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Structural Approach to Primary Rhinoplasty

The choice of primary rhinoplasty technique is based on preoperative diagnosis, external nasal contour, nasal anatomy, and expected changes in nasal contour. The author matches technique to nasal anatomy, describing procedures that have resulted in a high success rate. (Aesthetic Surg J 2002;22:72-84.)

Rhinoplasty is a complex operation that requires precise preoperative diagnosis to select the appropriate surgical technique. Because of variability in nasal anatomy and differing aesthetic and functional expectations, no single technique exists that is appropriate for all patients. Therefore, I will describe the principles of my primary rhinoplasty technique, considering variations in nasal anatomy and external nasal contour.

In primary rhinoplasty, I generally use a nondelivery (cartilage-splitting) approach or the external rhinoplasty approach. I use the nondelivery approach in patients who have a symmetric triangular nasal base with acceptable tip contour. Many of these patients require minimal nasal tip work and will do well with a conservative cephalic trim or may require no cephalic trim. Patients with an asymmetric or wide (bulbous) nasal tip, with a wide interdomal distance, are good candidates for a delivery approach or the external rhinoplasty approach. For most of these patients, to provide maximal exposure and to facilitate symmetric application of cartilage grafts, I will opt for the external rhinoplasty approach rather than the delivery approach. Occasionally, I will deliver the cartilages in patients who require limited tip work (dome sutures) with no grafting. I have not had a problem with camouflage of the transcolumellar scar. I attribute this to a careful transcolumellar incision closure technique. Here, I will describe the surgical technique for the external rhinoplasty approach, stabilization of the nasal base, profile alignment, and modification of the nasal tip.

The Operation

The patient is injected with 1% lidocaine with 1:100,000 epinephrine into the nasal tip, between and around the domes, down the columella, along the site of the marginal incision, and along the lateral wall of the nose (Figure 1). Additional injections are placed high on the nasal septum and along the osteotomy sites. After the local anesthetic takes effect, an inverted-V-shaped incision is marked on the columella, midway between the base of the nose and the top of the nostrils (Figure 2). I prefer the inverted-V incision because it is symmetric and easy to line up properly. The transcolumnellar incision is executed with a #11 blade; I use a fine sawing motion to avoid straying from the markings. The marginal incision is made along the caudal margin of the lateral crura, extending down the columella to meet the columellar incision. The columnellar extension of the marginal incision is placed only 1 to 2 mm around the face of the columella (Figure 3).

Converse scissors are used to incise the columnellar incision and elevate the columnellar flap. When elevating the columnellar flap, I take special care to avoid damaging the caudal margin of the medial and intermediate crura. With use of 3-point counter-traction, dissection is advanced laterally, exposing the lateral crura (Figure 4). The middle nasal vault is exposed in the midline, followed by a subperiosteal dissection over the osseous nasal vault. After completing the exposure, I use a bipolar electrocautery for hemostasis, and the cartilage structure is evaluated.

Stabilizing the Nasal Base

At this point, I usually determine the best method of stabilizing the nasal base. Patients who exhibit deficiency in the nasal base typically have a dependent or underpro-
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Figure 1. Local anesthesia is injected into the nasal tip, columella, along the proposed marginal incision site, and along the lateral nasal wall. Multiple small volume (0.1-mL) injections are made along the caudal margin of the lateral crura.

Figure 2. The inverted-V transcolumellar incision is marked midway between the base of the nose and the top of the nostrils. If the incised pattern is too small, the effect of breaking up the incision is diminished.

