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Augmentation Rhinoplasty Using an L-Shaped Auricular Cartilage Framework Combined with Dermal Fat Graft for Cleft Lip Nose

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Abstract. We prepared an L-shaped framework using autogenous auricular cartilage and combined this with dermal fat, according to each patient, to graft it in 12 patients with cleft lip nose. Although auricular cartilage is weak on its own, by our method we obtained a strong columella strut and nasal dorsum augmentation at the same time. Dermal fat graft provided camouflage for cartilage irregularities and was useful for increasing the graft volume. Although absorption caused a decreased volume to a certain extent, there were no other complications such as cyst formation, and a natural nasal contour was achieved in all patients.

Key words: Augmentation rhinoplasty—Auricular cartilage graft—Dermal fat graft—Cleft lip nose

There are various kinds of deformities in the cleft lip nose, such as flattening or inferior displacement of the alar dome, sepal cartilage deviation, nostril floor depression, and short columella. It goes without saying that the main goal of revision is to obtain symmetry. However, the patient often desires not only symmetry, but also a slight raising of the nose.

Our first choice as the material for augmentation rhinoplasty in such patients has been auricular cartilage graft. However, because columella support is often weak in the cleft lip nose, even when two or three auricular cartilage sheets are joined together, it is difficult to obtain satisfactory results without separately conducting measures to form the tip projection.

The use of an L-shaped graft material is effective in simultaneously providing columella support and augmentation from the tip to the dorsum. Candidates for this material are bone (ilium or calvarium), costal cartilage, and silicone implants (used frequently in Japan). As is already known, however, bone (especially iliac bone) has high absorption [1], loss of elasticity of the nose is a disadvantage, and it is not appropriate without a strong saddle nose. With costal cartilage, warping occurs easily [4], calcification and ossification are sometimes seen [7,12], and there are also problems with stability. Silicone implants are prone to continue providing an unnatural-looking nose and abnormal feeling, tension is applied to the skin, and they are sometimes exposed. And, more than anything, the extreme cosmetic surgical procedure of using a prosthesis is hard for cleft lip patients to accept.

The disadvantage of the auricular cartilage graft is that strong support is difficult to obtain. However, we have obtained virtually satisfactory results by using our own method to prepare an L-shaped framework by combining auricular cartilage sheets together, adding a dermal fat graft depending on the patient, and then grafting it from the tip to the dorsum.

Patients and Methods

Subjects were 12 patients with cleft lip nose deformities, aged 15–47 (mean, 22.4) years at the time of surgery. There were five males and seven females. Regarding cleft type, there were 10 cases of unilateral cleft and 2 cases of bilateral cleft.

Prior to grafting, bilateral rim incisions are made, followed by subcutaneous dissection of the tip. Residual

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adipose and scarring are resected, and repair—such as flattened alar cartilage traction sutures, medial alar crus intercartilagenous sutures, and removal of pica vestibularis contracture—is performed according to each patient, and the symmetry of the nose measured.

Three or four long and short cartilage sheets approximately 4 mm wide are taken from the auricule and combined. Although the length differs among cases, long sheets, 30–45 mm, and even short sheets, up to 25 mm, are needed. These are used to prepare an L-shaped framework. First, however, two sheets are fixed together with sutures, then stabilized so that another sheet crosses over one end (Fig. 1A). This is then bent into two and sutured together as the columella strut (Fig. 1B). If the cartilage is extremely thin or soft, and the strut is also weak, it is useful to insert another sheet in between the two folds. A small amount of dermal graft left over from fat tissue is placed atop the prepared cartilage framework, and one end is passed through the cartilage loop which has been made into the strut, then sutured together (Figs. 1C and D and 2). The composite graft prepared as such is inserted in the pocket already prepared in the nasal dorsum. The columella strut is placed so it lies in the gap between the right and the left medial alar crus. If it is unstable, part of the medial crus intercartilagenous suture is also passed through the strut and it is stabilized. In order to prevent movement in the initial period following surgery, the lead suturing is pulled out from the tip and the nasal root. This suturing is removed 4 or 5 days postoperatively (Fig. 1E).

In cases where occasion warranted the bone to be grafted to the alveolar cleft simultaneously, dermal fat graft donor skin from the site where the iliac bone was taken was used, but the dermis in this same area is not that thick, so the lateral pectoral region was selected when augmentation was expected to be more effective.

