Correction of the Retracted Alar Base

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Abstract

Alar base retraction is a common yet difficult problem faced by the rhinoplasty surgeon. It may be caused by weakened, overresected lateral crura, vestibular lining deficiencies, or congenital alar malpositioning. Methods of correction include soft tissue manipulation, auricular composite grafting, and cartilage grafting. We present the senior author's graded approach to alar retraction using auricular composite grafting, alar rim grafting, and lateral crural strut graft placement with caudal lateral crural repositioning.

Keywords

- rhinoplasty
- alar retraction
- lateral crural strut graft
- composite graft

Alar base retraction is a common yet difficult problem faced by the rhinoplasty surgeon. It may be caused by weakened, overresected lateral crura, vestibular lining deficiencies, or congenital alar malpositioning. Retracted alae can mar both the frontal and lateral view by causing excessive nostril show and an abnormal, snarled appearance. This unnatural look is bothersome to many patients, and they will frequently seek revision surgery to correct it.

No universally accepted technique exists to correct alar retraction. Broadly speaking, methods of correction include soft tissue manipulation, auricular composite grafting, and cartilage grafting. Guyuron described vestibular V-Y advancement flaps to correct alar retraction and the alar concavity seen on the base view.[1] Jung and colleagues described a cutaneous alar rotation flap combined with conventional batten grafts for cases of severe retraction.[2]

Auricular composite grafts have been utilized for many years for correction of short noses.[3] Many authors have described composite graft placement in various orientations within the nasal vestibule. Regardless of where within the vestibule the graft is sutured, the goal is the same—to expand the vestibular lining and move the ala caudally.

The design and placement of cartilage grafts to correct alar retraction have been more variable. Alar rim grafts have been used by various authors to correct mild deformities. Gunter and Friedman described lateral crural strut graft placement and lateral crural repositioning to correct alar retraction.[4] Naficy and Baker described an interposition graft wedged between the upper and lower lateral cartilages to lengthen a short nose.[5] Gruber and colleagues utilized a similar graft termed an *intercartilaginous graft* to correct or prevent alar retraction.[6]

Diagnosis

The alae are curving, three-dimensional structures that must be analyzed from the frontal, lateral, and basal views to fully comprehend their anatomy. The ideal alar-columellar relationship on the frontal and lateral views was described by Gunter and colleagues.[7] On the frontal view, the vertical distances from the highest point of the alar rim to the tip-defining points and columellar-tip lobular angle should be equal (►**Fig. 1**). This relationship is easier to appreciate on the lateral view, where the distance from the highest point of the alar rim drawn perpendicularly to the columella should be ~2 to 4 mm (►**Fig. 2**). A useful, related concept when analyzing the frontal view is the alar-columellar contour. A line tracing the alar rims around the infratip lobule should approximate a gentle V or "gull in flight"; exaggeration of this contour suggests alar retraction, a hanging columella, or both. Guyuron further described alar anatomy on the basal view.[1] The ideal nasal base should fit within an equilateral triangle, and thus the alar rims should be relatively straight. Weak or excessively thick alae will be too concave or convex, respectively, and fall outside this imagined triangle.

A common cause of alar retraction is weakened lateral crura from prior rhinoplasty (►**Fig. 3**). Overaggressive cephalic trimming of the lateral crura was commonly used to

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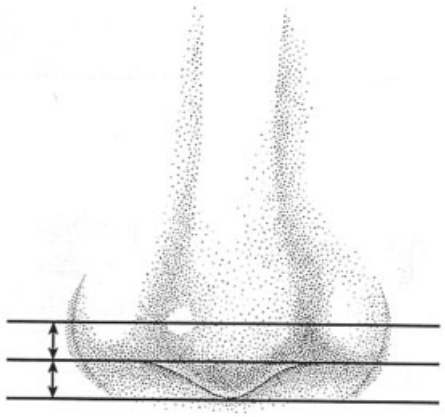

