



Non-Vital Discolored Teeth Bleaching Using the Walking Bleach Technique: A Case Report*

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Case Report

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ABSTRACT

Recently a visually pleasing smile has become a major concern for the patients; therefore, dental bleaching has gained importance due to its safety and great aesthetic results. A female patient presented with intrinsic discolored maxillary central incisors after endodontic therapy. Maxillary central incisors were isolated with rubber dam and 2mm of the gutta-percha was removed in an apical direction beyond the cemento-enamel junction. Glass ionomer cement was used as a barrier material. Mixture of hydrogen peroxide and sodium perborate placed in the pulp chamber and the teeth were temporarily restored with zinc phosphate cement. Following the treatment, a satisfactory aesthetic result was achieved. In this case, using the walking bleach technique was found to be successful in whitening discolored teeth after endodontic therapy. This method can be recommended as a safe alternative for treating the discolored devitalized teeth.

Keywords: Hydrogen Peroxide, Sodium Perborate, Tooth Discoloration, Walking Bleach Technique.

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Introduction

It is known that discoloration occurs quite frequently in devital, endodontically treated teeth, usually resulting from pulpal injuries, contamination of the pulp cavity, pulp tissue remnants, and root filling materials.^{1,2} Iron released from substances induced by the degradation of blood during hemolysis of erythrocytes can be converted to ferric sulfide (a black compound), may result in dark staining of the tooth.³

Many patients find the change in color disturbing and unaesthetic, especially when their anterior teeth are affected. In these cases, dental treatment commonly used by physicians is internal bleaching, also known as intracoronal or walking bleaching technique. Compared to alternative treatments such as veneers or crowns, this bleaching procedure is minimally invasive, with a relatively low cost.⁴

However, this technique has some limitations if the darkening is severe and has lasted for a long time. Concerns about its adverse effects due to possible recurrence of darkened color have also been reported.⁵ Moreover, another very rare side effect is external cervical root resorption.⁶

Common bleaching agents used to whiten devital teeth include hydrogen peroxide, carbamide peroxide, and sodium perborate.² Among the non-vital teeth whitening techniques available, the walking bleach is an option which consists of a combination of whitening agents such as sodium perborate (powder) and 30% hydrogen peroxide (liquid); which are added to the pulp chamber and exchanged every 3 to 7 days. The process is continued until the desired whiteness is obtained.^{2,7}

Currently, the most common devital whitening method is the walking bleaching technique. In this technique, mostly sodium perborate paste is mixed with hydrogen peroxide or water and placed in the pulp chamber. After that, the tooth is temporarily restored and the process is repeated at intervals of 3 to 7 days until the wanted result is obtained.^{4,8,9} The application is simple, fast and effective as well as clinically reliable can be listed among the reasons for the frequent use of this technique.⁹

The purpose of this case report is to present the walking bleach technique in non-vital endodontically treated teeth.

Case Report

A 45-year-old female patient was admitted to Ankara University Faculty of Dentistry, Department of Restorative Dentistry with the complaint of discoloration in the two maxillary central teeth. As a result of clinical and radiological examinations, it was observed that the teeth were root canal treated and there were widespread discolorations on the buccal and palatal surfaces of the crowns. In order to remove the discoloration, it was decided to apply bleaching with the "walking bleaching" technique. To begin the bleaching treatment, an initial radiograph was taken to assess the conditions of the endodontic treatment and periodontal tissues. There was no periapical lesion, endodontic treatment was satisfactory. Initial photographs of the teeth were taken to compare the degree of discoloration of the related teeth before whitening with those after the treatment (Figure 1). After isolating the teeth with a rubber dam, suitable access cavities were prepared and the root canal fillings were removed with a steel round bur 2 mm below the enamel cement composition (Figure 2). In order to remove the smear layer formed during this procedure, the cavity was washed with 5.25% sodium hypochlorite solution followed by 17% EDTA solution and dried. To prevent leakage in the coronary region, 2 mm thick glass ionomer cement (Fuji IX, GC Corporation, Tokyo, Japan) was placed in the canal openings (Figure 3). Before applying the devital bleaching agent to the pulp chambers, 37% orthophosphoric acid was applied to the enamel tissue in the cavity. Sodium perborate tetrahydrate (TEKKİM Kimya Sanayi, Bursa, Türkiye) and 30% hydrogen peroxide (TEKKİM Kimya Sanayi, Bursa, Türkiye) mixture was formed (1gm powder with 0.5ml liquid) and it was placed in the pulp chamber and condensed with a wet cotton pellet. Dry cotton was tightly placed over this the access cavity was sealed with zinc phosphate cement (Figure 4). The patient was recalled after 1 week for assessment.

