

An Alternative Coronal Barrier in Treatment of Non-Vital Discoloured Maxillary Anterior Teeth: A Case Report

Ramsundar Hazra¹ Shatarupa Saha² Dharmesh Padsala³ Tarun Vyas⁴ Prashant Shetty^{5*}

¹Professor, Department of Conservative Dentistry and Endodontics, Pacific Dental College, Udaipur, Rajasthan, India.

²Professor and Head, Department of Conservative Dentistry and Endodontics, Pacific Dental College, Udaipur, Rajasthan, India.

³Post Graduate Student, Department of Conservative Dentistry and Endodontics, Pacific Dental College, Udaipur, Rajasthan, India.

⁴Post Graduate Student, Department of Oral Medicine and Radiology, RR Dental College and Hospital, Udaipur, Rajasthan, India.

⁵Post Graduate Student, Department of Conservative Dentistry and Endodontics, Pacific Dental College, Udaipur, Rajasthan, India.

ABSTRACT

Background: Discoloration of non-vital anterior teeth is an esthetic deficiency frequently requiring bleaching treatment. Dentist should always consider teeth bleaching at the beginning of the esthetic treatment plan, regardless of the method that will be chosen conservative or prosthodontic. The most important parameter in non-vital bleaching is the placement of a barrier to prevent the resorption of the tooth which has a poor prognosis. This case report presents a case of successful non-vital bleaching by using an alternative novel material Biodentine as a barrier.

Keywords: Discoloured anterior teeth, non-vital bleaching, bleach barrier, external resorption.

INTRODUCTION

Endodontically treated teeth frequently present discoloration resulting from trauma, incomplete removal of pulp tissue or iatrogenic procedures. The main technique used to solve this esthetic problem is intracoronal bleaching(1). Extensively discoloured, non-vital teeth are highly receptive to the bleaching techniques. But the clinical situation must be carefully assessed before the bleaching treatment is considered. The quality and the type of the root canal filling that has been employed are of primary importance in this regard. Proper apical sealing is necessary to prevent percolation of the bleaching agents into the periodical tissues. A pretreatment is indicated in the cases where the root canal filling is inadequate or where it is improperly condensed. Also, the crown should be relatively intact, since a crown with large carious lesions or restorations can be better treated by means of a cast post and core, together with full coverage

(2)(3)(4). Walking bleaching is a technique commonly used in discolored endodontically treated anterior teeth. Bleaching agents used in this technique include hydrogen peroxide and sodium perborate(5). Although these agents are effective in lightening tooth color, their use has been associated with some undesirable complications. One of the complications is external resorption of cervical root which is probably caused by the highly concentrated oxidizing agents which diffuse through dentinal tubules and cementum defects and cause necrosis of the cementum, inflammation of the periodontium, and, subsequently, root resorption (6)(7). Therefore, it is recommended that a protective barrier be used over the coronal extent of the root canal filling to prevent leakage of bleaching agents into the periodontium(8). A variety of dental materials such as intermediate restorative material (IRM), hydraulic filling materials (Cavit, Coltosol), resin composites, photo-activated temporary resin materials, zinc oxide-eugenol cement, zinc phosphate cement and glass-ionomers (GI) have

Received: Sep. 10, 2017; Accepted: Nov. 3, 2017

*Correspondence Dr. Prashant Shetty.

Department of Conservative Dentistry and Endodontics, Pacific Dental College, Udaipur, Rajasthan, India.

Email: drprashant10@rediffmail.com



Fig 1: Preoperative Clinical Photograph.



Fig 2: Access cavity preparation.



Fig 3: Cervical gauging.

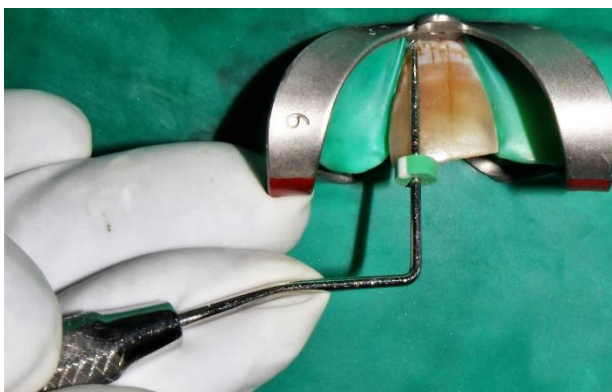


Fig 4: CEJ Locator.



Fig 5: Post bleaching clinical.



Fig 6: Post operative Photo.



Fig 7: Obturation and Cervical barrier space created.



