

A Procedure to Prevent Cephalic Rotation of Cartilage Grafts in the Nasal Tip



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BACKGROUND: The mestizo patient usually has a small nose with a wide base, round nostrils, and a convex dorsum. The alar cartilages are weak, thin, and short, providing deficient structural support and poor definition of the nasal tip. Cartilage grafts in the nasal tip are very often used to correct this condition, but a common problem of this procedure is the cephalic or lateral rotation of these grafts.

OBJECTIVE: We used an angulated extended columellar graft to give columellar support and projection to nasal tip grafts for better control and prediction of the position and effect of these grafts.

METHODS: The surgical protocol included a medical history, development of a surgical plan by analysis of the deformity, and the use of pre- and postoperative photographs taken at both intermediate and long-term follow-up visits for evaluation of the results.

RESULTS: Sixty-seven patients underwent surgery using this procedure, 56 with an open technique and 11 with a closed technique. Follow-up ranged from 6 months to 4 years. The results obtained were satisfactory, showing better control and prediction of the shape of the nasal tip.

CONCLUSIONS: The angulated extended columellar graft provides better control of the projection and angularity of cartilage grafts placed in the nasal tip. (*Aesthetic Surg J* 2009;29:98-105.)

The mestizo patient commonly presents with a small nose, including a low radix, convex dorsum, wide nasal base, round nostrils, and short columella. The alar cartilages are thin, short, and weak, providing poor structural support and limited projection to the nasal tip. The upper and lower alveolar rims are overprojected, pushing the lips forward and resulting in an acute nasolabial angle.¹ In addition, the skin is thick, contributing to a poorly defined nasal tip.

On lateral view and in normal anatomic conditions, the vector of the middle crura rotates cephalically from the limiting point of the columella (lobule-columellar junction). The columella also forms a vector that changes direction precisely at the lobule-columellar junction. The intersection of these two vectors estab-

lishes the angle of cephalic rotation (Figure 1). The degree of angularity is influenced by the shape of the middle crura, which determines the shape of the lobe of the nasal tip.^{2,3}

Anatomically, the internal crura forms a vector with a caudal direction (Figure 2) in the mestizo nose, in part because of its short length and weakness. The two segments of the middle crura (lobular and dome) are also short and convex, creating a vector with a cephalic orientation. The main problem is that the angle of domal inflection is obtuse. The domal segment of the middle crura does not reach the degree of deflection needed to obtain a point of maximal projection of the nasal tip; therefore, the curvature of the middle crura is convex. Because the skin is usually thick, this results in a flat nasal tip (Figure 3).

Surgical treatment of the mestizo nose often requires a columellar graft to obtain adequate structural support, in addition to correcting the short internal crura and increasing nasal tip projection. Cartilage tip grafts are also indicated to improve definition of the nasal tip. The shape, height, and projection of the nasal tip will depend on the length, shape, position, and angulation of the tip grafts.^{4,5}

