



Wide-Based Columellar Strut Graft: A Novel Boost for Enhanced Nasal Tip Support in Ethnic and Revision Rhinoplasty

Erkan Soylu¹ · Alper Yenigun² · Hasan Demirhan¹ · Orhan Ozturan²



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Abstract

Background Adequate nasal tip support is crucial for achieving both aesthetic and functional outcomes in rhinoplasty. This study introduces a wide-based columellar strut graft (WB-columellar strut graft) as a new modification to provide enhanced support for the nasal tip, especially in challenging ethnic and revision rhinoplasty cases.

Objective To present and evaluate the effectiveness of the WB-columellar strut graft in providing sufficient nasal tip support and achieving satisfactory aesthetic outcomes in patients with ethnic noses, Asian noses, and revision rhinoplasty cases presenting with weak caudal septum or anterior nasal spine.

Materials and Methods A total of 32 patients, aged between 17 and 48, were included in this study. Of these, 11 were revision cases, 12 had ethnic noses, and nine had Asian noses. The technique involved preparing a WB-columellar strut graft in two different ways according to the need of particular case. WB-columellar strut graft-1: Constructed from either costal or septal cartilage, with a widened columellar base using bilateral grafts and a columellar strut graft.

WB-columellar strut graft-2: Exclusively from costal cartilage, featuring a groove on the anterior surface for insertion of a columellar strut graft to form a wide-based structure. The grafts were applied to provide robust support

in cases, where the caudal septum and spine were excessively resected.

Results In 25 patients, the graft was prepared from costal cartilage, while in seven patients it was from septal cartilage. The WB-columellar strut graft-1 modification was used in 22 patients, and the WB-columellar strut graft-2 in 10 patients. Follow-up ranged from 12 to 24 months, with only one case requiring a mini-revision due to visible tip graft. No significant complications were reported in other patients.

Conclusion The WB-columellar strut graft is an effective boost for enhancing nasal tip support in ethnic and revision rhinoplasty cases. It provides a more robust structural foundation, leading to long-lasting and satisfactory aesthetic results. This technique is particularly beneficial for patients with retracted caudal septum and weak anterior nasal spine, providing improved nasal tip projection and rotation.

Level of Evidence IV This journal requires that authors assign a level of evidence to each article. For a full description of these Evidence-Based Medicine ratings, please refer to the Table of Contents or the online Instructions to Authors www.springer.com/00266.

Keywords Rhinoplasty · Columellar strut graft · Nasal tip support · Ethnic rhinoplasty · Revision rhinoplasty · Caudal septum · Anterior nasal spine

✉ Alper Yenigun
alperyenigun@gmail.com

¹ Faculty of Medicine, Department of Otorhinolaryngology, Medipol University, Bagcilar, Istanbul, Turkey

² Faculty of Medicine, Department of Otorhinolaryngology, Bezmialem Vakif University, 34093 Fatih, Istanbul, Turkey

Introduction

In rhinoplasty, adequate nasal tip support is important for providing a good nasal tip shape and functional entrance. Many cartilage grafts and surgical techniques have been described to alter effectively nasal tip projection and

rotation. Columellar struts and septal extension grafts are both commonly used in modern rhinoplasty to adjust nasal tip projection and rotation [1–6].

Columellar strut grafts have been utilized for this purpose in rhinoplasty for decades. They have been employed to straighten and support the medial crura, reinforce the insufficient and weak caudal septum, and increase tip projection and rotation [1, 7]. In patients with a retracted or resected caudal septum and a retracted or weak anterior nasal spine, conventional columellar strut grafts are not robust enough to fulfill required support. In this study, we presented a wide-based columellar strut graft (WB-columellar strut graft) as a novel modification to replace the spine and provide adequate caudal septum and nasal tip support, especially in cases with a retracted septum, weak and retracted anterior nasal spine, such as ethnic noses, Asian noses, and in revision cases with a frail caudal septum or anterior nasal spine.

Material and Method

Thirty-two patients between the ages of 17–48 were included in the study. Eleven of them were revision cases, 12 had ethnic noses, and nine had Asian noses. Twenty-three patients were female and nine were male.

