

Journal section: *Clinical and Experimental Dentistry*

doi:10.4317/jced.3.e180

Publication Types: *Case Report*

Management of tooth discoloration in non-vital endodontically treated tooth – A report of 6 year follow-up

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Received: 02/05/2010
Accepted: 24/10/2010

Nagaveni NB, Umashankara KV, Radhika NB, Satisha TS. Management of tooth discoloration in non-vital endodontically treated tooth – A report of 6 year follow-up. J Clin Exp Dent. 2011;3(2):e180-3..
<http://www.medicinaoral.com/odo/volumenes/v3i2/jcedv3i2p180.pdf>

Article Number: 50299 <http://www.medicinaoral.com/odo/indice.htm>
© Medicina Oral S. L. C.I.F. B 96689336 - eISSN: 1989-5488
eMail: jced@jced.es

Abstract

Discoloration of teeth, especially the anteriors, can result in considerably cosmetic impairment in young children. It is the pediatric dentist's responsibility to supervise those children who seek to undergo a whitening treatment to ensure the maximum cosmetic benefit within the boundaries of oral and systematic health. Among bleaching techniques, the walking bleach technique with sodium perborate and distilled water stands out because of its superior esthetic results with no side effects. This paper presents a case of tooth discoloration in non-vital tooth which was successfully bleached using walking bleach method. After 6 year follow up the prognosis was good with no reversal of tooth discoloration and absence of external cervical resorption.

Key words: *Discoloration; Walking bleach; Non-vital tooth; Sodium perborate.*

Introduction

Trauma to anterior teeth results in a nonvitality and tooth discoloration posing a great challenge to clinician in young pediatric patients. Children as well as their parents become worried psychologically as esthetics is impaired because of ugly looking discolored tooth. Their expectations are high when dealing with such tooth. Patient demand for esthetic procedures and the trend for non-invasive dental treatment have led to the development of different materials and whitening techni-

a history of trauma to the same tooth 2 years back. Intraoral examination revealed Ellis class IV fracture in relation to right maxillary central incisor, which was discolored (Fig. 1a). An intraoral periapical radiograph was taken, which revealed large periapical radiolucency in relation to 11 (Fig. 1b). A diagnosis of periapical cyst was made. A treatment plan of endodontic therapy with intentional over obturation, apicectomy and walking bleach was planned. Endodontic treatment with over obturation followed by apicectomy was performed

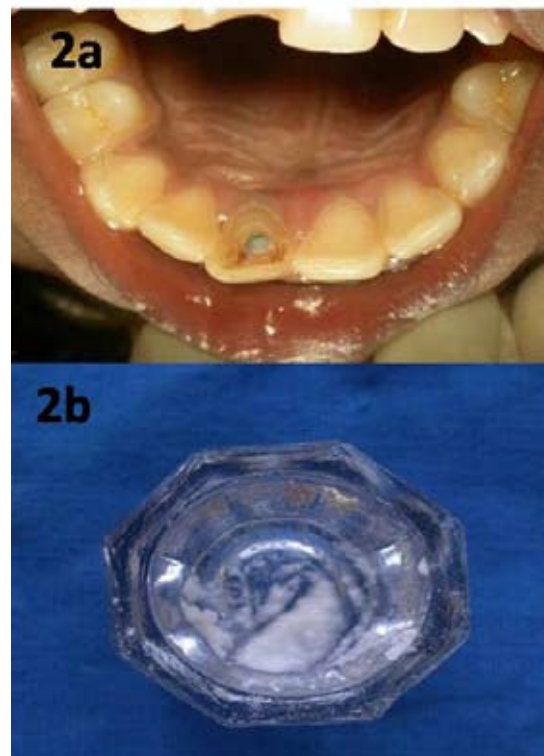


*Fig.1. a. Pre-treatment photograph of maxillary right central incisor showing severe discoloration due to a necrotic pulp caused by trauma
b. Periapical radiograph showing large periapical radiolucency in relation to 11*

ques that are capable of re-establishing a patient’s smile without affecting dental structure. Besides invasive and expensive conventional restorative options, such as full crowns or veneers, whitening of teeth is an alternative therapeutic method (1). Internal bleaching procedures such as the “walking bleach” technique can be used for whitening of discolored root-filled teeth, which is simple and time-saving method with superior esthetic results and safety. This technique is performed by application of a paste consisting of sodium perborate and distilled water or 3% hydrogen peroxide (H₂O₂) respectively, in the pulp chamber (1). This mixture releases H₂O₂ which is able to react with the staining substances. The first description of the walking bleach technique with a mixture of sodium perborate and distilled water was mentioned in a congress report by Marsh and published by Salvas (2). Nutting and Poe (3), advocated the use of 30% H₂O₂ instead of water. The present article reports the successful bleaching of discolored non-vital, endodontically treated tooth using walking bleach technique with good prognosis and no side effects even 6 year after bleaching.

