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Management of anterior teeth discoloration - Case Report

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Abstract

An array of treatment options is available for today's dentists to reconcile a smile with discolored teeth. The treatment options available ranges from invasive options such as full crowns, veneers, direct restorations to minimally invasive options such as micro abrasion, macro abrasion, and bleaching. The most non-invasive and conservative treatment option is bleaching of teeth, hence gaining wider acceptance. The aim of this case report is to describe the use of in-office vital and non-vital tooth bleaching techniques with use of micro abrasion in one of cases.

Keywords: Dental Abrasion, Bleaching, Discoloration, Peroxide.

Introduction

Aesthetic dentistry is a field of dentistry concerned especially with the appearance of the dentition as achieved through its arrangement, form, and color. The demand for aesthetic dentistry has increased continuously and the smile has become an integral part of social attractiveness of a person.[1]

Stains

Many types of colour problems may affect the appearance of teeth, and the causes of these problems vary, as does the speed with which they may be removed. Therefore, the causes of tooth staining must be carefully assessed for better prediction of the rate and the degree to which bleaching will improve tooth color, since some stains are more responsive to the process than others [2]. Discolorations may be extrinsic or intrinsic

Extrinsic staining

Extrinsic stains usually result from the accumulation of chromogenic substances on the external tooth surface. Extrinsic colour changes may occur due to poor oral hygiene, ingestion of chromogenic food and drinks, and tobacco use. These stains are localized mainly in the pellicle and are either generated by the reaction between sugars and amino acids or acquired from the retention of exogenous chromophores in the pellicle.[3] The reaction between sugars and amino acids is called the ‘‘Millard reaction’’ or the ‘‘non-enzymatic browning reaction,’’ and includes chemical rearrangements and reactions between sugars and amino acids. The chemical analysis of stains caused by chromatogenic food demonstrates the presence of furfurals and furfuraldehyde derivatives due to this reaction.[3] In addition, the retention of exogenous chromophores in the pellicle occurs when salivary proteins are selectively attached to the enamel surface through calcium bridges; consequently, a pellicle will form. At the early stage of staining, chromogens interact with the pellicle via hydrogen bridges. Most extrinsic tooth stains can be removed by routine prophylactic procedures. With time, these stains will darken and become more persistent, but they are still highly responsive to bleaching.[4]

Intrinsic staining

Intrinsic discolorations are due to the presence of chromogenic material within the enamel or dentin, incorporated either during odontogenesis or after tooth eruption. intrinsic colors are determined by the optical properties of the enamel and dentin and their interaction with light. If incorporated into the dentin, they become visible because of the translucency of the enamel. They can be related to periods of tooth development, as in amelogenesis imperfecta or dentinogenesis imperfecta, or they may be acquired after completion of tooth development, as in pulp necrosis.[5]

Excessive fluoride in drinking water, greater than 1–2 ppm, can cause metabolic alteration in ameloblasts, resulting in a defective matrix and improper calcification of teeth.[6] Discoloration from drug ingestion may occur either before or after the tooth is fully formed. Tetracycline is incorporated into the dentin during tooth calcification, probably through chelation with calcium, forming tetracycline orthophosphate, which causes discoloration. Moreover, intrinsic stains are also associated with inherited conditions (e.g., amelogenesis imperfecta and dentinogenesis imperfecta.[3,7] Blood penetrating the dentinal tubules and metals released from dental restorative materials also cause stains. Intrinsic stains cannot be removed by regular prophylactic procedures. However, they can be reduced by bleaching with agents penetrating enamel and dentin to oxidize the chromogens. Tooth stains caused by aging, genetics, smoking, or coffee are the fastest to respond to bleaching: Yellowish aging stains respond quickly to bleaching in most cases[8] , whereas blue–gray tetracycline stains are the slowest to respond to bleaching, while teeth with brown fluorescence are moderately responsive.[9]

Type of bleaching procedures[5]

I. Intracoronal bleaching (bleaching of endodontically treated tooth/nonvital bleaching)

1. Walking bleach technique

2. In-office thermocatalytic bleach

II. Extra coronal bleaching (vital tooth bleaching)

1. In-office vital bleach

2. At-home vital bleach

Case reports

Case 1

A 29-year-old female patient reported to the Department of Conservative Dentistry and Endodontics of the Desh Bhagat Dental College & Hospital, Mandi Gobindgarh with discoloration of upper anterior teeth from #13 to #23. On clinical examination, moderate yellowish bands of discoloration were observed (fig. 1), following which the patient was reviewed with the options and details involving bleaching. At the conclusion the patient felt that in-office bleaching would meet her needs. A self-supporting cheek retractor was placed in the patient's mouth.

