Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies NLM ID: 101716117

Journal home page: www.jamdsr.com doi: 10.21276/jamdsr Indian Citation Index (ICI) Index Copernicus value = 100

(e) ISSN Online: 2321-9599;

(p) ISSN Print: 2348-6805

Case Report

Management of Discoloured Non-vital Anterior Tooth by Non-invasive Walking Bleach Technique: A case report

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ABSTRACT:

Discoloration of the tooth, especially the anterior, appears unpleasant and non-harmonious dento-facially. The psychological and social impact of tooth staining on patient has been routinely seen in dental practice. One of the techniques which is commonly employed for bleaching of endodontically treated teeth is "walking" bleach technique. Based on the clinical reports with non-vital tooth bleaching, it is a viable, aesthetic treatment for the discoloured tooth. The advantage of bleaching over crown or veneers is that it offers a conservative approach in removal of intrinsic stain and whitens discoloured teeth without damaging original tooth structure. Predictability and success with bleaching starts from correct diagnosis, didactic treatment planning and the utilisation of appropriate techniques.

Received: 12 July, 2023

Accepted: 14 August, 2023

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This article may be cited as: Kewlani M, Mahajan R. Management Of Discoloured Non-Vital Anterior Tooth By Non-Invasive Walking Bleach Technique: A Case Report, J Adv Med Dent Scie Res 2023;11(9):47-49.

INTRODUCTION

With increased demand in esthetic dentistry, bleaching of discolored teeth, either vital or non-vital, has become popular. Single tooth discolouration can be an important aesthetic concern to patients. Several intrinsic and extrinsic factors can cause changes in tooth natural color.^{1,2} While intrinsic discoloration of the tooth may be caused following trauma, loss of vitality, endodontic treatment, and restorative procedures apart from known local, systemic and hereditary factors. Extrinsic tooth stains occur due to improper tooth brushing techniques, smoking, chromogenic bacteria, dietary intake of tannin-rich foods, excess use of chlorhexidine mouth wash, and/or consumption of metal salts.³There are various different techniques to manage single discoloured tooth and the treatment of choice is often dependent on a range of factors including: the cause of discolouration, operator experience, patient finances, patient wishes, coronal tooth structure remaining, previous treatment and prognosis.⁴Intracoronal bleaching, also known as non-vital bleaching, has been around since 1848, when chloride of lime was placed inside the pulp chamber and utilised as an

oxidising agent. Spasser introduced the application of sodium perborate and water in the pulp chamber of root canal-treated tooth to bleach the discolored non-vital teeth in 1961. ^{5,6}In 1963,this technique was modified by Nutting and Poe. They replaced water by 30% hydrogen peroxide, which is called the "walking" bleach technique.^{7,8}During the procedure, proper cervical barrier placement and an apical seal is mandatory to prevent the percolation of bleaching agents into the periradicular tissues to avoid undesirable post-operative complications. In this case report, non-vital walking bleach technique for the management of a single discoloured tooth will be discussed.

CASE REPORT

A 36-year-old male patient reported to the institution with a complaint of discolored upper front tooth and desired the discolored tooth be treated. On clinical examination, maxillary right central incisor tooth #11 was found to be slightly mobile. It showed pink discoloration.(Figure 1)Patient had a history of trauma 15 years back. Tenderness to percussion was negative. Cold testing was done with cold spray (Endo-Frost, Coltene, Germany) on all the maxillary anterior teeth which confirmed right maxillary central incisor as non-vital. Radiographic examination was done which revealed root resorption and periradicular changes with the concerned teeth. Patient was explained about the walking bleach procedure and was consented to correct discoloured tooth.



Figure 1: Preoperative intraoral photograph showing discoloration with #11



Figure 2: Working length and obturation with MTA radiovisograph.

Treatment plan was decided as non-surgical root canal treatment followed by non-vital bleaching of the involved teeth. Root canal treatment was done in relation to concerned tooth. MTA was chosen as root canal filling material as it will aid in open apex due to root resorption and a superior intracoronal barrier too(Figure 2). A2 shade color was determined using Vita shade guide. No additional requirement of removal of obturated material was required from the tooth up to 2 mm below the gingival margin. Using 37% phosphoric acid, pulp chamber was etched for 30-60sec, washed and dried, which resulted in the opening of dentinal tubules. Sodium perborate tetrahydrate and 30% hydrogen peroxide 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 and was sealed with cavit(Figure 3). The patient was recalled after 1 week for assessment. The discolouration of tooth was absolutely improved and no second sitting of bleaching was required(Figure 4).

