BLEACHING AND CARIES CONTROL IN ELDERLY PATIENTS

VAN B. HAYWOOD

Abstract

Bleaching teeth with carbamide peroxide in a custom tray is an exciting service to offer patients and a tremendous adjunct to restorative dental treatment. One of the side effects noticed when bleaching teeth is that the use of 10% carbamide peroxide applied nightly in a custom-fitted tray is effective to remove plaque, reduce caries bacteria and elevate pH on elderly patients for successful longterm oral hygiene care.

As the population of the world ages and is living longer with more teeth, there is a greater number of people who have received good dental care in their younger years, but are now faced with difficulty in maintaining those restorations and existing teeth in their later years. Dentists have experienced the frustration of rampant root surface caries around crown margins or in virgin teeth as these patients age. This caries phenomenon seems to be associated with a reduction in salivary flow, due to both ageing, increased side effects of medications, and decline in health. There is also a loss in manual dexterity, and the ability to perform routine oral hygiene care. Even if these patients have access to care from a general dentist, their ability to clean at home around hemi-sected molars, under pontics for Fixed Partical Dentures, or interproximally around gingival recession or periodontally involved teeth is compromised, and often results in caries between dental appointments. This mechanical disadvantage is further complicated by the tendency of these patients to use sugar containing mints for breath due to salivary flow loss, and the resultant effect on the caries index.

What is needed is a simple, inexpensive mechanism to apply to better clean the teeth. Rather than mechanical means alone, a chemotherapeutic approach is needed. Typically, fluoride in a tray has been used for this population. However, clinical experience has indicated this is not very effective. Chlorhexidine is also used, but the staining is a detriment to use. Interestingly enough, 10% carbamide peroxide can be used alternately with Chlorhexidine to remove those stains (Addy et al, 1991).

Although 10% carbamide peroxide is generally associated with tooth whitening, the material was originally used as an oral antiseptic for gingival healing (Haywood, 1992). It was being applied in a tray for wound healing when the tooth whitening side effect was discovered (Haywood, 1991). Carbamide peroxide 10 and 15% has been has been classified by the United States Food and Drug Association as category 1, which means there are sufficient data to demonstrate that these agents are safe and effective for use in the oral cavity as oral antiseptic agents (Haywood, 1993, Dental Product Spotlight, 2001). Persons now involved in tooth whitening research report a loss of plaque during that time such that their teeth feel 'squeaky clean' much like after a prophylaxsis. Reports from a century ago cite the use of this material in children with pitted teeth to reduce caries (Atkinson, 1893).

Current research on safety noted that the pH of the saliva and the material in the tray is elevated to about eight in less than five minutes after application, and remains that for the duration of the application (Leonard et al, 1994, Leonard and Austin et al, 1994) (in those studies, two hours). This occurrence is related to the urea in the composition (Firestone et al, 1982, Wainwright and Lemoine, 1950). The pH values are crucial to preventing the formation of tooth decay, since root caries can start when the pH of the mouth is between 6 and 6.8 (Hoppenbrouwers et al, 1986, 1987). A further study has indicated that 10%CP kills one of the two bacteria causing tooth decay (Bentley et al, 2000). Gingival indices in bleaching studies have indicated some improvement in gingival scores (Powell and Bales, 1991), although the patient population involved in bleaching often has a very clean mouth for the onset of treatment. Carbamide peroxide is preferred rather than hydrogen peroxide, since the urea and carbopol in 10% CP allows it to be active up to 10 hours in the mouth, while hydrogen peroxide is only active for 30-60 minutes. (Haywood, 2007).

The tray design used for caries control is a non-scalloped, no reservoir tray, which extends 1-2mm onto the gingival tissue (Haywood 2006, 2007). It should not extend into undercuts to the path of insertion, nor encroach on frenum attachments. The contact with the gingival prevents the washing out of the material, and does not generally cause gingival irritation at the 10% concentration (Leonard et al, 1994). The lack of reservoirs

Van B. Haywood, DMD,
Professor, Director of Dental Continuing Education, Department of Oral Rehabilitation, School of Dentistry, Medical College of Georgia

Moderate tetracycline stained teeth with dark discoloration on the incisal half and slight banding is an unsightly problem for this patient. Tetracyclinestained teeth generally take two to six months to treat. Generally lighter teeth make a person appear 10 years younger

Four month of nightly bleaching using at 10% carbamide peroxide in a non-scalloped, no-reservoir tray produces an acceptable outcome. Now the patient is interested in restoring the fractured central incisor. One arch was treated at a time to allow comparison and encourage compliance. Elderly people look younger with whiter teeth

A non-scalloped, no-reservoir bleaching tray is used to apply 10% carbamide peroxide nightly for caries control in elderly patients. One or both arches may be treated, depending on the patient's needs. The disadvantage is the natural teeth will become whiter but restorations will not change colour

means less material is needed per application. The traditional custom fitted bleaching tray from an alginate impression works well, although there are some options with 'boil and form' trays in certain arches (Haywood et al, 2001). The boil and form tray can also be used as a diagnostic test to see if the patient can wear the tray and if the material will be effective.

