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Bleaching of a non-vital anterior tooth to remove the intrinsic discoloration

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Abstract---Discoloration of tooth can be extrinsic or intrinsic based on its etiology, site, appearance, and severity. It poses esthetic problem which could be a prime concern for many patients, especially in anterior region of teeth that may be compromised due to previous trauma, caries, or failed restorations. Bleaching is a more conservative approach which is noninvasive as compared with other prosthodontic options like crowns or veneers. Among various bleaching techniques, “Walking bleach technique” is preferred, as it provides better cosmetic outcome with limited side effects. This article aims at presenting a case on walking bleach method performed on endodontically treated teeth, after which a satisfactory aesthetic result was achieved.

Keywords---bleaching, discoloration, walking bleaching method, non-vital bleaching.

Introduction

Aesthetic dentistry has evolved, gained popularity and became one of the highly important factors in the dentistry field. Recently a visually pleasing smile has become a major concern for the patients, and a noticeable improvement in the perception of beauty concept was observed in the media.¹ There are several important dental aesthetic concerns such as, tooth discoloration, hypocalcification and surface irregularities.² The etiology, appearance, localization

and severity of discolored teeth vary, and the discoloration is classified as intrinsic, extrinsic, or both according to its location and etiology.³

Extrinsic discoloration is caused by the habitual intake of chromogenic dietary sources such as, wine, coffee, tea, carrots, oranges, chocolate, tobacco, mouth rinses, or plaque on the tooth surface.⁴ As for intrinsic discoloration, it can either be caused by systemic or local factors. Systemic causes include drug-related (tetracycline), metabolic, fluorosis, and genetic (hyperbilirubinemia, amelogenesis imperfecta, and dentinogenesis imperfecta).⁵ Local causes include pulp necrosis, intrapulpal hemorrhage, pulp tissue remnants after endodontic therapy, endodontic materials, coronal filling materials, root resorption, and aging.⁶

Bleaching of discolored teeth, either vital or non-vital, has become one of the highly popular approaches to resolve this problem. Therefore, it is considered as one of the least invasive economical procedure for discoloration treatment.^{6,7,8} Multiple dental bleaching materials have been used for example, oxalic acid, calcium hypochlorite, hydrogen peroxide, carbamide peroxide, and sodium perborate.⁸ 30%-35% hydrogen peroxide and sodium perborate either in combination or separately are the most used agents for non-vital bleaching of endodontically treated teeth, in which oxidation reaction and degradation of pigment molecules are resulted.^{9,10}

Case Report

A 27-year-old female patient reported to the Department of Conservative Dentistry and Endodontics of the Desh Bhagat Dental College & Hospital, Mandi Gobindgarh with chief complaint of discolored and unaesthetic appearance of her upper right anterior tooth. The patient was free from systemic disorders and was not under any medications that cause staining of the teeth. Patient had a history of trauma with anterior teeth 5 years back and she had undergone root canal treatment for the same.

Intraoral examination revealed brownish discolored maxillary right central incisor. An intraoral radiograph showed obturation and normal periapical tissue wrt 11. The patient was explained about the treatment of bleaching for the tooth and informed consent was taken. Preoperative photograph was taken (Fig. 1).



Fig. 1: Preoperative photograph of discolored maxillary right central incisor

The pulp chamber was prepared prior to application of bleaching agent by removing 2 mm of gutta-percha near orifice and placing a base of 1 to 2 mm glass ionomer cement (GIC) over the gutta-percha to create a mechanical barrier between the sealed root canal and bleaching agent to be used in pulp chamber (Fig. 2).

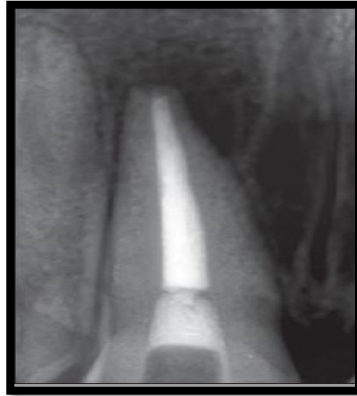


Fig. 2: Placement of intra-orifice barrier

Nonvital bleaching with a mixture of sodium perborate and 3% hydrogen peroxide [sodium perborate and 3% H_2O_2 in ratio of 2:1 (gm/mL)] was decided for this patient (Fig. 3) and bleaching procedure was performed.