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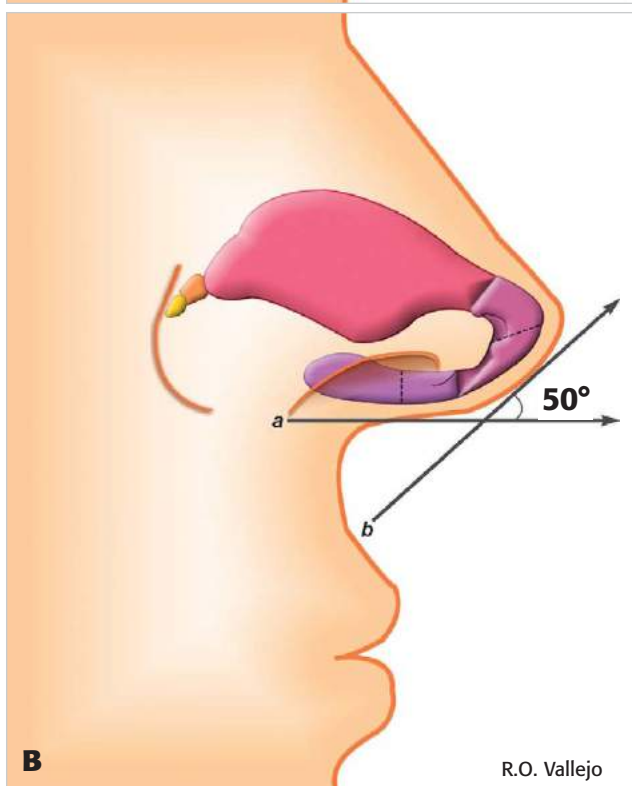
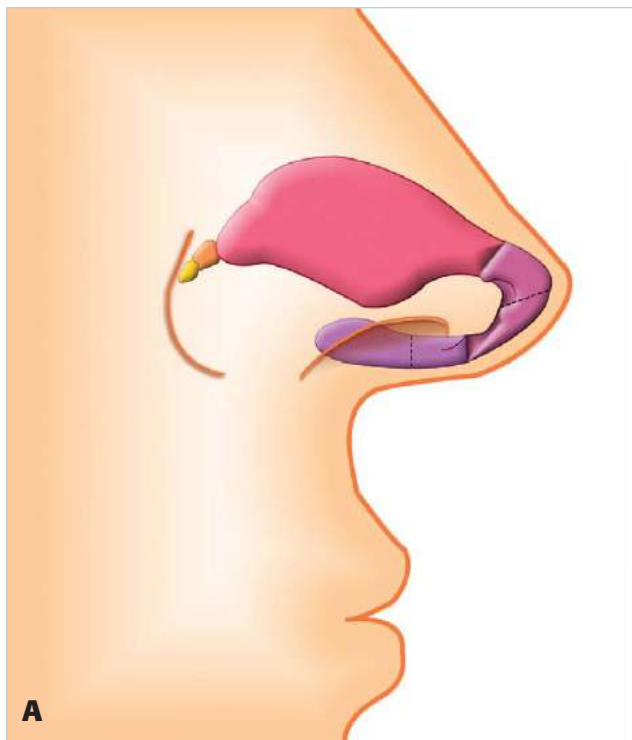


Figure 1. Anatomy of a prototype aesthetic nose. **A**, Medial, middle, and lateral crura, and accessory cartilages. **B**, The intersection between the described vectors *a* and *b* at the lobule-columellar junction form a 50° angle.

We have observed that nasal tip grafts tend to displace cephalically and sometimes laterally, in part because of weak structural support, but also because of the weight exerted by the soft tissues on the graft, the scar retraction effect, and perhaps the fixation technique used to secure the grafts. Progressive

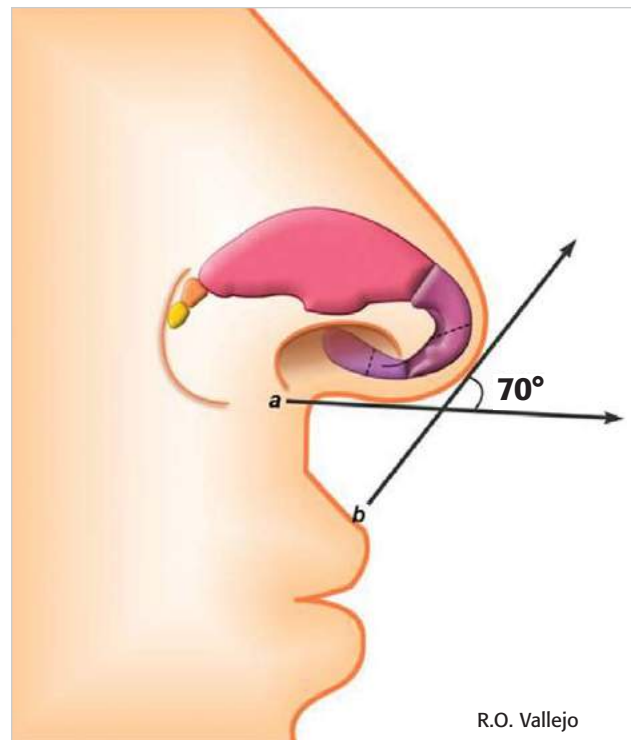


Figure 2. Mestizo nasal anatomy. The medial crura is short and caudally directed; the middle crura is also short and convex. The vectors *a* and *b* form a wider angle greater than 50°.

cephalic displacement prevents adequate definition of the outermost part of the nasal tip (Figure 4).

