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콧구멍 확대근의 절제를 통한 넓은 콧방울의 교정-예비 보고

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Correction of Prominent Alar Lobule by Resecting Dilator Naris Muscles–A Pilot Study

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Purpose: The authors have conducted a series of anatomic studies on the factors affecting shape of a lower vault in Asian noses. The results of the studies showed that prominence of alar lobule is mainly affected by the volumes of the dilator naris anterior and posterior muscles and the insertions of the dilator naris posterior muscles. However, information on its clinical availability is yet insufficient. The present study was undertaken for clinical purpose to find out the effect of dilator naris muscle resection on the correction of prominent alar lobule.

Methods: Six patients who were treated by dilator naris muscle resection with a long-term follow-up of more than 1 year were involved in this study. Rhinoplasties were performed via endonasal approaches with resecting dilator naris anterior and posterior muscles by sharp scissor. The effect of the dilator naris muscle resection on alar prominence was investigated by measuring ratio of the short axis to the long axis of a nostril (SA/LA) pre-and postoperatively. The visual analog scale (VAS) was also used to evaluate satisfaction of patients. An average follow-up time was 15.6 ± 3.7 months.

Results: Having lost the dilating and lateral pulling effects of the dilator naris muscles, the alar lobule shifted medially and alar lobule shapes improved. SA/LA significantly improved (preoperatively 0.71 ± 0.11 and postoperatively 0.58 ± 0.08; p<0.05). The VAS score was also increased postoperatively (preoperatively 3.2 ± 1.8 and postoperatively 8.7 ± 1.2; p<0.05). A mild degree of hyperpigmented scar was noted in one alar lobule. Otherwise, there was no case of postoperative complication.

Conclusion: Our results suggest that prominent alar lobule could be modified by resecting the attachment of the dilator naris muscles. This maneuver removes the function of dilator naris muscles, then may produce a more aesthetically acceptable alar lobule shape.

Key Words: Alar lobule, Dilator naris muscle

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I. INTRODUCTION

Although rhinoplasty becomes more and more popular in Asia, the current concept of facial and nasal beauty shows a tendency to correspond with that of white people.[1] Thus, it is important for the plastic surgeon to be skilled in the techniques required and be aware of patient's demands to improve their aesthetic outcome. Cosmetic enhancement of the Asian nose requires a unique philosophical approach and strategy in comparison with those necessary for Western rhinoplasty. The typical Asian nose is characterized by low dorsum, decreased tip projection, thick lobular skin, bulbous tip, wide nasal base, retracted columella, and alar lobule.[2-4] The alar lobule, the movable lower third, is usually more prominent and wider than that of the Caucasian nose.[2] This feature is commonly perceived by patients to be unaesthetic. Therefore, many Asians who want to undergo aesthetic rhinoplasty complain of prominent alar lobule shape as well as a low dorsum.[5]

Various surgical techniques have been developed to correct the perceived deficiencies of the Asian nose. Although a review of the literature shows that there is much interest in the nasal dorsum and tip, relatively few studies are available on the shape of wide alar lobule.[2]

Authors have conducted a series of anatomic studies on the factors affecting alar shape in Asian noses. The result of the studies study shows that the gross appearance of alar lobule is mainly affected by the volumes and actions of the dilator naris anterior posterior muscles.[2,6]

Based on this automatic feature, we hypothesized that resection of the well-developed dilator naris muscles would

change the alar lobule shape. The purpose of this clinical pilot study was to find out the effect of dilator naris muscle resection on the correction of prominent alar lobule.

II. MATERIALS AND METHODS

Procedures were performed under local anesthetic infiltration (1% lidocaine mixed with 1 : 200,000 epinephrine). Rhinoplasties were performed via endonasal approaches. The marginal incision started from nostril apex and the incision was extended laterally downward to nostril sill as possible to approach dilator naris anterior and posterior muscles. The external skin envelope was sharply elevated up to the alar groove. The exposed musculoaponeurotic layer, which includes the dilator naris muscles were then elevated from underlying vestibular skin. The dilator naris anterior and posterior muscles were well developed in the alar lobule area. The dilator naris anterior muscle originated from the upper lateral cartilage and inserted into the caudal margin of the lateral crus and alar lobule skin. The dilator naris posterior muscle, which is known to originate from the maxilla, inserted into the middle of alar lobule as well as the alar base.[7] The freed musculoaponeurotic layer between superficial skin and inner vestibular skin, was resected en bloc fashion by sharp scissor (Fig. 5).

