

Mucogingival Surgery in the Interdisciplinary Management of Patients with Palato-alveolar Cleft Defects

Abstract

Here will present a mucogingival technique for interdisciplinary management in patients with palato-alveolar cleft defect sequelae. Mucogingival continuity is sought in these patients by means of an extended laterally positioned flap. Achieving a mucogingival seal in the cleft area would be of great value in interdisciplinary management, favoring the prognosis of subsequent treatments, such as alveolar bone grafts, orthodontics, and rehabilitation, to achieve more esthetic and functional and harmonious results for the patients' dentogingival complex.

Keywords: *Gingiva, mucogingival technique, periodontal health, surgical technique*

Introduction

Cleft lip, cleft palate, and cleft lip and palate, produced by embryological alterations, are the most common congenital malformations of the face. The highest prevalence at birth of cleft lip and palate is found in Asian and Native American populations (1 in 500 live births), whereas the lowest prevalence is observed in populations of African descent, with approximately 1 in 2500 live births.^[1]

Due to these deformities' great impact on facial esthetics, the conditions of the gingiva and mucosa adjacent to the defect tend to be underestimated and are not considered the primary problem to be solved. The mucogingival deformity, the anatomy of the defect, and the dental malpositions adjacent to the cleft palate are predisposing factors for biofilm accumulation and periodontal disease.^[2,3] Children and adults with cleft lip and palate may have an increased risk of developing periodontal disease in teeth adjacent to the defect, mainly related to congenital anatomical defects and the lack of mucogingival continuity.^[4,5]

Periodontal tissue in general, and particularly mucogingival conditions, should be considered as important aspects to be addressed in the multidisciplinary management of patients with palato-alveolar cleft defects. Mucogingival disorders are the most frequent periodontal alterations,

including the absence of keratinized mucosa and a shallow vestibule caused by the presence of scars secondary to the reconstructive surgeries, inflammatory and drug-induced gingival hyperplasia, and gingival recession.^[6]

Almeida *et al.* evaluated the prevalence and severity of gingival recession in teeth adjacent to the cleft sextant, as well as the possible etiologic factors and the relationship between type of cleft and gingival recession, considering the lack of data in the literature on the periodontal status of individuals with cleft lip and palate. The conclusion was that the prevalence of recession in teeth close to the cleft was higher than the same teeth in individuals without clefts.^[7,8]

Continuous mucogingival tissue improves the response of regenerative surgery, facilitates orthodontic treatment, and generates more stable functional and esthetic restorative results,^[9,10] therefore, a mucogingival surgical technique is proposed that seeks to provide continuity and mucogingival sealing to the palato-alveolar cleft, with the intention of improving the predictability of comprehensive interdisciplinary management. In addition to the technique, a series of cases of different patients are presented.

Objectives of mucogingival surgery

1. Achieving mucogingival continuity at the site of the palato-alveolar cleft

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defect by means of closure with soft tissues (keratinized mucosa and gum)

2. Attaining a greater amount of mucogingival tissue so that, during the expansion of the jaws, continuous mucogingival tissue is expanded to the same extent
3. Providing continuous mucogingival tissue to cover the alveolar bone grafts, ensuring adequate insulation and impermeability of the material to be grafted
4. Achieving perfect dentogingival harmony when performing rehabilitation treatment.

Mucogingival surgery with extended laterally positioned flap

The extended laterally positioned flap is a modified technique of the lateral flap of Grupe and Warren, initially proposed in 1956 to cover gingival recessions.^[11]

The intention in patients with palato-alveolar cleft defect is to cover the cleft area with mucogingival tissue. For this purpose, a laterally positioned flap taken from the distal area to the palato-alveolar cleft is performed, which then slides laterally to fully cover the defect. The flap is called extended because to cover the cleft, a large flap is needed, for which it is necessary to extend to the first or second molar zone according to the size of the defect to be covered.

In patients with bilateral cleft, it is recommended to first perform the lateral flap procedure on one side and then to perform the surgery on the contralateral side after 3 months.

Indications

This surgical technique is indicated for achieving mucogingival continuity in patients with unilateral or bilateral alveolar cleft, either complete or incomplete.

Contraindications

1. Palato-alveolar clefts that present steps or position discrepancies between the maxilla and the premaxilla, which would prevent the relaxed placement of the mucogingival flap
2. Dental malposition in the area of the cleft which leads to teeth remaining submerged when the lateral flap is performed
3. Active endodontic and/or periodontal lesions of the teeth adjacent to the palato-alveolar cleft
4. Absence of suitable adherent and/or keratinized gingiva in the donor area adjacent to the cleft that does not permit having an optimal donor site.

The contraindications are not absolute since once these situations are treated, the laterally positioned flap procedure can be performed.

