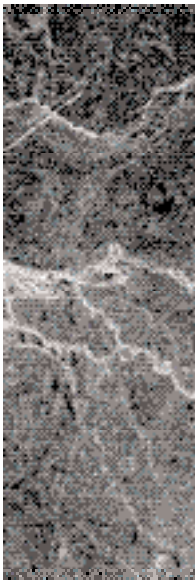

Critical Appraisal

AT-HOME BLEACHING: PULPAL EFFECTS AND TOOTH SENSITIVITY ISSUES, PART I

Author and Associate Editor

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The most common side effect of at-home bleaching is transient tooth sensitivity. Despite its high frequency, this phenomenon is not well understood. This two-part Critical Appraisal presents a summary and analysis of several articles on tooth sensitivity issues with at-home bleaching. The first installment reviews articles that focus on the incidence of sensitivity, long-term effects of bleaching, and related pulpal concerns. The second installment also will cover pulpal concerns, as well as the prevention of sensitivity during at-home whitening treatments.

INCIDENCE OF TOOTH SENSITIVITY AFTER HOME WHITENING TREATMENT

M.G. Jorgensen, W.B. Carroll
Journal of the American Dental Association 2002 (133:1076–82)

ABSTRACT

Objective: This was a randomized, double-blind clinical trial designed to determine the incidence of tooth sensitivity associated with at-home whitening treatment.

Materials and Methods: One hundred adult patients participated in the study. Using a custom tray, they applied either a bleaching gel or a placebo gel for one 3- to 4-hour period daily for 4 weeks. The bleaching gel was Opalescence F1 (Ultradent, South Jordan, UT, USA) (15% carbamide peroxide with 1,100 ppm fluoride ion) and the placebo was an identically packaged glycerin gel.

For each subject, plaque index, gingival recession, dental caries status, dentifrice use, tobacco use, and pretreatment sensitivity were evaluated. At weekly intervals, subjects were interviewed about tooth

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sensitivity. Sensitivity was recorded on a 0 to 3 scale:

0 = no sensitivity
1 = mild sensitivity (slight change, but well tolerated)
2 = moderate sensitivity (definite change, avoidance of certain foods necessary)
3 = severe sensitivity (patient considered discontinuing treatment)

Results: At 1 week, 27% of patients in each group reported mild sensitivity. Very few reported either moderate or severe sensitivity. Sensitivity rates were very similar after 2 weeks of treatment. The sensitivity rates declined over the last two weeks of treatment, and at the end of the study (4 weeks), nearly all patients reported having no sensitivity. Of the pretreatment factors considered, only gingival recession had a statistically significant relationship with tooth sensitivity.

Conclusions: Patients can be advised that there is a 50% chance that they will experience mild sensitivity with bleaching, a 10% chance of moderate sensitivity, and a very slight (4%) chance of severe sensitivity. This side effect tends to diminish as treatment continues, and is very unlikely to prevent completion of treatment.

COMMENTARY

This study has several interesting aspects. First, it provides useful guidelines for discussing sensitivity issues with patients who are considering bleaching treatment. Second, it reports that the sensitivity rates were quite similar for the bleaching gel and placebo, indicating that the active ingredient is not necessarily responsible for causing tooth sensitivity. Third, the study provides good evidence that sensitivity tends to occur early in treatment and diminishes with time, which is reassuring to both patients and clinicians. Fourth, it reports that patients with gingival recession are predisposed to tooth sensitivity with bleaching. The latter finding has not been verified in other studies. The best predictor of tooth sensitivity with bleaching is a history of sensitivity to other stimuli.

SUGGESTED READING

Leonard RH, Haywood VB, Phillips C. Risk factors for developing tooth sensitivity and gingival irritation associated with night-guard vital bleaching. Quintessence Int 1997;28:527–34.

Haywood VB. Treating sensitivity during tooth whitening. Compendium 2005;Suppl 3:11–20.

NIGHTGUARD VITAL BLEACHING OF TETRACYCLINE-STAINED TEETH: 90 MONTHS POST TREATMENT

R.H. Leonard, Jr., V.B. Haywood, D.J. Caplan, N.D. Tart

Journal of Esthetic and Restorative Dentistry 2003 (15:142–53)

ABSTRACT

Objective: This study reported the outcomes of a 6-month treatment of tetracycline-stained teeth using 10% carbamide peroxide bleaching gel at approximately 90 months after completion of treatment.

Materials and Methods: Twenty-one patients with moderate to severe tetracycline stain were enrolled in the study. They bleached their teeth using a 10% carbamide peroxide gel (Opalescence, Ultradent) in custom-fitted trays for 6 months. They recorded the number of hours of bleach application and any side effects in log books. Shades were evaluated using a value-oriented Vita shade guide at completion of treatment, and at 6, 12, 54, and 90 months after treatment. Patient perception questionnaires were completed at each appointment.

