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A TECHNIQUE FOR TREATMENT OF LATERAL CRUS MALPOSITION AND ALAR RIM RETRACTION SIMULTANEOUSLY IN RHINOPLASTY: CAUDAL EXTENDED LATERAL CRURAL STRUT GRAFT

RİNOPLASTİ AMELİYATINDA LATERAL KRUS MALPOZİSYONU VE ALAR RİM RETRAKSİYONUNUN SİMÜLTANE DÜZELTİLMESİ: KAUDALE UZATILMIŞ LATERAL KRUS STRUT GREFTİ

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Abstract

Objective: Cephalic malposition and weakness of the lateral crus may result in a long alar line, boxy nasal tip, parenthesis-deformity of the alar rim and external nasal valve insufficiency in deep inspiration, in addition to alar retraction. There is no gold standard method for correcting alar retraction and lateral crus deformities in rhinoplasty operations. Caudal extended lateral crural strut (CELCS) graft is a technique used to correct malposition of the lateral crus, to strengthen a weak lateral crus and to correct the alar rim retraction. An autologous septal cartilage graft may be used during CELCS.
Methods: CELCS graft was placed in 46 primary, open rhinoplasty procedures between 2014 and 2019. The graft was harvested from septal cartilage and placed on the lateral crus so that the cephalic areas overlapped while the caudal portion would extend into the pocket created in the caudal rim.
Results: Of the 46 patients, 30 (65.2%) were female and 16 (34.8%) were male. Median (range) age was 32 (23 to 41) years. All patients underwent CELCS graft, placed to correction cephalic malposition and alar rim retraction simultaneously. The average follow-up period was 12 months (9-15 months). Satisfactory results were achieved in all patients.
Conclusion: CELCS graft was a successful method to correct both lateral crus malposition and alar rim retraction simultaneously.

Keywords: *Alar, crus, lateral, malposition, retraction, rim.*

Öz

Amaç: Sefalik malpozisyon ve zayıf lateral kurus birlikteliği uzun alar çizgi, boxy burun ucu, parantez rim deformitesi ve eksternal nazal valv yetmezliği yanında alar rimde çekintiye neden olur. Lateral kurus deformitesi ve alar rim çekintisini eş zamanlı düzelten altın standart tedavi yöntemi yoktur. Hastanın septal kartilajından alınarak kaudal kenarı rime uzanacak şekilde lateral kurusun üzerine adapte edilen "kaudale uzatılmış lateral kurus strat grefti" kurusu güçlendirirken rimdeki çekintiyide düzeltir.
Yöntem: Kaudale uzatılmış lateral kurus strat grefti, 2014-2019 yılları arasında primer açık rinoplasti uygulanan 46 hastada kullanıldı. Septal kartilajdan alınan greft sefalik tarafta lateral kurusla üst üste, kaudal tarafta rimde açılan poşa gelecek şekilde konuldu.
Bulgular: Hastaların 30'u (%65,2) kadın, 16'sı (%34,8) erkekti. Hastaların ortalama yaşı 32'ydi (23-41). Kaudale uzatılmış lateral kurus strat grefti tüm hastalarda sefalik malpozisyon ve rim çekintisini eş zamanlı düzeltmek için kullanıldı. Ortalama takip süresi 12 aydı (9-15 ay). Tüm hastalarda başarılı sonuçlar elde edildi.
Sonuç: Kaudale uzatışmış lateral kurus grefti lateral kurusun sefalik malpozisyonu ile alar rimdeki çekintiyi eş zamanlı düzeltebilen başarılı bir yöntemdir.

