

Aesthetic Rehabilitation of a Severely Discolored Anterior Tooth: A Clinical Report

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Abstract: Discoloration of anterior teeth is a major concern in today's society. This can result in the cosmetic impairment of such patients which affects their social interaction with the peers. Discoloration of anterior teeth is often due to traumatic injury and its aesthetic rehabilitation poses a great challenge for the dentist. The aesthetic rehabilitation of an endodontically treated tooth usually done by translucent metal free ceramic restoration is contraindicated for a heavy discoloured tooth, as this affects the shade matching of the affected tooth with that of the natural dentition. So internal bleaching technique can be utilized here to reduce the shade of the discoloured tooth crown before ceramic restoration. This article presents a case report of aesthetic rehabilitation of an endodontically treated discoloured tooth with translucent lithium disilicate crown after intracoronal bleaching.

Keywords: Lithium disilicate crown; walking bleaching technique; intracoronal bleaching; intrinsic discoloration; cervical resorption

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I. Introduction

In today's era, where the aesthetics has become a major concern, the discolouration of anterior teeth results in considerable cosmetic impairment in patients irrespective of their age. It has become a great challenge for the dental practitioners to meet the high aesthetic expectations posed by the patients with discoloured teeth and to re-establish their good smile and aesthetics. ^[1]

Tooth discoloration can be classified as intrinsic, extrinsic, or both according to its location and etiology. ^[2] Extrinsic discoloration is caused by chromogens from dietary sources like coffee, tea, carrots, oranges, chocolate, tobacco, wine, mouth rinses, or may be due to plaque on the tooth surface. ^[3,4] Pulpal hemorrhaging following the traumatic injury is the main reason for the intrinsic discoloration. As a result of necrosis of the traumatic pulp the initial pink color of pulpal hemorrhage to a darker grayish discoloration. ^[5] This impairment in the aesthetics due to discoloration as a result of traumatic injury, calls up for the dental treatment to improve the tooth colour for re-establishing patient's smile as this can have a significant effect on psychosocial development and interaction with peers. ^[6]

In aesthetic dentistry, the restoration of grossly discoloured endodontically treated teeth with all ceramic crown restoration is extremely arduous, as the discoloration of the prepared tooth can affect the shade matching of the ceramic restoration with the natural dentition. ^[7] For anterior full coverage restorations, where aesthetics is the prime concern, all ceramic crowns with a translucent core are an excellent choice. ^[8] A light transmission which corresponds to that displayed by natural teeth was achieved by using translucent build-up materials. Although crowns with translucent core are good in aesthetics, they are poor in strength, ^[9] so they are recommended for anterior teeth with dentin that are not heavily discoloured. In heavily discoloured teeth where the shade is influenced by the underlying substrate, a crown with an opaque core can be used but this in turn affects the translucency of the restoration failing to give natural appearance expected. ^[10] This intrinsic discoloration of such nonvital teeth can be alleviated by intracoronal bleaching technique, a non-invasive technique which adds on to the aesthetic accomplishment of the ceramic restoration.

Bleaching of discolored endodontically treated teeth is a very important procedure in aesthetic dentistry. In 1961, Spasser recommended the most possible way to bleach a discolored non-vital tooth with sodium

perborate and water in the pulp chamber. [11] Nutting and Poe later in 1963 modified by replacing water with 30% hydrogen peroxide and thenew “walking” bleach technique evolved. [12] [13] By following a clearly coordinated procedure, the treatment team can achieve satisfactory esthetic results with an internal bleaching method, and a preparation technique that suits the requirements of the restorative material.

II. Clinical Report

A 37-year-old female patient presented with the complaint of severely discolored and endodontically upper front tooth and expressed the wish to restore it with an aesthetic restoration. It was confirmed that she had not experienced any problems since the root canal treatment done 5 years previously; however, she was dissatisfied with the impaired esthetic appearance due to discoloration caused by the affected tooth as seen in figure 1



Figure 1: Preoperative view of the severely discolored teeth

The clinical and radiological evaluations of tooth 11 revealed tight and properly executed root canal obturation. Various treatment options were suggested for patient including metal ceramic restoration and metal free ceramic restoration after alleviating the discoloration through the internal bleaching procedure. The patients demand was that her natural tooth shade and position should be restored. And owing to her demand, and after an initial technical and clinical evaluation, the following treatment plan was determined: First, the optical property of the affected teeth was to be adjusted by internal bleaching to match with the optical property of the neighboring teeth during a preliminary treatment phase, followed by the preparation for the final restoration of the severely destroyed anterior tooth, for which we decided to use Emax crown(IvoclarVivadent, Liechtenstein) based on a lithium disilicate material.

Preliminary preparation

Initially, the shade of the affected right central incisor was noted as A4 with vita classical porcelain shade guide (Vita Zahafabrik,Germany)which was differing from the adjacent right central incisor tooth of A2 shade. The pre-bleaching photograph was taken and, this allows the matching of the shade and brightness of the affected tooth with that of the adjacent natural tooth as in the figures 2a and 2b.



