

Gingival Erosions Caused by Utilization of the 10% Carbamide Peroxide in Home Dental Bleaching

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Abstract

The vital tooth bleaching technique has been widely used in the dental clinic. Care is usually taken, as in the choice of bleaching gel concentration and in the confection of the trays, avoiding, respectively, the dentin hypersensitivity and trauma by tray excess over the marginal gingival region. However, the action of the bleaching gel over the periodontal tissues has not been much explored. We present in this article a clinical case of gingival erosions due to home dental bleaching, using the 10% carbamide peroxide gel, which healed with the cessation of treatment. We also highlight about the precautions that should be taken in the making of molds and the use of whiteners.

Keywords: Tooth Bleaching; Gingiva; Oral Diagnosis; Wounds and Injuries

Introduction

The domestic technique of vital teeth bleaching has been widely disseminated and applied in the daily clinic. Several are the bleaching agents and modalities of dosage, raising desirable and efficient effects [1-4]. Many causes, such as coloring by aging, eating habits, smoking, innate discoloration, fluorosis, trauma and ingestion of tetracycline during odontogenesis promote the darkening of dental crowns.

Usually, the carbamide peroxide (10%, 16% and 22%) are employed in the domestic bleaching of vital teeth, using acetate trays [1,2], while the hydrogen peroxide from 25 to 37% is used in the bleaching of vital and root-filled teeth on applications made in the dental office. The deleterious action of hydrogen peroxide on the soft tissues of the oral cavity is known, so it is usually used with absolute or relative isolation (gingival mechanical barrier as, for example, OpalDam®, Ultradent Products, South Jordan, Utah, USA), can cause located inflammation and necrosis, when the contact between the oxidizing agent and gingiva occurs [2,4,5]. The carbamide peroxide presents efficiency, but the total security of their

use is still debated, because little is known about the action of the oxidizing agents on periodontal components [3,6].

Purpose of the Study

The purpose of this work was to present a case of gingival erosions arising from home dental bleaching using 10% carbamide peroxide gel, discussing the action of the gel on periodontal components.

Case Report

Caucasian male patient, 27 years-old, attended the particular clinic requesting dental bleaching. In anamnesis were not found systemic alterations as well as smoking, alcoholism, or other habits or addictions.

Clinically, were not observed periodontal changes, and the patient presented satisfactory oral hygiene. The superior tray was made and it was suggested the protocol for daily use (3 hours in the morning and in the afternoon) for a period of 15 days, using 10% carbamide peroxide.

However, in the second consecutive day, symptomatic gingival irritations were noted, characterized by swelling, with change of color (from rose to erythematous) and smooth erosions at the vestibular gingival papillae tips of the teeth 23, 24 and 25 (Figure 1). The tray was well adapted, without causing trauma in gingival locations. It was recommended to the patient the discontinuity of use for 3 days, and so (with the symptoms remission) the resumption of treatment. Dentin hypersensitivity was not reported. Meanwhile, with the continuity of the treatment, recurrence of the injury was observed. Nevertheless, the patient chose to complete the treatment. For the bleaching of the inferior arcade, it was suggested to use the same protocol, and minor erosive injuries were observed at the tip of the gingival papillae in vestibular of the teeth 31, 32, 33 and 34, causing mild pain and discomfort (Figure 2). The tray was revised again, noting if there was local trauma on gingival. The same procedure was taken, with the discontinuity of use, but again the patient completed the treatment. The patient was notified that if there was any greater change, to return for evaluation by the dentist.



Figure 1: Erythematous and smooth erosions at the vestibular keratinized gingival tip of the teeth 23, 24 and 25.



Figure 2: Erosive injuries observed at the tip of the vestibular gingival papillae of the teeth 31, 32, 33 and 34.

Discussion

Tooth whitening has become one of the most frequently requested aesthetic treatments in dental offices. Despite the high level of clinical success, some adverse effects have been reported, including dentin hypersensitivity, dental resorption, gingival lesions and erosions (with burning sensation) and the possible development of premalignant lesions, especially when misused [5,7].

The gingival erosions could be caused by excess in the trays' edges, which would have traumatized the marginal gingiva by mechanical irritation; the chemical action of the gel; high concentration of the bleaching agent; or by the methodology of management [2,8]. The gingival irritation tend to disappear with the discontinuation of the use (of 1 to 2 days), with the reduction of the frequency of use or the amount of gel in tray and/or tray adjustments [2,5,8,9]. In the present case, was noted the trays has been reviewed, eliminating the last hypothesis.

