

CASE REPORT

Management of Gingival Pigmentation with Diode Laser: Is It a Predictive Tool?

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ABSTRACT

Today, an attractive smile is the vogue for many individuals. Gingival health and appearance are essential components for an attractive smile and removal of unsightly pigmented gingiva is the need for a pleasant and confident smile. In some populations, gingival pigmentation seems to be a genetic trait and is irrespective of age and gender, hence gingival pigmentation is termed as physiologic or racial gingival pigmentation. Intraoral pigmentation is seen due to the presence of the fundamental pigment melanin that colors the tissues. Several treatment modalities have been suggested for gingival depigmentation. Many varying results have been observed, but the repigmentation has been documented to occur. The large variation in time of repigmentation may be related to the techniques used and the race of the patient. This case report demonstrates the probable cause of repigmentation where pigmentation has recurred limbs.

Keywords: Melanin, Laser, Keratinocytes, Melanocytes.

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INTRODUCTION

Any feeling of pleasure, happiness, laughter or simply a greeting leads to a smile resulting in the exposure of teeth and gingiva. If this exposure is optimal, then the result is a beautiful smile. A smile is not only a method of communication but is also a medium of socialization, interaction and attraction. The harmony of the smile is not only determined by the shape, position and the color of the teeth but also by the level and color of the gingival tissues. One of the major factors involved in the evaluation of smile is the color of the gingiva which is typically coral pink. The factors that affect the gingival color include its vascularity, thickness, keratinization and gingival pigmentation.¹ Gingival pigmentation may appear as early as 3 hours after birth.² Oral melanin pigmentation is well documented in the literature and is considered to be multifactorial. Whether the condition is physiological or pathological, it can be caused by a variety of local and/or systemic factors^{3,4} including genetic, tobacco use,⁵⁻⁷ prolonged administration of certain drugs especially antimalarial agents and tricyclic antidepressants.⁸ Gingival pigmentation has been classified as:⁹ 0—no pigmentation; 1—solitary unit(s) of pigmentation in papillary gingiva

without extension between neighboring solitary units; 2—formation of continuous ribbon extending from neighboring solitary units (Fig. 1).

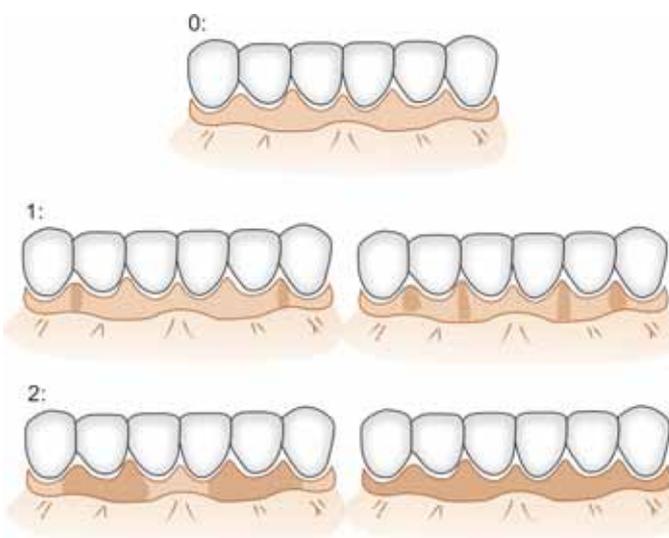


Fig. 1: Gingival pigmentation classification

Various procedures have been proposed for removal of the gingival pigmentation and to restore esthetics. These techniques include gingivectomy,¹⁰ free gingival autografts, surgical depigmentation,¹¹ electrosurgery,¹² cryotherapy,^{13,14} use of rotary instruments, chemical agents like phenol and alcohol¹⁵ and lasers.¹⁶

Lasers were first introduced in 1960 by Maiman and were brought into general practice by Dr William and Terry Myers.¹⁷ Although, CO₂ lasers are very commonly used for depigmentation procedure, they can damage tooth structure and the delivery system is very cumbersome. Since CO₂ lasers are used in noncontact mode, they can also cause loss of tactile sense.¹⁷ Also, diode is an excellent soft tissue laser and is indicated for cutting and coagulating gingival tissue.^{18,19} Thus, we decided to use diode lasers. Wavelengths of diode laser are highly absorbed by pigmented tissue. This case report presents recurrence of gingival repigmentation after depigmentation was carried out using a diode (940 nm) laser, but the pigmentation was comparatively mild.

