Case Report

Management of discoloured endodontically treated anterior teeth: A case report

Sanjana Deka[1], Geetika Dixit[1], Shagun Chhikara[1], Sushmita Kumar[1]

Abstract

Intrinsic discoloration of a non-vital permanent incisor tooth due to trauma may have a significant esthetic and social impact on children and adolescents. Treatment options for discolored Non-vital teeth are bleaching, crowns or veneers. However, this restorative crown or veneer approach has a significant drawback of being an invasive technique. Intervention should be minimal destruction of tooth structure and should not compromise future restorative options. The advantage bleaching over crown is that it offers simple conservative approach in removal of stain and whitening discolored teeth without damaging tooth structure.

Key words: Bleaching, crown, endodontic treated tooth, non-vital, tooth discoloration, veneers.

Introduction

The aesthetics and color of teeth are the vital indicators of systemic health. A variety of intrinsic and extrinsic factors significantly influence tooth color, making it crucial to recognize their impact.[1] Intrinsic discoloration may arise from factors such as trauma, loss of vitality, or dental treatments.[2-4] In contrast, extrinsic stains are often the result of insufficient oral hygiene practices, smoking, the consumption of tannin-rich foods, excessive use of chlorhexidine mouthwash, or the intake of metal salts. Understanding these distinctions is essential for effectively addressing and managing tooth discoloration.[1,5]

Bleaching, whether addressing vital or non-vital discoloration, has established itself as a leading and effective solution to restore and brighten your smile. This method stands out as both economical and one of the least invasive procedures available, making it the ideal choice for anyone looking to enhance their appearance with remarkable results.[6-8]A variety of dental bleaching agents have proven effective, including oxalic acid, calcium hypochlorite, hydrogen peroxide, carbamide peroxide, and sodium perborate.

1. Postgraduate student
Department of Pediatric and Preventive dentistry
Kothiwal Dental College & Research Centre
Moradabad, Uttar Pradesh

Corresponding author
Sanjana Deka
Department of Pediatric and Preventive dentistry
Kothiwal Dental College & Research Centre
Moradabad, Uttar Pradesh

Notably, 30% to 35% hydrogen peroxide and sodium perborate, either used alone or in combination, stand out as the most widely preferred choices for non-vital bleaching of endodontically treated teeth. These powerful agents initiate oxidation reactions that significantly degrade pigment molecules, resulting in a brighter, more radiant smile.[8-10]
In 1961, Spasser revolutionized the field of endodontics by introducing a groundbreaking method for bleaching discolored non-vital teeth using sodium perborate combined with water in the pulp chamber.[11] Just two years later, Nutting and Poe took this innovation a step further by replacing water with 30% hydrogen peroxide, ultimately developing the highly effective "walking bleach" technique.[12] In 1980, Howell made another significant advancement by revealing that acid etching the dentin opened the dentinal tubules, which enhanced the penetration of the bleaching agent.[13] Moreover, a study by Tran et al. in 2017 demonstrated that the concentration of hydrogen peroxide (H2O2) peaked within 27 hours, plateauing after 75 hours, with detectable low levels persisting for up to 28 days.[14] Together, these advancements underscore the remarkable efficacy of modern bleaching techniques in dentistry.

This case report highlights the successful bleaching of non-vital teeth that discolored after endodontic treatment, using the walking bleach technique, resulting in a positive prognosis and no side effects.

Case Report

A 16 year old male child reported to the Department of Pediatric and Preventive Dentistry, Kothiwal Dental College and Research Centre with the chief complaint of discoloured upper front tooth since 4 years.
The patient presented with a history of trauma sustained four years ago, which resulted in discoloration of teeth 11 and 21. Root canal treatment was performed on the affected teeth at the time; however, no intervention was undertaken to address

the discoloration. On general examination, patient had no significant dental and medical history. Extra oral examination showed symmetrical face, no abnormalities of the lips, the left and right mandibular salivary glands were unaffected and painless. Intra-oral examination showed that crown of teeth 11 and 21 were discoloured with broken incisal edge (Figure 1). Hygiene of the oral cavity was good. Tenderness to percussion was negative.

Figure 1: Pre Operative photograph

So,for treating the discolouration, patient was explained about the intracoronal bleaching and informed consent was taken. The preparation in the pulp chamber for bleaching was done by removing 2 mm of gutta percha near orifice (Figure 2) and 1 to 2 mm glass ionomer cement (GIC) was placed over it to create a mechanical barrier
in the root canal at the level of cemento- enamel junction(figure 3). Then the pulp chamber was etched with 30% phosphoric acid for 30 sec. and dried.

