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Clinical Paper
Cleft Lip and Palate

Component columella augmentation in cleft nose rhinoplasty: a preliminary study

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Abstract. The purpose of this study was to evaluate the outcome of a component columella augmentation technique in cleft nose rhinoplasty. This prospective study included rhinoplasty procedures in bilateral cleft nose patients treated by component columella augmentation technique. After surgery, all patients were followed up daily for the first week, and then at 1 month and 6 months postoperative. The following four parameters were assessed: nasal tip projection, infratip lobule length, infratip lobule-to-base distance, and columella–labial angle. Thirteen rhinoplasty patients were included. Tip projection was increased (5.6 ± 3.5 mm) in all cases postoperatively ($P < 0.05$); the increase was seen mostly in the lobule-to-base length (4.5 ± 0.4 mm), with a minimal change in lobule length (1.1 ± 3.6 mm). Preoperative and postoperative lobule lengths were not statistically different ($P > 0.05$). With this technique, it is not necessary to involve the upper and lower lips. Therefore, the non-aesthetic vertical scars and tissue distortion that may occur with local flaps are easily avoided. Compared to composite augmentation, each part of the deformity (cartilage and skin) is precisely and separately restored with this technique.

Key words: rhinoplasty; cleft nose; component columella augmentation.

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Aesthetic reconstruction of the nose in patients with a bilateral cleft lip deformity is usually a challenging endeavor in cosmetic rhinoplasty. In these patients, the underdeveloped nasal tip presents a downward rotated tip with a prominent pseudo hump, the nasal lobule is generally poorly defined, and the columella is severely shortened, while the alae are flared laterally.[1–4] The general strategy when operating on these patients is to increase the tip projection and reduce the pseudo hump in order to provide an acceptable aesthetic profile. The main restricting factor is usually the shortened columella, which limits the increase in tip projection. The use of various modalities to overcome this complex deformity, such as the V–Y plasty, local flaps, and composite grafts, is well-documented in the literature.[3–5]

Joseph Gensoul is frequently credited as being the first to address this deformity. With his technique, the nasal philtrum is advanced to the columella and the upper lip is closed leaving a vertical scar.[6–8] Although many modifications have been made to resolve the potential drawbacks of

this approach,[9,10] its popularity has not grown due to its potential limitations.

In Millard's approach for columella lengthening, two prolabial flaps are created on each side of the philtrum so that the remaining scars of previous lip surgeries are lifted in flaps; these two pedicled flaps are attached and sutured to extend the columella.[11,12] The lip revision works are then completed to remove the scars and to lengthen the columella at the same time.[11,12]

Rikimaru et al. proposed a modification of the fork flap by preparing two accompanying subcutaneous pedicles for better survival and healing of the cutaneous flaps.[13] Carlino tried to avoid entering the upper lip; in this modification, the two fork flaps are formed from the columella skin and the V–Y plasty of these small fork flaps elongates the columella.[14]

Cronin used the nasal base crease to conceal the incision line and to slide the nasal base tissues to a vertical incision in the columella.[7,8] Brauer and Foerster placed all of the incisions on the columella and the nasal side walls to do the V–Y plasty advancement and to avoid leaving additional upper lip scars.[15] Ozaki et al. used their standard columellar incision (V incision on columella) for V–Y plasty.[16]

The Abbe flap is another well-known and regularly reported technique to restore deficient upper lip components and the columella base in bilateral cleft lip patients.[17–19] Yoshimura et al. reported the innovative use of the Abbe flap in cleft nose patients. They performed routine cleft rhinoplasty, while open incision designs were planned such that the shortage of columella skin was completely compensated by the skin of the upper lip. Once the rhinoplasty had been completed without any problem, the Abbe flap was reflected from the lower lip to cover the prolabium and to restore any possible deformities in the upper lip.[20] This approach, with many modifications, is repeatedly reported in the literature.[21–23]

