

Changing Role of Septal Extension versus Columellar Grafts in Modern Rhinoplasty

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Summary: Effective control of nasal tip projection and rotation is a key component in modern rhinoplasty. Tip projection is a product of several anatomical factors: length and strength of lower lateral cartilages, the suspensory ligament, fibrous connections to the upper lateral cartilages, and the anterior septal angle. Several cartilage grafts have been described for effectively altering nasal tip projection and rotation. Columellar struts and septal extension grafts are both commonly used in modern rhinoplasty to affect projection and rotation of the nasal tip. Although columellar strut grafts have shown moderate efficacy in maintaining tip projection and unifying the tip complex, their effect on increasing tip projection has been shown to be very limited. In comparison, septal extension grafts have been shown to effectively control tip projection, rotation, and shape by securing the nasal tip to the septum. Varieties of septal extension grafts have been described to support the medial crura and control tip shape, all of which depend on the presence of a stable caudal septum. The type of graft used is dependent on the specific characteristics of the underlying tip structures. The authors' aim is to provide an updated classification of cartilage grafts for altering nasal tip projection and rotation, and an algorithmic approach for their implementation. Although both columellar struts and septal extension grafts offer the modern rhinoplasty surgeon a way to alter tip projection and rotation, they do vary in efficacy. Understanding which graft to use and in what setting is key in successfully controlling projection, rotation, and shape of the nasal tip. (*Plast. Reconstr. Surg.* 145: 927e, 2020.)

Effective control of nasal tip projection and rotation is a key component in modern rhinoplasty. Tip projection is a product of several anatomical factors: length and strength of lower lateral cartilages, the suspensory ligament, fibrous connections to the upper lateral cartilages, and the anterior septal angle. The tripod concept of relying solely on the lower lateral cartilages for altering tip projection without the addition of cartilage grafting has been slowly falling out of favor in modern rhinoplasty. Augmentation of the septum is now considered the predominant factor in augmenting tip projection and rotation.¹⁻³

Several cartilage grafts have been described for effectively altering nasal tip projection and rotation. Columellar struts and septal extension grafts are both commonly used in modern rhinoplasty to affect projection and rotation of the nasal tip. The extent to which each of these alters nasal tip projection and rotation is dependent on the composition of the underlying structures and

the type of effect one is trying to achieve on the nasal tip. For example, a floating columellar strut, although effective in unifying the nasal tip and maintaining its position, is not nearly as efficient in increasing projection.^{1,4,5}

In comparison, septal extension grafts have been shown to effectively control tip projection, rotation, and shape by securing the nasal tip to the septum.^{1,5} This article provides an updated classification of cartilage grafts for altering nasal

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tip projection and rotation and an algorithmic approach for their implementation. The rationale for when to use a columellar strut or a particular septal extension graft is also discussed.

COLUMELLAR STRUTS

The role of the columellar strut in altering nasal tip projection has been a recurrent point of discussion in the rhinoplasty literature. Although fixed columellar struts have fallen out of favor in aesthetic rhinoplasty, floating columellar struts are still commonly used. Rohrich et al. specifically looked at the effect of floating columellar struts in increasing tip projection and found that such effect, if any, was minimal.⁴ Columellar struts should instead be seen as an effective tool for unifying the nasal tip and maintaining its position in the presence of three distinct structural characteristics: weak medial or middle crura, asymmetric lower lateral cartilages, and short medial crura (Fig. 1).

It is the degree of nasal tip projection and structural integrity of the lower lateral cartilages that dictates how the columellar strut should be used. Different types of struts have been previously described. Their proper design and placement is dependent on careful analysis of these two variables. For example, adequate nasal tip projection in the presence of weak or asymmetric cartilages warrants placement of a shorter strut to strengthen and unify tip elements, rather than a longer floating strut more suitable for tips that also lack tip projection.



Fig. 1. Columellar strut graft.

