

Pink in, black out : gingival depigmentation - a clinical study

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INTRODUCTION

Gingiva is the most common intraoral tissue which is affected and responsible for an unpleasant appearance.¹ Gingival hyperpigmentation is defined as increase in pigmentation beyond the normally expected degree of the oral mucosa. There are various physiologic and/ or pathologic factors that can cause hyperpigmentation. However, primary culprits are the melanocytes which deposit excessive melanin, which in turn depends on the activity of tyrosinase enzyme.^{2,3} The color of healthy gingiva is varies from pink to purplish blue. Pigmented gingiva has always had a negative psychological effect on individuals and that attitudes towards pink coloration of gingiva are more favorable compared to brown, blue-black, or mixed colorations.^{3,4}

Both, the endogenous and exogenous factors can attribute to Hyperpigmentation. Medical conditions such as Peutz-Jeghers syndrome etc. are included under the endogenous factors.⁵ While heavy metals such as copper, mercury, bismuth are the various exogenous factors that cause hyperpigmentation.^{6,7}

ABSTRACT

Background: Recurrence of pigmentation is seen to be associated with gingival melanin depigmentation, which starts with melanocytic migration from the adjacent free gingiva. The extent and rate of recurrence varies according to various treatment procedures used and time period of follow-up. The aim of this study is to compare surgical stripping and diode LASER techniques for gingival depigmentation and to evaluate clinical repigmentation.

Methods: In this study, 20 sites from 10 patients with bilateral melanin hyperpigmentation were treated with surgical stripping and diode LASER techniques. Changes in Dummett Oral Pigmentation Index (DOPI) from baseline to 3 months postoperatively were recorded.

Results: At the 3-month postoperative visit, 53% of the scalpel group and 46% of the diode LASER group showed clinical repigmentation. Paired t test was used for statistical analysis. Change in DOPI score was statistically significant.

Conclusion: After gingival depigmentation, clinical repigmentation is an outcome of histologic changes in the melanocyte activity. Gingival depigmentation carried out by surgical stripping remains the gold standard, however diode LASER is seen nowadays as an upcoming treatment modality.

Keywords: Cell Biology, Hyperpigmentation, LASERS, Pain

Melanin is derived from “melas” which is a Greek word meaning black. It is a pigment produced endogenously by the melanocytes present in the basal and suprabasal layers of the epithelium. Premelanosomes are formed from active melanocytes which help in synthesizing tyrosinase enzyme, thereby accumulating within Golgi apparatus.⁸⁻¹¹ Oxidation of tyrosine occurs with the help of tyrosinase enzyme via a product named as dihydroxyphenylalanine (DOPA), thereby leading to the formation of melanin pigment, which forms homogeneous, opaque melanosomes.⁸⁻¹⁴ Because of the cytokine ability of the melanocytes, premelanosomes are transferred to the adjacent keratinocytes. Where keratinocytes play an active phagocytic role, it is known as inoculation.^{9-11,15} This relationship explains the concept of the epithelial-melanin unit.^{9,15-19} Regardless of race, individuals have approximately the similar number of melanocytes in any given location. Surgery, chemical, cryosurgery, and by means of electro cautery have been used with variable success in cases of gingival depigmentation.^{7,20} Thus the aim of this study is to compare surgical stripping and diode LASER techniques for gingival depigmentation and to evaluate clinical repigmentation.

MATERIALS AND METHODS

The study was approved by the Ethical committee. It was a split mouth study in which a total number of 20 sites (10 patients) with bilateral melanin hyperpigmentation were included. Subjects were divided into 2 groups randomly with the toss of coin: Group A & Group B - surgical stripping and diode

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LASER respectively. 10 sites with melanin hyperpigmentation were randomized for treatment with surgical stripping which was performed on the right side (group A) (Fig. 1) and the other 10 sites were randomized for treatment with diode LASER on the left side (group B) (Fig. 2). Zolar system, PHOTON PLUS, Diode LASER was used for oral application (wave length of 980 nm) (Fig. 3). LASER radiation is applied via the optic fiber (power 2 watt). Only the patients who were esthetically concerned about their appearance were motivated and enrolled in the study. Smokers, debilitating systemic disease/condition, lactating mothers and patients with clinically diagnosed periodontitis were excluded from the study. A comprehensive dental and medical history was recorded for each patient. Patients were given an explanation of the study and an informed consent was obtained. Change in Dummett oral pigmentation index (DOPI)²¹

from baseline to 3 months postoperatively were recorded.

DOPI SCORE: 0 = pink coloured gingiva (no clinical pigmentation); 1 = mild light brown gingiva (mild clinical pigmentation); 2 = medium brown or mixed brown and pink gingiva (moderate clinical pigmentation); or 3 = deep brown/ blue-black gingiva (heavy clinical pigmentation).

