

Gingival Depigmentation using the Diode Laser: Three Case Reports

Udatta Kher, Zeenat Khan

ABSTRACT

Melanin pigmentation of the gingiva is a common occurrence. Depending on the gingival display during smiling, corrective measures may be needed for an esthetic purpose. Diode laser is a minimally invasive treatment option for the treatment of gingival melanin pigmentation. Three case reports of gingival depigmentation procedure performed using a 980 nm diode laser are presented here.

Keywords: Depigmentation, Diode laser, De-epithelialization, 980 nm.

How to cite this article: Kher U, Khan Z. Gingival Depigmentation using the Diode Laser: Three Case Reports. *Int J Laser Dent* 2012;2(3):78-83.

Source of support: Nil

Conflict of interest: None declared

INTRODUCTION

Oral pigmentation has been associated with a variety of endogenous and exogenous etiologic factors.¹ Most pigmentations are caused by five primary pigments.¹ These include: Melanin, melanoid, oxyhemoglobin, reduced hemoglobin and carotene.¹ Others are caused by bilirubin and iron.¹ Melanin, a non-hemoglobin derived brown pigment, is the most common of the endogenous pigments and is produced by melanocytes present in the basal layer of the epithelium.¹ Melanin pigmentation often occurs in the gingiva as a result of an abnormal or increased deposition of melanin.² Brown or dark pigmentation and discoloration of gingival tissue, whether of a physiologic or pathologic nature, can be caused by a variety of local and systemic factors.²

This type of pigmentation is symmetrical and persistent, and it does not alter normal architecture.² This pigmentation may be seen across all races and at any age, and has no gender predilection.² Clinical melanin pigmentation of the gingiva does not present a medical problem although complaints of 'black gums' may cause esthetic problems and embarrassment, particularly if the pigmentations are visible during speech and smiling (Fig. 1).²

Methods Aimed at Removing the Pigmented Layer³

- A. Surgical methods of depigmentation
 1. Scalpel surgical technique
 2. Cryosurgery
 3. Electrosurgery
 4. Lasers:
 - Neodymium: Aluminum-Yttrium-Garnet (Nd:YAG) lasers
 - Erbium (Er:YAG) lasers
 - Carbon dioxide (CO₂) lasers
 5. Diamond burs
- B. Methods aimed at masking the pigmented gingiva with grafts from less pigmented areas.
 1. Free gingival grafts
 2. Acellular dermal matrix allograft.

The following are three case reports of gingival depigmentation procedure performed using a 980 nm diode laser. The procedures were performed under local or topical anesthesia depending on the patient's pain threshold and the degree of depigmentation to be achieved.

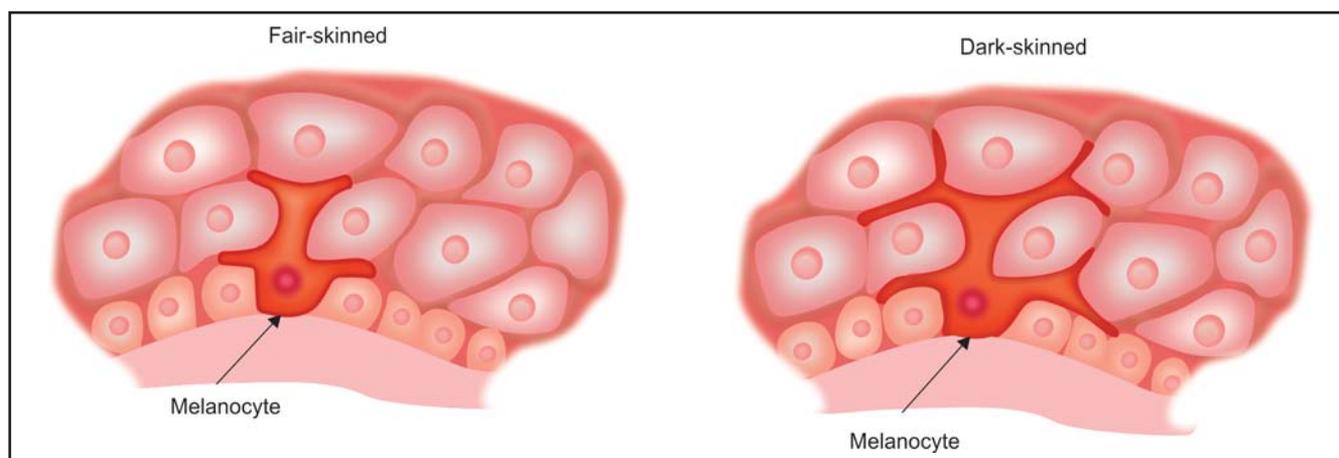


Fig. 1: Melanocytes as seen in fair and dark-skinned people

CASE REPORTS

Case 1

A 25-year-old patient reported to the dental office with a chief complaint of pigmented gingiva and unesthetic crowns in 11, 21 region. She had a high lip line with excessive display of gingiva on smiling. Melanin hyperpigmentation was found on labial surface of both maxillary and mandibular arches. Infiltration anesthesia was administered. Depigmentation of maxillary gingiva was done using

980 nm diode laser. Crowns in 11, 21 region were removed, margins refined and temporary crowns were given in the same appointment (Figs 2 to 12).

