Nasal tip sutures: Techniques and indications

Cemal Cingi, M.D.,¹ Nuray Bayar Muluk, M.D.,² Seçkin Ulusoy, M.D.,³ Hakan Söken, M.D.,⁴ Niyazi Altıntoprak, M.D.,⁵ Ethem Şahin, M.D.,⁶ and Servet Ada, M.D.⁷

ABSTRACT

Objectives: The surgical anatomy of the nasal tip is determined by intrinsic factors, such as the nasal tip volume, shape, definition, and symmetry. These factors are intimately related to the morphology of the lower lateral cartilages. Tip sutures reduce the need for grafts and allow the surgeon to manipulate the tip with a high degree of precision and better long-term clinical outcomes. In this review, we evaluated common nasal tip suture techniques to clarify the similarities and differences among them.

Methods: The following nasal tip suture techniques were investigated: medial crural fixation suture, middle crura suture, transdomal (dome creating, dome binding, domal definition) suture, interdomal suture, lateral crural mattress suture, columella sepal suture, intercrural suture, tip rotation suture, craniocaudal transdomal suture, lateral crural spanning suture, suspension suture, tongue-in-groove technique, and lateral crural steal.

Results: Tip sutures increase tip projection, narrow the tip, provide stabilization, and provide tip rotation. The sutures may be used separately or together.

Conclusion: Nasal tip sutures have long been used as noninvasive suture techniques. Each suture technique has unique benefits, and various key points must be considered when using these techniques.

Sutures are not only techniques for creating excellent tip outcomes. Sutures should be used selectively in appropriate cases. In this review, we discuss common nasal tip suture techniques, including their indications and important issues to consider. We presented them on the same drawing model to clarify their similarities and differences. The benefits of each nasal tip suture technique and important points to consider are listed in Table 1.

SUTURE MATERIALS

For many years, it was believed that permanent sutures would be necessary to achieve a permanent effect on cartilage contour. That has simply not proven to be true. Polydioxanone (PDS) sutures work just as well as permanent sutures and have the benefit of not causing stitch reactions (by protruding through the skin) or microabscesses that manifest as a bad odor noted by the patient.⁸ The tensile strength of a PDS suture is 75–80% at 2 weeks and 65–70% at 4 weeks. At 6 weeks, −55–60% of the initial strength of the PDS suture remained. Complete absorption is at 180 to 210 days.⁴ As for suture size, 5–0 PDS is empirically the size of choice for tip cartilages.⁴ The investigators also used Vicryl and Prolene sutures.

The nonabsorbable sutures have a potential for late complications, such as infection, foreign body reaction, and extrusion, especially in cases with poor soft-tissue coverage above the suture. If the absorbable suture material is lost earlier than the time needed to maintain the shape due to intrinsic forces, then the reshaped cartilage is naturally prone to return to its initial position. The permanence of cartilage reshaping does not depend on the durability of suture material after the formation of scar tissue. Because 2 to 12 weeks are enough for the formation of scar tissue that will maintain the shape in place, long-lasting absorbable suture materials (e.g., polydioxanone) can be preferred to stabilize the reshaped cartilage as effective as nonabsorbable sutures, without causing potential complications.²,¹⁰