The need for better control and outcome prediction of nasal tip grafts motivated us to design an angulated extended columellar graft (AECG) similar to that used by Tebbetts.⁶ The graft is obtained from septum cartilage and composed of a vertical columellar portion and an angled extension in the shape of an inverted golf club. The degree of projection and the angularity of the point of cephalic rotation are determined according to each individual case (Figure 5). The columellar portion improves the structure of the central tripod, elongating the internal crura and repositioning and defining the point of cephalic rotation. The angle of cephalic rotation is determined according to the inclination of the angled extension. The extension acts as a brake to prevent cephalic displacement of the tip cartilage graft because it leans directly on the angled extension, providing better control and prediction of the final position of the tip graft. In this article, we report our technique and results using the AECG.

MATERIALS AND METHODS

We treated 67 patients (52 women and 15 men) ranging from 17 to 54 years of age. There were 52 primary cases and 15 secondary cases. The surgical protocol included a medical history, development of a surgical plan by means of analysis of the deformity, and pre- and postoperative photographs to aid in the evaluation of intermediate and long-term results. All patients underwent rhinoplasty with local anesthesia and sedation. The procedure was performed using an open

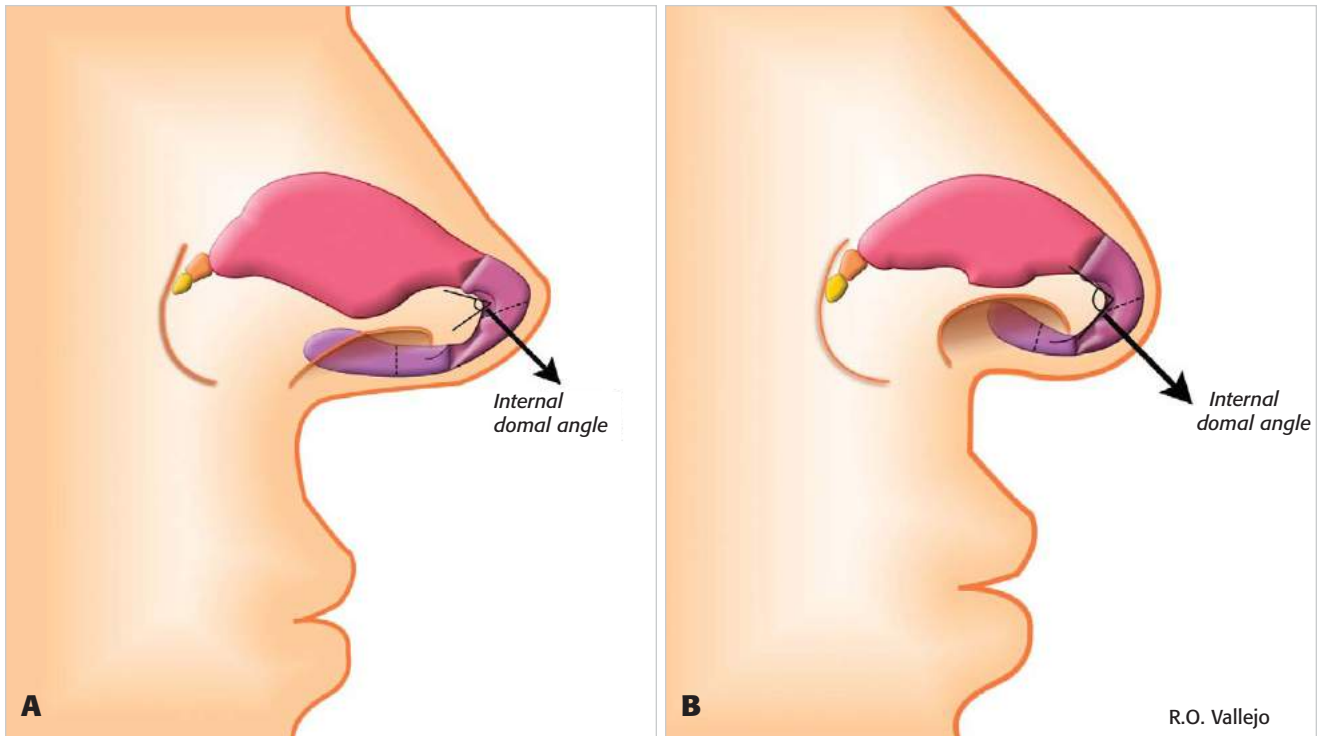


Figure 3. Internal domal angle. **A**, The internal domal angle in the aesthetic nose is acute and reflects the most prominent portion of the nasal tip. **B**, In the mestizo nose, the internal domal angle is obtuse (flat nose).