Surgical Technique

An open rhinoplasty approach was performed in all patients under general anesthesia due to the complexity of the cases. Standard transcolumellar and bilateral infracartilaginous incisions were utilized, and the skin and soft tissue were elevated at the supraprimerichondrial level over the cartilages and at the subperiosteal level over the bony skeleton.

In revision cases, a WB-columellar strut graft was crafted from costal cartilage, whereas in primary cases, it was harvested from the septal cartilage. The costal grafts were harvested at the start of the operation, typically from the right sixth or seventh ribs. After removing the perichondrium, the costal cartilage graft was carved to the desired size using a dermatome knife, ensuring hemostasis. To prevent warping and to ensure a strong, stable graft, the oblique split method was employed when using costal cartilage [8].

A WB-columellar strut graft was prepared in two ways.

WB-columellar Strut Graft -1

The part of the graft that would correspond to the columellar base was adjusted to the right and left of the columellar strut graft in accordance with the depth of the

columellar base in three layers using 5-0 pds sutures. The columellar graft was prepared with a three-layered base and a single-layered upper columellar part. Thus, our WB-columellar strut graft, which has a wider part that will fit into the columellar base and a columellar strut graft, was prepared. This WB-columellar strut graft can be obtained from costal cartilage in revision cases and septal cartilage in primary cases (Video 1) (Figs 1–2).

WB-columellar Strut Graft -2

The second modification can only be made from costal cartilage. Here, a groove was created on the anterior surface of a costal cartilage graft with sufficient thickness and depth to form the columella base, and a WB-columellar strut graft was placed and sutured into this groove. Thus, a graft with a wide base and a narrower columellar part was obtained (Video 2) (Figs. 3–4).

Application of the WB-columellar Strut Graft

WB-columellar strut graft was used in Asian noses, ethnic noses, and revision cases, where the caudal septum and spine were excessively resected. The widened base of this graft was placed in front of the spine by creating a flat surface in front of the anterior maxillary spine in a way that it would not touch the bone at the base, leaving a distance of 1-2 mm to avoid clicking sounds and gummy smile deformity. WB-columellar strut graft was prepared from septal cartilage in patients with sufficient cartilage available in the septum, and from costal cartilage in those without (Video 3).

Tip plasty was performed after achieving the desired nasal tip projection and rotation with nasal tip stabilization providing a WB-columellar strut graft. The incisions were closed with 5-0 rapid vicryl sutures. Finally, intranasal silicone septal splints and an external splint were placed. Both the intranasal and external splints were removed on the seventh day after surgery.

Results

WB-columellar strut graft was prepared from costal cartilage in 25 patients and from septal cartilage in seven patients. WB-columellar strut graft-1 and 2 were in 22 and ten patients, respectively. In revision patients, WB-columellar strut graft was formed from costal cartilage and in primary cases from septum cartilage. A mini-revision surgery was performed in one of the Asian patients due to becoming the tip graft visible. No problems were encountered in the others. The desired results were largely achieved by ensuring the pleasing tip projection and

Fig. 1 Right view before and after surgery, where we applied WB-columellar strut graft -1



Fig. 2 Bottom view before and after surgery, where we applied WB-columellar strut graft -1



Fig. 3 Right view before and after surgery, where we applied WB-columellar strut graft -2



Fig. 4 Bottom view before and after surgery, where we applied WB-columellar strut graft -2



supporting of the septum in all patients. They were followed for an average of 18 months (ranging from 12 to 24 months). All patients experienced satisfactory aesthetic outcomes.

Discussion

Various types of columellar struts have been outlined based on the degree of nasal tip projection and the structural integrity of the lower lateral cartilages. Toriumi discussed

the use of caudal extension grafts in situations, where there is a deficiency in the caudal septum [9].