Long-term outcomes of the suture techniques are also important. Soares et al.¹¹ reported that the average interdomal distance was 12.3 mm before surgery and 8.1 mm perioperatively by intercrural suture technique. It indicated a significant diminishing of 4.2 mm for the interdomal distance. At 3 months after surgery, the average interdomal distance was 8.8 mm; so there was an increase of 0.8 mm compared with the perioperative result. At 6 months after surgery, the average interdomal distance was 9.1 mm. The investigators concluded that the average of 8.1 mm (perioperatively) reaches 9.1 mm (6 months after surgery). Therefore, the average increase of 1.0 mm for the average interdomal distance was acceptable.¹¹ Most of the postoperative problems secondary to the nasal tip suture techniques are...
<table>
<thead>
<tr>
<th>Tip Sutures</th>
<th>Benefits of the Suture</th>
<th>Important Points to be Noted</th>
</tr>
</thead>
</table>
| Medial crural fixation suture (Fig. 1) | 1. Equalizes initial projection of the domes  
2. Tip projection can be increased as necessary | 1. Placing the suture above the point of divergence of the intermediate crura will narrow the angle of divergence |
| The middle crura suture (Fig. 2) | 1. Helps more pronounced reduction of the interdomal distance  
2. Narrows the lobule  
3. Greater strengthening of the tip | 1. The middle crura suture approximates the most anterior portion of the medial crura |
| Transdomal (dome creating, dome binding, domal definition) suture (Fig. 3) | 1. Used in convex lateral crura–flat dome  
2. Very effective to flatten the lateral crura  
3. Decreases the horizontal contribution to the bulbous nasal tip contour  
4. Narrows the lobule size  
5. Reduces the angle between the domal and lobular segments of both middle crura  
6. Reduces interdomal distance  
7. Pulls the lateral crura medially  
8. Increases tip projection  
9. Increases alar rim concavity | 1. Sutures are usually positioned 2–3 mm on either side of the required tip-defining point, inserted in a horizontal mattress fashion |
| Interdomal suture (Fig. 4) | 1. Provides stabilization  
2. Provides tip rotation  
3. Provides narrowing  
4. Useful to set the width between the domes | 1. Controls tip width both at the domes and in the infralobule  
2. Increasing the tightness of the suture decreases the distance between the domes |
| Lateral crural mattress suture (Fig. 5) | 1. To control the convexity of the lateral crura  
2. To obtain a flat lateral crus | 1. The width of the mattress should be 6–8 mm for an optimal result  
2. Tying the knot too tightly may cause unwanted concavity of the lateral crus |
| Columella septal suture (Fig. 6) | 1. Reestablishes the tip strength and integrity  
2. Helps to threat hanging columella  
3. Provides tip rotation and little tip projection  
4. Reduces the overprojected tip | 1. Used to adjust the tip height and/or rotation |
| Intercrural suture (Fig. 7) | 1. Reduces the width of the cartilages of the middle crus | 1. To not tie the knot too tightly to avoid overly narrowing the normal middle crus width |
| Tip rotation suture (Fig. 8, A and B) | 1. The nasal tip is rotated cephalically  
2. Increase of the columellar lobular angle  
3. Increases the angle of tip rotation | 1. If a medial crura suture is not used before placement of this suture, then the tip rotation suture may result in flattening of the columella  
2. If the suture is extended from the cephalic margin of the medial crura to the caudal septal angle, then flattening and widening of the columella are not observed |
| Craniocaudal transdomal sutures (Fig. 9) | 1. Narrows the tip  
2. Increases protrusion | 1. It is directed toward the transition of the domal part of the medial crus and the lateral crus  
2. On the other side (the other alar cartilage), the needle does not pass through the cartilage but under it and its skin pad |
| Lateral crura spanning suture (Fig. 10) | 1. Repositioning and changing the shape of lateral crural convexities  
2. To correct asymmetries, alar and internal valve collapse, and overrotation of the tip | 1. If there is asymmetry between the lateral crura due to intrinsic kinks, bends, or dense segments in one of the alar cartilage, this technique cannot produce symmetry |
| Suspension suture (Fig. 11) | 1. Allows the nasal tip to be rotated while maintaining its appropriate position  
2. Offers a more logical vector of rotation | 1. The ideal direction of the vector for nasal tip suspension is from posterior to anterior and in a slightly superior direction |
often the confirmations of intraoperative suspicions and preventable with easy prophylactic maneuvers. For example, the mild or moderate pinching observed during surgery may become more prominent and may cause alar collapse years after the surgery as a result of the scar contracture process that shrinks the skin envelope over the modified tip structure. Not tying the knots too tight and/or prophylactic placement of the lateral crural strut or alar batten graft will prevent such problems and potential revision surgery.2