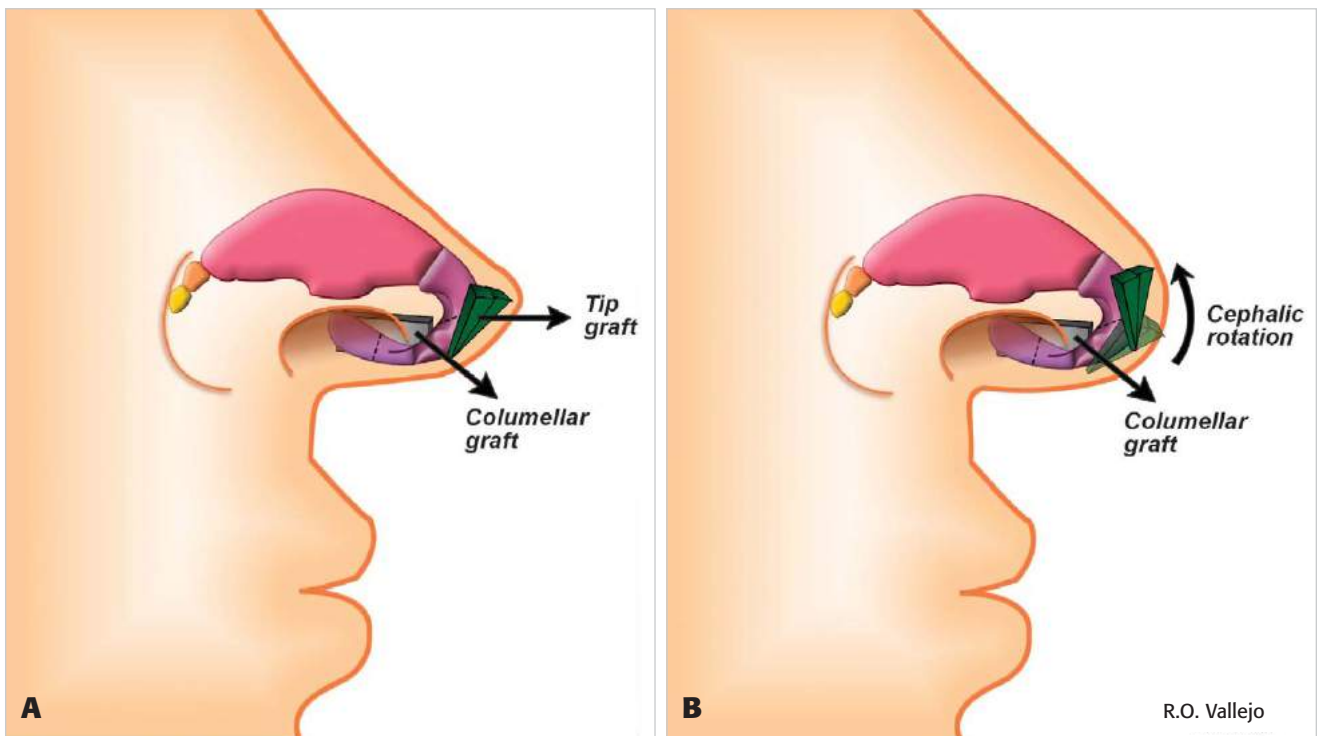


Figure 4. **A**, The columellar and tip grafts. **B**, Spontaneous cephalic rotation of the tip graft is frequently observed.

approach in 56 patients and a closed approach in 11 patients.

SURGICAL TECHNIQUE

The day before surgery, oral cephalexin (500 mg, 3 times per day) and oral arnica (as a preventive antiinflammatory drug) were prescribed. Postoperatively, cephalexin

was continued for 4 days and arnica was continued for 10 days.