Figure 1 Alar-columellar relationship on frontal view; vertical distance between columella lobular angle and the tip-defining points is divided in half by a horizontal line drawn through the highest point of both alar rims. (From Gunter JP, Friedman RM. Lateral crural strut graft: technique and clinical applications in rhinoplasty. Plast Reconstr Surg 1997;99:943–952.[4])

decrease tip bulbosity during traditional endonasal rhinoplasty, although overresection can certainly be accomplished via the external approach. The relentless forces of scar contracture will narrow the cartilaginous void between the upper lateral cartilage and remaining lateral crus, and the ala can retract over time if its intrinsic strength is insufficient to counteract these forces. Patients will notice slowly increasing nostril show on the frontal view. This condition may be exacerbated by excessive tip rotation via an analogous process

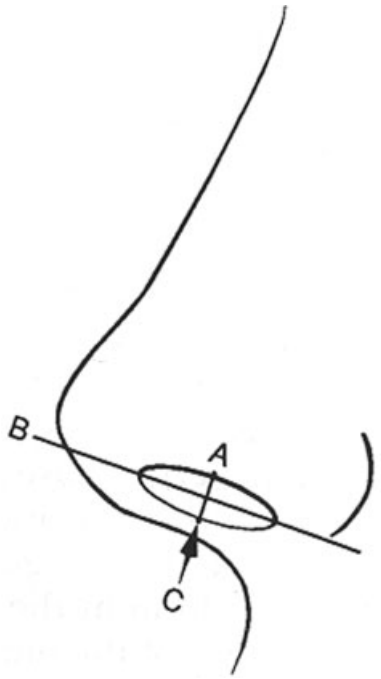

Figure 2 Alar-columellar relationship on lateral view showing distance from axis B to A should equal distance from axis B to C. (From Gunter JP, Friedman RM. Lateral crural strut graft: technique and clinical applications in rhinoplasty. Plast Reconstr Surg 1997;99:943–952.[4])

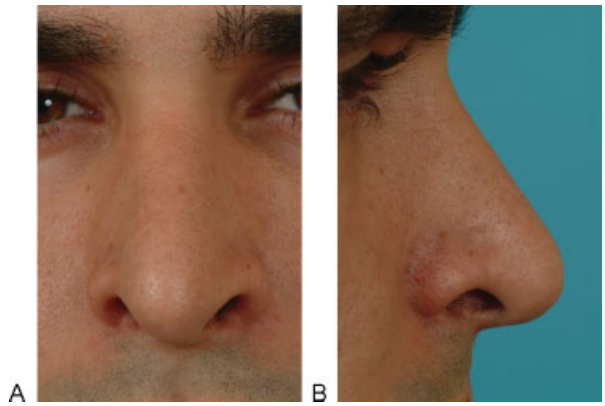

Figure 3 Close-up frontal view (A) and lateral view (B) of a patient with bilateral alar retraction as a complication of previous rhinoplasty.

(scar contracture between the medial crura and septum after resection of the anterior septal angle; ►**Fig. 4**).

Alar retraction may also be caused by soft tissue deficiencies. Primary closure of nasal Mohs defects may pull the alar rim cephalad. Similarly, local flap reconstruction of defects with a bilobed flap often retracts one or both nostrils. This anatomic distortion tends to slowly abate as the skin stretches, but oversized defects or undersized flaps may leave permanent deformities.

Vestibular lining defects are frequent secondary causes of alar retraction. Lining defects may be due to skin cancer resection, previous rhinoplasty, or necrosis from cocaine abuse or environmental toxins. Secondary intention healing of lining defects can pull alar rims upward. Scar contracture from deliberate mucosal resection or poorly closed marginal or intercartilaginous incisions will produce the same effect.

Figure 4 Frontal view of patient with (after rhinoplasty) excessive tip rotation exacerbating nostril show.

