



Depigmentation of Gingiva Using Diode Laser: A Case Report

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ABSTRACT

Introduction: Gingival hyperpigmentation, occurring due to either increase in the amount of melanin production or the number of melanocytes in the epithelium, can significantly affect the smile aesthetics and is a major concern among youngsters. The current report aimed to present a case of gingival depigmentation in a young female treated using a diode laser.

Methods: A 26 year old female patient presented with hyperpigmentation in labial gingivae of both jaws. The depigmentation in upper jaw was performed using a diode laser at a wavelength of 808 nm, fiber diameter of 300 μ m, and power of 1 W and in continuous mode. Proper resolution of hyperpigmented areas at 1 week and 3 months follow-up was noticed. No recurrence was noticed till 3 months after the procedure.

Conclusion: The 808-nm diode laser is a safe and efficient method of gingival depigmentation resulting in less patient morbidity and an acceptable cosmetic outcome.

Keywords: Hyperpigmentation; Laser therapy; Diode laser; Melanocytes; Cosmetic dentistry.

I. INTRODUCTION

Gingival aesthesis is an imperative component of an appealing smile. Gingival hyperpigmentation affects the smile aesthetics negatively and hence, is undesirable.¹ Although genetically determined, gingival pigmentation is altered by environmental and pathological factors.^{2,3}

It can be of physiological or pathological etiology⁴ and can be caused by drugs, metals, genetics, endocrine disorders, ultraviolet rays, inflammation, malignancies, tattoos, and tobacco usage.^{5,6} Also, it can be the manifestation of systemic diseases like Peutz Jeghers syndrome and Kaposi's sarcoma.⁷

It occurs due to presence of excessive melanin in the basal/suprabasal layer of epithelium. There is either an increase in the amount of melanin production or in the number of melanocytes.⁸ Melanosomes produced by melanocytes uniquely synthesize and store melanin pigments.⁹ Melanocytes convert tyrosine to

melanin by using the enzyme, tyrosinase, which is then stored in basal cells in the form of melanosomes.⁴ The degree of pigmentation depends on a variety of factors, with the activity of melanocytes being particularly crucial.¹⁰

Gingival hyperpigmentation can be managed either by its removal or masking.¹¹ Approach for management depends on the aetiology and extent of the pigmentation and patient's expectations. Gingival depigmentation is a periodontal plastic procedure accomplished various modalities such as bur abrasion, scalpel, cryotherapy, electrosurgery, and lasers.¹²

The production of laser requires two main components: an energy source (e.g., lamps, electrical current or other lasers) and an optical resonator (a tube containing a medium surrounded by mirrors).¹³ The electrons are excited using the energy supplied by the energy source. After returning of the electrons to their primary state, photons of a particular wavelength are emitted.¹⁴ It is the medium that determines the properties, e.g., wavelength, of the laser. Common mediums are diode, CO₂, Nd:YAG, Er:YAG, KTP, etc.¹³ The CO₂, Er:YAG, Nd:YAG, and Diode are the lasers commonly utilized in gingival depigmentation.^{7,15,16} The use of diode laser leads to efficient performance of depigmentation procedure with minimal bleeding and greater patient comfort.¹⁷

This report presents a case treated with simple non-invasive depigmentation technique; using 800nm diode laser

II. CASE PRESENTATION

The present case report describes an effective laser depigmentation technique involving the selective removal of melanin pigmentation affecting the anterior labial gingiva, using a diode laser which yielded aesthetically excellent results.

A 26-year-old female reported with aesthetic concern regarding "dark-coloured gums" in the anterior area, which she had since childhood and had remained the same since then. She was systemically healthy and made no mention of any specific symptoms and also denied taking any medications. Clinical examination revealed



melanin hyperpigmentation of scores 3 with respect to labial gingiva of the upper and lower jaws respectively, according to the Dummett–Gupta Oral Pigmentation Index (DOPI)¹⁸ (Fig 1)

A periodontal examination revealed normal gingival contour with no pocketing, and with normal sulcus depth of 1-2 mm. There was no mobility and no bleeding on probing. All teeth related to the pigmentation area were tested for vitality. Clinically; there no carious tooth was detected.

Due to the fact that only upper gingiva of the patient was visible while smiling and as per the patient's request, the decision to perform depigmentation on only upper gums was made.

Informed consent of the patient, after elaborating risks, benefits and alternatives, was obtained both verbally and in written.

