Case Report

Esthetic and Endodontic Management of Discolored Non-vital and Retreated Maxillary Anterior Tooth with Conservative Approach: A Case Series

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ABSTRACT

Non-vital bleaching is a conservative approach to treat intrinsic discoloration of teeth of several etiology. Sodium perborate and hydrogen peroxide (H_2O_2) are the commonly used bleaching agents. The aim of this case series is to demonstrate the walking bleach technique in non-vital and retreatment cases of maxillary anterior teeth. Maxillary central incisors were isolated with rubber dam and root canal treatment was performed in non-vital teeth and amp; in retreatment cases after G.P retrieval. Barrier space preparation was done using a heated instrument. Glass-ionomer cement was used as a barrier material. Mixture of H_2O_2/saline; sodium perborate was placed in canal; sealed with intermediate restorative material. After 1 week, the procedure was repeated to achieve the desired result. Walking bleach is a minimally invasive procedure to restore the esthetic of discolored non-vital; retreated tooth, however, care should be taken to avoid any post-operative complications.

Key words: Endodontic retreatment, hydrogen peroxide, sodium perborate, walking bleach

INTRODUCTION

The appearance and color of the teeth are indicators of overall health. Numerous internal and external variables can affect tooth color.

Causes of tooth discoloration

Because it greatly affects the result of treatment, determining the exact reason of tooth discoloration is crucial. Therefore, to provide a proper diagnosis that results in an effective treatment strategy, dental professionals must have a thorough grasp of the genesis of tooth discoloration. A mixture of optical phenomena and light-related events affect tooth color.[1] Dentin color as well as intrinsic and extrinsic colorations are the main factors that affect tooth color. The optical characteristics of enamel and dentin and how they interact with light determine intrinsic color. Extrinsic color is influenced by the materials that are absorbed onto the enamel surface.

Extrinsic causes

Chromogens from frequent food sources such wine, coffee, tea, carrots, oranges, licorice, and chocolate as well as from smoke, mouthwashes, or plaque on the tooth surface are the main causes.

Intrinsic causes

Systemic causes are tetracycline-related, metabolic (dystrophic calcification and fluorosis), genetic (congenital erythropoietic porphyria, cystic fibrosis of the pancreas, hyperbilirubinemia, amelogenesis imperfecta, and dentinogenesis imperfecta), and metabolic (dystrophic calcification, fluorosis). Local causes include root resorption, ageing, pulp necrosis, intrapulpal bleeding, pulp tissue leftovers after endodontic therapy, endodontic materials, and coronal filling materials.[2]

Bleaching agents for whitening of root-filled teeth

For whitening teeth with fillings at the roots, hydrogen peroxide (H_2O_2), carbamide peroxide, and sodium perborate are the most often used bleaching chemicals.

H_2O_2 is the substance that makes up today's tooth-whitening products. It can be created chemically from sodium perborate or carbamide peroxide, or it can be administered directly. There are two types of peroxides: organic and inorganic.[3] They are potent oxidizers and can be thought of as byproducts of H_2O_2 when hydrogen atoms are replaced by metals (inorganic peroxides) or organic radicals (organic peroxides). At dentistry, H_2O_2 is used as a bleaching agent in concentrations ranging from 5% to 35%. H_2O_2 is corrosive at high concentrations, can burn tissues on touch, and can also produce free radicals. Solutions with high concentrations

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need to be treated carefully since they are thermodynamically unstable. Application of accelerates the breakdown of H_2O_2 into active oxygen.[4]

Carbamide peroxide $[CO(NH_2)_2H_2O_2]$ is an organic, white, and crystalline substance that can be employed in various amounts. It is made from urea and H_2O_2. It disintegrates into roughly 3% H_2O_2 and 7% urea in a hydrophilic environment.

To make carbamide peroxide more chemically stable than H_2O_2, the most widely used commercial bleaching preparations at the moment frequently also contain glycerin at various proportions. An oxidizing agent called sodium perborate is offered as a powder. H_2O_2, sodium metaborate, and developing oxygen are the products of its breakdown. In comparison to concentrated H_2O_2 solutions, sodium perborate is safer and easier to control.[5]

Vital bleach

Oxalic acid was first used to perform vital whitening on the teeth's outer surfaces. Oxalic acid was then replaced with eurozone or H_2O_2. Liquid HP in higher concentrations was administered to the tooth.

Non-vital bleach

Walking Bleach Technique in a congress report by Marsh and released by Salvas, the walking bleach procedure with a solution of sodium perborate, and distilled water was first described.

During this operation, the mixture was allowed to sit in the pulp cavity for a few days, while temporary cement was used to seal the access cavity.

Today, sodium perborate and water or H_2O_2 are still utilized, and this method of intracoronal bleaching has been documented successfully numerous times.[6]

Cervical seal

Reduce the root filling by 1–2 mm below the cementoenamel junction (CEJ). This can be discovered by replicating the relevant exterior probing to the CEJ while utilizing a periodontal probe implanted in the pulp cavity. Using Gates-Glidden or Largo burs, filling material up to this depth can be removed8. Because the presence of impurities on the surfaces may impair the effectiveness of the bleaching agent, it is crucial to clean the cavity surfaces of debris and endodontic material residues.