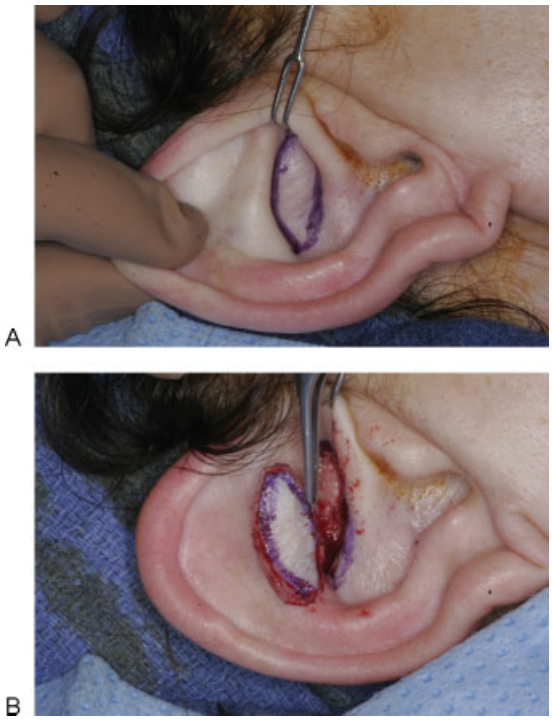

Figure 5 (A) Composite graft harvested from cymba concha of the right ear. (B) Composite graft harvested.

Finally, cocaine abuse results in diffuse mucosal necrosis that may result in alar retraction and vestibular stenosis.

A final cause of alar base retraction is the patient's native anatomy. Some patients have primary alar retraction secondary to weak, cephalically malpositioned lateral crura or variant soft tissue anatomy. A hanging columella will exacerbate the severity of alar retraction by causing excessive columellar show on the lateral view. Shortening the nose and rotating the tip will lessen the need to pull the ala caudally. Lengthening a short nose in the central compartment (columella and tip) without bringing down the ala to complement the position of the central compartment can result in alar retraction as well.

Knowledge of prior rhinoplasty or Mohs reconstruction is important during the patient consultation. A history of cocaine abuse will alert the surgeon to a contracted vestibular lining contributing to the alar retraction. Inspection of the alar anatomy on the frontal, lateral, and base views is imperative. Photographs may better demonstrate irregularities because proper lighting provides better contrast between convexities and concavities. Photographic analysis also helps describe abnormalities to patients. Palpation of the ala is very important. Pulling the ala caudally allows assessment of the severity of scarring and the amount of possible movement. A fixed, scarred ala may not permit lowering, and the patient needs to be counseled that minimal improvement should be expected. Additionally, congenitally retracted ala are more difficult to correct as the soft tissue envelope itself may be limited and not allow significant correction of the retraction. Intranasal examination should look for vestibular scars and webs. This often indicates a lack of nasal lining, and the patient should be counseled that auricular composite grafting may be necessary.

Figure 6 Composite graft placed into the defect at the marginal incision prior to suturing the graft.

Treatment

The method chosen to correct alar base retraction is determined by the retraction's cause and severity, and the following represents the senior author's graded approach. When a deficiency in vestibular lining causes the retraction, auricular composite grafting will be necessary with or without lateral crural repositioning. With regard to severity, mild, focal retractions may be corrected with auricular composite grafting or alar rim grafting. Moderate to severe deformities require lateral crural strut grafting and repositioning with or without composite grafting to close intranasal vestibular skin deficiencies. Correction of concomitant nasal deformities such as a hanging columella will permit less caudal alar movement to balance overall tip aesthetics.

Minor cases of alar retraction may be treated with auricular composite grafts sutured into the nasal vestibule. Grafts can be excised from the cymba concha in an elliptical fashion, although the entire conchal bowl may be resected if a large graft is necessary (►**Figs. 5A** and **5B**). A marginal incision is made within the vestibular mucosa parallel to the area of greatest retraction. The pocket is dissected to allow the alar margin to move caudally. The graft is then placed into the pocket (►**Fig. 6**) and sewn into the defect using 5–0 chromic gut sutures. 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 more rapid vascular ingrowth into the graft and will improve graft survival. Small auricular defects may be closed primarily; larger defects require full-thickness skin grafting to prevent auricular distortion, and the postauricular crease is an excellent donor site for the skin graft. After closing the postauricular incision primarily, a cotton bolster covered in antibiotic ointment is sutured transauricularly with 3–0 nylon. The bolster remains in place for approximately 2 weeks to prevent hematoma formation and promote graft take.

