Aesthetic and functional rehabilitation of child using mock-up combined with stratified technique

ABSTRACT

Background The loss of the vertical dimension of occlusion in children with quickly progressing early childhood caries hinders the aesthetic rehabilitation of primary incisors. Minimally invasive restorations using chemical-mechanical caries removal methods preserve sound dental tissue and maintains the health of the pulp. This is the treatment of choice for children and allows crown reconstruction of the primary incisors without the need for endodontic treatment. The resources employed in the rehabilitation process range from biological restorations to direct and indirect crowns with or without the aid of a celluloid matrix.

Case Report The aim of this study was to describe a case of maxillary incisor rehabilitation in a female patient aged two years five months using a mock-up combined with the stratified technique and Planas’ direct tracks. After a 26-month follow-up period only a little fracture of the reconstructed incisor had occurred. Clinical Implications: In the case described, neuro-occlusal and functional rehabilitation enabled the establishment of satisfactory aesthetics in the primary incisors.

Keywords Dental aesthetics; Mouth rehabilitation; Primary teeth.

Introduction

The loss of vertical dimension of occlusion in children with quickly progressing early childhood caries hinders the aesthetic rehabilitation of primary incisors and can lead to a reduction in chewing capacity, a change in the swallowing pattern, speech problems, the development of bad oral habits and emotional problems stemming from compromised dental aesthetics [Pupo et al., 2011; Gujjar & Indushekar, 2010; Oliveira et al., 2010].

The extensive loss of dental tissue normally requires endodontic treatment to enhance the retention of the restoration and allow prosthetic rehabilitation for the preservation of primary teeth until eruption of the permanent successors. However, as prevention is currently the main focus of paediatric dentistry [Oliveira et al., 2010], minimally invasive restoration using a chemical-mechanical caries removal method for the maximum preservation of sound dental tissue and the maintenance of pulp health is the treatment of choice in children. The use of Papacarie® (Formula & Ação, São Paulo, Brazil) for chemical-mechanical caries removal is a painless procedure, that allows the dentist to forgo anaesthesia, and has proven to be effective at reducing residual cariogenic bacteria [Anegundi et al., 2012; El-Tekeya et al., 2012; Kochhar et al., 2011].

The resources employed for crown reconstruction on primary incisors range from biological restorations to direct and indirect crowns with or without the aid of a celluloid matrix. A diagnostic wax-up combined with a silicone mock-up serves as a guide in this process, allowing predictability in restorative procedures regarding shape, speed and contour and facilitating the application of filling increments [Baratieri et al., 2010].

The presence of malocclusion in approximately 73% of children in the primary dentition phase hinders the rehabilitation of a large portion of teeth, rendering functional and esthetic recovery impossible. However, early diagnosis and treatment can help avoid alterations in the bone base [Chibinski et al., 2005].

In the 1960s, Pedro Planas developed a functional orthopedic therapy based on neuro-occlusal rehabilitation in patients in the primary dentition phase. Functional jaw orthopaedics proposes the use of Planas’ direct tracks in primary teeth for the correction of crossbite and functional rehabilitation [Planas, 1988].

This paper describes a case of neuro-occlusal, functional and aesthetic rehabilitation of primary incisors using a minimally invasive restoration technique with the aid of Planas’ direct tracks. The advantages and disadvantages of the use of a mock-up and the stratified restoration technique are also discussed.

Case Report

A female patient aged two years five months...
visited the paediatric dental clinic of Nove de Julho University (Brazil) with complaints of pain during meals and problems with socialisation at school. The patient history revealed a cariogenic diet with an irregular schedule and inadequate oral hygiene. The clinical exam revealed a considerable loss of vertical dimension, anterior crossbite, angular cheilitis, carious lesions on the mandibular molars and maxillary incisors with extensive crown destruction, but without pulp involvement (Fig. 1).

