Aesth Plast Surg (2018) 42:1648–1654
https://doi.org/10.1007/s00266-018-1219-6

Nasal Elongation with Septal Half Extension Graft: Modification of Conventional Septal Extension Graft Using Minimal Septal Cartilage

Soo Hyang Lee[1] · Han Byul Lee[1] · Eun Taek Kang[2]

Received: 15 May 2018 / Accepted: 21 August 2018 / Published online: 14 September 2018

Abstract

Background In Asian rhinoplasty, a septal extension graft can be used for both tip projection and derotation of the alar cartilage. However, patients often do not have enough harvestable septal cartilage to create the septal extension graft. We therefore devised a method with which to fix the derotated alar cartilage with a small amount of septal cartilage.

Methods From January 2012 to December 2016, 23 patients underwent short nose correction with a septal half extension graft made of septal cartilage and were postoperatively monitored for at least 6 months. The alar cartilage was completely separated from the adjacent structures, especially the scroll area and hinge complex, for caudal derotation. The septal half extension graft was then harvested from the septal cartilage and secured to the caudal septum and the lateral crura of the alar cartilage. Photographs of the patients were compared immediately before surgery and 1 year after surgery.

Results Of the 23 patients, 21 (91%) had satisfactory results without short nose recurrence. Two (9%) patients developed recurrence: undercorrection and poor tip projection in one patient each. Aesthetic assessment of short nose correction was performed by comparing the columellar labial angle before and after surgery. Our method reduced the columellar labial angle by 6.2% (paired t test, $p < 0.05$, $t = 31.698$).

Conclusion In patients who cannot undergo conventional septal extension graft due to insufficient amounts of septal cartilage, the septal half extension graft could be a promising alternative technique for short nose correction with minimal septal cartilage harvesting.

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 Short nose · Septal cartilage · Septal extension graft

Introduction

Nasal length is defined as the distance from the radix to the tip-defining point, and a short nose is generally characterized by a short distance from the radix to the tip-defining point. When evaluating a short nose, we consider alar retraction, columellar retraction, the nasolabial angle, the ratio of the nasal length to the facial length, and the actual nasal length. However, Asian patients have additional considerations that may make surgery more difficult. First, Asians tend to have a smaller amount of nasal cartilage, and it is much less firm. Second, they have thicker and less pliable skin [1–4].

To effectively elongate nasal length of a short nose, the external skin and soft tissue should be stretched by extensive undermining of the tissues. The cartilaginous structures forming the internal framework must be simultaneously extended by freeing the alar cartilage from its adjacent structures [5–9].

✉ Eun Taek Kang
migobeauty@gmail.com

[1] Department of Plastic and Reconstructive Surgery, College of Medicine, Inje University, Ilsan Paik Hospital, Goyang 10380, Korea

[2] Migo Plastic Surgery Clinic, 838 Nonhyeon-ro, Gangnam-gu, Seoul 06025, Korea

Autologous cartilage grafts are widely used by rhinoplastic surgeons to effectively fix the released alar cartilage into the caudal portion of the septal cartilage and upper lateral cartilage (ULC). The septal extension graft, introduced by Byrd et al. [9, 10] in 1997, is one of the most useful grafts for East Asians. It is secured between the caudal septum and both of the lower lateral cartilages (LLCs) while controlling the nasal length, tip projection, rotation, and shape. However, tip rigidity, bending of the graft, and lack of harvestable septal cartilage are limitations to the use of this graft as the first-choice treatment [11–13].

The derotation graft is another option for fixing the released alar cartilage to the caudal septum. The most widely used material for a derotation graft is the ear cartilage, which is composed of elastic cartilage. It is easy to bend against external forces but is not deformed, unlike septal cartilage. This characteristic of the derotation graft results in a less rigid nasal tip and avoids interference with the function of the membranous septum, thus maintaining the natural appearance and tip flexibility [11, 14].