Alar rims move only a finite distance with composite grafting, so restraint is advised in cases of severe retraction.

Figure 7 Oblique view of patient with an exposed composite graft pushing vestibular skin below the nostril margin. Note the double alar rim appearance and the external growth of the vibrissae.

Overly large grafts will roll the nasal lining out of the vestibule and create the odd appearance of a double alar rim (►**Fig. 7**). The vibrissae will continue to grow externally and necessitate constant attention.

Minor cases of retraction may sometimes be addressed with alar rim grafts. These thin, needle-shaped grafts are inserted into a pocket dissected caudal to the marginal incision at the true alar rim (►**Fig. 8**). The grafts are secured with a single 6–0 Monocryl suture. Alar rim grafts also serve to preserve the tip-alar highlight and maintain the ideal, straight rim contour on the base view.

The senior author now employs a technique similar to that described by Gunter and Friedman of lateral crural strut grafting and caudal repositioning of the lateral crura for moderate to severe alar retraction.[4] This technique is an effective means of moving the entire nostril base in a caudal direction. This method is not recommended for focal alar retraction. In most cases, the lateral crura are dissected free from the underlying vestibular mucosa (►**Fig. 9**). The mucosa can be very adherent, so injection and hydraulic dissection with local anesthetic facilitate the dissection. The injection will

Figure 8 Alar rim graft. A narrow and tight pocket is created just caudal to the marginal incision and a thin strip of cartilage is placed and secured.

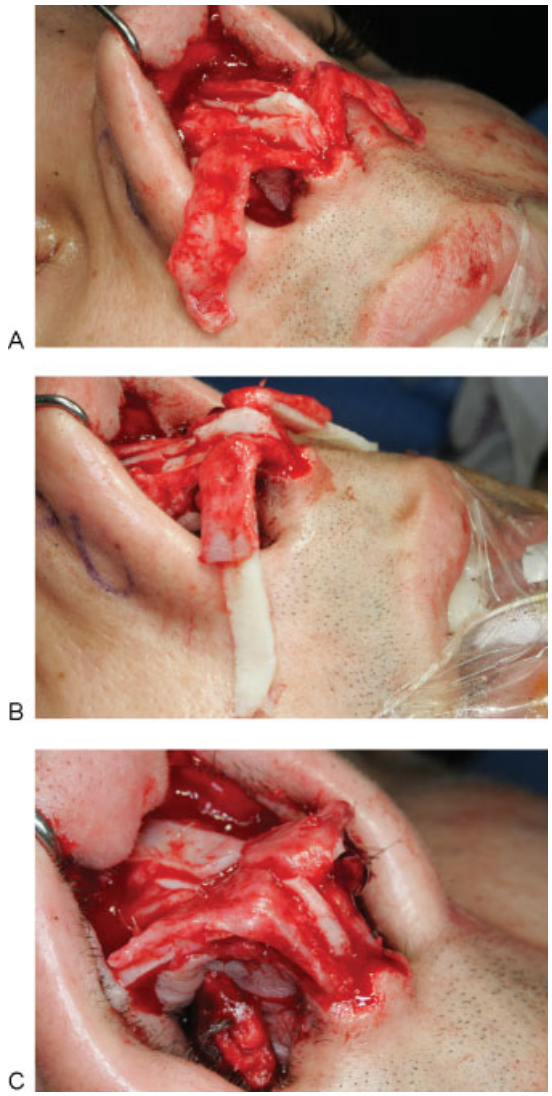

Figure 9 (A) The lower lateral crura are dissected free from the vestibular skin. (B) Lateral crural strut grafts are sutured onto the undersurface of the freely dissected lower lateral cartilages. (C) Pockets are dissected laterally and their position depends on the extent of caudal repositioning needed to correct the alar retraction. The dissected lateral crura/lateral crural strut complex is placed into the caudally positioned pockets.

