

ESTHETIC ENHANCEMENT BY NONVITAL BLEACHING PROCEDURE AND DIASTEMA CLOSURE WITH CERAMIC VENEER ON MAXILLARY CENTRAL INCISOR

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ABSTRACT

The dental practitioner is provided with a variety of treatment options for discoloured teeth which range from invasive methods like full crowns and veneers to least invasive procedures like bleaching. This article describes a case report of non vital bleaching and diastema closure performed on a root canal treated, discoloured, maxillary central incisor. Non vital bleaching can be considered as a safe, effective and non invasive treatment option in the management of endodontically treated, discoloured teeth.

KEY WORDS: Diastema, Diastema-closure, Electric pulp tester, Non vital bleaching

The discolouration of pulpless teeth could be a result of an aetiological factor (trauma) or the endodontic procedure itself. A haemorrhage in the pulp chamber may result from either a blow, death of the pulp or a failure in controlling the bleeding during endodontic therapy. The penetration of blood into the dentinal tubules, followed by haemolysis of the red cells, which results in the release of haemoglobin and its breakdown products, produces a yellowish brown discolouration. This discolouration occurs when the iron pigments get degraded to iron sulfide. Such a discolouration may appear some months after the endodontic treatment is completed and it is similar to haemorrhagic discolouration (Ingle J and Bakland, 1976; Cohen SC, Burns RC, 1980)

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 regards. Proper apical sealing is necessary to

prevent percolation of the bleaching agents into the periodical tissues. A pre-treatment 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 (Fisher NL and Radford JR, 1990; Wray A and Welbury R, 2001; Nutting EB and Poe GS, 1967)

CASE REPORT

A 26-year old female patient reported to the Department of Conservative Dentistry and Endodontics with complaint of the discoloured upper anterior tooth and spacing between anterior two teeth which gave her very unpleasing appearance. Clinical examination revealed discoloured 11 with fractured incisal edge and diastemata between 11 and 12 (Figure 1).

Figure 1- Pre-operative photograph



A diagnosis of non vital 11 made, based on the vitality testing which was performed by using an electric pulp tester (Parkell Digitest Digital pulp tester, Parkell Inc, NY, USA). The endodontic treatment was carried out under rubber dam. The access cavity was temporarily sealed with Cavit (3M ESPE, St. Paul, MN, USA). (figure 2,3).

Figure 2- Pre-operative radiograph



Figure 3- Post-obturation radiograph



The patient was recalled after one week for the bleaching procedure. In the subsequent visit, the tooth was cleaned with pumice and the shade was noted (VITA shade guide). Rubber dam was applied to ensure complete isolation of the tooth. The root filling in the coronal pulp chamber was removed to 1 mm below the facial cemento-enamel junction. Following this, a 1 mm thick layer of Glass Ionomer cement was placed over the gutta percha (Figure 4).

Figure 4- GIC Barrier is placed over the gutta percha



The chamber was etched with 37% phosphoric acid (Total Etch, Ivoclar Vivadent, Liechtenstein) for 30 seconds and it was washed and dried. A mixture of sodium perborate (in the tetrahydrate form) (Degussa, Hanau, Germany) and 30 % hydrogen peroxide (in the ratio, 1 g of powder: 0.5 ml of liquid) was made and it was placed in the pulp chamber and condensed with a

wet cotton pellet and the access cavity was sealed with Zinc Phosphate Cement. A piece of gauze saturated with 30% hydrogen peroxide was then placed on the labial surface of the tooth and was heated with hot ball burnisher (Figure 5)

Figure 5-Bleaching agent applied on the labial surface



The patient was scheduled after 1 week and the same procedure was repeated as there was very little change in the shade of the tooth. The patient was recalled for a review after a week again and at this visit though the shade of treated tooth was not like contra-lateral incisor, there was drastic improvement in the shade (Figure 6).

Figure 6- Recall photograph after 1Week Bleaching



To further enhance the aesthetics, the diastema closure was achieved by giving ceramic veneer (incisal-lapping preparation design) on the same tooth. Following cleaning, shade selection, and isolation of the tooth, the intra-enamel preparation was made with a tapered, round ended, diamond instrument. The preparation on the mesial surface

was extended to the mesio-lingual line angle to allow subsequent restoration of the proximal contact with 21. After the preparation was completed an elastomeric impression was made and sent to the laboratory for fabrication of veneer (Figure 7).

Figure 7- preparation of the tooth



For final cementation of the veneer, the prepared tooth was cleaned with a pumice slurry, rinsed, dried and etched. An adhesive was then applied to the etched enamel and tooth side of the silane-primed porcelain veneer. Then, a thin layer (0.5) of the selected shade of light -cured resin cement was placed on the tooth side of the veneer. The excess resin cement was removed and the veneer was cured for a minimum of 40-60 seconds each from facial and lingual directions for a total exposure time of 80-120 seconds ((Figure 8).

