are one of the more common deformities requiring attention during rhinoplasty. Fortunately, concomitant with enhancing the convexity and definition of the dome, the dome-spanning suture creates a concave contour to the adjacent lateral crura, which in most cases is sufficient to properly contour the lateral alar cartilages. This effect, however, may not be sufficient to correct a particularly marked convexity of the lateral crura. Scoring, morcelizing, performing incisions with overlapping edges, and performing triangular-shaped wedge excisions used to correct lateral alar convexity all have a destructive result and cause irreversible modifications of the carti-
lages. Most of these maneuvers reduce to variable degrees the projection of the nasal tip. They are also, to greater or lesser degrees, all predisposed to subsequent buckling of the cartilages from wound-healing contracture forces. A lateral crural spanning suture provides a predictable, accurate method of correcting excess lateral crural convexity without the need for procedures that would compromise the integrity of the cartilage. A 5-0 horizontal mattress suture is used to connect the points of the most lateral projections of the lateral crura drawing them medially (Figure 4).

In the case of asymmetries, separate sutures are placed between the lateral crura and the septum. Similar to the techniques used to place the dome-spanning sutures, hydrodissection of the vestibular skin assists in preventing penetration of the skin with the needle and exposing the suture to the nasal passage. The nasal vestibule is inspected with placement of each suture prior to tying. Each suture is tightened incrementally using a surgeon’s knot. The nasal skin is redraped to inspect the contour of the tip prior to completing the knot. More than a single suture may on occasion be required to fine tune the supratip region. This may be in the form of unilateral sutures extending from the lateral crus to the nasal septum.

Tebbetts has noted that the lateral crural spanning suture has a number of dynamic effects on the tip that depend on the position of suture placement. Passing the cephalic arm of the suture through an appropriate point on the dorsal septum allows the tip complex to be cephalically rotated and/or recessed. These effects are adjusted by varying the point along the dorsal septum at which the suture is passed through. Adjusting the tautness of the suture is another variable that allows the surgeon to accurately adjust the width and slope of the supratip.

The columnellar-lobule angle can be adjusted by the lateral crural spanning suture by passing one arm of the suture through the dorsal septum so as to increase cephalic rotation of the tip complex. As the suture is tightened, it incrementally causes greater cephalic bending of the intermediate crura, increasing angularity of the columnellar-lobule junction.

Following placement of a lateral crural spanning suture, the surgeon should inspect the final positioning of the extreme lateral aspect of the crura to ensure that they are not positioned excessively medially, compromising the external or internal nasal valve. Lateral crural batten grafts extending from the inferior surface of the crus to the bony pyramid will prevent this problem.

Another, more technical approach is the use of alar spreader grafts, as described by Gunter, to stabilize the lateral crura. These grafts span the space between the 2 lateral crura and serve as a buttress to prevent medial migration of the crura during wound contraction.

Medial malpositioning of the lateral crura can also be caused by dome-spanning sutures. This is infrequent compared with lateral crural spanning sutures and can be prevented in a similar fashion. Of the 4 suture techniques discussed, the lateral crural spanning suture is the most difficult to master and can be associated with a number of complications, including an overnarrowed tip or retraction of the nostril margins.
Adjunctive Sutures

The medial crural fixation suture, dome-spanning suture, interdomal suture, and lateral crural spanning suture are the main sutures used to contour the tip by controlling the projection and shape of the tip complex. There are occasions, however, where adjunctive sutures may be helpful in refining the lower third of the nose. The flare of the inferior aspect of the medial crura can be reduced by a spanning suture passing between the columella and septum. The columellar-septal suture consists of a 5-0 mattress suture that passes from the caudal surface of the columella at the point of divergence of the intermediate crura and extends through the caudal septum, either at an anterior or posterior point, to achieve the desired tip projection or recession. Only 1 or 2 mm of change in tip position can be achieved using this suture without the use of a cartilage buttress graft placed between the caudal septum and alar cartilages to prevent excessive compression of the membranous septum.

Although the lateral crural spanning suture can adjust rotation of the tip complex, additional refinement and cephalic positioning of the tip can be achieved with analar septal spanning suture extending between the cephalic borders of the intermediate crura 2 to 3 mm below the domes and the dorsal septum just cephalic to the anterior septal angle. This suture has a more direct influence on tip rotation than the lateral crural spanning suture, which passes through the septum. The alar-septal spanning suture rotates the tip by bending the intermediate crura cephalically, thus increasing angularity of the columellar-labule angle. As the suture is tightened, nasal contour must be carefully analyzed because the suture can distort the columella and cause excessive tip rotation.

Noncontouring adjunctive sutures may be used to finalize a tip rhinoplasty by correcting or preventing dysfunctional nasal valves. An example is the use of a 5-0 horizontal mattress spanning suture placed through the caudal septum (columellar septal spanning suture) to increase tip rotation; (10) a 1-mm-thick Peck graft; and (11) a 3-mm type 2 alar base reduction, including a portion of the nasal sill. Note that no resection of alar cartilages was performed.

