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CASE REPORT

Nine Shade Change by Laser-Assisted Teeth Whitening

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ABSTRACT

Different external whitening procedures utilizing highly concentrated hydrogen peroxide formulations can be used for tooth bleaching and tooth whitening. Light can be used to enhance or accelerate the bleaching process. Laser bleaching gels incorporate laser absorption-enhancing particles which are used to accelerate the whitening process. This case report describes the procedure for the use of Biolase LaserWhite20™ whitening gel and Ezlase™ 940 nm laser in a patient requesting teeth whitening.

Keywords: Teeth whitening, Teeth bleaching, Laser whitening, Laser bleaching, Laser smile, Dental lasers.

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INTRODUCTION

A whiter and a brighter smile makes a person more confident, active and socially outgoing. In todays' age drinking dark colored beverages like coffee, tea and others things like red wine, smoking and aging takes a toll on the color of the enamel.

Teeth whitening procedures are the easiest and simplest way of improving one's smile. There are different ways of teeth whitening which can be classified as those that are mechanically activated, chemically activated and light activated. They can be either done at home or in a dental office.

The different ways of teeth whitening are by using whitening gels, whitening kits, bleaching strips, whitening toothpastes or bleaching gels. Whitening toothpastes are mechanically agitated at the stained tooth surface for tooth stain removal through abrasive erosion of the stained acquired pellicle whereas bleaching gels, pastes or liquids accomplish the tooth bleaching effect by a chemical process while in contact with the stained tooth surface for a specified period of time after which the formulation is removed.[1] The bleaching solvent usually contains hydrogen peroxide may be subjected to halogen light, LED light or laser light to enhance the bleaching process.

Laser teeth whitening can be carried out using a diode, Er:YAG, Nd:YAG lasers. Laser whitening gels incorporate chromophores or activator specific to that particular wavelength, which absorbs the laser light and enhances the bleaching process.

The following is a case report using Biolase LaserWhite20™ whitening gel and Ezlase™ 940 nm laser and whitening handpiece.

CASE REPORT

A 58-year-old female patient came with the chief complaint of yellow discoloration of teeth and requested for teeth whitening.

Intraoral examination revealed fixed prosthesis on her posterior teeth. Color changes in the teeth may be attributed to age, occurring physiologically, a result of excessive dentin apposition, thinning of the enamel and optical changes. Food and beverages also have a cumulative discoloration effect.

It was decided to bleach the anterior teeth using Biolase LaserWhite20™ whitening gel and Ezlase™ 940 nm laser and whitening handpiece.

Dental prophylaxis was carried out a week prior to teeth whitening appointment. On the day of the appointment the teeth were cleaned to remove surface plaque and stain with a pumice (non-glycerine based) prior to the administration of the whitening system.

The patient's shade was measured and recorded using the Vita Shade Guide. It was found to be C3 (Fig. 1). Vaseline was applied to the lips and cheek retractors were inserted to expose the treatment area and to keep any soft tissue away from the teeth. Cotton rolls were also used for increased protection. Liquid dam was applied beginning at end of one arch to the other covering any exposed root surfaces and embrasures (Fig. 2). The liquid dam was cured using standard curing light, holding the handpiece at least 2 cm from the tooth, for 5 to 10 seconds. The activator and base gels of LaserWhite20™ whitening gel were mixed according to manufacturer's recommendations (Fig. 3). After an even mix was obtained, a thin layer of about 1 mm thickness was applied on dried teeth with the brush tip applicator (Fig. 4). A disposable clear cap over the handpiece's arch was placed. Safety eyeglasses provided for Ezlase™ 940 nm laser were worn by the dentist, assistant and patient. The Ezlase™ 940 nm laser (Biolase technologies) was set to 7 W power, continuous wave mode, and 200 J energy output (Fig. 5). The handpiece is designed to treat a full quadrant of 4 to 5 teeth at a time. The handpiece was placed about 1 mm away from a quadrant, and then activated the laser for 30 seconds to allow 200 J of laser energy to be applied (Fig. 6). This step was continued for the remaining quadrants.

