Paranasal Augmentation With Composite Graft Transfer in Overresection of Alar Base and Nostril Contracture

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Background: Many Asian patients desire a narrower nasal base with less flaring of the alar lobules. However, patients who underwent multiple rhinoplasty surgeries with nostril contracture or an overreduction of the alar base may experience nostril contracture and deformity, which may lead to further airway obstruction. We present a technique that combines paranasal augmentation with composite chondrocutaneous graft transfer to overcome this problem.

Methods: Nine patients underwent composite chondrocutaneous graft transfer to the soft triangle or alar base combined with paranasal augmentation using preshaped porous polyethylene implants to correct nostril contracture and airway obstruction between September of 2014 and May of 2018. Preoperative and postoperative alar base distances and cross-sectional areas of the nostrils were measured and compared.

Results: The average thickness of paranasal augmentation was 5.5 mm (range, 4.0–7.0 mm). Eighteen composite grafts were located over the soft triangle (n = 3) and the alar base (n = 15). The average number of composite grafts for each person was 2 (range, 1–4). All composite grafts survived totally or partially, and no graft failed. The average follow-up was 10.9 months (range, 3–28 months). The alar base increased 13.9% (range, 2.2%–23.9%), and the nostril area increased an average of 78.1% (range, 4.5%–316.8%) postoperatively. Patients had satisfactory aesthetic and functional outcomes.

Conclusions: Combining paranasal augmentation and composite graft transfer increased the cross-sectional area of the external valve and improved nostril contracture and airway obstruction after the overresection of the alar base or nose contracture after multiple rhinoplasty surgeries.

Key Words: alar reduction, nose contracture, composite graft, paranasal augmentation

(*Ann Plast Surg* 2021;86: 133–136)

Many Asian patients desire a narrower nasal base with less flaring of the alar lobules.[1–3] Therefore, alar reduction is a quite common procedure in Asia. However, an overestimation of the wedge size to be excised may occur and result in an overreduction of the alar base, which may lead to nostril deformity and further airway problems.[1–3] The contractured nose is also a unique entity that follows multiple rhinoplasty surgeries in Asian patients, who generally present with a short nose and severe scar contracture over the external valve, soft triangle, or alar base.[4,5] It may also lead to nostril contracture and breathing problems.

The use of composite chondrocutaneous grafts is quite common in reconstructive surgery to restore small full-thickness defects in the nasal valve, alar rim, soft triangle, columellar-lobular junction, or vestibular stenosis.[6–10] Our previous study on soft tissue changes after paranasal augmentation found that alar width and alar base width increased 4.84% ($P = 0.01$) and 7.66% ($P = 0.01$), respectively, after this procedure.[11] Although the widening of the alar base was generally considered an unfavorable effect in Asian populations, this effect may be helpful in patients with overresection of the alar base, scar contracture over the nostril, or airway obstruction problems.

Therefore, we proposed a simple method that combines composite chondrocutaneous graft transfer with paranasal augmentation to increase the alar base distance and cross-sectional area of the external valve and improve airway problems. Tear-drop nostril deformity may also be corrected. To our knowledge, this study is the first report to demonstrate the combination of these 2 procedures in patients with overreduction of the alar base or nostril contracture.

MATERIALS AND METHODS

This retrospective study was performed at the Chang Gung Memorial Hospital after obtaining approval from the institutional review board. Nine patients who underwent paranasal augmentation with composite graft for correction of nostril contracture and airway obstruction between September 2014 and May 2018 were included. Two of these patients were men, and 7 patients were women. The group had an average age of 33.3 years (range, 23–49 years). Table 1 shows the demographics and characteristics of the patients. The etiology of the nostril contracture revealed that 3 patients exhibited congenital nasal deformity, and 6 deformities were caused by multiple cosmetic rhinoplasty surgeries. All patients suffered airway obstruction problems.

