



Management of discoloured, non-vital tooth by “in-office” bleaching technique Conservative Approach: Case report

Jandel Singh Thakur, Associate Professor, Dental Department, CIMS, Bilaspur

Abstract

Discolouration of tooth can cause considerable aesthetic concern for many patients. Based on the clinical reports, non-vital tooth bleaching is a viable, aesthetic treatment for the discoloured, non-vital endodontically treated tooth. This case report presents “in-office” bleaching method in non-vital endodontically treated tooth. After successful endodontic treatment maxillary central incisor tooth was bleached by 37.5% hydrogen peroxide gel activated by a standard curing light unit. Radiographically, there was no evidence of cervical or apical resorption after regular follow-ups.

Keywords

Discolouration, Non-vital tooth, Walking bleach technique, In-office bleaching, Hydrogen Peroxide gel

Introduction

Teeth colour varies among people, among the teeth in the same person and within the same tooth. Tooth discolouration is a frequent dental finding associated with clinical and aesthetic problem especially in the aesthetic region¹. Discolouration of tooth can be extrinsic, intrinsic or both based on its aetiology, site, appearance and severity². Extrinsic discolouration is caused by chromogens derived from habitual intake of dietary sources such as coffee, tea, wine, carrots, oranges, chocolate, tobacco, mouth rinses and plaque on the tooth surface while intrinsic discolouration typically results from systemic or local causes³. Systemic causes include metabolic (alkaptonuria and congenital erythropoietic porphyria), fluorosis, drug-related (tetracycline) and genetic (hyperbilirubinemia, amelogenesis imperfecta and dentinogenesis imperfecta)⁴. Local causes include pulp necrosis, intra-pulpal haemorrhage, pulp tissue remnants, endodontic materials, coronal filling materials, root resorption and aging⁵.

With increased interest in aesthetic dentistry, bleaching of discoloured teeth has become popular. Bleaching techniques may be classified as vital tooth bleaching or non-vital tooth bleaching and whether the procedure is performed in the office or out-side the office. The most popular techniques for non-vital tooth bleaching are the “walking bleach” technique and “in-office” bleaching technique⁶. Many bleaching agents like oxalic acid, calcium hypochlorite, hydrogen peroxide, carbamide peroxide and sodium perborate had been used with varying results. The most commonly used agents for bleaching endodontically treated teeth are 30%–35% hydrogen peroxide and sodium perborate either in combination or separately⁷.

Non-vital tooth bleaching is a more conservative approach which is non-invasive as compared with other aesthetic options. Non-vital tooth bleaching processes also describe as intra-coronal



bleaching have some disadvantages like cervical resorption, external root resorption, possibility of colour regression and over-lightening of teeth^{1, 8}. This case report discusses the management of a discoloured non-vital endodontically treated tooth with “in-office” bleaching technique with good prognosis and no side effects.

Case report

A 30-year-old female patient reported to the department of dentistry with a history of discoloured upper left front tooth. Dental history revealed a history of trauma about 10 years ago. On examination and electric pulp test (C-Pulse, COXO-Medical Instrument, China) showed results of tooth being non-vital. Diagnosis and treatment plan was explained to the patient and consent was taken for treatment. After scaling and polishing shade was noted (Vita shade-A4) preoperatively using Vita shade guide (VITA Zahnfabrik, Germany) under normal daylight (fig-1). Tooth was isolated and conventional endodontic treatment was carried out (fig-4). The pulp chamber was prepared for bleaching by removing two mm of coronal gutta-percha and two mm GIC (GC Corporation, Tokyo, Japan) was placed over it (fig-5 and 6). A thick layer of gingival barrier was applied and light cured for 10-20 seconds over gingival region of the isolated tooth. Bleaching agent Pola Office plus (SDI Limited Bayswater, Victoria, Australia) was then expressed into the opened pulp chamber and on the labial surface. Curing light was applied to activate the bleaching gel from the labial and palatal sides. We changed the gel and repeated the bleaching procedure until desired results (Vita shade -A2) were obtained (fig-2). After the completion of bleaching treatment, the pulp chamber was cleaned, dried and calcium hydroxide was filled. The cavity was closed with a temporary filling material and called the patient after seven days for permanent restoration with composite resin (Ivoclar Vivadent) (fig-3).