The patient was recalled after 24 hours and then after 1 week. Good soft tissue healing was observed and the patient's recovery from the procedure was uneventful. The definitive crowns made of lithium disilicate were bonded over the prepared teeth. The end result was esthetic and showed a marked improvement in the overall appearance of the patient on smiling.



Fig. 2: Preoperative view showing gingival pigmentation



Fig. 5: Preoperative view—crowns removed and margins refined



Fig. 3: Preoperative view



Fig. 6: Depigmentation done with 980 nm diode laser at 1 W power on a continuous mode



Fig. 4: Preoperative view

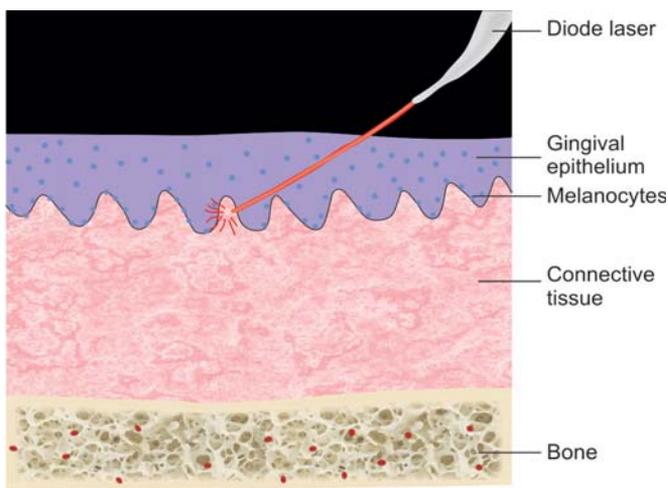


Fig. 6A

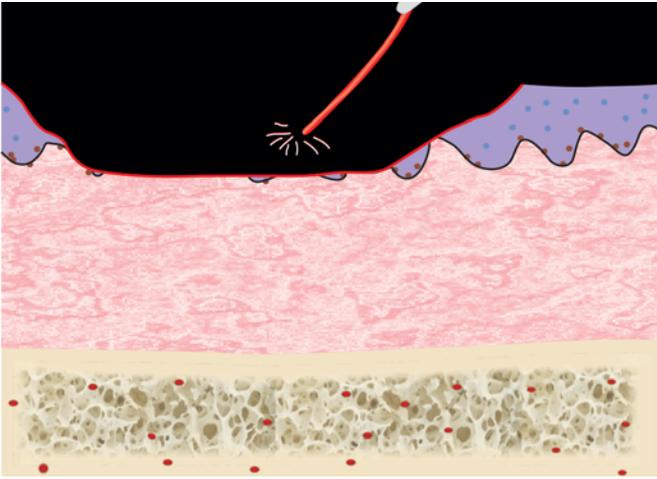


Fig. 6B: Gingival stripping up to the basal layer of the epithelium



Fig. 10: Postoperative view: Lithium disilicate permanent crowns bonded



Fig. 7: Silicone putty index with temporary crowns



Fig. 11: Postoperative view



Fig. 8: Temporary crowns cemented



Fig. 12: Postoperative view 3 months after procedure. Note the difference between gingival color in the upper and lower arch



Fig. 9: Temporary crowns removed. Note the tissue healing 1 week after surgery

Case 2

A 22-year-old female patient was conscious of the dark discoloration seen on her gums while smiling. She was traveling overseas after 4 days and hence sought a minimally invasive option for correcting the pigmentation. She was operated under topical anesthesia for a gingival depigmentation procedure using the 980 nm diode laser. A follow-up was done at the end of 4 days and a satisfactory result was achieved. The patient was completely asymptomatic postoperatively (Figs 13 to 15).



Fig. 13: Preoperative view showing melanin pigmentation



Fig. 16: Baseline situation. Severe gingival pigmentation



Fig. 14: Immediate postoperative view
Note the clean bloodless field



Fig. 17: Immediate postoperative view



Fig. 15: Four days postoperative view



Fig. 18: Three weeks postoperative view

Case 3

A 40-year-old female with history of smoking reported with a complaint of discolored gums. She was keen to get her smile designed. After cessation of her smoking habit, a gingival depigmentation procedure was performed using the technique mentioned above (Figs 16 to 18). The healing was uneventful and the patient was satisfied with the end result.

RESULTS

In all the above three cases, no postoperative pain, hemorrhage, infection or scarring occurred in any of the sites. The patients were observed at 1 day, 4 days and 1 week after the procedure and the healing was found to be uneventful. The patient's acceptance of the procedure was good and the results were excellent, as perceived by the

patient. The follow-up period spanned over 3 months. There was no recurrence of pigmentation observed in 3 months.

DISCUSSION

Various methods of de-epithelialization of the pigmented areas of the gingiva have been documented, such as scalpel surgery, gingivectomy, gingivectomy with free gingival autografting, cryosurgery, electrosurgery, chemical agents such as 90% phenol and 95% alcohol, abrasion with diamond burs, Nd:YAG laser, semiconductor diode laser and CO₂.

