A non-invasive technique for management of non-vital teeth discoloration by intracoronal bleaching- A case report

Neha Agrawal^{1*}, Mansi Tiwari², Anshul Sharma³

¹⁻²Senior Lecturer, ³Reader. ¹Dept. of Conservative Dentistry and Endodontics, ²Dept. of Oral Medicine and Radiology, ³Department of Oral and Maxillofacial Surgery, ¹New Horizon Dental College and Research Institute, Sakri, Bilaspur, Chhattisgarh, ^{2,3}Chhattisgarh Dental College And Research Institute, Sundra, Rajnandgaon, Chhattisgarh, India

***Corresponding Author: Neha Agrawal**

Email: drnehaagrawal30@gmail.com

Abstract

Anterior teeth that are discolored and non-vital are a common aesthetic concern for many patients. In addition, it may affect their self-esteem, self-concept, and career prospects. There are many reasons for discolored non-vital teeth, including trauma, caries, endodontic treatment, and unsuccessful restorations. The treatment of such patients poses a challenge to dental practitioners. Among the options post-endodontic restorations include veneers, laminates, crowns, and bleaching, which is a noninvasive procedure. There has been advancement in the treatment of this problem with intracoronal bleaching of non-vital teeth. An intracoronal bleaching technique was successfully employed to lighten the discoloration in this case report of a root canal treated tooth within two months which showed a noticeable reduction in discoloration.

Keywords: Intracoronal bleaching, Non-vital teeth, Discoloration.

Introduction

Anterior discolored teeth are often perceived as an esthetic detraction. The increasing need for beautiful, white teeth, associated with the development of aesthetic treatment methods, has made bleaching of non-vital teeth an increasingly popular procedure in recent years. The bleaching of teeth can be done either externally, called vital tooth bleaching, or intracoronally, called non-vital tooth bleaching. The process of bleaching non-vital teeth is a low-risk treatment for improving the esthetics of endodontically treated teeth.^[1] It has been suggested that there are many causes of non-vital tooth discoloration, including dental trauma, necrotic debris on pulp horns and dentinal tubules, poor irrigation, and sealing materials in the pulp chamber or chamber walls. One of the most common causes is intracoronal blood decomposition. When erythrocytes are hemolyzed in the dentin tubules, iron is released. This, together with sulfate hydrogen, forms iron sulfide, a black, discolored compound.^[2]

A conservative alternative to invasive esthetic treatment is intracoronal bleaching of non-vital discolored teeth. The process requires healthy periodontal tissues and a root canal that has been properly obturated to ensure the bleaching agent is not able to reach the periapical tissues.^[3] Both hydrogen peroxide and sodium perborate have been used as bleaching agents, and an array of heat sources has been applied to speed up the reaction and improve the bleaching effect.^[4] A root-filled tooth can be bleached internally (walking bleach technique) using internal whitening.^[5] Using intracoronal bleach, this case report describes the appropriate procedures

to reduce the possibility of complications and ensuring a successful bleaching process.

Case Report

A 30 year old male patient reported to the department of Conservative Dentistry and Endodontics, New Horizon Dental College and Research Institute, Sakri, Bilaspur, Chhattisgarh, India with a chief complaint of discoloration in his upper left front teeth. The medical history was not contributory. Dental history revealed an incident of traumatic fall to the upper front teeth region 10 years ago and root canal treatment was done with tooth#21 elsewhere 3 months back. Extraoral examination shows no abnormality. Intraoral examination revealed that tooth#21 is darker in color than the adjacent teeth. Radiographic examination showed root canal treatment done with tooth#21. During the first visit, the patient was informed of the procedure to be performed. Following the patient's consent intracoronal bleaching of tooth#21 was carried out. Preoperative intraoral photographs were taken so as to compare the change in shade with time which was done by Vita shade guide (Figure 1). The tooth to be bleached was isolated using rubber dam and temporary filling was removed. Then 2mm of obturated material was removed from the tooth below the cemento-enamel junction. A base of 2mm of glass ionomer cement (GC Corporation, Tokyo) was placed over the gutta percha which acts as a barrier to prevent bleaching materials from seeping into the root portion of the tooth. Etch the chamber with 30% phosphoric acid for 30 seconds then wash and dry, this will open the dentinal tubules. This was followed by placement of 35% hydrogen peroxide gel (Pola Office, Ultadent, USA),