Figure 3. The columellar extension of the marginal incision is placed 1 to 2 mm around the face of the columella. The incision should be superficial to avoid damaging the underlying medial crura.
jected nasal tip, acute nasolabial angle, and/or retracted columella. Methods of stabilizing the nasal base include the following: (1) columellar strut sutured in place, (2) setting back the medial crura on the caudal septum, (3) placing a caudal extension graft, or (4) extended columellar strut. If the patient has a normal alar/columellar relationship and the base is well supported, then I typically place a rectangular septal cartilage columellar strut in a pocket between the medial crura and fixate with a 5-0 chromic suture (Ethicon Inc., Somerville, NJ) on a straight septal needle (Figure 5). If the patient has a tension nose deformity or hanging columella, I prefer to dissect between the medial crura, perform the septoplasty, and then set back the medial crura on a midline caudal septum (tongue-in-groove technique).1 The medial crura are sutured to the caudal margin of the caudal septum with a 5-0 chromic catgut suture on a straight septal needle in a tongue-in-groove manner (Figure 6). Then a 5-0 PDS suture (Ethicon Inc., Somerville, NJ) is passed through the caudal septum and internal surface of the medial (or intermediate) crura to provide additional support. I take special care to set the domes symmetrically with appropriate tip projection, rotation, and alar/columellar relationship.

The vestibular skin and mucoperichondrium was previously dissected bilaterally off of the nasal septum and can be advanced cephalically to prevent any intranasal mucosal redundancy. I prefer not to resect vestibular skin because this tissue has an excellent blood supply that can be preserved. I then place a 5-0 plain catgut suture, in a running mattress fashion, along both sides of the septum to eliminate dead space and prevent blood collection under the flaps. This running septal quilting suture is critical to ensure uniform draping of the mucoperichondrial flaps. When using this tongue-in-groove technique, special care must be taken to avoid creating a retracted columella, foreshortened nose, or long upper lip. When setting back the medial crura on the caudal septum, note that it must be midline and excessively long. Patients with a hanging columella or tension nose deformity, who
would usually require trimming of the caudal septum, are
good candidates for this technique (Figure 7). Patients
with normal or short caudal septal length are inappropri-
ate candidates for the technique of setting back the medi-
al crura on the caudal septum. Use of the
tongue-in-groove technique in such patients may result in
a retracted columella, foreshortened nose, or a long
upper lip.

Patients with a retracted columella or foreshortened

Figure 7. A, C, E, G, Preoperative views of a 35-year-old woman with an overly long caudal septum. B, D, F, H, Postoperative views 1 year after setback of the medial crura on a midline caudal septum (tongue-in-groove technique). Note how the prominence of the intratip lobule is decreased and the alar/columellar relationship is improved. Tip refinement and projection was accomplished with a lateral crural strut graft and dome-binding sutures.
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nose can undergo placement of a caudal extension graft.\(^2\) In this technique, I suture a rectangular-shaped segment of septal cartilage to the existing caudal septum and extend caudally (Figure 8). This rectangular-shaped cartilage graft usually overlaps the caudal septum to provide stability; it is sutured in place with two or three 5-0 PDS mattress sutures. In some cases, the caudal extension graft can be placed end-to-end and stabilized with extended spreader grafts or other splinting grafts. The medial crura are sutured to the caudal margin of the caudal extension graft to stabilize the nasal base and set tip projection, alar/columellar relationship, and nasal length. The caudal extension graft must be in the midline; otherwise, the nasal tip may deviate.

Patients with a severe deficiency in the nasal base frequently have a retracted columella and acute nasolabial angle. These patients can benefit from placement of a structurally sound strut and/or some form of premaxillary augmentation (Figure 9). I frequently use an extended columellar strut that is fixated to the perios- teum about the nasal spine. Extended columellar struts are typically carved from autologous costal cartilage to provide lasting, reliable support. Symmetric carving is critical to avoid warping of the costal cartilage. The medial crura can then be advanced anteriorly on the rigid strut to open the nasolabial angle and increase nasal tip projection (Figure 10). In some cases, the tissue around the feet of the medial crura must be released from the premaxilla to allow the medial crura to be advanced anteriorly. In patients with a severe premaxillary deficiency, I combine a premaxillary graft with an extended columellar strut that is fixated into a notch in the premaxillary graft (Figure 11). The premaxillary grafts are also fashioned from costal cartilage. These grafts will make the nasal tip rigid and stiff; patients should be advised about this change before the procedure.