The key maneuver to successful improvement of the nostril-tip disproportion was increasing tip projection. This was achieved primarily by use of a dome-spanning suture, which recruited lateral crura into the dome complex. This maneuver enhanced the size of the intrinsic dome complex while concomitantly narrowing the domes, which improved definition. The lateral crural spanning suture placed just cephalic to the domes reduced interdomal distance. The marked rotation of the tip and improved columellar-labule angulation resulted from suture suspension of the alar cartilages from the caudal septum.

CASE 2: POORLY DEFINED TIP (BROAD SUPRATIP)

A 30-year-old woman complained of left-sided nasal obstruction and dorsal convexity. The results of analysis showed a short nose with a poorly defined nasal tip (Figure 6). Although the interdomal distance was appropriate, lateral crural flare gave the supratip excessive fullness. There was marked convexity and moderate overprojection of the dorsum. Results of intranasal examination revealed deviation of the cartilaginous septum toward the left.

The surgical sequence was as follows: (1) open approach through a w-shaped translumellar incision; (2) a 2-mm cartilaginous and bony dorsal reduction; (3) septoplasty with removal of deviated portion of the bony septum; (5) transverse and lateral osteotomies; (6) removal of the depressor septi muscles and placement of columellar strut with 2 medial crural fixation sutures; (7) bilateral dome-spanning sutures; (8) lateral crural spanning suture; (9) spanning suture between the columellar strut and caudal septum (columellar septal spanning suture) to increase tip rotation; (10) a 1-mm-thick Peck graft; and (11) a 3-mm type 2 alar base reduction, including a portion of the nasal sill.
Figure 5. Case 1: nostril-tip disproportion. Left, preoperative view; right, 10-month postoperative view.
Figure 6. Case 2: poorly defined tip (broad supratip). Left, preoperative view; right, 3-year postoperative view.
Figure 7. Case 3: wide overprojected and underrotated tip. Left, preoperative view; right, 2-year postoperative view.
A very limited trim of the cephalic portion of the lateral crura was performed. However, the majority of tip modification accomplished in this patient was the direct result of the dome-spanning sutures, which narrowed the domes and created an appropriate concave contour of the lateral crura. The interdomal suture served to stabilize the domes and ensure long-term symmetry of the tip.

**CASE 3: WIDE OVERPROJECTED AND UNDERROTATED TIP**

The primary concerns expressed by this 38-year-old woman were that her nose was too large and she disliked the convexity of her nasal bridge. She also complained of bilateral nasal obstruction. Analysis findings of the nose showed overprojection and mild deviation of the middle and lower nasal vaults toward the right (Figure 7). The interdomal distance was excessive. There was marked convexity of the dorsum and inadequate rotation of the tip. Intranasal examination demonstrated a severe buckle of the cartilaginous septum obstructing both nasal passages.

The surgical sequence was as follows: (1) open approach through a w-shaped transcolumellar incision; (2) a 4-mm bony and cartilaginous dorsal reduction; (3) a 3-mm full-length resection of the caudal septum; (4) septoplasty with resection of the buckled cartilage; (5) insertion of bilateral 2-mm-thick spreader grafts; (6) transverse and lateral osteotomies; (7) placement of columellar strut and 2 medial crura fixation sutures; (8) bilateral dome-spanning sutures; and (9) a single interdomal suture. Note that no resection of the alar cartilages was performed.

The correction of the overprojected tip was accomplished by lowering the anterior septal angle. Improved definition of the tip was achieved solely by the use of dome-spanning sutures. Tip narrowing was accomplished with the use of the interdomal suture. Tip rotation primarily resulted from resection of the caudal septum and use of a columellar strut stabilized by medial crural fixation sutures.

**CONCLUSIONS**

Suture contouring of the nasal tip usually alleviates the need for nonreversible techniques that disrupt the integrity of the alar cartilages. Such disruptive techniques have the potential for distortion of the tip as wound contraction occurs. Disrupting the intrinsic strength of the alar cartilages has a narrow margin for error and is completely irreversible. The open approach to rhinoplasty has enabled the surgeon to recontour the tip complex primarily with sutures. In most circumstances this limits the need for contour grafts, which may result in certain undesirable manifestations. It is important to secure each contouring suture with a temporary knot, frequently redraping the skin to assess the change in shape of the tip before finalizing the knot.

The routine use of a columellar strut provides a stable foundation for suture contouring the alar cartilages. A 5-0 horizontal mattress suture of permanent (Prolene or nylon) or long-lasting (polydioxanone) material is preferred. Such sutures provide the surgeon with a flexible, effective method of contouring the alar cartilages. The use of sutures to shape the alar cartilages has the advantage of providing a nondestructive approach to contouring the nasal tip. The technique, however, is probably not entirely reversible once healing has occurred. The altered configuration of the cartilages is maintained by an envelope of scar tissue that likely will not allow the alar cartilages to assume their original contour if spanning sutures are removed.

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