Anahtar Kelimeler: *Alar, çekinti, kurus, lateral, malpozisyon, rim.*

Introduction

The position, strength, length, and width of the lower lateral cartilage (LLC) become increasingly important in rhinoplasty operations as the LLC affects the nasal type, position of the alar rim and external nasal valve, directly or indirectly. The normal position of the lateral crus (LC) forms an angle between the LC and the midline of >45 degrees and is facing the lateral canthus ipsilaterally. Retraction of the alar rim, which frequently develops depending on the position of LC, it is defined as the distance between the long axis of the nostril and alar rim exceeding 2 mm.[1] Cephalic malposition of the LC is one of the most common causes of alar retraction.[2,3] Especially in primary rhinoplasty operations, alar retraction may occur after excessive excision of cephalic LC. Cephalic malposition and weakness may lead to a long alar line, boxy nasal tip, parenthesis deformity of the alar rim and external nasal valve insufficiency during deep inspiration, in addition to alar retraction.[4-7] Alar retraction causes an unnatural alar rim and a more visible nostril. Techniques such as alar rim grafts, LC reposition, lateral crural strut grafts, composite grafts, and soft tissue advancement flaps have been used to correct alar retraction.[2,8] Currently, the gold standard technique remains lateral crural strut graft (Gunter graft) to correct cephalic malposition. However, this technique may be inadequate in correcting alar rim retraction.[9] Composite grafts are frequently used for the treatment of severe alar retraction but these are inadequate for treatment of malposition and weakness of the LC. Composite grafts may also cause complications such as donor site morbidity and graft resorption.[10]

In this article, we describe the "caudal extended lateral crural strut (CELCS)" graft, which simultaneously corrects both alar retraction and malposition of the LLC.

Methods

Local institutional ethics committee approval was obtained (Kocaeli Üniversitesi, GOKAEK-2021/7.11, Project no: 2021/127) and all procedures were in accordance with the Declaration of Helsinki. Informed consent was obtained from all patients. All patients underwent primary rhinoplasty and CELCS graft was applied to all patients between 2014 and 2019. No patient had general illness or was undergoing additional therapies. Patients with external nasal insufficiency, as well as patient with alar rim retraction and cephalic malposition of LLC were included. The collapse and rim retraction occurring with deep inspiration were observed.

Surgical Technique

All patients were operated under general anesthesia. Local anesthesia infiltration was performed in the incision and dissection areas. By performing subperichondrial dissection via the transcolumellar inverted "v" incision, elevating the nasal flaps and dissecting bilateral LLCs were revealed by dissecting to the apertura piriformis. A marginal incision was made in a cephalic manner, taking care to cover the skin without causing tension on the graft. The alar vestibular skin was dissected until the caudal portion to allow for positioning of the caudal part of the CELCS graft to be placed in the pocket formed. Two grafts measuring on average 9 mm in width and 14 mm in length were prepared from the graft taken from the septal cartilage (Figure 1). The dimension of the caudal edge of the graft was determined according to the severity and size of the retraction and malposition. It is appropriate to plan this to extend 2-3 mm along the caudal edge of the graft. After tipplasty, the CELCS graft was placed on the LC so that the cephalic parts would overlap, and the caudal part could be positioned in the pocket created in the caudal rim. LLC strut grafts were extended until the apertura piriformis. The graft was stabilized at three sites with 5.0 PDS sutures (Figure 2). The aim of this was to strengthen the LLC and to correct LLC cephalic malposition, as well as to simultaneously correct the rim retraction. Figure 3 demonstrates how the CELCS graft was placed on the lateral crus.

Figure 1. Grafts measuring on average 9 mm in width and 14 mm in length were harvested from the septal cartilage.