Extended laterally positioned flap surgical protocol

1. Asepsis and antisepsis of the operative field are ensured
2. A truncal and infiltrative anesthetic block is administered in the intervention area

3. Preparation of the receptor site: The receptor site or bed is the area in the premaxilla that will receive the flap. It is suggested that the bed be wide and include one or two teeth mesial to the cleft (usually in the central and lateral zones). Once the receptor site is located, de-epithelialization is performed with either a scalpel blade or gingivectomy scissors
4. Preparation of the donor site: A flap is designed with two paramedian vertical incisions and an intrasulcular horizontal incision. A paramedian incision is made distal to the first or second molar, depending on the size of the area to be covered; the other vertical incision is made adjacent to the cleft, usually in the mesial area of the canine or first premolar. The two vertical incisions that limit the flap must extend beyond the mucogingival line to allow the mobility of the flap. A partial-thickness flap is elevated and displaced toward the palato-alveolar cleft. The flap should pass through the cleft and meet its receptor bed in the premaxilla without any tension
5. Suture: Once the flap is located in the de-epithelialized receptor bed, the flap is immobilized in its new position using simple and suspensory stitches
6. Gentle pressure is applied to the flap for 2 min using gauze moistened with physiological saline solution
7. Analgesics and anti-inflammatories are administered orally
8. The surgical cement is removed after a week
9. The sutures are removed 2 weeks after the surgery [Figures 1 and 2].

Justification for the extended laterally positioned flap

The extended laterally positioned flap aims for mucogingival coverage of the palato-alveolar cleft. It is suggested to perform mucogingival management before other conventional procedures, such as maxillary expansion, bone regeneration of the cleft, orthodontics, and oral rehabilitation. However, the flap could be of great help during the placement of the bone grafts to guarantee the total coverage of the regeneration material. There are several advantages and benefits that the implementation of this mucogingival technique could provide to patients with palato-alveolar cleft defects.

Routinely, maxillary expansion is performed without mucogingival continuity of the cleft. When the segments are separated (maxilla and premaxilla), the cleft tends to increase in size, and the mucogingival defect usually becomes larger. It is then proposed to perform an extended laterally positioned flap before the expansion of the maxilla because if there is a mucogingival continuity, then with the expansion, the mucogingival tissue will also expand [Figure 3].

Likewise, when a regenerative procedure is to be performed on the cleft using a bone graft, the regenerative process can benefit from the existence of continuous mucogingival

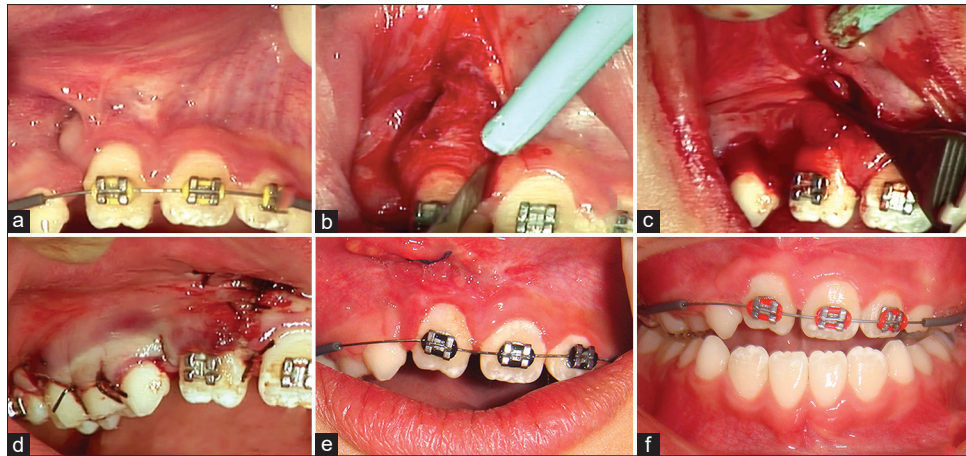


Figure 1: Extended laterally positioned flap. (a) Complete unilateral palato-alveolar cleft. (b) Preparation of the receptor site or bed with de-epithelialization. (c) Mobilization or displacement of the flap to the receptor bed. (d) The flap is sutured with simple and suspensory stitches. (e) Postoperative control at 2 weeks. (f) Control at 2 months where mucogingival continuity is observed

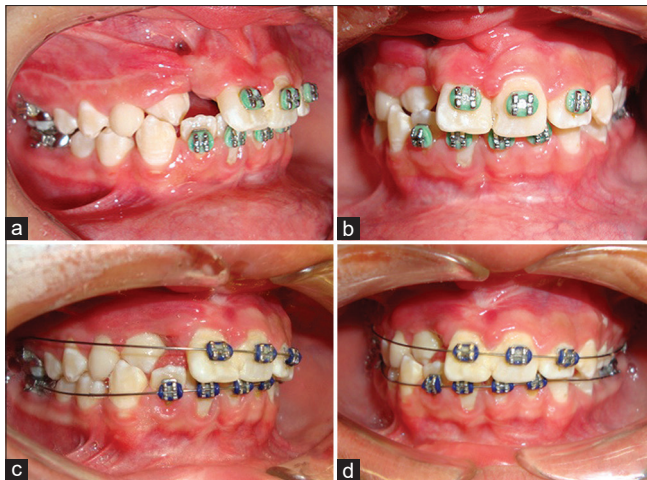


Figure 2: Complete unilateral palato-alveolar cleft before and after mucogingival surgery. (a and b) Before the extended laterally positioned flap. (c and d) Two months after the extended laterally positioned flap was performed. Note the mucogingival continuity at the defect site

tissue that guarantees the coverage and impermeability of the alveolar bone graft.