SUTURE TECHNIQUES

Medial Crural Fixation Suture

The medial crural fixation suture is used to fixate the medial crura to the columellar strut and provide foundation for subsequent suture contouring of the domes and lateral crura. This suture stabilizes and aligns the base of the alar arches, unifies and stabilizes the medial crura, and equalizes the initial projection of the domes. It strengthens and provides a foundation for securing the medial crura. Medial crural fixation is accomplished by placing a 5–0 polydioxanone (PDS) horizontal mattress suture through both crura and the strut. It is helpful to secure the position of the crura and strut by placing a needle through the structures, which stabilizes the positioning before placement of the medial crural fixation suture. The medial crural fixation suture is placed in the midportion of the crura to avoid obliterating the natural flair of the caudal borders (Fig. 1).12

It is important to avoid placing the suture above the point of divergence of the intermediate crura because this will narrow the angle of divergence. A second mattress suture through the medial crura and strut is placed at the base of the columella. These two sutures stabilize and align the base of the alar arches and provide the foundation for subsequent suture contouring of the domes and lateral crura.12 First, a needle is inserted to secure the position of the crura and strut. Next, a horizontal mattress suture is placed through both medial crura and the strut. The domal symmetry can be adjusted and the tip projection increased as necessary.2

Middle Crura Suture

The middle crura suture is placed through each medial genu, in the uppermost portion of the medial crura. In contrast to the medial crural fixation suture, the middle crura suture results in a more pronounced reduction of the interdomal distance and narrows the lobule. The middle crura suture approximates the most anterior portion of the medial crura. This suture provides greater strengthening of the tip and some approximation of the domes (Fig. 2).

Transdomal (Dome Creating, Dome Binding, Domal Definition) Suture

The nasal lobule is the mobile lower third of the external nasal pyramid. It is composed of the tip, alae, and columella as subunits. The lobular or alar cartilages are horseshoe-shaped and support the structured anatomy of the whole lobule.13 Alar cartilage consists of three crura (medial, middle, and lateral) and of each of these three segments of crura, with distinct junction points of esthetic importance. If the distance between the medial crura in wide and the soft tissue is thin, then the appearance of the tip is bifid; but, if the soft tissue is thick, then the appearance of the columella is wide. The domal segment has a distinct domal notch, which is correlated with the shape of the soft triangle of the lobule. The change of the angulation and the convexity of the domal segment directly affect the appearance of the tip.2

Most patients undergoing primary rhinoplasty exhibit a convex lateral crura-flat dome. For such patients, transdomal sutures are very effective to flatten the lateral crura and decrease the horizontal contribution to the bulbous nasal tip contour.2 The transdomal suture with a closed approach was introduced by Tardy et al.14 and the open approach was introduced by Daniel.15 This suture brings the domal and lobular segments of each individual dome into close proximity. It, therefore, narrows the nasal tip by reducing the angle between the
domal and lobular segments of both middle crura, and reduces the interdomal distance.14,15

The term “transdomal suture” as used today often refers to the dome definition suture described by Daniel.15 It is defined as the key step in defining the domal notch on the caudal border of the crura and placing a horizontal mattress suture across the domal segment with the knot tied medially. Sutures are usually positioned 2–3 mm on either side of the required tip-defining point and are inserted in a horizontal mattress fashion. The knots are tied medially between the domes (Fig. 3)2,5,14,16–18. The use of two separate single dome sutures is usually preferred to preserve the normal divergence of the interdomal crura.2,3,14,15

The transdomal suture is a horizontal mattress suture that spans the domal arch anterior to the vestibular lining. With its placement, the medial and lateral crura of the same lower lateral cartilage are brought into closer proximity. The consequences of this technique are in reducing the interdomal distance and narrowing the lobule size if the medial crura are sufficiently stabilized.3

Transdomal sutures narrow the domal arch while pulling the lateral crura medially. The net results are increased tip projection and alar rim concavity, and the potential need for an alar rim graft. In addition, depending on the suture position, cephalic or caudal rotation of the lateral crura may be observed.3

**Interdomal Suture**

Joseph19 described what is now known as the interdomal suture to provide stabilization, tip rotation, and narrowing. This suture provides satisfactory domal definition, interdomal width, and domal equalization. The interdomal suture is a simple vertical interrupted suture placed between the domes of the middle crura. It controls the tip width both at the domes and in the infralobule region. The suture is usually placed at a level ~3–4 mm posterior to the dome and preserves the normal separation between the domes.3,14