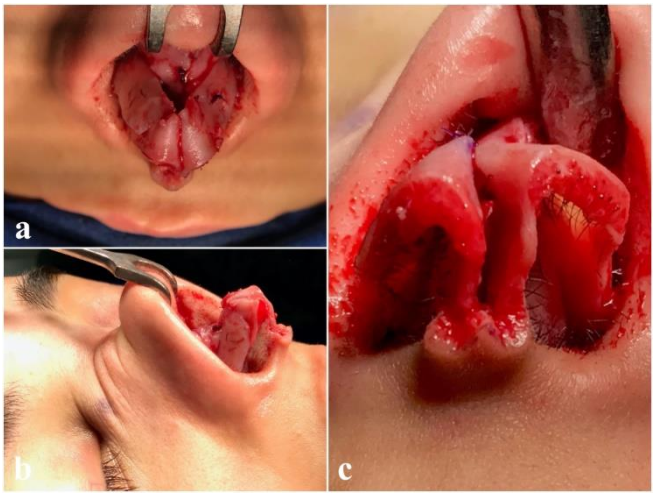

Figure 2. (a) Lateral crus is seen after tipplasty and cephalic trim. (b) Caudal extended lateral crural strut graft applied over the lateral crus. Lateral crus malposition and weakness is corrected. (c) Lateral crus is elevated in sub-perichondrial plane. Lateral crus malposition is seen.

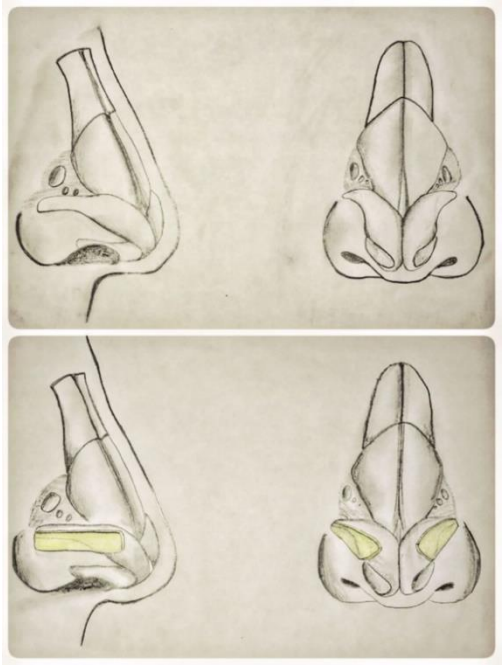

Figure 3. The graft (yellow) is applied on the lateral crus to extend to the apertura piriformis.

Results

The CELCS graft was used in 42 patients during the study period, of whom 30 (65.2%) were female. The mean (range) age of the patients was 32 (23-41) years. The average follow-up period was 12 months (9-15 months). Postoperative recurrence of the deformity was not clearly detected in photos during the follow-up periods. External nasal valve insufficiency, occurring during deep inspiration was successfully treated in all patients. No infection, suture reaction or step deformity was observed. Six patients were re-operated due to other problems: tip problems (n=3) and dorsum irregularities (n=3). During the revision operation, the graft was thinned and re-adapted in position. Clinical results are shown in Figure 4 and 5.

Figure 4. This 29 year-old male presented with a cephalic malposition of the lateral crus and alar rim retraction. (A-B-C). Post-operative, 18 months after primary rhinoplasty (D-E-F). Patient affected by primary alar retraction (seen white arrow-B) corrected by caudal extended lateral crural strut graft (seen white arrow-E). Patient affected by primary cephalic malposition (seen dashed white arrow-C and F) corrected by caudal extended lateral crural strut graft (seen white arrow-F). Note that the rim contour is corrected despite the retracted columella being brought forward.

