

Inferiorly Based Alar Groove Flap for Correction of Alar Base Malposition and Nasal Stenosis

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Summary: When the external nasal valve (ENV) is excessively narrow or lacks support, nasal obstruction can develop causing decreased airflow. Although cartilage grafts may support a collapsed nasal ala, addressing severe nasal stenosis requires further intervention. Techniques to move flared ala inward are well-known; however, repositioning a medially displaced alar base is less commonly described. Our surgical team developed an inferiorly based alar groove flap to achieve lateral movement of a malpositioned alar base, with goals of widening the ENV and improving nasal symmetry and cosmesis. A retrospective chart review was performed on a series of five patients over a two-year period. Charts were reviewed for demographic data, medical and surgical history, functional airway complaints, and subjective aesthetic concerns. All patients presented with unilateral ENV collapse, alar base malposition, and nostril asymmetry. Our operative method consisted of repositioning the affected alar base laterally and inferiorly to alleviate nostril stenosis and using an alar rim graft to support the ENV. Postoperatively, all patients demonstrated immediate alleviation of subjective nasal obstruction and improvement in size of ENV aperture, nostril symmetry, and overall cosmesis. Four patients showed lasting postoperative results. One patient experienced restenosis by 4 months and required revision. Our inferiorly based alar groove flap provides a reproducible solution for repositioning a medially displaced alar base. This technique reliably corrects ENV stenosis, relieves airway obstruction, and improves nasal symmetry and cosmesis. (*Plast Reconstr Surg Glob Open* 2022;10:e4334; doi: 10.1097/GOX.0000000000004334; Published online 18 May 2022.)

INTRODUCTION

The nose is arguably the most prominent feature of the face and serves important roles both functionally and aesthetically. The internal nasal valve and external nasal valves (ENVs) are the narrowest portions of the airway.^{1,2} Pathologic limitations in either of these structures can cause significant functional consequences. Dysfunction of the ENV occurs when the ENV

is narrowed or the lateral wall lacks support, which can be secondary to congenital cleft deformity, previous rhinoplasty, or trauma. Correction of this requires either increasing the size of the ENV aperture or strengthening the lateral wall, respectively.¹ Although cartilage grafts may be used to support collapsed nasal ala,^{1,3} addressing nostrils with severe stenosis requires further intervention. Weir incisions are a well-described technique used to move flared nostrils inward. However, repositioning a medially displaced alar base is less commonly described.^{4,5}

This case series presents patients with alar base malposition and ENV collapse resulting in significant airway obstruction. To address this complex nasal deformity, our surgical team designed an inferiorly based flap from the alar groove to facilitate lateral repositioning of the alar base and alleviate nasal stenosis. Our technique also employs alar rim grafts using auricular cartilage to provide alar support.

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Index Case and Flap Design

The first patient in our series was an 18-year-old woman with a prior surgical history of repaired unilateral cleft lip and palate and previous open rhinoplasty. She presented with severe unilateral nasal stenosis, medially displaced ala, and ENV collapse on the cleft side, resulting in nasal obstruction and aesthetic concerns (Fig. 1). Our operative goal was to correct these issues by repositioning the ala laterally and supporting it with a cartilage graft. However, previously described techniques would not be sufficient in her case due to the degree of movement required for repositioning of the alar base. Thus, our team designed a flap from the alar groove with an inferiorly based pedicle to address our patient's unique surgical needs.

METHODS

A retrospective chart review was performed on a series of five patients who have been followed by the Cleft and Craniofacial Team at Children's of Mississippi from May 2019 to October 2021. Charts were reviewed for demographic data, medical and surgical history, functional airway complaints, and subjective aesthetic concerns (Table 1). All patients had three fundamental problems that warranted correction: unilateral ENV collapse, alar base malposition, and nostril asymmetry. The operative goal consisted of expanding the stenosed nostril by repositioning the affected alar base laterally and inferiorly and correcting ENV collapse by using a cartilage alar rim graft for support.

Surgical Technique

In our technique, a crescentic flap is designed along the skin of the cheek in the alar-facial groove. The flap is based inferiorly and intended for medial transposition into the nasal sill. The width of the unaffected nostril is measured, including the nasal sill and ala, and reflected onto the affected side. The width of the flap is then determined by measuring the difference between



Fig. 1. Preoperative image of index patient demonstrating medialized right ala and right nostril stenosis with ENV collapse.

Takeaways

Question: How can we best surgically address medialized alar base malposition with nasal stenosis and ENV collapse to alleviate airway obstruction and improve symmetry and cosmesis?

Findings: An inferiorly based alar groove flap was designed to reposition the affected ala laterally while increasing the aperture size of the stenosed nostril using cartilage alar rim graft. Postoperatively, patients had alleviation of nasal obstruction and improvement in ENV aperture, nostril symmetry, and overall cosmesis.

Meaning: This innovative flap design provides a reproducible solution for correction of severely medialized alar base malposition with nasal stenosis.

the new proposed location and the lateral side of the affected ala (Fig. 2). (See Video 1 [online], which shows the flap design.) The flap and alar base are both incised, elevated, and transposed. The alar base is rotated laterally into its new inferolateral position, while the flap is rotated medially and inset into the nasal floor. (See Video 2 [online], which shows flap elevation and inset.) Next, auricular cartilage (or other cartilage graft) is harvested and inserted into a subcutaneous pocket developed in the alar rim to reinforce the ala and ultimately the ENV.