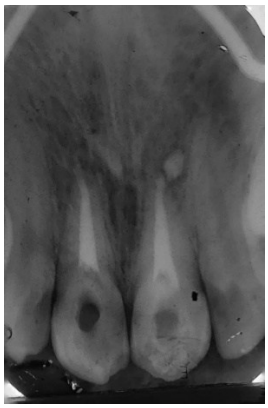

Figure 2

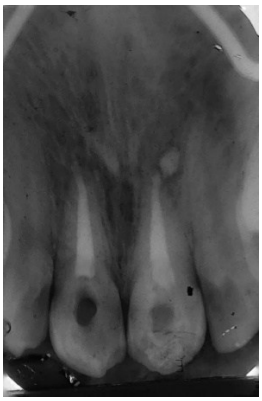

Figure 3

Then Sodium tetrahydrate perborate and 30% Hydrogen peroxide were mixed in relation 2 g to 1 ml in a creamy paste consistency. Using the amalgam carrier, the material was applied in the pulp chamber and then covered with cotton pellets. The tooth was coronally sealed with the temporary cement. The same procedure was repeated weekly in three-time intervals.

After 1st week and 2nd week, there was change in shade(Figure 4).

Figure 4: Follow up after 1st and 2nd week

After the 3rd week, the desired result was achieved with the change in shade from C3 to A3 and the tooth was permanently restored with composite(Figure 5).

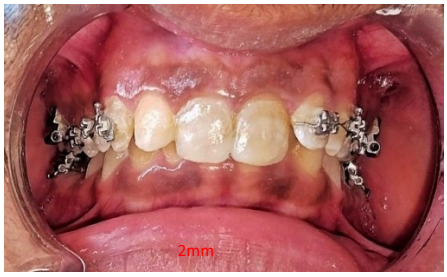

Figure 5: Post operative photograph

Discussion

When treating a discoloured anterior tooth that has undergone endodontic treatment, many strategies are utilised.[15] In-office bleach has many advantages over conventional options and is particularly effective in addressing crown and intrinsic discoloration of the tooth. The in-office bleach, which was used in this patient, is discussed here. For a tooth that had discolored following devitalization, bleaching is more favourable to crown placement when the tooth is relatively intact.[16] In vitro studies suggested that it is the bulk of the tooth's residual structure instead of the dowel that yields the endodontically treated tooth strength and fracture resistance.[17] Sorensen et al his study reported no significant difference in the success rate achieved between anterior non-vital teeth with and without crowns.[18] Additionally, Trabert et al. found no obvious distinction in the fracture resistance of anterior teeth that lacked endodontic treatment in contrast to those that had.[17] For instance, teeth restored with pin-retained amalgam cores or cast gold dowel cores are far less likely to fracture than endodontically treated anterior teeth with intact natural crowns. Furthermore, in comparison with teeth rebuilt with

crowns and dowel cores, central incisors are three times more resistant to fractures.[19]
A laminate veneer can serve as a less invasive alternative to a crown, effectively masking discoloration. However, it is prone to issues such as fracture, debonding, and marginal leakage. Additionally, it necessitates tooth preparation, making the procedure irreversible.[20]

Based on the above considerations, in-office bleaching was chosen for this patient, yielding desirable results and ensuring patient satisfaction. This approach offers several key advantages: (1) it is highly conservative, (2) effectively removes stains, and (3) significantly enhances tooth color appearance. Consequently, in-office bleaching should be the preferred method for dentists, as it allows complete control over the treatment process.[21] In addition, in-office bleaching is typically a swift procedure, with noticeable results often achieved after a single session. This method is widely favored by patients, as it demands minimal effort or active involvement on their part. In the current case, a chemically activated dental bleach containing 38% hydrogen peroxide and requiring no light or heat activation, was utilized. This bleaching agent is extensively employed and well-supported by clinical documentation.[22-23] Hydrogen peroxide functions by releasing oxygen, which disrupts the conjugated bonds responsible for stains, breaking them into single bonds that can be easily rinsed away with water, thereby effectively removing the discoloration. This process enhances the absorption of color wavelengths, producing a whitening effect on the tooth. Notably, the addition of light in bleaching procedures has shown no significant advantage over chemically activated whitening systems.[24]

Conclusion

In comparison to more expensive and intrusive choices like veneers, porcelain-fused-to-metal crowns, and full-coverage ceramic restorations, which involve extensive tooth structure removal and result in irreparable damage, this technique is less invasive. Patients can benefit from both financial saving and aesthetic improvements through this bleaching method. The type of intrinsic staining, however, is a crucial factor in determining the bleaching process's success, and the dentist's clinical judgement and skill will choose the best course of action based on the patient's unique case.

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