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Case Report

Association of Dental Bleaching, Glass Fiber Post and CAD/CAM Crowns for Esthetic Rehabilitation of Discolored Anterior Teeth: A Case Report and 6 Months Follow-up -

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ABSTRACT

Background: Discolored teeth post-trauma have a negative impact on esthetic perception and quality of life. Dental bleaching and/or crowns are options treatments for this condition. The digital workflow in the restorative dentistry reduce the time of appointments.

Case: A forty-six-year-old female with a background history of dental trauma in the maxillary central incisors. She had previous dental restorations in these teeth, with high roughness and unsatisfactory esthetic. Radiographic examination showed satisfactory endodontic treatments. Dental bleaching in non-vital and vital teeth were previously performed followed by glass fiber posts and ceramics crowns CAD/CAM. A six-months follow-up was performed.

Conclusions: This case highlights the importance of association of dentistry techniques in resolution of cases with esthetic compromise. Besides that, the six-months follow-up showed the longevity of case performed with patient satisfaction.

Keywords: Discolored teeth; Dental bleaching; Glass fiber post; Ceramic; CAD/CAM

INTRODUCTION

Maxillary central incisors are the teeth most affected for trauma (69%) [1] and may show discoloration due to ferric sulfide deposition in the dentinal tubules after hemolysis of red blood cells and/or when obturator materials used in endodontic treatment remain in the pulp chamber [2]. The discolored of the anterior teeth has a negative impact on the aesthetic perception and quality of life of individuals, being a most reason in the search for aesthetic procedures [3].

Some techniques can be used in the aesthetic management of discolored teeth. Dental bleaching in vital or non-vital teeth has a positive effect on the psychosocial impact and aesthetic self-perception of patients and is considered a preparatory step for more invasive aesthetic procedures, such direct or indirect restorations [4,5].

Coronal reconstruction of endodontically treated teeth and/or with extensive restorations is frequently required prior to crown performing, especially in cases of teeth with insufficient dental remnant to provide strength and retention to the new restoration. In these cases, the use of fiber glass posts has been a viable option due to their mechanical, aesthetic properties and high survival rates [6-10].

With the improvement of materials and adhesives, ceramics have been used for the resolution of aesthetic complaints of patients [11,12]. In this context, Computer Aided Design and Computer Aided Manufacturing (CAD/CAM) technology has facilitated the performing of cases of this kind, reducing the time to complete, eliminating the laboratory stage and allowing the individualization of results, as the materials currently available ceramics allow for the realization of makeup and/or glaze techniques, with natural and similar aesthetic results to homologous teeth [13-16].

This study was purpose to present a case report of the association of dental bleaching, fiber glass posts and CAD/CAM ceramic crowns for aesthetic resolution of maxillary central incisors discolored and endodontically treated.

CASE PRESENTATION

A forty-six-year-old female patient was referred for aesthetic treatment dissatisfied with the discoloring of the maxillary central incisors. After initial clinical examination, extensive composite resin restorations with intense discoloration and roughness were observed, as well as non-carious cervical lesions in both maxillary central incisors (Figure 1). Radiographic examination showed endodontic treatment performed on the two maxillary central incisors (Figure 2). During the anamnesis, the patient reported that the teeth showed pulp involvement due to trauma during a car accident 5 years ago.

After the dental prophylaxis, it was observed that the teeth presented color A3.5 (Vita Scale) (Figure 3). The patient's main complaint was the color of her maxillary central incisors, compromising social life and prevented her from smiling. In addition, the patient wished the procedure to be performed in a short time. Considering the condition of patient, the proposed treatment was to perform dental bleaching as



Figure 1: Initial aspect of the case, was observed maxillary central incisors with large and unsatisfactory composite resin restorations

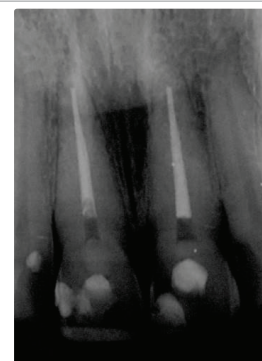


Figure 2: Radiographic examination proving endodontic treatment under satisfactory conditions in the maxillary central incisors

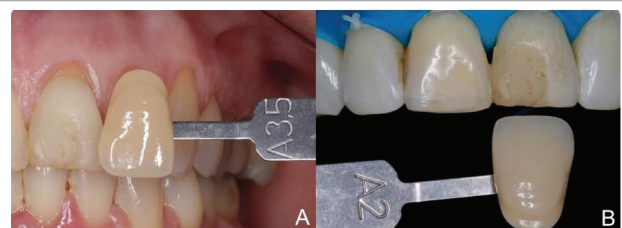


Figure 3: (A) Color analysis of teeth before; (B) Dental bleaching with 35% hydrogen peroxide

a preparation for ceramic crowns. However, due to the little dental remnant, coronary reconstruction was also necessary, with indication for the use of fiber glass posts. The patient's approval of the treatment proposal was registered with the signing of consent form.