Carbamide peroxide for caries control hasa long history of use, except that the previousattempts did not employ a tray application. Several papers cite the use of 10% carbamideperoxide as a rinse, in the form of Glyoxide, in orthodontic patients during three years treatment to prevent white spot lesions (Fogel and Magill, 1971). It has also been used in elderly patients as a rinse for oral hygiene (Haywood, 1992). Carbamide peroxide seems to be most effective when some type of container or barrier is used.

The questions of safety to the ingestion have been answered in literature prior to bleaching, as well as current literature (Ritter et al, 2002, European Commission, 2005). Prior to bleaching and even today, 10% carbamide peroxide is used in new born infants, 10 drops in their throat every two hours for seven to eight days, to treat candidiasis or thrush (Dickstein, 1964).

Since carbamide peroxide kills lactobacillus, and Chloroxidine kills strep mutans, one option is to both clean the teeth and destroy the lactobacillus bacteria by wearing the nonscalloped, no-reservoir tray overnight with 10% carbamide peroxide. This can be supplemented by using Cholohexidine rinse for 30 seconds prior to bedtime. In addition to caries control, the 10%CP can control the staining from Chlorhexidine.

The only side effect of this treatment is that the teeth will become white. For most people, this may be a benefit. However, since restorations do not change colour, there can be a mismatch between existing restorations and bleached teeth. Some restorations may need to be replaced due to this colour mismatch. However, the benefit of saving the teeth, or having larger restorations due to caries may override this concern. Teeth typically whiten to a certain level, then stabilise, even with further treatment. However, it is unknown to what level of whitening the patient will progress, so some patients may have very white teeth over time.

Sensitivity is often associated with bleaching. However, in elderly patients, the pulps have receded such that sensitivity is seldom a problem. The use of potassium nitrate in the bleaching tray for 10-30 minutes has been shown to alleviate this in most patients (Haywood et al, 2001). Additionally, many bleaching products now contain this ingredient, and sensitivity levels have been greatly reduced with the combination of potassium nitrate and a soft tray, as well as by pre-brushing and using a desensitising toothpaste during treatment (Haywood et al, 2005).

This technique is meant to be used for the life of the patient. Studies on bleaching teeth nightly for six to twelve months with tetracycline-stained teeth have indicated no harm to the teeth or pulp with low concentrations of carbamide peroxide

(Haywood 1997, Matis et al 2006, Leonard et al 1994).

Additionally, this technique may prove beneficial with oral cancer patients for whom the cancer treatment has reduced the salivary flow, and caries is a problem. It is also used in orthodontic patients to avoid white spot lesions, although the fit of the tray and the amount of material needed makes this option more of a challenge. Typically the 'boil and form' trays can be made over the brackets if care is taken.

Summary

Root caries may be minimised by use of carbamide peroxide in a tray overnight to remove plaque, elevate pH and kill bacteria. Long-term use is both cost efficient and safe. Sensitivity can be treated by potassium nitrate in the tray, pre-brushing with it, and using a bleaching product containing the material. Primarily the indication for caries control is for ageing patients, those with physical handicaps or patients in nursing homes for which conventional brushing and flossing is not proving effective. The side effect of whitening the teeth is often less of a problem than the cost and medical challenge of restoring teeth due to root caries.

References

Addy M, al-Arrayed F, Moran J. The use of an oxidising mouthwash to reduce staining associated with chlorhexidine. Studies in vitro and in vivo. J Clin Periodontol 1991;18(4):267 71.

Atkinson CB. Hints, Queries, and Comments: Pyrozone. The Dental Cosmos 1893;35:330- 332.

Bentley CD, Leonard RH Jr and Crawford J. Effects of whitening agents containing carbamide peroxide on cariogenic bacteria. J Esthet Dent 2000; 12: 33-37.