CASE REPORT 1

A 21-year-old female patient, who complained of discolored and unesthetic appearance of her upper front tooth without any pain or symptoms, attended to the Department of Conservative Dentistry and Endodontics Bareilly International University on December 26, 2021.

The patient had no systemic illnesses, and no drugs that stained teeth were being taken by her. Before any examination or treatment, a patient's written informed permission was obtained. When #11, 12 was examined, a flawed palatal composite with recurrent caries was discovered. Based on the further endodontic testing, the pulpal diagnosis was previously managed with asymptomatic apical periodontitis [Figure 1].

A Vita porcelain shade guide was used to evaluate the discolored tooth's shade guide in the presence of natural sunlight. In addition, the patient's pre- and post-bleaching photos were obtained. The patient underwent a standard endodontic procedure.

Powdered sodium perborate was used for the bleaching procedure. Vaseline, a water-soluble lotion, was administered to the soft tissues to protect the gingiva, and rubber dam isolation was accomplished. Beyond the cementoenamel junction, 2 mm of the gutta-percha was removed in an apical direction (CEJ).

To create a barrier between the sealed root canal and the bleaching material, 1 mm of glass-ionomer cement (GIC) base was applied over the gutta-percha after the tooth had been cleaned and dried (mechanical seal). A calcium sulfate-based temporary filling material (CavitTM (Temporary Filling Material), prosthesis was provided by KATARA LABS. Sodium perborate powder was combined with saline and, then, inserted into the opening pulp chamber over the dentinal walls. Cotton pellets were also placed Figure 1.

CASE REPORT 2

A 23-year-old female patient reported to the institution with a complaint of discolored upper front tooth and desired the discolored tooth be treated. The right central incisor of the maxilla was structurally sound and undamaged upon inspection. Negative results were observed from the pulp vitality tests, with mild surface abrasion Maxillary central incisors were taken. A full root canal obturation without periapical disease was visible on an intraoral periapical radiograph taken with the maxillary left central incisor. The patient received an explanation of the bleaching process and gave his or her agreement to get both inside and outside in-office power bleaching therapy to treat stained teeth [Figure 2].

The tooth that was to be bleached was isolated using a rubber dam, cleaned with pumice, and the shade was noted.

Up to 2 mm of the obturated material was taken out of the tooth's gingival edge. Using a spherical bur, stains in the pulp chamber were removed with the least amount of damage. Over the gutta-percha, 1 mm of GIC (Type 1, GC Corporation, Singapore) was applied. Dentinal tubules were opened after the pulp chamber was etched with 37% phosphoric acid for 30–60 seconds, cleaned, and dried.

After that, a thick paste containing 38% H_2O_2 (Pola Office Ultra-Dent, USA), a bleaching agent, was made and immediately applied to the pulp chamber and external labial surface of the tooth. The tooth was cleaned after 10–15 min, and the bleach residue within was removed with water and a high suction device.

Four times the process was carried out. After the last wash, the tooth's shade was assessed to make sure it matched the shade of the neighboring tooth, and satisfactory findings were obtained. The pulp chamber and the access were repaired using tooth-colored composite resin.

This method requires less tooth structure to be removed from the teeth than total ceramic, ceramic fused to metal, or veneers, which are also more expensive and cause irreparable damage.

The patients who undergo this type of bleaching get good esthetic and financial results. The type of intrinsic stain can have a big impact on how tooth whitening turns out, and the dentist's clinical judgment and decision-making depend on the patient's situation as well as their clinical expertise.

Application of the bleaching agent

A appropriate bleaching agent is sodium perborate (tetrahydrate) combined with distilled water in a 2:1 (g/mL) ratio. Water can be substituted with 3% H_2O_2 when there is significant discoloration. The bleaching agent should be replaced every 3–7 days and can be applied using an amalgam carrier or plugger. Depending on the degree of the discoloration, it may take 2–4 sessions before the bleaching is successfully accomplished. To prevent "over-bleaching," patients should be advised to monitor their tooth color regularly and return when it is appropriate to bleach.

After bleaching, the access cavity should be repaired using a resin composite that is fused to enamel and dentin using the acid-etch procedure. The durability of the teeth is increased and recontamination with bacteria and stains is prevented. A sound repair with sealed dentinal tubules is necessary for bleaching therapy to be effective. Some writers suggest employing resin composites with lighter hues to make up for partially effective bleaching.[7]

Glass-ionomer cements and resin composites' temporary reduction in adhesive strength to bleached enamel and dentin are due to this. It is known that residual oxygen or peroxide prevents resin composites from polymerizing. It is less likely that modifications to the enamel structure could affect the adherence of resin composites (114, 115). However, compared to unbleached enamel, the hybrid layer's appearance in bleached enamel is less regular and distinct.[8]

