Correction of Alar Retraction Based on Frontal Classification

Jae Hoon Kim, MD, PhD¹ Jin Woo Song, MD¹ Sung Wan Park, MD¹ Erica Bartlett, MD¹
Anh H. Nguyen, MD²

¹April 31 Plastic Surgery Clinic, Seoul, Korea

²Division of Plastic Surgery, Baylor College of Medicine, Houston, Texas

Address for correspondence: Jae Hoon Kim, MD, PhD, April 31 Plastic Surgery Clinic, 6th floor, Geonwoo B/D, Gangnam-daero 548, Gangnam-gu, Seoul 135-010, Korea (e-mail: april31kjh@naver.com).

Semin Plast Surg 2015;29:278–285.

Abstract

Keywords

- alar retraction
- alar spreader graft
- cartilage graft
- nasal hinge

Among the various types of alar deformations in Asians, alar retraction not only has the highest occurrence rate, but is also very complicated to treat because the ala is supported only by cartilage and its soft tissue envelope cannot be easily stretched. As patients' knowledge of aesthetic procedures is becoming more extensive due to increased information dissemination through various media, doctors must give more accurate, logical explanations of the procedures to be performed and their anticipated results, with an emphasis on relevant anatomical features, accurate diagnoses, detailed classifications, and various appropriate methods of surgery.

As secondary surgeries have increased based on an increasing number of rhinoplasties, types of alar deformation are also becoming more varied because scar tissue contracture is hard to predict. Hence, there are limits in the description of various forms of alar retraction appearing in secondary cases based only on Gunter's classification of "alar-columellar discrepancies from side view."^{1,2} Actually, cases of alar retraction with alar notching seen only from the frontal view and not from the side view are quite common. Patients with such alar retractions frequently complain about the alar retraction being visible from the frontal view. Many Asian patients especially wish to have a secondary surgery due to the development of a contracture after placement of allogenic implant; these patients often complain of the alar retraction originating from the notch of the weak triangle. Therefore, we classify alar retraction into a medial type, a central type, and a lateral type according to the visual identification of alar notching from the frontal view, which is related to the spread of lateral crus of alar cartilage. Inspired by aspects of Gunter's classification, our classification system provides a varied and detailed classification of alar retraction before surgery. Using this classification, a more thorough surgical plan can be created, and postsurgical results predicted.

Diagnosis

The ideal alar-columellar relationship is when the highest point of the alar rim is located in the middle of the distance between the columellar-lobular angle and the tip-defining point; this relationship works the same for the frontal view as well.¹ Although the 2-mm distance between the nostril long axis and the alar rim is considered normal from the side view, it may not appear so for both the side and frontal views in cases of iatrogenic alar retraction. There are scenarios where the existence of alar retraction is not seen from the side view, but obvious alar notching with clear cephalic orientation of the lateral crus can be seen in the frontal view. When such cases are classified according to Gunter's classification, they are classified as a normal relationship (► Fig. 1).

When in the frontal view of the head's natural position the alar rim's location was higher than the horizontal line crossing the middle of the distance between the tip-defining point and the columellar-lobular angle, we classified this as alar notching. Next, we drew a hypothetical midline crossing the tip-defining point vertically and a horizontal line crossing the middle of the vertical line touching the alar groove. When notching was located on the inner side of the hypothetical line, it was classified as alar retraction (AR) type 1—medial

Fig. 1 (A) In the lateral view, this case does not comply with Gunter's definition of alar retraction. (B) In the frontal view, alar notching was noted on the right side.

Fig. 2 The frontal classification of alar retraction (AR). According to the position of alar notching, alar retraction was classified into AR type 1 (medial type), AR type 2 (central type), and AR type 3 (lateral type).

type; in the middle as AR type 2—central type; when it was located on the outer side of the hypothetical line, it was classified as AR type 3—lateral type (→Fig. 2).

Surgical Correction

There are a variety of surgical indications and options for the correction of alar retraction. The alar contour graft is very effective for mild-to-moderate alar retraction or col-

lapse. The alar spreader graft, lateral crural strut graft, and alar extension graft are appropriate for moderate-to-severe alar retraction or collapse. Composite grafting is indicated for more complex deformities with skin loss or lining deficiency.³

Using the frontal classification, more detailed surgical plans could be created and the postsurgical results could be predicted. The AR types 1 and 2 are influenced by the pinch, collapse, or damage of the lateral crus of the alar cartilage.

