

AESTHETIC ENDODONTIC REHABILITATION OF UPPER-CENTRAL INCISOR TREATY

LUIZ AUGUSTO SILVA DIAS LIMA¹, NILTON OLIVEIRA GONÇALVES JÚNIOR², CARLOS ROBERTO TEIXEIRA RODRIGUES^{3*}

1. Undergraduate student of Dentistry, University Severino Sombra, Vassouras (USS); 2. MD, Professor of Implantology, Graduation Course of Dentistry, University Severino Sombra (USS); 3. MD, Professor of Dental Prosthesis, Graduation Course of Dentistry, University Severino Sombra (USS).

* Eliete Nunes Barbosa Street, 88, Center, Vassouras, Rio de Janeiro, Brazil. ZIP CODE: 27700-000 rodriguescrt@gmail.com

Received: 05/27/2015. Accepted: 09/24/2015

ABSTRACT

The esthetic dentistry is an important aspect, where the presence of discolored teeth could be a concern for the patient. The practice of non-vital teeth whitening is constant acts in the clinical work, because of the blackout bother the patient. The dental bleaching is possible only thanks to the permeability of the dental structure to bleaching agents which have the ability to diffuse freely through the enamel and dentin. In the reported case, the mixed technique of home bleaching with the use carbamide peroxide at 16% and the office of exogenous whitening in three sessions with hydrogen peroxide at 35%, was used at the end of treatment, were performed two procedures, namely, composite resin restoration to the tooth to be bleached and proximal manufacture of glass fiber post for the purpose of reinforce the restorative composite used. Thus, it was proved that, taking into account the coronal structure features the use of exogenous whitening as conservatively relative to external cervical reabsorption.

KEYWORDS: Tooth whitening, bleaching agents, restoration.

1. INTRODUCTION

The aesthetic in dentistry is an important aspect, where the presence of discolored teeth ends up being a concern for the patient. The practice of bleaching non-vital teeth is a constant act in the office because of the blackout bother the patient, disrupting social and professional relationship of the patient. Tooth bleaching is a widely used procedure and required to solve these problems, it is a conservative treatment that brings back the aesthetic and restores natural smile¹.

The dental darkening is due to intrinsic factors (pre- and post-eruptive) and extrinsic. The pre-eruptive may be caused due to use of drugs (tetracycline), systemic factors (fluorosis) during the formation of the tooth germ or pulp necrosis, post-eruptive, when pulp begins to decompose it

ends up releasing hemoglobin, containing iron, combining with hydrogen sulfide that is produced by the bacteria to form ferrous sulphide, a dark color, thus changing the color of dentin¹. Since extrinsic factors, are the staining that are acquired over the years by the use of beverages with pigmentation as wine, coffee, tobacco or the use of prostheses which have metal and are formed by precipitation of dyes and diet pigment on plaque which coats the tooth².

The tooth whitening to be a conservative technique is becoming an increasingly common practice in offices as a way to improve the harmony and presentation smile. The bleaching in most indicated pulped teeth is endogenous, however, some indication should be taken into consideration at the time to brighten, as state dental remaining, presence of lesions, darkening tetracycline, fractures².

The shade of a tooth is directly related to the quantity and the wavelength of light incident on its surface, which is reflected or absorbed. Dark objects absorb much of the incident light, resulting in no color. The formation of long molecular chains within the tooth structure is responsible for an increase in light absorption rate, thus resulting in browning².

Root canal treatment done properly does not cause color change. However the dimensions of color (hue, chroma and value) are influenced by the presence of the dental pulp, and when it ceases to exist, there may be a change in color and brightness of the tooth³.

The dental darkening occurs by chromophores (pigments) impregnated in the dental structure for various reasons, when these pigments form a molecule capable of reflecting light at a wavelength visible to the human eye and whose intensity is higher than the light reflected by the tooth structure, predominated the pigment color and observed the blackened tooth⁴.

Among the main causes of color change in pulped teeth can be highlighted: the presence of restorative

materials in the crown, bleeding inside the pulp chamber, decomposition of debris located inside the pulp chamber, root canal medication use and canal filling materials root⁵.

Bleaching of non-vital teeth where the endodontic treatment was conducted recently has advantage in being made whitening as well as other advantages such as avoiding the wear of sound structures and show satisfactory cosmetic results, since the bleaching agent and the technique used are carefully selected⁶.

Bleaching agents are vehicle free radicals unstable oxygen; when in contact with the tissues, undergo an oxidation process. These macromolecules are converted into molecular chains increasingly smaller, releasing carbon dioxide and water, which removes all or part of the pigments tooth structure by diffusion².

The presence of peroxide on the tooth surface, the saliva isolated turn, contributes to increase the dehydration of the enamel, which might be even more durable. The effects of dehydration in the tooth whitening may last for two weeks or more⁷.

