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WHITENING OF A PRIMARY TOOTH WITH 16% CARBAMIDE PEROXIDE: A CASE REPORT

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Whitening of a Primary Tooth with 16% Carbamide Peroxide: A Case Report

Aclaramiento de un diente deciduo con peróxido de carbamida al 16%: un reporte de caso

[1] Martha Juliana Rodríguez. ORICID: https://orcid.org/0000-0001-7339-7836

[2] Claudia Cáceres. ORICID: https://orcid.org/0000-0002-7902-1503

1 Odontóloga. Magíster en Epidemiología, Universidad Santo Tomás, Bucaramanga, Colombia.

2 Odontóloga. Especialista en Odontopediatría, Universidad Santo Tomás, Bucaramanga, Colombia.

Autor de correspondencia: Martha Juliana Rodríguez

Correo electrónico: marthajuro@gmail.com

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Resumen

The clinical indications for dental whitening include discolorations caused by traumatic injuries, which may lead to the diagnosis of either dental pulp necrosis or calcification. This procedure is widely used in adult patients; however, it is uncommon in pediatric patients, possibly due to the limited publication of relevant studies or because primary teeth are expected to be replaced in the future. The purpose of this paper is to describe the treatment of a darkened primary tooth belonging to a five-year-old boy who attended the dental clinics at Universidad Santo Tomás in Bucaramanga, Colombia.

Palabras claves: Tooth bleaching, Tooth, Dental pulp necrosis, Case reports.

Abstract

Las indicaciones clínicas para el aclaramiento dental incluyen decoloraciones causadas por una lesión traumática que evoluciona a un diagnóstico de necrosis o degeneración pulpar calcificante. Este procedimiento es ampliamente usado en pacientes adultos, sin embargo, en el paciente pediátrico esta práctica no es común, posiblemente por la limitada publicación de estudios sobre el tema o por tratarse de dientes que serán reemplazados en un futuro. El propósito de este trabajo fue describir el tratamiento de un diente deciduo con cambio de color en un niño de cinco años, que asistió a las clínicas odontológicas de la Universidad Santo Tomás en Bucaramanga, Colombia.

Keywords: Blanqueamiento de dientes, Diente, Necrosis de la pulpa dental, Informes de casos.

Introduction

Today, the concern for physical appearance is not only observed in adults, but children also worry about their clothing, hair, and teeth. Given the importance of anterior teeth, the presence of fractures, dental caries, or color changes may

generate a state of anxiety and low self-esteem, leading to social and psychological issues [1, 2].

Color changes in the primary teeth are a frequently consulted topic generally arising following a dentoalveolar traumatic injury [3-5]. Although it is a common event, it's hard to find reports about its prevalence and in many cases, a discoloration becomes the only sign of the trauma suffered by the child [6-8].

Goettems et al., conducted a retrospective cohort study over a 10-year period to assess the incidence of crown discoloration following trauma in primary teeth. They included 355 children with 628 records of traumatized teeth. The authors found an incidence of crown discoloration to be 27.9%. The change of color was higher when the child suffered the injury at a young age (two to four years), and it was associated with the type of trauma [9].

The relationship between the differing tonalities and the possible diagnostic for the affected tooth has been studied. Camp reported that teeth with tones from dark brown to dark gray could be found, and that this change in color is generally evident between the first and third weeks after the trauma has occurred [10]. Holan and Fuks evaluated 48 deciduous incisors with a dark gray coloration, finding that 77.1% of the teeth presented necrosis of the dental pulp, 20.8% partial necrosis, and 2.1% had a vital pulp. They concluded that the dark gray color could be a sign of dental pulp necrosis even without the presence of sensitivity to percussion and increased mobility [7]. Goettems et al., also reached the same conclusion [9].

The treatment alternatives for this change in color include microabrasion, composite veneers, dental whitening, and non-treatment [11, 12]. Since 2004, the American Academy of Pediatric Dentistry (AAPD) has established the guidelines for performing dental whitening in children and adolescents. The support whitening procedures that are safe and effective, considering an individualized treatment plan after conducting a comprehensive study [13].

Favorable results obtained with dental whitening are generally attributed to the release of oxygen by the whitening agents in their oxide-reduction reaction. This

reaction leads to the rupture of rings composing the molecules of the pigments responsible for the color change [3]. However, it has been reported that this type of treatment may also have adverse effects, such as dental ankylosis and external radicular reabsorption [13, 14]. These side effects are related to the presence of free radical hydroxyl, a by-product of the degradation of hydrogen peroxide or carbamide peroxide. Therefore, it is recommended to use the lowest concentration, considering that professional-grade products typically range from 10 to 38% carbamide peroxide. Approximately 10% of carbamide peroxide is equivalent to 3% of hydrogen peroxide, which is responsible for the release of the oxygen necessary for whitening process [14].

