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Esthetic rehabilitation of non vital tooth using internal and external bleaching technique: A case report

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Abstract

The discoloration of permanent teeth has a significant aesthetic and social impact. Treatment options for discolored non-vital teeth are restoration, bleaching, crowns, laminate and veneers. However, the method for preparation of crown or veneer has a significant disadvantage as an invasive technique. The intervention should include minimal damage to the tooth structure and should not affect future restoration options. Compared with dental crowns, the advantage of bleaching is that it provides a simple conservative method that can remove stains and whiten discolored teeth without destroying the tooth structure. This article presents a case report of combined (internal and external) bleaching techniques for non-vital discolored teeth, which can be considered as a clinically effective method that is beneficial to patients and clinicians. It needs a periodic evaluation to obtain good functionality and aesthetics.

Keywords: discolored non vital, bleaching, internal, external, aesthetic

Introduction

One of the most common cosmetic problems is discoloration of the anterior teeth, prompting patients to take corrective action. Mainly, bleaching can totally or partially correct discoloration. Other restorative methods such as crowns and veneers options are available [1]. In dentinal staining, as in non-vital teeth, the bleaching process proves to be convenient because of permeability provided by the tooth structure to the hydrogen peroxide (H₂O₂), which has the strong ability to diffuse through that structure resulting in either oxidation or reduction of staining molecules. In the progress when H₂O₂ molecule engages with the tissue it breaks up and forms oxygen and peridroxil free radicals. These highly reactive and unstable free radicals can fracture macromolecular pigments, cracking them into progressively smaller molecules until, by diffusion, these pigments are totally eliminated [2,3]. Various substances have been optimized and used, such as hydrogen peroxide, carbamide peroxide, sodium perborate, sodium hypochlorite, aluminum chloride, acetic acid and oxalic acid [4-6].

The result of bleaching depends mainly on the concentration of the bleaching agent, the ability of the bleaching agent to reach the chromogenic molecules, the duration and frequency of use of the bleaching agent [7].

Amongst these techniques, internal/external bleaching technique is an effective and conservative treatment option compared to placing restorations. In comparison to placing restorations such as crown and veneers [8-10].

Case Report

A 26-year-old male patient reported to the hospital with a chief complaint of discolored upper right anterior teeth. The patient had a history of trauma due to an accidental fall on the ground associated with anterior teeth 5 years back. Intraoral examination revealed a brownish discolored maxillary right central incisor. Electric pulp testing was done with tooth number 11 to evaluate the status of pulp, which exhibited no response which thereby showed the tooth being non-vital. The patient's medical history was unremarkable. A periapical radiograph revealed that the root formation was complete.

A detailed explanation about the treatment plan was given to the patient, which included root canal treatment followed by treatment of bleaching by combined technique for the tooth and

informed consent was taken from the patient.

To determine the shade of teeth preoperatively, Vita classic porcelain shade guide (Vita Zahafabi) was used under normal daylight, and preoperative photographs were taken of tooth number 11 (Figure b). Thereafter, conventional endodontic treatment was carried out on tooth number 11 (Figure a).

Using a rubber dam, the tooth to be bleached was isolated and cleaned with pumice on tooth number 11 (Figure c). The pulp chamber was prepared before the application of the bleaching agent by removing 2 mm of gutta-percha from the cement-enamel junction in the apical direction and placing a base of 1 to 2 mm glass ionomer cement (GIC type I) over the gutta-percha to create a mechanical barrier between the sealed root canal and bleaching agent to be used in the pulp chamber.

Using 37% phosphoric acid gel (Prime etching gel, India) pulp chamber was etched for 30-60 seconds, washed and dried, which resulted in the opening of dentinal tubules. Following this, 38% hydrogen peroxide bleaching (Pola Office Ultradent, USA) agent was mixed into a thick paste and placed immediately in the pulp chamber and on the external labial surface of the tooth. After 10-15 minutes, the tooth number 11 was cleansed and the residue bleach inside was removed with water using a high suction unit.

The procedure was repeated three times (Figure d, e, f). Following the final wash, tooth shade was evaluated, which matched with adjacent teeth and satisfactory results were achieved (Figure f). The access and the partially empty pulp chamber were restored using tooth colored composite resin (Shade A2 of Tetric N Ceram, Ivoclar Vivadent).

After six months follow-up the esthetic result was good and there was no change in color of tooth 11 (Figure g).