Scalpel technique for depigmentation is the most economical one as compared to other techniques which require more advanced armamentarium. Scalpel technique is relatively simple and versatile and it requires minimum time and effort. However, scalpel surgery causes unpleasant bleeding during and after the operation and it is necessary to cover the surgical site with periodontal dressing for 7 to 10 days.³

Gingival abrasion using a round bur is a comparatively simple method that is both easily used and readily repeated, if necessary, to eradicate any residual or repigmented area.³

Electrosurgery requires more expertise than scalpel surgery. Prolonged or repeated application of current to the tissues induce heat accumulation and undesired tissue destruction. Contact of current with the periosteum or the alveolar bone and vital teeth should be avoided.³

Cryosurgery procedure is followed by considerable swelling and it is also accompanied by increased soft tissue destruction. Depth control is difficult and optimal duration of freezing is not known, but prolonged freezing increases tissue destruction.³

Free gingival grafting is quite an invasive and an extensive procedure and it has not been advised for depigmentation procedures routinely. It also has the disadvantage of a second surgical site, additional discomfort and poor tissue color matching at the recipient site.³

The case reports describe depigmentation technique using 980 nm diode laser surgeries. A one step laser treatment is usually sufficient to eliminate the pigmented areas and does not require any periodontal dressing.³ This has the advantage of easy handling, short treatment time, hemostasis, decontamination and sterilization effects.³ But this approach needs expensive and sophisticated equipment that is not available commonly at all places and it makes the treatment very expensive.³

Lasers were introduced in 1960 by Maiman and were brought into general practice by Dr William and Terry Myers.⁴ Different lasers such as carbon dioxide (CO₂) laser, Nd:YAG laser, semiconductor diode laser, argon laser, Er:YAG laser and Er,Cr:YSGG laser have been reported as effective, pleasant and reliable method with minimal

postoperative discomfort and faster wound healing for depigmentation procedure. The diode laser is a solid-state semiconductor laser that typically uses a combination of gallium (Ga), arsenide (Ar), and other elements, such as aluminum (Al) and indium (In), to change electrical energy into light energy. Dental laser energy has an affinity for different tissue components. The 980 nm diode laser has energy and wavelength characteristics that specially target the soft tissues.⁵ It has an affinity for hemoglobin and melanin, therefore it is more efficient and better equipped to address deeper soft tissue problems. Since, the diode does not interact with dental hard tissues at reduced power settings, the laser is an excellent soft tissue surgical laser, indicated for cutting and coagulating gingiva and oral mucosa, and for soft tissue curettage or sulcular debridement.⁵ There is little information on the behavior of melanocytes after surgical injury. Spontaneous repigmentation has been shown to occur and the mechanism suggested is that the active melanocytes from the adjacent pigmented tissues migrate to treated areas. The large variation in time of repigmentation may be related to the technique used and the race of the patient. Repigmentation may also be attributed to the melanocytes which are left during surgery as stated by Ginwalla et al. These may become activated and start synthesizing melanin.⁵

Diode lasers have high electrical to optical efficiency, are small lightweight and compact, hence portable and are quiet devices as compared to other solid state and gas lasers (such as Nd:YAG, KTP:YAG, Ho, YAG, argon, erbium family and CO₂).⁶ The procedure can be performed using topical or infiltration anesthesia depending on the patient's pain threshold and the comfort of the operator.

CONCLUSION

The diode laser is a minimally invasive treatment option for the elimination of unesthetic gingival melanin pigmentation. None of the three patients experienced any intraoperative or postoperative pain or discomfort. The results in all the three cases were excellent at 3-month follow-up period. There was no evidence of repigmentation of the gingiva resulting in improved esthetics.

REFERENCES

1. Çiçek Y. The normal and pathological pigmentation of oral mucous membrane: A review. *J Contemp Dent Pract* 2003 Aug;(4)3:76-86.
2. Mokeem SA. Management of gingival hyperpigmentation by Surgical abrasion: Report of three cases. *Saudi Dent J* 2006 Sep-Dec;18(3):162-66.
3. Kanakamedala AK, Geetha A, et al. Management of gingival hyperpigmentation by surgical scalpel technique. *J Clin Diagn Res* 2010 April;4:2341-46.

4. Doshi Y, Khandge N, Byakod G, Patil P. Management of gingival pigmentation with diode laser: Is it a predictive tool?. *Int J Laser Dent* 2012;2(1):29-32.
5. Gupta G. Management of gingival hyperpigmentation by semiconductor diode laser. *J Cutan Aesthet Surg* 2011 Sep-Dec;4(3):208-10.
6. Mathews MA. Diode lasers: A versatile clinical tool (a technical and clinical review). *Intl J Laser Dent* 2011;1(1):9-15.

ABOUT THE AUTHORS

Udatta Kher (Corresponding Author)

Private Practitioner, Only Smiles Dental Centre, India, e-mail: udattakher@gmail.com

Zeenat Khan

Private Practitioner, Dental Designs, India