

# Gingival Depigmentation: Is Laser Better than Scalpel? A Case Series

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**Abstract:- A healthy pink smile is usually associated with aesthetic concerns especially when gingiva is visible. Gingival hyperpigmentation is an esthetic problem when gingiva is visible during speech and smiling. Gingival depigmentation is a periodontal plastic surgery wherein the visible melanin pigment on the gingiva can be removed using various techniques. In this case series we will be comparing two methods of depigmentation, the conventional scalpel and Laser among 3 patients.**

**Keywords:-** Depigmentation , Scalpel, Laser , Smoking.

## I. INTRODUCTION

Current era wherein facial plastic surgery is being on demand , periodontal plastic surgery is going hand in hand to enhance ones smile and esthetics. Smile boosts up once self confidence and is associated with physiological factors such as teeth, lips, and gingival tissue. Main factors that contribute to the colour of gingiva are number and size of blood vessels, thickness of the epithelium, extent of keratinization, and endogenous and exogenous pigmentation.<sup>1</sup> The main pigments that contribute to the colour of gingiva include melanin, carotene, reduced hemoglobin and oxyhemoglobin.<sup>2</sup> Gingival hyperpigmentation is caused by excessive melanin deposition in the basal and suprabasal cell layers of the epithelium.<sup>3,4</sup> Melanin is produced by specific cells known as melanocytes that reside in the basal layer and are then transferred to the basal cells where they are stored in the form of melanosomes. They can also be found in keratinocytes of gingival epithelium.<sup>5,6</sup>

Periodontal plastic surgery is a surgical procedure wherein the gingival hyper pigmentation is removed or reduced by various techniques.<sup>3</sup> Its main indication is for patients own esthetic satisfaction. for eg: patients with gummy smile. In this case series, two methods of depigmentation procedures -traditional scalpel method and laser were compared .

➤ *CASE 1: using conventional scalpel or blade method AND laser( split mouth)*

A 19-year-old Male patient reported to the Out- patient Department of Periodontology and Implantology with a chief complaint of “blackish discoloration of gums”. Patient had no relevant habit history and no relevant medical history. On clinical examination, Periodontal tissues were healthy with melanin pigmentation present bilaterally[Figure 1].

SCORE	SCALE OF DEPIGMENTATION
0	Pink–no pigmentation
1	Light Brown–mild pigmentation
2	Mixed Pink and Brown or Medium Brown
3	Deep Brown–Blackish Brown

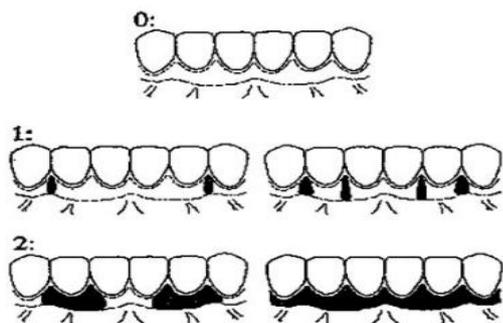
BOX 1: Dummett-Gupta Oral Pigmentation Index (DOPI)<sup>7</sup>

Class	Smile Line	
Class 1	Very high smile line	> 2 mm of the marginal gingiva visible.
Class 2	High smile line	0-2 mm marginal gingiva visible
Class 3	Average smile line	only gingival embrasures visible
Class 4	Low smile line	gingival embrasures and CEJ not visible

BOX 2 : The smile line classification (Liebart and Deruelle 2004)<sup>8</sup>

Score	
0	No pigmentation
1	Solitary unit(s) of pigmentation in papillary gingiva without extension between neighbouring solitary units
2	Formation of continuous ribbon extending from neighbouring solitary unit

BOX 3 : Classification according to extent of brownish or black pigmentation in labial gingiva of anterior teeth<sup>9</sup>



