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Vital Tooth Bleaching Using Locally Prepared Hydrogen Peroxide Gel: A Case Report

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Abstract

Discoloration of the front teeth decreases patient's self esteem. Desire for sparkling white smile has stimulated the search for effective treatments in the field of dentistry. Among these, most common procedure is dental bleaching. It offers a conservative, simplified, and low cost approach for changing dental color.

Hydrogen peroxide (H_2O_2) is an important agent used in bleaching procedure. H_2O_2 releases free radicals which penetrate into tooth structure causes oxidation of chromophore molecules, by means of redox reaction. The pigments oxidation is responsible for tooth bleaching. This case report reflects the remarkable change of tooth color by in-office bleaching using locally prepared hydrogen peroxide gel.

Keywords: Vital bleaching, H_2O_2, hydrogen peroxide gel.

Introduction

Dental bleaching is a regular procedure in general dentistry.[1] There are many methods available for tooth whitening, such as toothpastes, bleaching strips, bleaching pen, bleaching gel, and laser bleaching. Bleaching has become the most requested procedure as it is conservative and can lead to satisfactory results for changing dental color.[2]

There are two main types of bleaching techniques- Non-vital bleaching and vital bleaching. Non-vital bleaching procedure is performed on a tooth that has root-canal treatment done. Vital tooth bleaching is done on teeth that have live nerves. In this technique gel-like whitening solution which contains some forms of hydrogen peroxide that is applied directly to the tooth surface.[3]

Vital bleaching is an in-office procedure and uses high concentration hydrogen peroxides ranging from 25% to 35%. There is inverse relation between the concentrations of hydrogen peroxide in the bleaching gel with the application time needed to achieve satisfactory results. Therefore for faster results, with fewer applications, higher concentration of hydrogen peroxide is used.[4]

Various bleaching agents are available in market. In our case report, whitening gel used was locally prepared in the biochemistry laboratory of our institution. Ingredients used for manipulation of bleaching agent are easily available and economical. Once prepared, bleaching agent is active for 7 days provided that it kept refrigerated.

As whitening gel used was experimental, it was checked for adverse effect on dental tissue and for its whitening efficacy using different concentrations of hydrogen peroxide gel in vitro. Afterwards most efficacious i.e. 35% hydrogen peroxide gel used as whitening agent for patient.[5]

The use of high concentration hydrogen peroxide gels intraorally requires specific safety protocols. First, the doctor and patient must wear eye protection, and proper isolation is must to protect adjacent the gingival soft tissues.[6]

Patient selection

For successful vital tooth bleaching, patient's selection is very important to have the best prognosis. Concentration of the bleaching agent, duration of use of the bleaching agent, type of tooth discoloration, color of the teeth, and patient's age are key factors that have an influential effect on the final result after bleaching. Tooth discolorations with the best prognosis for vital bleaching are the followings:

1. Yellowing of the teeth without any systemic or developmental cause (food, smoking, aging, and staining)
2. Mild flourosis staining
3. Mild tooth darkening due to trauma
4. Mild tetracycline staining.[7,8]

Case report

A 22 years old male patient reported to the Department of Conservative Dentistry and Endodontics with the chief complaint of discoloration of upper front teeth. Discoloration was due to mild flourosis. During the examination of the patient, the clinical parameters that are focused on are good periodontal health, no or minimal gingival recession and the absence of decay. Also, history of tooth sensitivity was asked. As patients with a history of tooth sensitivity may experience mild to moderate tooth sensitivity for 24 hours after in-office bleaching. In our case, he had no history of any tooth sensitivity.

Bleaching gel preparation procedure:

The whitening gels used was locally prepared in our laboratory, resulting from the mixture of 50% hydrogen peroxide solution, alovera gel and glycerin. Ingredients were manually mixed one day before application in the proportion as follow [9]

50% H2O2 solution	**Alovera gel**	**Glycerin**	**H_2O_2 gel**
14ml	6gm	6ml	35% H_2O_2 gel

Immediately after mixing, the pH of gel was calculated using a pH meter. It was 6.3. Prepared gel was kept in refrigerator for a day.

Treatment procedure

The teeth were cleaned with pumice slurry. Teeth were dried, and then isolation was achieved with rubber dam. (Figure-1).

A 1mm layer of whitening gel was applied over the enamel surface of 11,12,21,22 for 10 minutes and repeated three times, totaling 30 minutes of application. An aspiration cannula was used to remove the gel in between each application. After the last application, all the applied gel was suctioned, washed with water. After the completion of the procedure, the rubber dam was removed. The patient was asked to return after 7 days to evaluate the results. Using standard visual examination, a noticeable shade change has occurred. Final polishing of the teeth was performed after the desired color improvement.

Figure 1: Pre-operative

Figure 2: Post-operative

Figure 3: Follow up after 7 days

Discussion

During in-office vital bleaching, one must take care of proper isolation and protection of mucosal tissues.

As whitening gel used was locally prepared, checked in vitro for adverse effect on enamel and for its whitening efficacy. This study concluded that results of prepared experimental bleaching gel were found to be equally effective to that of commercially available bleaching products. Enamel microhardness was not influenced by different concentrations of hydrogen peroxide gels. The 35% hydrogen peroxide gel exhibited higher whitening potential than the 20% gel, without intensifying the side effects on the enamel surface.[5]

The strength of the carbon bonds present in the chromophore molecules is inversely related to the dental color. Higher the light absorption by complex molecules, the lower is the reflection, giving the sensation of a darker tooth. Dark tooth requires more application time of the bleaching gel or a higher concentration of the hydrogen peroxide. [10]

Gel pH (less than 5.2) is responsible for Demineralization of enamel and structural modifications have been observed after bleaching.[11-13] These adverse effects on enamel and/or dentin after bleaching are mostly due to the pH of the formulation used.[14] Thus, gels with neutral pH are recommended for tooth bleaching to reduce deleterious effects on tooth enamel. Thus bleaching gel used in this case was having pH nearly neural i.e. 6.3.[5]

Apart from hydrogen peroxide concentration, structural changes of the enamel surface are time dependent. Bistey and others observed considerable changes at greater than 60 minutes of exposure to peroxide. Thus exposure time of bleaching gel kept was 30 min. [15]

Hydrogen peroxide solutions with higher concentrations have more number of free radicals that increases it's the whitening potential. Penetrated hydrogen peroxide can remain active for several days in enamel prisms until it is completely neutralized, hence patient called after 7 days to allow enamel rehydration and attain color stability.[16]

Conclusion

Vital tooth bleaching can significantly change the appearance of teeth. Patient satisfaction has been observed after use of in office vital bleaching treatment. It is a viable, aesthetic treatment for the discolored dentition. Its

conservative nature and little, if any, risk makes it acceptable aesthetic dentistry treatment plan. In office bleaching is a procedure provides fast and immediate change in the color of their teeth.

Locally prepared experimental bleaching gel was found to be as effective as commercially available bleaching products evident from literature. It showed marked color change of teeth.

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