Dickstein B. Neonatal Oral Candidiasis: Evaluation of a new chemotherapeutic agent. Clinical Pediatrics 1964;3(8):485-488. European Commission:Scientific Committee on Consumer Products: March 2005 SCCP/0844/04 (website).

Firestone A R, Schmid R, Muhlemann H R. Effect of topical application of urea peroxide on caries incidence and plaque accumulation in rats. Caries Res 1982;16:112-117.

Fogel M S, and Magill J M. Use of an Antiseptic Agent in Orthodontic Hygiene. Dental Survey 1971; October:50-54.

Haywood V B. History, safety, and effectiveness of current bleaching techniques and applications of the nightguard vital bleaching technique. Quintessence Int 1992 23: 471–488.

Haywood V B., Caughman W F, Frazier K B, Myers M L. Tray delivery of Potassium nitrate-fluoride to reduce bleaching sensitivity. Quintessence Int 2001;32:105-9.

Haywood V B, Caughman W F, Frazier K B, Myers M L. Fabrication of

Immediate Thermoplastic Whitening Trays. Contemporary Esthetics and Restorative Practice 2001;5(9):84-86.

Haywood V B, Cordero R, Wright K, Gendreau L, Rupp R, Kotler M, Littlejohn S, Fabyanski J, Smith S. Brushing with a potassium nitrate dentifrice to reduce bleaching sensitivity.J Clin Dent. 2005;16(1):17-22.

Haywood V B, Leonard RH, Dickinson GL. Efficacy of six-months nightguard vital bleaching of tetracycline-stained teeth. J Esthet Dent 1997;9(1):13-19.

Haywood V B. Nightguard Vital Bleaching: A History and Products Update: Part 1. Esthetic Dentistry Update 1991;2(4):63-66.

Haywood V B. The Food and Drug Administration and its influence on home bleaching. Current Opinion in Cosmetic Dentistry 1993:12-18.

Haywood V B. Considerations for Vital Nightguard Tooth Bleaching with 10% Carbamide Peroxide after nearly 20 Years of Proven Use. Inside Dentistry 2006; Sept: 2-5.

Haywood V B. Extended Bleaching of Tetracycline-stained teeth: a case report. Contemporary Esthetics and Restorative Practice 1997;1(1):14-21.

Haywood V B. History, safety, and effectiveness of current bleaching techniques and applications of the nightguard vital bleaching technique. Quintessence Int 1992;23:471-488.

Haywood V B. Treating Sensitivity during Tooth Whitening. Compendium 2006;26(9):11-20. Home-Use Bleaching Agents. Dental Product Spotlight. JADA 2001;132:1292.

Haywood VB.Tooth Whitening: Indicationsand Outcomes of Nightguard Vital Bleaching.Quintessence Pulbishing Co, Inc. HanoverPark, IL 2007:133-138

Hoppenbrouwers PMM, Driessens FCM, Borggreven JMPM. The Mineral Solubility of Human Tooth Roots. Archs Oral Biol. 1987;32:319-322.

Hoppenbrouwers PMM, Driessens FCM, Borggreven JMPM: The vulnerability of unexposed human dental roots to demineralization. J Dent Res 65(7):955-958, 1986

Leonard R H Jr, Bentley C D, Haywood V B. Salivary pH changes during 10% carbamide peroxide bleaching. Quintessence Int 1994 25: 547–550.

Leonard RH, Austin SM, Haywood VB, and Bentley CD. Change in pH of plaque and 10% carbamide peroxide solution during nightguard vital bleaching treatment. Quintessence Int., 1994 Dec; 25(12): 819-23.

Leonard RH, Haywood VB, Caplan DJ, Tart ND. Nightguard Vital Bleaching of Tetracycline-Stained teeth: 90 months Post Treatment. J Esthet Restor Dent 2003;15(3):142-154.

Matis BA, Wang Y, Eckert GJ, Cochran MA, Jiang T. Extended bleaching of tetracyclinestained teeth: A 5-year study.Operative Dent, 2006, 31-6, 643-651.

Powell LV, Bales DJ. Tooth bleaching: its effect on oral tissues. J Am Dent Assoc 1991;122(12):50-4.

Ritter AV, Leonard RH, St. Georges AJ, Caplan DJ, Haywood VB. Safety and stability of nightguard vital bleaching: 9 to 12 years post-treatment. J Esthet Restor Dent 2002; 14(5):275-285.

Wainwright WW, Lemoine FA: Rapid diffuse penetration of intact enamel and dentin by carbon14-labeled urea. JADA 1950;41:135-