Although useful in properly selected patients, columellar struts can have significant drawbacks. Any structure placed in between the medial crura can serve to inadvertently widen the columella. Depending on the type of strut used, clicking against the anterior nasal spine has been reported. As with any cartilage graft, warping is always a possibility, which may result in the loss of tip projection and symmetry. Finally, although columellar struts have been found unreliable in increasing tip projection, it is the lack of control over nasal tip rotation that is their single most important limitation.^{4,6}

SEPTAL EXTENSION GRAFTS

Byrd et al. introduced septal extension grafts as a more reliable method of controlling tip projection, shape, and rotation, particularly in patients with weak lower lateral cartilages. Columellar struts had proven ineffective in providing such control, which is particularly evident in noses characterized by a weak midvault, a plunging tip, and drawn-up alae. Septal extension grafts were proposed as a way of redefining the skeletal relationship between the nasal tip and dorsum. Creating structural support for the tip complex based on the anterior septum allows for predictable control of tip projection and/or rotation.^{1,5}

Varieties of septal extension grafts have been described to support the medial crura and control tip shape, all of which depend on the presence of a stable caudal septum. Although these differ in their shape and points of fixation to the septum, they have similar points of fixation within the tip-lobule complex. It is important to note that points of septal fixation indeed vary depending on status of the midvault, septal stability, and amount of available cartilage, whereas the distance that the graft extends beyond the dorsal septum is contingent on the thickness of the overlying skin.¹

To be effective, septal extension grafts should extend beyond the anterior septal angle into the interdomal space. The most caudal and inferior portion of the graft is placed on the cephalic border of the medial crus at the columellar-lobular angle. The most important point of fixation is inferior to the divergence of the middle crura, where the cephalic borders of the medial crura abut each other. At this point, the graft incorporates the desired columellar-lobular angle. A point of interdomal fixation can then be used to control wanted interdomal distance and projection. If supratip break is desired, graft fixation to the lower lateral cartilage should allow for a marked

differential between the domes and nasal dorsum. Although an excellent tool in the appropriate patient, septal extension grafts are not indicated for noses with heavy lower lateral cartilages and normal or excessive tip projection.^{1,5,7} [See **Video (online)**, which demonstrates the septal extension graft placement for nasal tip projection and rotation.]

Paired Extended Spreader Grafts

Paired extender spreader grafts can be used to alter both tip projection and rotation in settings of midvault collapse or narrowing. An increase in internal nasal valve angle is often achieved by placement of these grafts at the junction of the upper lateral cartilage and septum in a parallel line to the nasal dorsum. Any horizontal excess in cartilage should be recessed 1 to 2 mm below the plane of the dorsum to avoid excessive dorsal widening. To increase tip projection, the distal segments of the graft need to extend vertically beyond the level of the dorsum. Finally, suturing the tip-lobule complex to the graft establishes the desired tip projection or rotation^{1,5} (Fig. 2).

Septal Batten Grafts

Bilateral septal batten grafts can serve to change both nasal tip rotation and projection.^{1,5} Although these cannot address issues pertaining to the internal valve or midvault, septal batten grafts require significantly less cartilage than extended spreader grafts. Paired septal batten grafts require a strong caudal septum. The grafts are placed below the junction of the upper

lateral cartilages with the septum at a 45-degree angle from the anterior septal angle and extend diagonally across the caudal and dorsal L-strut of the septum. Proper suture anchorage is crucial for overall graft stability and to prevent rotation (Fig. 3).

Unilateral septal batten grafts have also been described to control tip projection and rotation. These require less cartilage than paired grafts, and their intrinsic curvature can be used to correct asymmetries inherent in this unilateral design. In turn, unilateral septal batten grafts are particularly useful in cases of where tip deviation is secondary to the anterior septum^{1,5} (Fig. 4).

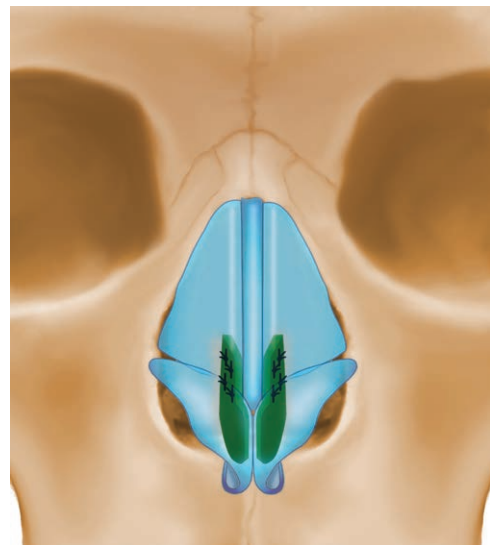


Fig. 3. Bilateral septal batten graft.