Figure 8 -cementation of ceramic veneer



RESULTS AND DISCUSSION

The literature has reported numerous reviews on the bleaching of vital and non vital teeth; yet, there are extremely few published case reports on successful non-vital bleaching. The “walking bleach” technique that was introduced in 1961 involved the placement of a mixture of sodium perborate and water into the pulp chamber that was sealed off between the patient’s visits to the clinician (Spasser HF, 1961). The method was later modified and water was replaced by 30–35% hydrogen peroxide, to improve the whitening effect (Nutting EB and Poe GS, 1963; Lambrianidis T, et al, 2002). Some reports have suggested the use of a mixture of sodium perborate and water because of its decreased potential to cause cervical resorption (Rotstein I, et al, 1996; Nutting EB and Poe GS, 1963; Tselnik M, et al, 2004).

Non vital bleaching has not found much favour amongst the clinicians because of the fear of resorption following the procedure, which has a poor prognosis. But literature also has proved that adhering to the proper barrier placement methods can definitely prevent the resorption. Several barrier materials and supplementary barriers have been proposed in the literature. They range from materials like Cavit to Modified Zinc Oxide eugenol (IRM), glass ionomer cement, calcium hydroxide and resin modified glass ionomer cement (Costas FL and Wong, 1991; Lambrianidis T, et al, 2002; Tselnik M, et al, 2004). In this case the protective barrier of GIC was placed 1 mm below the facial CEJ because it resulted in more acceptable aesthetic results, particularly in the cervical region (Steiner DR and West JD, 1994). It has been proved that the reactivity of the bleaching agent improves with heat application. Heat application causes a reaction that increases bleaching properties of the hydrogen peroxide (Howell RA, 1980). Heat application can be

repeated 3 or 4 times at every appointment, changing the pellet with “fresh” bleaching agent at each visit. When heat is applied, a reaction produces foam and releases the oxygen present in the preparation and enhances the redox reaction. In the present case we too applied heat on the labial surface of the tooth that was coated with a cotton piece saturated with H₂O₂.

An incisal lapping preparation is indicated in cases of diastema closure or when the tooth being veneered needs lengthening or when an incisal defect warrants restoration. The incisal lapping design is frequently used with porcelain veneers because it not only facilitates accurate seating of the veneer upon cementation, but it also allows for improved esthetics along the incisal edge. In the present case, the decision of giving veneer was made to close the diastema. The veneer provided three-fold advantages; it helped in closing the diastema, the fractured incisal edge of the bleached tooth was restored and it improved the shade of the bleached tooth thus imparting the overall aesthetic enhancement.

CONCLUSION

This case report demonstrates the successful management of a discoloured and fractured endodontically treated tooth by non-vital bleaching and ceramic veneer. Non vital bleaching can be used as a very effective and safe post - endodontic treatment for discoloured anterior teeth, provided the procedural protocol and precautions are strictly adhered to.

REFERENCES

- Cohen SC, Burns RC. Pathways of the Pulp. St. Louis, C.V. Mosby Co, 1980.
- Costas FL, Wong M. Intra-coronal isolating barriers: effect of location on the root leakage and the effectiveness of the bleaching agents. *J Endod* 1991 ;17:365-68.

- Fisher NL, Radford JR. Internal bleaching of discolored teeth. *Dent Update*, 1990; 110–14.
- Howell RA. Bleaching discoloured root-filled teeth. *Br Dent J* 1980;148:159–62.
- Ingle J, Bakland: Endodontics, ed 5. *Philadelphia, Lea and Febiger*, 1976.
- Lambrianidis T, Kapalas A, Mazinis M. Effect of calcium hydroxide as a supplementary barrier in the radicular penetration of hydrogen peroxide during intra-coronal bleaching in vitro. *Int Endod J* 2002; 35:985-90.
- Nutting EB, Poe GS. Chemical bleaching of discolored, endodontically treated teeth. *Dent Clin North Am* 1967: 655–62.
- Nutting EB, Poe GS. A new combination for bleaching teeth. *J So Calif Dent Assoc* 1963; 31:289–91.
- Rotstein I, Lewinstein I, Zuwabi O, Stabholz A, Friedman M. Role of the cemento-enamel junction on the radicular penetration of 30% hydrogen peroxide during intracoronal bleaching in vitro. *Endod Dent Traumatol* 1996;12:146-50.
- Spasser HF. A simple bleaching technique by using sodium perborate. *NY State Dent J* 1961; 27:332–34.
- Steiner DR, West JD. A method to determine the location and shape of an intracoronal bleach barrier. *J Endod* 1994; 20: 304 – 06.
- Tselnik M, Baumgartner J, Marshall J. Bacterial leakage with mineral trioxide aggregate or a resin-modified glass ionomer which was used as a coronal barrier. *J Endod* 2004 ;30:782-84.
- Wray A, Welbury R. Treatment of the intrinsic discoloration in the permanent anterior teeth in children and adolescents. *Int J Paediatr Dent* 2001; 11: 309–31.