

Adverse Effects of Tooth Bleaching and Its Management

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Abstract: *Quality of life could be negatively influenced or compromised by discolouration of even a single tooth, the demand therefore for aesthetic dentistry and bleaching procedure has increased exponentially over the last decade. Tooth bleaching is intended for improving tooth color and has become an accepted and popular dental procedure in aesthetic dentistry. However, as with any dental procedure, bleaching also involves certain controversies and adverse effects like post operative tooth sensitivity, gingival irritation, resorption, effects of bleaching on restorative materials; although tooth bleaching is a minimally invasive and relatively low-cost procedure it does not offer a permanent solution for tooth to minimize risks and maximize benefits, the involvement and consent of dental professionals in bleaching treatment is necessary during the treatment procedures. The purpose of this paper is to analyze the negative ramifications of tooth bleaching and throw light on subsequent adverse effects and its management to determine if it's truly safe.*

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I. Introduction

Quality of life could be negatively influenced by discolouration of a single teeth; dental aesthetics, especially tooth colour, is of great importance to majority of the people. Tooth bleaching or (whitening) which is one of the most common and inexpensive method for treating discolouration of teeth¹. The purpose of this paper is to analyze the negative ramifications of tooth bleaching and throw light on subsequent controversial facts to determine if it's truly safe.

To bleach or not: Tooth bleaching is intended for improving tooth color and has being accepted as popular dental procedure in aesthetic dentistry. Data accumulated over the last 20 years also indicate no significant, long-term oral or systemic health risks associated. Effective and safe tooth bleaching requires correct diagnosis of the problems associated with tooth discoloration or stains. Furthermore, tooth sensitivity and gingival irritation may occur during the course of bleaching treatment. Therefore to conclude ; Although tooth bleaching is a minimally invasive and relatively low-cost procedure it does not offer a permanent solution for tooth to minimize risks and maximize benefits, the involvement of dental professionals in bleaching treatment is necessary during the treatment procedures^{2,3}

White spot lesions: The term "white spot" lesions, implies that there is a subsurface demineralized area with most of the mineral loss beneath a relatively intact enamel surface. white spot lesions are not only the result of demineralization however as fluorosis, hypomineralization, hypomaturation, hypoplasia can also cause lesions. minimal intervention is an ideal approach in managing white spot lesions, and should start with remineralization therapies. however sometimes esthetics is of utmost important concern, and since bleaching can accentuate white spots resin infiltration technique is considered as most non invasive technique to treat these lesions.⁴

Bleaching of non vital tooth: The bleaching of nonvital, discolored teeth is a low-risk routine treatment for improving esthetics. The three most popular techniques for nonvital tooth bleaching are the walking bleach technique, inside/outside bleaching, and in-office bleaching. The recurrence rate in bleached, endodontically treated teeth is relatively high, and the mechanism has not been completely elucidated.⁵

In office method and home method: A systematic review and meta analysis performed to evaluate the risk and intensity of tooth sensitivity concluded that were no differences detected, either regarding risk/intensity of tooth sensitivity or effectiveness of bleaching treatment⁶

Bleaching with or without light: In office dental bleaching with or without light-without considering variations in the protocols, the activation of in-office bleaching gel with light does not seem to improve color change or affect tooth sensitivity. Although claimed commercially that in office bleaching associated with light improves and accelerates color change, this study did not confirm this belief. Some manufacturers recommend the additional application of heat or light. The application of heat in the pulpal cavity must be considered problematic (→ root resorption). The use of a diode laser did not improve the bleaching result compared to light

application with a halogen lamp (Gontijo et al. 2008). However, the use of the halogen lamp also produced a marked temperature increase in the root canal, and the bleaching effect was not better than that with the walking bleach technique (Carrasco et al. 2007)⁷

Tooth sensitivity: Tooth sensitivity occurs in two-third of the patients treated with home bleaching products. The majority (55%) may experience mild sensitivity whereas 10% experience moderate and only 4% may experience severe sensitivity. Symptoms are noticed early in the treatment, usually after 2 - 3 days, and may persist 3 - 4 hours following removal of the tray and disappear shortly after the treatment ends. By-products produced during HP and CP breakdown through dentinal tubules. Glycerine, used as a carrier in most bleaching agents, is hydrophilic and causes dehydration of tooth structure during bleaching treatment.