In the first clinical session, internal bleaching of the maxillary central incisors was performed, followed by external bleaching of all teeth. The maxillary central incisors were isolated with a rubber sheet and then a cervical plug was performed with glass ionomer cement (Vitrebond Plus, 3M ESPE, Germany). The internal bleaching was performed with 35% hydrogen peroxide (Whiteness HP, FGM, Joinville, SC, Brazil), with two applications for 15 minutes, without light source application. Whitening gel was also applied externally to the crown to obtain more satisfactory results (Figure 3).

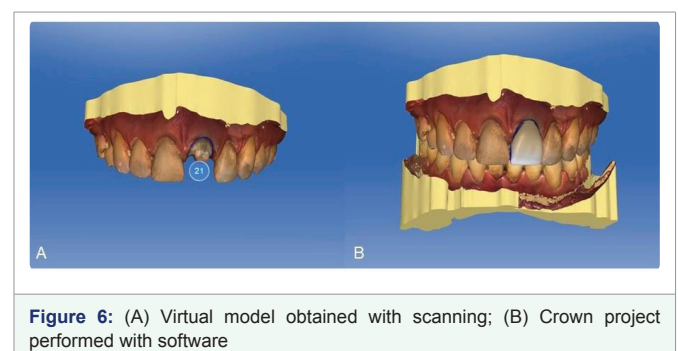
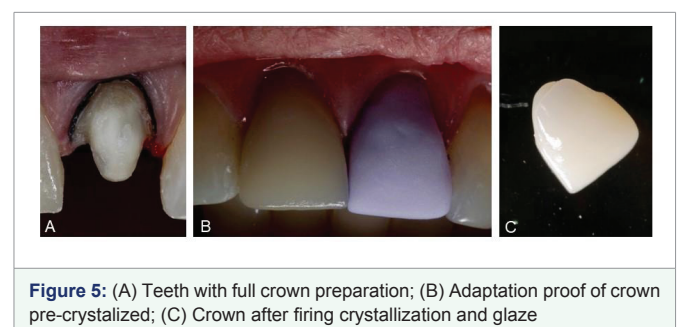
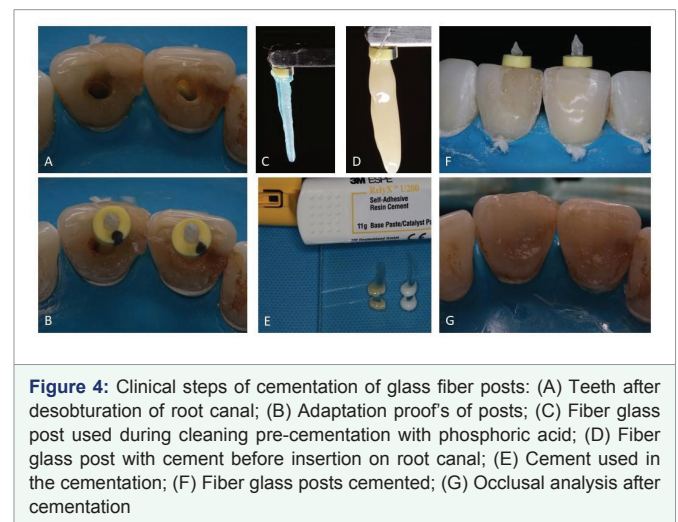
To improve anterior aesthetics as a preparatory step for indirect restorations, external bleaching was performed on all maxillary and mandibular teeth. At this stage, the same product of internal bleaching (Whiteness HP, FGM, Joinville, SC, Brazil) was used, being performed only one session, with two applications of 15 minutes. The immediate result of this procedure is shown in figure 3, where an A2 (Vita scale) color was achieved.

Two weeks after the bleaching, the patient returned to perform the other proposed procedures. Initially, the cementation of the fiber glass posts was performed. The teeth had 2/3 of their roots desobtured using Gates Glidden drills (#1, #2 and #3), keeping 4mm of obturator material at the root apex. After radiographic confirmation of the root apex obturation maintenance, the conduit was washed and dried with absorbent paper cones. For the cementation of the posts, a self-adhesive cement (Rely X U200, 3M ESPE, Germany) was used, which didn't require acid etching of the teeth. The previously selected fiber glass post, #1 (Whitepost DC, FGM, Joinville, Brazil), after their radiographic confirmed adaptation to the root canal, were cleaned with 37% phosphoric acid (Condac 37, FGM, Joinville, Brazil), washed and dried with air jets. Silane (Prosil, FGM, Joinville, Brazil) was applied for 60 seconds, dried with air jets and received adhesive application (Scotchbond, 3M ESPE, Germany) with photoactivation (Radii-cal, SDI, Sao Paulo, Brazil) for 20 seconds. In the sequence, the cement (Rely X U200, 3M ESPE, Germany) was dispensed over the glass fiber post, which was brought into position in the root canal. Excess cement was removed with micro applicators (Kg Brush, KG Sorensen, Cotia, Brazil) and photoactivation was performed for 40 seconds (Figure 4).