Case Reports

Case 1

An 18-year-old male presented with left complete cleft lip and palate. He had previously undergone nose and lip revision (at age 10) (Figs. 3A–C).

A total of four auricular cartilage sheets was extracted, including the longest one of 35 mm, and a framework of three sheets combined was prepared for the dorsum. The length of the columella strut was chosen as 17 mm. A dermal fat graft taken from the groin was placed atop this and grafted to the tip of the dorsum. In addition, to achieve retention following maxillary dental arch expansion, a bone graft to the alveolar cleft and lip scar revision were simultaneously performed.

Figures 3D–F show the postoperative results 1 year and 5 months later.

Case 2

Case 2 was a 19-year-old female with bilateral complete cleft lip and palate (Figs. 4A–C). Three cartilage sheets were extracted, including a maximum-length one of 30 mm, and a framework was prepared. Two sheets were combined for the dorsum, and the columella strut was 10 mm long. The dermal fat graft was taken from the groin. In addition, bone was grafted to the alveolar cleft and lip revision was performed.

The 1-year postoperative results are shown in Figs. 4D–F.

Case 3

Case 3 was a 21-year-old female with incomplete left cleft lip (Figs. 5A–C). A total of four auricular cartilage sheets was extracted, including a maximum-length sheet of 35 mm, and three sheets were used for the dorsum. The columella strut was 10 mm long. Because the strut was not sufficiently strong, it was reinforced by wrapping residual cartilage sheets around it. Dermal fat graft was not performed in this case. Lip revision was also performed.

Figures 5D–F show the postoperative results 1 year later.

Case 4

Case 4 was a 17-year-old female with complete left cleft lip and palate. Although the patient had slight mental retardation, she was fairly concerned about her small nose (Figs. 6A–C).

Three cartilage sheets were extracted, including a maximum-length one of 45 mm. Two sheets were combined for the dorsum, and the length of the strut was 12 mm. Dermal fat was taken from the lateral pectoral region. It was longer than the cartilage framework (60 mm) and onlayed. The upper end was positioned to be slightly above the nasal root. Lip revision was also performed.

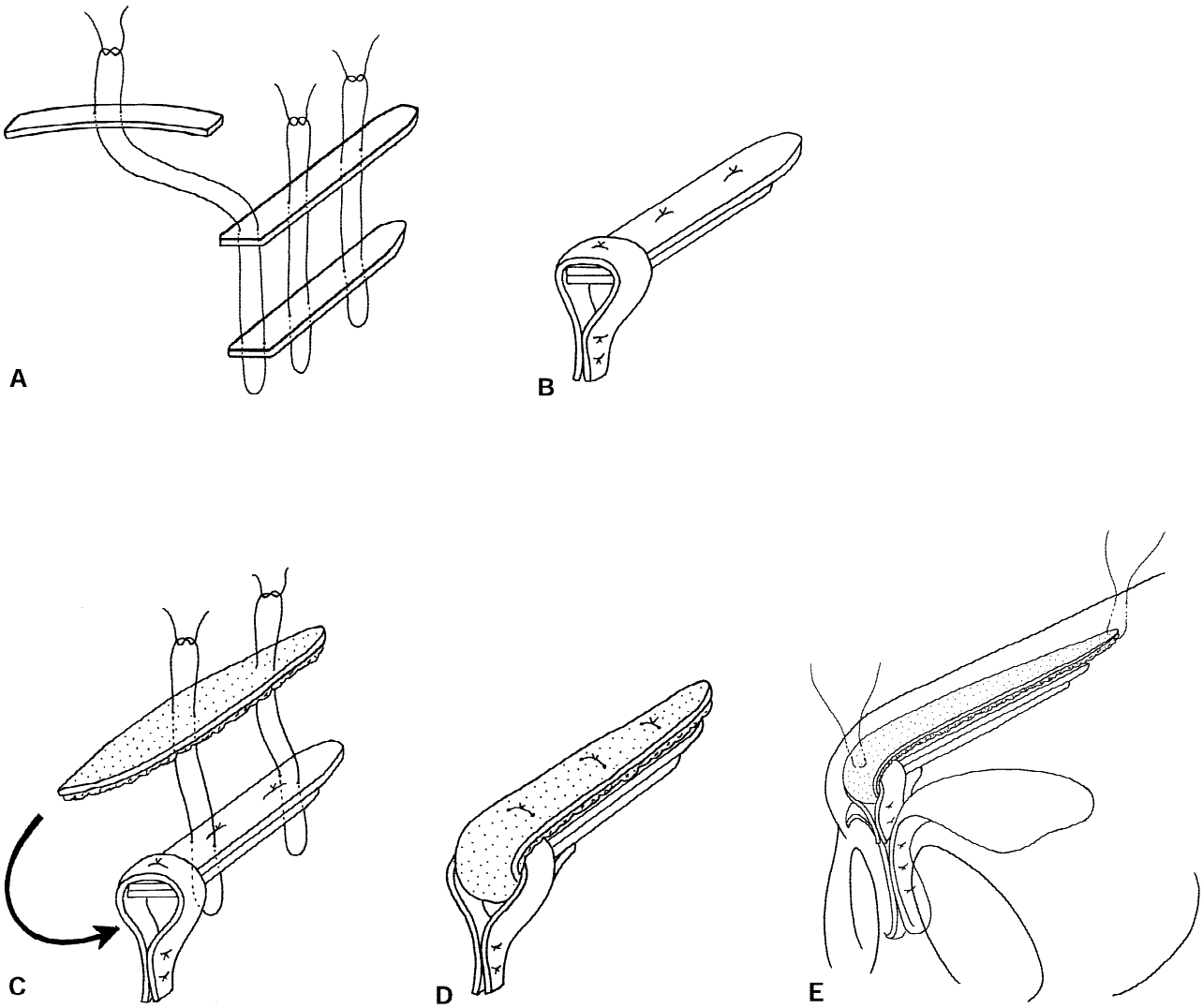
Figures 6D–F show the 4-month postoperative results.