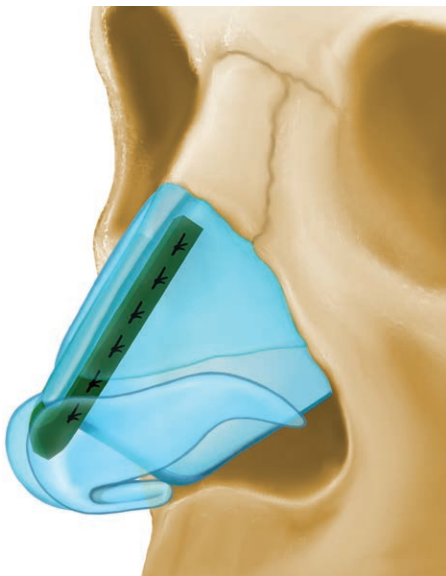


Fig. 2. Paired extended spreader graft.



Fig. 4. Unilateral septal batten graft.

Direct Caudal Septal Extension Grafts

Toriumi described the use of caudal extension grafts in cases of caudal septal deficiency.⁸ In the foreshortened nose or in the setting of columellar retraction, caudal extension grafts can decrease tip rotation and alter the alar-columellar relationship. Grafts are traditionally fixed directly to the anterior nasal angle and thus inherently unstable. Several techniques can be used to address this issue. Suture fixation in at least three points is essential, while using a significant amount of cartilage allows for greater degree of overlap between the graft and the caudal septum. In addition, extended spreader grafts can be used to help stabilize the graft (Fig. 5).

Tongue-In-Groove Technique

The tongue-in-groove technique was first described by Guyuron and Varghai as a way to effectively improve tip projection in the setting of a severely shortened nose.⁹ It allows for nasal lengthening, ensures tip alignment with the rest of the nose, and avoids tip rigidity. To accomplish this, bilateral spreader grafts extending beyond the caudal septum are sutured to the septum. A columellar strut is then placed in the groove formed by the extensions of the spreader graft. The medial crura are then sutured to a portion of the columellar strut. To prevent excessive columellar show when using the tongue-and-groove technique, it is necessary to properly mobilize the lower lateral cartilages¹⁰ (Fig. 6).

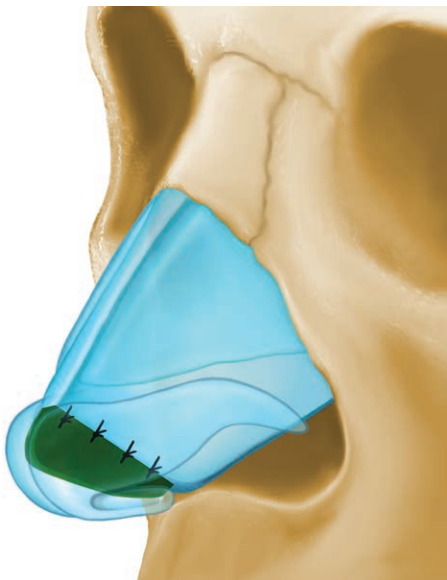


Fig. 5. Direct caudal septal extension graft.

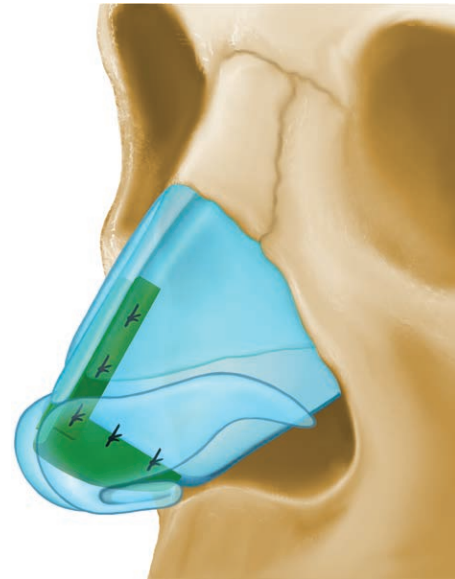


Fig. 6. Tongue-in-groove technique.

DISCUSSION

Effectively controlling tip position, rotation, and shape remains a key component of modern rhinoplasty. Columellar struts were once used as a way to increase tip projection. Recent literature suggests that these grafts are unable to reliably achieve this and should instead be seen as an effective tool for unifying the nasal tip and maintaining its position. Columellar struts are indicated in noses with a weak medial or middle crura, asymmetric lower lateral cartilages, and/or a short medial crura.

