



Laser: A Beam of Brightness For Fluorosed Teeth-A Case Series

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Abstract

Tooth color has been regarded as an important factor for beautiful smile and enhancing the appearance. Dental fluorosis is a developmental disturbance of dental enamel, caused by successive exposures to high concentrations of fluoride during tooth development. Bleaching is one of the most popular and a conservative dental procedure to lighten discolored teeth. Power bleaching by use of lasers reduce in office bleaching time by energizing bleach material. Bleaching agents have been developed for use with light source which include use of activator or colorant for light absorption or reduced tooth heating.

Keywords: Bleaching, Diode laser, Fluorosis, Photothermal effect, Wavelength.

Introduction

Excessive fluoride in drinking water, greater than 1-2 ppm, can cause metabolic alteration in ameloblasts, resulting in defective matrix and improper calcification of teeth. Dental fluorosis affects the color and /or structure of enamel which leads to an unpleasant esthetic appearance.

Bleaching procedure corrects or improves the color of teeth, and is also the least expensive esthetic treatment option. The dental bleaching process can be accelerated by additional heat activation as it is found that heating hydrogen peroxide (HP) results in an acceleration of dissociation and oxidant-free radical formation. One of the activation methods resulting in an increase of the temperature in the bleaching gel is power bleaching with high-intensity light.

The latest development in this treatment is the use of diode laser. The laser process provides many advantages which include a shorter treatment time, the reduction of tooth sensitivity and gingival irritation.

The goal of power bleaching is to whiten the tooth efficiently by obtaining controlled temperature elevation without causing harm to pulp.

Mechanism of Action of Bleaching Agent and Diode Laser

Bleaching is a chemical process involving the oxidation of organic material having carbon double bonds which are broken down to produce less complex molecules having straight chain structure and carbon single bond.

These smaller molecules are lighter in colour than original larger molecules.

- Laser is used to increase the temperature of a bleaching agent applied to the tooth surface, thereby increasing the rate of decomposition of oxygen to form oxygen free radicals and enhancing the release of stain-containing molecules.

History

- Tooth bleaching has been described in the literature as early as 1889.
- Superoxol became the solution used by most dentists because of high safety (*Pearson 1951*).
- The most effective methods involve the use of hydrogen peroxide (*Haywood, 1992*).
- Studies have shown that higher concentration materials may bleach teeth faster (*Leonard & others, 1998*).
- Diode laser was introduced in dentistry in 1995.
- Diode laser would lead to less micro-roughness of enamel compared to the conventional method (*Mansoreh Mirzaie, Journal of Lasers in Medical Sciences, 2016*).

Advantages

Advantages of in office Bleaching Procedure Are:

- Dentist control,
- Avoidance of soft tissue exposure & material ingestion,
- Reduced total treatment time,
- Greater potential for immediate results,
- Enhanced patient motivation and satisfaction.

Advantages of Diode Laser Bleaching Procedure Are

- A fundamental difference between lasers and the other light sources is that lasers emit a well-defined monochromatic light and a single-wavelength only that reduces the risk of rising pulpal temperature.
- Diode requires short application time.
- Photothermal effect converts light energy into heat and increases the rate of bleaching process.

- Diode laser unit has small size, portability and flexible optic fibers.

Presenting hereby three cases of fluorosis treated by diode laser.

Case Series

Case -1

A 25 year old male patient reported to Dept. of Conservative Dentistry & Endodontics with chief complaint of discolored anterior teeth.

Pre-Operative Photographs



Fig. 1.1. Labial View



Fig. 1.2 Right Lateral View



Fig. 1.3 Left Lateral View

On examination brown stains were seen on middle third region of maxillary central and lateral incisors. From clinical examination and from patients history diagnosis of FLUOROSIS of teeth was made.

Diode laser assisted bleaching procedure using 35% hydrogen peroxide was planned.

- Patient's consent was taken.

Armamentarium



Fig. 2.1 Bleaching agent

35% Hydrogen peroxide liquid and powder (thickening agent) [Pola Office] and liquid rubber dam provided by manufacturer of bleaching agent.



Fig. 2.2- Soft Tissue Diode Laser (Zolar, Photon Plus)

Isolation



Fig. 3.1- Isolation



Fig. 3.2 - Isolation

Isolation was done using liquid rubber dam, cotton rolls, cheek retractor. Tissue paper napkin was used to prevent any contact of bleaching agent with skin. Protective eye wear was used to prevent damage by laser. Petroleum jelly was applied on gums and lips. Thus all due precautions for protection of soft tissue was done.

Procedure

- 35% Hydrogen peroxide (Pola Office, SDI) powder and liquid are mixed together to form gel and applied on teeth.