Results: Fifteen of the original 21 subjects completed the 6-month treatment regimen. The mean treatment time was 860 hours, with a range of 150 to 1,440 hours. The median shade lightened from C4 to B1, and 80% of the subjects experienced side effects, primarily tooth sensitivity or gingival

irritation. Those side effects were experienced in a sporadic fashion for 0 to 180 days of treatment. There was no correlation between patient age and tooth sensitivity.

At 90 months after treatment, two-thirds of the subjects reported only a slight darkening of the teeth. About 25% had re-bleached. Only one participant reported having any tooth sensitivity after treatment, but that individual had reported thermal sensitivity before treatment also. Radiographs of the treated teeth showed no pathologic alterations.

Conclusions: Tetracycline-stained teeth can be treated successfully using extended at-home bleaching procedures, and the results can remain satisfactory for 7 or more years.

COMMENTARY

This study is one of several that have demonstrated the efficacy of at-home bleaching for treating tetracycline-stained teeth. The patients who participated in this study were overwhelmingly positive about the result, and the photographs that accompany the article are very impressive. However, clinicians and their patients should be aware of the disadvantages and potential problems associated with extended treatment. First, the patient must be very committed, and willing to expend the time and money required to obtain the desired results. Also, because tetracycline stain frequently is banded or concentrated cervically, the patient might not achieve a uniform result.

The average time of bleach application in this study was 860 hours. Compared with a typical 2-week regimen using an overnight product, this represents a substantial increase in treatment time. Not surprisingly, the incidence of tooth sensitivity is very high during such extended regimens. However, as this study shows, the sensitivity does not persist and does not result in any apparent pulpal pathology.

Extended at-home bleaching is a viable and conservative option for treating tetracycline-stained teeth. The results are long-lasting and no long-term side effects have been identified.

SUGGESTED READING

Ritter AV, Leonard RH, St-Georges AJ, Caplan DJ. Safety and stability of nightguard vital bleaching: 9 to 12 years post-treatment. J Esthet Restor Dent 2002;14:275–85.

Matis BA, Wang Y, Jiang T, Eckert GJ. Extended at-home bleaching of tetracycline-stained teeth with different concentrations of carbamide peroxide. Quintessence Int 2002; 33:645–55.

PULP REACTION TO VITAL BLEACHING

J.O. Fugaro, I. Nordahl, O.J. Fugaro, B.A. Matis, I.A. Mjör
Operative Dentistry 2004 (29:363–8)

ABSTRACT

Objective: This study evaluated the histological changes in the pulp related in response to at-home bleaching with a 10% carbamide peroxide gel.

Materials and Methods: The study involved 15 patients with an average age of 16.7 years, all of whom required extraction of premolars for orthodontic reasons. Maxillary and mandibular custom bleaching trays were made for each patient. The trays were fabricated to include reservoirs over three of the premolar teeth. The bleaching regimens for the different teeth were designed so that specific teeth were bleached for either 4 or 14 days. Some of the teeth bleached for 14 days were untreated for 14 additional days before extraction. Some teeth were not bleached at all, and served as controls. The bleaching was done using 10% carbamide peroxide (Opalescence, Ultradent) for 6 hours daily.

Following extraction, the teeth were submitted for histological

evaluation at 40× to 400× magnification. The evaluation included such features as the presence of inflammatory cells and displaced odontoblasts.

Results: All of the control and most of the experimental teeth showed no pulp reaction. Of the 45 total teeth that were bleached, 16 demonstrated a slight pulpal reaction in a limited portion of the coronal pulp. Of the 15 teeth that were bleached for 14 days and then were not treated for an additional 14 days before extraction, only three teeth demonstrated pulpal reaction.

Conclusions: At-home bleaching with 10% carbamide peroxide may cause minor short-term pulpal reactions in about one-third of the teeth in young patients.

COMMENTARY

This is an interesting study because it provides good in vivo evidence for the safety of at-home bleaching. Most clinicians are aware that as many as 50% of patients who undergo at-home bleaching experience some tooth sensitivity, and some published estimates of the incidence are even higher. Because of this, there has been some concern that at-home bleaching could potentially cause pulpal damage. However, this study clearly indicates that whatever pulpal irritation occurs is minor, and more importantly, appears to be of very short duration. The slight pulpal reactions that did occur diminished greatly within 2 weeks after completing treatment.

Of course, it should probably be noted that this study was done using only a single, and relatively low-concentration, bleaching agent using a strict regimen (no treatment longer than 14 days), and in a young population. Different results might be seen with higher concentrations, longer exposure times, or different patients.

SUGGESTED READING

Cooper JS, Bokmeyer TJ, Bowles WH. Penetration of the pulp chamber by carbamide peroxide bleaching agents. J Endod 1992;18:315–7.

Schulte JR, Morrissette DB, Gasior EJ, Czajewski MV. The effects of bleaching application time on the dental pulp. J Am Dent Assoc 1994;125:1330–5.

Anderson DG, Chiego DJ, Glickman GN, McCauley LK. A clinical assessment of the effects of 10% carbamide peroxide gel on human pulp tissue. J Endod 1999;25:247–50.

Editor's Note: We welcome readers' suggestions for topics and contributors to Critical Appraisal. Please address your suggestions to the section editor:

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