Additional conchal cartilage graft was performed for tip augmentation in 3 patients. At the end of the operation, the incisions were closed with 6-0 Prolene suture.

Thirteen consecutive patients underwent our dilator naris muscle resection between June of 2006 and March of 2009. Patients in the series were all women. The mean age of participants was 29 ± 6.0 year, ranging from 20 to 39 years. The patients had no history of previous nasal surgery, nasal disease, or facial trauma. Informed written consent was obtained from each subject. All patients included had prominent alar lobule. Of these 13 patients, a long-term follow-up for more than 1 year was possible in 6 patients. Results were evaluated in these 6 long-term follow-up patients. The mean length of follow-up was 15.6 ± 3.7 months.

The digital photographs were taken to evaluate the shape of an alar lobule. The ratio of the short axis to the long axis of a nostril (SA/LA) was evaluated preoperatively and 12 months postoperatively. The long axis of the nostril was defined as a line which runs between two opposing points (point A and A'). Point A was the medial intersection of the long axis of the nostril with the nostril rim, and point A' was the lateral intersection of the long axis of the nostril with the nostril rim. The short axis of the nostril was defined as a line perpendicular to the long axis of the nostril showing the largest distance between two opposing points (point B and B') (Fig. 1).

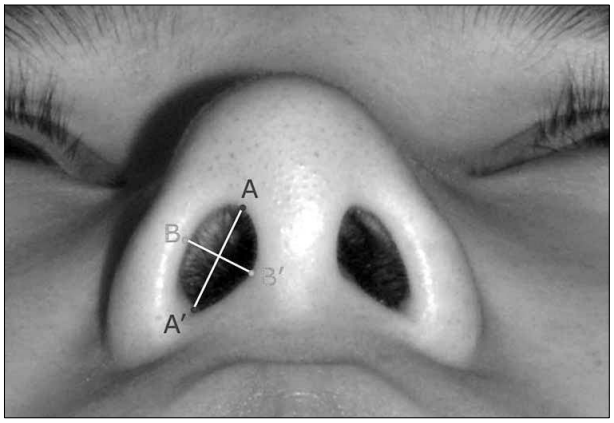

Fig. 1. A photograph of basal view of nose to show the landmarks of long and short axis of a nostril. The line between point A and A' is the long axis (LA) of a nostril, point B and B' is the short axis (SA) of a nostril. The ratio of the short axis to the long axis (SA/LA) was calculated on both alar lobules.

In addition, a visual analog scale (VAS) was used to evaluate patient satisfaction preoperatively and 6 months postoperatively. The satisfaction VAS system ranged from 0 (worst, totally unsatisfied) to 10 (best, completely satisfied) points.

During follow-up periods, any complication associated with the surgery was recorded.

Statistical comparisons were performed using the Mann-Whitney U test, and results were expressed as means ± SD. Statistical significance was accepted at the 5% confidence level. The data were analyzed using SPSS version 16.0 (SPSS Inc., Chicago, Ill.).

III. RESULTS

A. SA/LA

All including patients showed improvement in their alar lobule shape. The appearance of the alar lobule has changed to gentle curve instead of circular shape (Figs. 2~4).

The mean values of preoperative and postoperative SA/LA were 0.71 ± 0.11 and 0.5 ± 0.08, respectively ($p < 0.05$). The data of all patients included in this study were provided in Table I.

B. Visual analog scale analysis

The outcome assessed with the VAS revealed a significantly better outcome in most of case (5/6 cases; 83.3%).