Fig. 1: pre-operative photograph

The teeth and gums were rinsed and air dried thoroughly. Pre-operative shade was recorded the gingival dam barrier was dispensed along the gingival margin at a continuous speed overlapping approximately 0.5mm onto the enamel. The resin was light cured for 20 seconds in a fanning motion. (fig. 2)

Fig. 2: gingival barrier applied

A 0.5- 1mm thick layer of the gel (37% hydrogen peroxide) was applied on the labial surface of the maxillary anterior teeth. The gel remained on the teeth for 20 minutes and was light cured. Saliva was suctioned periodically as needed. (fig. 3)

Fig. 3: bleaching gel application

The gel was then suctioned back following which the teeth were thoroughly rinsed. The gingival barrier was removed. The patient was recalled twice with an interval of 7 days and the procedure was repeated. Using standard visual examination, the shade change was evaluated. A noticeable shade change had occurred. The patient noticed a marked improvement with comfort and was very ecstatic with the outcome. (fig. 4)

Fig. 4: post operative photograph

Case 2

A 34-year-old female patient reported to the Department of Conservative Dentistry and Endodontics of the Desh Bhagat Dental College & Hospital, Mandi Gobindgarh with chief complaint of discolored and unaesthetic appearance of his upper right anterior tooth #12. Patient had a history of trauma with anterior teeth 5 years back and she had undergone root canal treatment for the same.

Intraoral examination revealed brownish discolored maxillary right lateral incisor. An intraoral radiograph showed obturation and normal periapical tissue wrt 12. The patient was explained about the treatment of bleaching for the tooth and informed consent was taken. Preoperative photograph was taken. (fig. 5).

Fig. 5: pre-operative photograph

Tooth was isolated and pre-operative shade was selected. (fig. 6)

Fig. 6: shade selection and isolation #12

The pulp chamber was prepared prior to application of bleaching agent by removing 2 mm of gutta-percha near orifice and placing a base of 1 to 2 mm glass ionomer cement (GIC) over the gutta-percha to create a mechanical barrier between the sealed root canal and bleaching agent to be used in pulp chamber. Nonvital bleaching with a mixture of sodium perborate and 3% hydrogen peroxide [sodium perborate and 3% H_2O_2 in ratio of 2:1 (gm/mL)] was decided for this patient and was placed in the pulp chamber. (fig. 7)

Fig. 7: placement of sodium perborate mixture in the pulp chamber

After placement, the cavity was sealed with temporary restorative material and the patient was recalled every week for repeating the bleaching procedure in two-time intervals to obtain the desired results. After 1 week, there was change in shade (Fig.8).

Fig. 8: 1ST Appointment

Figure 9: 2ND Appointment

Discussion

Restoring the dental aesthetics has been considered one of the chief purposes of modern dental medicine. Novel materials and treatment methods are being developed every day to reach this goal.[10] Dental bleaching is a conservative treatment compared to other treatment methods used for treating discoloration, such as, laminate veneers and full crowns. The bleaching mechanism works on the principle that hydrogen peroxide penetrates the tooth and generates free radicals that oxidize the organic stains.[11]

Dental bleaching is reported to be a harmless procedure, with respect to some protection aspects. First, complete soft tissue isolation for the gum, lips, tongue and cheeks is mandatory in order to protect them from eventual burns caused by the peroxide. Second, the risk of cervical resorption has to be considered; thus, a base of 1-2mm glass ionomer cement has to be placed over the root filling material to assure a mechanical barrier between the sealed root canal and the bleaching material, which is in agreement with other studies.[12,13]

Sodium perborate was also introduced in bleaching application. It is an oxidizing agent containing 95% perborate which occurs in the form of mono, tri ($NaBO_2 \cdot H_2O_2 \cdot 3H_2O$) or tetrahydrate.[14] Walking bleach method was first explained by Spasser[15] which utilizes sodium perborate mixed with distilled water. Sodium perborate when mixed with water releases H_2O_2. This method was later modified by Nutting and Poe[16] replacing H_2O with 30% H_2O_2 to improve the effect, but it increased the risk of external cervical root resorption, and hence, is to be used with caution. The pigmentation that causes intrinsic discoloration from necrotic pulp consists of long chain of organic molecule. Bleaching using H_2O_2 oxidizes these long-chain molecules and transform them into carbon while releasing H_2O_2 and oxygen.[17]

Walking bleach method involves application of a thick paste of sodium perborate mixed with H_2O_2 or water into pulp chamber for a period of 3 to 7 days followed by recall visits for review and repeat of procedure till desired results are

achieved. When the bleaching agent is applied inside the pulp chamber and sealed, the bleaching occurs between dental appointments through this walking bleach technique. Other modifications in this technique can be using higher concentration of H_2O_2 or 10% carbamide per-oxide with sodium perborate or additionally adding thermocatalytic action with this, but it poses the risk of external cervical resorption which could become a serious complication. According to Howell, the walking bleach technique has an immediate success rate of 89.5%.[18,19]

Conclusion

The increasing demand for tooth bleaching has driven many manufacturers and researchers to develop bleaching products to be used either in the dental office or at home. However, as with any dental procedure, bleaching involves risks. For that reason, to minimize the risks, the involvement of dental professionals, the prevention of using of OTC bleaching products and the reduction of overused of bleaching products are necessary. In addition to that interval of 2 weeks post-bleaching procedure is found to be adequate to avoid adverse effects on the polymerization. Finally, Clinicians should inform their patients about the possible changes that may occur on their dental restorations during bleaching procedure as well as the possibility of replacement of the bleached restorations at the end of bleaching treatment.

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