

CASE REPORT***Laser gingival depigmentation: A Modern Approach to Aesthetic Smile Enhancement***Annanya gupta ¹, Tabinda khan ¹, Chirag gupta ¹**Abstract**

Gingival hyperpigmentation can affect the aesthetics of a smile since it is brought on by an increase in the synthesis of melanin or the number of melanocytes in the epithelium. Although there are a number of treatment alternatives for this problem, laser therapy appears to be the most dependable and effective approach in this respect. This study reviews the outcome of laser treatment of gingival hyperpigmentation in terms of response to treatment and recurrence. Conclusion : Gingival tissue can be effectively and safely treated with the 808-nm diode laser.

INTRODUCTION

Health and appearance of [gingiva](#) are important parts of a smile [1]. The color of the gingiva is various among different individuals and it is thought to be associated with cutaneous [pigmentation](#). The gingival color depends primarily upon the number and size of [vasculature](#), epithelial thickness, degree of [keratinization](#) and pigments within the gingival epithelium.²

The most prevalent endogenous pigment is melanin, a dark pigment that is not generated from haemoglobin and is made by melanocytes found in the basal and suprabasal cell layers of the epithelium.²

It is widely accepted that pigmented patches only appear when melanocyte-synthesised melanin granules are transported to keratinocytes.³ This intimate connection is referred to as the "epidermal-melanin unit." Patients with a gummy smile often complain of "black gums" and request cosmetic correction but apart from this gingival hyperpigmentation in itself does not present a problem [4].

There is frequently a need for cosmetic treatment for gingival hyperpigmentation. Gingival melanin depigmentation has been treated cosmetically using a variety of techniques, including gingivectomy (Bergamaschi et al., 1993), gingivectomy with free gingival autografting (Tamizi & Taheri, 1996), acellular dermal matrix allografts (Pontes et al., 2006), electrosurgery (Gnanaesekhar & Al-Duwairi, 1998), cryosurgery (Yeh, 1998), abrasion with diamond bur (Bishop, 1994), and various lasers (Stabholz et al., 2003).

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The latest techniques of gingival depigmentation like laser, cryotherapy, free gingival autograft has been recognised as one of the most effective, comfortable and reliable techniques.⁵

CAUSES

Diffuse and Bilateral Pigmentation The colour ranges from light to dark brown. The attached gingiva is the most common intraoral site of such pigmentation, where it appears as a bilateral, well-demarcated, ribbon-like, dark brown band that usually spares the marginal gingiva.⁶

Addison's Disease

The increased production of ACTH induces melanocyte-stimulating hormone, which results in diffuse pigmentation of the skin and oral mucosa. Oral involvement presents as diffuse brown patches on the gingiva, buccal mucosa, palate and tongue, which may resemble physiologic pigmentation.⁷

Heavy Metal Pigmentation

Increased levels of heavy metals (e.g., lead, bismuth, mercury, silver, arsenic and gold) in the blood represent a known cause of oral mucosal discolouration.

The pigmentation appears as a blue-black line along the gingival margin and seems to be proportional to the amount of gingival inflammation.⁸ Depending on the type of metal implicated, a number of systemic signs and symptoms may be associated with chronic exposure.⁹

Kaposi's Sarcoma Early lesions appear as flat or slightly elevated brown to purple lesions that are often bilateral. Advanced lesions appear as dark red to purple plaques or nodules that may exhibit ulceration, bleeding and necrosis.⁹

Drug-Induced Pigmentation

A number of medications may cause oral mucosal pigmentation. It can cause pigmentation of the alveolar bone, which can be seen through the thin overlying oral mucosa (especially the maxillary anterior alveolar mucosa) as a grey discolouration.¹⁰

Postinflammatory Pigmentation

Histologically, there is increased production of melanin by the melanocytes and accumulation of melanin laden macrophages in the superficial connective tissue.¹¹

Smoker's Melanosis

Smoking may cause oral pigmentation in light-skinned individuals and accentuate the pigmentation of dark skinned patients.¹² Smoker's melanosis occurs in up to 21.5% of smokers.¹³

Focal Pigmentation**Hemangioma and Vascular Malformation**

The lesion may be flat or slightly raised and varies in colour from red to bluish purple depending on the type of vessels involved (capillaries, veins or arteries) and the depth of the lesion in the tissues.¹⁴

Varix and Thrombus

Varices are abnormally dilated veins, seen mostly in patients older than 60 years of age. If the varix contains a thrombus, it presents as a firm bluish purple nodule that does not blanch on pressure.¹⁵

Hematoma and Other Hemorrhagic Lesions

Hematomas, petechiae, purpurae and ecchymoses are caused by extravasation of blood into the soft tissues.¹⁶

Amalgam Tattoo and Other Foreign-Body Pigmentation

The gingiva and alveolar mucosa are the most common sites of involvement, but these lesions may also involve the floor of the mouth and the buccal mucosa.¹⁷

Melanotic Macules

The labial melanotic macule is a benign pigmented lesion that is common on the lower lip, and the oral melanotic macule is the same lesion seen inside the oral cavity, most commonly on the gingiva, buccal mucosa and palate.^{18]}

Pigmented Nevi

Histologically, nevi are composed of an accumulation of nevus cells in the basal epithelial layers, the connective tissue or both. Junctional nevi. Intramucosal and compound nevi are typically light brown, dome-shaped lesions.^[19]

HIV oral melanosis:

Ficarra et al. studied 217 patients seropositive for HIV over 2 years and found that 6.4% developed oral pigmentation. Majority of such patients had multiple macules on the oral mucosa, while labial, palatal and gingival pigmentation were seen in others ^[20].

