Objective: To use the trimmed cartilage as a support material for both internal and external valves.

Methods: The lateral crural turn-in flap (LCTF) technique is simply to make cephalic trimming of the lateral crura and turn it into a pocket created under the remaining lateral crus. Twenty-four patients with lateral crura wider than 12 mm and in whom this technique was applied took part in this study. The trimmed cartilage was used to reshape and/or support the lateral crus and the internal valve by keeping the scroll intact. The support and suspension of the lateral crura “sandwich” helped not only to prevent stenosis of the internal valve angle but also to widen it in some cases.

Results: The LCTF has been used in 24 patients to reshape and/or add structure to the lateral crus with great success. The internal valve was also kept open by keeping the scroll area intact, especially in 1 patient with concave lateral crura in whom this technique helped to widen the internal valve angle.

Conclusions: This study shows that the LCTF can be used to reshape and add structure to the lateral crus and to suspend the internal valve. Although it is a powerful technique by itself in functional rhinoplasty, it should be combined with other methods, such as spreader flaps/grafts or alar battens, to obtain the maximum functional result.

lateral crural grafts, and/or alar battens. In this study, a technique that can overcome some of the abovementioned structural problems of the lateral crura is presented.

**METHODS**

This technique was used in 24 cases (13 women and 11 men) who underwent surgery from December 2008 through January 2011. The mean duration of follow-up was 14 months (range, 8-24 months). The mean age was 27 years (range, 19-50 years).

All patients underwent surgery under general anesthesia. After the local anesthetic was applied to the incision sites and dissection planes, an inverted-V incision and marginal incisions were performed. The columnellar flap was elevated by using sharp curved scissors. Then the columnella, domes, and lateral crura were dissected free of the surrounding soft tissues. By doing so, an undistorted view of the lower lateral cartilages could be obtained, which was very important in decision making. At this point in the operation, the shape, orientation, resiliency, thickness, width, and symmetry of the lateral crura were evaluated. In almost all of the patients, I was willing to leave at least 7 mm of lateral crus left behind. The turned-in flap was used to reinforce the remaining lateral crus while refining the ala. In these 19 patients, the lateral crura were very thin and weak, and the turned-in flap was used to reinforce the remaining lateral crus.

The lateral crural turn-in flap (LCTF) has been used in 24 cases. In 12 of these patients, the lateral crura were found to have concavity (Figure 3), whereas 7 had convexity. In 16 of these 19 patients, the shape of the lateral crus was turned into a slight convexity, which was a desirable result. In the remaining 3, it stayed slightly convex because of irregular shape of the lateral crus. In 5 of the cases, the lateral crura were very thin and weak, and the turned-in flap was used to reinforce the remaining lateral crus while refining the ala. In these 19 patients, the lateral crura were moderately thick in 15 patients, whereas they were remarkably thick in 4 patients. The most striking correction was noted in this latter group because the turned-in flap was strong enough to eliminate extreme concavity or convexity. In 1 of these patients with concave lateral crura, after the application of LCTF, the concavity turned out to be a mild convexity, and the internal valve angle was widened owing to the pulling effect of the suspended lateral crus.

In the first 5 cases, the scroll area was also detached so as to turn the cephalically trimmed piece inward throughout the whole length of the lateral crus. In the remaining 19 cases, the scroll area was kept intact to prevent possible collapse at the internal valve angle by scar contracture. In 1 case in which the patient had a 1-sided severe alar collapse during quiet breathing, after the application of LCTF, a mild collapse persisted, although it did not cause any kind of nasal obstruction.

**COMMENT**

The turn-in folding of the cephalic portion of the lateral crus to support the alar rim was described in 2007 by Telioğlu et al, who reported satisfactory results in all cases. Murakami et al also reported a similar technique to reinforce the alar cartilage after cephalic trimming. The technique described herein was adapted from these 2 studies.

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**Figure 1.** The schematic illustration of the surgical technique. A, Cephalic trimming is usually the resection of the medial half of the lateral crus leaving at least 7 mm of cartilage in place (shaded area). In the modified technique presented herein, a linear cut on the lateral crus is made as shown. B, The width of the lateral crus should be at least 12 mm to create a lateral crus turn-in flap. C, The internal lining of the lateral crus is carefully dissected, leaving 1 to 2 mm adhered to it caudally. A caliper is used to measure 7 mm, and a linear marking is made as shown in panel A. D, The cephalic portion is turned in after partial cutting and sutured in a sandwich fashion using three to four 5-0 PDS sutures. E, The preservation of the scroll area helps to suspend the caudal portion of the upper lateral cartilage. The inner lining is then sutured to close the dead space.
but modified starting from the first case. What was the reason for this modification? It was thought that the lateral crus could be supported if the trimming was done in a linear fashion, and the turned-in flap could be long and wide enough to support throughout its entire length. That is why this technique was used only in cases in which the width of the lateral crus was at least 12 mm. Keeping in mind that this modification could cause a collapse at the nasal valve angle, a second modification was made, keeping the scroll area intact. In fact, no collapse was observed in any of the