Fig.4- Powder and Liquid of Bleaching Agent Mixed Together



Fig. 5- Application of Bleaching agent

- Diode laser (Photon Plus, Zolar) 980 nm (7W) was applied for 30 sec.
- Teeth were washed with water and dried. Same procedure was repeated thrice in same appointment.

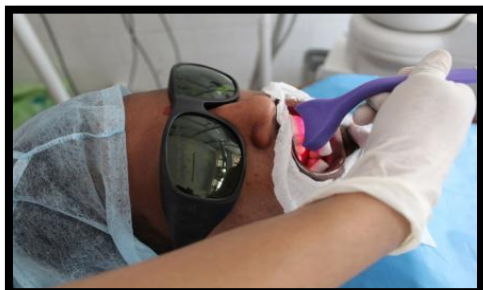


Fig. 6 Application of Diode Laser

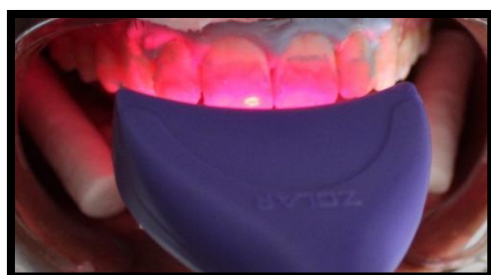


Fig. 7 Application of Diode Laser



Fig. 8 Application of Diode Laser

Post-Operative Photographs



Fig. 8.1 Labial View



Fig. 8.2 Left Lateral View



Fig. 8.3 Right Lateral View

For this case only one sitting was sufficient and notable color difference can be seen. Same procedure was followed for rest 3 cases.

Case -2

These are

Pre-Operative Photograph



Fig. 9.1. Labial View

Post-Operative Photographs



Fig. 9.2 Labial View

Case -3

These are

Pre-Operative Photographs



Fig. 10.1. Labial View

Post-Operative Photographs



Fig. 10.2. Labial View

Discussion

- Dental fluorosis can range from mild form where white opaque striations are present on tooth surface to severe form having pitting and discoloration.
- Bleaching procedure corrects or improves the color of teeth, and is also the least expensive esthetic treatment option.
- Tooth sensitivity is the most common side effect of bleaching. It is related to the increase in enamel and dentin permeability.
- In this case series 35% hydrogen peroxide (Pola office) was used as bleaching agent which contains potassium nitrate desensitizing agent.
- Potassium nitrate reduces dental sensitivity by decreasing the ability of nerve fibers in the dental pulp to repolarize after an initial depolarization due to pain sensation^[2].
- The addition of colorants in bleaching agent may help to provide a better absorption of high power diode laser light in the bleaching.

No significant effects on the morphology of the enamel surface after laser bleaching with diode laser was seen^[3].

- Bleaching treatment with hydrogen peroxide combined with a diode laser irradiation not only improves the bleaching effect but also protects against the change of enamel structure compared with the bleaching treatment without laser irradiation as treatment time is reduced and thus contact of bleaching agent with tooth surface is reduced leading to reduced enamel and dentine permeability.
- During laser application intrapulpal temperature increase of 5.5 degrees is regarded as threshold value which should not be exceeded so as to avoid pulpal damage and among all the lasers used for bleaching intrapulpal temperature increase by diode laser is least.

Conclusion

Significant color difference in patients treated with diode laser was noticed. The objective of laser bleaching is to achieve the ultimate power bleaching process using the most efficient energy source.

Currently, the laser has been proven to be the most valuable energy source for power bleaching with simple and short application in the office.

References

1. Cohen et al; Pathways of the pulp; 10th edition
2. RT Basting et al. Clinical Comparative Study of the Effectiveness of and Tooth Sensitivity to 10% and 20% Carbamide Peroxide Home-use and 35% and 38% Hydrogen Peroxide In-office Bleaching Materials Containing Desensitizing Agents, Operative Dentistry, 2012, 37-5, 464-473
3. A. Dominguez et al, Photo medicine and Laser Surgery, vol. 29, no.1, pp.53-59, 2011.
4. Nazanin Kiomars et al, Evaluation of the Diode laser (810nm, 980 nm) on color change of teeth after external bleaching

5. Dental Bleaching; Quintessentials of Dental Practice; Operative Dentistry; 6th edition; Martin G D Kelleher.
6. Mansoreh Mirzaie et al; A Comparative Study of Enamel Surface Roughness After Bleaching With Diode Laser and Nd: YAG Laser; Journal of Lasers in Medical Sciences; 2016 Summer;7(3):197-200
7. TM Auschill et al; Efficacy, Side-effects and Patients' Acceptance of Different Bleaching Techniques (OTC, in-office, at-home); Operative Dentistry, 2005, 30-2, 156-163
8. BA Matis et al; Eight In-office Tooth Whitening Systems Evaluated In Vivo : A Pilot Study; Operative Dentistry, 2007, 32-4, 322-327.