

# Tip Graft and Columellar Strut Using Dorsal Osseocartilaginous Hump

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## Abstract

**Background:** Although, different grafts are used for nasal tip plasty in cases with under projected or ill defined tip, the selection of a graft material, which provides sufficient amount of tissue with least donor site morbidity and low recipient site complication is challenging. The objectives of the present study were to examine the usefulness of cartilaginous dorsum as a proper material for tip graft, and to introduce the cartilaginous dorsum as an acceptable material for columellar strut.

**Methods:** Fifty six (18 males and 38 females) patients were operated for augmentation tip plasty and hump reduction from 2004 to 2008. The tailored cartilaginous or osteocartilaginous dorsum was used as a tip graft or columellar strut in 35 and 21 cases, respectively. The cartilaginous framework was exposed using open or close rhinoplasty approach in 41 and 15 cases, respectively. The patients were followed for 12- 36 months. Cosmetic outcomes and patients' satisfaction were obtained using qualitative measures.

**Results:** The percentage of patients with very improved, improved, unchanged or unacceptable aesthetic outcome were 39.29%, 50%, 3.57% and 7.14%, respectively. Moreover, the percentages of very satisfied, satisfied, indifferent and unsatisfied patients were 66%, 18%, 9%, and 7%, respectively.

**Conclusion:** The procedure provides a well-defined nasal tip with no evidence of bifidity, angularity, or cartilage graft visibility and displacement. The use of dorsal osteocartilaginous graft offers outstanding advantages including ease of harvest, mould, fix, and low resorption.

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**Keywords** • Rhinoplasty • Graft • Cartilage

## Introduction

Rhinoplasty is one of the most common and challenging aesthetic surgical procedures. A challenging part of aesthetically pleasing nose during rhinoplasty is to provide an appropriate nasal tip positioned slightly higher than the proper dorsum with the two approximate tip defining points.<sup>1</sup>

It is a frequently occurring incident that the tip projection and contour is lost due to over-resection of the alar cartilages during rhinoplasty or due to structural deformity or trauma. The consequence is a blunted or distorted nasal tip, which is not acceptable to both the surgeon and the patient. There are many different techniques to achieve a well-designed tip; however,

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the standard methods of tip contouring may not provide adequate projection in patients with inadequate tip projection. In such a condition, an excellent method for restoring projection and recreating a normal nasal tip is tip grafting using cartilage, which was first introduced in the mid 1960s. The method, which was accompanied with dramatic result for tip projection and angular appearance, used graft in the secondary rhinoplasty of patient with thick skin and supratip deformity. Nasal tip grafting was more popular in the secondary rhinoplasty in 1970s, and was increasingly important in the primary rhinoplasty as well. Refinements in the technique and materials are hallmarks of the current approach to different aspect of rhinoplasty.<sup>1</sup>

Nowadays, numerous grafting materials such as autogenous, homogenous, and synthetics are available for nasal tip augmentation.<sup>2</sup> One of the challenges for the repair of the nasal defects, which demands graft, is the material and the site of harvesting. First septal grafts were the preferred material. Ethmoid or vomer was the next choice for the tips with very thick or scarred tissues. During 1970s, ear cartilages were used for the first time, and the ethmoid bone was abandoned as a primary graft because clinical and radiographic evidence showed a short time application and early absorption. Recently, widespread applications and availability of more patients without prime graft materials have resulted in a wide spectrum of material choices for tip augmentation.<sup>1</sup> However, there is little doubt that autogenous cartilage is the preferable implant material for nasal tip plasty.<sup>2</sup>

The objective of the present study was to examine the usefulness of cartilaginous dorsum, which was first described by Jose and Manuel Garcia-Velasco,<sup>3</sup> as a proper material for tip graft. The study also aimed at introducing the cartilaginous dorsum as an acceptable material for columellar strut when it is used in a combination with the osseous portion of the dorsum.

## Patients and Methods

### Study Design and Patients

The study included 56 consecutive patients (18 males and 38 females, 24±6 years old) who underwent rhinoplasty from June 2004 to September 2008. The cases were candidates for primary rhinoplasty. They were operated, and followed up for a period of 24±12 months. The most important defect in all of the patients was a poorly projected or ill-defined tip. All patients who had a predominant osseocartilaginous hump entered in the analysis. The study protocol was

reviewed and approved by the Research Ethics Review Board of our institution.