Profile Alignment

Once the nasal base is stabilized, I usually turn my attention to the upper two thirds of the nose. I prefer a higher dorsal profile, so I am conservative with regard to dorsal hump reduction. Dorsal reduction is usually performed with a Rubin osteotome and rasp (Lorenz Surgical, Jacksonville, FL), leaving a relatively high dorsum. Most dorsal humps are composed of cartilage and I rarely reduce significant amounts of osseous nasal vault. I frequently use a radix graft to elevate a low nasal starting point to create a more favorable profile (Figure 12). Radix grafts, which are frequently composed of gently crushed cartilage, are not positioned until the end of the operation, just before closure. This will ensure that they are not displaced during the surgery.

Medial and lateral osteotomies are used to set the appropriate width of the osseous nasal vault. I typically use a 3-mm straight osteotome to minimize trauma to the soft tissues when completing the medial and lateral osteotomies.

I prefer to use a fading medial osteotomy and a high-low-
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Figure 9. A, C, E, G, Preoperative views of a 43-year-old woman who underwent previous surgery and presented to me with a deficient nasal base, retracted columella, and acute nasolabial angle. B, D, F, H, Postoperative views 2 years after treatment with a costal-cartilage extended columellar strut sutured to premaxillary periosteum, advancing the medial crura on the strut to open the nasolabial angle and increase tip projection.

high lateral osteotomy (Figure 13). The fading medial osteotomy avoids those deformities created by extending osteotomies into the thick frontal bone. The high-low-high lateral osteotomy starts 2 to 3 mm above the base of
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the pyriform aperture and extends laterally and superiorly, ending near the medial canthus. After dorsal hump removal and osteotomies, I frequently use spreader grafts to reconstruct the middle nasal vault. When applying spreader grafts, I bevel one end to facilitate advancing them under the caudal margin of the nasal bones (Figure 14). This ensures a smooth transition from the middle vault to the osseous vault. After placing the spreader

Figure 10. The medial crura are advanced on the rigid costal cartilage extended columellar strut that is fixated to the peristium over the nasal spine. This increases tip projection and opens the nasolabial angle. Soft tissue release around the premaxilla may be necessary to allow movement of the nasal base.

Figure 11. The extended columellar strut is combined with a premaxillary graft. Note how the strut is sutured into a notch in the premaxillary graft to help stabilize the reconstruction. The notch under the premaxillary graft will sit on the nasal spine and help stabilize the premaxillary graft in the midline.

Figure 12. A radix graft can be placed into a narrow pocket over the nasofrontal angle in a patient with a deep radix or low nasal starting point. This graft will augment the radix and help create a straighter nasal profile while leaving a higher nasal dorsum.
grafts, I fixate the upper lateral cartilages into position with two 5-0 PDS mattress sutures. I then palpate the middle vault carefully to make sure I have created symmetry in this area.

**Modification of the Nasal Tip**

In most primary rhinoplasty cases, I use 2 separate dome-binding sutures to narrow the domes and create appropriate tip width. Typically, a 5-0 clear nylon suture is passed through each dome and cinched down to narrow the domes. The effect of the dome-binding suture can be modified by altering the amount of cartilage incorporated in the suture as well as by altering the point where the suture is centered. I usually incorporate about 2 to 4 mm of lower lateral cartilage in the suture. If the dome suture is centered about a point lateral to the existing dome, the lateral crura will be recruited medially and rotate the tip cephalically, increasing tip projection (Figure 15). If the suture is centered about a point medial to the dome, the tip will tend to counter-rotate and blunt the columellar-lobular angle. If the suture is centered about the existing dome, tip projection will increase with a slight increase in rotation. After placing the dome sutures, I frequently place a 5-0 PDS interdomal suture between the domes, which sets the distance between the domes and also sets the tip width (Figure 16).