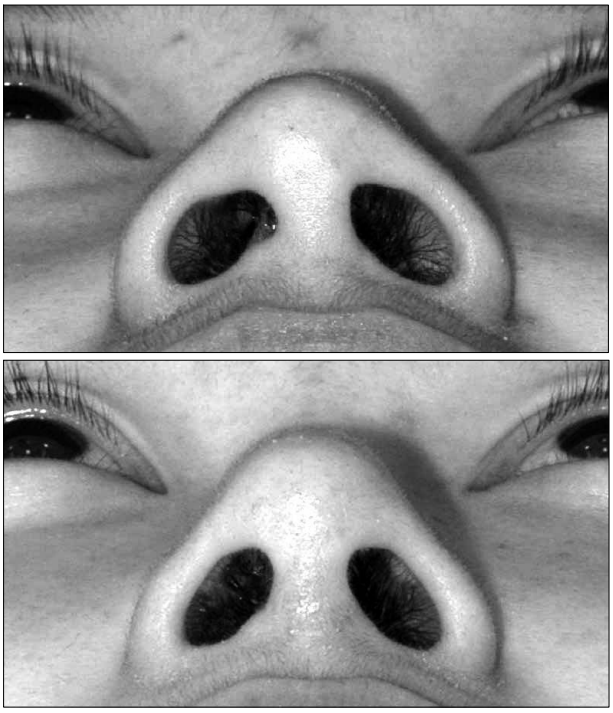

Fig. 2. (Above) A nose of a 27-year-old female patient who complained of the prominent lateral alar lobule. (Below) Twelve months after dilator naris resection.

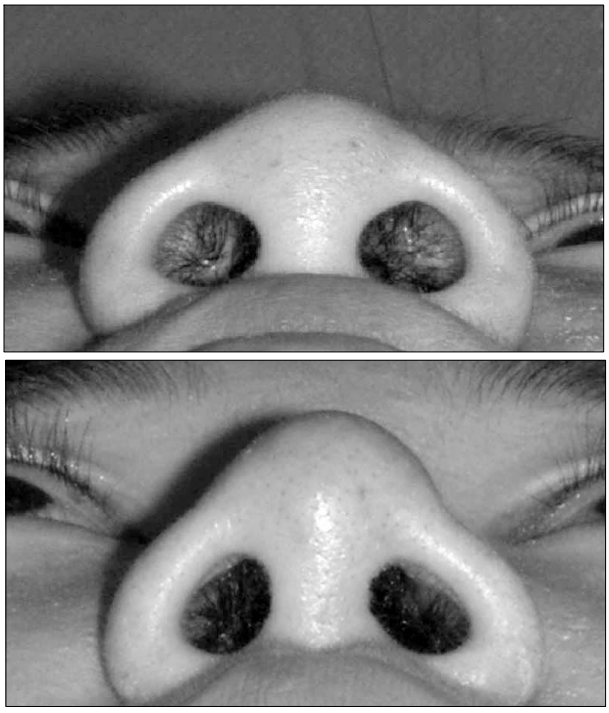

Fig. 3. (Above) A nose of a 30-year-old female patient with prominent alar lobule. (Below) Seventeen months after the operation, the prominent alar lobule has improved. In this patient, conchal cartilage was grafted simultaneously for tip augmentation.

Table I. Data of SA/LA Change

	Pre	Post
Case 1	0.85	0.52
Case 2	0.84	0.60
Case 3	0.62	0.49
Case 4	0.67	0.52
Case 5	0.76	0.67
Case 6	0.90	0.69
Mean (± SD)	0.71 (± 0.11)	0.58 (± 0.08)

The average postoperative VAS score was 8.7 ± 1.2 points, whereas the average preoperative VAS score was 3.2 ± 1.8 points.

A mild degree of hyperpigmentation was noted in one alar lobule. However, this color change was easily hidden by cosmetics and neither the patient nor the surgeon considered this clinically significant (Fig. 4). There were no cases of infection, scar contracture, or respiratory complaints. No revision procedures were performed.

IV. DISCUSSION

Rhinoplasty surgeons are often faced with the challenge of achieving patient satisfaction for different racial groups. Therefore, surgeons undertaking rhinoplasty in Asian individuals require a broad understanding of ethnically specific nasal features.[4]

Typically, Asian patients complain of a wide and low nasal dorsum. However, many Asians also complaint of more excessive alar flaring, wider nasal base, and horizontal nostril shape.[8] The ideal nasal base resembles an equilateral triangle with an outward bowing of the posterior alar rims and a rounding nasal tip. The aesthetically acceptable nostril shape is said to be teardrop-shaped, with a long axis from its base to the apex directed inferiorly and laterally.