Fig. 3 (A) Illustration demonstrating placement of an alar contour graft. (B) An alar contour graft is inserted into the vestibular skin pocket in the form of a finger-in-groove.

Fig. 4 (A) Schematic diagram of the alar spreader graft: Complete release of the nasal hinge (dotted line); the vector of the lateral crus, which is spread by the alar spreader graft (arrows); and the pivot point (dark oval) to prevent derotation of the tip of the nose due to lateralization and caudal mobilization, and to prevent further lengthening of the nose and/or creation of a hanging columella. (B) Photograph showing an alar spreader graft.

Overmedialization of the lateral crus due to scar tissue contracture, overresection, or inappropriate suturing of the lateral crus of the alar cartilage from previous surgery is a frequent cause in acquired cases. Sometimes this collapse is exaggerated by a fixed strut such as a septal extension strut. Especially in Asians, alar notching linked to scar contracture caused by allogenic implants is quite common. Therefore, lateralization—by spreading the lateral crus opposite its cause—would restore it to its original form. An alar spreader graft is a very effective method for correcting it; in practice, most AR type 1 cases have shown good results with the alar spreader graft alone. However, for AR type 3, which appears in a number of congenital cases, the application of only an alar spreader graft has limits because of the lack of soft tissue. Additional direct stretch for deficient alar rim tissues in the form of a composite graft, an alar contour graft, and alar extension graft should be performed; an additional alar base resection may be needed.^{1,4} Predicting results in such cases is difficult and informing patients of these additional possibilities before surgery leads to a much better surgeon–patient relationship. Further research to develop management strategies for alar retraction is warranted.²

Alar Contour Graft

This method is commonly applied because it is simple yet effective. Both open and closed approaches can be used exclusively in performing this technique, and a strip of cartilage is inserted in the pocket of the alar rim (►Fig. 3). Any type of cartilage is allowed; however, septal cartilage is mainly applied. Even though the alar contour graft is placed in a nonanatomical position where there is ordinarily no cartilage, it works empirically to improve and effectively correct mild-to-moderate cases of alar retraction.^{3,5} It may even give better results than expected because this method is significantly influenced by the extensibility of the alar rim tissue itself.

Alar Spreader Graft

The alar spreader graft has been used to correct a pinched tip deformity caused by excessive tip surgery for tip definition or cephalic resection of the lateral crus in a lateral crural-spanning suture.^{5,6} It also is effective for correcting overmedialization of the lateral crus, which is one of the main reasons for alar retraction. Alar spreader grafts very effectively correct alar retraction with an upturned tip if

Fig. 5 Conchal cartilage has been shaped into spreader graft (white arrow) and alar extension graft (dark arrow). (A) Frontal and (B) oblique views.

Fig. 6 (A) Composite graft has been harvested to make the skin island of the composite graft slightly smaller than the cartilage portion of the graft. Photographs demonstrate a composite graft (arrow) used in a secondary cleft lip nasal deformity case. (B) Frontal and (C) basal views.

Fig. 7 (A,B) Illustration demonstrating placement of an intercartilaginous graft (C). The intercartilaginous graft (white arrow) is inserted between the upper lateral cartilage and the lateral crus element.

used together with caudal rotation because the scroll area and nasal hinge also need to be released to address the upturned tip.⁷⁻¹¹ Complete release of the nasal hinge, lateralization of the whole lateral crus, and caudal

mobilization must precede alar spreader graft placement to correct alar retraction (►Fig. 4).

