

## CASE REPORT

# Management of Hyperpigmentation of Lips with 940 nm Diode Laser: Two Case Reports

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## ABSTRACT

Lip hyperpigmentation is an issue with the young adults when the dark brown patch on the lips makes an unsightly appearance. The laser energy is selectively absorbed by the melanin that causes pigmentation. This causes a photothermal ablation of melanocytes which leads to its disruption and subsequent removal by the body's immune system. It generally takes one to three treatments to lighten or remove unwanted pigmentation with laser. With most laser lip pigmentation removal, the pigmentation becomes darker for approximately 1 week and then flakes off. The treatments are spaced at least 1 month apart. There is also usually some redness and mild swelling in the treatment areas for a few days after treatment. The previous studies reported 100% clearance of pigmentation of the lips with a single laser treatment, and recurrence was not observed even after 6 months. This article highlights the use of 940 nm diode dental lasers for lip depigmentation procedure. Dental diode lasers have become a universal alternative tool for esthetic corrections of the oral cavity.

**Keywords:** Laser depigmentation, Melasma, Lip depigmentation, Diode lasers, Esthetic correction, Melanin, Hyperpigmentation.

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## INTRODUCTION

Lips are a visible body part at the mouth of humans and many animals. Lips are soft, movable, and serve as the opening for food intake and in the articulation of speech and sound. A woman's lips are also a visible expression of her fertility creating the illusion that a woman has more estrogen.<sup>1</sup> Human lips are a tactile sensory organ, and can be erogenous when used in kissing and other acts of intimacy.<sup>2</sup>

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Anatomically, the upper and lower lips are referred to as the 'Labium superius oris' and 'Labium inferius oris' respectively. The juncture where the lips meet the surrounding skin of the mouth area is referred as the vermilion border, and the typically reddish area within the borders is called the vermilion zone. The vermilion border of the upper lip is known as the Cupid's bow and is the area of transition from the skin to the oral mucosa.

Histologically,<sup>3</sup> the skin of the lips is stratified squamous epithelium with three to five cellular layers, and is very thin compared to typical face skin, which has up to 16 layers. Connective tissue papilla extend deep into the epithelium and are heavily vascularized. Between the outside and inside of the lips—the labial vessels, nerves, the orbicularis oris muscle (striated) which shapes the lips, and labial salivary glands are present. With light skin color, the lip skin contains fewer melanocytes (cells which produce melanin pigment which give skin its color). Hence, the blood vessels appear through the skin of the lips, which leads to their notable red coloring. With darker skin color, this effect is less prominent, as the skin of the lips contains more melanin and thus is visually darker.

## LASER EQUIPMENT

A 940 nm diode (Ezlase, Biolase, USA) was used for the removal of hyperpigmentation of the lips. Diode surgical soft tissue lasers are class IV lasers, and all laser safety precautions are to be followed precisely, such as wearing of protective eyewear specific to the wavelength by the patient, dental assistant and the operating dentist; minimizing reflective surfaces in the operating site, reduce the traffic within the operatory, the laser safety officer is present to ensure all safety protocols are adhered to control the hazards, etc.

## CASE REPORTS

The patients were initially evaluated for their concern about the appearance of lip discoloration after a consultation with general physician to rule out any systemic conditions. General prescriptions prescribed authentically by doctors or beauticians did not eradicate the patches on the lips, hence, increasing their anxiety to reduce the dark appearance significantly.