Fig. 3: Mixture of sodium perborate and hydrogen peroxide

After placement, the cavity was sealed with temporary restorative material and the patient was recalled every week for repeating the bleaching procedure in two-time intervals so as to obtain the desired results. After 1 week, there was change in shade (Fig.4).



Fig. 4: After 1 week follow up

After the 2nd week, the result was achieved (Fig.5) as the shade of the tooth gets lightened to a superior esthetic shade with accepted clinical success. Thereafter, the tooth was permanently restored using composite resin as significant color change was achieved.



Fig. 5: After 2nd week follow up

Discussion

Restoring the dental aesthetics has been considered one of the chief purposes of modern dental medicine. Novel materials and treatment methods are being developed every day to reach this goal.¹¹ Dental bleaching is a conservative treatment compared to other treatment methods used for treating discoloration, such as, laminate veneers and full crowns. The bleaching mechanism works on the principle that hydrogen peroxide penetrates the tooth and generates free radicals that oxidize the organic stains.¹²

Dental bleaching is reported to be a harmless procedure, with respect to some protection aspects. First, complete soft tissue isolation for the gum, lips, tongue and cheeks is mandatory in order to protect them from eventual burns caused by the peroxide.⁶ Second, the risk of cervical resorption has to be considered; thus, a base of 1-2mm glass ionomer cement has to be placed over the root filling material to assure a mechanical barrier between the sealed root canal and the bleaching material, which is in agreement with other studies.^{13,14}

Bleaching of discolored nonvital teeth was first reported during the mid-19th century for which the bleaching agent of choice was chloride of lime,¹⁵ and other agents described for bleaching of pulpless teeth included aluminum chloride, oxalic acid initially, until tooth bleaching effect of H₂O₂ was discovered in 1884 to be used for bleaching.¹⁶

Sodium perborate was also introduced in bleaching application. It is an oxidizing agent containing 95% perborate which occurs in the form of mono, tri (NaBO₂·H₂O₂·3H₂O) or tetrahydrate.¹⁷ Walking bleach method was first explained by Spasser¹⁸ which utilizes sodium perborate mixed with distilled water. Sodium perborate when mixed with water releases H₂O₂. This method was later modified by Nutting and Poe¹⁹ replacing H₂O with 30% H₂O₂ to improve the effect, but it increased the risk of external cervical root resorption, and hence, is to be used with caution. The pigmentation that causes intrinsic discoloration from necrotic pulp consists of long chain of organic molecule. Bleaching using H₂O₂ oxidizes these long-chain molecules and transform them into carbon while releasing H₂O₂ and oxygen.²⁰

Walking bleach method involves application of a thick paste of sodium perborate mixed with H₂O₂ or water into pulp chamber for a period of 3 to 7 days followed by recall visits for review and repeat of procedure till desired results are achieved. When the bleaching agent is applied inside the pulp chamber and sealed, the bleaching occurs between dental appointments through this walking bleach technique. Other modifications in this technique can be using higher concentration of H₂O₂ or 10% carbamide per-oxide with sodium perborate or additionally adding thermocatalytic action with this, but it poses the risk of external cervical resorption which could become a serious complication. According to Howell, the walking bleach technique has an immediate success rate of 89.5%.²¹

Conclusion

Nowadays, restorative treatment has achieved high aesthetic standards. Among minimally invasive treatments, dental bleaching has gained importance due to its safety and great aesthetic results. This article aims at highlighting the efficiency of the nonvital bleaching method using sodium perborate with 3% hydrogen peroxide to attain successful and predictable cosmetic outcome. However, it depends on the endodontist's expertise to proceed ahead with a good case selection and to prevent any post procedural problems that may occur.

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