In this sense, different studies have shown the importance of impermeability and the control of bacterial biofilm to achieve favorable clinical results in regeneration procedures.^[12] Studies on bacterial contamination of bone grafts show an inverse relationship between bacterial infection, colonization of black-pigmented periodontopathogenic bacteria, and periodontal gain in clinical insertion.^[13,14]

Based on the aforementioned, the regenerative treatment of patients with palato-alveolar cleft constitutes a great challenge because the clefts present communications to the oral cavity (vestibular and palatal) and the nasal cavity (floor of the nasal fossa), which increases the possibility of contamination and failure of the regenerative treatment. The above would justify the presence of continuous mucogingival tissue in the area of the cleft,

which guarantees, at least in the vestibular portion, the total coverage of the bone graft^[15] [Figure 4].

Likewise, a bony ridge with continuous mucogingival tissue at the site of the cleft would greatly favor orthodontics since dental alignment requires that the teeth that are to be moved and located correctly in the arch must have bone support and a healthy dentogingival unit, which allow proper movements to be produced. Finally, mucogingival management would also benefit dental rehabilitation, whether with osseointegration implants or fixed or removable prostheses, with which the comprehensive treatment of the patient would culminate, emphasizing the harmony of the dentogingival detail for the benefits of function and esthetics [Figure 5].

Conclusions and Recommendations

An extended laterally positioned flap is proposed to achieve the external closure of the cleft with mucogingival tissue.

Guaranteeing the optimal coverage of alveolar bone grafts with mucogingival surgery is a significant step for the predictability of bone regeneration in the cleft area.

This type of laterally positioned flap could also be performed in patients who do not require expansion of the maxilla or bone regeneration, with the intention of achieving mucogingival continuity and favoring esthetics and function.

It is recommended to look for palatal soft-tissue management techniques that achieve closure of the cleft and/or palatal fistula before the expansion of the jaws and before guided bone regeneration procedures.

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Figure 3: Interdisciplinary management of complete bilateral palato-alveolar cleft defect. (a and b) Initial. (c-e) Interdisciplinary treatment with expansion, mucogingival surgery, and orthodontics. (f) Final side view. (g) Final front view. Note the mucogingival continuity achieved

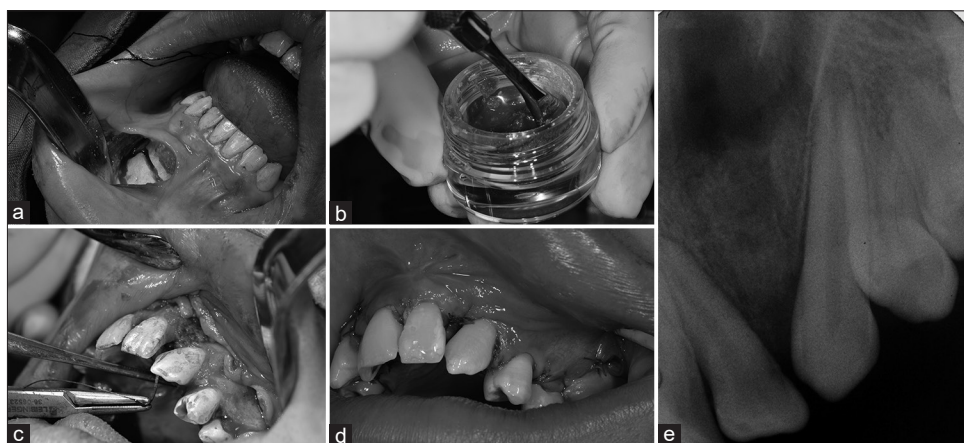


Figure 4: Bone graft posterior to laterally positioned flap. (a) Autologous chin bone graft. (b) Mixture of autograft and xenograft. (c) Bone graft placement at the site of the cleft. (d) Mucogingival tissue completely and continuously covering the bone graft. Notice how the relaxing incision is distant from the site where the bone graft has been placed. (e) Radiographic control of the grafted site at 2 months, where the alveolar remodeling becomes evident, with suitable height of the bone crest and periodontal ligament space in the teeth adjacent to the cleft

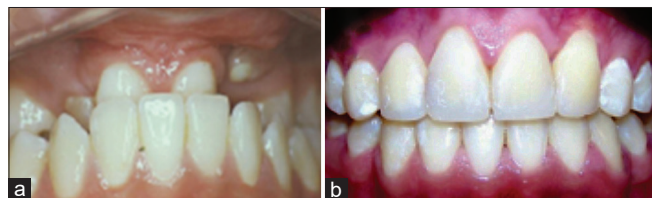


Figure 5: A patient with complete bilateral palato-alveolar cleft defect. (a) Initial. (b) Final. Treatment with mucogingival surgery, followed by maxillary expansion, bone graft, and rehabilitation. The mucogingival continuity and the detail of the dentogingival harmony helped improve the functional and esthetic recovery

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Conflicts of interest

There are no conflicts of interest.

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