

Original Article

Case analysis of triangular bracket from autogenous nasal septal and auricular cartilage for the correction of short nose

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Abstract: Objective: To evaluate the clinical efficacy of short nose correction which was performed by transplanting the autogenous nasal septal cartilage combination with auricular cartilage. Methods: One hundred women (from 18 to 40 years old) with short nose were enrolled in our hospital. All these participants showed short nasal tip, low and flat nasion, obtuse nostril, and short nasal dorsum. Flexible transplantation of autogenous nasal septal cartilage combination with auricular cartilage and implantation of nasal prosthesis were used to reconstruct the support structure, and provide enough forward and downward support forces for nasal tip. Also, this approach could increase the length of nose, and correct the topspin of nasal tip. Meanwhile, auricular cartilage with shield and cap-form grafts were employed to promote the shape of nasal tip. The clinical efficacy and complication were also assessed. Results: The elongated nasal dorsum and normal nasolabial angle were achieved in all participants. After 3 to 12 months following-up, participants showed stable nasal profile, except 2 cases without enough lengthen of nasal tip. There was no complication, including infection, prosthetic deflection, graft cartilage and prosthesis exposure, perforation of nasal septal, dorsal nasal sag, secondary deformities, and skin damage. Conclusion: Strong forward and downward support forces were needed for nasal tip, which could extend the short nose effectively. Reconstruction the bracing structure of the lower part of the nose was also necessary. The shield and cap-form of cartilage grafts could further promote the efficacy of correction.

Keywords: Short nose, nasal septal cartilage, auricular cartilage, transplantation, low nose

Introduction

Many Asian noses show characteristics including low and flat nasion and nasal dorsum, bulbous nasal tip, clear nostril exposure, short nasal columella, soft nasal cartilage bracket, and sick skin soft tissue. The short nose generally means that, the length from nasion to nasal tip is below 1/3 of facial length [1]. In order to correct the malformation of short nose, the nasal columella, alar, lateral and septal cartilage, bone, skin and mucous membrane are involved in the operation. The difficulties and key points of this technique are the construction of strong bracing structure from autogenous cartilage, then achieving backspin and increasing bulges of nasal tip. At present, the surgical methods of short nasal correction

mainly include septal extension, osteotherapy, and the cosmetic treatment [2-5]. As the plastic cartilage, the auricular cartilage is soft and has natural radian, which is used as graft in nasal tip with shield or cap-form. For the nasal septal cartilage, the harder and straightness features are suitable for the reconstruction of nasal tip with strong framework [6-8]. Thus, the nasal tip bracket from nasal septal cartilage and auricular cartilage for the correction of short nose was accepted by more and more clinicians.

However, as the main difficulty in the plastic surgery for nasal, the correction of short nose is hard to maintain the efficacy in long time when using the previous approaches. In this study, triangular bracket from autogenous na-

Triangular bracket from self-nasal septal and auricular cartilage



Figure 1. Cartilage graft example.

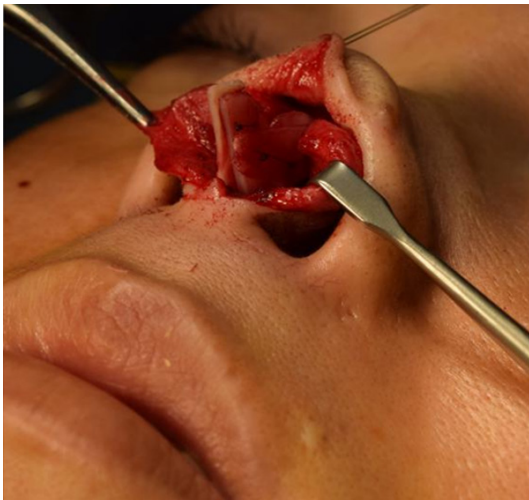


Figure 2. Spreader graft by nasal septal cartilage combined with auricular cartilage.

sal septal cartilage and auricular cartilage for the correction of short nose was employed. The height and projection of the nasal were increased, and the length of nasal dorsum was extended significantly.

Materials and methods

Participant information

This study has got approval from local ethical committee. One hundred women (from 18 to 40 years old) with short nose were enrolled in our hospital from December 2015 to August

2017. The participants understood and signed the informed consent. The diagnostic criteria included short nasal tip, low and flat nasion and nasal dorsum, short nasal columella, obtuse nostril, overlarge nasolabial angle, and no obvious malformation on nasal bone. The inclusion criteria were consisted of (A) meeting the diagnostic criteria which was listed above, (B) health without underlying diseases, (C) tolerance for corrective surgery. The exclusion criteria were consisted of (A) non-compliance with the diagnostic criteria above, (B) surgical and anesthetic contraindications, (C) history of short nose correction.