The bleaching agents were removed and access cavity was cleaned with saline thoroughly and dried. Final access filling was done with composite (3M ESPE Filtek Z350 XT).



Figure 3: Placement of bleaching agents and cavit used for sealing access cavity.



Figure 4: Post operative image showing no discoloration.

DISCUSSION

Various irritants to pulp like bacterial, mechanical, or chemical result in tissue necrosis, causing release of noxious by-products that can penetrate tubules and discolor the surrounding dentin. After severe traumatic dental injury; hemorrhage in the pulp chamber occurs as blood vessels break down and lead to discoloration in the tooth. The released heme by hemolysis of red blood cells combines with the necrotic pulpal tissue to form iron. Iron and its products are responsible for discoloration of tooth whether pink or grey. The longer the discoloration compounds are present in the pulp chamber, the greater the discoloration.⁹ This discolorationcan usually be bleached intracoronally as done in this case report. Various different options are used in the treatment of discoloured endodontically treated anterior tooth. One of the most popular approach is walking bleach technique. It is minimally invasive procedure for esthetic rehabilitation of discolored non vital teeth. The most common bleaching agents used are per-oxygen bleaching agents like hydrogen peroxide(H₂O₂) or sodium perborate. Bleaching using H₂O₂ oxidizes thelong-chain pigmented organic molecules and transform them into carbon while releasing H₂O and oxygen.¹⁰ According to various case reports, sodium perborate in combination with hydrogen peroxide has shown significant results in bleaching procedures. The only major risk with the use of these bleaching agents was of external cervical root resorption(ECR). 4,11 It is believed ECR result from bleaching agent passing through the dentinal tubules and cemental defects, resulting in necrosis of

the cementum and inflammation of the periodontal ligament.⁴To prevent MTA was chosen as obturating material which covers up the risk of leaking of bleaching agents resulting into ECR.¹²This barrier should match the contour of the epithelial attachment, as proposed by Steiner and West. The shape of the barrier was kept as 'bobsled tunnel' when viewed from facial aspect. The importance of this shape is that it blocks all the dentinal tubules which run from pulp chamber to external tooth surface apical to the level of epithelial attachment so that the bleaching agent stays within the cavity. The rmocatalytic activation of 30% H₂O₂ was avoided, as it may cause leakage of bleaching agent into dentinal tubules with initiated inflammation during treatment.¹³ Heithersay et al analyzed 257 teeth with cervical resorptions and found that in 3.9% of teeth, it was due to intracoronal bleaching. The literature highlights several risk factors associated with ECR and bleaching.¹⁴These include:

- 1. Use of $H_2O_2(HP)$ concentration greater than 30%
- 2. Application of heat(thermoctalyst)
- 3. A history of trauma
- 4. Orthodontic treatment
- 5. Presence of bacteria
- 6. No barrier over the gutta percha to protect the odontoblasts and dentinal tubules close to the cervical dentine.

Age has been suggested as a risk factor for ECR, however a study by Friedman et al. demonstrated that this may not be the case, with fewer than 20 patients experiencing ECR following bleaching with 30% HP than patients over 20 years of age and as such, age may not considered a risk factor.^{15,16} Most in vitro studies have concluded that sodium perborate in water, sodium perborate in 3% H₂O₂ or 30% H₂O₂ and 10% carbamide peroxide are efficient agents for internal bleaching of nonvital teeth.8 According to Howell, the walking bleach technique has an immediate success rate of 89.5%.17 The walking bleach procedure was done taking all the precautions. Monthly radiographic follow-up usingdigital subtraction technique showed no evidence of any cervical resorption or any progressive alteration in theperiapical region.

CONCLUSION

This case report focuses at the efficiency of the nonvital bleaching method using sodium perborate with 30% hydrogen peroxide to procure successful and predictable cosmetic results.

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