<b>Very poor</b>	<b>Tissue color: <math>\geq 50\%</math> of gingiva red</b>
Poor	Tissue color: $\geq 50\%$ of gingiva red
Good	Tissue colour: $\geq 25\%$ and $< 50\%$ gingiva red
Very good	Tissue colour: $< 25\%$
Excellent	All tissues pink

Box no 5: Healing index by Landry et al based on the color of the tissue colour post 14<sup>th</sup> day of depigmentation procedure.<sup>13</sup>

Type	Fu et.al 2010	Seibert and Lindhe (1989)
Thick biotype	Probe not seen through gingiva	$\geq 2$ mm
Thin biotype	Probe seen through gingiva	$< 1.5$ mm

BOX 4: Gingival biotype classification. (Fu et al.2010)<sup>10,11,12</sup>

CASE	DOPI score	Smile line	Extent of pigmentation	Gingival biotype	Treatment used /Etiology	Healing Index 14 th day
CASE 1	3	3	2	Thick, $> 1.5$ mm	Split mouth study, Scalpel vs laser Physiological	Very good (scalpel site ), excellent ( laser)
CASE 2	4	1	2	Thick $> 1.5$ mm	Split mouth study, Scalpel vs laser Physiological	Excellent (for both techniques)
CASE 3	3	2	2	Thick $> 1.5$ mm	Laser Pathological	Excellent

Box 6:- The score level for each of the cases is summarized in box no 6.

Under local anaesthesia, depigmentation procedure was carried out using B.P blade no: 15. A partial split thickness flap was scrapped off from the superficial epithelium [Figure1 A-C]. Care was taken not to leave any pigmented remnants over the denuded area. Once the bleeding was controlled, periodontal pack(coe-pack) was placed [Figure 1 D]. following a week, patient was recalled for re-evaluation and depigmentation using laser was carried out in the lower anterior arch on patients interest. The depigmentation procedure was carried out under local anaesthesia (Lignocaine with adrenaline in the ratio 1:80000 by weight)). Before starting the procedure, both patient and the staffs were protected from laser by wearing safety glasses The diode laser used in this study has fiber optic delivery system with beam diameter of 200  $\mu$ m, 810 nm wave length and was operated at a 1.5 W irradiation power, in a continuous contact mode. The ablation was operated in a paint brush type stroke movement over the epithelial soft tissue. [Figure 1 F]. The patient was recalled after 14days. The healing was satisfactory( Landry et al ) and patient reported laser to be relatively better compared with that of scalpel.

