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Technique of Augmentation for Para-Alar Deficiency: A Technical Revisit

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Abstract

Objective *To describe a forgotten technique of augmentation for para-alar deficiency associated with skeletal Class III deformity patients.*

Material and Methods *A 5-year retrospective study between 2012 and 2017 was conducted in our institute, in the department of Oral and Maxillofacial Surgery and Orthodontics. A total of 12 patients between ages 16 and 32 years (mean age of 20.83 years) who underwent BSSO with mandibular set back along with para-alar augmentation were included in the study. Patients who underwent additional procedures like Lefort I osteotomy, rhinoplasty or genioplasty were excluded.*

Surgical Technique *Bilateral vestibular incisions were given to expose para-alar regions bilaterally and subperiosteal dissection was carried out. The buccal cortical bone obtained from BSSO with setback surgery of mandible was recontoured to required dimensions and fixed with mini screws in the para-alar regions bilaterally. The vestibular incisions were closed using absorbable 4-0 sutures.*

Results *All patients' facial profile showed good improvement. Also, the enhanced para-alar fullness was in congruence with the mandibular setback. On an average, 5-7mm of para- alar augmentation was achieved.*

Conclusion *In cases with mild para-alar deficiencies in combination with skeletal class III deformity requiring BSSO, para-alar augmentation with cortical bone obtained from BSSO site can be performed for addressing the deficient para-alar regions, with the advantage of elimination of second donor site surgery or use of allografts and alloplasts.*

Introduction

The human facial form is determined by the harmony of the overlying soft tissue to the skeletal structures. The skeletal structure of the face is formed by the frontal, orbital, nasal, maxillary and mandibular bones. Size, shape, and relative position of these bones vary for each human race **[**1**]**. Among the different races, the Asian face has a predisposition for a characteristic skeletal Class III malocclusion, relatively prominent zygoma with mid-facial and para-alar deficiencies **[**2**]**. The lower profile of the face in a skeletal Class III malocclusion patient may be improved by BSSO with mandibular setback surgery. However, the para-alar region also being an important criterion for assessment of facial form; if uncorrected, can lead to mild-to-significant esthetic detraction **[**3**]**. Correction of this deficiency is by augmentation surgery which also serves as an adjunct to rhinoplasty **[**4**]**.

Le Fort I osteotomy with or without grafts is the mainstay for advancement of large alar base deficiencies. Minor para-alar deficiencies are more commonly treated with autologous bone grafts and alloplastic materials **[**2**]**. Although, use of autologous bone grafts harvested from various sites has been reported previously **[**4**]**, very few articles have illustrated the use of bone procured from the osteotomized site after BSSO for treatment. In this article, we describe a simple technique of augmentation for mild para-alar deficiency associated with skeletal class III deformity.

Materials and Method

A 5-year retrospective study between 2012 and 2017 was conducted in the Department of Oral & Maxillofacial Surgery and Orthodontics, Faculty of Dental Sciences, MSRUAS, 12 patients between the ages of 16 and 32 years (6 males, 6 females with a mean age of 20.83 years) who had undergone BSSO with setback for mandibular prognathism and para-alar augmentation with autogenous bone procured from osteotomy site of mandible were included in the study. The follow-up of all patients was done. Clinical records, photographs, orthopantamogram and lateral cephalometric radiographs were used for evaluation. Patients undergoing additional procedures like Lefort I osteotomy, rhinoplasty or genioplasty were not included in the study. The follow-up period ranged from 9 to 24 months (mean 16.5 months).

Bilateral incisions were given intraorally in the maxillary vestibule to expose the para-alar regions. Medially, the nasal mucosa was freed liberally at the pyriform aperture only. Meticulous dissection was performed to avoid any perforation of the nasal mucosa. Cortical bone graft obtained from the

buccal cortex of BSSO site was used as the graft and placed over the para-alar regions bilaterally. The contour and dimension of this cortical bone are usually optimal for use and are self-retaining; however, it was contoured and stabilized in position with mini screws. The same procedure was performed on the opposite side for a symmetric result. The vestibular incisions were closed with absorbable sutures.

Results

All patients exhibited good enhancement of para-alar regions with an average amount of augmentation of 5 - 7 mm. Blood loss due to the para-alar augmentation was minimal; total average blood loss for combined para-alar augmentation and BSSO was 90 – 120 mL. No major intraoperative complications were noted on the augmented para-alar sites.