### Case 1

A 19-year-old boy had come to our dental clinic with concern of his dual colored lips (Fig. 1). His expectation was monotone lips and leveling his melanin tone. History taking was done meticulously and all systemic factors were ruled out. The patient was clinically examined, an informed consent was taken after complete explanation of the procedure, and all laser safety precautions were followed (Fig. 2). A topical anesthetic spray (15% lidocaine) and anesthetic gel (pricaine—lidocaine 8%, dibucaine 0.8% in a flavored aqueous base) was applied on the lips of the patient. The patient was asked to open the mouth widely as if a lipstick was to be applied and the depigmentation process was carried out from the upper lip to the lower lip in a sequential clockwise manner (Fig. 3). A 400  $\mu\text{m}$  7 mm length surgical disposable tip was used to ablate the lips and bring about depigmentation (Fig. 4). The laser setting was 1 W continuous mode (Fig. 5). Care was taken to remove the pigmentation along the commissure also. Visual analog

scale (VAS) was used to record pain, bleeding and redness. The entire lip was depigmented (Fig. 6), and the patient was comfortable throughout the treatment process. Low level laser therapy (LLLT) was done extraorally with 2.5 W using a specialized handpiece (Fig. 7). Postoperative instructions were given and the patient was encouraged to have cold beverages and to avoid hot and spicy food. The patient was advised to apply lip vaseline after 24 hours and throughout the healing process. The patient was continuously monitored at 24 hours postoperatively (Fig. 8), 3 days (Fig. 9) and 1 month (Fig. 10) postoperative interval to assess the repigmentation pattern.

### Case 2

A 21-year-old girl had visited our dental office and complained of dark pigmented lips (Fig. 11). It was an esthetic concern hampering her self-confidence and attitude. She had enquired many dermatologists too regarding her concern before visiting us. Her expectation was to lighten her lips



Fig. 1: Preoperative view of hyperpigmented dual toned lips (Case 1)



Fig. 2: All laser safety precautions adhered to pre- and intraoperatively (Case 1)



Fig. 3: Intraoperative view using diode lasers for depigmentation (Case 1)



Fig. 4: A 400  $\mu\text{m}$  initiated surgical tip used for depigmentation of lips (Case 1)



**Fig. 5:** Laser settings used in 940 nm diode 1 W, continuous wave (Case 1)



**Fig. 6:** Immediate postoperative view after depigmentation with laser (Case 1)



**Fig. 7:** Low level laser therapy done postoperatively (Case 1)



**Fig. 8:** One day postoperative view showing crusted lip appearance (Case 1)



**Fig. 9:** Three-day postoperative view showing pink lips (Case 1)



**Fig. 10:** One month postoperative view showing pink lips (Case 1)

so that she could wear light colored lipsticks. History taking was done meticulously, and all systemic factors were ruled out before commencing the treatment.

The patient was clinically examined, an informed consent was taken after complete explanation of the procedure

and all laser safety precautions were followed (Fig. 12). A topical anesthetic spray (15% lidocaine) and anesthetic gel (precaine—lidocaine 8%, dibucaine 0.8% in a flavored aqueous base) was applied on the lips of the patient. The patient was asked to open the mouth widely as if a lipstick was



**Fig. 11:** Preoperative view of hyperpigmented dark toned lips (Case 2)



**Fig. 12:** All laser safety precautions followed pre- and intraoperatively (Case 2)



**Fig. 13:** Intraoperative view using diode lasers for depigmentation (Case 2)



**Fig. 14:** A 400 µm initiated surgical tip used for depigmentation of lips (Case 2)



**Fig. 15:** Laser settings used in 940 nm diode 1 W, continuous wave (Case 2)



**Fig. 16:** Immediate postoperative view after depigmentation with laser (Case 2)

to be applied, and the depigmentation process was carried out from the upper lip to the lower lip in a sequential clockwise manner (Fig. 13). A 400 µm 7 mm length surgical disposable tip was used to ablate the lips and bring about depigmentation (Fig. 14). The laser setting was 1W continuous mode

(Fig. 15). Care was taken to remove the pigmentation along the commissure also. Visual analog scale was used to record pain, bleeding and redness. The entire lip was depigmented, and the patient was comfortable throughout the treatment process (Fig. 16). Low level laser treatment was done