### Graft Harvesting

The grafts were harvested only in patients who had a prominent osseocartilaginous hump. A conservative rhinoplasty was performed. The osseocartilaginous hump was resected in one block using a No. 11 blade and a dorsal osteotomy (figure 1). The upper surface had a little convexity (figure 1A) while the undersurface had a central projection (figure 1B & 1C) that corresponds to the septum. Subsequently, based on whether tip graft or columellar strut was required, two design pathways (figure 2) were performed as follows.

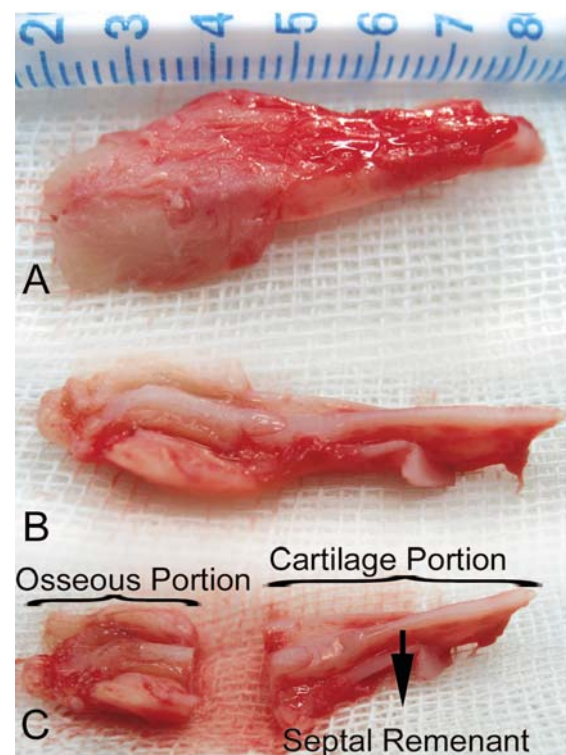
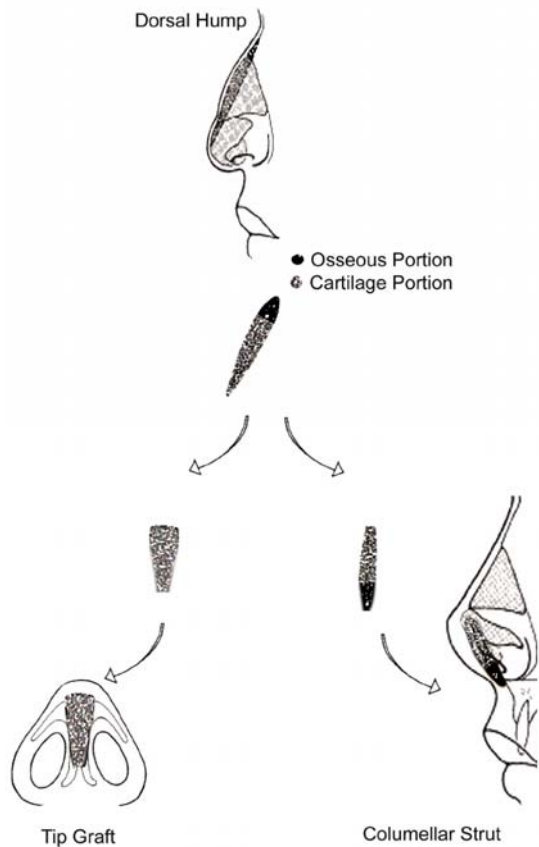


Figure 1: Osteocartilaginous hump removed in one block. A. Anterior surface, B. Posterior surface, and C. Osseous and cartilaginous portions, and the central septal projection.

### Tip Graft Design

In 44 cases the osseocartilaginous hump was used as a tip graft. The bony portion was detached (figure 1C), and any possible residue of nasal mucosa was eliminated from undersurface of the cartilaginous portion. Then final sculpturing of the material for different types of tip graft was done. Care was taken to preserve the upper surface of the perichondrium. Mostly a triangular-shaped graft (about 1.5 cm by 6 to 8 mm on its base) was tailored (figure 3A). The septal nasal projection of the undersurface of