Surgical Technique

Composite Graft

All surgeries were performed under general anesthesia. The scar contracture over the nostril, generally at the soft triangle and alar base, was released first. A nasal speculum was also used to open the airway. The defect size was measured, and we harvested composite grafts from the concha, superior helical, and triangular fossa. Donor sites were closed primarily or covered using postauricular full-thickness skin graft with tie-over dressing. The grafts were divided into pieces according to the size and the number of the defects (range, 1–4). The size of each piece of composite graft ranged from 0.8 to 1.2 cm in width and 1 to 1.5 cm in length. Grafts were transferred to the soft triangle or alar base, or both, and sutured with 5-0 absorbable sutures. Postoperative wound care with normal saline-soaked wet dressing was applied every 2 hours for 3 days postoperatively. Topical antibiotic ointment was applied for 3 to 7 days postoperatively. Five days of oral amoxicillin combined with clavulanic acid were prescribed. Postoperative nasal stents were applied for at least 3 to 6 months.

The donor site tie-over dressing was removed 7 days postoperatively. We suggest that patients wear a nasal stent for at least 3 to 6 months to keep the airway patent and prevent scar contracture.

Received November 21, 2019, and accepted for publication, after revision May 27, 2020.

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Conflicts of interest and sources of funding: none declared.

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Supplemental digital content is available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal's Web site (www.annalsplasticsurgery.com).

ISSN: 0148-7043/21/8602–0133
DOI: 10.1097/SAP.0000000000002485

TABLE 1. Demographics and Characteristics of Patients

No	Sex	Age	Etiology	Surgery (Stage)	PA Thickness, mm	CG Number	Follow-up, mo	Complication
1	M	29	Congenital	PA + CG (2)	7	2	4	None
2	F	49	Binder syndrome	PA + CG (1)	6	2	28	None
3	F	23	Romberg	PA+ CG (1)	4.5	1	3	None
4	M	39	Cosmetic	PA + CG (1)	7	1	20	Oral wound poor healing
5	F	36	Cosmetic	PA + CG (1)	4.5	1	8	None
6	F	32	Cosmetic	PA + CG (1)	4.5	2	8	None
7	F	30	Cosmetic	PA + CG (1)	4.5	4	15	None
8	F	25	Cosmetic	PA + CG (1)	4.5	3	6	None
9	F	37	Cosmetic	PA + CG (2)	4.5	2	6	None

CG, composite graft; PA, paranasal augmentation.

Paranasal Augmentation

Bilateral upper gingivobuccal sulcus incisions were used, lateral to the pyriform aperture, above the root of the central incisor to the canine eminence and 1 cm above the sulcus, to provide an adequate cuff of mucosa for wound closure.[11] The incisions did not connect at the midline, and subperiosteal dissection was conservative.[11] Preshaped porous polyethylene (PPE, Medpor; Stryker, Kalamazoo, Mich) implants were contoured to adapt to the recipient site and trimmed along the margin of the canine root to avoid iatrogenic injury during fixation.[11] The graft edges were contoured to the recipient bone for a more natural contour.[11]

Preshaped porous polyethylene was soaked in an antibiotic solution with negative pressure.[11] An airtight seal was created with a gloved finger and a syringe, and the plunger was withdrawn to create a near vacuum.[11] The shape and position of the PPE was confirmed, and the implants were secured using a 10- or 14-mm miniscrew centrally, depending on the thickness of the implant.[11] Special attention was taken to avoid injury to the tooth root.[11] A 3-0 nylon alar cinch suture was placed between the transverse nasalis muscles at the alar-facial junction, and the overlying mucosa was closed with absorbable sutures.[11] Drains were not placed.

Figure 1 demonstrates the composite graft transfer and paranasal augmentation simultaneously.