There may be some concerns about an extensive release of the tip-supporting structure in light of the potential for tip-

projection loss due to damage to the structure's inherent integrity. However, any tip-projection loss created as a result of this process was very slight based on follow-up results. These results are assumed to result from the fact that once the nasal cartilaginous framework has been solidly splinted through the healing process, the thick Asian skin contributes to nasal tip structure maintenance, as if it has a shape memory effect. Thus, the skin flap plays a role in the maintenance of the nasal tip projection, even after extensive dissection.⁷

However, in cases coupled with a drooping tip or hanging columella, a septal extension strut, a fixed columellar strut, or a columellar–septal suture should be applied as a pivot point because the lateral crus must be spread while it is fixed to avoid caudal rotation of the tip or worsening of the drooping tip and hanging columella.²

The alar spreader graft is appropriate for moderate-to-severe alar retraction.³ It is especially more effective for AR

type 1. It also has the advantage of correcting both an upturned and a pinched nose at the same time, but it has a tendency to create a bulbous tip from spreading of the alar cartilage.

Lateral Crural Strut Graft

The lateral crural strut graft as described by Gunter and Friedman¹² employs an autogenous cartilage graft placed between the inner surface of the lateral crus and the vestibular skin. The strut measures 3 to 4 mm in width and 5 to 25 mm in length. The lateral end of the strut extends to the pyriform rim and is positioned caudal to the alar groove and the accessory cartilages. This can be used for both alar rim retraction and lateral crural malposition. This technique is an effective method for moving the entire nostril base in a caudal direction.

However, considering the drawbacks—a complicated and time-consuming process, severe postoperative edema, and

Fig. 8 A 29-year-old woman with alar retraction (AR) type 1 on the right side. She underwent an alar spreader graft using conchal cartilage. Preoperative (*left*) and 10-month postoperative (*right*) photographs after a secondary rhinoplasty.

worsening of alar flare—this method is not recommended for focal alar retraction.

Alar Extension Graft

With the alar extension graft, an autogenous cartilage graft is applied on the caudal side of the alar cartilage in the batten form to correct alar retraction (►Fig. 5).¹³ The conchal cartilage is ideal for Asians because Asians have a relatively rounder alar rim curvature compared with Caucasians. To prepare the recipient site for graft, it is necessary to undermine the vestibular skin pocket wider so that the graft is placed on the caudal-most margin of the alar rim.

The alar extension graft can be effectively applied to correct moderate-to-severe alar retraction that falls into AR types 2 and 3 based on our frontal classification.

Composite Graft

Composite grafts using conchal cartilage have been well documented for the reconstruction of multilaminar alar rim defects. Composite grafting may be required for alar deformities and retractions with severe scarring or lining and skin limitations.³ This method is considered as the only alternative in effective alar retraction correction. However, it is hard to correct both sides symmetrically because the level of composite graft resorption is hard to predict.^{14,15} Additionally, hypertrophic scar formation is a frequent and critical drawback to this approach.¹⁶

If the retraction is more severe and a composite graft larger than 1 cm is used, it is advisable to make the skin island of the composite graft slightly smaller than the cartilage portion of the graft. This will allow the mucosal suture line to overlap onto the perichondrium of the cartilage. This overlap allows

Fig. 9 A 56-year-old woman with alar retraction (AR) type 2. She underwent an alar spreader graft and bilateral alar extension grafts using conchal cartilage. Preoperative (*left*) and 3-month postoperative (*right*) photographs after a secondary rhinoplasty.

more rapid vascular ingrowth into the graft and improves graft survival (►Fig. 6).¹⁷

Intercartilaginous Graft

The intercartilaginous graft is a modification of the lateral crural strut graft. This technique promotes maximum soft tissue release to insert a cartilaginous graft that spans the gap between the upper lateral and the lateral crus element (►Fig. 7). The graft is inserted under slight tension to maintain maximal lengthening of the sidewall of the nose. This method is effective for correcting moderate-to-severe alar retraction and prevents alar retraction after lengthening of an extreme short nose. Contraindications to the intercartilaginous graft technique are cases where there is an insufficient lateral crus element or skin.¹⁸

Conclusion

Because alar retraction is a challenge to correct, various surgical methods should be acquired and applied. The alar portion has the thickest skin and is not supported by cartilage. In order to extend the ala, consideration should be given not only to the extension of the nasal tip and alar cartilage. The extensibility of the nasal mucosa and the alar rim soft tissue is considered along with the tip relationship columella and alar base width as well. All of these layers and factors add predictability to the planned change.