Fig -1. Preoperative photograph (Vita shade -A4) Fig -2. After bleaching (Vita shade -A2)



Fig -3. After restoration



Fig -4. Completely obturated root canal



Fig -5. Removal of coronal gutta percha (two mm)



Fig -6. Placement of glass-ionomer cement barrier



Fig-7 Pre operative radiograph



Fig-8 Follow-up after two years

Discussion

Bleaching refers to lightening and whitening of discoloured vital or non-vital teeth by using oxidizing materials such as hydrogen peroxide, carbamide peroxide and sodium perborate. Bleaching of non-vital discoloured teeth is a low-risk routine treatment for improving aesthetics¹. It is based upon hydrogen peroxide as the active agent. Hydrogen peroxide acts as a strong oxidizing agent through the formation of free radicals, reactive oxygen molecules and hydrogen peroxide anions. These reactive molecules attack the long-chained, dark-coloured chromophore molecules and split them into smaller, less coloured and more diffusible molecules⁸. Hydrogen peroxide may be applied directly or produced in a chemical reaction from sodium-perborate or carbamide peroxide. The choice of material to use depends on a number of factors including the type of discolouration present and how dark the teeth are initially⁹. However, the most important consideration has to be the patient, his/her lifestyle, the time available for bleaching. Nearly all the bleaching materials have been shown to work with little difference between them. Generally, the higher concentration, thicker, more viscous materials produce a lightening effect more quickly than lower concentration, less viscous materials^{10, 11}.

The two most popular techniques for non-vital tooth bleaching are:

1. "Walking bleach" technique
2. "In-office" bleaching technique.

In the "walking bleach" technique a combination of sodium-perborate and water or hydrogen peroxide has been placed in the pulp chamber, sealed, left for three to seven days and thereafter replaced regularly until acceptable lightening is achieved. "Walking bleach" technique is a time-consuming procedure which requires multiple visits^{6, 7}. "In-office" bleaching technique is usually a rapid process and the results are evident even after a single intervention. In this technique bleaching is carried out within the tooth and on external surface of the tooth simultaneously (It was first described by "Settembrini et al." in 1997)⁹. Pola office containing 37.5% hydrogen peroxide was used in the current procedure. Pola office is extensively used material for bleaching procedure and is well-documented.



There are many side effects (like chemical burns, cervical resorption and negative effect on resin/hard dental tissue bond) of bleaching procedures in non-vital teeth^{8, 12}. To minimize the side effects of the bleaching agents, complete soft tissue isolation (gums, lips, cheeks) was done to protect them from eventual burns caused by the hydrogen peroxide⁸. To minimize the risk of cervical or apical resorption two mm of coronal root filling is sealed off with glass-ionomer cement which acts as a mechanical barrier between the sealed root canal and the bleaching gel^{12, 13}.

The pulp chamber was filled by calcium hydroxide for a week before the final filling material was placed. This was necessary to allow for elimination of residual oxygen, which interferes with the polymerization of the filling material. Calcium hydroxide renders the medium alkaline that reduces the risk of cervical resorption^{1, 14}.

Heat or light source is used to activate bleaching agent placed in pulp through release of nascent oxygen. The acceleration was assumed to follow the Q10 rule that for every 10°C increase in temperature, the reaction rate increases two times¹⁵. Therefore; hydrogen peroxide was activated with light to speed up the bleaching process.

In present case there was no evidence of any cervical resorption or any progressive alteration in the periapical area was noted. This may be attributed to the placement of the mechanical barrier that prevents the leakage of hydrogen peroxide (fig-8).

Conclusions

This case report demonstrates the successful management of a discoloured non-vital tooth using 37.5% hydrogen peroxide gel (Pola Office plus) as bleaching material, effectively and safely. Above mentioned modifications and precautions in the bleaching technique has to be taken to eliminate the side effects of hydrogen peroxides. No evidence of cervical resorption of the tooth was observed during the two-year follow-up period; furthermore, there were signs of improvement related to the periapical region. More advanced studies still needed to gather more information about the stability of results and to detect any adverse effect that could appear.

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