Fig. 1: Preoperative shade

Fig. 2: Application of liquid dam

Fig. 3: Mixing of LaserWhite20™ gel

Fig. 4: Application of gel on teeth

Fig. 5: Ezlase™ 940 nm diode laser

Fig. 6: Laser light being delivered through bleaching handpiece

The entire process was repeated for all quadrants one more time. Dividing the teeth into quadrants allows the laser to accelerate the whitening process while minimizing heat induced to the teeth. The gel was left on the teeth for an additional 5 minutes to allow the teeth to absorb the laser-activated hydrogen peroxide, allowing continued whitening after the laser exposures. The gel was removed using high-speed suction, and then flushed with an air and water spray to remove any residual gel. The brush applicator tip was changed and the gel was reapplied and entire process was repeated once again. The liquid dam was removed by sliding the tip of an explorer between the gingiva and the barrier and lifted carefully. The entire procedure took approximately 20 minutes. Patient did not report any sensitivity during the procedure. Biolase Laser White 20™ desensitizing gel containing potassium nitrate was applied on the teeth for 15 to 20 minutes (Fig. 7). The post-whitening

Fig. 7: Application of LaserWhite20™ desensitizing gel

Fig. 9: Preoperative

Fig. 8: Postoperative shade

Fig. 10: Postoperative

shade was recorded and found to be A2 (Fig. 8). The brightness scale was used to compare the result.

BRIGHTNESS SCALE

B1-A1-B2-D2-A2-C1-C2-D4-A3-D3-B3-A3.5-B4-C3-A4-C4

On checking with the brightness scale it showed 9 shades of improvement on comparison between pre- and postwhitening treatment shades, i.e. from a C3 to an A2 (Figs 9 and 10).

The patient was ecstatic with the brighter smile and extremely happy with the results.

The patient was advised not to consume products that stain teeth for up to the next 48 hours, such as coffee, red wine, tobacco, tea, some fruits and tomato sauce, etc.

DISCUSSION

Using laser energy for teeth whitening presents some advantages over most available over-the-counter, home, and in-office bleaching products. The procedure can be completed with a single visit and allows one to focus on a single tooth or even a selected part of a tooth. The choice of the wavelength is based on the light–target tissue relationship. The bleaching gel, on one hand should absorb the light, and the tooth structure on the other hand, should be minimally affected. Therefore, photoinitiators or dyes are incorporated, which are adjusted to absorb the wavelength of the light source used.[2]

Biolase LaserWhite20™ whitening gel is a proprietary dental whitening gel used in conjunction with the Ezlase™ 940 nm or LaserSmile™ 810 nm laser system. The laser, through a specialized handpiece and delivery system, activates the LaserWhite20™ whitening gel. Laser energy is absorbed by special particles or chromophores in the whitening gel to activate the hydrogen peroxide (38% concentration after mixing accelerator gel), which accelerates the whitening process faster than 'simple' light does, so the procedure time is dramatically shorter. The bleaching handpiece delivers 7 W over a quadrant of teeth, i.e. 4 to 5 teeth at a time, giving a mean of approximately 1.4 to 1.7 W on each tooth for a period of 30 seconds and repeated after giving a relaxation time.

The protocol for the Ezlase whitening system is very easy, and no special training is required. A concern that some doctors have had with in-office whitening is patient sensitivity. Because of the unique properties of the laser, the gel-to-tooth contact time is reduced to about half as long as other in-office bleaching systems that use a similar concentration of hydrogen peroxide gel. Less contact time results in less sensitivity. Studies have shown that bleaching with diode laser resulted in less tooth and gingival sensitivity; it might be preferred among in-office bleaching systems.[3]

There are serious concerns about the safety of conventional hydrogen peroxide-containing bleaching products. Alterations of the surface texture of enamel, including shallow depressions, increased porosity, and slight erosion, have been reported, via the use of scanning electron microscopy.[4,5] Studies have shown that no change was observed in enamel microhardness after treatment with hydrogen peroxide gel photoactivated using diode laser with or without APF.[6]

This case report shows a 9-shade improvement being possibly compared to the traditional 8 shades of improvement using nonlaser systems (using the VITA Shade Guide Brightness Scale).[7]

CONCLUSION

Laser teeth whitening may offer advantages, such as faster and more profound whitening procedure, little or no postoperative sensitivity along with little or no surface alterations. But even with so many great outcomes, it is very important to discuss potential results with patients before the procedure begins. The degree of whitening varies from patient to patient based on type of stain, enamel thickness, tooth structure, and age. So patients deserve to have realistic expectations before the treatment begins.

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