mixed with bleaching agent into a thick paste into the pulp chamber and light cured to activate it which was then sealed with temporary filling. Patient was recalled after one week. The procedure was repeated four times. The final wash was followed by an evaluation of the tooth shade, which aligned with adjacent teeth and produced satisfactory results (Figure:2). A tooth-colored composite resin was used to restore the pulp chamber access.

Fig. 1: Preoperative Photograph of Discolored Maxillary left Central Incisor Tooth

Fig. 2: Postoperative Photograph of Maxillary left Central Incisor tooth after intracoronary bleaching

Discussion

Discolorations of the teeth vary in their origin, appearance, location, severity, and adhesion to tooth structures. Depending on the location and the etiology, it may be termed extrinsic or intrinsic. Cause of intrinsic tooth discoloration in tooth may be due to an irritation of the pulp by a chemical or bacteria causes necrosis of the pulp, which releases products that enter the dentinal tubules and cause discoloration. The extent of discoloration directly relates to the time the by-product has been in the tubule. A procedure of intracoronary bleaching is necessary in such cases. When a tooth is traumatized, hemorrhage of the pulp may occur, causing blood vessels to rupture and red blood cells to accumulate in the dentin, causing tooth discoloration.^[6]

The first reports on whitening nonvital teeth were published in the middle of the 19th century, describing different chemical agents. It was recommended initially to use chlorinated lime, then oxalic acid and compounds of chlorine, sodium hypochlorite, sodium peroxide, or mixtures

consisting of 25% hydroperoxide in 75% ether (pyrozone). Harlan reported the first use of hydrogen peroxide (1884). As early as 1918, Abbot mentioned superoxol (30% hydrogen peroxide).⁷ Concentrations of hydrogen peroxide typically range from 5-35%. Either it is directly applied to the tooth surface or it is released when the sodium perborate reacts with the carbamide peroxide. In most cases, hydrogen peroxide bleaching is caused by release of free radicals. Because hydrogen peroxide has a low molecular weight, it penetrates the dentinal tubules and dissociates organic and inorganic molecules.⁶ In 1924, Prinz suggested the use of heated solutions containing sodium perborate and Superoxol for cleaning the pulp cavity. The activation of the bleaching agent by light, heat, and electric currents has been proposed as a way to accelerate bleaching.⁷

In comparison to invasive dental repair options like crowns or veneers, dental bleaching offers a conservative, aesthetic solution. There are many studies that indicate that devital bleaching has several complications. The penetration of hydrogen peroxide into open dentin tubules may lead to an inflammatory reaction, which could result in tooth root resorption.^[8] It has been recommended to use "buffer ionomer" at the entry of the root canal when performing internal dental bleaching in order to minimise external resorption. Furthermore, hydrogen peroxide in a 30% concentration can cause burns on the gums. It is important to cover the soft tissues with an isolation cream in order to protect them from chemical burns. As a result of bleaching treatment, oxidizing agents in the cavity must be completely removed. Otherwise, restorative materials will not bond to the tooth effectively. Therefore, the cavity must be completely cleaned of bleaching agents before the restoration is undertaken.^[9] As the bleaching agents are sealed into the pulp chamber, the whitening occurs between sessions. In between three and six sessions, a satisfactory reduction can be achieved depending on the cause of the discoloration.^[8]

Conclusion

Devitalised teeth are prone to discoloration, which is one of the most common aesthetic problems affecting patients. The intracoronary bleach technique can be successfully used to treat discolored root-filled teeth. This approach is minimal invasive than complete ceramics, ceramics fused to metals, or veneers, which remove substantial tooth structure, resulting in irreversible effects, and is also much more expensive. This type of bleaching benefits the patients' aesthetics and economics.

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Conflict of Interest

None.

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