The interdomal suture approximates the domes and can equalize asymmetric domes. However, the entire tip may shift to the short side if there is a significant difference in the heights of the domes due to short lateral and medial crura.3 The interdomal suture is a simple loop suture placed from the most anterior portion of one dome to the contralateral dome. The changes in the cartilage produced by this suture are somewhat similar to those produced by the transdomal suture. As the suture is tied, the domes are approximated, which narrows the tip and decreases the lobule width (Fig. 4).3 An interdomal suture brings the two tips together, prevents them from splaying, and contributes to narrowing of the nasal tip. The purchase is made ~3 mm posterior to the domes. The cephalic ends of the domes are usually allowed to be separate from one another by ~3 mm.3

This suture is particularly useful to set the width between the domes; increasing the tightness of the suture decreases the distance between the domes. The suture narrows the tip and increases tip projection. This suture should not be tied too tightly, otherwise, the domes will come too close together, the natural divergence between the intermediate crura will be eliminated, and the collemellar lobular angle will be blunted.2,5,16 The overall nasal tip width is controlled by the interdomal suture as well as the transdomal suture. A wider tip width is planned for male than for female patients, and this can be controlled by both the interdomal and transdomal sutures.8

**Lateral Crural Mattress Suture**

Controlling the curvature (convexity or concavity) of the nasal cartilages and cartilage grafts has long been a frustrating problem in the field of plastic surgery. In their review, Gruber et al.20 described another suture technique to control the convexity of the lateral crura and support the existing tip sutures. If transdomal sutures do not reduce the convexity of the lateral crus, then lateral crural mattress sutures may be used to obtain a flat lateral crus. In this technique, a mattress suture is placed through each crus separately, and the convexity of the crus is altered based on the suture tension.20 The area of maximal convexity of the lateral crus is grasped with a forceps, a suture is passed through the lateral crus on one side of the forceps perpendicular to the axis of the lateral crus, another suture is passed through on the other side of the forceps, and the sutures are tied. The width of the mattress should be ~6–8 mm for optimal results (Fig. 5).2,21,22 Tying the knot too tightly may cause unwanted concavity of the lateral crus. Residual convexity is frequently present at the posterior aspect of the lateral crus; this, accordingly, should receive a second mattress suture. Occasionally, a third mattress suture may be necessary to achieve a straight lateral crus.8

**Columella Septal Suture**

The columella septal suture secures the tip complex to the caudal septum and provides a small amount of projection. With this suture technique, a large needle is passed between the leaves of the middle crura at the point of divergence of the intermediate crura.2,24 Many fibers are present between the middle crura, which allows for very good purchase. The needle is then passed through the anterior septal angle, which is usually located more anterior to the columella–septal entry. The needle is then passed back between the leaves of the middle crura. If a transfixion incision has been made, then a clamp is placed between the tip cartilages and the caudal septum to prevent overtightening of the knot. As the knot is slowly tightened, it pulls the tip cartilage up against the caudal septum, which corrects any existing hanging columella and provides a small amount of tip projection (Fig. 6). The suture reestablishes the tip strength and integrity, helps

---

**Figure 3. Transdomal suture.**

**Figure 4. Interdomal suture.**

**Figure 5. Lateral crural mattress suture.**
creased.

creases, tip projection increases, and tip rotation is created and in-

is tightened, elevation of lower lateral cartilages to the septum in-

teriorly and from the lower lateral cartilages inferiorly. When the suture

width of the cartilages in this location. PDS (5–0) is used for purchase

increases.

lower lateral cartilages to the septum increases and tip projection also

lateral cartilages inferiorly. The suture is passed from the septum supe-

riorly and from the lower

crus.8

If the suture is extended from the cephalic margin of the medial crura

then the tip rotation suture may result in flattening of the columella.

If a medial crural suture is not used before placement of this suture,

To avoid a hanging columella, provides tip rotation and slight tip

projection, and may reduce tip overprojection.8

The columella septal suture is used to adjust the tip height and/or

rotation. The projection and rotation can be adjusted, depending on

the location and tightness of the suture on the caudal septum.2 The

suture is passed from the septum superiorly and from the lower

lateral cartilages inferiorly. When the suture is tightened, elevation of

lower lateral cartilages to the septum increases and tip projection also

increases.