Coronal reconstruction was performed by photoactivated composite resin (Filtek Z350 XT, 3M ESPE, Germany) increments for 40 seconds (Radii-cal, SDI, Sao Paulo, Brazil). After obtaining the reconstructions, preparations for total crowns were obtained using diamond tips (Figure 5). After retraction wire insertion (Ultrapak 00, Ultradent, Indaiatuba, Brazil), scanning (CEREC Omnicam, Dentsply Sirona) was performed, obtaining digital models of the maxillary and mandibular arches and image of the arch during occlusion. From these models, a software (CEREC SW 4.4, Dentsply Sirona) was used to perform the restoration projects that were milled (Dental Milling Machine MC XL, Dentsply Sirona) in sequence. Initially this process (milling) was performed for the crown of the right maxillary central incisor. After cementation of this crown, a new scan was performed only to obtain a copy to allow, through the software used, the crown of the left maxillary central incisor to present a similar anatomy (Figure 6).

The crowns were obtained from lithium disilicate-based ceramic blocks (IPS e.max CAD HT Blocks, Ivoclar Vivadent AG, shade A2). After obtaining the crowns at a pre-crystallized stage, they were tested for intraoral adaptation and brought to crystallization firing and oven glaze firing (Programat CS2The, Ivoclar Vivadent) according to the manufacturer's recommendations (6-min pre-heating cycle; 90°C/min temp increase rate; 800-850°C firing temp; firing time of 7 min; hold time of 9 min).

After crystallization, internal surface treatment was performed for to cementation. The crowns were conditioned with 9% hydrofluoric acid (Porcelain Etch, Ultradent, Cotia, Brazil) for 20 seconds and washed thoroughly with air/water jets for similar time. After drying with air jets, they received silane (Prosil, FGM, Joinville, Brazil) for 60 seconds and an application of adhesive (Scotchbond, 3M ESPE, Germany) photoactive (Radii-cal, SDI, São Paulo, Brazil) for 20 seconds. For cementation, self-adhesive resin cement (Rely X U200, 3M ESPE, Germany) was used, dispensing the need for dental



surface etching. After the fixation of the crown and removal of excess cement, photoactivation by buccal, palatal and occlusal surfaces was performed for 40 seconds.

After analysis of occlusal contacts, no adjustments were necessary. Images immediately (Figure 7) and after 6 months (Figure 8) of crown cementation were obtained. It is important noteworthy that in the follow-up, with 6 months after cementation, no finishing and/or polishing procedure was required.



Figure 7: (A) Frontal and of smile; (B) Views immediately after cementation of ceramics crowns CAD/CAM in the maxillary central incisors



Figure 8: Six-months follow-up of ceramics crowns CAD/CAM in the maxillary central incisors

DISCUSSION

This case highlights the use of new technologies currently available for treatments in aesthetic dentistry that allow the satisfaction of patients in short time. In addition, the six-month follow-up evidenced the longevity guarantee of the aesthetic treatment performed.

Dental bleaching is a proven preparatory technique for aesthetic and rehabilitation procedures [4,5]. A harmonious smile, obtained with lighter shades of the teeth, facilitates the procedures to be performed in the restorative steps [4,5]. In the present case, the dental bleaching allowed the CAD/CAM ceramic crowns to be obtained in a lighter shade, meeting the aesthetic complaint of the patient.

Fragilized dental remnants, such as teeth traumatized, require reinforcement to ensure mechanical strength of the rehabilitations to be performed. In this case, the option for reinforcement of the dental remnant was the use of fiber glass posts. This material has excellent mechanical properties, such as modulus of elasticity close to that of dentin, and provides good aesthetics, which is indispensable in this case, as it is the main complaint of the patient and is superior anterior region [6-8].

Adhesive cementation is a crucial step in ensuring the longevity of restorative procedures [17]. In cementing intraradicular retainers such as fiberglass posts, the use of self-adhesive resin cement has survival rates like conventional resin cements [10]. In addition, the use of self-adhesive cement facilitates the procedure by presenting a

less sensitive technique, thus reducing the possibility of failures [18].

The use of dental ceramics is a very interesting option for aesthetic rehabilitation [11,12]. This material combines excellent mechanical and biological properties. Previously, aesthetic procedures with the use of this material had the drawback of requiring a laboratory step, which increased treatment costs and time, and a period in which the patient needed to wear a provisional crown that frequently not meet the aesthetic needs of the patient [15,16]. However, the present case eliminated this step for the patient, since the use of CAD / CAM technology allowed the rehabilitation to be completed in a single session, disregarding the previous stage of dental bleaching.

CONCLUSION

The present case highlights the association of dental treatments for the resolution of aesthetic complaint in the maxillary anterior region. The use of new available approaches allowed the conclusion of treatment in a short time and the follow-up of six months evidenced the clinical longevity of the achieved results.

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