Despite numerous methods to modify nasal dorsum and tip have been described, the surgical options tp correct prominent alar lobules remain limited. Alar base excision can be used. However, nostril distortion or stenosis may result, if resection enters the vestibule. Patients with a caudally positioned alar rim or a retracted columella, in particular, may show caudal transposition of the alar rim which is detrimental to the nasal balance. Visible scar may be a frustrating problem especially in Asian people.

The nose is a dynamic structure. The entire shape of

the nose is changed dynamically with the synergistic action between mimetic nasal muscles and the surrounding mimetic facial muscles.[9] Discovery of new knowledge pertaining to these dynamic changes will help to attain predictable better outcomes. For example, the plunging nasal tip is accentuated by active action of depressor septi muscle. De souza Pinto et al. have recently reported "dynamic rhinoplasty" technique, which involves the dissection and transposition of the depressor septi muscle during rhinoplasty. Now many surgeons generally address this problem by such techniques.[10] In Asian nose, the alar lobule area mainly consists of collagen fibers and the lateral crus is not as large as that of Caucasians. Therefore, the influence of the lateral crus on alar shape may be ignored in Asians.[9] Taken together, we thought that the concept of "dynamic rhinoplasty" could apply to modify alar flaring.

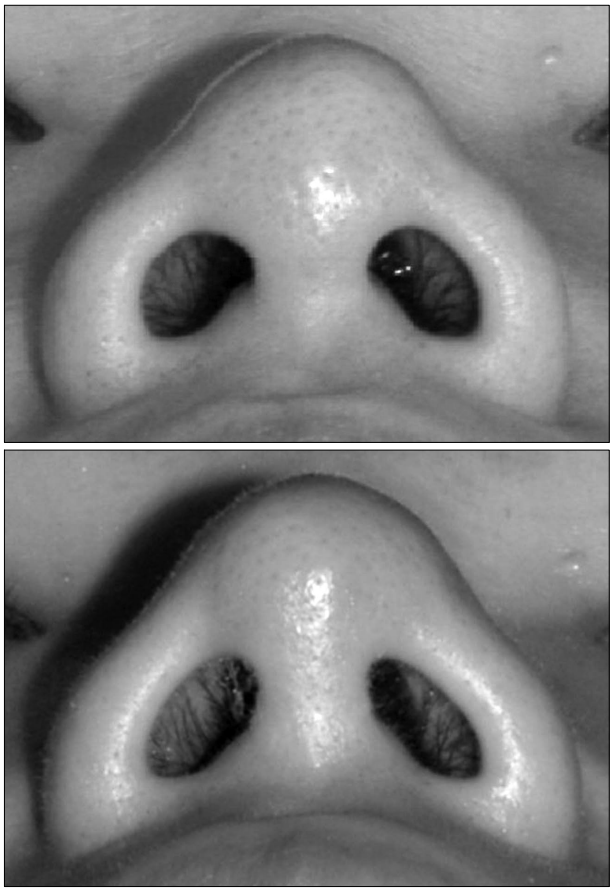

Fig. 4. (Above) A nose of a 26-year-old female patient with prominent alar lobule. (Below) Thirteen months after the operation.

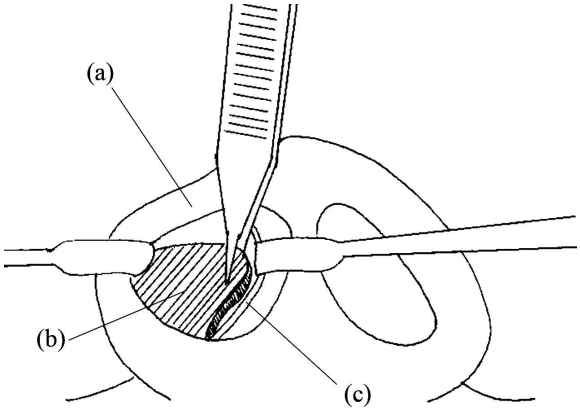

Fig. 5. Schematic illustration showing the resection of dilator naris muscles. The freed musculoaponeurotic layer including dilator naris muscle mass between superficial skin envelope and inner vestibular skin, was resected en bloc fashion by sharp scissor. (a) superficial skin, (b) musculoaponeurotic layer, (c) inner vestibular skin.