Intercrural Suture

The intercrural suture, which is simply a mattress middle crus

suture as described by Guyuron and Behmand9 and a domal equal-

ization suture as described by Daniel,15 can be used to reduce the

width of the cartilages in this location. PDS (5–0) is used for purchase

of the inside of the middle crus (from posterior to anterior) on one

side and then on the contralateral side. The knot is located between

the middle crura (Fig. 7). Care is taken to avoid tying the knot too

tightly and thus overly narrowing the normal width of the middle

crus.8

Tip Rotation Suture

Tebbetts6 introduced the tip rotation suture, which passes from the

cephalic edge of the medial crura to the dorsal septum near the septal

angle to produce and maintain tip rotation. The nasal tip is then

rotated cephalically with an increase in the columellar lobular angle

(Fig. 8, A and B). A rotation suture is designed to increase the angle

of tip rotation by advancing the middle crura onto the septum just

above the septal angle.1,2,3

If a medial crural suture is not used before placement of this suture,

then the tip rotation suture may result in flattening of the columella.

If the suture is extended from the cephalic margin of the medial crura

to the caudal septal angle, then flattening and widening of the colu-
mella are not observed.3 The suture is passed from the septum supe-

riorly and from the lower lateral cartilages inferiorly. When the suture

is tightened, elevation of lower lateral cartilages to the septum in-

creases, tip projection increases, and tip rotation is created and in-

creased.

Craniocaudal Transdomal Suture

To reduce the nasal tip, Nedev24 recommended excision of one-

third of the volume of the lateral crus from its cephalic end. Polypro-

ylene nonabsorbable 3–0 sutures are then applied. The needle is

placed on the transition of the domal part of the medial crus and its

lobular part. It is then directed toward the transition of the domal part

of the medial crus and the lateral crus. On the other side (the other

alar cartilage), the needle is moved similarly but in the caudal to

cranial direction. The needle does not pass through the cartilage but

under the cartilage and skin pad. The knot is passed not in front of

the cartilage but in a cranial direction (Fig. 9). Nedev24 reported narrow-

ing and protrusion in all the patients with the use of craniocaudal

transdomal sutures.

Lateral Crural Spanning Suture

As conceived by Tebbetts,6 a lateral crural suture (or lateral crural

spanning suture) may be used to reposition and change the shape of

lateral crural convexities, as seen in patients with boxy or trapezoid

nasal tips. The lateral crural suture may be placed unilaterally or

bilaterally and at varying positions to correct asymmetries, alar and

internal valve collapse, and tip overrotation.8 The convexity of the

lateral crura is identified, and a needle is placed across both lateral

crura. A horizontal mattress suture is then inserted and tightened

incrementally. One arm of the suture can be passed through the
dorsal septum to increase cephalic rotation of the tip complex. The

width and slope of the supratip can also be adjusted by changing

the tightness of the suture (Fig. 10). The notching of the alar rims

should be avoided, and a lateral crural strut may be required to

prevent this problem. The technique applies equal force to both lateral

crura. If there is asymmetry between the lateral crura due to intrinsic

kinks, bends, or dense segments in one of the alar cartilages, this

technique cannot produce symmetry.2,14,22,23

Suspension Suture

Cárdenas et al.25 described a procedure for nasal tip rotation with a

suture suspension technique that allows the nasal tip to be rotated

while maintaining its appropriate position. They reported that this

technique may offer a more logical vector of rotation when the osteo-
cartilaginous junction is used as an anchoring place, when taking into

account that the ideal direction of the vector for nasal tip suspension

is from posterior to anterior and in a slightly superior direction.

After subcutaneous undermining of the nasal tip and dorsum, a

nonabsorbable suture is passed across the medial side of both domes

(intermediate crus) of the alar cartilages, and one polypropylene

thread is slid through the guide to exit through the skin incision at the

osteoarticular junction. The end of the suture is again passed

across the osteocartilaginous junction to the other side of the dorsum.