Outcome Evaluation

Standard views of photographs were taken preoperatively and postoperatively, and basal views were used for comparisons of alar base distance and cross-sectional areas of the nostril before and after surgery. Overall, 9 alar base distances and the cross-sectional areas of 15 nostrils were measured using ImageJ software (Version 1.50i, March 26, 2016). Each measurement was performed 3 times, and the average was used for analyses. The degree of improvement was calculated as a percentage of the original alar base distance or cross-sectional area of the nostril before surgery.

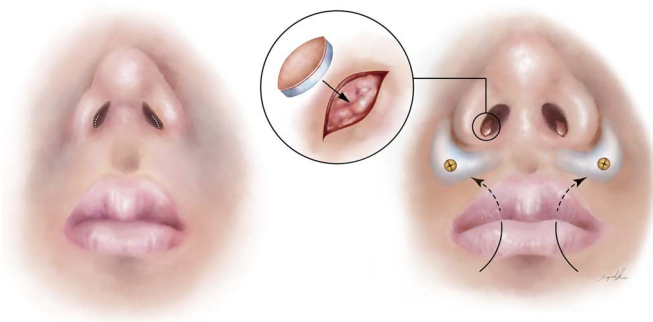

FIGURE 1. Left, Adequate releasing of the scar tissue was performed first. Right, Composite chondrocutaneous grafts transfer to the alar base with paranasal augmentation using Medpor implants. full color online

RESULTS

Nine patients underwent paranasal augmentation and composite grafts transfer. Seven patients were in the same stage, and 2 patients were in different stages. The average thickness of paranasal augmentation was 5.5 mm (range, 4.0–7.0 mm). Eighteen composite grafts were located over the soft triangle (n = 3) and alar base (n = 15). The average number of composite grafts for each person was 2 (range, 1–4). All composite grafts survived totally or partially, and no graft failed. One of the 9 patients with paranasal augmentations had poor healing over of intraoral wound but healed after limited debridement. No wound infection, wound dehiscence, hematoma, or other complications were noted. The average follow-up was 10.9 months (range, 3–28 months). The alar base increased 13.9% (range, 2.2%–23.9%), and the nostril area increased an average of 78.1% (range, 4.5%–316.8%) after surgery. Patients had satisfactory aesthetic and functional outcomes.

Case Presentation

Case 1

A 32-year-old woman had an overresection of the bilateral alar base after rhinoplasty that resulted in nostril contracture (Fig. 2A). Paranasal augmentation with Medpor 4.5 mm and composite graft transfer to the bilateral alar base were performed at different stages. Postoperative 8-month follow-up showed an increase in the cross-sectional area of bilateral external valves (Fig. 2B). The patient was satisfied with the aesthetic and functional results. Comparing the preoperative photos (Supplementary Fig. 1, http://links.lww.com/SAP/A523; Supplementary Fig. 2, http://links.lww.com/SAP/A524) and the latest photos with 16 months follow-up (Supplementary Fig. 3, http://links.lww.com/SAP/A525; Supplementary Fig. 4, http://links.lww.com/SAP/A526), the contour of the nasal external valve remained well after operation without recurrent contracture or deformity. The Mepor implants were also stable without protrusion or infection problem.

Case 2

A 37-year-old woman had nostril contracture after multiple rhinoplasty surgeries, which led to airway obstruction problems (Fig. 3A). Paranasal augmentation with Medpor 4.5 mm and composite graft transfer to the bilateral alar base were performed simultaneously. Postoperative 6-month follow-up showed an increase in the cross-sectional area of bilateral nostrils and improved airway obstruction (Fig. 3B).