Despite the mentioned aspects and the security of the procedure when done with caution according to each case, the number of published epidemiologic studies is scarce; revision articles and case reports dominate the literature. The purpose of this paper is to present the procedure performed on a patient who required dental whitening for the upper right primary central incisor.

Case report

A 5-year-old boy attended the dental clinics at Universidad Santo Tomás in Bucaramanga with his mother. She explained the reason for their visit to the dental clinic as “he has a black tooth”; the patient did not complain about pain but was unhappy about the color of his upper right primary central incisor (tooth 51).

The boy was systemically healthy without any relevant familiar or personal background. He had suffered a traumatic injury a year ago while playing and did not present any discomfort in his teeth at that moment. Nevertheless, his parents noticed that one tooth was changing color. His behavior at the dental clinic was “positive” according to Frankl’s behavior scale [15].

Clinical examination showed complete primary dentition with healthy soft tissue, an overbite of 2 mm and a vertical overbite of 30%. There was a bilateral straight terminal plane and a bilateral class I canine relationship. An active cavitated

dental caries was found on the mesial surface of the upper left primary central incisor (61). Additionally, an intrinsic dark discoloration was observed on the upper right central incisor (tooth 51), without symptoms or clinical signs of an infectious pathology (Figure 1). The tooth did not present any mobility, and thermic tests were not performed due to their limited diagnostic value in a pediatric patient [4, 10].

Figure 1. Clinical appearance of the discolored traumatized upper right central incisor before treatment.

The periapical x-ray showed no anomalies, such as widened periodontal ligament, periapical radiolucency, calcification, internal or external resorption. Furthermore, the root length was adequate in case of performing endodontic treatment.

Based on these findings, the diagnostics were:

- *Systemic:* healthy patient.
- *Facial:* straight profile.
- *Dental:* possible pulp necrosis on the upper right central incisor, cavitated dental caries on the upper left central incisor.

The goals for this treatment plan were explained to the mother, who was very motivated. The following options for the treatment of tooth 51 were presented: anterior strip crown, endodontic treatment and anterior strip crown, composite veneer, and whitening with 10% carbamide peroxide [3, 12]. The possibility of not performing any treatment on the affected tooth was also proposed [11]. The mother opted for the endodontic treatment, the 10% carbamide peroxide whitening, and definitive restoration using composite. Consent from her was requested, as well as the patient's agreement.

Before conducting the endodontic treatment, the color of the tooth was compared with the VITA guide, and it was determined that the closest match was C4 (Figure 2). The endodontic treatment was performed on tooth 51, which presented partial pulp necrosis. After developing an access preparation, the root canal was instrumented up to size 25 (Figures 3 and 4). The tooth was irrigated using a normal saline solution, and the root canal was filled with a zinc-oxide eugenol (Figure 5). Seven days later, internal dental whitening was performed with the use of 16% carbamide peroxide (BMS Home Whitening□, Code 5.024-H16). For that procedure, part of the zinc-oxide eugenol paste was removed to make space for the glass ionomer, which was applied at the entrance to the root canal with rubber dam isolation. The agent (16% carbamide peroxide) was applied within the chamber (Figure 6); this was covered with a moist cotton pellet, and the cavity was provisionally restored with glass ionomer to prevent filtration and ensure the maintenance of the agent within the chamber.

Figure 2. Observable change of color on the upper right central incisor (51) compared with the VITA guide.

Figure 3. Gaining access to the root canal.