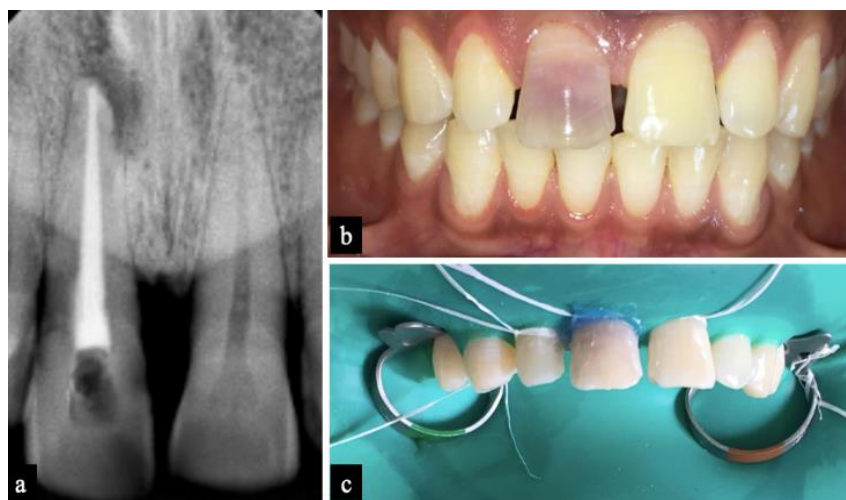


Fig a: Radiographic view of tooth number 11 after endodontic treatment. **b:** Pre-operative photograph of tooth number 11. **c:** Intra operative view of application of bleaching agent on tooth number 11



Fig d: Immediate result after procedure. **e:** Result after one week of procedure.



Fig f: Result after two weeks of procedure. **g:** Result after six months of clinical follow ups.

Discussion

Bleaching techniques for discolored non-vital teeth began just when the bleaching agent of choice was chloride of lime^[8], whereas for pulpless teeth they included aluminum chloride, oxalic acid initially until the landmark effect of H₂O₂ was discovered^[9].

Bleaching techniques should consider the biological and clinical safety^[10]. Biological security is related to the concentration of the product and the time of application whereas clinical security is related to the adverse effects that may occur such as irritation of soft tissues, changes in enamel hardness and dentin permeability^[10, 11].

The nonvital teeth can be bleached with the combination of two techniques: internal bleaching ("walking bleach") and external bleaching (in-office)^[12].

As there are few reports about the benefits of the combination of these two techniques^[13-15]. Its principal feature is the quickness of the result^[14, 16] and the less possibility of external root resorption.

Internal bleaching requires healthy periodontal tissue and a properly treated root canal to prevent bleaching agent from seeping into the periapical tissue. Many *in vitro* studies have shown that sodium perborate in water, sodium perborate in 3% H₂O₂ or 30% H₂O₂, and 10% carbamide peroxide are effective agents for internal bleaching of non-vital teeth^[17].

In 1967, Nutting and Poe introduced the use of 30% hydrogen peroxide in combination with sodium perborate, which is called walking bleaching^[18]. They further added that sodium perborate combined with water would be more effective.

Bleaching methods include thermocatalytic, walking bleach or combination of these. In injured teeth, bleaching techniques that use less caustic substances (hydrogen peroxide at low concentrations, or even water associated with sodium perborate) should be used, instead of using 35% hydrogen peroxide associated with heat (thermocatalytic technique)^[19]. In thermocatalytic technique, a heat source is used to activate bleaching agent placed in pulp through release of nascent oxygen (it is not advisable to use thermocatalytic method with 30% H₂O₂, as it may cause leakage of bleaching agent into dentinal tubules with initiated inflammation during treatment)^[17]. The material in this case (sodium perborate with hydrogen peroxide 20%) has a lower concentration of hydrogen peroxide, and therefore it is less aggressive^[20].

For non-vital teeth, this effect will not occur, but if the technique is not well developed, root resorption or external resorption will occur. It can happen,^[21] although it is more common in teeth treated with thermocatalytic technique^[4, 12, 22]. According to Howell, the instant success rate of non-essential whitening techniques is 89.5%^[23].

In order to avoid external resorption, different techniques and materials have been proposed^[4, 22]. The most effective solution found theoretically is to place a glass ionomer "buffer" at the entrance of the root canal^[21].

Since the accumulation of food residues and waste deposits will reduce the bleaching effect, it is recommended to seal the bleach in the passage cavity. A key step in the protocol is to place the temporary restoration on the bleach, which can be difficult due to the texture of the bleach. To facilitate this process, some cotton fibers can be placed between the bleach and the temporary restoration. Hence, in this case report the root canal orifice was sealed with the cotton pellets followed by temporary restoration.

Teeth bleaching provide a solution to conservative and aesthetic problems, rather than an invasive restorative option. Follow-up is essential for external cervical resorption and possible discoloration from the bleaching procedure, so clinical and radiological examinations should be performed to confirm the condition through periodic follow-ups.

In this case, no darkening was observed during the 6-month follow-up, and the cosmetic effect was maintained^[4].

Conclusion

In the modern era of cosmetic dentistry that aims for esthetics as well as conservative approach for successful restorative outcome rather than crowns or veneers, which removes substantial amounts of tooth structure leading to irreversible damage, and are expensive. The use of combination bleaching techniques for bleaching of non-vital discolored teeth can be considered as an effective, and expedient method that can be used in clinical favor for the patient as well as the clinician.

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