Our series of anatomic and histologic studies of Asian noses indicate that anterior and posterior components of the dilator naris muscle have a direct effect on the alar lobule and nostril shape, by enlarging the nostrils and maintaining the laterally extruding alar. The dilator naris anterior and posterior muscles were noted to be well developed in nostrils with a horizontal shape, whereas in vertically oriented nostrils, these muscles were found to be poorly developed. Moreover, there was some difference in muscle insertion area between two types of nostril shape. The dilator naris anterior is the primary dilator of the nose. This fanlike muscle generally originates from the upper lateral cartilage then inserted into the caudal margin of the lateral crura and the lateral alar skin.[11] The insertion of the dilator naris anterior muscle of the horizontal nostril type was identified to the caudal margin of the lateral crus and alar lobule skin, whereas that of the vertical nostril type was hard to identify. The dilator naris posterior muscle generally originates from the maxilla above the lateral incisor tooth (just lateral to the bony origin of the depressor muscle) and inserts on the skin along the posterior circumference of the lateral crura. The insertion of the dilator naris posterior in horizontally oriented nostrils was seen to extend to the alar lobule and to the alar base, unlike that in vertically oriented nostrils, where the insertion was limited to the alar base only.[2,6]

In this study, a mild degree of hyperpigmented scar was noted in one alar lobule. The initial erythematous color gradually darkened and became hyperpigmented lesion. The subcutaneous tissues and skin problems associated with rhinoplasty including hypertrophic scarrings, are often related with bleeding into this space or compromised vascular supply to flaps. In this study, we resected soft tissue lump between superficial skin and

inner vestibular skin an en bloc fashion, because the volumes of these muscles are small and the muscle fibers are hard to be distinguished. It might make arterial, venous, and lymphatic injuries in or above the musculoaponeurotic layer of the alar lobule, related to color change on skin envelope. When surgeons dissect the alar lobule area, they should be careful to minimize hemorrhage and protect against skin complications by preserving the vascular supply of skin.

Dilator muscle resection might possibly have the risk of nasal airway narrowing since medial displacement of the alar rims and change of lobule shape, may decrease the cross-sectional area of the external valve during inspiration.[12] In our case, however, there was no case of respiratory complaint or airway obstruction. This should be because the most restrictive anatomical region of the airway is the internal valve, not the external valve.

Various methods could be used for the objective quantification of prominent alar lobules.[13,14] The alar base width is most widely used, but it may be affected with skin thickness of alar lobule and do not represent shape of alar. Other methods usually require the indication of multiple landmarks and complex calculations. Recently, diverse software programs may be used to analyse the nasal structure including alar lobules, but their costs area very high.[15,16] SA/LA, which represents the ratio of the short axis to the long axis of a nostril, could quantify the degree of alar prominence and nostril shapes. This parameter provides easy way to use and cost-effectiveness.

In order to maintain an objectivity, the authors tried to search more database of SA/LA. However, there was no other information of SA/LA including reference data. The mean value and the racial difference of this parameter could be investigated further.

In this study, additional conchal cartilage graft was performed for tip augmentation in 3 patients. Postoperative alar and nostril shape could possibly be affected by such procedure. However, other 3 patients who did not undergo conchal cartilage graft also showed meaningful change of alar shape and SA/LA ratio.

Small number of participating patients may be a limitation of the present study. A well-designed, prospective study with large sample size is needed to definitely determine the usefulness of the technique. Despite the study's weak points, we would like to say that the results of the present pilot study demonstrate the possibility of using dilator muscle resection for a more aesthetic change of the alar lobule.

V. CONCLUSION

This study was designed to find out how resecting dilator naris muscles changes the prominent alar lobule shape. Our results suggest that prominent alar lobule could be modified by resecting and severing the attachment of the dilator naris muscles. Having lost the dilating and lateral pulling effect of the dilator naris muscles, the alar lobule shifted medially, producing less prominent alar shape. This maneuver removes the function of dilator naris muscles, could achieves more aesthetically acceptable alar lobule shape.

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