However, when using a derotation graft, it is difficult to effectively correct a short nose if the caudal septum is remarkably short or the distance between the caudal septum and the released LLC is too far to allow the graft to bridge the gap. In such patients, the derotation graft cannot resist the skin tension after closure because of the tight skin envelope and weak strength of the graft. In the long term, relapse frequently occurs in patients with these characteristics.

We herein introduce a surgical procedure using septal cartilage for fixation of the released alar cartilage. The targets of this procedure are the above-mentioned patients; i.e., those without enough harvestable septal cartilage and either a short caudal septum or a long distance between the caudal septum and the released alar cartilage. These characteristics prevent the use of both a septal extension graft and derotation graft. Unlike the ear cartilage, the septal cartilage is strong enough to withstand the tension of the skin envelope. Thus, we found that the use of a septal half extension graft made of septal cartilage provided the most stable condition with which to sustain the internal framework. We herein present the concept, technique, results, and strengths of this surgical procedure.

Materials and Methods

Surgical Procedure

Extensive Dissection of the Skin Envelope

All patients underwent open rhinoplasty with a transcolumellar inverted V-shaped incision and bilateral marginal incisions. The skin–soft tissue envelope was separated from the underlying structures of the LLC, ULC, and nasal bone through supraperichondrial dissection (from the nasal tip to the cartilaginous vault) and subperiosteal dissection (over the nasal bone), preserving the supplying arteries and subdermal plexus.

Release and Caudal Rotation of the LLC

To isolate the LLC, the soft tissue dissection proceeded from the LLC to the ULC using scissors. The dissection then proceeded to the hinge complex to release the LLC from its retaining components (i.e., superficial musculoaponeurotic system, perichondrium, ligament, and fibrous tissue), which constitute the major supporting area for the nasal tip. If adequate caudal rotation could not be achieved, further dissection between the mucosa and the perichondrium beneath the ULC was attempted for additional lengthening. Such dissection enables tension-free rotation of the LLC in a caudal direction without the need for a composite graft.

Fixation of the Derotated LLC

To fix the LLC in a new position, a piece of septal cartilage was harvested while ensuring adequate L-strut. This septal half extension graft was overlapped and fixed to the end of the caudal septal angle and the lateral crura of the LLC in the respective cephalad and caudal locations using 5-0 polydioxanone. The graft was approximately 10 mm in width and length (Fig. 1).

Tip Projection and Nasal Augmentation

Complete release of the nasal tip-supporting structures may cause tip projection loss. Furthermore, fixing the LLC to a new location with a small graft also usually lowers the tip projection. Therefore, we performed a tip plasty in all patients using a floating-type columellar strut, an onlay graft made of double-layered cymba concha, and a tip-extension suture anchoring the nasal septum to the cephalic aspect of the medially moved LLC (12). Finally, all patients underwent nasal augmentation using silicone implants.