Finally, the guide and the suture are passed to the nasal tip, and a

knot is tied, adjusting the tip rotation as far as the desired level (Fig.

11).25 The investigators reported that this technique guarantees opti-

mal, long-lasting results.

Tongue-in-Groove Technique

This technique is used to correct excessive columellar show.24 It

may also be indicated for controlling nasal tip rotation and projection

while preserving the lobular cartilaginous complex.1 Correction of the

lower third of the nose is perhaps the most challenging component of
performing a rhinoplasty. The tongue-in-groove technique provides a method for correcting excess columellar show and maintaining correction of caudal deviation. It is also indicated for controlling nasal tip rotation and projection while preserving the integrity of the lobular cartilaginous complex, and it may be combined with either external or endonasal rhinoplasty.26

The denuded caudal septum is positioned into the surgically created space between the two medial crura by a series of sutures in a through-and-through fashion. A full transfixion incision is created, and the mucoperichondrium is elevated from the septum bilaterally in a posterior direction for at least 4 mm to expose both sides of the caudal end of the cartilaginous septum. The deviated portion of the cartilaginous septum is then incised with a Cottle elevator, and the contralateral mucoperichondrial flap is elevated in the area that overlies the section of cartilage to be removed. A portion of the removed cartilage is crushed, replaced between the mucoperichondrial flaps, and secured in this position with a series of 4–0 chromic mattress sutures. At the completion of any required septoplasty techniques, retrograde dissection is performed between the medial crura by using fine forceps and tenotomy scissors to create a pocket. The medial crura are then pushed cephaloposteriorly and the denuded caudal septum is placed into the potential space created between them. If excessive width of the columella was present preoperatively, then the soft tissue from the dissected pocket may be removed to help with narrowing (Fig. 12). Three or four chromic sutures are typically placed in a through-and-through fashion by using a straight needle.26 To avoid columellar widening, soft tissue may be removed from the dissected pocket.1 This technique is effective in all cases in which either the medial crura is straight or round because medial crura are fixed to the septum, which is the most stable part of the nose.

Lateral Crural Steal

A further variation of the transdomal suture, viz. lateral crural steal, was described in 1989 by Kridel et al.27 In this technique, nasal tip projection and rotation are increased while preserving the alar rim strip. After medial crura stabilization, a transdomal suture is placed through the lateral crus and brought out through the medial crus, just below the new domal units. This involves rotation of the lateral crus medially and placing of an interdomal stitch to hold the crura in place. This procedure narrows the nasal tip, moderately increases tip projection, and leads to mild cephalic tip rotation. The procedure uses the external rhinoplasty approach for exposure. By elevating both the dorsal and vestibular skin from the domes of the lobular cartilages, the lateral crura may be advanced onto the medial crura to further project the nasal tip and reorient the tip upward.27

The vestibular skin is undermined from the undersurface of the alar cartilage, starting at the junction of the medial and lateral crus and then proceeding both laterally and medially for ~5 mm to each side to allow free lateral crural mobilization without restriction by the underlying skin attachments. The lateral crus is advanced medially in a curvilinear fashion onto the medial crus and is fixed in its new position by using permanent mattress sutures just below the newly established dome (Fig. 13).27,28 By way of differential suture placement, this technique makes use of the “tripod concept” first described by Anderson29 in 1969. The end result is a tip positioned in a more anterior and superior location.29

In this article, we did not mention the other techniques that were used to shape the nasal tip. We did not say that the only method is the suture technique. We only presented the suture techniques that could be used alone or in addition to the other techniques.
CONCLUSION

The nasal tip is one of the most important features of facial esthetics, and successful rhinoplasty depends on maintaining adequate nasal tip projection and rotation. Securing the position and shape of the nasal tip is one of the most challenging problems in rhinoplasty. Suturing techniques provide a reliable alternative to tip plastics. Nasal tip sutures have long been used as noninvasive techniques. Each suture technique has some benefits, and there are important points to note when using these techniques. In this article, nasal tip suture techniques were presented in detail.

REFERENCES


American Journal of Rhinology & Allergy e211