RESULTS

Clinically, the results showed 80% of the patients had dummet oral pigmentation score of 3, 20% had a score of 2 pre-operatively with scalpel while post-operatively patients with dummet score of 3 were reduced significantly and 60% of the patients had dummet score of 1 (Fig. 4). Pre-operatively 80% of the patients had dummet oral pigmentation score of 3 with LASER and a significant reduction was seen post- operatively. 53% of the patients had dummet score of 1 (Graph 5).



Fig. 1: Pre-operative picture showing gingival depigmentation



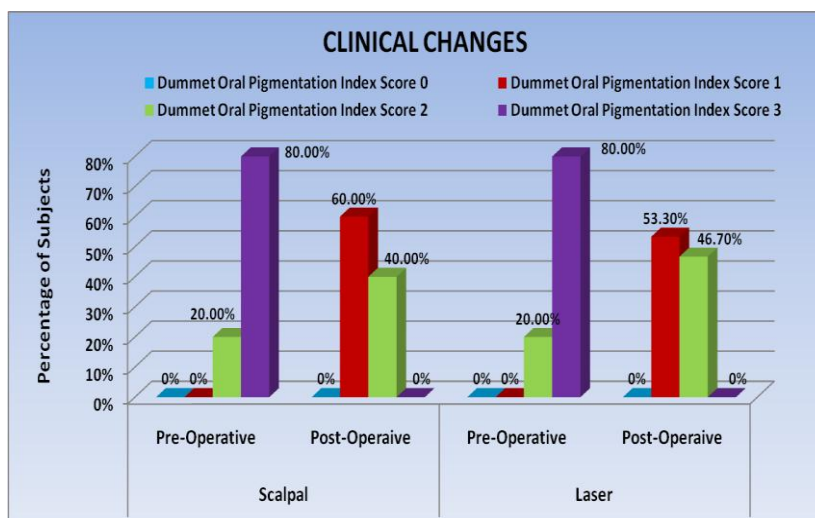
Fig. 2: Intraoperative picture where right side was treated with surgical blade while the left side with diode LASER



Fig. 3: Diode LASER



Fig. 4: Post-operative picture after 3 months



Graph 1: Showing clinical parameters assessed after 3 months

DISCUSSION

Gingival hyperpigmentation is of major concern for a large number of patients.^{22,23} Various treatment modalities have been suggested in the recent past but the repigmentation has been documented to occur.²⁴ According to the migration theory, the active melanocytes migrate from to the treated area from the adjacent pigmented tissues. Repigmentation may also occur from melanocytes which are left during surgery.²⁵ Results of the present study were in conjunction with the study done by Ginwalla et al. (1966)²⁶ who also attributed the repigmentation to left out melanocytes. 11 cases, four LASER and seven scalpel, at the end of 3 months a patchy repigmentation was seen, which could be due to the ongoing process of repigmentation.²⁵ The results are in conjunction with the finding of Bergamaschi et al,²⁷ who concluded that permanent results cannot be attained when gingival depigmentation procedures were done for esthetic reasons.²⁶ Also, Perlmutter and Tal²³ reported the case of one patient in whom gingival pigmentation reoccurred after 7 years of removal of gingival tissues. Dummett and Bolden (1963)²⁸ observed partial recurrence of hyperpigmentation in 75% patients after gingivectomy at 1-4 months. Nakamura et al.²⁹ described depigmentation in 10 patients using CO₂ LASERS. There was no re-pigmentation seen in the 1st year, though four patients showed re-pigmentation by 24 months. The recurrence of pigmentation may be due to the nature of the melanocytes. These cells originate from the neural crest cells of ectoderm and enter the epithelium as melanocytes from about the 8th gestational week and, by the 14th week, densities of these cells may be around 2100/mm² in some of the regions. Previous clinical and experimental reports have described various modalities by which depigmentation can be done. Electro surgery requires more expertise than scalpel surgery. Heat accumulation and undesired tissue destruction has been seen with prolonged or repeated application of current to the tissues. Contact with the periodontium or the alveolar bone and the vital teeth should be avoided.²⁸ The treatment success can only be determined by amount of depigmentation that has occurred and the time after which reappearance of pigments has occurred. As the present study was a short follow-up study hence, further studies should be taken up for a longer period to monitor and understand the process of reappearance of pigments.

CONCLUSION

As per this study, there was no statistical significance seen when both the techniques were compared in terms of recurrence of pigmentation. The results of this study concluded that both the scalpel as well as the LASER were quiet efficient for depigmentation of the gingiva. No post-operative complication was seen in both the procedures and uneventful healing of the gingiva was

seen. Gingival biotype and the degree of pigmentation determines the choice of technique to be used.

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