The frontal classification of alar retraction is very useful in choosing a suitable surgical method. As alar notching is located closer to the medial side (AR type 1), it is influenced significantly by the angle of the lateral crus of the alar cartilage and has a good

Fig. 10 A 34-year-old woman with alar retraction (AR) type 3 on the right side and AR type 2 on the left side. She underwent an alar spreader graft and bilateral alar extension grafts using the 10th costal cartilage. Preoperative (*left*) and 3-month postoperative (*right*) photographs after a secondary rhinoplasty.

prognosis. Correction with an alar spreader graft or an alar extension graft is very effective in these cases (►Figs. 8–10). However, when alar notching is located closer to the lateral side (AR type 3), it is less influenced by alar cartilage and has a less favorable prognosis. In these cases, an alar base reduction may hide the lateral deficient portion, or, alternatively, an alar contour graft can compensate for deficient soft tissues. Also, a composite graft or V-Y advancement flap can be combined to directly compensate for deficient soft tissues.

References

- Gunter JP, Rohrich RJ, Friedman RM. Classification and correction of alar-columellar discrepancies in rhinoplasty. *Plast Reconstr Surg* 1996;97(3):643–648
- Kim JH, Park SW, Oh WS, Lee JH. New classification for correction of alar retraction using the alar spreader graft. *Aesthetic Plast Surg* 2012;36(4):832–841
- Rohrich RJ, Raniere J Jr, Ha RY. The alar contour graft: correction and prevention of alar rim deformities in rhinoplasty. *Plast Reconstr Surg* 2002;109(7):2495–2505, discussion 2506–2508
- Sheen JH. *Aesthetic rhinoplasty*. St. Louis, MO: CV Mosby; 1987: 264–265
- Tebbetts JB. Alar spreader or lateral crural spanning graft? Some additional observations. *Plast Reconstr Surg* 1993;92(2):366–368
- Gunter JP, Rohrich RJ. Correction of the pinched nasal tip with alar spreader grafts. *Plast Reconstr Surg* 1992;90(5):821–829
- Kim JH, Song JW, Park SW, Oh WS, Lee JH. Tip extension suture: a new tool tailored for Asian rhinoplasty. *Plast Reconstr Surg* 2014; 134(5):907–916
- Rohrich RJ, Hoxworth RE, Thornton JF, Pessa JE. The pyriform ligament. *Plast Reconstr Surg* 2008;121(1):277–281
- Adamson PA, Morrow TA. The nasal hinge. *Otolaryngol Head Neck Surg* 1994;111(3 Pt 1):219–231
- Han SK, Ko HW, Lee DY, Kim WK. The effect of releasing tip-supporting structures in short-nose correction. *Ann Plast Surg* 2005;54(4):375–378
- Kim JH, Oh WS, Park SW, Kim KH. Various surgical procedures in the scale of upturned nose. *J Korean Soc Aesthetic Plast Surg* 2010; 16(1):21–34
- Gunter JP, Friedman RM. Lateral crural strut graft: technique and clinical applications in rhinoplasty. *Plast Reconstr Surg* 1997; 99(4):943–952, discussion 953–955
- Kim HS, Roh SG. The alar extension graft for retracted ala. *J Korean Soc Plast Reconstr Surg* 2009;36(1):66–74
- Hirohi T, Yoshimura K. Surgical correction of retracted nostril rim with auricular composite grafts and anchoring suspension. *Aesthetic Plast Surg* 2003;27(5):418–422
- Constantian MB. Indications and use of composite grafts in 100 consecutive secondary and tertiary rhinoplasty patients: introduction of the axial orientation. *Plast Reconstr Surg* 2002;110(4): 1116–1133
- Kamer FM, McQuown SA. Minicomposite graft for nasal alar revision. *Arch Otolaryngol Head Neck Surg* 1987;113(9): 943–949
- Sclafani AP. Rhinoplasty: The experts' reference. In: Losquadro WD, Bared A, Toriumi DM eds. *Correction of the Retracted Alar Base*. New York: Thieme Medical Publishers; 2015: 345–351
- Gruber RP, Kryger G, Chang D. The intercartilaginous graft for actual and potential alar retraction. *Plast Reconstr Surg* 2008; 121(5):288e–296e