CLASSIFICATIONS OF GINGIVAL DEPIGMENTATION

Score	Scale of Pigmentation
0	Pink—no pigmentation
1	Light Brown—mild pigmentation
2	Mixed Pink and Brown or Medium Brown
3	Deep Brown—Blackish Brown

Table1.Dummet-Gupta Oral Pigmentation Index

Score	Scale of Pigmentation
Degree 1	Isolated—only 1 or 2 pigmented interdental papillae
Degree 2	Numerous pigmented interdental papillae
Degree 3	Short continuous ribbons
Degree 4	Long continuous ribbon

Table 2. Hedin's classification

GINGIVAL DEPIGMENTATION TECHNIQUE

A variety of depigmentation techniques have been described in the literature which can be classified into the following groups:

- 1) Chemical methods: Using agents such as alcohols, phenols, and ascorbic acid
- 2) Surgical methods

A. Conventional techniques

- a. Gingival abrasion
- b. Split thickness epithelial excision/scalpel surgical technique/surgical stripping
- c. Free gingival grafting
- d. Acellular dermal matrix allograft (ADMA).

B. Electrosurgery**C. Laser****D. Cryosurgery****E. Radiosurgery****3.Methods used to mask the gingival pigmentation:**

- a. Free gingival graft.
- b. Acellular dermal matrix allograft.

CASE REPORT

A female patient aged 25 years with a chief complaint of "darkened gums" visited department of periodontology. The patient was systemically healthy and not under any medication. In clinical examination, periodontal tissues were healthy, but bilateral melanin pigmentation was present in the maxilla [Figure 1]. Dummet-Gupta oral pigmentation (DOP) index^[21] was used to determine the level of depigmentation, and the score was diagnosed as "4" for both of the patients (1: no clinical pigmentation, 2: mild clinical pigmentation, 3:

moderate clinical pigmentation, and 4: heavy clinical pigmentation).



Figure.1: Pre-operative view

Under local anesthesia, depigmentation procedure was applied by 810 nm wavelength diode laser (Cheese® Wuhan, China). The fiber-optic laser tip having a 400 µm diameter at 1.3 W power in continuous mode was kept in contact with the pigmented area. Depigmentation was performed in a horizontal direction, using the laser tip in contact mode on the pigmented part of the gingiva and parallel to the root surfaces not to cause overheating, and the area depigmented was wiped with gauze soaked in saline [Figure 2].



Figure.2: Intra operative (Depigmentation with laser tip)

Patients were brought back for a clinical evaluation and repigmentation rate at weeks 1, 4, and 12 after depigmentation.



Figure.3: Immediate post operative

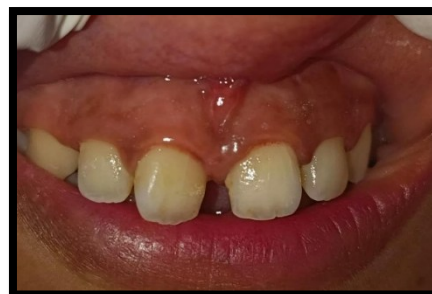


Figure.4: Three month follow up

DISCUSSION

Pigmented gingival tissue many a times forces the patients to seek cosmetic treatment. Several treatment modalities have been suggested and presented in the literature, ranging from a simple scalpel method to sophisticated lasers.²² According to Cicek (2003),²³ melanin pigmentation is caused by melanin deposition by active melanocytes located in the basal layer of oral epithelium.

Diode laser with 810 nm wavelength is used in soft tissues for coagulation and cutting. Diode laser irradiation also has bactericidal effect resulting in hemostasis.²⁴

An effective treatment modality employed in the present case is the depigmentation by diode laser. Here, radiation energy is transformed into ablation energy, resulting in cellular rupture and vaporization with minimal heating of the surrounding tissue.²⁵

According to **Atsawasuwan and Greethong** (1999),²⁶ laser beam produces bloodless field for surgery, causes minimum damage to the periosteum and underlying bone, and the treated gingiva and mucosa do not need any dressing. This has the advantages of easy handling, short treatment time, hemostasis, and decontamination and sterilization effects

Chandna et al. (2015) ²⁷ showed through their study comparing pain levels between electrosurgery and diode lasers that at all intervals (24 h, 1 week) the patients in the diode lasers group experienced significantly lesser pain levels as evaluated by the Visual Analog Scale (VAS).

CONCLUSION:

Most patients with severe gingival display require depigmentation treatment. Relapse or repigmentation is a significant risk, contingent on the operation and follow-up period. The rate of recurrence, patient preferences, and the clinician's experience all play a significant role in the surgery selection. More research is needed to determine the efficacy and efficiency of the current methods, however reports

indicate that employing lasers results in superior aesthetic outcomes and a low recurrence rate.^[28]

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