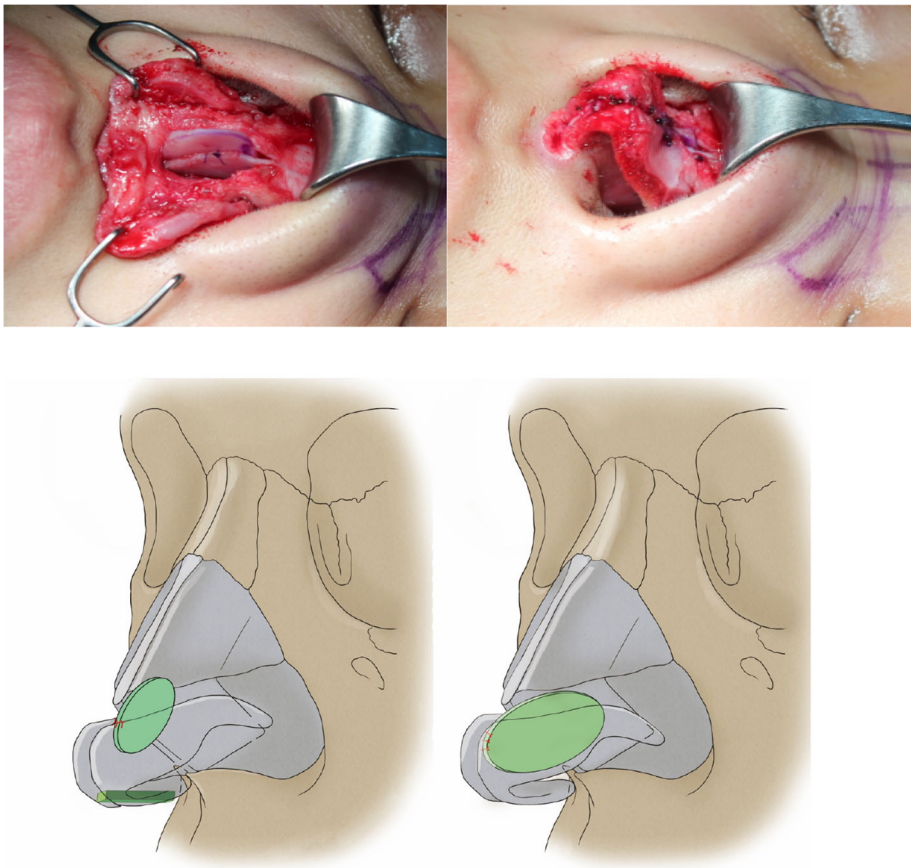

Fig. 1 Intraoperative view of short nose correction. (Above, left) The lower lateral cartilage is completely released from its adjacent structures and is rotated in a caudal direction without tension. (Above, right) The lateral crura of the released alar cartilage is anchored to the septal half extension graft. (Below, left) The septal half extension graft is anchored to the lateral crura of the alar cartilage, (Below, right) whereas the conventional septal extension graft is anchored to the dome of the alar cartilage

Columellar Labial Angle Measurement

We used the columellar labial angle which is formed by the columellar and the upper lip to evaluate the postoperative result of short nose correction. The degree of the columellar labial angle was measured by only one physician before and at 1 year after surgery in all patients.

Results

From January 2012 to December 2016, a total of 23 patients underwent rhinoplasty using septal half extension grafts made of septal cartilage. The mean age of the patients was 31.5 years (range, 19–65 years), and all were women. The patients were followed up for a mean of 1.6 years (range, 0.5–4.0 years). The average sizes of harvested septal cartilages and silicone implants used in dorsal augmentation are as shown in Table 1.

Graft Durability Assessment

The patients and surgeon compared the preoperative and postoperative photographs 1 year after the operation. The operator assessed the nasal shape and considered the following symptoms as recurrence of short nose: undercorrection of the nasal length, inadequate correction of columellar retraction, and poor tip projection. Of the 23 patients, 21 (91%) had satisfactory aesthetic results without recurrence of short nose during the 1-year follow-up. Two

Table 1 The average size of harvested septal cartilage and silicone implants

	Septal cartilage	Silicone
Length (mm)	10.5 (range, 9.5–11)	45 (range, 40–52)
Width (mm)	10.3 (range, 9.5–10.8)	9.5 (range, 9.0–10.5)
Thickness (mm)	1.4 (range, 1.0–1.8)	2.7 (range, 2.0–4.5)

Table 2 Recurrence of short nose caused by graft instability

Complications	
Undercorrection	1 (4.5)
Columellar retraction	0 (0.0)
Poor tip projection	1 (4.5)

Data are presented as *n* (%) patients

(9%) patients showed recurrence and required a revisionary procedure (Table 2).

Aesthetic Assessment of Short Nose Correction

The mean value of the columellar labial angle before surgery was 118° (range, 113°–127°), and after surgery was 110.7° (range, 106°–119°). Statistical analysis to confirm the effectiveness of the surgery was performed using the paired t test on SPSS software, and statistical significance was proven ($p < 0.05$, $t = 31.698$) (Table 3).