**Fig. 17:** Low level laser therapy done postoperatively (Case 2)



**Fig. 18:** One day postoperative view showing crusted lip appearance (Case 2)



**Fig. 19:** Three-day postoperative view showing pink lips (Case 2)



**Fig. 20:** One month postoperative view showing pink lips (Case 2)

extraorally with 2.5 W using the specialized handpiece (Fig. 17). Postoperative instructions were given to the patient and she was encouraged to have cold beverages and to avoid hot and spicy food. The patient was advised to apply lip Vaseline after 24 hours and throughout the healing process. The patient was continuously monitored at 1 day (Fig. 18), 3 days (Fig. 19), 1 month (Fig. 20) and 6 months (Fig. 21) postoperative interval to assess the repigmentation pattern.

## PROCEDURE

The psychological quotients of patient's need to be considered and clearly evaluated before commencement of such procedures. A realistic evaluation of the dark-colored lips, the treatment process, postoperative healing and reappearance of the pigments is clearly informed to the patients. A realistic decision is then charted out. The patients appreciate such time spent with them before the procedure, so that the dentists can safely deliver what is possible.

Dummett and Gupta's oral pigmentation classification<sup>4,5</sup> (1964) and William and Terry Meyers gingival pigmentation



**Fig. 21:** Six-month postoperative view showing pink lips (Case 2)

index was modified to classify the lip tone under this new classification. The lip tone can be classified into categories, such as:

1. No islands of melanocytes giving a pink color to the lips.
2. Few light brown hued islands of melanocytes giving a light brown tone to the lips.

3. Mild dark hued islands interspersed on the surface of the lips giving a brown color.
4. Moderate dark hued islands interspersed on the surface of the lips giving a dark brown color.
5. Dark hued tone on entire lips giving it a chocolate brown color.
6. Severe dark hued tone on entire lips giving it a blackish brown-colored lips.

The laser tip was initiated and the outer skin layers of the lips were ablated sequentially in a clockwise manner so that no areas were left untouched. The tip was cleaned periodically to eliminate the hot tip effect while doing the complete procedure. Care was taken to continuously monitor the patients comfort level using the VAS. A crusted appearance of the lips is seen during the first 3 days of healing, which might be esthetically compromising. Application of Vaseline and vitamin E brings about radical relief for the patient. This crust is self-whitening and leaves a pink-colored lips beneath it in about 7 days.

The general postoperative instructions included are usage of a sunscreen lotion daily and staying out of the sun which decreases the activation process of the melanocytes thereby preventing early recurrence of pigmentation in the lips. Sun exposure increases the melanin in the skin and causes areas to darken. Eating green vegetables and fruits, and drinking plenty of water help to keep the lips hydrated and supple. Honey and glycerin works as best moisturizing agents, and neem paste or aloe vera paste revitalizes the lips. Rubbing cucumber to the lips also brings quick relief to chapped skin. Application of lime juice on lips helps to maintain the natural color of lips and keeps them shining and soft. Usage of beeswax contained in lip balms generally protects, seals and moisturizes the lips. Cocoa butter is also an excellent antioxidant which softens and protects the lips. Vitamin C intake is also essential for getting rid of lip pigmentation. Gentle massages using olive and peanut oil are great for pigmented lips. These homecare remedies aid in maintenance of healthy lips. Decades before, red rose petals were crushed and applied on lips to give it a beautiful red hue. General instructions, such as reduced caffeine and nicotine consumption, avoiding smoking also improves the lip color. Traditional methods, such as skin-bleaching products, chemical peel that are safe for sensitive skin can lighten skin color by peeling away layers of the skin. Application of hydroquinone cream decreases the production of melanin in skin and kojic acid, a natural product extracted from mushrooms works by blocking the melanin production in the skin. Topical retinoid application lightens the color in lips and reduces the pigment by promoting rapid cell turnover. Many of these techniques cumulatively can result in significant downtime with transient results but cannot be

fool proof methods to guarantee predictable results when done individually.