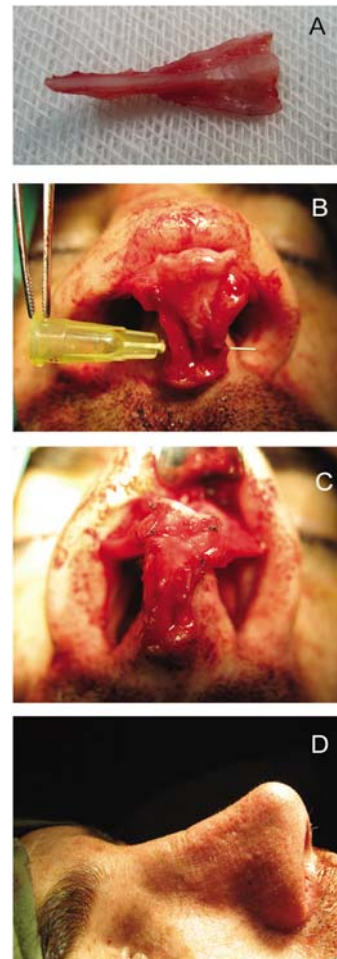


**Figure 2:** The schematic presentation of graft harvesting, preparation and insertion as a tip graft or columellar strut.

the initial graft (figure 1C) was preserved (figure 3A) to facilitate graft fixation between the medial crura. The graft was preferably applied to the nasal tip in the usual way through a marginal incision during rhinoplasty, but not restricted to open approach. A pocket was designed between the medial crura of the alar cartilages, and the projection of the undersurface of the cartilaginous dorsal graft positioned in the pocket to help fixation. The undersurface projection of the graft rests on the groove, secures the position of the graft, and avoids any displacement (figure 3B & 3C).

#### *Columellar Graft Design*

In 12 cases the osseocartilaginous hump was used as columellar strut. The removed osseocartilaginous hump was tailored to shape a columellar strut with sufficient length (25-30 mm) and width (2-3 mm) (figure 2). The tailored strut was placed in the pocket between the medial crura from the nasal tip to the anterior nasal spine as a floating type, or confluent to the nasal spine as a fixed type. The graft was preferably positioned through a marginal incision during primary rhinoplasty, but not restricted in open approach. The osseous side of



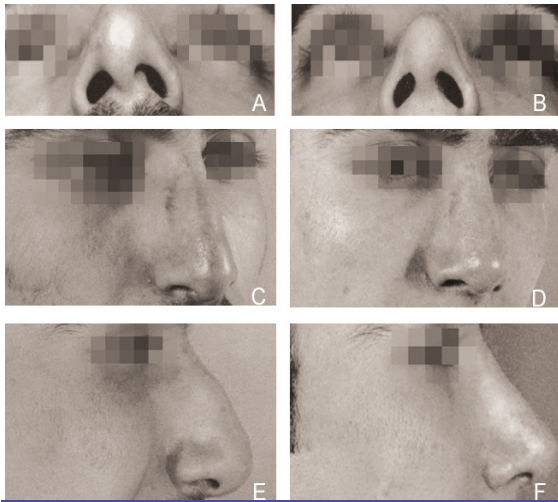
**Figure 3:** A. The sculptured tip graft, B and C. the positioning and fixation of the graft in nasal the tip, and D. the lateral view at the end of the operation

the osseocartilaginous graft positioned just before the anterior nasal spine, while the flexible cartilaginous side replaced anteriorly between lower lateral cartilage domes (figure 2 & figure 4). The position of the graft secured using suture to dome area.

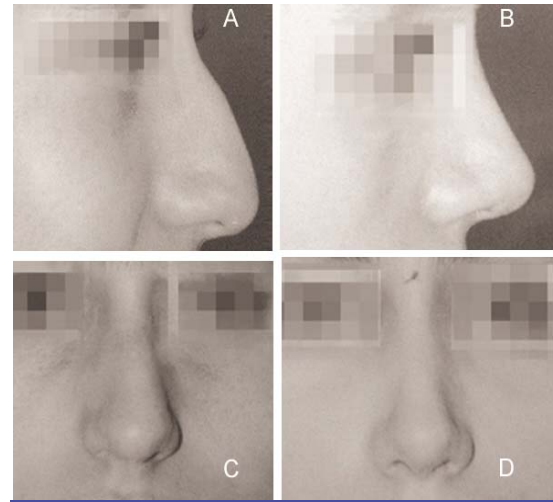
The other procedures during routine rhinoplasty such as cephalic trim, lateral and medial osteotomy were performed as usual.

#### *Outcome Measures*

Using photographs from the patients, a cosmetic surgeon did compare the cosmetic outcomes of the procedures, and reported his judgments in a semi-quantitative scale as very improved, improved, unchanged and unacceptable according to standard cosmetic indices regarding tip projection and definition. The patients' satisfaction after the operation was also documented using a semi-quantitative scale, which had four categories including very satisfied, satisfied, indifferent and unsatisfied.