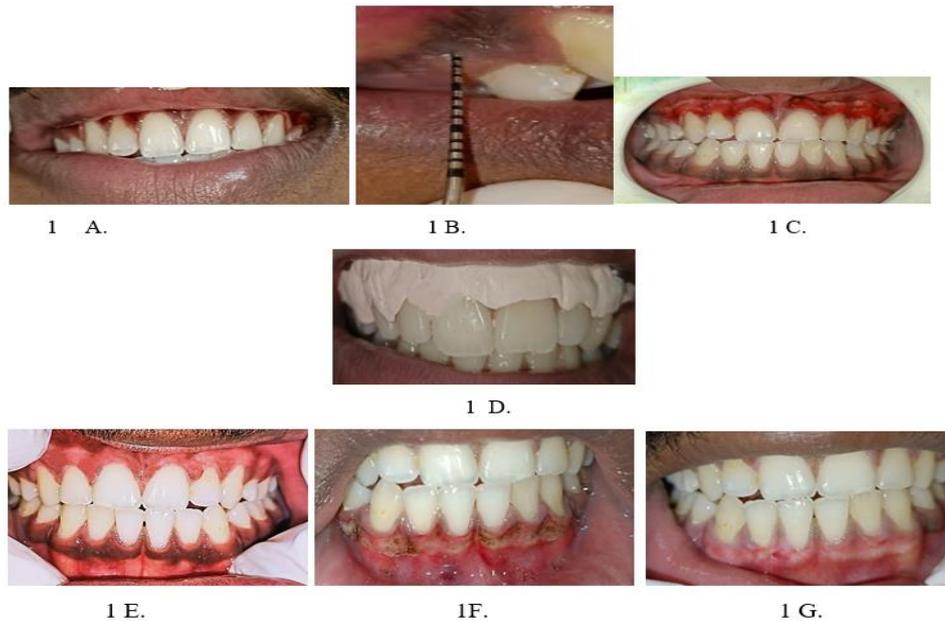


Fig 1:- a. Pre-operative B. Gingival biotype determination(< 2mm) c. intraoperative d. coe-pack placed e. re-evaluation on 10 th day F. depigmentation using laser G.14<sup>th</sup> day re-evaluation

➤ CASE 2: laser vs scalpel ( split mouth study )

A twenty-year young male patient reported to the department with chief complaint of unesthetic smile due to brownish-black gingiva. ( Fig.2.A). On clinical examination, the gingiva appeared to be brownish-black due to the presence of diffuse generalized bilateral melanin pigmentation in maxillary arch (Fig. 2.B). Medical history was taken to rule out the presence of any pathological conditions which can predispose to such pigmentation. No systemic diseases were found. Under local anaesthesia (Lignocaine with adrenaline in the ratio 1:80000 by weight), depigmentation was done by scalpel (No 15 BP Blade) in upper right anterior region (Fig. C) and by diode (Wavelength 800nm) laser in upper left anterior region (Fig. 2.C) at the same time. During the procedure, pressure was applied with sterile gauze soaked in local anaesthetic agent to control bleeding. Care was taken to remove the entire pigmented epithelium along with a thin layer of connective tissue . Periodontal pack ( coe-pack) was placed in this case.(Fig. 2 D). There was uniform healing at the end of 14 days( Fig 2.E) and patient was happy with the results. Assessment of gingival biotype is essential to determine the technique. Since laser is soft tissue specific it protects the underlying periosteum and bone when compared to that of scalpel ,as it depends on clinicians clinical expertise Easy handling, less chair time , better homeostasis, sterilization effects and excellent coagulation can be achieved with the laser as it produces a bloodless surgical field , causes minimum damage to the periosteum and underlying bone.<sup>20</sup>



Fig 2:- a. Pre-operative B. Gingival biotype determination(< 2mm) c. intraoperative d. Periodontal pack placed e. re-evaluation on 14 th day,

➤ *Case 3: Using Laser*

A 24 -years-old male patient reported to the Outpatient Department of Periodontology and Implantology with a chief complaint of dark colored gums [Figure 3 A]. Patient was asymptomatic 1 year back when he noticed blackish discoloration in his gums which was looking unesthetic . Patient used to smoke and has reported to quit the habit since 6 months. On intraoral examination, periodontal tissues were healthy but had bilateral melanin pigmentation present.. The procedure was carried out using laser similar to case 1 and 2 (Figure 3 B-D).Neither pain nor bleeding were observed during and after the procedure, the wound healing was completed in 1 week. The gingiva was generalized pink and healthy in appearance with satisfactory aesthetics [Figure 3E]



Fig 3:- a. Pre-operative B. Gingival biotype determination (< 2mm) c. intraoperative d. immediate post -operative, using laser e. re-evaluation on 14th day,

## II. DISCUSSION

The facial appearance is a complex mixture of oral and extraoral factors.<sup>14</sup> The gingiva plays a major role as an intraoral tissue which when affected by pigmentation can cause an unpleasant aesthetics and smile. There are several causes for gingival pigmentation, mainly the physiologic or pathological. The physiologic depigmentation has genetic predilection, whereas pathological is due to factors like smoking, drug induced, haemangioma ,graphite tattoo, amalgam tattoo etc. In clinical dentistry , one side effect of smoking is gingival pigmentation. While the smoking rate is decreasing in developed countries, the rate of young smokers has been on the rise for the past several years in some countries .<sup>15</sup> Hence it's a cause of concern for ones personal health as well. In the present study, two cases had physiological pigmentation and one had pathological ( smoking) pigmentation.