## DISCUSSION

Oral melanin pigmentation is caused due to endocrine disturbances, Albright syndrome, malignant melanoma, familial intestinal polyposis,<sup>6-8</sup> antimalarial therapy, Peutz-Jeghers syndrome,<sup>9</sup> trauma, hemochromatosis, chronic pulmonary disease, smoking,<sup>10</sup> racial pigmentation<sup>11</sup> to name a few. Melasma, a skin condition that commonly effects people with dark complexions, is characterized by patches of discolored skin on the lips and other areas of the face. This increase in melanin is often due to sun exposure, though pregnancy, hormonal imbalances<sup>12</sup> and genetics are other common causes. Laugier-Hunziker<sup>13,14</sup> (LH) syndrome is a rare benign condition in which hyperpigmentation of the lips and buccal mucosa occurs with no systemic associations.

A number of previous studies have been published over the past few years enumerating the successful removal of benign cutaneous<sup>15</sup> pigmented lesions, such as lentigines, café au lait macules, nevi,<sup>16</sup> nevus of Ota, and lentigo maligna<sup>17</sup> by a variety of lasers,<sup>18-23</sup> such as the excimer (351 nm), argon<sup>24-27</sup> (488, 514 nm), ruby<sup>28,29</sup> (694 nm), Nd:YAG<sup>30</sup> (1060 nm), and CO<sub>2</sub><sup>31</sup> (10,600 nm). Q-switched Nd:YAG lasers can also be very effective and requires a course of three to four treatments spaced 4 weeks apart which includes an advantage of minimal downtime.

Laser tissue interaction is basically based on the chromophore present in the host tissue and the ability of these chromophores to absorb the laser light. The melanocytes present in the basal layer get activated and spread over the tissue thereby creating a darker hue to the lips. Such melanin when closely placed causes an increase in the pigment of the lips giving it a dark appearance. The diode lasers have an affinity toward melanin and hemoglobin and hence were used to bring about the depigmentation process in this case report.

The diodes (810, 940 and 980 nm) are used widely in treatment of depigmentation procedures intraorally for over a decade now. The same concept was extended to bring about changes in the vermilion zone of the lips to enhance the esthetic quotient of patients who had a desire for such corrective treatment. Both the cases showed a radical change of pigmentation within 1 week of laser intervention and reduced the lip tone to two to four shades lighter which brought a change in the outlook of the patients. The VAS aided in understanding the psychological quotient in both the patients and also reiterated the fact that lasers are indeed painless and bloodless in nature. The patients recorded scores less than 1 and were very receptive to the concept of lasers in esthetic correction of their dark pigmented lips.

The patients were very happy and gave excellent feedback as it restored their confidence levels in addition to improving their self-esteem and self-worth. These patients further went out to become brand ambassadors for the procedure which further increased the practice revenue. Such procedures with predictable noticeable change are encouraged and can also aid in enhancing the smile design of the patient.

## CONCLUSION

Lip hyperpigmentation is an esthetic concern as it masks the overall appearance of the individual. Today's society gives immense credentials to smart pleasant looks and an internal craving to meet the demanding standards of society plays a pivotal role in propelling the patients to undergo such esthetic corrections intra, and extraorally. Lip depigmentation procedures further enhances the personality of the patients. Different from facial skin, the lip skin is more delicate and very sensitive to the outside environment. A routine protection with moisturizing lip care products helps in maintaining a healthy look and feeling of well-being.

Lasers being in the nonionizing part of the electromagnetic spectrum; no adverse side-effects are clinically reported with use of them as against conventional scalpel, electrocautery or usage of abrasive burs. The lip depigmentation procedures are bloodless, relatively painless, comfortable postoperative healing period, reduced medications has initiated and encouraged the patients to undergo such corrections willingly. The procedure itself being so simple the patients do not mind repeatedly doing this atleast once a year similar to removing the tan on the facial skin. Lasers have paved a new way for such esthetic corrections and thereby widened the horizon of the duty of a laser specialist dental surgeon to offer such treatment procedures in his clinic.

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