Laser Mediated Vital Teeth Bleaching: A Case Report

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ABSTRACT: Aesthetics of the teeth is of great importance to patients, including tooth colour. Of the various causes of tooth discoloration, fluorosis, enamel hypoplasia, medication staining etc. is commonly encountered. The treatment options for discoloration are varied depending on individual case basis. Dental bleaching offers a conservative, simplified, and low cost approach to change the colour of discoloured teeth. The pigments oxidation is responsible for tooth bleaching and can be carried out with two different products; carbamide peroxide and hydrogen peroxide. In addition, light-activated bleaching gels have been growing among dental professionals mainly due to the fastening of the whitening procedure and/or therapeutic purposes. Thus, the objective of this case report is to present the bleaching protocol and efficacy of a light-activated bleaching agent.

KEYWORDS: Tooth discolouration, vital teeth bleaching, diode laser, Pola-Office H₂O₂.

I. INTRODUCTION

Bleaching is a conservative and effective method to lighten discoloured teeth and has been practiced in dentistry for many centuries. Vital bleaching is an in-office procedure and the most popular systems use high concentration hydrogen peroxides. These high concentration hydrogen peroxides range from 25% to 35%. In-office bleaching can be provided to patients as either a one-visit of 1–1.5-hour treatment or a multiple visit procedure. One can use one of the light enhanced bleaching techniques, a laser activated bleach or merely a paint-on bleaching gel or solution. Light and heat increase the reactivity of hydrogen peroxide. Diode laser light is produced from a solid – state source. It is ultra-fast, taking 3-5 seconds to activate the bleaching agent. Laser light differs from conventional light as it requires a laser-target interaction. The interaction takes place in the first instance in the bleaching gel. The second interaction has to be induced in the tooth, more specifically in the dentin. There is evidence that interaction exists with the bleaching gel: photothermal, photocatalytical, and photochemical interactions occur. The reactivity of the gel is increased by adding photo catalysts or photosensitizers.

Tooth discolorations with the best prognosis for whitening are the followings:
1. Yellowing of the teeth without any systemic or developmental cause (food, smoking, aging, staining)
2. Mild fluorosis staining
3. Mild tooth darkening due to trauma
4. Mild tetracycline staining.

It also has the advantages of having high success rate with no tooth alteration and cost effective.

II. CASE REPORT

A 25-year-old female patient reported to our out-patient department of Guru Nanak Institute of Dental Sciences & Research, Kolkata with the chief complaint of discolouration of teeth. On examination of oral cavity, there was good periodontal health, no or minimal gingival recession and absence of decay. There was no history of any tooth sensitivity. Further history revealed that her teeth were discoloured since childhood and she given strong medication while she was sick. She was a non-smoker, non-alcoholic and occasionally takes 1 -2 cups of tea per day. Vitality test revealed her teeth to be vital. Intra Oral Peri Apical radiograph in anterior teeth did not reveal any pathology. Diagnosis of generalized moderate discolouration of teeth due to tetracycline staining was made. Pre-operative photograph was taken and the patient’s initial shade- A3 was verified by a digital shade taking device (Vita Easy Shade Compact). The teeth were cleaned with pumice slurry, cheek retractor was positioned and the field was kept dry.
Gingival barrier (1mm of the tooth surface in the cervical region) was applied and light cured in fanning motion. POLA-OFFICE H2O2 bleaching agent was prepared and carefully placed on the enamel using applicator tips. This material contains 35% hydrogen peroxide, which facilitates significant whitening procedure with a start to finish time of less than an hour. The shorter treatment time and the inclusion of potassium nitrate in the composition, provides patients with less treatment and/or post-operative sensitivity than other in-office systems.

Diode laser 810nm (Smile doctor, Italy) was used for the procedure. Protective sunglasses were placed over the patient’s & the operator’s eyes.
First maxillary anterior six teeth were done. Then mandibular anterior six were done. Starting from maxillary central incisors and moved laterally towards premolar, irradiation of every tooth was done for 30sec at average power settings of 1W. Used bleaching agent was wiped off using wet gauze/cotton and fresh material was reapplied and reactivated the laser. Procedure was tried 2-3 times till there was desirable appropriate shade after application of non-staining fluoride solution and Laser was used again. New improved shade was confirmed with Vita shade guide and photograph was taken for record. There was difference of 3 shades in one sitting. After 1 week, one repeat sitting was carried out.