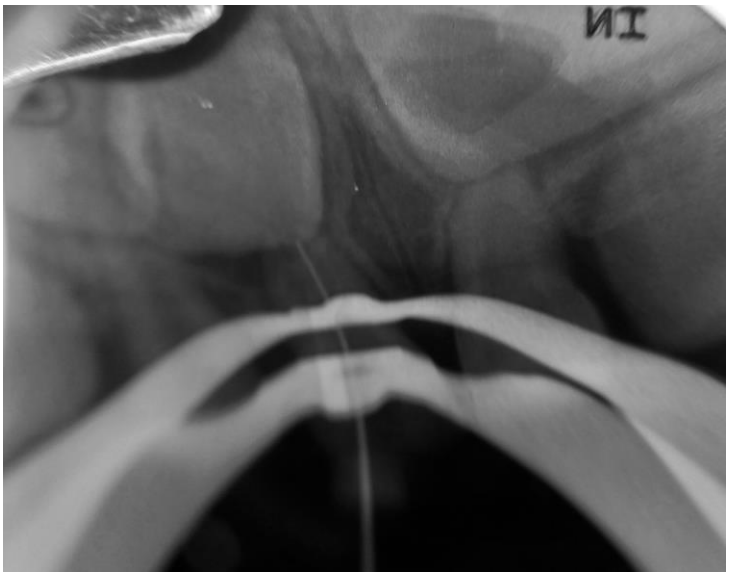

Figure 4. Root canal instrumentation.

Figure 5. Radiograph of the tooth after the root canal treatment.

Figure 6. Application of 16% carbamide peroxide.

After three weeks, the whitening agent and the cotton pellet within the pulp chamber were removed. At this appointment, the final restoration using composite was performed. The change in the tooth's color improved but was not as evident as expected. Unfortunately, it was not possible to take the corresponding picture because the patient did not grant permission.

Discussion

In present-day, publicity regarding what is considered beautiful is extremely widespread. Parents are not unaware of this situation, and they often request the form and color of their children's teeth to be restored. This is one of the reasons for introducing dental whitening for primary teeth, even though this procedure has been conducted for a long time in permanent teeth [13, 14, 16].

The AAPD has suggested that whitening agents may cause external reabsorption and ankylosis [13]. Ayhan et al., found an average of penetration by filtration of 0.6 mm when zinc-oxide eugenol was used as the obturation material for

the root canal [17]. For this reason, it is necessary to use the lowest available concentration of the agent, seal the root canal thoroughly to avoid filtration, and schedule frequent recall appointments [18]. In this case report, the most coronal section of the obturated canal was sealed with glass ionomer to prevent leakage, and the patient was schedule for a follow-up appointment three weeks after the dental whitening procedure was conducted.

Among the agents previously used on children are 35% hydrogen peroxide with a light source, 10% carbamide peroxide in a tray overnight, 37% carbamide peroxide with a diode laser and with halogen lamp, and sodium perborate using the walking bleach technique [16, 18-20]. These four techniques were successful, with no side effects or complications.

Carbamide peroxide has been used with trays overnight or in a localized way [3, 14, 19]. It contains urea as an active agent that, when released, raises the pH, resulting in reduced structural loss [3]. Shannon et al., assessed the characteristics of the enamel following its exposure to 10% carbamide peroxide; they found that the enamel did undergo some structural changes after four weeks of treatment [21]. However, Rafiee et al., observed that 10% carbamide peroxide did not cause a decrease in the enamel microhardness, as indicated by their In vitro study [22].

Another aspect to consider is that primary teeth are more permeable than permanent teeth, so high concentrations of the whitening agents are not required, and little time is needed to achieve the desired results [18]. In this report, the concentration of carbamide peroxide was 16% because it was the only available in the market. Nonetheless, this agent was applied for a short period (three weeks). The treatment whitened the tooth's color by two tones. It had been explained to the mother that this result was possible, to avoid creating false expectations.

Regardless, it is important to be careful and understand that this treatment is not recommended for children with conditions such as xerostomia, asthma, poor oral hygiene, enzymatic disorders, hypersensitivity to hydrogen-based components, bruxism, and reflux. Similarly, the AAPD does not endorse treatment using trays in patients with mixed dentition [13].

This case report has some limitations as there are only four photographs illustrating the case. Additionally, it was not possible to conduct follow-up visits because the patient did not attend after the treatment.

Conclusion

While further investigation of the subject is required, it can be concluded that dental whitening is an interesting treatment option considering the minimal removal of dental tissue and the good results that can be obtained within a short time. In this case, the treatment was deemed satisfactory when having in mind some favorable aspects: the patient did not present any systemic condition, exhibited positive behavior during the treatment, the change in coloration was limited to a single tooth, and his mother was motivated.

Given the limited publications on this topic, it is important to conduct a bibliometric study and a systematic review to illustrate the agents involved and how this procedure is applied to pediatric patients.

Conflictos de intereses: Los autores declaran no tener algún conflicto de interés.

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Correo de autores

Martha Juliana Rodríguez: marthajuro@gmail.com
Claudia Cáceres: claudiacaceres22@yahoo.com