sometimes permit blunt dissection from medial to laterally. The lateral crus can be divided near its attachment with the sesamoid cartilages; it is not necessary to remove all remaining pieces laterally. Lateral crural strut grafts are fashioned from septal or rib cartilage; auricular cartilage is often insufficient for this technique because its weakness necessitates thicker grafts. Graft dimensions are ~25 mm to 30 × 5 × 1.5 mm; stronger rib cartilage may be carved thinner than septal cartilage. It is imperative that the lateral crural strut graft be curved with the concave side of the graft placed medially to allow preservation of the nasal airway. The graft is sutured to the underside of the lateral crura remnants using 5–0 polydioxanne (PDS) tied on the cutaneous side ; knots on the vestibular side may erode through the thin vestibular mucosa.

A new pocket is then dissected caudally to the lateral crura's original position. The dissection is angled toward the

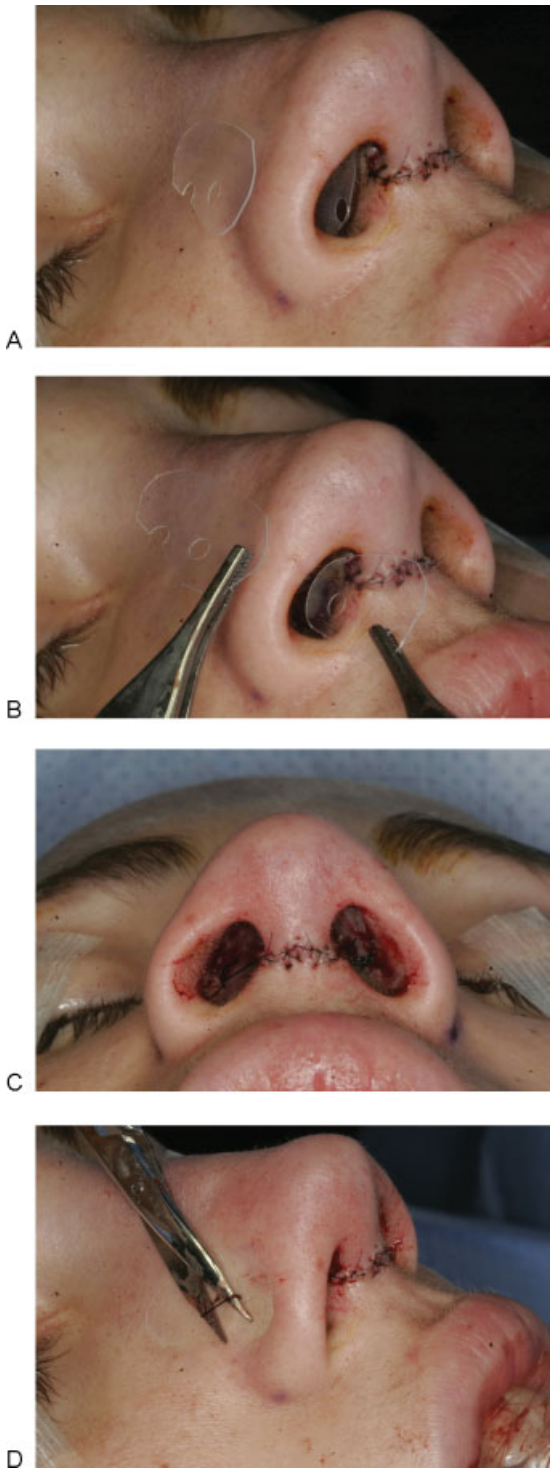

Figure 10 Lateral wall splints are applied to the nasal sidewalls to preserve position of the lateral crural strut grafts. (A) Splints cut. (B) Splints placed. (C) Splints sutured in place. (D) Suture loosened to avoid vascular compromise.

alar crease, and the pocket is dissected between the vestibular mucosa and soft tissue–skin envelope. Bleeding from the lateral nasal vessels is frequently encountered and stops spontaneously. The pocket's position varies depending upon the distance the ala needs to be moved. If one ala is higher than the other, the pocket is made more caudal on the side with the higher ala. The lateral crural strut graft is gently inserted into the pocket; brittle, calcified rib grafts may fracture and require replacement.