The dental bleaching is possible only thanks to the tooth structure permeability of bleaching agents that have the ability to diffuse freely through the enamel and dentin, thus acting in the organic portion of the structure, promoting whitening⁷.

The application of different bleaching agents resulting in a relief of samples from enamel and dentin and dentin subsurface. Dentin is more susceptible to bleaching, even despite the fact that the product must penetrate through the enamel layer before spraying the subsurface dentin⁸.

Pretreatment with dentinal tubules obstructed substances such as fluorides and angina compounds help decrease in sensitivity after or during the bleaching⁹.

The use of less caustic, such as sodium perborate and distilled water, are less harsh to tooth structure, and presenting the same bleaching results obtained with hydrogen peroxide. Some authors even claim to become contraindicated in teeth whitening by metallic pigmentation, old darkening by medication or by systemic factors¹⁰.

It is important to mention that some structural features and some of the enamel surface features may contribute to the precipitation of pigment such as roughness, the porosity, and depression¹¹.

The main bleaching agents used are hydrogen peroxide, carbamide peroxide and sodium perborate. Hydrogen peroxide appears to be the most effective agent to whiten your teeth and can be used alone, having various concentrations, ranging from 10% (home use) to 35% (use in odontológico office). The carbamide peroxide is dissolved into hydrogen peroxide and urea, may nevertheless still present carbopol which is responsible for the slow release of oxygen, having concentrations of 10% to 22%. Since perborate with distilled water dissolved oxygen, sodium metaborate and hydrogen

peroxide which is the material that will carry out the bleaching¹⁰.

Contemporary tooth whitening is based on the use of hydrogen peroxide. This agent will act on dentin chromogens, thereby reducing the tooth body color¹².

Species subjected to bleaching, shows changes in the enamel and the cementum. However, the cemento-enamel junction is the most affected part because it promoted changes in joint standard, increasing the exposure of dentin surface and forming junctions of the "gaps", displaying large areas separate cementum enamel without intermediate cementum and dentin tubules exposure when observed by scanning electron microscope (SEM)¹³.

The most common side effect in whitening technique consists of tooth sensitivity. However, efforts to reduce the incidence and severity of sensitive teeth, fluoride is added to the bleaching properties of some materials. Damage to the structural integrity of the tooth is generally not considered a significant problem when related to bleaching. However, it has been associated with adverse effects such as decreased abrasion resistance, decrease in hardness, among other¹⁴.

The post-bleaching invasive root resorption is related to a history of trauma. Bleaching agents can cause denaturation in dentin cementum enamel junction (CEJ), if the defect between cement and enamel is present. The denatured dentine can act as a foreign body and being attacked by periodontal tissue elements and may be reported cases of resorption without the presence trauma¹⁵.

Studies have shown that effects of bleaching agents (hydrogen peroxide) in the mechanical and morphological characteristics of the adhesive interfaces of teeth whitened, with changes in bond strength values and standard interface between the adhesive and the bleached enamel. The loss of bond strength immediately after the bleaching treatment is related to the time of treatment, the applied concentration and the achievement of adhesive procedures period after tooth whitening¹⁶.

One limitation of non-vital teeth bleaching discolored relapse color is initially obtained, which is caused by the diffusion of pigment substances and the infiltration of bacteria present in the space between the restoration and the tooth structure. It is believed also that other color change causes is the reduction of bleaching compounds, permeability inherent in the dental tissues (enamel and dentin) the extraneous substances and the restoration of darker molecules¹⁷.

The combination of a direct restoration with composite resin with a glass fiber pin helps in maintaining the remaining tissue and the crown reinforcement, the resin cement is used in the cementing of the glass fiber pin¹⁸.

The use of glass fiber posts has the advantage of being translucent, it over with, you win aesthetics. They are chosen to support restorations made of composites and

ceramics, especially in anterior teeth. Furthermore, polymerization is increased as this kind of pin can allow the passage of light¹⁹.

This article aims to present a case of a patient report in which an exogenous bleaching was performed on a tooth treated endodontically.

2. CASE REPORT

Patient, female, 30 years old, attended the dental clinic at the University Severino Sombra complaining of darkening in the tooth 11. During the anamnesis it was found that the reported tooth had endodontic treatment performed 15 years ago. The clinical examination can be diagnosed presence of composite resin restorations in the middle third of the mesial of it and satisfactory endodontic treatment (Figure 1).



Figure 1: Initial aspect.

Just after the clinical examination, began the pictures agreement with the initial color of diagnosis according to VITA A4 range. It was proposed to the patient the use of exogenous bleaching with 35% hydrogen peroxide, for the tooth in question had become very fragile, so being a conservative, also linked to the home whitening option with silicon plate.