Fig 8: Biodentine as cervical barrier.

been suggested as interim sealing agents during bleaching techniques (9). One of the disadvantages of temporary sealing materials is the necessity to remove them after bleaching process before the final restoration of the access cavity. Therefore, a 2-mm of layer of glass-ionomer cement has been recommended as a base material during bleaching, which can be left in place after bleaching and can serve as a base for the final restoration (10). The pivotal feature of a protective base material for use as a barrier must be adequate sealing ability. The mineral trioxide aggregate (MTA) is a material recently made available to dentistry with excellent sealing properties. This material was first reported in 1993 for use in repairing lateral root perforations (11). There are few reported cases of MTA used as a cervical barrier material in Non-vital bleaching cases which showed promising results. Recently, dental discoloration has been reported with application of MTA in contact with tooth structures (12). Biodentine on the other hand is a clinically safe alternative to MTA in aesthetically sensitive areas (13). Thus the objective of this article is to present a case report of Intracoronary bleaching using Biodentine as a cervical barrier.

CASE REPORT

A 28-year old male patient reported with the chief complaint of a discolored right upper front tooth #11 for past 5 years. The patient gave a history of trauma in the upper front tooth region following a road traffic accident 10 years back but however the discoloration became evident from past 5 years. On clinical examination, there was discoloration in upper right front tooth region and sensitivity test was performed (heat and cold test) which revealed non-vitality of tooth #11. Radiographic interpretation reveals no periapical changes in relation to tooth #11. Thus, on co-relating the clinical and radiographic findings a diagnosis of pulp necrosis with normal periodontium in relation to tooth #11 was given. Although several treatments for these conditions can be opted, root canal procedure followed by intracoronary bleaching was selected first as the patient demanded non-invasive esthetic procedure.

Preoperative radiograph and photographs were taken. Access cavity was prepared on tooth #11 under rubber dam isolation and working length was

determined using apex locator (Canal pro, Coltene) and confirmed with radiovisiography. The root canal instrumentation was done until K-file size no. 60 along with copious irrigation of 0.5% sodium hypochlorite and saline.

Obturation was done using lateral condensation technique and the access cavity was sealed with Cavit (3M ESPE, St. Paul, MN, USA). On recall visit after 1 week, the tooth was cleaned with pumice and the shade was recorded (VITA shade guide). Under complete isolation with rubber dam, root canal filling from the coronal pulp chamber was removed to 1 mm below the labial cemento enamel junction. The pulp chamber was evaluated meticulously to ensure that no contamination remained on them to eliminate any undesirable effects on the final result of tooth whitening. Barrier placement was done with Biodentine (Septodont, USA) according to Steiner and West's recommendations. After setting of Biodentine in 12 minutes, the chamber was etched with 37% phosphoric acid (Total Etch, Ivoclar Vivadent) for 30 seconds followed by washing off and drying. Then a mixture of sodium perborate and 30% hydrogen peroxide in the ratio 1g of powder: 0.5 ml of liquid was prepared and placed into the pulp chamber and condensed with a moist cotton pellet. The access cavity was then sealed with a piece of dry cotton over the mixture and modified zinc oxide eugenol cement (IRM, Dentsply). Patient was recalled after 2 weeks to repeat the protocol and after 1 week for removal of the mixture from the pulp chamber and the access cavity was cleaned and sealed with composite resin (Filtek Z350, 3M ESPE). Post-operative photographs were taken to compare and evaluate the color change of 11 after the procedure which showed definitive improvement in the shade. (VITA shade). The patient was recalled after 12 and 24 months for review and any radiographic evidence of cervical resorption. The bleached shade was maintained and there was no evidence of cervical resorption.

DISCUSSION

The early concept of perborate technique was modified by Nutting and Poe in 1963 as "Walking bleach" technique by adding 30% of hydrogen peroxide to the bleaching mixture in order to increase the bleaching effectiveness (9)(14).

Intracoronary bleaching is a non-invasive esthetic procedure yet not devoid of relative risk factors like external cervical resorption and re-discoloration. Some reports have suggested the use of a mixture of sodium perborate and water because of its decreased potential to cause cervical resorption(15)(16).

Adhering to proper barrier placement can prevent leaching of bleaching agents through the cemento enamel junction and thereby prevent the development of resorption. The barrier is usually placed 1 mm below labial CEJ because it resulted in more acceptable aesthetic results, particularly in the cervical region (17). Several barrier materials have been proposed ranging from Cavit to Modified zinc oxide eugenol, glass ionomer cement, calcium hydroxide, resin modified glass ionomer cement and recently MTA is also used. Though MTA has superior properties as barrier material including high alkalinity, insolubility, hydrophilicity and excellent sealing capability, there are reports of its discolouration potential. Thus use of MTA as barrier material in esthetic zones should be considered with high level of caution (18). Biodentine is a new dentine substitute which has various clinical applications and physical properties similar to MTA (19). It can be used as a barrier material and when compared to light cure GIC showed better results. The reason for this could be the marginal sealing ability of calcium silicate-based materials. It has an ability to produce surface apatite crystals and crystalline precipitates formed when in contact with the phosphates available in tissue fluids (20). In an in-vitro study comparing the tooth discolouration effects of calcium silicate based barrier materials with internal bleaching showed, Biodentine when used as a barrier material, obtained more whitening with bleaching treatment compared to MTA group (21). Treatment options like veneers and porcelain crowns requires invasive tooth reduction and are technique-sensitive and are not cost-effective procedures. Walking bleach is a valuable treatment modality for a single discoloured tooth if procedural protocol and precautions are strictly adhered when compared against direct and indirect restorative modalities.