TREATMENT

After thorough completion of phase 1 therapy, depigmentation surgery using diode laser was planned. Safety goggles were applied for the patient, assistant and operator prior to surgery and local anaesthesia was achieved using lidocaine topical spray (Lidayn surface anaesthetic, Lidocaine U.S.P 15% w/w Inert solvents and propellant q.s to 100% w/w.) Irradiation was done using a diode laser with wavelength of 808 nm, power of 1 W, fibre diameter of 300 µm, total energy of 180 J, and energy density of 4 J/cm² in continuous mode. The laser was applied in contact mode using brushing motion at 45-degree angle to the tissue, moving from the attached gingiva towards the free gingiva. 1-1.5 mm of marginal gingiva was left in order to prevent any recession from occurring. Local anaesthesia spray was repeated as and when required. Debris was removed intermittently using gauze soaked in normal saline. No periodontal dressing was applied. (Fig 2) Patient was advised to brush her teeth with a soft tooth brush and to avoid smoking, alcohol, acidic or spicy foods, and beverages. Twice daily 0.2% Chlorhexidine rinse was prescribed along with ibuprofen 400 mg tablets to be taken if required. At one-week follow-up, patient reported no adverse events during healing. (Fig 3) At 3-month follow-up, complete healing and pink colour of treated site was observed (DOPI score=1).

III. DISCUSSION

Gingival hyperpigmentation has a high prevalence of 89% and affects the appearance of smile, especially patient's with high smile line.¹⁹ Among the various methods of depigmentation available,²⁰⁻²³ scalpel technique is

the most common and economic one with mild to moderate postoperative pain.²⁴ Laser, however, is emerging as a method of choice for various procedures including depigmentation. It has advantages of reduced infection risk and improved wound healing.²⁶ Accelerated healing results from laser stimulation of collagen synthesis and epithelialization.²⁷ Also, the bactericidal effect of a laser prepares a sterile environment with a minimum risk of infection.²⁸ However, caution should be taken to avoid bone exposure or gingival fenestration.²⁹ A comparison between scalpel and diode lasers yielded successful results with no statistical difference in wound healing, reappearance of gingival pigmentation and intensity. No bleeding or pain was reported with the diode; whereas, moderate pain was reported with scalpel treatment.³⁰ Today, the laser has largely found its place among the therapeutic treatment option for depigmentation. Several lasers have been used according to their wavelength: carbon dioxide (CO₂), semiconductor diode, neodymium-doped yttrium-aluminium-garnet (Nd:YAG), and erbium-doped yttrium-aluminium-garnet (Er:YAG). They are considered to be a less invasive de-epithelialization alternative to traditional surgical procedures that present several risks such as pain, oedema, and infection. The diode laser is a solid-state semiconductor laser that is emitted in continuous-wave and gated-pulsed modes³¹. It has an affinity for haemoglobin and melanin. Having wavelengths ranging from 800-980 nm, it targets the soft tissues. Also, as compared to Er:YAG laser, it requires shorter treatment time and has greater tissue penetration (1–10 nm vs. 1 µm)³². Minimal injury is produced on the treated site.³³ Its disadvantages include occurrence of ulcerations and recessions, especially in cases of a thin periodontium and it being an expensive tool, being uneconomical for the patient.³⁴ Also, there is present a significant risk of recurrence of pigmentation. Recurrence can also be attributed to residual melanocytes left during the procedure which can start to synthesize melanin once activated.³⁵ According to Agha and Polenik³⁶ and Hegde et al.,³⁷ the recurrence rate is lower in the diode laser group compared to those treated with erbium. In our case, the use of an 808 nm diode laser for gum depigmentation resulted in a relatively painless procedure with minimal intraoperative bleeding and post operative morbidity. An uneventful healing was reported and no recurrence was noticed till after 3 months of procedure.

IV. CONCLUSION

The diode laser (800nm) used in this procedure was found to be an effective depigmentation tool without reports of any patient discomfort, adverse effect or damage to the marginal gingiva or the underlying bone. It proved to be a safe, effective and relatively painless method as it could be done under only local anaesthesia spray. Also, the aesthetic results were highly acceptable. A longer patient follow-up is required to monitor the onset of recurrence of pigmentation.



Fig 1 Preoperative picture



Fig 2 Postoperative picture



Fig 3 Follow up- one week

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