Case 1

A 35-year-old woman presented with a short, upturned nose with columellar retraction and alar retraction. She had not previously undergone rhinoplasty. After complete release, the alar cartilage was secured to the caudal septal angle using a septal half extension graft. Tip plasty was performed using conchal cartilage and columellar strut graft, and augmentation was performed with a silicone implant (Fig. 2).

Case 2

A 31-year-old woman had undergone augmentation rhinoplasty using a silicone implant at an outside clinic. Columellar retraction gradually developed, and we therefore performed a secondary rhinoplasty. Flap elevation was performed above and beneath the implant capsule. The implant was removed, and the alar cartilage was completely released from the ULC. A septal half extension graft harvested from the septal cartilage was used to fix the alar cartilage to the caudal septal angle. Finally, tip plasty using conchal cartilage was performed, and the silicone implant was trimmed and reinserted (Fig. 3).

Case 3

A 28-year-old woman presented with an upturned nose, bulbous nasal tip, and under-projected dorsum. She had undergone nasal lengthening using a septal half extension graft. Then, tip plasty was performed using a conchal cartilage graft, intercrural suture, and columellar strut graft, and dorsal augmentation was performed with a silicone implant (Fig. 4).

Table 3 Statistical analysis of the preoperative and postoperative columellar labial angle

	Preoperative	Postoperative	t	p value
Mean	118	110.7	31.698	< 0.05
SD	3.75	3.48		

Fig. 2 A 35-year-old woman with a short upturned nose, columellar retraction, and alar retraction (left side) underwent short nose correction with a septal half extension graft from the septal cartilage, tip plasty using conchal cartilage, columellar strut graft, and nasal dorsum augmentation with a silicone implant. The improvement of her short nose was maintained 2 years after the rhinoplasty (right side)

Discussion

Short nose is a complicated deformity that usually requires more than one surgical technique. Simultaneous extension of both the external skin and internal cartilaginous

Fig. 3 A 31-year-old woman who underwent augmentation rhinoplasty at an outside clinic developed gradual columellar retraction (left side). Nasal lengthening was achieved using a septal half extension graft from the septal cartilage, and the silicone implant was trimmed and reinserted. 1 year after the operation, the last visit was made and the short nose correction was well maintained (right side)

framework is important when correcting a short nose. [1–4, 9] Adequate undermining is crucial to extend enough external skin. Various surgical techniques ranging from septal reconstruction to tip plasty have been introduced to extend the internal cartilaginous framework. [9, 10, 14] Complete release of the nasal tip-supporting structures is particularly crucial for caudal movement of the nasal tip. With the release of these structures, nasal tip projection and