Surgery program

The endotracheal general anesthesia or total intravenous anesthesia combined with block anesthesia for bilateral infraorbital foramen and local infiltration anesthesia were employed in the surgery. The nasal columella and bilateral nasal alar were dissected. Local infiltration anesthesia (epinephrine and 2% lidocaine buffer, with 1:200,000 dilution) was performed for the front boundary with marked lines of left ear and the nasal. The front boundary with marked lines was separated, and the cartilage (around 10 mm*20 mm) was taken out (**Figure 1**). After electrocautery, the skin was stitched by 6/0 nylon lines discontinuously. Then 3/0 nylon lines were used as ear packing and compression bandage.

Then the bottom of nasal columella was divided as W-form. Both ends were folded up along the inner columella to 1/2 length of nasal alar. After throughout of the nasal column by scissor and uncover the skin flap, inner, outer and fornix parts of bilateral nasal alar cartilage were exposed. The fiber linker between bilateral fornix was separated. Throughout the inner of bilateral nasal alar cartilage, the trailing edge of nasal septal cartilage was revealed. The mucous membrane and perichondrium of bilateral trailing edge were separated. After separating the perpendicular plate of the ethmoid with clinging the perichondrium, the septal cartilage was exposed completely. With the parallel cutting on 10 mm away from leading edge of nasal septal cartilage, the cartilage (10 mm*20 mm) was separated by rotary cutter (**Figure 1**). The integrity of nasal mucous membrane needed to be protected in the surgery.

Triangular bracket from self-nasal septal and auricular cartilage

Table 1. Comparison of the average nose length and nasolabial angle before and after the treatment

Indices	Before the treatment	After the treatment	t	P
Average nose length	4.79±0.66	5.32±0.54	6.215	<0.001
Average nasolabial angle	87.93±6.94	92.96±2.78	6.728	<0.001

The separated cartilage was then fixed on the top of remaining nasal septal cartilage by stitching with 5-0 PDS line. It would lengthen nose, and provide a strong support force. After further processing, the separated auricular cartilages included two pieces of long strips (around 20 mm long), cap and shield-shaped cartilages. One piece of cartilage with long strip was fixed on the bottom of nasal septal cartilage, another piece was then embedded in the inner of nasal alar cartilage to heighten the nasal tip. The cap and shield-form cartilages could also transplant on the top of columella as needed, which could lengthen and heighten the nasal tip furtherly. For the participants with low and flat bridge of the nose, the augmentation was employed to assist rhinoplasty. The skin flap of nasal tip and columella was covered the area of nasal tip without tension. The 6-0 nylon line was used to suture the incision discontinuously. The gelatin sponge was embedded between the two nostrils to induce the septal and soft tissue fitting together. The nasal dorsum was fixed through tape firstly. Then nasal splint was prepared by the soft thermoplastic plate after warming. It would provide reliable fixation for the rhinoplasty (**Figure 2**).

Cold compress (4-5 times, 20 min for each time) was employed after the surgery. Medicine was changed locally 24 h later. Then the nasal fillings were taken out, and the incision was cleaned 48 h later after the surgery. The bandage on ear was taken out 72 h later after the surgery. Routine antibiotic treatment was given for 3-5 d. The stitches and nasal splint were taken out 7 d later after the surgery.

Outcome measures

The main outcome measures were the length extended of the participant's nose, and the satisfaction of participant. The secondary outcome measures included the appearance efficacy of rhinoplasty, and occurrence rate of

complications (such as prosthetic deflection, graft cartilage and prosthesis exposure, perforation of nasal septum, dorsal nasal sag). The participants were followed up 6-12 months to evaluate the stability of rhinoplasty.

Data analysis

The data analysis was performed by SPSS. 22.0. The measurement data were expressed as mean ± standard deviation and the comparison adopted t test. P<0.05 considered a significant difference.

Results

Evaluation of nasal elongation efficacy

An elongation of 4-7 mm was observed in all 100 participants as the average nose length was 4.79±0.66 before the treatment and 5.32±0.54 after the treatment with significant difference (P<0.001). The exposure of the nostrils was significantly improved. The topspin of nasal tips was corrected completely. The average nasolabial angle was 87.93±6.94 before the surgery and 92.96±2.78 after the surgery, which was corrected to normal level (P<0.001, **Table 1**). And the participants were satisfied with the nasal tip shape and height. After 6 to 12 months following-up, participants showed stable nasal profile (especially for the nasal length), except 2 cases without enough lengthen of nasal tip.

Evaluation of complications

There was no complication, including infection, prosthetic deflection, graft cartilage and prosthesis exposure, perforation of nasal septum, dorsal nasal sag, secondary deformities, and skin damage.

Typical case

As shown in **Figure 3**, the length and height of nasal tip was significantly extended, which indicated the good efficacy of correction.