RESULTS

We treated five patients with this technique. Postoperatively, all patients had immediate improvement in ENV aperture size and alar support with alleviation of nasal obstruction. Nostril symmetry and overall cosmesis were also improved for each patient. Four patients had lasting postoperative results. One patient, who had a unique and more complex nasal deformity requiring columellar reconstruction at the index operation, experienced restenosis of the affected ENV by 4 months and required revision.

DISCUSSION

Literature on correction of stenotic nares is limited,^{4,5} but includes some of the following methods: W- and Z-plasties, full or partial thickness skin grafts, chondrocutaneous grafts, and nasolabial flaps.⁶⁻⁸ In one case series, Constantian uses a crescent-shaped local flap adjacent to the alar base to correct alar base malposition.⁴ However, his method describes an island flap that is rotated medially into the nasal defect after alar detachment and repositioning.⁴ This island flap, supplied by the lateral nasal arteries and other branches off the facial artery, theoretically poses a risk of devascularizing the nasal tip in patients with a history of open rhinoplasty. This in part led us to develop our inferiorly based flap.

A more recent study describes correction of alar stenosis with a para-alar flap.⁵ The authors also employ an inferiorly based flap to increase the size of the nasal floor. However, their flap design incorporates a lip revision into the repair. Additionally, their study does not address the secondary

Table 1. Patient Characteristics

Case	Age	Sex	Race	Pertinent Prior Medical History	Pertinent Prior Surgical History	Reconstruction	Complications	Follow-up Time (Mo)
1	18	F	White	Unilateral cleft lip and palate	Cleft lip & palate repair	Alar groove flap 2 × 1 cm	None	9
2	23	F	Black	Cleft nasal deformity secondary to necrotizing infection of palate and nasopharynx Severe septal deformity and columellar deficiency and right alar collapse Oronasal fistula	Surgically assisted rapid palatal expansion with distractor	Auricular cartilage graft to right ala Alar groove flap 3 × 3 cm Auricular cartilage graft to right ala	Restenosis at 4-month f/u Operative revision	7
3	7	M	Black	Unilateral cleft lip and palate	Cleft lip repair	Alar groove graft 1 × 1 cm	None	1
4	9	F	White	Cleft nasal deformity Bilateral cleft lip and palate Cleft nasal deformity	Cleft palate repair with bone graft Cleft lip & palate repair	Auricular cartilage graft to right ala Alar groove flap 2 × 1 cm Iliac crest cartilage graft to right ala (concurrent repair of alveolar cleft with iliac crest bone graft)	None	1
5	16	F	Black	Unilateral cleft lip and palate Cleft nasal deformity	Cleft lip and palate repair Tibial bone grafting to left alveolar cleft and Lefort I advancement Cleft septorhinoplasty Cleft lip revision with upper lip fat grafting	Alar groove flap 0.6 × 3 cm Auricular cartilage graft to left ala	None	1

problem of alar collapse, which is often seen in these cases. Thus, a notable difference in our technique is the use of a cartilage graft for alar support and correction of ENV collapse.

We describe an inferiorly based alar groove flap useful for alar base repositioning in the setting of a medially displaced ala. Our technique reliably corrects the stenosed ENV, relieves airway obstruction, and improves nasal symmetry and cosmesis. The correction is made via transposition of the flap from the upper lip-alar groove margin to the nasal floor. The alar base is placed in an inferolateral

position and the involved side of the lip may be elevated. If the ipsilateral side of the lip is inadvertently elevated, then consideration is made to perform a complete lip lift to avoid asymmetries. Additionally, in these severe cases of nostril stenosis, composite grafts may be used for alar support.⁴ The innovative nature of this flap is with its inferiorly based pedicle that allows easy and reproducible rotation for placement into the nasal floor. Additionally, the incisions do not extend cephalad to the alar groove, theoretically decreasing the risk to the lateral nasal vessels and allowing patients with a history of open rhinoplasty to be candidates for nasal stenosis repair. Of note, varying degrees of re-stenosis can be expected in patients

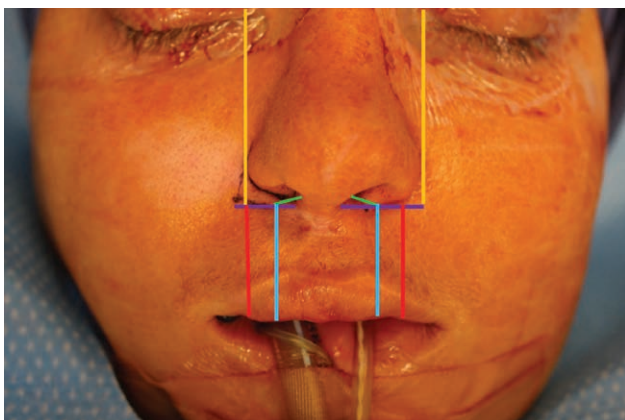


Fig. 2. Schematic of flap design and intraoperative measurements used to determine the new right-sided alar base position based off the contralateral side (yellow: original nasal base width; purple: new nasal base width; green: nasal sill width; blue: alar insertion height; red: mid alar base height). Marked flap design in alar groove.



Fig. 3. Postoperative image of index patient at 9-month follow-up.

undergoing this procedure. This limitation can be seen in the patient presented in [Figure 3](#) at her 9-month postoperative follow-up. To avoid this outcome, the authors recommend a prolonged period of nasal stenting to counter the effects of scar contracture.

There are limitations to our study, including small sample size, short follow-up period for results, and lack of objective measurements for pre- and postsurgery nasal obstruction data. However, we believe our flap has the potential to provide an easy and reproducible method to resolve this problem.

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PATIENT CONSENT

The patients provided written consent for the use of their images.

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