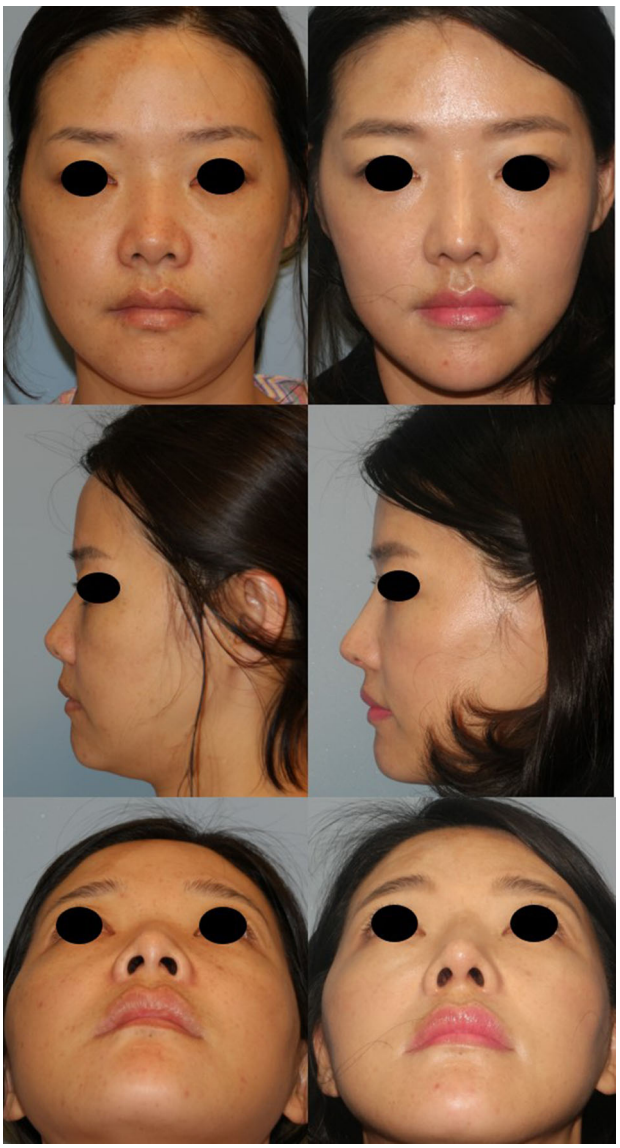

Fig. 4 A 28-year-old woman with an upturned nose, bulbous nasal tip, under-projected dorsum (left side) underwent short nose correction with a septal half extension graft from the septal cartilage, tip plasty using conchal cartilage, columellar strut graft, intercrural suture and nasal dorsum augmentation with a silicone implant. The improvement of her short nose was maintained 4 years after the rhinoplasty (right side)

rotation can be easily achieved. After caudal rotation, fixation of the released LLC in a new position is important [13, 14].

In the present study, the realigned LLCs were further fixed by various autologous cartilage grafts. The septal extension graft is one of the most widely used surgical techniques. It involves the use of solid septal cartilage to fix the released LLC in a more caudal position. It is especially suitable for patients with thicker skin and a relatively weak LLC. [10–13] However, the septal extension graft is directly anchored to the medial crura of the

LLC, which leads to a rigid nasal tip and consequently an unnatural facial expression. Additionally, patients with a short nose tend to have a smaller amount of septal cartilage, and its quantity is usually insufficient for harvesting.

Derotation grafts were introduced to overcome these drawbacks of septal extension grafts. The derotation graft, which is made of ear cartilage, is fixed to the caudal angle of the septal cartilage and the lateral crura of the LLC in the respective cephalad and caudal locations [7]. The flexibility of this ear cartilage graft results in a less rigid nasal tip and avoids interference with the function of the membranous septum, resulting in a natural aesthetic nasal shape. [4] During long-term follow-up, however, patients with long distances between the caudal septal angle and the released LLC develop recurrence of short nose at a high frequency (undercorrection of the nasal length, inadequate correction of columellar retraction, and poor tip projection). Thus, a derotation graft made of ear cartilage cannot resist the skin tension after closure if the graft is too long.

We therefore devised a procedure that utilizes a small graft and applied it to the following patients:

1. Patients with little septal cartilage for use as a septal extension graft.
2. Patients with a short caudal septum and a long distance between the caudal septal angle and the released LLC; this distance is too far to allow the graft to bridge the gap using only a derotation graft made of ear cartilage.
3. Patients who do not want to harvest rib cartilage.

In these specific patients, we harvested a small amount of septal cartilage, fabricated it into about 10 mm in length and width. Its size is adequate for use as a derotation graft but not a septal extension graft. Thus, the septal half extension graft is not fixed to the dome of the LLC as is a conventional septal extension graft, but is instead fixed to the lateral crura of the LLC like a derotation graft. This operational technique, which modified the conventional septal extension graft, allows us to achieve the effect of caudal rotation of the derotation graft using a small amount of septal cartilage. For objective evaluation of short nose correction, the columellar labial angle was measured preoperatively and at 1 year postoperatively in all patients. In all 23 patients, reduction of the columellar labial angle of approximately 6.2% was statistically proved, and the average preoperative columellar labial angle was 118°, and postoperatively it was 110.7°. Also, when we evaluated patient subjective satisfaction at 1 year postoperatively, we found that 91% (21 patients) were satisfied with cosmetic results.

