Operative Strategies

Continuing Medical Education Article—Facial Aesthetic Surgery

Surgical Management of the Boxy Tip

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Learning Objectives

The reader is presumed to have knowledge of the basic concepts and surgical procedures of rhinoplasty. After studying this article, the participant should be able to:

1. Describe the anatomic components responsible for the boxy nasal tip appearance.
2. Summarize the principles of suture reformation in converting the lower lateral cartilage convexity into a predictable concavity.
3. Plan the application of additional grafts and maneuvers to enhance nasal tip appearance.

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The author uses a dome-binding suture to reform the heavy appearance of the boxy nasal tip by reshaping the convex lower lateral cartilage into a more refined concave shape. This procedure is performed with a straight needle and permanent suture, undermining of dome mucosa, meticulous contamination prevention, and incremental lowering of the unitized dome height for tip refinement. (Aesthetic Surg J 2007;27:306–318)

The boxy nasal tip is relatively common in patients presenting for rhinoplasty. It is one of several considerations when size of the lower third of the nose is viewed as an aesthetic problem. The large nasal tip may be associated with thick skin, an over-projecting tip, an abundant nasal ala problem, or a boxy nasal tip. A large tip that is not boxy requires very different surgical management than a boxy tip.

The boxy nasal tip is characterized by strong, convexly curved lower lateral cartilages (LLC). The strong convex curve of the lower laterals gives width to the (nasal) front and submental views and is responsible for the flat, box-like tip appearance. The strong, resilient, and convexly arched LLC, which constitute the anatomic basis for the boxy nasal tip, frequently demonstrate a separated interdomal junction. Here, I discuss aesthetic correction of the boxy nasal tip having a wide, full, flat appearance.

Most patients with a boxy nasal tip have a shared view of the effect that this nasal structure has on their appearance. The female patient may feel that her nose is unrefined, lacks delicacy and elegance, and looks somewhat masculine. Some complain of a rough, pugnacious appearance. In new social situations, many admit to feeling that the focus of attention is on their large nasal tip. It is rare for the patient requesting aesthetic nasal change not to want the boxy tip modified when the boxy tip is a component of the nasal deformity.

Anatomic Considerations

You can identify and confirm the presence of a boxy nasal tip by visual inspection and careful manual palpation. Multiple anatomic factors may be present in the
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Anesthesia

The atmosphere in the operating room, including music, is conducive to the patient’s relaxation. I place topical cotton pledges saturated in 4% cocaine against the nasal septum and turbinates, 3 per side. I anesthetize the external nose with about 5- to 6 mL of lidocaine (Xylocaine) 2% with epinephrine 1:100,000 via a 25 gauge needle. To facilitate injection of local anesthetic, I use acupressure at meridian points on the hand, shoulder, and forehead. Occasionally, I use increments of 0.5 mg of midazolam to supplement the premedication and the acupressure.

Procedure

I approach all boxy tip rhinoplasties through an endonasal LLC delivery technique (as follows):

Extend the initial intercartilaginous incision over the anterior septal angle onto the anterior margin of the caudal septum. Make the secondary incision along the inferior margin (marginal incision) of the lower lateral cartilage past the soft triangle to the junction of the medial and inferior crura of the lower lateral cartilage (Figure 1).

Use a curved Steven’s scissors to separate the nasal tip skin from the LLC. This dissection extends from the near posterior margin of the LLC, past and medially, to the anter iormost portion of the inferior crura. Deliver the totally mobilized LLC into the nares (Figure 2). Then, decide how much of the cephalic margin of the LLC to remove.

The amount of cartilage removed is usually minimal because the change in boxy tip appearance is a function of suture reformation rather than excision (Figure 3). Any excision is usually posterior to the dome. The vestibular mucosa is always preserved. A minimal vertical height of 6 mm must remain in the LLC. It is rare, however, to have less than 8 mm of cartilage remaining. Heavy, dense LLC may require more resection than thin, fragile LLC. A minimal vertical height of 6 mm must remain in the LLC because the cartilage that remains

Boxy tip that will require specific surgical attention during rhinoplasty, including severity of lower lateral arch convexity, presence of a central cleft, depth and extent of alar creases, overall tip projection, alar margin elevation, sublobular tip shape, and angle of tip elevation or depression. The final outcome frequently depends on successfully dealing with all the nuances involved in handling these factors.