**Figure 4:** Preoperative (A, C and E) and postoperative (B, D and F) base (A), oblique (B), and profile (C) views of a 26 years old male subjected to rhinoplasty using columellar strut by sculptured osseocartilaginous dorsal graft.



**Figure 5:** Preoperative (A, C) and postoperative (B, D) right and front views of a 24 year old female subjected to tip plasty using dorsal cartilaginous tip graft.

The findings were analyzed using descriptive statistics.

## Results

According to the cosmetic surgeon's expectation and esthetic criteria the final shapes and projections of the nasal tips were very improved (n=22, 39.29%), improved (n=28, 50%), unchanged (n=2, 3.57%) or unacceptable (n=2, 7.14%).

In terms of patient satisfaction, the percentages of very satisfied, satisfied, indifferent and unsatisfied patients were 66%, 18%, 9%, and 7%, respectively. Four patients were reoperated for over projection (2 cases), under projection (one case) of the graft, or revision due to V deformity (one case). Moreover, from the point of cosmetic indexes, the postoperative results were very satisfactory as far as the rhinoplasty was concerned (figure 2D and figure 5).

The graft was not displaced in any case. No noticeable reabsorption was observed even after 3 years of follow up. No infection was encountered during the study.

## Discussion

Good nasal tip projection, natural columellar appearance and improvement of the nasolabial angle are important considerations during rhinoplasty. Nasal tip plasty, achieved by a variety of techniques according to patients' tip status, is an effective method for improving the nasal appearance to provide the patients' satisfaction.<sup>4,5</sup> Standard methods of tip contouring may not provide adequate projection in patients with inadequate tip projection.<sup>1</sup> Generally

the use of graft for tip plasty is restricted to those cases whose problems can't be corrected by other methods. Currently, however, tip grafting is often used as an alternative to the conventional method of tip contouring by cartilage resection. The alar cartilages can be left for support, while improved definition and contour can be produced by different tip grafts.<sup>1</sup> Cartilage is used usually as an autograft during tip plasty in rhinoplasty. Biocompatibility of the cartilage is unsurpassed, and the risks of infection or extrusion are much lower than the alloplastic materials.<sup>1</sup> However, the cartilage autografts have the demerit of donor site morbidity, limited amount to be harvested, change in the shape, and resorption.<sup>6</sup>

As Garcia-Velasco described for the first time in 1986,<sup>3</sup> the present study found that the cartilaginous portion of the dorsum was a good choice for tip plasty in cases with poorly-defined or under projected tips that had a considerable dorsal hump. Cartilaginous dorsum in humpy patients is an accessible material, which does not need more procedure to harvest it. Moreover, it can be used as a suitable material not only for tip grafting but also for a columellar strut during primary rhinoplasty when it remains with osseous component. To the best of our knowledge there has been no previous report using this material as a choice for columellar strut during rhinoplasty. Therefore, the discussion is inevitably deprived of comparison with a similar procedure.

In agreement with what Garcia-Velasco mentioned,<sup>3</sup> the study shows that a well-projected nasal tip can be obtained using a part of the cartilaginous hump as a tip graft or tailored osteocartilaginous dorsum as a columel-

lar strut. Using this material has the following advantages:

1. It preserves other structures such as the nasal septum or ear concha, therefore, subsequent morbidities caused by these additional procedures are eliminated.
2. Hump resection is a necessary stage during conventional rhinoplasty, especially in the humpy nose. The replacement of this material with other grafts such as septum or ear cartilage, which takes time to harvest, shortens the duration of the operation.
3. Cartilaginous hump as graft material covered by perichondrium ensures the survival.
4. The method of tongue and groove fixation eliminates future displacement or malposition of the graft.
5. The flexibility along with the special form of cartilaginous dorsal hump makes it an ideal choice for tip graft without abrupt demarcation and irregularity.

### Conclusion

Cartilaginous dorsum hump is a soft and less visible tissue, which deserves elegant contour with reliable long term result as a tip graft. Furthermore, it could be applied as a columellar strut, using a combination of cartilaginous and osseous part of the dorsum. In addition, it preserves other materials such as septal cartilage, which may be used in future for the

correction of possible problems in a secondary rhinoplasty.

**Conflict of Interest:** None declared

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