Patient was reviewed after 1 week, 2 weeks and then after 45 days. There was no pain, sensitivity or rebound staining. Prognosis was good. Patient was very satisfied with the procedure and the results.

III. DISCUSSION

Besides invasive therapies, such as crowns or veneers, bleaching in contrast is a non-invasive and conservative procedure. Vital teeth can be whitened by utilizing carbamide peroxide. A broad range of peroxide-based treatments are currently available:
1. Professionally-administered (in-office)
2. Professionally-dispensed (custom-tray-based systems), and
3. Self-directed (over-the-counter).

Teeth discoloration can be classified as—
1. By Abbot 1997
   A. Extrinsic
   B. Intrinsic
   C. Combination of both

2. Extrinsic stains further classified by Nathoo & Gaffar 1995
   N 1 – type dental stain (direct dental stain). The chromogen binds to the tooth surface to cause tooth discoloration. E.g. stains caused by tea, coffee and wine.
   N 2 – type dental stain (direct dental stain). The chromogen changes colour after binding to the tooth. E.g. age-related formation of yellowish discoloration on the interproximal or gingival areas.
   N3-type dental (indirect dental stains). The prechromogen binds to the tooth and undergoes a chemical reaction to cause a stain. E.g. browning of teeth by cooking oils or therapeutic agents containing stannous fluoride.

The three techniques of vital bleaching:
1. At Home – 10% carbamide peroxide
2. In Office – 35% hydrogen peroxide (can be combined with heated bleaching lamp / Lasers)
3. Over the Counter – 5.3% hydrogen peroxide gel / hydrogen peroxide strips
The oxidation-reduction reaction that takes place in the bleaching process is known as “Redox Reaction”. The oxidizing agents (e.g. hydrogen peroxide) has free radicals with unpaired electrons, which it gives up and thus becomes reduced. The reducing agent (the substance being bleached) accepts electrons and become oxidized.

Two key factors determining overall tooth bleaching efficacy from peroxide containing gels are the concentration of the Hydrogen Peroxide and the duration of application. Contradictory results are found as was also seen with conventional bleaching procedure using high hydrogen peroxide concentrations. Heat and light application may initially increase whitening due to greater dehydration, which reverses with time. Actual colour change will not be evident until 2 to 6 weeks after bleaching treatment. The average number of in-office visits for maximum whitening is three, with a range of 1 to 6 visits, so the patient should be prepared for additional in-office treatments. Even though light-activated bleaching agents are commonly associated to higher tooth sensitivity, mainly because it is believed that the light may heat the tooth leading to possible pulp injuries, the present case report had no sign of post-bleaching sensitivity, as stated by the patient itself in the next clinical meeting. This may have occurred probably due to the laser component of the Whitening Lase II hybrid light source used to irradiate the gel. Therefore, the combination of light sources (at least that used in this report) with dental bleaching agents is an interesting option to bleaching treatments, demonstrating satisfactory results. Bleaching is a procedure that removes staining substances from the tooth surface. Considering this, the consumption of staining substances (e.g., coffee, tea, wine) after bleaching may promote a faster darkening of the substrate, vanishing with the whitening effect. Notwithstanding, our patient has related no high consumption of these substances. According to a double blind randomized clinical trial (followed-up for 2-years) patients reported that their tooth shade relapsed from mild to moderate when compared to the 1-month evaluation. This shows that bleaching is a procedure that should be repeated after some period of time, since the patient’s dietary behaviour may individually imply in faster or slower darkening of teeth. In contrast, the study of Giachetti et al. resulted in satisfactory and long-lasting (nine-month follow-up) bleaching, showing that this esthetic procedure may be considered an effective treatment.
IV. CONCLUSION

Vital tooth bleaching is an effective treatment modality that can significantly change the appearance of teeth. In-office bleaching has gained a lot of popularity among general public. Many patients are now aware that in-office bleaching is a procedure that many dentists offer and is a great way to get a fast and immediate change in the color of their teeth. Dental lasers contribute to the field of tooth bleaching. Currently, the lasers have been proven to be a safe method and the most valuable energy source for power bleaching with simple and short application in the office. In today’s world of immediate gratification, in-office bleaching is one of the most requested procedures in many dental offices.

V. REFERENCES

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