The composite graft is one of the oldest known techniques for columella augmentation. The popularity of this approach has been revived in the past few years. In original descriptions by Meade, a composite chondrocutaneous graft was harvested from the ear helix, which was placed in a gap created in the columella.[24] The later advent of the open approach increased the possibilities for composite graft placement. The general concept of the chondrocutaneous composite graft is to reinforce the cartilaginous framework and to elongate the columellar skin at the same time. The cartilagenous part of the composite graft is usually sutured and fixed to the medial crural cartilage to support the lower lateral cartilage. In addition, the overlying skin is sutured to the columella flap on the one side, and to the columella base on the other, to freely cover the skin gap.[24–26] Cheon and Park used composite conchal grafts to elongate the columella in 137 patients, over a relatively long period of time (nearly 21 years), and found these to be quite effective and predictable, especially for a severely short columella.[27]

The authors believe that although the composite defect presents in the nasal lobule, which includes the columellar skin and the cartilage, one of the major limitations in reconstruction of these parts is a deficiency of skin. This skin shortage will be more obvious after adjusting the tip shape and projection. With the component columella augmentation technique, the cartilaginous framework in the tip area is reconstructed (to improve tip support, increase tip projection, and form the nasal tip). Then a full-thickness skin graft obtained from the alar base resection (or ear) is used to cover the skin defect in the columella area. This defect in the columella area becomes more obvious after tip reconstruction.

The purpose of this study was to evaluate the outcomes of the component columella augmentation technique in cleft nose rhinoplasty and its effects on nasal tip projection, lobule length, lobule-to-base distance, and columella–labial angle.

Materials and methods

This study was approved by the university research and ethics committee. This prospective study included rhinoplasty procedures in bilateral cleft nose cases treated by component columella augmentation by the senior author (BB) during the years 2010–2014. The primary inclusion criterion was severe shortening of the columella, requiring both cartilage and skin augmentation to provide the best tip form and projection. The length of the columella was evaluated objectively before the operation. None of the patients had any history of previous rhinoplasty or orthognathic surgery. The following patients were excluded as study subjects: patients unwilling to accept the possible complications and those who did not attend follow-up visits.

All patients underwent component columella augmentation. The patients were then followed up daily for the first week postoperative to evaluate the vitality of the graft and possible graft necrosis, after which they were followed up at 1 month and 6 months. Follow-up was continued every 6 months for up to 4 years. Preoperative, intraoperative, and postoperative photographs were used to analyze the parameters. All postoperative values were those measured at the final follow-up visit when the results were considered to be stable.

Frontal, profile, and basal views were assessed using a clinical photograph analysis system for the following four parameters: nasal tip projection, infratip lobule length, infratip lobule-to-base distance, and columella–labial angle.

Nasal tip projection was measured as a line drawn parallel to the Frankfort horizontal plane from alar point (AP) to nasal tip (NT). The line drawn across the alar point was perpendicular to the Frankfort horizontal plane (Fig. 1A). Lobule length was measured from a line drawn from the nasal tip (NT), perpendicular to the distance line between the nostril domes (Fig. 1B). The lobule-to-base distance was measured as a line drawn from the inter-nostril dome distance line to the columella base (Fig. 1C). The columella–labial angle was considered as the curved junction of the columella with the upper lip (Fig. 1D).

The statistical analysis of the findings was performed using SPSS 16.0 software (SPSS Inc., Chicago, IL, USA). Results with a P-value of <0.05 were considered significant.

Surgical technique

All patients underwent an open rhinoplasty under general anesthesia. After placing an inverted V incision over the columella and marginal incisions, a wide skeletonization was performed. The lateral crural cartilage was completely stripped off the underlying skin to allow it to be freely repositioned superomedially in the midline. An extended strong columella strut was prepared from the septal cartilage and was then placed and fixed to obtain the ideal tip projection. Next, a well-shaped shield graft was harvested from the septal cartilage (or conchal cartilage) and fixed with several PDS sutures into its correct position. After providing an ideal tip form and projection, the skin flap was gently returned to its place to evaluate the extent of the skin defect in the newly elongated columella.

Skin marks were placed accordingly in the alar base area to complete the nasal base surgery, while a full thickness skin graft was provided for the denuded area. If the alar base resection was not done or if