At one week visit, both #11 and #21 showed definite improvement in appearance except near the middle third of the tooth which still showed discoloration. Hence, the bleaching procedure was repeated and the patient was recalled again after 1 week to assess the bleaching results. At two-week visit, the discoloration was completely removed and shade of the patient was enhanced. After the bleaching agent was removed from the pulp chamber by washing with distilled water, calcium hydroxide (Ca(OH)₂) paste (Calcicure, Voco, Germany) was applied to the cavities to neutralize the effectiveness of carbamide peroxide, and sterile cotton pellets were placed on them and the cavities were temporarily restored with cement. After the removal of Ca(OH)₂ remaining in the cavity in the fourth session, held one week later, the teeth were permanently restored with light-cured composite resin material (Clearfil Majesty Esthetic, Kuraray, Germany) (Figure 5). In the control performed three months later, it was observed that the patient did not have any discomfort and the colors of the teeth remained stable. In addition, no pathology was found in the radiological examination.



Figure 1: Photo before whitening treatment



Figure 2: Prepared cavity



Figure 3: 2 mm thick glass ionomer cement



Figure 4: Zinc phosphate cement



Figure 5. Photo after whitening treatment

Discussion

Though the mechanism of bleaching is not clear, it is based on oxidation. Whitening agents used in dentistry usually consist of various forms of hydrogen peroxide, such as hydrogen peroxide, sodium perborate, carbamide peroxide.^{8,10,11} Preparations containing carbamide peroxide are known to have the same oxidizing power as hydrogen peroxide and sodium perborate.¹⁰ When carbamide peroxide comes into contact with tissue, depending on the concentration of urea, ammonia, carbon dioxide, hydrogen peroxide, and the formulation, different levels of oxygen are released.^{9,10,11} In the thermocatalytic method, the released bases used in combination with hydrogen peroxide, one of several whitening methods, cause a pH drop in the cervical region of the tooth and ultimately lead to cervical root resorption.^{9,12}

Therefore, nowadays, the thermocatalytic method is not preferred for devital teeth whitening, and the walking whitening technique is often used.¹³ In our study, we preferred the walking bleaching technique instead of the thermocatalytic technique to avoid possible cervical root resorption.

Hansen-Bayless and Davis¹⁴ reported that to avoid bleaching agents from reaching the apical region root canal filling alone is not sufficient. Various researchers have recommended the use of a cervical insert over the canal filling to prevent apical and lateral penetration of bleaching agents and external root resorption.^{15,16} Thus, in our case, the canal fillings were covered with glass ionomer cement to prevent the risk of cervical resorption.

Spasser first described the bleaching technique in which a paste of sodium perborate and water is placed into the access cavity.¹⁷ Nutting and Poe¹⁸ modified this technique when they replaced the water with hydrogen peroxide in 1963 and reported that sodium perborate was more effective in mixing with hydrogen peroxide instead of distilled water. In our study, we used a mixture of sodium perborate powder and 30% hydrogen peroxide as a bleaching agent.

Holmstrup et al.¹⁹ reported that a ratio of 2:1 (g/ml) bleach mixture of sodium perborate and hydrogen peroxide is most suitable mix for non-vital teeth bleaching. In this case, we also used a mixture of 0.5 ml of hydrogen peroxide and 1 g of sodium perborate powder.

Nutting EB et al.²⁰ reported that for successful whitening occurs after 2 to 4 sessions, devital whitening agent should be changed every 3 to 7 days depending on the severity of the discoloration. In our case, the whitening agent was changed every 7 days and the desired color change was observed at the end of 3 sessions.

Following the treatment, the teeth must be restored with composite resins that have a good enough adhesion to enamel and dentin to prevent re-infection of the teeth by microorganisms, for the re-infiltration of dyes into the tooth and for the durability of the tooth to be improved.^{21,22} Studies have shown that peroxide or oxygen remaining in the cavity after bleaching, inhibits polymerization of composite resins. In addition, the adhesion of composite

resins can negatively be effected by the changes in enamel structure resulting from bleaching.²³ Therefore, to buffer the acidic pH and prevent possible resorption of the cervical root, a calcium hydroxide paste placed in the pulp chamber should be applied within a week after bleaching.²¹ Studies have shown that calcium hydroxide applied to the pulp chamber does not affect the bonding in permanent restorations.²⁴

Conclusions

In this case report, it has been shown that the walking bleach technique, which is used as an alternative to traditional invasive methods such as metal supported or full ceramic crowns, composite or porcelain laminates, can be successfully applied in the discoloration of devital teeth. This method can be recommended as a safe alternative for treating with discolored devitalized teeth.

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