Local anesthesia consisted of 1% lidocaine with epinephrine (ratio of 1:100,000). Cotton applicators soaked with this solution were introduced to create a vasoconstrictive effect on the mucoperichondrium of the septum and turbinates. The infraorbital nerves and the areas to

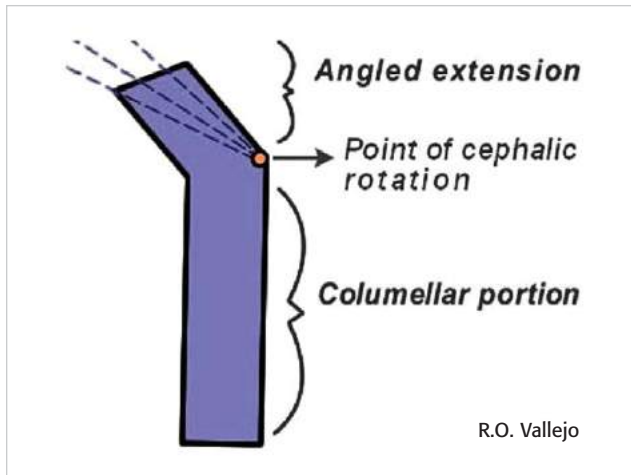


Figure 5. The angulated extended columellar graft has two parts: a “columellar portion” and an “angled extension.” The angulation of the angled extension varies in each case.

be dissected were infiltrated. The mucoperichondrium of the nasal septum was infiltrated, directing the bevel of the needle towards the wall of the septum in order to perform hydrodissection, thereby facilitating elevation of the mucoperichondrial flap. The external approach was made through a stepwise transcolumellar incision connected to a marginal incision through the lower edge of the alar cartilage.⁷⁻¹⁰

The nasal ala was inverted to locate the lower edge of the inferior lateral cartilages. Dissection began with fine-tip scissors at the level of the marginal edge of the cartilage, ascending in a subperichondrial plane up to the lower edge of the nasal bones, where the dissection shifted to a subperiosteal plane on the bony dorsum, continuing to the nasion.

When it was necessary to remove a large hump, subperichondrial tunnels were created along the anterior edge of the septum up to the level of the nasal bones, allowing for extramucous resection.¹¹ We preferred to harvest the septal cartilage and then work on the dorsum, followed by necessary modifications of the tip. This provided us with a fixed point of reference from which to establish a dynamic harmony between the dorsum and the tip. The grafts were carved from the septum for the columella, tip, and dorsum in the size and shape determined in the preoperative planning.¹²

If there is insufficient septal cartilage for the graft, ear cartilage provides a good alternative. Rib cartilage can also be used when a greater amount of cartilage is needed or when other donor areas have been used previously.

Design and Positioning of the Angulated Extended Columellar Graft

The AECG was traced in the shape of an inverted golf club that included two components: a long portion for columellar support (columellar portion) and a short portion (angled extension) that would be in contact with the cartilage grafts placed in the tip. The height of the columellar portion, the inclination of the extension,

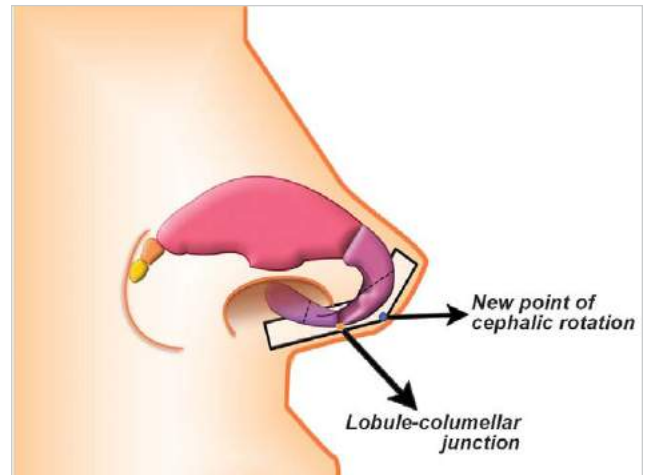


Figure 6. Correct location of the angulated extended columellar graft and the cephalic rotation obtained.

and the angle of cephalic rotation were determined preoperatively and corroborated during surgery.