If the posterior margins of the LLC project into the airway before surgery, surgical changes to improve the external nose may impair the airway by projecting these margins further into the airway. Skin thickness is always a consideration in final tip refinement. The alar skin at the very defined posterior end of the LLC may be depressed, giving the impression of an alar crease, which extends to the alar rim.

The surgeon must understand that changes necessary for nasal tip refinement are related not only to what must be accomplished in the upper two thirds of the nose, but also to how these changes will relate to the entire face. The surgeon’s ability to envision the appropriate balance of nose to face and to effect changes that will bolster the patient’s self-image comes with experience. With time the plastic surgeon realizes that the rhinoplasty procedure is but one phase of a process that begins with patient consultation and continues in a long postoperative course. Understanding the long-term consequences of reductive, augmentative, and manipulative nasal surgery is imperative. The ultimate objective is an attractive, lifelong natural-looking nasal appearance.

After my patient and I agree on appropriate and realistic rhinoplasty goals, I find it helpful to develop a diagrammatic procedure plan. I chart each element of the undesirable nasal characteristic onto a facial/nasal line template along with the surgical change that will correct it. This document, created in real time while observing the patient, is as valuable as preoperative photographs. It provides not only a plan that can be referred to just before surgery or weeks or months after the initial consultation, but also serves as immediate reference if a patient wants me to review the changes I proposed long after the consultation. My concise response, facilitated by this detailed documentation, can be very affirming and confidence-building to the patient considering surgery.

Anesthesia

I prefer to perform endonasal rhinoplasty exclusively under local anesthesia with intravenous analgesia. I use general anesthesia only under special circumstances, such as in a remarkably anxious patient, a patient who does not speak English and therefore cannot respond to any reassuring or instructive dialog during the procedure, a patient with severe attention deficit hyperactivity disorder, or, occasionally, for live surgical demonstration.

I administer meperidine (Demerol) 100 mg and promethazine (Phenergan) 50 mg intramuscularly about 30 minutes before surgery, adjusting these doses downward for the slight patient. Demerol and Phenergan, which have been used in combination for many years, produce a consistent and predictable euphoria without nausea. They provide an excellent background for administering additional small amounts of intravenous sedation, if necessary.

The atmosphere in the operating room, including music, is conducive to the patient’s relaxation. I place topical cotton pledges saturated in 4% cocaine against the nasal septum and turbinates, 3 per side. I anesthetize the external nose with about 5-6 mL of lidocaine (Xylocaine) 2% with epinephrine 1:100,000 via a 25 gauge needle. To facilitate injection of local anesthetic, I use acupressure at meridian points on the hand, shoulder, and forehead. Occasionally, I use increments of 0.5 mg of midazolam to supplement the premedication and the acupressure.
Figure 1. The LLC are approached via an intercartilaginous and marginal incision. The incisions are carried laterally to the near posterior margin of the LLC. The anterior extent of the incision is onto the medial crura. The scalpel is making the intercartilaginous incision.

Figure 2. The LLC are delivered in the nares after being freed from the nasal tip skin by spreading action of the curved Steven’s scissors. The dissection should hug the surface of the LLC.
must adequately support the tip for a lifetime. Routine removal of large amounts of LLC during rhinoplasty has been one of the main causes of postoperative alar collapse and alar margin elevation (arching). At the conclusion of the procedure, with the LLC in place, additional small amounts of cartilage can be removed with a retrograde exposure of the cephalic ends of the LLC, if necessary, to achieve symmetry and further refinement.

Once the LLC excision has been completed, address the rest of the rhinoplasty, which may include cartilaginous and bony hump removal, osteotomies, and septoplasty for function or cartilage retrieval. After these procedures, suture reformation of the boxy nasal tip is the next step. Then, if necessary, alar grafting, strut grafting, tip rotation, and finesse morsel grafting conclude the procedure.