Postoperative healing of the augmentation sites was uneventful. No signs of infection, wound dehiscence, excessive resorption, infraorbital nerve damage or any functional disturbances were observed. The facial contour outcome achieved was acceptable and hopeful. A follow up of all these patients for 16 months (average) showed good maintenance of grafted bone at the para- alar regions.

Discussion

A variety of treatment procedures and orthognathic surgeries are available to treat the mid face deficiencies **[**5**]**. Among the various surgeries, Lefort I osteotomy with or without grafts is performed frequently for maxillary jaw deficiency associated with malocclusion **[**6**]**. If the deficiency is only in para-alar region with satisfactory occlusion, then only or interpositional grafting of autografts, allografts and alloplasts become the mainstay of treatment. U shaped osteotomy of the pyriform rims and anterior nasal spine is another technique done to improve the appearance of the midface **[**7**]**. Pyriform rim sandwich osteotomy is an alternative procedure that uses the cortical bone harvested from BSSO site as an interpositional graft to augment the para-alar region with satisfactory outcome1. Each type of graft comes with its own set of advantages and disadvantages. Alloplasts are available in different sizes, easy to manipulate and fix with screws, have no donor site morbidity; however, they are costly, can undergo rejection and infection **[**3, 8**]**.

Autografts such as cartilaginous grafts could be procured from conchal, septal and costal cartilage. Osseous grafts are obtained from nearby sites like mentum, ramus, body of mandible, coronoid process, pterygoid buttress and calvarium or from distant sites like the iliac crest and ribs occasionally. Being autologous in nature, these grafts have fewer chances of rejection and infection. They are cost-

effective and easily accessible [2, 5]. However, donor site morbidity like defect and scarring, resorption of graft, second surgery for graft harvesting are their disadvantages [5]. Osseous autografts obtained from the BSSO site could be used as onlay or interpositional graft and these overcome the need of second surgery for graft harvesting.

The mandibular bone onlay is dynamic in nature and undergoes resorption, revascularization, osteoinduction, and osteogenesis and remodels itself at various rates. It is formed by intra membranous ossification, shows less resorption and rapid vascularization which explains the maintenance of graft volume at the recipient site8. Using this graft, the para alar region could be advanced for at least 5 to 7 mm with ease. Symmetric augmentation, satisfactory contour, low surgical morbidity and blood loss reduced surgical time are the advantages of this graft3. Being corticular in nature it contains mature bone cells, more BMPs (bone morphogenic protein) and growth factors such as TGF (transforming growth factor) and VEGF (vascular endothelial growth factor) that stimulate the blood vessel growth from the recipient site. Hence, they represent low resorption rates between 5% - 28% and show good integration and short healing times [8]. This could explain the satisfactory clinical outcome in our cases.

Alar base widening is an associated adverse outcome of para-alar augmentation which occurs due to inadvertent stripping of periosteum in the region and could be corrected with various alar base cinch sutures [9]. However, this widening was insignificant in our cases, due to minimal stripping of periosteum done for onlay graft placement. While there are many studies conducted to assess the soft tissue response for malar and chin augmentation surgeries; the soft tissue response to para-alar augmentation surgeries has not been studied effectively6. In our study, though the representative soft tissue changes after para alar augmentation were difficult to analyse, the improvement in soft tissue contour was satisfactory and accepted well by the patients. With the advent of CBCT scans in Oral and Maxillofacial surgery, more studies using CBCTs are to be conducted to analyse both soft tissue as well as hard tissue changes in the long run.

Patients with poor economic status, who decline allografts and alloplastic materials, who are not willing for second surgery for graft harvesting, this technique of para-alar augmentation could be a boon. The advantage of this combination is the elimination of a second donor site surgery, overcoming the disadvantages of allografts and alloplastic materials. However, this technique has a few disadvantages like - limited amount of graft procured, unpredictable resorption rate and could be used only in class III cases with mild alar base deficiency [1].

In summary, the technique of using cortical bone from BSSO site as onlay graft could be easy to perform with satisfactory outcomes. We consider that this novel forgotten technique will be a surgical option facilitating oral and maxillofacial surgeons to improve treatment outcomes for patients with mild para-alar deficiency with class III skeletal deformities. Though short-term results are inspiring, long-term follow-up is necessary before definitive conclusions can be made. The clinical effectiveness could be generalised when large number of participants of different age groups, sex and ethnicity are treated with this technique.

Figure 1: Clinical photograph –

a) Pre-operative frontal profile, b) pre-operative lateral profile

c) Post-operative frontal profile, d) post-operative lateral profile

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