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Labial repositioning using polymethylmethracylate (PMMA)-based cement for esthetic smile rehabilitation—A case report

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ABSTRACT

INTRODUCTION: One of the most common esthetic complaints among dental patients is a gingival smile, which may be of multifactorial etiology, *e.g.* gingival hyperplasia, skeletal deformities featuring overgrowth of the anterior maxilla, altered passive eruption, maxillary alveolar tooth extrusion, fine lip and hypermobility of lip elevator muscles, which must be diagnosed prior to treatment so that the appropriate management approach can be selected. Maxillary overgrowth may give rise to subnasal skeletal depression where the upper lip retracts to during smiling, causing gingival exposure. The objective of this case report was to describe a lip repositioning technique using polymethylmethacrylate (PMMA)-based bone cement for esthetic smile rehabilitation.

CASE REPORT: A 23-year-old female attended the Esthetic Dentistry Clinic of our institute, reporting dissatisfaction with her smile, due to the size of her teeth and the amount of gingiva exposed when smiling. A rehabilitation planning was designed, which was performed with periodontal surgical intervention to fill the subnasal depression with PMMA-based bone cement. After crown lengthening, the PMMA-based bone cement was prepared with gentamicin in a sterile surgical bowl. When the mixture stopped sticking to the surgical gloves, it was then positioned into the subnasal pit, under constant and copious saline irrigation. With the cement in place, the prosthesis was shaped in a maximum thickness of 7-mm. After complete polymerization and under abundant cooling, refinement and finishing of the PMMA prosthesis was performed. The prosthesis was fixed onto the bone with two titanium-based bone graft fixation screws. The smile aesthetic rehabilitation was complemented using 10 lithium disilicate-based ceramic veneers.

DISCUSSION AND CONCLUSION: PMMA-based bone cement proved effective when combined to clinical crown lengthening for esthetic smile rehabilitation, acting as a filling material for subnasal depression, providing new lip support.

1. Introduction

The esthetic evaluation of a patient should include extra-oral, labial, periodontal and dental examination. The so-called beautiful attractive and healthy smile is a balance between the shape and symmetry of the teeth, lips and gingival tissues, as well as the way they relate and harmonize with the patient's face [1]. The assessment of the frontal and lateral views of the aforementioned structures should be peformed aiming at determining labial positioning, vertical dimension and delimiting the facial proportions [2].

A gingival smile is one of the most common complaints among patients seeking esthetic rehabilitation treatment, and indication for correction of a gingival smile has become the most frequent dental esthetic rehabilitation. Characterized by excessive gingival exposure (above 3 mm), gingival smile affects approximately 10% of the population between 20 and 30 years [3–5].

The etiology of a gingival smile is multifactorial, for instance gingival hyperplasia, altered passive teeth eruption, skeletal deformities of excessive maxillary growth, lack of lip support resulting from a marked depression of the anterior process of the maxilla and a hyperactive and/or asymmetric upper lip. It is imperative that these etiologies are identified before rehabilitation treatment [4]. Accurate facial analysis is crucial to determine the most appro-

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Fig. 1. Patient reporting dissatisfaction with her smile, due to the size of her teeth and the amount of gingiva exposed when smiling.

priate surgical periodontal treatment. Clinical crown lengthening is the commonest esthetic treatment in cases of abnormal passive teeth eruption and mild skeletal deformity. In some situations, a lack of lip support due to marked depression of the anterior process of the maxilla is the culprit. In these cases, esthetic clinical crown lengthening may be combined with lip repositioning using Polymethylmethacrylate (PMMA)-based orthopedic cement. This material has a good degree of compatibility with human tissues, acting as a filler material for subnasal depression and may be an innovative way to tackle gingival smile [4].

PMMA-based bone cement has been used in several health specialties, such as neurosurgery since World War II for cranioplasties, secondary to decompressive craniectomy and is still the most used reconstructive material by many professionals because it is one of the most biocompatible alloplastic materials available to date, inducing low foreign body reaction and providing adequate protection to adjacent neural tissues. The first indication for its use in dentistry was for full dentures and it has since demonstrated positive results, including high biocompatibility with the oral tissues [6].

In this case, a successful management of sever gummy smile using gingivectomy surgical procedures combined with PMMA-based bone cement had achieved satisfactory results. This manuscript has been reported in accordance with the SCARE criteria [7]. The aim of this report was to present a clinical case of lip repositioning using PMMA-based bone cement for esthetic smile rehabilitation

2. Case report

A 23-year-old female attended the Esthetic Dentistry Clinic of our institue, reporting dissatisfaction with her smile, due to the size of her teeth and the amount of gingiva exposed when smiling (Fig. 1). The patient wished to achieve a more harmonious smile.

2.1. Clinical examination

The face, smile, gingival contour and teeth of the patient were analyzed both clinically and photographically (Fig. 2a–l). Radiographic examinations were then requested for periapicals bite-wings, cephalometric radiograph and computed tomography.

The patient was then diagnosed with excessive gingival exposure associated with depression of the subnasal region, in which the upper lip would lodge during smiling, lack of proportion of teeth as well as generalized diastemas.

A rehabilitation planning was designed, which was performed with periodontal surgical intervention to fill the subnasal depression with PMMA-based bone cement, clinical crown lengthening of teeth 15–25 in order to equalize the proportion between the teeth and esthetic rehabilitation of the smile using ceramic veneers.

2.2. Treatment considerations

To determine the correct proportion of the teeth, an acrylic resin device was fabricated on the upper central incisors for esthetic and functional evaluations, based on the patient's interpupillary distance and described by Arcuri et al. [8] This device is used to evaluate the following: the correct proportion of the dimensions of the central incisor to be rehabilitated, involving its height and width, as well as its ideal spatial positioning in the arch; to predict the need for surgical intervention to lengthen the clinical crown and to provide an effective communication between the dental surgeon and the dental laboratory technician, guiding the diagnostic wax-up from the anatomical references obtained. (Fig. 3a and b).

Impressions for study models were taken using addition silicone (Virtual, Ivoclar Vivadent AG, Liechtenstein) (Fig. 4a and b). The esthetic and functional device positioned in the model aided the technician in building a diagnostic wax-up based on the anatomical references provided by the device (Fig. 5a and b). From the wax-up, a dense silicone dam (Zetalabor, Zhermack, Badia Polesine, Italy) was also made in the laboratory, which was later refined using a fluid silicone wash (Oranwash L, Zhermack, Badia Polesine, Italy) for accurate copying of the details of the teeth. This silicone dam was used to obtain a guide for the diagnostic restorative test (mock-up) (Fig. 6). Once the mock-up was tried in, the need for clinical crown lengthening was established aiming to reestablish the height and width proportions of the upper anterior teeth (Fig. 7).

2.3. Surgical procedures

An acetate surgical guide was made from a copy of the diagnostic wax-up model to serve as a parameter during osteotomy.