Deliver each of the LLCs into the nares. Identify the domes that will be united. Simply bringing the medial surface of the domes together in the midline with an interdental suture is not adequate. Use a mattress suture technique to modify the dome shape, accurately unite the 2 domes, and create some degree of concavity in the LLC. It is convexity that is responsible for the boxy nasal tip appearance.

Before bringing the suture into the surgical field, place an open surgical sponge over the patient’s upper lip, mouth, and chin to prevent suture contamination. Begin suture placement on the right side. Deliver the LLC into the nares. Locate the dome. Use a Brown-Adson forceps to hold the dome in a position mimicking the new dome shape anticipated by use of the mattress suture. Then, release the dome and grasp the LLC so that a small, sharp, curved scissors can be used to carefully dissect the mucosa away from the undersurface of the dome. Do this slowly and without force to avoid tearing the dome cartilage. Separation of the mucosa will allow the suture material to remain internal, avoiding exposure in the nasal cavity.

I find that a straight needle allows for best placement of the mattress suture. An absorbable suture may be used if is long acting; however, most long-acting or absorbable sutures are quite reactive. I prefer a permanent material that provides a continuous long term contouring effect. Various sutures have been used, but 4-0 polypropylene suture on a V-47 needle (Ethicon, Inc. Somerville, NJ) provides superior results.

Place the suture through the superior right dome from medial to lateral, in the left inferior dome, and then from lateral to medial in the superior position of the same dome (Figure 5). This allows the knot to fall in a buried position between the domes.

Use a surgical twist to temporarily pull the domes together into a new central position and gently reform the LLC from a convex to a slightly concave form. Loosen or tighten the suture to provide the desired nasal tip appearance.

The surgical twist allows the domes to be placed into their anatomic position so you can judge the effect before permanently placing the knot. The surgical twist also allows the domes to be brought closer together for a narrower tip and increased LLC concavity. Likewise, a lesser correction is achieved by loosening the surgical twist. The use of the surgical twists facilitates artistic judgment by providing direct tip visualization.

After you decide on the appropriate degree of tightness for the suture, apply a second knot, pulled tightly. Then place the third knot, again pulled firmly, but not tightly. Then place a fourth knot. Although the final knot is pulled tightly, it will not transfer tension to the other 3 knots. In this manner the desired tension of the original surgical twist remains (Figure 6). Paint the site of permanent suture placement with povidone iodine to ensure its sterility. Then cut the sutures exactly on the knot, so that no suture ends exist. The effect of the dome-binding suture will be evident immediately, that is, reformation of the LLC and some degree of increased projection (Figure 7).

The dome suture is the foundation of the boxy tip LLC reformation. After completing the dome suture, decide if additional grafting or other maneuvers will be needed to achieve the desired appearance. To make this decision, consider the following questions:

1. Should the lateral tip view be more angular than rounded?
2. Is the tip slightly dependent and therefore in need of elevation?
3. Is the tip slightly elevated and in need of downward rotation?
4. Are the lateral ala weak or is there a deep alar crease that will require grafting?
5. Is the tip support weak?
6. Are any final refinements necessary in the tip appearance?

I prefer a more angular than rounded lateral tip appearance. If the vertical dimension of the tip appears high in the lateral view, lending a rounded look, draw back the united domes into the nares and reduce the
Figure 3. On each side, a small cephalic margin of the LLC is removed. The excision extends laterally from the dome. Mucosa is preserved. The cartilage is removed to prevent lateral supratip fullness when the domes are brought together with the dome binding suture.

Figure 4. First, mucoperichondrium is separated from the immediate undersurface of the dome. A 4-0 polypropylene suture on a straight needle is passed from medial to lateral and then (as shown) lateral to medial to complete the mattress suture of the right dome.
**Figure 5.** The needle is passed to the opposite side (pushing the needle/suture junction beneath the infratip lobule). Next, the needle is passed through the left dome going from medial to lateral and then (as shown) from lateral to medial. The loose ends of the suture now present in the interdomal position and are ready to knot.