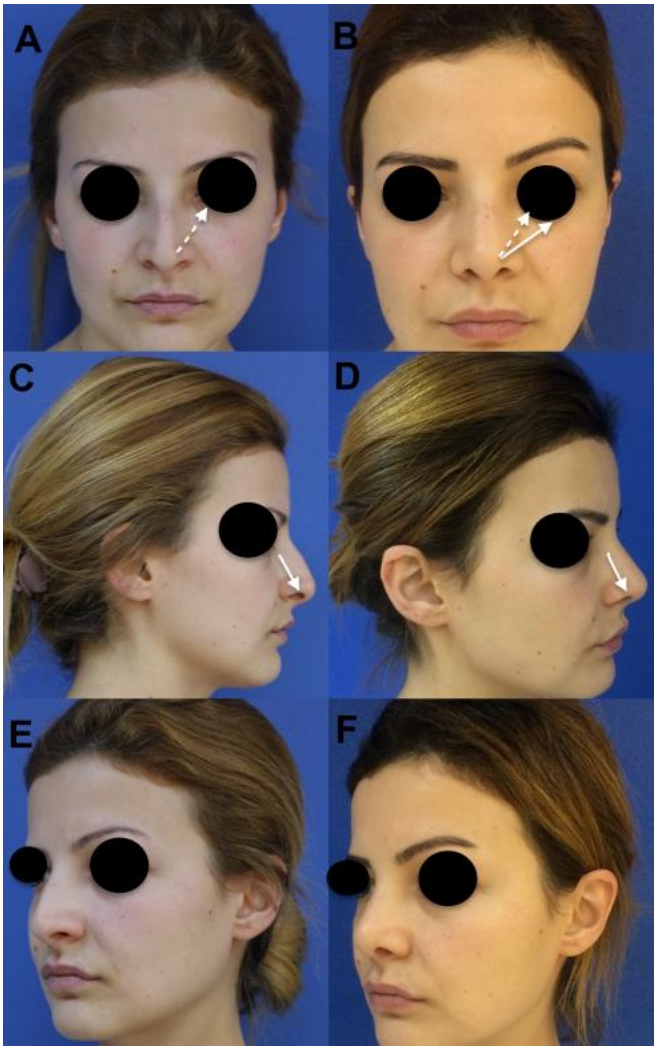

Figure 5. This 23 year-old female patient presented with primary cephalic malposition (dashed white arrow-A) and primary alar retraction (white arrow-C) corrected by caudal extended lateral crural strut graft (seen white arrow-B and D).

Discussion

It is important to assess rim retraction and malposition of the LC pre-operatively because deformity of these structures may cause both functional and aesthetic problems. Malposition of the LC causes boxy tip, external nasal valve insufficiency, and deformities in the alar rim lead to unnatural nose wings and nostril exposition. Sheen et al.[11] described an alar-columellar relationship as 2 to 3 mm of the columellar showing on the lateral view. Alar rim retraction may be accompanied by malposition and weakness of the LC. The position, strength, and size of LC are important for rhinoplasty operations. There are numerous methods for correcting deformed and weak LC. These include suture techniques, graft techniques and flap techniques.[12-14,16-18] One or a combination of these techniques is used in rhinoplasty operations. Currently, lateral crural strut grafting is frequently used to treat malposition and weakness of LC.[19] Septal cartilage, conchal cartilage, and costal cartilage have been used as grafts. In our study, the lateral crural graft was extended caudally and alar rim retraction was also corrected simultaneously. Gunter et al.[19] achieved successful results in 118 patients by using lateral crural strut graft. These authors used the septal cartilage as a graft donor site and additional morbidities were avoided. The graft was sutured to the deep surface of the lateral crus. In this way, a contribution was provided to the stability of the graft. In our technique, the

graft was placed on the lateral crus to protect the deep connections of the lateral crus.

Some authors have resected the malpositioned lateral crus and replaced it in a more caudal position as a free graft.[20] In this technique, the entire association of the lateral crus with the accessory cartilages connected to the piriformis aperture was impaired. Thus, the preservation of all anatomic connections of the lateral crus can be considered as an advantage of our technique.

Boccieri et al.[21] made an overlap by dissecting the lateral crus into anterior and posterior segments in order to correct the lateral crus parenthesis deformity. This improved the lateral crus deformity, but it caused a drop of the tip projection. In the CELCS graft technique, the tip is supported.

Tellioglu et al.[22] used a technique of turn-in folding of the cephalic portion of the LC to correct the concavity of the lateral crus. With this turn-in folding of the cephalic portion of the LC, the alar rim was supported by correcting the concavity of the cartilage. However, although it strengthens the LC, it cannot correct malposition. Once again, use of the CELCS graft overcomes this problem by both correcting the malposition and strengthening the LC.