A pocket was dissected between the medial cruras, undermining the base of the columella from the internal crura to the nasal spine. The AECG was introduced into this pocket and secured to its site with 2 or 3 5-0 horizontal mattress sutures¹³ (Figure 5). The position of the AECG with regard to the medial and middle crura was decided specifically for each individual case. We identified the lobule-columellar junction of the alar cartilage as a reference point to create a new cephalic rotation point on the columellar portion, which would have a higher position as determined in each individual case. In this way, the columella was elongated and the point of rotation was repositioned, delimiting the columellar portion and the angled extension (Figure 6). If in a lateral view the columella was hidden by the alar borders, the AECG was placed anteriorly to increase columellar projection. In patients with a long upper lip, we added a triangular extension to the anterior edge of the base of the columellar portion. This maneuver made the nasolabial junction seem lower and the upper lip look shorter (Figure 7). Small rectangular grafts were placed on both sides of the angled extension to increase its contact surface, so as to avoid lateral displacement of the nasal tip grafts (Figure 8).

Positioning of the Tip Graft

The nasal skin flap was placed back into position to estimate the height of the angled extension, with its vertex as a reference point for determining the projection of the tip graft. Ideally, it should protrude discreetly over the dorsum, considering a possible decrease of nasal projection secondary to wound retraction (Figure 8).

For the nasal tip, a triangular cartilage graft^{5,14} was placed; the size and shape were determined on a case-by-case basis. The angles and edges of the graft were smoothed into a diamond shape with sterile sandpaper to avoid pressure on the graft or skin, although in patients with very thick skin, the angles were deliberately left acute to better define the tip.

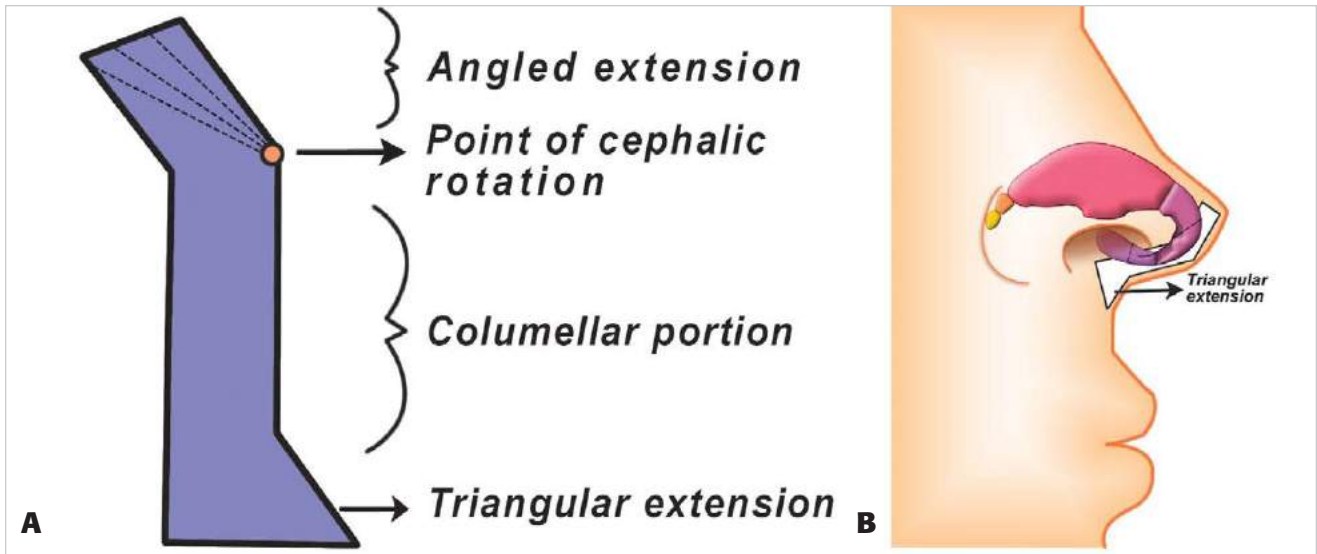


Figure 7. **A**, The angulated extended columellar graft with an added low triangular piece for projection of the nasolabial angle in a patient with a long upper lip. **B**, The angulated extended columellar graft provides greater nasal projection while also giving the visual effect of a shorter lip.