**Figure 6.** The tightness of the dome-binding suture is case dependent. A surgical twist is placed initially and the domes are brought together tightly. The domes are replaced in their normal position and the form of the tip is observed. If the tip appears too narrow, the domes are brought into the operative field and the knot is loosened slightly. The maneuver is repeated until the tip is optimal—an artistic judgment on the part of the surgeon. Three additional knots are added to the initial surgical twist to secure the dome-binding effect.
superior margin of the domes incrementally with either a blade or small sharp scissors. One millimeter of excision can make a visible difference in the roundness or sharpness in the lateral view of the nose. Be careful not to cut the mattress suture (Figure 8).

If the tip appears slightly dependent, excise a base up triangle from the caudal margin to rotate the tip cephalically. If the tip needs to be dropped slightly, excise a triangle of caudal margin with the base down. This decreases the support of the feet of the LLC and will allow the tip to rotate slightly inferiorly (Figure 9).

The next step is to decide whether alar batten grafts will be necessary to support and counteract any medial pulling on the ala that can result from changing the LLC from a convex to a concave configuration. If a deep alar crease was noted at the posterior margin of the LLC (the parentheses sign) before surgery, some support of the alar margin will most likely be needed. Alar grafts are cut from septal cartilage in a range of 0.75 to 2.0 cm and

Figure 7. A, C, Preoperative views of a 25-year-old woman with a boxy tip who is an ideal candidate for the dome-binding suture for LLC reformation. B, D, Immediate postoperative views following the dome-binding suture. Note the increased concavity of the LLC and the increased projection.

Figure 8. If the vertical dimension of the domes appears high after placement of the dome-binding suture, the superior margin can be reduced slightly. Care is taken not to cut the suture. This will provide a slightly sharper tip appearance.
inserted into a pocket that begins at the posterior marginal incision beneath the alar internal skin surface and extends to the pyriform aperture.

Create a pocket that is precisely the same size as the graft; this will give the graft retentive quality. Place the graft into the pocket so that it lies superficial to the LLC. If the graft abuts the dome, that end (of the graft) must be very thin, even morselized, so that no elevation is noted on the alar skin. Close the marginal incision with 4-0 chromic sutures.

Most boxy tips have fairly strong tip support, especially following the suture unity of the domes. If, at the conclusion of the procedure, it seems that more tip support would be beneficial, then a columellar strut is indicated. There are several ways to place a columellar strut. One way is to place the strut directly through the columella. Make an incision that is about 6 mm in length in the lateral mid-columella that parallels the long columella axis. Use a small, curved sharp scissors to pierce the cartilaginous foot of the LLC centrally. Then, using a curved Steven’s scissor, make a pocket in the intracrural space to accept the columellar strut. This pocket should extend toward the maxillary spine, but not touch it. Fashion a strut from septal cartilage that measures about 2 cm.