Byrd et al. introduced septal extension grafts as a more reliable method of controlling tip projection, shape, and rotation.¹ These were proposed as a way to redefine the skeletal relationship between the nasal tip and dorsum. Different types of septal extension grafts have been described with variations in shape and points of septal fixation. The type of graft used is dependent on the specific characteristics of the underlying tip structures (Fig. 7).

Columellar struts and septal extension grafts offer the modern rhinoplasty surgeon a way to alter tip projection and rotation. As mentioned previously, each of these varies in what it can accomplish and to what extent. Nonetheless, it should be noted that although each is very useful, these grafts come at the potential tradeoff of increasing tip rigidity. Understanding which graft to use and in what setting is key for successfully controlling projection, rotation, and shape of the nasal tip.

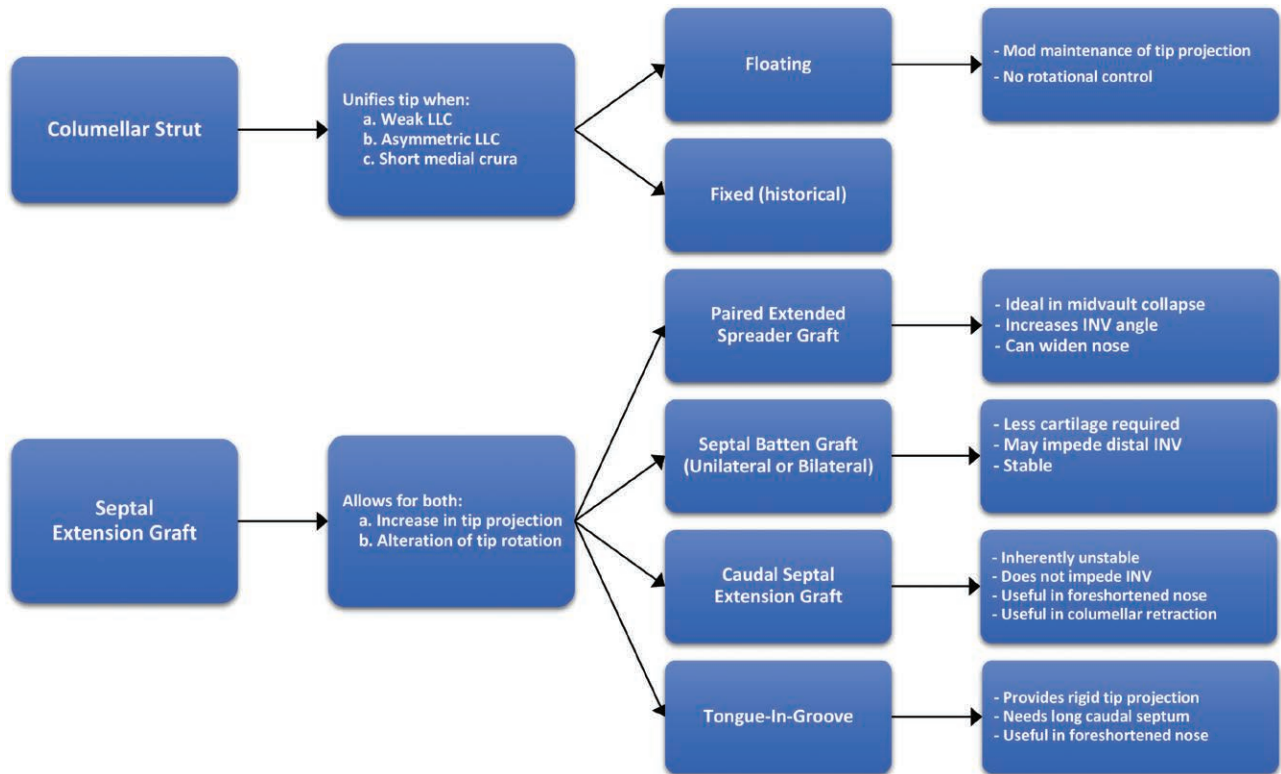


Fig. 7. Algorithm for cartilage graft use in nasal tip projection and rotation. LLC, lower lateral cartilage; INV, internal nasal valve.

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