

An Unusual Habitual Use of an Undiluted Sodium Hypochlorite to Remove Smoking Stains and Calculus: A Case Report

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ABSTRACT

No doubt that teeth staining has a detrimental effect on smoker's appearance, which in turn affects his social life. This is why most of the smokers are seeking for the bleaching and fixed prosthodontics. Due to excessive expenses of oral esthetics, patients usually think of other alternatives that are not expensive and easily available at home. However, diluted sodium hypochlorite (NaOCl) has been known as a bleaching and antiseptic agent, but due to its injurious effects, it became confined in the dental practice. In this case report, a heavy smoker patient who used undiluted NaOCl on a brush instead of tooth paste claimed that it is more effective in removing his stains and calculus.

Keywords: Smoking; Sodium hypochlorite; bleaching agent; Antiseptic agent

Introduction

Smoking is a major risk factor for oral and systemic health. It can cause oral cancerogenic and non-cancerogenic lesions, discoloration, periodontal disease and consequent teeth loss [1]. The most visible dental manifestation is the discoloration of the teeth as it results from penetration of coal tar to tooth surface, the color and intensity of the discoloration depends on the duration and frequency of smoking [2]. No doubt, teeth staining have a detrimental effect on smoker's appearance, which in turn affects his social life. This is why most of the smokers are seeking for the bleaching and fixed prosthodontics.

Due to excessive expenses of oral esthetics, some patients think of other alternatives that are not expensive and easily available at home. Commonly, they used sodium bicarbonate powder, hydrogen peroxide, and abrasive tooth dentifrices to remove the smoking stains from teeth and make it white. However, Sodium bicarbonate which is the common baking soda has been recognized to have the properties of pH restoration, wetting action, mechanical cleansing and bacterial reduction with minimal side effects [3]. While, Hydrogen peroxide (H_2O_2) is an oxidizing agent that was used as bleaching and antibacterial agents but it was found that diluted H_2O_2 solution causes alteration in enamel topography which in turn increases the surface roughness and the susceptibility of extrinsic discoloration after the bleaching procedure [4]. Furthermore, it has been confirmed that dentifrices with whitening or abrasive agents could produce excessive levels of calcium release, affect enamel morphology and increase the tooth sensitivity [5].

Earlier, the diluted sodium hypochlorite (NaOCl) has been known as a bleaching and antiseptic agent, but due to its injurious effects and potential complications such as adverse tissue reactions with life threatening allergic response, it became confined in the dental practice [6]. However, its cytotoxic effects are directly proportional to the concentration of the NaOCl [7].

Nonetheless, NaOCl 1.0–6.0% has been retained as an antiseptic agent in endodontic treatment for a century, and endures the favored antimicrobial solution for canal irrigation because of its low viscosity that allow easy introduction into canals, acceptable shelf life, low cost and effectiveness [8]. While, use of NaOCl for treating other types of oral infection has been stated rarely [8]. However, a very low number of studies have shown that using a diluted NaOCl 0.25% decreases the plaque accumulation and gingival inflammation. In whatever way, some precautions should be taken during the dental procedure when using a NaOCl solution such as aqueous solution with proper dilution should be used, eye protection, face mask, gloves and apron should be worn, solution should be stored in lightproof nonmetallic container and patient clothes should be covered. In this case report, a heavy smoker patient who used undiluted NaOCl on a brush instead of tooth paste claimed that it is more effective in removing his stains and calculus.

Aim of the Article

Our purpose was to highlight the habitual oral effect of undiluted sodium hypochlorite solution.

Case Report

A 56 years old Caucasian Syrian male patient, who works as builder, was referred to the dental clinics, Farabi College, KSA for evaluation and treatment of his decayed teeth. The medical history was taken revealing that he was systemically healthy but considered as heavy smoker according to the WHO as he smokes more than 50 cigarettes/day. He reported that the first time he noticed the discoloration of his teeth and gum was 9 years ago where he started his smoking habit. He also stated that the situation of his teeth and gum became progressively worsen even with using the oral hygiene regime. The Patient recorded no pain or bleeding during any life activity (eating, drinking and brushing)

Clinical Evaluation

On clinical examination, there were a general pale pink colored gingiva and class IV recession according to Millar's classification in all mandibular anterior teeth facially and lingually in range of 3-5mm, where there were complete loss of interdental papillae causing the black triangles appearance. Minimal plaque deposits and subgingival calculus were observed on anterior teeth surfaces while plaque accumulation and food debris were well noticed with high amounts in the cervical cavities of the teeth. Dental caries were seen in #13,#23,#33,#32,#38 and #34. Teeth number #17,#24,#35,#36,#37, #44, #45, #46 and #47 were missing by previous extraction as shown in Figure 1.



Figure 1: Intraoral preoperative pictures of a patient who used undiluted NaOCl (Clorox) showing minimal amount of plaque accumulation on the exposed roots of mandibular teeth while plaque retention and food debris were observed in the facial and proximal cavities

None of these clinical features existed; edema, inflammation, bleeding on probing and ulceration in the gingiva. Also, neither he had high frenal attachment nor narrow zone of attached gingiva. In addition, generalized black, brown and dark brown stains were observed in all teeth especially the cervical portions while gingiva and oral mucosa showed localized smoker melanosis as shown in Figure 1. Moreover, the patient had smoker hairy tongue while ventral and lateral tongue surfaces were free from any abnormalities or lesions.

On radiographic examination, there were general severe interproximal bone loss ranged stage III- IV according to the new classification staging of periodontitis [9] where the bone loss reaching and extended the mid third of roots. The case was diagnosed as currently unstable generalized periodontitis stage III-IV grade C, where the destruction rate exceeds the expectations and at high risk of more progression and less responsiveness to the mechanical therapy due to the smoking effect. An informed consent and verbal approval were obtained, patient agreed for taking and presenting his case.

