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Case Report

Management of non-vital maxillary central incisor with intrinsic discoloration using walking bleach technique

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ABSTRACT

Non-vital bleaching is a non-invasive technique for the treatment of intrinsic discoloration of teeth. Hydrogen peroxide and sodium perborate are commonly used bleaching agents. The aim of this case report is to demonstrate the non-vital bleaching technique in maxillary anterior teeth. Maxillary central incisors were isolated and root canal treatment was performed. Barrier space preparation was done using a heated instrument. Glass ionomer cement was used a barrier material. Mixture of hydrogen peroxide was placed in the canal and sealed with intermediate restorative material. After 1 week, the procedure was repeated to achieve the desired results. Non-vital bleaching is a minimally invasive procedure to restore the esthetics of a discoloured non-vital tooth. However, care should be taken to prevent any post-operative complications.

1. Introduction

Single tooth discoloration is an important aesthetic concern for patients as it has a psychosocial impact and also influences the individual's esthetic self-perception.[1,2] It can be managed through various approaches depending on various factors like the cause of discoloration, operator experience, patient finances, patient wishes, coronal tooth structure remaining, and previous treatment.[2]

The bleaching of non-vital teeth is relatively low risk treatment for improvement of the esthetics of endodontically treated teeth and was first mentioned by Garretson in 1895, who used chlorine as the bleaching agent. The intra-coronal bleaching procedure is widely used in discoloured non vital teeth, because it is efficient, relatively simple, presents low cost and preserves the dental hard tissue compared to the prosthetic treatment. Most commonly used intra-coronal bleaching agents are hydrogen peroxide, carbamide peroxide and sodium perborate.[3] When these compounds contact with the tooth, they release active metabolites that diffuse in the enamel and dentin and oxidize the pigments, which are responsible for discoloration.[4]

A well-designed treatment plan is the key for a successful and long-term final outcome. This case report illustrates a successful bleaching treatment in a non-vital maxillary central incisor with intrinsic discoloration.

2. Case Report

A 30-year-old male patient reported to the department of conservative dentistry and Endodontics with a complaint of discolored upper front tooth and Desired the discolored tooth to be treated (Figure 1). Patient had a history of trauma 5 years back. On intra-oral examination, maxillary left central incisor tooth was structurally intact, firm and

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with surface discoloration. Tenderness to percussion was negative. Vitality test was performed with cold test using cold spray (Endo- Frost, Coltene, Germany) on all the maxillary anterior teeth which confirmed that #21 was non-vital. Intra oral periapical radiograph with maxillary left central incisor revealed no peri-radicular changes with the concerned tooth. Patient was informed about all the restorative options after Endodontics therapy like bleaching, laminates or crown placement. Treatment plan was decided to do a root canal treatment followed by non-vital bleaching of the involved tooth.

2.1. Method of inside in-office power bleaching

Using rubber dam, the tooth to be bleached was isolated and cleaned with pumice and the shade was recorded and access cavity was made on #21 on the palatal side with a no. 4 round bur. Working length was established with a #15K file (Mani Inc, Japan) and confirmed with an apex locator (Root ZX mini, J Morita, USA). Biomechanical preparation with hand K- file size #40 (Mani Inc, Japan).

Fig. 1: Preoperative intraoral photograph showing discoloration with #21

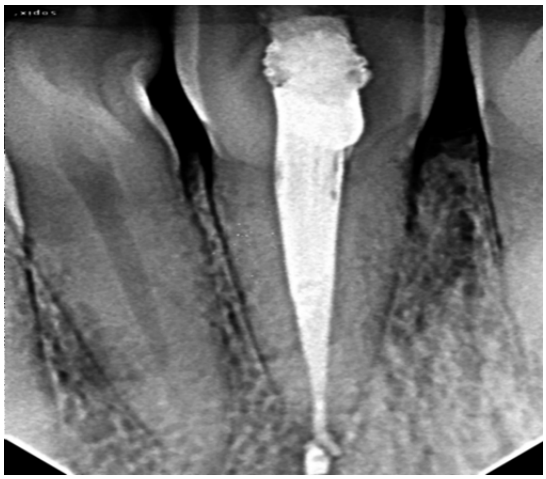

Fig. 2: Radiovisiograph showing endodontics restoration

Fig. 3: Obturated material removed up to 2 mm below the cemento-enamel junction

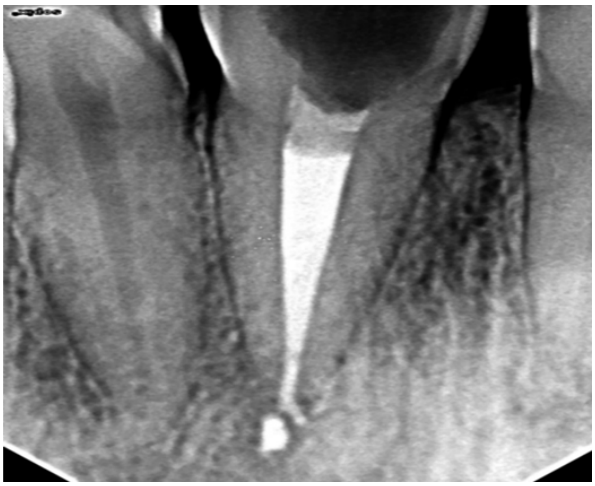

Fig. 4: Intraoperative radiovisiograph showing barrier placement

Fig. 5: Photograph showing two weeks follow up showing complete bleaching of intrinsic stains.