In ethnic noses and Asian noses, the caudal septum and spine are generally located posteriorly and are inherently weak. In ethnic and Asian noses, the tip is in bulbous structure and less projected. This situation is related to the posterior location and weakness of the caudal septum as well as the skin thickness [5]. This is also the case in some revision cases, where the caudal septum is removed excessively or the anterior nasal spine is resected. Since, the premaxillary region is empty in these patients, there is usually a retracted columella. Therefore, the caudal septum should be extended anteriorly with strong caudal septum support. In order to move the posteriorly located spine forward, placing a support with adequate width to the anterior part of the spine renders that the spine is carried forward together with the caudal septum. This intervention provides appropriate and strong nasal tip support and eliminates the problem of retracted columella. The WB-columellar strut graft that we apply has an adequate structure to allow for this purpose.

Traditional columellar strut grafts have been widely used to enhance nasal tip projection and rotation. However, these grafts often fall short in patients with a retracted or weak anterior nasal spine and caudal septum, particularly in ethnic and revision rhinoplasty cases [10]. WB-columellar strut graft is also a good choice for patients who need to lengthen the nose. The most basic technique for lengthening the nose is to extend the nose framework forward and downward. WB-columellar strut graft extends the caudal septum and spine downward together, providing a balanced and strong augmentation. This is why it is a useful graft in especially ethnic and Asian noses and for revisions of the shortened noses.

In addition, having a wide base supports the columella to remain durable and unchanged for at least 2 years. In this way, it fits properly on the base compared to a narrow-based graft and the possibility of shifting to either side is lower. Aesthetically, it is not a natural appearance for the columella to be the same width as the columellar base. The base of the columella should be wider than the columella itself. Our graft, which has a wider base, also fulfills this purpose.

There are many different techniques for using and shaping costochondral cartilage grafts, including scalpel, piezo, and dermatome knife. Oblique split method defined by Tastan E et al., provides straight costal cartilage grafts of varying thicknesses without the risk of warping [8]. Soyulu et al., on the other hand, use piezo to shape the ossified costal cartilage, especially in elderly patients [11]. In this technique, we used a scalpel, a burr, dermatome knife and piezo to shape the costal cartilage in accordance with the substance of the costal graft.

We have described the WB-columellar strut graft for use in ethnic Asian patients and patients with weak caudal septum and spine. It is a very useful graft to strengthen the caudal septum and spine in these patients. We do not recommend the use of WB-columellar strut graft in patients with strong and prominent spines. If used in patients with strong spines, it may cause fullness in the subnasale and compressing the graft by touching the maxillary bone completely may cause gummy smile or clicking sound.

There is a continuing debate about the long-term effectiveness and stability of Columellar Strut Graft (CSG) and Septal Extension Graft (SEG) in primary rhinoplasty. Many surgeons are in favor of CSG because of its flexibility. Studies by Bucher et al. and Alghonaim et al. demonstrated that CSG is adequate for maintaining projection and rotation in patients undergoing primary rhinoplasty [2,3]. In this case, SEG may not be sufficient. When the SEG is extended forward too much, the part that protrudes forward from the caudal septum will increase and may cause a bend in the nasal tip [12]. Conventional columellar strut grafts are weaker compared to WB-columellar strut grafts. In addition, they cannot provide sufficient fullness in the spine region in Asian and ethnic noses. Moreover, since it will create the columella and columellar base with the same width, the columellar base will appear too thin and will not look natural in terms of aesthetics. As a result, WB-columellar strut grafts provide a satisfactory aesthetic appearance, adequate nasal tip and columellar support in Asian and ethnic noses with posteriorly placed caudal septum and spine and in revision cases with weakened caudal septum and spine resection.

Conclusion

We demonstrated the use of WB-columellar strut grafts obtained from septal or costal cartilages in primary or revision rhinoplasty, respectively. The WB-columellar strut graft is a valuable boost in rhinoplasty, offering enhanced support and aesthetic outcomes, particularly for ethnic and revision cases. By providing a more robust structural foundation, this technique helps achieve long-lasting and pleasing results for patients seeking nasal refinement.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s00266-024-04460-w>.

Declarations

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964

Helsinki Declaration and its later amendments or comparable ethical standards.

Informed consent For this retrospective type of study informed consent is not required.

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