A possible drawback is that the distance between the nasal tip and supratip becomes abnormally long due to anchoring the lateral crura of the LLC to the cartilage graft. In this case, supratip fullness may occur and a cephalocrural suture (introduced by Regalado-Briz) can be performed to solve this problem. [15] Second, we had to make sure that there was no asymmetry because this graft overlaps the caudal septum. We thought that the graft we used would not cause asymmetry because the thickness was as thin as about 1 mm (mean 1.4 mm, range 1.0–1.8 mm), but a columellar strut graft was performed together to prevent asymmetry. As a result, no asymmetry was found. Finally, this procedure should be carefully performed in patients with a narrow LLC or alar retraction.

In contrast to other studies that used autologous cartilage grafts using abundant amounts of cartilage (e.g., septal cartilage, ear cartilage, costal cartilage), we performed short nose correction only using minimal septal cartilage. Thus, this procedure is a promising alternative to conventional septal extension grafts when the amounts of available septal cartilage are insufficient in short nose correction using autologous cartilage grafts. Future study will be interesting to compare the conventional autologous cartilage graft and our method when there is enough available septal cartilage.

Conclusion

The septal half extension graft harvested from the septal cartilage can be used for patients who cannot undergo short nose correction using a conventional septal extension graft and derotation graft because of limited amounts of septal cartilage. It is a very useful nasal lengthening method with which to secure nasal tip flexibility and stability from external forces.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Human and Animal Rights 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.

References

1. Park JH, Mangoba D, Mun SJ, Kim DW, Jin HR (2013) Lengthening the short nose in Asians: key maneuvers and surgical results. JAMA Fac Plast Surg 15:439–447
2. Gruber RP (1996) The short nose. Clin Plast Surg 23:297–313
3. Toriuml DM, Bared A (2012) Revision of the surgically overshortened nose. Fac Plast Surg 28:407–416
4. Byun JS, Kim KK (2013) Correction of Asian short nose with lower lateral cartilage repositioning and ear cartilage grafting. Plast Reconstr Surg Glob Open 1:e45

5. Lee YH, Kim JH, Lee E (2000) Lengthening of the postoperative short nose: combined use of a Gull-Wing concha composite graft and a rib costochondral dorsal onlay graft. Plast Reconstr Surg 105:2190–2199
6. Han SK, Ko HW, Lee DY, Kim WS (2005) The effect of releasing tip-supporting structures in short-nose correction. Ann Plast Surg 54:375–378
7. Paik MH, Chu LS (2012) Correction of the short nose using derotation graft. Arch Aesthet Plast Surg 18:35–44
8. Naficy S, Baker S (1998) Lengthening the short nose. Arch Otolaryngol Head Neck Surg 124:809–813
9. Cardenas-Camarena L, Gomex RB, Guerrero MT, Solis M, Guerrerosantos J (1998) Cartilaginous behavior in nasal surgery: a comparative observational study. Ann Plast Surg 40:34–38
10. Byrd HS, Andochick S, Copit S, Walton KG (1997) Septal extension grafts: a method of controlling tip projection shape. Plast Reconstr Surg 100:999–1010
11. Kim JH, Song JW, Park SW, Oh WS, Lee JH (2014) Tip extension suture: a new tool tailored for Asian rhinoplasty. Plast Reconstr Surg 134(5):907–916
12. Jeong JY (2014) Obtaining maximal stability with a septal extension technique in east Asian rhinoplasty. Arch Plast Surg 41:19–28
13. Kim MH, Choi JH, Kim MS, Kim SK, Lee KC (2014) An introduction to the septal extension graft. Arch Plast Surg 41:29–34
14. Paik MH, Chu LS (2014) Correction of short nose deformity using a septal extension graft combined with a derotation graft. Arch Plast Surg 41:12–18
15. Regalado-Briz A (2005) Cephalo-crural suture: a new way to deal with supratip fullness. Aesthet Surg J 25:481–488