Abundant amount of normal saline and sodium hypochlorite were used as irrigants during the cleaning and shaping procedure. Canal was dried with paper points. Obturation was done with cold lateral compaction technique using sealapex as sealer. (Figure 2). Following root canal filling, the obturated material was removed from the tooth up to 2 mm below the cemento-enamel junction (Figure 3). Stains in the pulp chamber were removed using round bur with the minimal destruction. After removal of the gutta percha and stains, a 2 mm glass ionomer cement (Type 2, GC Corporation, Singapore) was placed over the gutta-percha as a barrier material (Figure 4). Using 37% phosphoric acid, pulp chamber was etched for 30-60 s, washed and dried, which resulted in the opening of dentinal tubules. Following this, 37.5% hydrogen peroxide (pola office ultradent, USA) bleaching agent was mixed into thick paste and placed immediately in the pulp chamber and dry cotton was tightly placed over this, the access cavity was sealed with temporary restoration. The patient was recalled after 1 week for assessment. At a week visit, #21 showed definite improvement in appearance except near the middle third of the tooth which still showed discoloration. Hence, the bleaching procedure was repeated and the patient was recalled again after 1 week to assess the bleaching results (Figure 5). Discoloration was completely removed and shade of the tooth was enhanced. The hydrogen peroxide mixture was removed from the pulp chamber using abundant saline and the access cavity was sealed with temporary cement. Patient was recalled after 2 weeks and access cavity was sealed with composite resin restoration. Patient did not experience any post-operative symptoms.

3. Discussion

Tooth discoloration may be caused by trauma induced internal pulp bleeding leading to dissemination of blood components into dentinal tubules. Blood degradation products such as haemosiderin, haemin, haematin and haematoidin release iron during hemolysis which in turn is converted to black ferric sulfide with hydrogen sulfide produced by bacteria, causing staining of the tooth.[5] During the process of bleaching, the pigments are oxidized by hydrogen peroxide which acts as a strong oxidising agent through the formation of free radicals, reactive oxygen molecules, and hydrogen peroxide anions. These reactive molecules split the long-chained, dark-coloured chromophore molecules into smaller, light coloured, and more diffusible molecules.[3]

When the tooth is relatively intact, bleaching is preferable to crown placement. It has been suggested by various in vitro studies that bulk of the remaining tooth structure provides the strength and fracture resistance to the endodontically treated tooth rather than the dowel.[6]

Bleaching of discoloured nonvital teeth was first described during the middle of the 19th century using various chemical agents including hydrogen peroxide. Hydrogen peroxide mainly acts due to reactive oxygen through the formation of free radicals. Thermocatalytic technique was used to bleach nonvital teeth as the application of heat increases the bleaching properties of hydrogen peroxide by accelerating the bleaching reaction. Nowadays the thermocatalytic technique and high concentration of hydrogen peroxide is less preferred due to increased risk of external cervical resorption. There is speculation that hydrogen peroxide diffuses through dentinal tubules, cementum, periodontal ligament and reach to periradicular bone inducing an inflammatory resorption process.[7]

The ‘walking bleach’ technique was described by Spasser in 1961which involves placing a paste of sodium perborate mixed with water into the pulp chamber of a non-vital tooth and sealing it in. Later, in 1967, Nutting and Poe described a similar technique using a paste of sodium perborate mixed with hydrogen peroxide. Sodium perborate when mixed with water has been reported to be as effective as when it is combined with hydrogen peroxide.[8] Internal tooth bleaching is a minimally invasive, conservative, relatively simple, effective, and low-cost method in the treatment of discolored endodontically treated teeth.

Various risks associated with non-vital teeth bleaching are penetration of hydrogen peroxide in the dentinal tubules, changes in the dentin structure and permeability, general weakening of the physical properties of dental hard tissues, dental fracture during treatment, over-bleaching, possibility of relapse and the most serious external cervical root resorption. Root resorption is caused by the diffusion of hydrogen peroxide through the dentinal tubules and micro-perforations of the cement to the cervical periodontal ligaments leading to the destruction of the hard tissues at the level of the cementoenamel junction, due to local necrosis and inflammation.[2]

Glass ionomer cement was used as the barrier material. The shape of the barrier was kept as ‘bobsled tunnel’ as seen from the facial aspect. The significance 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 and hence helps in the prevention of external root resorption.[5]

After the completion of the bleaching procedure, the acidic environment in the tooth cavity should be neutralized by placing calcium hydroxide suspension for 7 days. This duration is necessary for releasing the remaining oxygen and dentin remineralization to stabilize the colour and to provide adequate adhesion to the composite filling material.[4] The average treatment time for single tooth bleaching is 6–8 weeks, although variations may be there. Patients undergoing intracoronal bleaching should be recalled for follow-up on at least a two-week basis to

evaluate the response of the single dark tooth, appropriately manage any complications, to reassure and re-motivate the patient, and replace intracorneal bleaching agents if required.[1]

The case presented above highlights the effectiveness of the nonvital bleaching by walking bleach technique to achieve a successful and predictable cosmetic outcome. Hence, it is concluded that walking bleaching technique can be used as a treatment of choice to bleach the discoloured nonvital endodontically treated cases conservatively as compared to prosthetic procedures.

4. Conclusion

Case selection and patient compliance was the key to success in this treatment. Regular clinical evaluation helped us to depict the pronounced difference in the pre and post-treatment results. The present case study suggests non vital bleaching therapy to be a successful treatment alternative to the prosthetic treatment.

5. Source of Funding

None

6. Conflict of Interest

None.

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