Various treatment methods have been developed for gingival depigmentation. Each technique has its own advantages and disadvantages. With passing years advanced treatment techniques have been developed , which has helped the clinicians as well as the patients. In the current study the conventional scalpel and laser method of depigmentation were used. In the first case, only scalpel method was used in the maxillary anterior regions. Scalpel surgical technique is one of the most earliest techniques to be employed. The procedure involves surgical removal of superficial gingival epithelium and some part of connective tissue, which heals by

secondary intention. The new epithelium formed is devoid of any pigments.<sup>16,17</sup> It achieved satisfactory healing in 14 days. However, scalpel technique causes bleeding during and after the procedure, and requires periodontal dressing at the surgical site. It is noted that scalpel technique is simple, economical and has faster healing . For the same patient in the mandibular anteriors, laser technique was used. The Diode Laser is an excellent soft tissue surgical laser as there is no interaction with the hard tissues. The hot tip effect of the fiber optic tip results in formation of a thick coagulation layer at the surgical site. This in turn provides a sterile environment.<sup>17</sup>The laser treatment had comparatively less bleeding due to its ability to cut and coagulate tissues. Moreover laser treatment had minimal or no pain on the first day post-operative compared to that of scalpel technique. The pain perception for scalpel technique might be due to the intrusive nature of the treatment causing blood loss and a wide open surgical wound. The open wound also contributes to discomfort as it heals by secondary intention.<sup>18</sup>laser have less pain post operatively, similar to studies conducted by Ribeiro et al<sup>19</sup> and Lagdive et al<sup>20</sup>. Scalpel surgery is economical and less technique sensitive compared to that of laser which is quite costly and requires proper armamentariums. Assessment of gingival biotype is essential to determine the technique to be followed. Since laser is soft tissue specific it protects the underlying periosteum and bone when compared to that of scalpel. They can be considered safe for close proximity to tooth structure. In this case report , Laser had better healing compared to scalpel (Landery et.al

healing index, BOX 6) and patient had better compliance with Laser treatment.

In the second case report, a split mouth study in the same arch was done to compare the patients view of treatment technique. Pain was comparatively less during and after the procedure at the laser site. The time management , efficacy, visibility and accessibility to the surgical site was enhanced by laser , as it provided a bloodless field. There was uniform healing on the 14<sup>th</sup> day for both the sides.

In the third case report, the patient had history of smoking which he claimed to have quit three months back. Hence the etiology in this case is associated with pathologic reason. Hedin et.al first reported that smokers reported with greater pigmentation when compared to that of non smokers<sup>15</sup> and studies showed that quitting the habit results in a qualitative decrease of pigmentation. Studies reports that younger generation of population have more significant pigmentation compared to the older generation. This might be due to the high activity of melanocytes in younger population. Hence in dentistry, describing the effects of smoking on pigmentation is effective in educating patients on smoking cessation. This might help them to quit the habit and enhance their esthetics as well. In this case report , depigmentation using laser was carried out and there was satisfactory result on the 14 th day.

Pigment recurrence post-treatment is common and has occurred within 24 h to 8 years. The mechanism of repigmentation is unclear. One hypothesis suggests that the melanocytes from the adjacent pigmented tissues migrate to the treated area and cause repigmentation. Despite repigmentation,, above mentioned case series showed satisfactory results so far .Patients should be recalled once in every 6 months for re-evaluation.<sup>21</sup>

### III. CONCLUSION

The present case series prove that both scalpel method as well as laser gave successful outcomes. The selection of treatment technique must depend on clinicians experience, patients affordability and ones integral choice. Though laser is expensive , depigmentation using laser has less pain, gives a bloodless surgical field, is quick and has uneventful healing. Education on depigmentation, especially among the younger generation with habits (smoking, tobacco chewing) can give a hand in its cessation.

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