CONCLUSION

It can be concluded from this case report that non vital bleaching is a non-invasive, less time consuming, economical and valuable adjunct in endodontic treatment. Proper diagnosis, selection of bleaching materials, placement techniques, and an understanding of the biologic interaction with soft and hard tissues are all factors that determine not only immediate success but also long term success, safety, and patient satisfaction as well.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Brito-Júnior M, Quintino AF, Camilo CC, Normanha JA, Faria-e-Silva AL. Nonsurgical endodontic management using MTA for perforative defect of Internal root resorption: report of a long term follow up. OOOE 2010, Dec 110(6),784-8.
2. Chng HK, P. J. Effect of hydrogen peroxide and sodium perborate on biomechanical properties of human dentin. J Endod.2002, Feb 28(2),62-67.
3. Felman D, P. P. Coronal tooth discoloration and white mineral trioxide aggregate. J Endod 2013, Apr 39(4),484-87.
4. Ferris DM, B. J. Perforation repair comparing two types of Mineral Trioxide Aggregate. J Endod,2004, Jun 30(6),422-424.
5. Fisher NL, R. J. Internal bleaching of discolored teeth. Dent Update,1990, 110-14.
6. GS., H. Heithersay GS. Invasive cervical resorption: an analysis of potential predisposing factors. . Quintessence Int.1999, Feb 30(2),83-95.
7. Makbule Bilge Akbulut, A. T. Tooth discoloration effects of calcium silicate based barrier materials used in revascularization and treatment with internal bleaching. Journal of Dental Sciences,2017, Dec 12(4); 1-7.

8. Manoel Brito-Júnior, A. L.-e.-S. Sealing ability of mta used as cervical barrier. *Acta Odontol. Latinoam.* 2009, 22(2); 118-122.
9. Marciano, M. A. Dental discoloration caused by bismuth oxide in MTA in the presence of sodium hypochlorite. *Clin Oral Invest*, 2015, Dec 19(9); 2201-9.
10. Marjan Arman, Z. K. In Vitro Spectrophotometry of Tooth Discoloration Induced by Tooth-Colored Mineral Trioxide Aggregate and Calcium-Enriched Mixture Cement. *Iran Endod J.* 2015, Fall 10(4); 226-230.
11. MF, N. G. Biodentine-a novel dentinal substitute for single visit apexification. *Res Dent Endod* 2014, 120-125.
12. Nutting EB, P. G. A new combination for bleaching teeth. *J So Calif Dent Assoc*, 1963, 31; 289-91.
13. Nutting EB, P. G. Chemical bleaching of discolored, endodontically treated teeth. *Dent Clin North Am* 1967, Nov; 655-62.
14. Özlem Malkondu, Ö. M. A Review on Biodentine, a Contemporary Dentine Replacement and Repair Material. *BioMed Research International* 2014, 10.
15. Plotino G, B. L. Nonvital tooth bleaching: a review of the literature and clinical procedures. *J Endod.* 2008, Apr 34(4); 394-407.
16. Rotstein I, L. I. Role of cemento-enamel junction on the radicular penetration of 30% hydrogen peroxide during intracoronary bleaching in vitro. *Endod Dent Traumatol* 1996, 12; 146-50.
17. Rotstein I, T. Y. Effect of cementum defects on radicular penetration of 30% H₂O₂ during intracoronary bleaching. *J Endod* 1991, May 17(5); 230-233.
18. Rotstein I, Z. D. (1992). Effect of different protective base materials on hydrogen peroxide leakage during intracoronary bleaching in vitro. *J Endod.* Mar 18(3); 114-117.
19. Steiner DR, W. J. (1994). A method to determine the location and shape of an intracoronary bleach barrier. *J Endod*, 304-06.
20. WH, L. (1997). Intracoronary lightening of discoloured pulpless teeth: a modified walking bleach technique. *Quintessence Int.* Dec 28(12); 771-777.
21. Wray A, W. R. (2001). Treatment of the intrinsic discoloration in the permanent anterior teeth in children and adolescents. *Int J Paediatr Dent*, 11; 309-31.
22. Zimmerli B, J. F. (2010). Bleaching of nonvital teeth. A clinically relevant literature review. *Schweiz Monatsschr Zahnmed*, 120(4); 306-20.