Rodrigues, *et al.* [4] evaluated the incidence of gingival irritation according to the association between the bleaching agents and techniques (home or professional). In the group that used the association of 10% carbamide peroxide (home bleaching) with 37% carbamide peroxide (professional bleaching), about 67% of patients had gingival irritation. In the group that joined 37% carbamide peroxide with placebo agent, 33% had gingival irritation, and the group that joined 10% carbamide peroxide to placebo agent, 67% had gingival irritation. The authors concluded that both forms of bleaching (home or professional) and the association between the two techniques, produced gingival irritation, with greater predisposed by the 10% carbamide peroxide gel. Peña e Cabrita [8] evaluated the clinical efficacy and possible adverse effects of the home bleaching with 10% carbamide peroxide gel and hydrogen peroxide gel containing from 3.5% to 5% of potassium nitrate. Of the 16 patients evaluated, 5 had gingival irritation, and from that, 3 used carbamide peroxide and 2 have used hydrogen peroxide. Almas, *et al.* [1] evaluating the occurrence of side effects during the bleaching in 18 patients, observed that two patients had dentin hypersensitivity and no one presented gingival irritation.

The 10% carbamide peroxide, used in home bleaching of vital teeth, presented variable results. The substance did not generate tissue inflammation, presenting further improvement of the Plaque Index, Gingival Index, Nonmarginal Gingival Index and Nongingival Oral Mucosal Index. Reduction of bleeding on probing, of the flow of the crevicular fluid and pocket depth were observed [1,2,6,10]. The carbamide peroxide can prevent the growth of anaerobic bacteria [2]. Minimum and detectable clinically insignificant changes in the gums and soft tissues of the oral cavity were cited. The mea-

surement of flow of crevicular fluid was a factor included in the protocol for evaluating proposed by Curtis, *et al.* [3], but it was eliminated in other consecutive work [10]. In grade 3 Gingival Index, severe gingival inflammation, bleeding, swelling and redness were included, apart from gingival ulceration [10].

The systems of home bleaching are composed by glycerin, carbopol, fluorides and flavourizings, beyond the carbamide or hydrogen peroxide (active ingredients), which could cause the gingival irritations [6]. The carbopol (carboxypolymethylene), that is a vehicle agent that can be linked to side effects, was particularly highlighted. High concentrations of glycerin can be irritating. The phenacetin (acetophenetidine) is toxic and can cause cracks in the skin. Meanwhile, the chemical factors were evaluated as insignificant factors predisposing to the side effects [4,9]. The increase in the epithelium thickness and in the layer of keratin was cited [2]. Costa Filho, *et al.* [4] evaluated the histopathology and immunohistochemical gingival changes after bleaching of vital teeth using the 10% carbamide peroxide with carbopol. The authors concluded that the carbamide peroxide can cause statistically significant morphological changes in the gingival epithelium and increase the rate of proliferation of epithelial cells. The time of utilization of the gel was related directly to the appearance and severity of gingival irritation, as there are several protocols for use.

The hydrogen peroxide was not considered a carcinogenic agent, but it can amplify DNA changes, initiated by other agents on the oral cavity (as smoking, alcoholism, ultra-violet light and oncogenic viruses) [7,11-14]. However, hydrogen peroxide has been considered genotoxic (*in vitro* but not *in vivo* study - in humans). There was no evidence of the development of oral neoplastic or pre-neoplastic lesions. Usually, the oral cavity receives the hydrogen peroxide at low concentrations, with short duration (30 to 60 minutes), and this dosage could not increase carcinogenic risk associated with other known risk factors to the development of oral cancer, such as smoking and alcoholism.

Even with the concentrations of hydrogen peroxide higher in the gum, where the oral cancer is little noticed, the people have enough catalase activity in the saliva and buccal mucosa for effectively detoxify the hydrogen peroxide to lower levels of exposition [15,16]. Another study assessed the *in vitro* cytotoxicity of 3.5% hydrogen peroxide, which is equivalent to 10% carbamide peroxide to the gingival fibroblasts, having significant effect on the morphology, proliferation and functional activities, which are important in the maintenance and repair of tissues. This substance offered risks to periodontal and buccal tissues with previous injuries [14].

Clinical examination and review of the complete medical history of the patient are recommended, verifying especially allergies to chemicals substances, which may be a predisposing factor to gingival irritation. The association of pre-existing factors such as gingival retractions and variables such as gender (hormonal changes in women during the menstrual cycle), were important in the anamnesis data [9]. In order to prevent the gingival irritation, patients should be instructed to insert small quantity of bleaching agent into the tray to avoid its overflow [4,5].

Recently, the chemical (toxic) burn was classified as traumatic lesion of the non-dental-plaque-induced gingival diseases in 2017 by the World Workshop on the Classification of Periodontal and Peri-implant Diseases and Conditions [17].

Conclusion

We can conclude the 10% carbamide peroxide can develop adverse effects, even in the absence of previous periodontal diseases, as presented in this report. Any change of gel color or texture implies the elimination of the same. The gingival irritations were directly related to the length of time in the various protocols for use. We recommend extra attention to patients with periodontal diseases or gingival pre-existing injuries, smokers and alcoholics.

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