In addition to the caudal alar movement, lateral crura repositioning supports the airway and improves tip aesthetics. Weakened, malpositioned lateral crura often cause alar retraction; lateral crura strut grafts widen the vestibular airway, resist dynamic inspiratory collapse, and correct supra-alar pinching. The strut also flattens large, bulbous lower lateral cartilages and decreases tip bulbosity when correction is resistant to dome-binding sutures alone. Repositioning the lateral crura caudally also moves volume from the supratip to caudal tip. This prevents shadows from isolating the tip by maintaining the tip-alar highlight. The marginal incision requires inspection after caudal repositioning. A mucosal gap may exist in patients with preoperative lining deficiencies or in those who have undergone nasal lengthening. If a test suture retracts the alar rim, the vestibular lining is unlikely to stretch postoperatively, and the retraction will persist. Placement of an auricular composite graft will expand the vestibular lining and preserve the newly created alar contour (►**Fig. 6**).

Lateral nasal wall splints will help prevent graft displacement and sidewall thickening after lateral crural repositioning. Thin, 0.25-mm, fluoroplastic septal splints are cut, placed both intranasally and externally, and secured with a single transnasal 3–0 nylon suture (►**Fig. 10**). The knot should not be tied very tightly as this can, in rare instances, cause localized skin necrosis. The suture can be loosened by placing a scissor under the suture. Swabbing povidone-iodine antiseptic beneath the splints helps prevent comedone formation. The nose can be taped and casted in the regular manner, and the splints removed during suture and cast removal.

Lateral crural grafting is a very effective method of treating alar and nostril retraction (►**Figs. 11** and **12**). Disadvantages of lateral crural strut grafting and caudal repositioning include increased complexity, postoperative edema, and tip width/alar flare. Dissecting the lateral crura free, placing lateral crural strut grafts, and repositioning them in more caudal pockets takes time and introduces a substantial amount of variability. This complex technique should be reserved for more severe cases of alar retraction and should be performed with great caution to avoid creating deformity. Graft placement into tissue previously devoid of cartilage combined with injury to lateral nasal vessels may contribute to more postoperative edema. Last, caudal repositioning can widen the alar base and cause a substantial amount of alar flare. The flare can often be corrected with base excisions. The overall alar contour and preoperative nostril size will dictate whether internal or external base excisions should be utilized. Forgoing excisions when their need is questionable is prudent; it may be performed in the future if necessary.

Conclusion

Alar base retraction is a commonly encountered problem in revision rhinoplasty. Various authors have advocated soft tissue techniques, auricular composite grafting, and assorted cartilage

Figure 11 Patient with severe alar retraction after rhinoplasty. Lateral crural strut grafting with caudal repositioning was used to correct the retraction. (A, C, E, and G) Preoperative views. (B, D, F, and H) Postoperative views. Note correction of severe alar retraction with symmetric nostrils postoperatively.

Figure 12 Patient with severe alar retraction after rhinoplasty. She also has a prominent infratip lobule on frontal view. Lateral crural strut grafting with caudal repositioning was used to correct the alar retraction. The columella was elevated as well to help correct the hanging tip lobule. (A, C, E, and G) Preoperative views. (B, D, F, and H) Postoperative views. Note correction of severe alar retraction and nasal tip deformity. Postoperative frontal view shows improvement of the prominent nasal tip lobule.

grafts to lower the retracted alar rim. The senior author's algorithm for repairing alar retraction includes auricular composite or alar rim grafting for small, focal retractions and lateral crural strut grafting with caudal repositioning for more severe cases of alar retraction. Caudal repositioning is a powerful technique for lowering the alar rim and nostril base and recreating aesthetic alar base contours.

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