It was used for office bleaching the material of FGM (Santa Catarina - Brazil) Whiteness HP 35% according to the manufacturer's instructions. For home use, the material was the Perfect Whiteness (FGM - Santa Catarina - Brazil) with carbamide peroxide at 16%, following the manufacturer's instructions.

After photographic documentation, there was the impression from the patient with alginate, the model made of plaster type III and soon after the home use device. The third session was held the first application's office whitening, being used as a means of protecting the patient and Expandex gingival barrier, Topdam (FGM - Santa Catarina - Brazil). Three applications were made 15 minutes after each application material was removed by sucking and the end of the third application was made extensive washing with water to form the bleached tooth remineralization. At the end of the first consultation was delivered to patient whitening device and a syringe for home application only in the tooth to be bleached (tooth 11), still being held instruction as it should be done the same, with daily use of 2 hours (Figure 2).



Figure 2. Application of hydrogen peroxide (35%).

It was performed three subsequent office bleaching sessions with the patient daily using carbamide peroxide at 16% (Figure 3).



Figure 3. Teeth whitening after three sessions.



Figure 4. Isolation before restoration.



Figure 5. Appearance immediately after the restoration.

In the last session, held one week after the whitening in order to wait for the remineralization of the tooth and complete elimination of peroxides that could disturb the polymerization of the composite resin, was held exchange

of restorations old since it had cleared enough and then the present resins had yellowish appearance. At the end of treatment was diagnosed final color in the tooth, according to VITA scale B1 (Figures 4 and 5).



Figure 6. Patency of the duct.



Figure 7. Pin proof.



Figure 8. Cemented pin.



Figure 9. Final restoration.

Two months after the composite resin restoration has been performed the manufacturing of the glass fiber pin. It was carried the patency with Broad bits 1, 2, 3 and 4, and was used fiber pin number 2 brand Reforpost (Ange-

lus) and cemented with resin cement U200 (3M ESPE) and held final restoration resin composed (Figures 6, 7, 8 and 9).

3. DISCUSSION

The dental darkening due to endodontic treatment, especially in esthetic areas, can cause the patient inhibition during the interaction affecting your social life. This patient reported inhibition of certain public activities as photographs showing the smile, among other social activities in your smile bothered her.

Dental dimming has a multifactorial origin, however, the most common is due to the endodontic treatment, in which authors state that the same only to be performed will occur darkening², because the pulp is removed features such as hue, chroma and value will be changed. However, some authors argue that the root causes for these color changes are due to: pulp hemorrhage, necrotic debris, access surgery, pigmentation dental materials⁴. In this case, the blackout was due to endodontic treatment, which was conducted 19 years ago, and the patient reports blackout for over five years and without the presence of trauma^{1,4,7}.

The technique of bleaching, in cases of dimming for endodontic treatment, is in a more conservative procedure, taking into account procedures like ceramic laminates. The processing of this technique is the use of substances (hydrogen peroxide) which will act in the heavy molecules containing pigment which causes the tooth dimming releasing nascent oxygen that will cause the teeth to whiten². Having to be taken into account saturation point to dentin presents, in which, from the same dentin will be eroded and the tooth to be bleached it will not introduce more changes. In the report presented opted for the combination of two techniques, which are: the home use with carbamide peroxide for 16% and office (exogenous) with hydrogen peroxide for 35%, this technique was chosen because the patient has extensive composite resin restorations and to prevent fractures by the tooth to be demineralized, a fact that occurs during the endogenous whitening^{3,7,8}.

The composite resin restorations, after endodontic treatment is something that should be explained to the patient, because it does not undergo bleaching along with the dental element. Thus, the restorations are essential parts of the treatment of tooth whitening, so that the smile and the look of the tooth in question get even more harmonious and pleasing to the patient. When the whitening is done on teeth with composite resin restorations, after its termination, it is evident the difference in color of the restorations, which with its exchange should help in improving the harmony and even tooth anatomy to be cleared. Thus, can be save the direct restorations increasingly dental element structures⁴. It cleared the tooth in question were required to be held two exchanges of res-

toration in order to preserve as best as possible the remaining tooth structure.

The use of glass fiber pins associated with composite resin restorations, it has the function of expanding the reinforcement of the coronal structure. This type of material has been gaining more space in direct restorations, for the same display linear thermal expansion coefficient similar to that of dentin, causing, during temperature changes. The pin does not fracture root remaining associated to the pin, the cementing with resin cement (which prevents friction between the pin and the walls of the root dentin) and final restoration of endodontic access with composite resin, it makes the tooth can even clear anymore, after the bleaching treatment and strengthen the tooth, preventing that future fractures forcibly happen. In this report, the option of restoring definitively with glass fiber post aimed to strengthen the tooth by the same shows extensive composite resin restorations in both proximal and in the cingulate region (situation that would make the tooth more susceptible to future fractures)^{18, 19}.