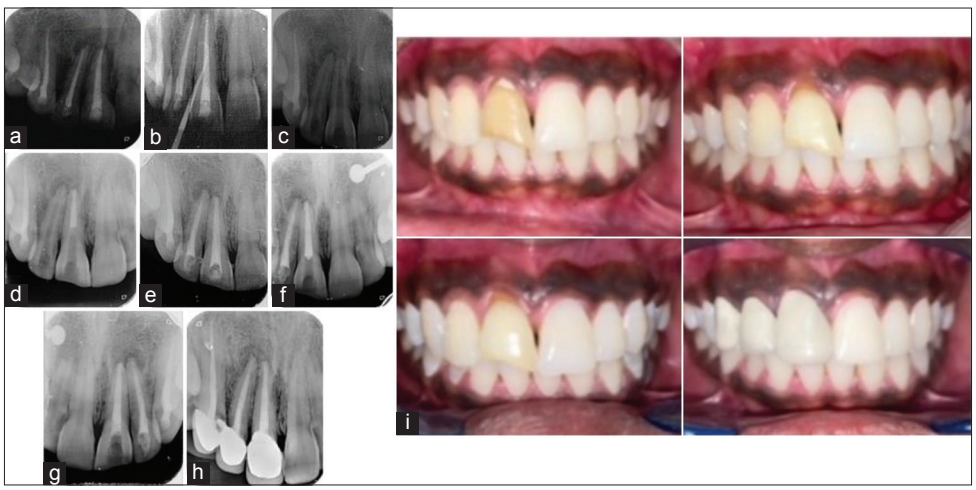

Figure 1: (a) Pre-operative radiograph, (b) sinus tracing irt 11,12, (c) faulty obturation removed from 11,12, (d) MTA placed irt 11, (d) 11, 12 (e) reobturated irt 11, 12, (f) gutta-percha removed up to cej irt 11, (f and g) Gic barrier made irt 11, (h) final post-operative radiograph after crown placement irt 11,12, and 13, and (i) clinical pre- and post-operative visuals

Figure 2: (a) Pre-operative radiograph, (b) faulty obturation removed and MTA placed irt 21, (c) reobturated irt 21, (d) gutta-percha removed up to cej irt 11, (e and g) gic barrier made irt 21, (f) final post-operative radiograph after composite restoration irt 21, and (g) pre- and post-operative clinical visuals

Prognosis of non-vital bleached teeth

There are not many research with scientific proof backing them up, despite numerous clinical accounts to the contrary. The majority of reports show the best possible initial outcomes following bleaching, with perfect color matching between the bleached tooth (or teeth) and the one next to it. It is important to note that the patient's assessment of the effectiveness of the therapy is frequently more favorable than the dentist's assessment. One study found that employing the WALKING BLEACH method to chemically bleach 20 cases resulted in an 80% success rate after 1 year and a 45% success rate after 6 years.[8]

Complications and risks

Both regional and systemic negative effects of bleaching are possible (toxicology, free radicals, etc.). Dental hard tissues and mucosa, tooth sensitivity when the bleaching agent comes into contact with vital teeth, interaction with adhesive mechanisms, risk of external cervical resorption, harm to composite restorations, and dental material solubility are all examples of possible localized adverse effects.[9] The alterations in enamel and dentin, particularly the decrease in enamel microhardness, are among the most significant local unfavorable effects. Another study found that bleaching agents were mostly linked to cementum surface alterations, which were more pronounced than in other tissues. The ratio of organic to inorganic components in tooth hard tissues may change as a result of peroxides, according to some theories.[10]

DISCUSSION

A stained anterior tooth that has undergone endodontic therapy is treated using a variety of techniques. In-office bleaching has several advantages over traditional methods, and it is particularly effective in treating tooth discoloration and the crown of the tooth. This article talks about the office bleach that was applied to this patient. When the tooth is still mostly intact, whitening is preferred to crown installation for a tooth that has become discolored after de-vitalization.[11]

Rubber dam should be used to shield the nearby structures before preparing the access cavity. It is important to form the access cavity so that all traces of restorative materials, root-filling materials, and necrotic pulp tissue are eliminated. Because they may include necrotic pulpal remnants that can result in discoloration, it is crucial to include the mesial and distal pulp horns in the access cavity, especially for maxillary incisors. It's also advised to clean the pulp cavity with sodium hypochlorite once again. According to some accounts, the smear layer should be removed and the dentinal tubules should be opened by treating the dentin surface of the access cavity with 37% orthophosphoric acid. This encourages the bleaching agent's deep penetration.[12]

CONCLUSION

Patients experience esthetic issues with discolorations in non-vital teeth, especially in the anterior region, which might interfere with daily activities. Although not all intracoronal bleaching procedures are completely successful and some recurrence rates are observed, it is a conservative treatment that can be favored at least to postpone invasive restorative procedures. In non-vital bleached teeth, cervical root resorption is seen, especially when there has been a history of dental trauma. Therefore, it is important to make sure that the cervical region is adequately sealed first. On the other hand, applications of high doses of H_2O_2 and the thermocatalytic method should be avoided. After intracoronal bleaching, recurrence seems unavoidable; therefore, more clinical studies on color stability are required for a deeper understanding.

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