Case Report

A 12-year-old female patient reported complaining of discolored tooth in the upper anterior region. There was



*Fig. 2. a. Photograph of access cavity after gutta-percha removal
b. Mixture of sodium perborate and distilled water*



Fig.3. a. Photograph of 11 taken after 6 years

b. Radiograph of 11 taken after 6 years shows absence of periapical radiolucency and external cervical resorption

before bleaching. In the next visit (after 20 days) the access cavity opened and approximately 3 mm of gutta percha filling was removed from the access cavity till cervical third of the crown using gates glidden drill (Fig. 2a). The cavity was irrigated with 1% orthophosphoric acid to remove smear layer, debris. A plug of a resin-modified glass ionomer (Vitremer, 3M ESPE) was placed on top of the gutta-percha filling to prevent percolation of bleaching agent into the cervical and apical region. A mixture of sodium perborate and distilled water (Fig. 2b) was placed inside the cavity and restored with composite. Patient recalled every 7 days once, for changing bleaching agent. After 3 visits there was a drastic change in the tooth color with satisfactory results. The fractured incisal edge was restored with composite (Restorative Z 100, 3M). Patient was followed regularly to check the occurrence of external cervical resorption and color stability. After 6 year follow up esthetic result remained satisfactory with no reversal of discoloration (Fig. 3a) and periapical radiograph showed absence of the periapical radiolucency and external cervical resorption in relation to the bleached tooth (Fig. 3b).

Discussion

When the bleaching agent is applied inside the pulp chamber and sealed, the bleaching occurs between dental appointments via the walking bleach technique. This technique traditionally has been used to treat discolored non-vital teeth. The other bleaching options involve the thermocatalytic technique and in-office external bleaching technique using high concentrated hydrogen peroxide and carbamide peroxide gel (1). It is not advisable to use the thermocatalytic method with heating of a 30% H₂O₂ solution, as this procedure increases the risk of external cervical resorption which is a serious

complication (4-6). For the same reason, 30% H₂O₂ should not be used for the walking bleach technique. External cervical resorption is mostly asymptomatic and is usually detected only through routine radiographs. However, sometimes swelling of the papilla or percussion sensitivity of bleached teeth can be observed. One month after bleaching, no changes in the tooth substance could be detected. It is also caused by lack of cervical seal. Because H₂O₂ can diffuse through dentinal tubules as far as the cervical periodontal ligament, altering these structures and generating inflammatory root resorption (7,8). It has been proved that formation using either 30% H₂O₂ alone or in combination with sodium perborate are more toxic for periodontal ligament cells as compared to a perborate-water suspension, presumed that application of bleaching agents led to denaturation of dentine in the cervical region of tooth (6,8,9).

Patients who had bleaching therapy at a young age often have external resorption. A possible explanation is that H₂O₂ can more easily penetrate into the periodontium because of wide open dentinal tubules in young teeth. Increased permeability of dentin is associated with both decreased dentine thickness and high surrounding temperature (10). Application of heat (thermocatalytic method) leads to widening of dentinal tubules and facilitates diffusion of molecules into the dentin. This explains the increasing dissemination of H₂O₂ into dentin with an increase in temperature. Moreover, application of heat resulted in generation of hydroxyl radicals from H₂O₂ that are extremely reactive and have been shown to degrade components of connective tissue (7). As a consequence, today the thermocatalytic technique is used less especially in young children because of the high risk of external root resorption. Thus walking bleach technique is the ultimate treatment of choice in children with dis-

colored non-vital tooth.

There is a paucity of evidence based literature that shows the prognosis of bleached non-vital teeth. According to Howell (11), walking bleach techniques have an immediate success rate of 89.5%. However, there is a possibility of recurring discoloration, which means that the initial results cannot be considered permanent. Several authors have evaluated the incidence of color regression one to six years after internal bleaching and reported different percentages of darkening (8, 11, 12). While Holmstrup et al (12) and Brown (13) both reported a success rate of 75% or more after one to five years. In the present case we found more than 90% success rate without change in the colour and with no pericapical changes in the tooth. Feiglin (8) reported a success rate of only 45% after six years. It seems that the more difficult it becomes to obtain a satisfactory result, the more likely the chance for reversal. Some authors have suggested that teeth that have been discolored for several years do not respond as well to bleaching as teeth that are stained for a short period of time (11, 13). Brown (13) reported that trauma or necrosis-induced discoloration can be successfully bleached in about 95% of the cases, compared with lower percentages for teeth discolored as a result of medicaments or restorations. Some studies (14, 15) have reported that stained teeth in young patients are easier to bleach than discoloration in older patients, presumably because the wide open dentinal tubules in young teeth enable a better diffusion of the bleaching agent.

This paper provides information to every dentist, based on the case presented that, the walking bleach technique can lead to successful whitening of non-vital root filled teeth without the risks of side-effects. Because the clinical results of other techniques have many disadvantages, the walking bleach technique, which is easy to perform, consumes the least time, relatively inexpensive and requires no special equipment, is the ultimate method of choice. It can be concluded from this case report that walking bleach technique is an important and valuable tool for discolored non-vital endodontically treated permanent teeth in pediatric clients.

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