Figure 2. A demonstrative case of a patient with hyperconcave lateral crura who was treated with lateral crural turn-in flap. A, On frontal view, concavity of the lateral crura can easily be seen. B, The concavity of the lateral crura can also be seen during surgery. C, The superior view also shows a prominent concavity of the lateral crura. D, The skin under the lateral crura is dissected and removed, keeping the caudal part untouched. E, A caliper is used to measure 7 to 8 mm of lateral crus, which will be left in place. F, After marking the linear incision line, a partial cut is made like a cephalic trim. G, The cut segment is turned in over the remaining lateral crus. H, After the 2 opposing segments of the lateral crus are sutured to each other, the concavity has become a convexity. I, On superior view, one can see the difference in shape on both sides, where the right side is convex and the untouched right side is concave. J, A lateral crural turn-in flap has been applied on both sides, and concavity has been transformed into convexity. K, The end result can also be seen in the superior view.

Figure 3. The change in shape can be seen when preoperative and postoperative pictures are compared. Frontal (A and B), lateral (C-F), oblique (G-J), and basal (K and L) views.
patients, even in the first 5 patients, during the follow-up. Moreover, the second modification has been used as a preventive measure, preventing inward collapse, and sometimes providing a lateral pull of the caudal part of the ULCs. This modification was found to be very helpful, especially in cases in which a hump was removed, and the ULCs were freed away from the nasal septum.

The shape of the lateral crus can be convex, concave, flat, or a mixture of all of these. One of the main strengths of this technique seems to be the ability to suture 2 opposing pieces together to straighten the lateral crus regardless of its shape. Although in theory it looked like a very appealing feature, in some cases it did not work out well. There were several reasons for this: (1) the lateral crus is not a symmetric ellipse, and the upper and the lower borders can show a different configuration, (2) the turned-in flap is usually 1 to 3 mm narrower than the caudal part, and (3) the lateral crus can too weak to buttress another piece.

Alar cartilage strength is usually an understated condition in the literature. When the cartilage strength was taken into account, it was found to be weak in 5 cases, moderate in 17, and thick and strong in 4. The weaker cartilages could be reinforced by LCTF without any reshaping effect. In the remaining 19 patients, a more desirable shape was obtained in 16 by this technique, and in 3 patients, a slight concavity persisted owing to a variant in alar shape (Figure 4). When these 3 patients were critically evaluated by looking at the intraoperative pictures and followed postoperatively, it was thought that lateral crural strut grafts could help more to get rid of concavity. Another option could also be the use of a cephalic tuck procedure, especially in this kind of anatomic variations. Therefore, the shapes of the cartilage segments sutured over each other and the resulting shape of the sandwiched lateral crus should be evaluated thoroughly in each particular case.

There are different surgical options for alar reshaping and/or restructuring described in the literature. The most widely used and simple of all is cephalic trimming and surgery. In cases of excessive concave crura, lateral crural “flip flop,” alar battens,6,7 lateral crural strut grafts,2 lateral crural grafts,2 and lateral crural mattress sutures2 are all viable options. The LCTF described herein proved to be a multipurpose technique for refining, reshaping, and restructuring in cases in which a similar result could be obtained only with the combination of above-mentioned techniques.

In 1 case in which the patient had a 1-sided severe alar collapse during quiet breathing, after the application of LCTF, a mild collapse persisted, although it was not causing any kind of nasal obstruction. When a critical analysis of the preoperative and intraoperative videos and pictures was performed, I realized that the epicenter of the collapse in this case was more lateral, beyond the margins of the lateral crus. Although the use of LCTF helped in this case, the addition of an alar batten would be more useful. Therefore, even though the LCTF can solve many problems regarding the ala, a surgeon should not hesitate to use adjunctive grafts during surgery, depending on the needs of the patient. In conclusion, LCTF as described herein can be used to refine, reshape, and add restructure to the lateral crus. By doing so, it is a useful technique to reinforce the external valve. In reduction rhinoplasties, it not only helps to prevent the collapse but also to widen the nasal valve angle. In many instances, it is highly recommend to combine LCTF with other internal and external valve supporting procedures, such as spreader flaps/grafs, alar battens, lateral crural strut grafts, and alar rim grafts.

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