Discussion

According to the requirement of nasal extension, different correction methods were chosen

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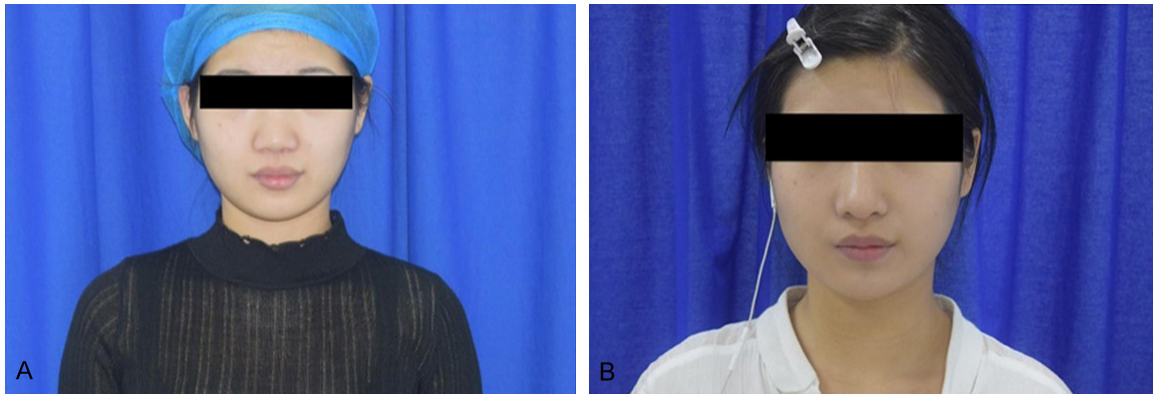


Figure 3. Typical case example. A: Full face before surgery; B: One month after the surgery.

for the short nose. The ideal ratio of nasal and middle face length is 0.67. Normally, compared with ideal nasal length, 1.0-3.0 mm less of that was defined as mild short nose. The classical features include low, flat and obtuse nasal tip, without low and flat nasion and nasal dorsum. Moreover, 3.0-5.0 mm less was defined as moderate short nose, which shows drooping nasal tip, and the ratio of height and length of nose less than $1/2$. The backspin of releasing lower lateral cartilage or other cartilages (such as nasion, nasal tip, or dorsum) can be employed as fillings for the nasal tip structure adjustment to improve the nasal length. For the moderate short nose (3.0-5.0 mm less of ideal nasal length obtuse nasal tip with topspin, exposure of nostrils, low and flat of nasion and nasal dorsum severely) and severe short nose (5 mm or above), the exclusive use of previous approach cannot extend the length of nasal dorsum, and promote nasolabial angle. The cartilage transplantation and nasal framework reconstruction are necessary for the correction. To achieve the successful rhinoplasty, the lower framework of nasal needs to be reconstructed to improve the support force on up and front of nasal tip. The inner, middle, and outer linkers of nasal alar cartilage, and the connections between alar cartilage and lateral nasal cartilage were loosen completely in the surgery to provide enough space for the nasal extension [9-12].

Using cartilage transplantation for the reconstruction of the nasal support structure, the nasal tip could be moved forward, then the short nose could be extended. As the most commonly used method, the nasal septal car-

tilage transplantation was employed in short nose extension [13-15]. After fixing the graft cartilage on the septum, the extended cartilage would suffer tension from soft tissue of nasal tip. The remaining L-form structure is the thinnest part when taking out the middle and top side of the nasal septal cartilage. If there is not enough support force on nasal cartilage framework, the graft would be distorted easily [16, 17]. One of the morphological features of Asian nasal cartilage framework is the small, thin, and short septal cartilage. The extension graft would induce the unstable of nasal cartilage when the support force is not enough (thin, soft or deflected framework). Meanwhile, the drooping nasal tip, deviation of nasal alar, and distortion of nasal columella would appear if the framework was unstable [18, 19]. The L and X-form cartilage grafts were designed in the previous studies, which resulted in good performance for nasal tip elevation and extension [16, 20]. With the best structural strength in theory, the stability of triangle bracket is believed as the best. Distortion or deviation is not easily appeared on this support arm for nasal tip reconstruction, then the most stable structure was formed to avoid the deviation of nasal tip framework after surgery. In order to keep the support function of septal cartilage in forward part of nose, the limited cartilage could be taken out. It also limited the construction of framework if only using septal cartilage. Thus, combined the auricular cartilage with septal cartilage were employed together for the construction of nasal tip framework, which resulted in good performance in this study.

Triangular bracket from self-nasal septal and auricular cartilage

In addition, malleability of mucous and cartilage membranes in nasal cavity were evaluated seriously before the surgery. The nasal soft tissue was separated and loosed widely from the cartilage membrane. The fully loosed nasal skin with mucous and cartilage membrane would prolong the nasal tip effectively and avoid the damage from overlarge pressure for skin of nasal tip. Moreover, the fiber connections between nasal alar cartilage and lateral cartilage also needed to loosen adequately. The fully loosening between soft tissue and cartilage was an important foundation for nasal tip extension.

In conclusion, the triangular bracket from autogenous nasal septal cartilage and auricular cartilage showed good efficacy for the correction of short nose. This approach not only reconstructed the framework of nasal tip with good efficacy, but also avoid the excessive cutting the nasal septal cartilage, which reduced the complication and increased the safety of short nose extension surgery. As the limited participants and surgeries, the conclusion still need to be investigated in the future studies.

Disclosure of conflict of interest

None.

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