DISCUSSION

The contractured nose is a unique entity that follows multiple rhinoplasties in Asian patients because of the alloplastic material used

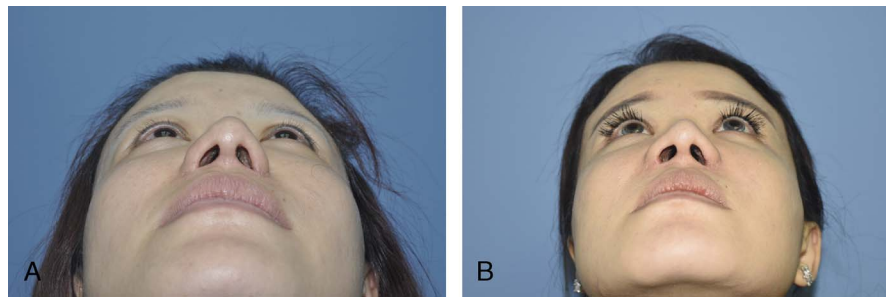

FIGURE 2. A, A 32-year-old woman had overresection of the bilateral alar base after rhinoplasty that resulted in nostril contracture. Paranasal augmentation using Medpor 4.5 mm and composite graft transfer to the bilateral alar base were performed at different stages. B, Postoperative 8-month follow-up. full color online

in the primary setting, trauma of repeated surgeries, pressure necrosis resulting from overzealous augmentation, or recurrent bouts of infection.[4] Alar reduction is a common procedure in Asian populations.[1–3] Any suboptimal incision location, excessive resection, or tense closure may lead to nostril notching or tear-drop deformity.[1,2] Arfaj et al[2] presented a case report showing that when excessive alar wedge resection is recognized intraoperatively, the excised wedge may be placed back as a composite graft, and a smaller wedge may be resected. Jung el al[4] mentioned that correction of an alar-columellar disparity should be undertaken with composite grafting only after 6 months have passed to gauge the ultimate relationship between the alae and columella. However, there is no case series demonstrating the methodology or outcome of solving this problem postoperatively.

Other choices include local or regional flaps, such as nasolabial flap, forehead flap, or facial artery musculomucosal flaps.[5,6] However, the facial scar is distinct, and the bulky flap may obstruct the airway again. These patients may need staged procedures or secondary debulking to achieve functionally and cosmetically pleasing results.

The first description of composite grafts for nasal reconstruction dates back to Konig in 1902.[6,7,9,10] Composite grafts for the reconstruction of small defects of the nose are a great tool in the armamentarium to provide single-stage reconstructions.[10] Grafts may be obtained from different regions of the auricle, such as the helical rim, anterior aspect of the concha, the antihelix, fossa triangularis, and the posterior aspect of the concha.[9] Composite graft transfer is technically simple, uses structurally similar donor tissue, causes no disfiguring donor-site scarring, causes no additional scarring of the nose, is performed in one step, and generally yields satisfying results.[6]

A good aesthetic result with a composite graft can only be hoped for if vascular survival is unquestionable.[10] However, the heavily scarred tissue is hypovascular and resists infection poorly, and any tension on closure further compromises tissue perfusion. In our series, the adequate release of scar tissue was crucial in opening the airway, and the composite graft must be an adequate size to avoid tension in wound closure, but it cannot be greater than 1.5 cm for survival.[6,7,9,10] We asked our patients to apply normal saline-soaked wet dressing frequently (every 2 hours) to decrease the metabolic rate of the graft and increase survival rates. All grafts survived well without necrosis or infection in our series.

Our previous study on soft tissue changes after paranasal augmentation found that alar width and alar base width increased 4.84% ($P = 0.01$) and 7.66% ($P = 0.01$), respectively, after this procedure.[11] For patients with mild overresection of the alar base, the effect of alar base widening after paranasal augmentation may be helpful in solving this problem. If the patient also exhibits midface concavity, the procedure provides even more cosmetic benefits. However, we suggest the combining of composite graft transfer with paranasal augmentation for patients with more overresection of the alar base and severe nostril contracture to widen the alar distance, open the external valves, and improve the nostril contracture. The alar base in our series increased 13.9%, and the cross-sectional area of the nostril increased approximately 78.1% on average after surgery. Although the airway is a continuous structure composed of many anatomic structures, the substantial increase in the cross-sectional area of the external valve contributed to great improvements in airway contracture and obstruction.