The Causative Habit

Upon questioning, the patient disclosed that he got the idea of using NaOCl solution from a previous dental visit where he heard the dentist calling for NaOCl irrigation during the root canal treatment, from then he started to use Clorox (as source of NaOCl) at home without any dilution by himself without any dental consultation. The usage of Clorox gave him a self-satisfactory bleaching and cleaning results, the patient claimed that all the calculus on his teeth were removed after repeated application of undiluted NaOCl but he admitted that he sometimes suffered from ulcers in the gingiva and lips. Furthermore, he mentioned that he overcame this problem by applying Vaseline on the oral mucosa during brushing with Clorox.

The patient described his habit, as he was using a dental soft brush that dipped in a glass cup of Clorox washing liquid, applying it on the surfaces of the teeth in circular motion once/twice a week. Also, He mentioned that neither of tooth pastes nor axillary aids was used, and he used to apply Vaseline in his lips and gums before this procedure to avoid the burning sensations and ulcer formation that he complained from it before.

Treatment Consideration

The Patient comprehended the effect of the undiluted solution (Clorox) and negative effect of smoking on his oral mucosa, gingiva, teeth and general health. Patient was instructed to do an oral hygiene regimen in a proper way including the replacement of his old brush and do brushing using Charter's brushing technique twice a day by starting at 45 degree on the gingiva in crown directions and gently weeping coronally in addition to dental flossing after meals.

Scaling and root planning were done to remove all the subgingival calculus and smoothing the unexposed roots to prevent plaque retention. However, the entire denuded root was smooth with very minimal amount of plaque accumulation. No complications were reported after or during scaling as well as sensitivity, pain and mobility. Caries were removed and restored by composite material. A partial denture was designed to replace the missing teeth after extraction of non-restorable tooth #34.

Discussion

The NaOCl solution causes biosynthetic interchanges in cellular metabolism and phospholipids devastation, establishment of chloramines that interfere with cellular metabolism [10]. It destroys microorganisms by oxidation of proteins, nucleotides and lipids. [11] In addition, the disintegration of fatty acid produces glycerol which reduces the surface tension of the solution and prohibits biofilm development [10,12].

Although, its effectiveness in killing oral pathogens, a very limited number of researches have been published on its rinsing effect on oral mucosa. The studies [13-15] showed that using diluted NaOCl reduces dental plaque and inflammation. The American Dental Association Council on Dental Therapeutics has designated 0.1% sodium hypochlorite a “mild antiseptic mouth rinse” and recommended its practice for direct application to mucous membranes [16].

Though, it was assumed that NaOCl can diminish Streptococcus mutants and other cariogenic bacteria [15,17], the patient had generalized cervical caries even with using strong undiluted NaOCl (Figure 1). This is may be because of the smoking habits that decreases the buffering effect, lowers the pH of the saliva, decreases the crevicular gingival fluid and increasing the Lactobacilli and Streptococcus mutant's bacteria [18] which in turn enhances the bacterial biofilm formation and increases the susceptibility to cervical caries. In addition, the improper using of the soft dental brush wasn't enough to inhibit caries process or remove all the causative bacterial biofilm.

In this case report, the clinical features of pale pink gingiva with no signs of edema, bleeding and inflammation were observed with radiographic bone destruction. These features were caused by the harmful effect of smoking as it causes vasoconstriction of blood vessels which in turn decrease the blood flow in gingival tissues resulting the pale pink, non-bleeding gingiva appearance. Also, it increases the prevalence potential of periodontal pathogens and causes an increase in expression of the (RAGE) receptor of advanced glycation products in gingival tissues causing the periodontal destruction. In addition, it decreases the Polymorphonuclear leukocytes activities and increases the formation of mediators that cause the devastation of periodontium. Moreover, Nicotine stimulates the osteoclastic differentiation, impair angiogenesis, and inhibit the expression of various growth factors which causes the progressive bone loss and pocket formation [19]. On the other hand, the reduction in the gingival inflammation and bleeding may be due to the effect of NaOCl solution as it acts as a hemostatic as well as a bacteriostatic and/or bactericidal agent [20].

However, it was obvious that the presence of supragingival calculus and plaque accumulation on root was low as shown in Figure 1, this is may be due to the habitual application of Clorox in addition to the mechanical cleansing of the brush which results a smooth surface of denuded root while there were sub gingival plaque and calculus due to the improper brushing techniques and inaccessibility of unexposed root.

In spite the patient realized the harmful effect of NaOCl on the surrounding oral mucosa because of the repeated usage, he insisted using it. He used to apply Vaseline on the oral mucosa to make a barrier that protects mucosa and to avoid the burning sensation and ulcers' formation. The only explanation for this behavior is that he was really satisfied by the cleaning and whitening effect of NaOCl realizing the difference before and after its usage.

Conclusions

Smoker patients should be conscious of the smoking negative effects on the oral health as well as inappropriate ways of the self-oral care to avoid the drawbacks of the harmful oral habits. High cost advices for the oral health are a challenge in dental clinics as patients always tend to use easy and low cost home approaches instead of going to the dentist. In our case report, we explore the effect of NaOCl as a potentially an effective, inexpensive and affordable solution for dental self-care alternatives. In spite of its harmful effect when used undiluted, it is effective in low concentrations. Further studies should be done with different concentrations of NaOCl to give maximum benefits without harming the oral tissues. Also more researches should be done to compare it with other mouth rinses to find out the more effective one on the oral pathogens.

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