Figure 2a: Shade selection of the affected tooth



Figure 2b: Shade selection of the natural dentition

The coronal pulp chamber of the incisor was cleaned after the removal of the restoration, and obturated gutta percha and root canal sealer were removed to a level of 2-3 mm below the cement-enamel junction as seen in the figure 3.



Figure 3: Cleaned coronal chamber devoid of restoration

A base of 1–2 mm glass ionomer cement was placed over the root filling material to assure a mechanical barrier between the sealed root canal and the bleaching agent as seen in the figure 4. This measure ensured that the bleaching agent which would be applied later will not diffuse into these sensitive areas.



Figure 4: Glass ionomer as the mechanical barrier



Figure 5: Coronal chamber plugged with bleaching agent

Sodium perborate (trihydrate) and 30% hydrogen peroxide were mixed in relation 2 g to 1 mL and the creamy paste was placed into the prepared cavity for bleaching as in the figure 5. The excess liquid of the material was removed by tamping with a cotton pellet which also pushed the paste into the pulp chamber. The cavity was then filled with cotton pellet and glass ionomer cement. The patient was recalled after 7 days for the assessment of the shade. For a better shade, intracoronal bleaching was performed for two more weeks. After 2 weeks, the shade of the affected tooth was confirmed to be A2 in accordance with the adjacent natural dentition as seen in the figures 6a and 6b. A calcium hydroxide preparation was inserted into the pulp chamber and left in place for a week in order to neutralize the bleaching agent. After the neutralization phase, composite restoration was done after the thorough cleaning of the coronal chamber.



Figure 6a: Shade of the affected tooth similar to natural dentition



Figure 6b: Shade if the affected tooth changed to A2

Tooth preparation and final prosthesis

Tooth preparation for metal free ceramic restoration was performed with shoulder finish line equigingivally as seen in figure 7. A highly precise final impression of the preparation was made using elastomeric impression material, additional silicone with light body and putty consistency along with antagonistic jaw impression made using irreversible hydrocolloid impression material, alginate. Bite was registered followed by provisionalization using eugenol free cement. Metal free ceramic (Emax,IvoclarVivadent, Liechtenstein) crown was fabricated using the layering technique. Bisque try in was done to evaluate the fit,occlusion,shape and contour of the restoration as seen in the figure 8. Glazed crown was tried again and confirmed for fit, shade, shape and contour and occlusion of the tooth and its cementation was done using the resin cement(RelyXU200, 3M ESPE,Germany) after the thorough removal of eugenol free temporary cements as shown in the figures 9a and 9b



Figure 7: Tooth preparation



Figure 8: Bisque try in



Figure 9a: Permanent cementation



Figure 9b: Permanent cementation, occlusal view

The tooth shade was in perfect harmony with the natural dentition. We were able to correct the tooth position and adjust the tooth proportions in addition to removing the severe discoloration of the affected tooth as in the figure 10. The patient did not experience any phonetic problems resulting from the correction of the tooth position and was extremely happy and fully satisfied with the esthetically pleasing outcome. At the final evaluation and during the follow up, the outcome was found to be very satisfactory with regard to the functional and esthetic parameters



Figure 10: Post-operative view

III. Discussion

Today's clinical practice is adorned with the availability of variety of metal-free restorations which improves the aesthetic outcome by overcoming the unaesthetic metallic hue of the porcelain fused to metal crowns.^[10] Therefore, clinicians should be aware of the desirable properties of each material to ensure the right choice of restoration for each case. For anterior restorations, where aesthetics is the prime concern, all ceramic crowns with a translucent core are an excellent choice. However, the crowns with translucent core are good in aesthetics, they are poor in strength, so they are recommended for anterior teeth with dentin that are not heavily discolored. The heavy discoloration which cannot be masked by the translucent core, can be reduced by the Nutting and Poe's walking bleaching technique before a full coverage restoration.^[12] In this case report, walking bleach technique is utilized to lighten the discoloration before the tooth is restored with lithium disilicate crown to amplify the aesthetic outcome. Very few such studies have been reported till date, so more long-term clinical studies are necessary to affirm the outcome.

But there are ample studies on beaching of nonvital teeth of which very few have scientific evidence. However, the major risk involved here is the cervical resorption, so few modifications have been done in an attempt to minimize this risk. A base of 1 –2 mm glass ionomer cement can be placed over the root canal filling material as a mechanical barrier between the sealed root canal and the bleaching gel and also, the pulp chamber can be filled with calcium hydroxide for seven days before the final restoration.^[1]

IV. Conclusion

The clinical report asserts that a severely discolored endodontically treated anterior tooth can be aesthetically restored by a lithium disilicate crown after lightening the discoloration with the walking bleaching technique. The final aesthetic outcome proved this conventional approach to be promising and cost effective.

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