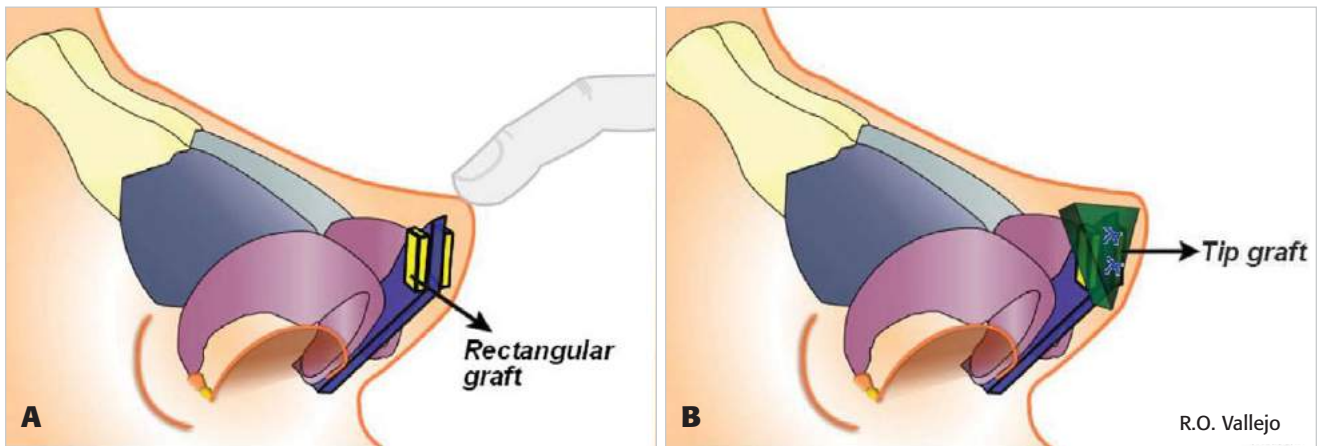


Figure 8. **A**, Rectangular lateral grafts prevent lateral displacement and their vertex is used as a reference for the triangular graft. **B**, The triangular graft leans directly on the rectangular graft.



Figure 9. **A**, A 19-year-old woman with a columella hidden by the nasal ala, a descended nasal tip, and a bony hump. **B**, Intraoperative view. The nasal tip is projected by the angulated extended columellar graft, descending the columella and defining the nasal tip. The hump was reduced and a cartilage graft was placed on the radix.



Figure 10. Secondary rhinoplasty. **A, C, E,** Preoperative views of a 25-year-old woman. **B, D, F,** Postoperative views 12 months after correction of an overprojected nasal tip and placement of an angulated extended columellar graft to project the nasal tip with adequate cephalic rotation.

Once the required angularity was estimated, the tip graft was located directly over the angled extension of the AECG, which was secured to its site with 2 or 3 5-0 horizontal mattress sutures (Figure 8). Finally, the skin flap was replaced and sutured to close the transcollellar incision. The intranasal incisions were closed with 5-0 chromic suture. Internal nasal splints were applied with cotton rolls (wrapped roll) soaked in a vasoconstrictive solution, as was an external nasal splint using several layers of adhesive tape (Figure 9).

RESULTS

The results obtained were satisfactory to patients with respect to the appearance of the nose, both frontally and laterally. The results also demonstrated better control and ability to predict the shape of the nasal tip based on follow-up periods ranging from 6 months to 4 years. The transcollellar scar was well accepted by patients and became practically imperceptible over time. Seven patients required secondary surgical correction: 3 because of tip overprojection, 1 because of underprojection, and 3 because of a residual hump. There were no other inherent complications. Short- and long-term follow-ups documented the maintenance of a symmetrical and projected nose with neither cephalic displacement of the tip nor lateral displacement of the grafts (Figure 10).

DISCUSSION

The mestizo nose has short alar cartilages, especially at the medial and middle crura. This results in a short columella, caudal projection, and nasal tip descent. The middle crura defines the shape of the tip lobe, which is limited caudally by the rotation point (lobule-columellar junction) and cephalically by the point of maximal projection of the nasal tip. However, in the mestizo nose, the middle crura is short and convex, making it difficult to locate the point of maximal projection of the nasal tip.

On a profile view, the vectors of the columella and the tip lobe are neither harmoniously balanced nor defined. The vector length of the columella is short and the rotation point is not clearly defined. Also, because the nasal tip has a convex shape, it is not possible to demonstrate its most prominent point. Because of the angulation established by the intersection of both vectors, the angle tends to be greater than ideal.