The posterior portion of the alar rim is composed of soft tissues controlling the movements of the nasal muscles.[23] Therefore, using alar rim contour grafts may impair the movement of these muscles by disturbing the natural structure of the posterior rim. Okten et al.[24] precluded the extension of the graft to the posterior rim by applying the z-plasty technique to the lateral crus. In this technique, the malposition of the LC was corrected without disturbing the natural structure of the rim, but it did not improve the weak lateral crus. In our technique, the graft was advanced only to the anterior portion of the rim. In this way, in addition to preserving the natural structure of the rim, the weak lateral crus was also strengthened.

Especially in Asian patients, congenital hypoplasia of the lateral crus and skin of the rim is the most common cause of alar retraction.[2,3] Yong et al.[10] corrected the retraction using a conchal cartilage extension graft and vestibular skin advancement flap. In this technique, the graft was sutured edge-to-edge to the caudal part of the LC. In contrast to our technique, the graft was sutured right on the top of the lateral crus, not to the lateral portion of it and thereby the LC was rendered stronger. With this technique, a pocket in which the caudal portion of the graft could be placed was created using the vestibular advancement flap, in a similar fashion to our technique. Although the Yong et al.[10] technique corrects malposition of the lateral crus and rim retraction, it does not improve the weakness of the LC. Thus, in our technique, in addition to correcting malposition and rim retraction, strengthening the LC can be considered as an additional advantage.

The lateral crural-spanning suture improves the convex deformity of the lateral crus whereas it does not contribute to the strength of the lateral crus.[13] There is a risk of deformity recurrence following suture loosening or break. In the CELCS graft technique, the fixation of the graft from three points leads to such complications. The medial portion of the graft was sutured to the lateral crus and the lateral edge was tucked into a created vestibular skin pocket. This technique supports the alar rim in a more anatomical manner. Similar to this technique, the CELCS graft supports the rim anatomically.

Essentially, the technique can be considered as a combination of lateral crural strut graft[19] and alar rim graft. The alarm rim graft is placed in the pouch created in the rim without any fixation. We observed that the graft could not show sufficiently effect, especially in patients with excessive skin retraction. In our technique the skin island with retraction is relaxed. So the effect of the graft is observed more clearly from the outside. Another problem is graft migration. Since the graft is adapted on the lateral crus in our technique, the risk of migration is reduced.

The advantages of the CELCS graft include correcting the malposition of the LC, strengthening the LC, supporting the tip, and correcting rim retraction without disturbing anatomical structures. All of these advantages mean that external nasal valve insufficiency and rim retraction can be repaired simultaneously. Using septal cartilage as a graft donor site prevented additional morbidity. Since the graft was overlapped on the lateral crus, there is a potential to cause thickening in that region, which may be considered a disadvantage of the CELCS technique. Thus, the graft to be placed should be sufficiently thin that it would not cause thickening, yet it should also be sufficiently strong that it would support the lateral crus. A limitation of our study was the inclusion of primary rhinoplasty patients only and the absence of a control group. Studies evaluating the effectiveness of the technique in secondary rhinoplasty operations will increase the evidence of its utility in a wider range of procedures.

As a conclusion, the CELCS graft technique offers simultaneous correction of lateral crus cephalic malposition and alar rim retraction. The limitation of the study is the absence of a control group. Compared with many other techniques for correction of these deformities, the CELCS technique appears to have many benefits. Compared with many other techniques for correction of these deformities, the CELCS technique appears to have many benefits. One of the disadvantages of the CELCS technique, however, is that care must be taken in shaping the graft so that it is thin but also sufficiently strong to support the repair. Future comparison with classical techniques will allow for comparison of CELCS and these techniques in order to assess its utility more fully.

Conflict of Interest

The author has no conflicts of interest to disclose.

Compliance with Ethical Statement

Local institutional ethics committee approval was obtained (Kocaeli Üniversitesi, GOKAEK-2021/7.11, Project no: 2021/127), and all procedures were in accordance with the Declaration of Helsinki. Informed consent was obtained from all patients.

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Author Contributions

CİD: Design, data collection, manuscript writing; EKY: Analysis, literature; MŞA: Design, critical review

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