CASE REPORT

An 18-year-old Indian female reported to dental office with a chief complain of gingival pigmentation. On examination, gingiva was found to be periodontally healthy with class 2

gingival pigmentation (Fig. 2). The patient was a nonsmoker and the pigmentation appeared to be of ethnic origin. She was informed of the various techniques that were available for gingival depigmentation. After an informed consent, it was decided to use a diode laser (940 nm) (Ezlase, Biolase Irvine, California, USA) to carry out the gingival depigmentation procedure. Local anesthesia (Lignox 2% Warren Pharma Maharashtra, India) was administered. A 400 micron tip was initiated using an initiator cork. The gingival epithelium and part of connective tissue was removed using 2.5 W pulsed mode. Pulse length and pulse interval were used for 0.50 microseconds. The tip was moved using brush strokes to prevent heating of the tissue. The area was irrigated using saline and was covered with periodontal dressing for 1 week (CoE Pak GC, Asia Hyderabad). Patient was recalled at the intervals of 1 week, 6 month and 1 year. Postoperatively, the gingival appeared pink color at the end of 1 week (Fig. 3) but when the patient returned after 6 months for follow-up, mild patchy pigmentation had reappeared (Fig. 4). The pigmented area further increased in size after 1 year (Fig. 5). The intensity of pigmentation was less compared to pretreatment intensity.



Fig. 2: Pretreatment photograph



Fig. 3: Seven days postoperative photograph



Fig. 4: Six months postoperative photograph



Fig. 5: One year postoperative photograph

DISCUSSION

Gingival pigmentation often forces the patient to seek therapy. Although various methods have been suggested for depigmentation, lasers are preferred for a number of advantages. Diode laser causes minimal damage to the periosteum and bone and it has the unique property of cleanly removing a thin layer of epithelium. Although healing of laser wounds is slower than healing of scalpel wounds, a sterile inflammatory reaction occurs after lasing.²⁰

Also the advantages of laser include:²¹⁻²⁴

1. A relatively bloodless surgical field
2. The ability to coagulate, vaporize or cut tissues
3. Sterilization of the wound site
4. Minimal swelling and scarring
5. Little mechanical trauma
6. High patient acceptance
7. Less postoperative pain, which may be due to the protein coagulum that is formed on the wound surface, sealing the ends of the sensory nerves
8. Smaller size of the units as well as the lower financial costs.

Initiation of the tip provides a hot tip effect which helps in concentrating energy at the tip.¹⁷ This helps in the easy removal of superficial cell layer and partly connective tissue without profuse bleeding or trauma to the mucosa. Melanin is produced by specialized pigment cells in gingiva called melanocytes. They are located in the basal layer of epithelium and epidermis. Hence, it is necessary to remove a part of the epidermis. The wound healing takes place by proliferation of cells present along the periphery of the wound. These cells migrate and help in reepithelialization of the wound.²⁵ Oral repigmentation refers to clinical reappearance of melanin pigment after a period of clinical depigmentation of the oral mucosa.¹ In this case, the pigmentation started to reappear after 3 months and during the 6 months follow-up period, the patchy pigmentation started to appear. The patchy pigmentation could be a result of the ongoing process of repigmentation. The decreased intensity of pigmentation may be due to less production of pigments. The intensity may increase with time and may reach to pretreatment level as it depends on the racial background of the patient. Similarly, Kon et al study was consistent with our findings; who demonstrated that permanent results can not be offered when gingival depigmentation procedures are performed for cosmetic reasons.²⁶ Also, Perlmutter and Tal reported the case of one patient in whom gingival repigmentation occurred 7 years after removal of gingival tissues.²⁷ Dummet and Bolden observed partial recurrence of hyperpigmentation in six out of eight patients after gingivectomy at 1 to 4 months.²⁸ Nakamura et al described depigmentation with CO₂ laser in 10 patients. No repigmentation was seen in 1st year but four patients showed repigmentation by 24 months.²⁹ The recurrence of pigmentation can be due to the nature of melanocytes. These cells arise from neural crest ectoderm and enter epithelium as melanocytes from about 8th gestational week and by 14th week, these cells may have reached densities of 2000/mm² in some regions. Melanocytes have a reproductive self-maintaining system of cells.³⁰ When locally depleted, they repopulate and keratinocytes derived growth factors FGF- β involve as mitogen.³¹ These cells lack desmosomes and possess long dendritic processes that extend between keratinocytes. Melanin is synthesized in melanocytes in small structures called melanosomes. These melanosomes are injected into the keratinocytes by the dendritic processes. All individuals, whether lightly or darkly pigmented have same number of melanocytes in any given region of mucosa. But, it has been observed that cells with melanin are present in connective tissue in the case of individuals who have a very high melanin pigment. These cells are actually macrophages that engulfed the melanin pigment.³²

CONCLUSION

Thus, the above case demonstrates that although lasers provide a lot of advantages for such cases, they are not the ultimate tool in the management of gingival pigmentation. Great caution must be exercised while selecting cases for depigmentation. Recurrence of pigmentation is dependent on racial background, habits and techniques. The expectations of the patient must be analyzed properly and the patient should be well informed before the procedure about recurrence. Hence, it is clear that people who are racially prone for gingival pigmentation need to be careful while undergoing such treatment since the results do not sustain for long time. Since, very little data is available on repigmentation after therapeutic procedures; long-term follow-up of such patients should be carried out to determine the time frame of repigmentation.

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