4. CONCLUSION

We demonstrate in this case, taking into account characteristics such as the situation of the remaining tooth must be taken into consideration in order to protect in cases of external resorption. The office bleaching associated with the home and the adhesive restorative therapy proved effective in the successful return of the aesthetic aspect of the patient.

REFERENCES

- [1]. Zanetti De Carvalho EMOF, Robazza CBC, Lage-Marques JL. Análise espectrofotométrica e visual do clareamento dental interno utilizando laser e calor como fonte catalisadora. *Pesquisa de odontologia brasileira*. 2002; 16(4):337-42.
- [2]. Martins JD *et al.* Diferentes alternativas de clareamento para dentes escurecidos tratados endodonticamente. *Revista de ciências médicas e biológicas*, Salvador-BA. Mai./ago., 2009; 8(2): 213-18.
- [3]. Bandéca MC, *et al.* Clareamento e restauração adesiva direta para correção de desarmonias estéticas. *International Journal of Brazilian Dentistry*, Florianópolis. 2010; 6(3):324-34.
- [4]. Dos Santos RL, *et al.* Solução estética através da interação do clareamento endógeno e restauração em resina composta. *Revista brasileira de ciências da saúde*. 2009; 13(3):99-104.
- [5]. Vasconcellos WA, Assis BRP, Albuquerque RC. Avaliação da capacidade de vedamento da região cervical por materiais usados na confecção do tampão durante o clareamento dental endógeno. *PUBLICATIO UEPG – Biological and Health Sciences*. 2000; 6(1):29-42.
- [6]. Bortolatto JF, *et al.* Clareamento interno em dentes despolpados como alternativa a procedimentos invasivos: relato de caso. *Revista de odontologia da universidade da cidade de São Paulo*. Mai./ ago., 2012; 24(2):143-52.
- [7]. Carnevali B. Ferreira MB, Franco de Carvalho EMO. Avaliação do clareamento dental exógeno por meio de fotografia inicial. *Revista odontológica UNESP*. 2009; 29(1):9-13.
- [8]. Wiegand A. *et al.* Efficacy of different whitening modalities on bovine enamel and dentin. *Departamento de operação e prevenção de dentística e periodontia*. 2004; 9:91-7.
- [9]. Alves MR. Soluções em clareamento dental: segurança e resultados em procedimentos terapêuticos: Passo a passo de um caso clínico realizado com técnica mista utilizando géis de consultório e caseiro com controle de concentrações. *Revista Brasil Dentistry*. Ribeirão preto. 2010; 20-25.
- [10]. Toledo FL, de Almeida CM, de Freitas MFA, de Freitas CA. Clareamento interno e externo em dentes despolpados – caso clínico. *Faculdade de odontologia de Lins- UNIMEP*.
- [11]. Vieira GF, Arakaki Y, Caneppele TMF. Spectrophotometric assessment of the effects of 10% carbamide peroxide on enamel translucency. *Brazilian Oral Res*. São José dos Campos. Mar., 2007; 22(1):90-5.
- [12]. Tredwin CJ, Naik S, Lewis NJ, Scully C. Hydrogen peroxide tooth-whitening(bleaching) products: Review of adverse effects and safety issues. *British Dental Journal*. 2005; 200(7):371-6.
- [13]. Esberard RR, *et al.* Efeitos das técnicas e dos agentes clareadores externos na morfologia da junção amelocementária e nos tecidos dentários que a compõe. *Revista Dental Press Estética*. Out. / dez. 2004; 1(1):58-72.
- [14]. Tam LE, Noroozi A. Effects of direct na indirect bleach on dentin fracture toughness. *Journal of Dental Research*. Botucatu. 2007; 86(12):1193-97.
- [15]. da Silva EM, *et al.* Etiologia e prevenção das reabsorções cervicais externas associadas ao clareamento dentário. *Revista sul-brasileira de odontologia*. Curitiba. 2010; 7(1):78-89.
- [16]. Marson FC, Sensi LG, Arruda T. Efeito do clareamento dental sobre a resistência adesiva do esmalte. *RGO*, Porto Alegre. Jan. / mar. 2008; 56(1):33-7.
- [17]. Compagnoli KR, Junior NS. Clareamento de dentes desvitalizados: técnica LED com peróxido de hidrogênio. *Revista de Clínica e pesquisa odontológica*. Curitiba. 2008; 4(2):107-12.
- [18]. Muniz L, *et al.* Restaurações diretas associadas a pinos de fibra de vidro em dentes fraturados. Relato de caso clínico. *Revista Dental Press estética*. 2005; 2(3):35-57.
- [19]. Ferreira R, Mildemberg B, Gadotti B. C, Garcia RN. Avaliação da influência do tratamento endodôntico na resistência de união de pinos de fibra reforçados por um composto restaurador. *Revista sul-brasileira de odontologia*. 2011; 8(2):174-81.