The structural tripod is weak and its three pillars provide limited support. This is particularly true of the columella, which is mainly responsible for the projection of the nasal tip. The incorporation of the AECG reinforces the central pillar, corrects its shortness, and clearly defines the lobule-columellar junction as the new point of cephalic rotation. Placement of the tip graft then defines the maximal point of projection of the nasal tip.

We believe that the other aspect reinforcing the external pillars is transdomal plication and its fixture to the AECG. Transdomal plication in itself can

increase nasal tip projection. We have also found that a change in the convexity of the external crura to a more concave shape favorably affects the external appearance of the tip by improving its bulky appearance and providing stronger reinforcement to the external arms of the tripod.

There are several ways to maintain the nasal tip graft in position. We have found that the angled extension of the AECG allows for better control of the angularity of the tip graft, because it leans directly on the angled extension, providing support that prevents its cephalic displacement.

CONCLUSIONS

The addition of the angled extension to our columellar graft offers better control when determining the angle of cephalic rotation required for the nasal tip graft. The extension acts as a brake that reduces displacement of the tip graft and prevents the graft from leaning on the middle crura when its angle of rotation is greater than ideal. The columellar support provides greater structural stability to the central tripod and provides a predictable and stable way to increase nasal tip projection. Another benefit of our technique is the ability to manipulate nasal length. Nasal length depends on the angularity of the angled extension, which defines the maximal projection of the nasal tip. Nasal length will be greater with less angulation and smaller with more angulation. This is useful in patients who require small changes in nasal length. The use of the AECG also permits better visualization of the vectors of the columella and the tip lobe. It is an effective and reliable resource for improving the appearance of the nasal tip. ▀

DISCLOSURES

The authors have no disclosures with respect to the contents of this article.

REFERENCES

1. Ortiz-Monasterio F, Olmedo A. Rhinoplasty on the mestizo nose. *Clin Plast Surg* 1977;4:89-102.
2. Guyuron B. Dynamics in rhinoplasty. *Plast Reconstr Surg* 2000;105:2257-2259.
3. Daniel RK. Rhinoplasty: creating an aesthetic tip. A preliminary report. *Plast Reconstr Surg* 1987;80:775-782.
4. Ortiz Monasterio F, Michelena J. The use of augmentation rhinoplasty techniques for the correction of the non-caucasian nose. *Clin Plast Surg* 1988;15:57-72.
5. Sheen JH. Tip graft: a 20-year retrospective. *Plast Reconstr Surg* 1993;91:48-63.
6. Tebbetts JB. Shaping and positioning the nasal tip without structural disruption: a new systematic approach. *Plast Reconstr Surg* 1994;94:61-77.
7. Gruber RP. Open rhinoplasty. *Clin Plast Surg* 1988;15:95-114.
8. Gunter JP, Rohrich RJ. The external approach for secondary rhinoplasty. *Plast Reconstr Surg* 1987;80:161-174.
9. Tebbetts JB. Open rhinoplasty: more than an incisional approach. In: Daniel RK, editor. *Aesthetic plastic surgery: rhinoplasty*. Boston: Little, Brown, 1993:525-553.

10. Tebbetts JB. Open and closed rhinoplasty (minus the “versus”): analyzing processes. *Aesthetic Surg J* 2006;26:456–459.
11. Jost G, Meresse B, Torossian F. Study of the junction between the lateral cartilages of the nose [in French]. *Ann Chir Plast* 1973;18:175–182.
12. Gunter JP, Landecker A, Cochran CS. Frequently used grafts in rhinoplasty: nomenclature and analysis. *Plast Reconstr Surg* 2006;118:14–29.
13. Ortiz-Monasterio F, Olmedo A, Oscoy LO. The use of cartilage grafts in primary aesthetic rhinoplasty. *Plast Reconstr Surg* 1981;67:597–605.
14. Sheen JH. Achieving more nasal tip projection by the use of a small autogenous vomer or septal cartilage graft. A preliminary report. *Plast Reconstr Surg* 1975;56:35–40.

Accepted for publication September 22, 2008.

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1090-820X/\$36.00

doi:10.1016/j.asj.2009.01.017