Patients with existing sensitivity should be treated before starting bleaching treatment: Desensitizing toothpastes and fluoride gels can be used for 2 - 3 weeks prior to the treatment or during treatment. A neutral sodium fluoride gel in a tray can be worn overnight or gels containing 3% to 5% potassium nitrate or fluoride and potassium nitrate in a tray before or after bleaching for 10 - 30 minutes.

Gingival or mucosal irritation: Some patients may experience gingival or mucosal irritation during home bleaching procedures. Soft tissue irritation may be caused by an ill-fitting tray impinging on the gingiva and/or the use of excess material. Management includes simply adjusting and polishing the tray and or instructing the patient to use less material.^{1,7}

Resorption: Where the remaining dentin walls are very thin, it is recommended that only low concentrations of bleaching agent be applied, or that sodium perborate be mixed with distilled water, in order to effect the bleaching of the tooth (Dietschi 2006). This is intended to prevent the bleaching agent from entering the periodontal space through the ubiquitous microperforations and there causing inflammation which can facilitate root resorption. Many authors have demonstrated that a high concentration of hydrogen peroxide, in combination with heating, seems to promote cervical root resorption (Baratieri et al 1995)⁸

Systemic effects: There is more concern about the possible adverse effects of home-bleaching agents, although their concentrations are far below those of in-office bleaching agents, because the latter are controlled by the dentist. Occasionally, patients report gastrointestinal mucosal irritation, e.g., a burning palate and throat, and minor upsets in the stomach or intestines. However, most reports in the literature have concluded that the use of low concentrations of hydrogen peroxide in tooth bleaching is still safe.^{1,4}

Effect on restorative materials: Increasing use of peroxide bleaching agents has raised concerns about their effects on different restorative materials. However, polishing of resin composite fillings is advisable following bleaching procedures to decrease the adherence of certain cariogenic micro-organisms.

The effects of dental bleaching on the bonding potential of composite resin restorations to tooth structure can be divided into the effects of pre- and post-operative bleaching on the bonding of composite resin restorations to the tooth structure.⁹

Hydrogen peroxide: in the form of carbamide peroxide is widely used for tooth whitening with evident adverse effects. Cervical root resorption is possible consequence of tooth bleaching and is more frequently observed in teeth treated with thermocatalytic procedure. Tooth sensitivity is experienced in 15-78 % of patients undergoing external tooth bleaching. Direct contact with hydrogen peroxide induces genotoxic effects in bacteria and cultured epithelial cells, but the effect is reduced or totally abolished in presence of metabolizing enzyme. Several carcinogenesis studies indicate H₂O₂ might possibly act as a promotor. It is therefore recommended that tooth bleaching products using concentrated H₂O₂ should not be used without gingival protection, and to be avoided in patients with damaged or diseased soft tissues.^{10,11}

Time interval: The influence of time interval between bleaching and enamel bonding suggested that a time interval of at least 7 days should be allowed between enamel bleaching and placement of adhesive bonding agents for accomplishment. Clinical significance states that establishment of adequate time after bleaching is fundamental to allow the normal penetration of one bottle conventional adhesive onto enamel surface.

With the gap interval of one week between bleaching sessions all carbamide peroxide concentrations tested produced improved tooth color. However the time reduction of the interval between two bleaching sessions with hydrogen peroxide from seven to two days reduced the treatment time without increasing the bleaching induced tooth sensitivity. The decreased time interval of two days between bleaching gel applications caused changes in microhardness but did not influence the surface roughness of dental enamel.^{11,12}

Longevity of tooth bleaching

After evaluation of color longevity of nine months in-office bleaching, teeth color was effective with slight rebound of color, maintained their objective color difference but not the subjective color difference. Patients were satisfied with bleaching procedure and this had a positive psychosocial impact at nine month recall.¹³

II. Conclusion

The increasing demand for tooth bleaching has driven many manufacturers and researchers to develop bleaching products to be used either in the dental office or at home. However, as with any dental procedure, bleaching involves risks. For that reason, this review article is provided to help clinicians improve their information about the bleaching process and their understanding of the controversial issues regarding the effects of bleaching on teeth, to help reduce the risks to patients. To minimize the risks, the involvement of dental professionals, the prevention of using of bleaching products and the reduction of overused of bleaching products are necessary. In addition to that interval of 2 weeks post-bleaching procedure is found to be adequate to avoid adverse effects on the polymerization.

Clinicians should inform their patients about the possible changes that may occur on their dental restorations during bleaching procedure as well as the possibility of replacement of the bleached restorations at the end of bleaching treatment.

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