Discussion

In recent years, septal cartilage and auricular cartilage have been used for nasal tip and dorsum augmentation [2,9,10,13–16]. In particular, because auricular cartilage is thin and flexible, it is possible to adjust the thickness of the graft by using it in combination, and it is highly useful as a material for dorsum augmentation [3,6]. However, it has poor stability on its own, and it is difficult to obtain a secure tip projection while conducting dorsum augmentation at the same time.

We therefore designed an L shape combining several sheets of auricular cartilage, as mentioned previously. Regarding the results of actual grafting, we were able to utilize the advantages of auricular cartilage to obtain support which matches that provided by silicone implants.

However, a disadvantage was that when auricular cartilage was grafted to the dorsum, distortion or unevenness penetrated the skin and it could be felt from the outside of the nose. As reported by Guerrerosantos [5] and Miller [8], one effective method of preventing this is



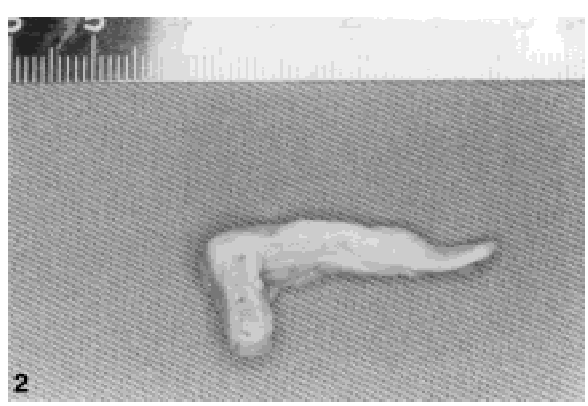


Fig. 1. (A, B) Combination of auricular cartilage for preparing the framework. **(C, D)** One end of the dermal fat is passed through the columella strut loop and placed atop the framework. **(E)** The composite graft is inserted in the pocket of the nasal dorsum, and the columella strut is placed between the right and the left medial alar crus.

Fig. 2. Graft immediately prior to insertion.