As for paranasal augmentation, autologous materials such as rib cartilage or other bone graft is an alternative choice, which we also applied in our previous series,[11] but donor-site morbidity must be considered, and the resorption of graft could generate unpredictable results. Alloplastic materials including porous polyethylene have resultantly gained widespread acceptance.[11] Preshaped porous polyethylene is strong and biocompatible and allows for tissue ingrowth with resistance to infection.[11] It is available in prefabricated shapes and sizes, is easy to shape, and will not resorb, and there is no donor site morbidity.[11] In our series, there are no obvious Medpor-related complications, such as implant extrusion,

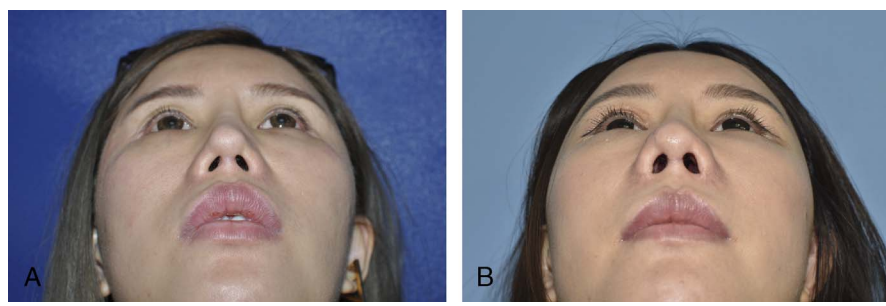

FIGURE 3. A, A 37-year-old woman had nostril contracture after multiple rhinoplasty surgeries, which led to airway obstruction problems. Paranasal augmentation using Medpor 4.5 mm and composite graft transfer to the bilateral alar base were performed simultaneously. B, Postoperative 6-month follow-up. full color online

infection, or migration being identified during follow-up period. We consider it as a stable prosthetics, although the patients have to pay at their own expense.

A composite graft at the external alar surface to correct the overresection of the alar base was considered a solution previously. However, the scar is generally apparent in Asian populations, and it may result in a skin patch–like deformity. Our method transferred the composite graft to the inner surface of the alar base after adequately release of the scar, which could open the external valve with a relatively inconspicuous scar.

We harvested donor tissue for the composite graft from the superior helical at first. However, we found that this site may lead to minimal ear deformity, although no patients complained during the entire follow-up duration. Therefore, we shifted the harvesting of the composite graft to the triangular fossa because of its ideal and similar shape to alar base anatomy, relatively unobvious scar due to its concave location, and almost no ear deformity. This procedure may add approximately 15 minutes to the skin graft to donor site, but we considered it a more suitable choice for the donor site.

Most of our patients received paranasal reconstruction and composite graft transfer simultaneously. Only 2 patients received the procedure in different stages because of personal reasons or budget considerations, and they all finally asked for another procedure because of suboptimal results, which was fully explained before surgery. We strongly suggest the combination of these 2 procedures to achieve the best outcome and increase the cross-sectional area of the external valve and solve the airway obstruction problem.

The limitations of this series are the small case number and lack of objective functional airway outcome analysis. However, based on the subjective functional satisfaction and the increase in the cross-sectional area of the nostrils, the results in this series showed that the combining of composite graft transfer and paranasal augmentation is an applicable choice to improve nostril contracture and open the external valve airway.

CONCLUSIONS

The combining of paranasal augmentation and composite graft transfer increased the cross-sectional area of the external valve and improved nostril contracture and airway obstruction after the overresection of the alar base or nasal contracture after multiple rhinoplasty surgeries.

ACKNOWLEDGMENT

The authors thank Miss Ingrid Kuo from the Center for Big Data Analytics and Statistics at Chang Gung Memorial Hospital for illustration of Figure 1.

Informed consent was received for publication of the figures in this article

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