In some patients with bulbous nasal tip cartilages, dome sutures can deform the cartilages or result in internal recurvature of the lateral crura into the nasal airway (Figure 17). In these patients, lateral crural strut grafts can be used to straighten the bulbous or recurving lateral crura. These rectangular-shaped cartilage grafts are sutured to the undersurface of the lateral crura to flatten the cartilages and eliminate the bulbous shape (Figure 18). After dissecting the vestibular skin from the undersurface of the lateral crura, I use two 5-0 clear nylon sutures to fixate the rectangular-shaped grafts to the undersurface of the lateral crura. After placing the lateral crural strut grafts, I create appropriate tip contour by placing the dome sutures.

In patients with thick nasal-tip skin, shield-shaped tip grafts sutured to the caudal margin of the medial and intermediate crura can be used to improve tip shape. The
tip grafts should project 2 to 3 mm above the existing domes (Figure 19). Tip grafts may become visible if the edge of the graft projects too prominently into skin that is thin or of medium thickness. The key to camouflaging a tip graft is to create a smooth transition from the edge of the tip graft to the existing lateral crura. I frequently

Figure 15. A, If the dome-binding suture is centered on a point lateral to the domes, the tip will be rotated and the projection increased. B, If the dome-binding suture is placed medial to the domes, the tip will be counter-rotated and projection decreased. This suture placement will tend to blunt the columellar/lobular angle.

Figure 16. The interdomal suture, placed through the internal surface of the intermediate crura, sets the distance between the domes and tip width. The suture is placed along the posterior or cephalic margin of the intermediate crura to avoid blunting the columellar/lobular angle.
use buttress grafts or lateral crural grafts to stabilize and camouflage tip grafts. Buttress grafts are sutured behind the leading edge of the tip graft and to the existing domes (Figure 20). The buttress graft will prevent cephalic rotation of the tip graft and allow the tip graft to project into thicker nasal-tip skin. Results of this procedure are seen in Figure 21. Lateral crural grafts are sutured to the posterior and lateral surface of the tip graft and are then sutured to the lateral crura (Figure 22). Lateral crural grafts support the tip graft and provide a smooth transition from the tip graft to the existing lateral crura. I frequently cover the leading edge of the tip graft with a thin layer of perichondrium or acellular dermis (Alloderm, LifeCell Corp., Woodlands, TX) to provide additional thickness to the skin over the nasal tip (Figure 23).

Closure of the columellar incision must be performed meticulously to maximize scar camouflage. I usually place...
a subcutaneous 6-0 PDS suture in the midline of the columellar incision. I then close the skin with 7-0 nylon vertical mattress sutures. The sutures are placed obliquely, just off the midline from medial on the lower flap to lateral on the upper flap, to recruit redundant columellar skin medially (Figure 24). This closure minimizes the chance of lateral notching of the columellar incision and aids in precise skin-edge alignment.
Figure 21. **A, C, E, G,** Preoperative views of a 32-year-old woman with thick nasal tip skin. **B, D, F, H,** Postoperative views 2 years after placement of a shield graft and buttress graft. Note the improvement in tip/supratip relationship after undergoing dorsal augmentation and tip grafting. The tip graft is well camouflaged under the thick nasal tip skin. In patients with thick skin, I avoid reducing the nose and instead leave the nose slightly larger than is ideal. This allows good redraping of the thick skin and helps avoid a polybeak deformity.
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Techniques for performing primary rhinoplasty depend on the preoperative diagnosis, external nasal contour, nasal anatomy, and expected changes in nasal contour. I have no set rhinoplasty technique but instead select techniques based on preoperative diagnosis, anatomy, and expected contour change. I prefer to use the external rhinoplasty approach in patients who require structural cartilage grafting. I believe that the base of the nose must be stabilized to prevent postoperative loss of tip projection and provide more predictable outcomes. The surgeon must anticipate long-term changes in rhinoplasty that occur because of the prolonged forces of scar contracture. Minimizing resection of supportive tissues and use of structural grafts will help counteract the forces of scar contracture. Structural grafts can also create deformity; therefore selective use and proper execution are critical to maximizing the aesthetic and functional outcome in rhinoplasty.

References


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