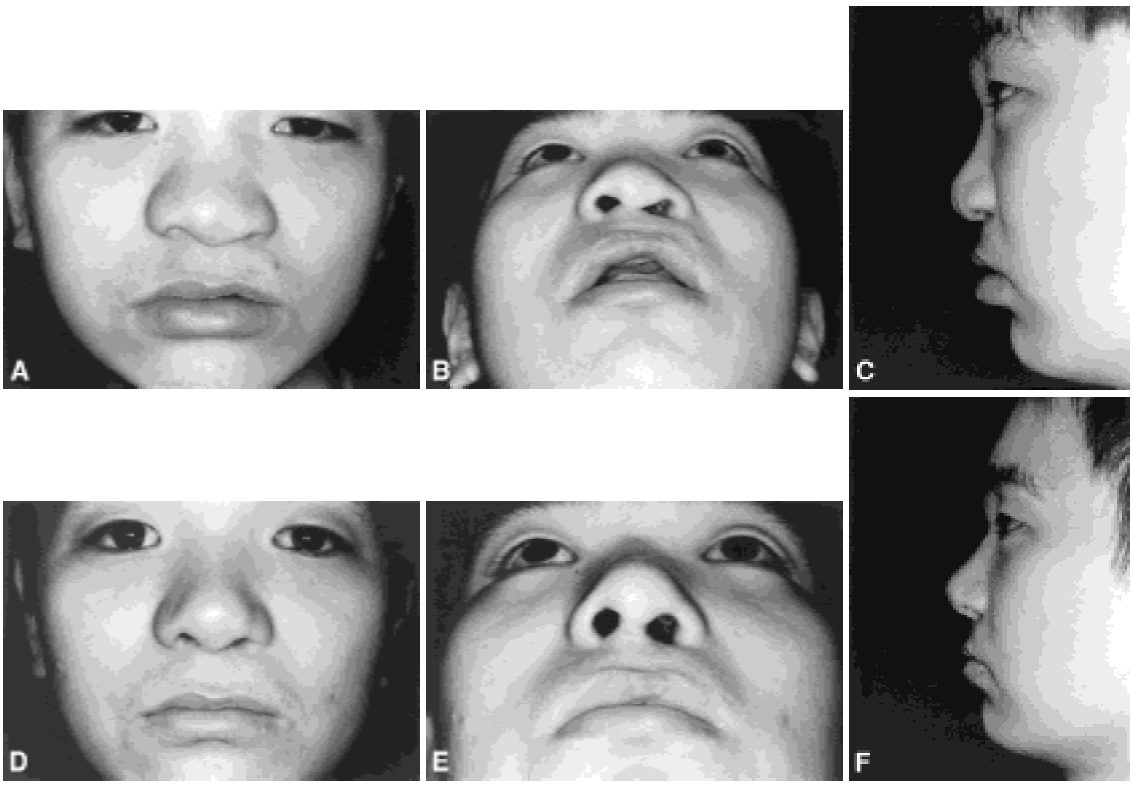


Fig. 3. (A–C) Preoperative views of an 18-year-old male with unilateral cleft lip and palate. **(D–F)** One year and 5 months after the operation.