The first phase of rehabilitation involved minimally invasive treatment with the application of Papacarie® (Formula & Ação, São Paulo, Brazil) for chemical-mechanical caries removal without anesthesia and Riva Light Cure glass ionomer cement (SDI Ltda, Australia). In the second step, casting was performed to obtain the mock-up, on which Planas’ direct tracks were created in the primary mandibular right second molar, primary mandibular left second molar and primary mandibular left first molar (teeth 74, 75, 84 and 85), which were cemented with Tetric flow resin (Ivoclar Vivadent, Brazil), and the wax-up diagnosis on the primary maxillary right and left incisors and primary maxillary right and left lateral incisors (teeth 52, 51, 61 and 62) (Fig. 2). For the mock-up wax casting with added silicone were used. The cast was cut, maintaining the crowns of the affected teeth, which were filled with acrylic resin, color Dencor® A1 (Classico, São Paulo, Brazil), and then adapted to the upper arch until partial polymerization. The procedure was finalised with adjustments and mild wear on the four maxillary incisors (Fig. 3). To finalise the rehabilitation, the stratified restoration technique was employed with resin compound. After 40 days, a silicone guide was created based on the mock-up installed in the upper arch. The mock-up was then removed and the affected teeth were cleaned with pumice stone and a rubber cup, conditioned with phosphoric acid 37% for 15 seconds, rinsed and dried gently. The Ambar bonding system (FGM, Joinville, Brazil) was applied with the aid of a disposable Cavibrush micro-applicator (FGM, Joinville, Brazil) in two layers for 10 seconds each. A mild jet of air was applied for 10 seconds for evaporation of the solvent. The bonding system was then photoactivated for 10 seconds, following the manufacturer’s instructions. An extra-thin layer of Opallis® T-neutral resin (FGM, Joinville, Brazil) was placed on the palatal face of the four teeth of the guide, which was positioned and adapted to the upper arch for photoactivation of the resin for 20 seconds. With the palatal enamel reproduced, the teeth were reconstructed in layers using the Opallis resin kit in colors DA1, EA1 and A0.5. Polishing and finishing were performed with the 8 mm Diamond pro sanding kit (FGM, Joinville, Brazil) and Diamond flex disc (FGM, Joinville, Brazil) (Fig. 4, 5, 6, 7).

After 1-year follow-up period no event was detected, just a piece of the primary right maxillary incisor had broken after 26 months (Fig. 8).

Discussion

Compromised aesthetics of the smile can have a direct impact on a child’s self-esteem. Aesthetics
can be further compromised by a loss of the vertical dimension of occlusion and subsequent reduction in neuro-occlusal function. The recovery of shape, function and aesthetics of teeth affected by extensive carious lesions is only possible with the reestablishment of the vertical dimension through either orthopaedic or prostho-dontic treatment.

In the case described here, the recovery of the vertical dimension of occlusion was achieved with Planas’ direct tracks on the primary mandibular molars, after which the anterior region had free functional space for the minimally invasive aesthetic rehabilitation of the four maxillary incisors with no risk of fracture to the root or new crown. However, follow-up is needed to evaluate the adaptation of the restorations and perform any necessary functional and/or aesthetic adjustments [Pupo et al., 2011; Oliveira et al., 2010].

Planas’ neuro-occlusal rehabilitation allowed the adaptation of the tissue and bone bases during therapy with direct tracks and the initial installation of the crown [Planas, 1988].

The use of Papacarie® on extensive, deep carious lesions helps the atraumatic removal of the carious tissue without the need for anaesthesia and preserves the sound dental tissue. In comparison to other products or techniques, Papacarie® offers greater efficiency in the treatment of the dental surface prior to restoration [Arora et al., 2012; Bussadori et al., 2005; Anegundi et al., 2012; El-Tekeya et al., 2012]. In the present case, chemical-mechanical caries removal led to the avoidance of endodontic treatment, which made the patient more cooperative throughout the rehabilitation process.

The mock-up technique allows reestablishing the lingual profile, width and incisal edge in a single step [Dietschi, 2008; Dietschi et al., 2006]. Upon placement into the oral cavity with acrylic resin, the mock-up constructed in the laboratory may require adjustments in terms of occlusion and function. In the present case, the mock-up remained functioning for 40 days, allowing the adaptation of the adjacent tissues and occlusion. The stratified restoration technique with the application of layers of resin is currently widely employed on permanent teeth, but it requires patient cooperation as well as a professional experience and knowledge regarding different products and their characteristics of opalescence and fluorescence for the reestablishment of the natural colour and translucence of the tooth. The silicone key serves as reference for the new contour during the three-dimensional incremental buildup of dentin and enamel [Dietschi, 2001; Dietschi et al., 2006]. In the case reported herein, the patient’s cooperation allowed the use of the stratified technique for the establishment of the natural structural characteristics of the teeth, and the loss of space was recovered and the crossbite was corrected using Planas’ direct tracks and the mock-up helped in repositioning the tongue, improved phonation and dental esthetics. However, the final phase requires considerable cooperation on the part of the patient as well as dexterity on the part of the dentist.

In conclusion, the successful aesthetic restoration of primary maxillary incisors is directly related to neuro-occlusal and functional rehabilitation. Moreover, a well-performed mock-up phase is sufficient to meet the aesthetic, functional and psychosocial needs of the child.

References