Place the strut into a pocket that is just slightly smaller

Figure 9. A, If, at the conclusion of the procedure, a slight tip elevation would improve the result, a small triangle of cartilage is removed from the anterior caudal margin. The base of the triangle is anterior. The removal of the cartilage is performed incrementally. The effect of each small excision is gauged as the tip rotates upward. The dome binding suture used to reform the nasal tip will usually increase tip projection. The anterior caudal margin excision rotates the tip but does not usually affect the projection. B, If the preoperative evaluation showed a slightly elevated nasal tip, a slight downward rotation can be achieved by a triangular excision of caudal margin with the base posterior. This excision is also performed incrementally. The effect of this maneuver decreases the support of the feet of the LLCs. The feet rotate upward and the tip rotates downward. Approximately 4 mm of downward rotation can be achieved. However, this maneuver also decreases tip projection slightly. C, The direction of movement of the LLCs is seen as downward and posterior. Removal of a triangular posterior section of the caudal septal margin will reduce nasal tip projection in addition to rotating the tip downward. The loss of projection must be calculated in the overall final nasal appearance. Remember that the dome binding suture often increases nasal tip projection, so the loss of projection in such cases is not a negative outcome.
Figure 10. A, C, E, Preoperative views of a 23-year-old woman with a boxy nasal tip. On the oblique view (C) note the interdomal cleft. B, D, F, Postoperative views 1 year following suture reformation of the LLC. In the submental view (F), note the gentle change from trapezoid to triangle possible with suture reformation.
Figure 11. A, C, E, Preoperative views of a 34-year-old man with a boxy nasal tip. Additional problems include nasal tip ptosis; asymmetric, severely convex LLC; and severe interdomal clefting. B, D, F, Postoperative views 1 year following correction of boxy tip with suture reformation following minimal excision of the cephalic margin of the LLC. The LLC convexity has been changed to a gentle concavity. The tip has been slightly elevated by excision of an anterior triangle of caudal septal margin and a small mid LLC base up excision of cartilage, allowing the tip to rotate superiorly.
Figure 12. A, C, E, Preoperative views of a 36-year-old woman with a boxy nasal tip. She demonstrates wide LLC convexity, an elevated nasal tip, and increased interdomal width without clefting on the oblique view. B, D, F, Postoperative views 1 year after correction of the boxy nasal tip with suture reformation. The frontal view (B) also shows slight downward rotation of the tip achieved by a posterior triangular excision of the septal caudal margin. The submental view (F) demonstrates that the severe convexity has been reduced as has the wide interdomal distance.
Figure 13. A, C, E, Preoperative views of a 34-year-old woman with a boxy tip who has a left nasal dorsum deviation. The oblique view (C) demonstrates a small nasal hump and marked projection of the convex LLC, which is characteristic of the boxy nasal tip. The submental view (E) shows the typical trapezoid nasal base of the boxy tip. B, D, F, Postoperative views 1 year after correction of the nasal tip with suture reformation and shift of the lower third of nose to the midline by placing the caudal septal margin on the opposite side of the maxillary spine. The oblique view (D) shows correction of the nasal hump and reduction of the projecting nasal tip convexity. The submental view (F) demonstrates the more triangular base achieved with the reformation of the dome binding suture.
than the graft. In this way the graft is under moderate tension in the intracrural space. A large pocket that allows the strut to be mobile within the columella would decrease the effectiveness of the strut.

Once you close all mucosal incisions with 4-0 chromic interrupted sutures, observe the tip form and projection. Correct any minute asymmetries with small morsel grafts placed via (still) open areas in the medial marginal incision. Soften the cartilage for these grafts to the consistency of a wet “corn flake.” As such, the cartilage will have a soft, draping, retentive quality. Smooth the edges of these morsel grafts so they are imperceptible.

Place a small piece of Telfa (Kendell Healthcare, Worcester, MA), rolled to three thicknesses and measuring $1 \times 3$ cm into each nares to prevent crusting at the confluence of mucosal incisions. Complete the procedure, using a paper tape and Aquaplast (Smith and Nephew, Inc. London, United Kingdom).

Instruct the patient to remove the Telfa wick after about 24 hours and to apply ophthalmic ointment to the nares twice a day. Remove the Aquaplast splint in the office 6 to 7 days after surgery.

**Conclusion**

I have used the dome-binding suture since 1969 to reform the heavy appearance of the boxy nasal tip by reforming the convex LLC into a more refined concave shape. The suture is a valuable alternative to major LLC cartilage excision, which is used to achieve the same nasal appearance. An additional benefit is the prevention of bossa formation, which may be caused by postoperative separation of the domes. The dome-binding suture also increases nasal tip projection and strengthens overall columella support.

Use of a straight needle and a permanent suture, undermining of dome mucosa, meticulous care to prevent contamination, and incremental lowering of the unitized dome height for tip refinement are all important details of the procedure. I have found that this method of managing the boxy nasal tip gives consistently reliable and satisfactory results (Figures 10-13).

I thank Dr. Jeffery B. Wise for his help with research.

**Suggested Readings**