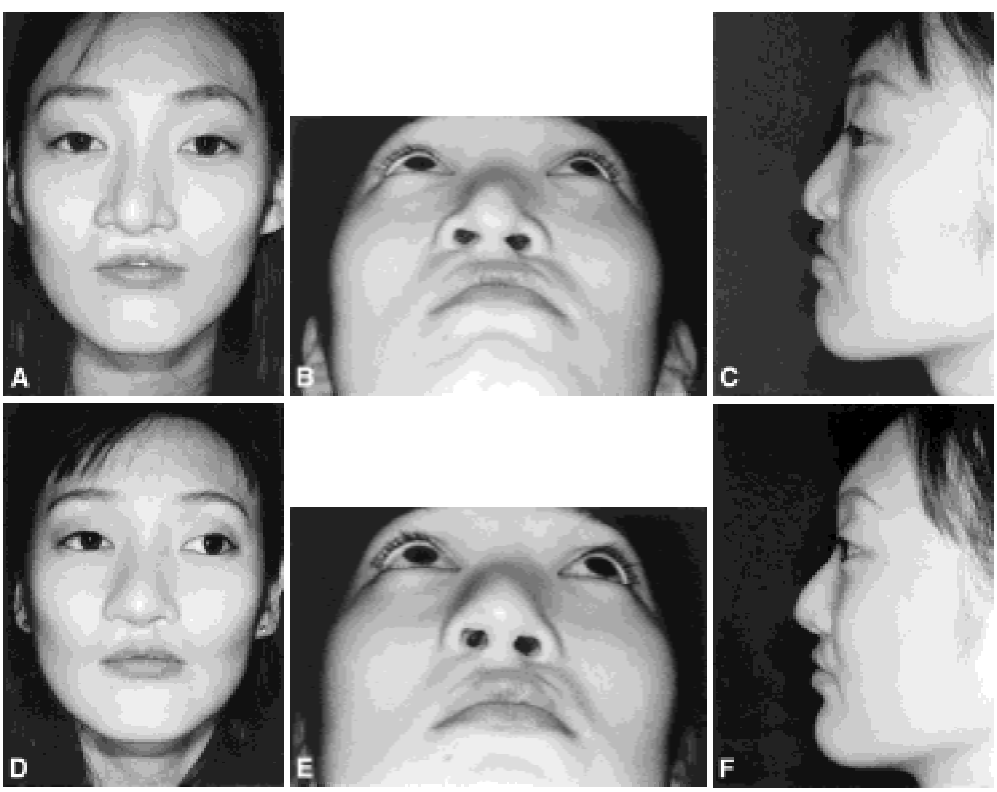


Fig. 4. (A–C) Preoperative views of a 19-year-old female with bilateral cleft lip and palate. **(D–F)** One year after the operation.

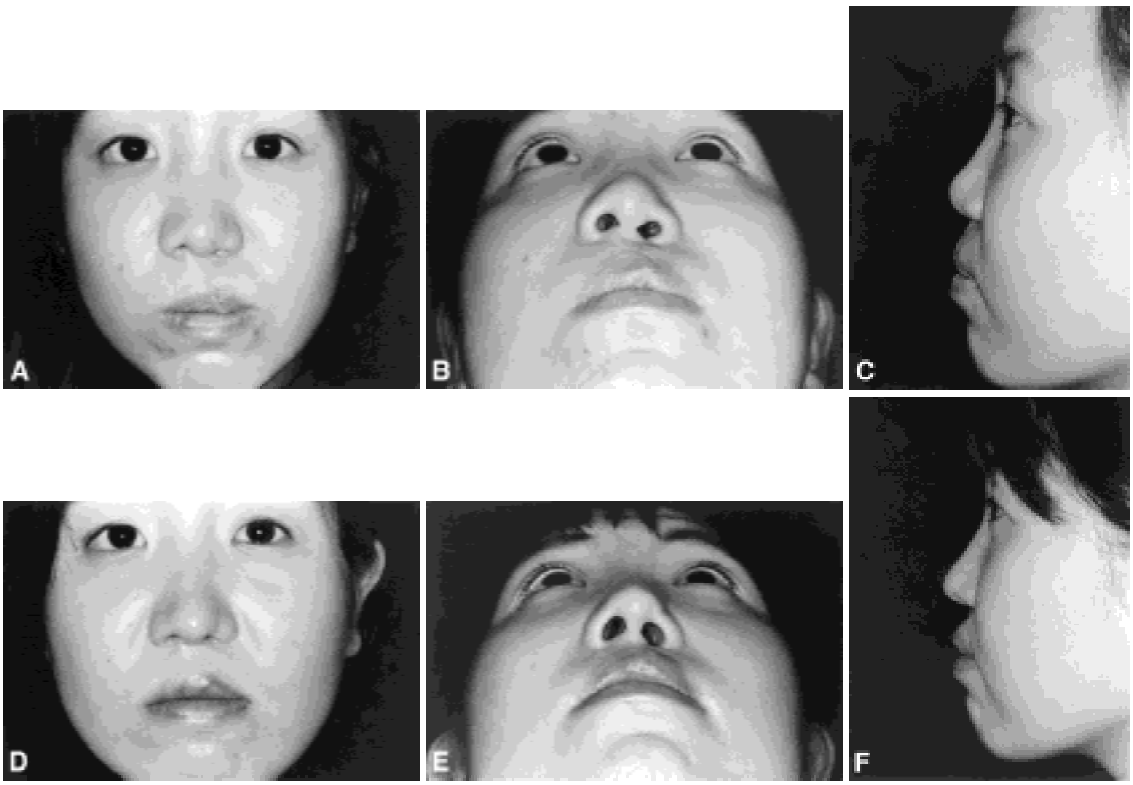


Fig. 5. (A–C) Preoperative views of a 21-year-old female with unilateral cleft lip. **(D–F)** One year after the operation.

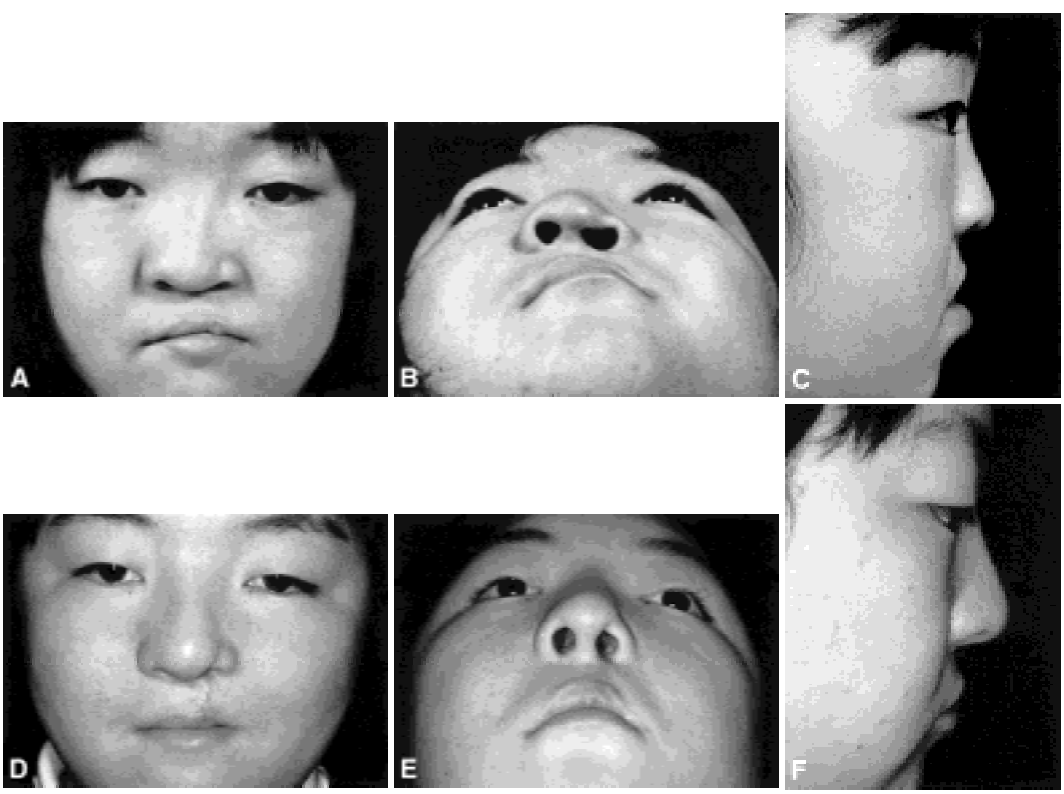


Fig. 6. (A–C) Preoperative views of a 17-year-old female with unilateral cleft lip and palate. **(D–F)** Four months after the operation.

to cover the top of the cartilage with a free graft of temporal fascia. However, because fascia is thin, the effectiveness of fascia augmentation in itself is low. We chose dermal fat graft to achieve more effective augmentation, in addition to camouflaging the unevenness of the cartilage.

The problems with dermal fat grafts are that, first, there is a decrease in graft volume in the later postoperative period and, second, there is the possibility of cyst formation. Reich reported that in 182 patients who underwent dermis graft in the dorsum, it was not clear whether there was a decrease in volume in the single-layer graft of dermis which excluded visible fat, but a decrease in volume was prone to develop in the multilayered graft when fat remained [11]. In our series, we grafted dermis in which a small amount of fat was left over by laying it atop the free cartilage. In general, the volume deceased visibly within 2 or 3 months postoperatively, but it virtually stabilized thereafter. At this stage there have been no cases of cyst formation.

The disadvantages of this are, first, the extreme length of time and labor involved. To obtain three or four cartilage sheets, it is normally necessary to extract them from both sides of the auricle and, combined with dermal fat extraction, many hours of surgery are needed. Second, there is the problem of donor characteristics. When the donor is limited to the concha, there are mostly no deformations, but when the ear is small, the graft length is insufficient with the concha alone, so extraction must be to the antihelix, resulting in the disappearance of the normal protuberance of that part. Also, when the pectoral region laterally is used as the dermal fat donor, scarring will be slightly noticeable, so for females sites should be chosen where scarring can be hidden by underwear.

It is rather difficult to obtain perfect symmetry from cleft lip nose revision; there are times when relapse is not preventable and the patient cannot be satisfied. Although surgery is naturally predicated on the wishes of the patient, active augmentation contributes to the overall look of the nose even if, for example, symmetry is not satisfactory. We were able to achieve effective augmentation and obtain a natural nasal contour using auricular cartilage and dermal fat.

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