



Comparison of Diode Laser and Scalpel technique in the treatment of Gingival Melanin hyperpigmentation

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Received: 22 April 2023

Revised: 28 May 2023

Accepted: 10 June 2023

Published: 30 June 2023

Abstract

Background: A smile can bring happiness into one's life and also create positivity in the surrounding environment. Black or brown gums is a very common problem among all races of men and women that one complains to a periodontist. Depigmentation of melanin hyperpigmented gingiva can be carried out using scalpel and diode laser. **Material & Methods:** 10 patients having uniformly dense band of bilateral physiologic gingival hyperpigmentation on the facial aspect of maxillary and mandibular gingiva were included in this study. Each patient underwent initial phase 1 therapy (oral hygiene instructions, scaling and root planning) 1 week before the depigmentation procedure. A split mouth study was followed. In test group depigmentation was done by Laser and in control group depigmentation was done by scalpel. Followup was done at 1 week, 1 month, 3 months and 6 months. **Results:** There was no statistical significance in plaque and gingival index in both the groups. At 6 months in group A, repigmentation was seen in 7 patients and in group B, repigmentation was seen in 6 patients. **Conclusion:** The methods used here produced desired results and above all, the patients were satisfied with the outcome, which is the ultimate goal of any therapy. The scalpel remains the gold standard because of its convenience and cost effectiveness, but with proper adherence to safety measures, the diode laser can also be used to remove gingival pigmentation efficiently.

Keywords:- Gingival depigmentation, laser, scalpel.

INTRODUCTION

Smile can bring happiness into one's life and also create positivity in the surrounding environment. However, some people try to hide their smiles or not show much dentition due to the dark appearance of their gums. Black or brown gums are considered as one of the most common problems that one complains to a periodontist. An attractive and beautiful smile is gained by two essential components: gingival appearance and health of gingival tissues, as a

result, for the need of a pleasant and confident smile, removal of these dark appearing pigmented gingiva is an essential procedure that a periodontist should be taken into consideration.^[1]

The normal color of gingiva is described as "coral pink".^[2] Gingival color is determined by the number of factors such as the thickness of the epithelium, number and size of blood vessels, degree of keratinization, pigment cells such as melanin, found in suprabasal and basal

cell layers of the epithelium.^[3,4] However, among some men and women, the color of gingiva appears as dark or light brown or black patches due to the excessive deposition and hyperactivity of these melanotic cells in the epithelium.^[5] Melanin is an endogenous, non-hemoglobin-derived from melanocyte cells,^[6] a brown pigment considered to play a protective role in gingival in the animation process. However, discoloration of gingiva is one of the symptoms in some systemic conditions such as Albright's syndrome, Addison's disease, Kaposi's sarcoma, and melanoma, prolonged administration of certain drugs especially antimalarial agents and tricyclic antidepressants endocrine disturbance.^[7,8] Therefore, before any depigmentation treatment, the cause of pigmentation needs to be determined. Dental esthetics plays an important role in the appearance of patients' smiles, as the esthetic awareness is increasing in demand and also different procedures to achieve it.

Gingival depigmentation can be done by various methods such as surgical methods using a scalpel, bur abrasion method, electrosurgery, lasers with different wavelength such as carbon dioxide (10.600 nm), diode (810 nm), Neodymium:Yttrium Aluminum Garnet (1.064 nm), and Erbium:YAG (2.940 nm) lasers, cryotherapy.

Each procedure varies in its technique, healing time, time taken for the procedure, and treatment cost.¹The disadvantage of the gingival depigmentation procedure is the repigmentation. Repigmentation refers to the reappearance of melanin pigment after a period of clinical depigmentation.^[9] This occurs due to the migration of active melanocytes from

adjacent pigmented tissues to the surgically treated areas. However, this migration of cells can be eliminated by the removal of melanin from the interdental papilla and free gingiva.

MATERIAL AND METHODS

Subjects for this study were selected from the outpatient Department of Periodontics, Govt Dental College and Hospital Srinagar. In this study a total of 10 patients having uniformly dense band of bilateral physiologic gingival hyperpigmentation on the facial aspect of maxillary and mandibular gingiva were included using sample size determination formula $n = z^2pq/e^2$. The study was a split mouth, 6 month follow up study. Each patient underwent initial phase 1 therapy (oral hygiene instructions, scaling and root planning) 1 week before the depigmentation procedure. Patients were made aware of the procedure and an informed consent was taken from all the patients.

Inclusion criteria

- Subjects with age between 15-35 years
- Systemically healthy subjects with melanin hyperpigmentation in the facial aspect of anterior regions of maxillary and mandibular gingiva.

Exclusion criteria

- Subjects with thin biotype
- Pregnant and lactating women
- Patients using drugs prone to cause oral pigmentation like oral contraceptives.
- Smokers.

Methodology

Patients were divided into two groups

GROUP A-(Control group)

Scalpel surgery was planned to perform the depigmentation. Local anesthesia was infiltrated in the maxillary anterior region from premolar to premolar. A Bard parker handle with no. 15 blade was used to remove the pigmented layer. Pressure was applied with sterile gauze soaked in local anesthetic agent to control hemorrhage during the procedure. After removing the pigmented layer the surgical area was covered with a periodontal pack and postoperative instructions were given. Patients were advised to use 0.2% mouth rinse twice daily. After 1 week pack was removed and surgical area was examined. The healing was uneventful without any post surgical complications.

GROUP B- (Experimental group) Laser technique Local anesthesia was given to the patient. Melanin pigmented gingival was ablated by diode laser having a wavelength of 810nm in a continuous wave mode with a flexible fiberoptic system. The tip was held in the light contact with target tissue and procedure was performed with light sweeping brush strokes until blister formation occurred in target tissues. Blistered tissue was scraped off with wet saline moistened gauze to remove the epithelium containing melanin pigmentation. The procedure was performed from cervico apical direction in all pigmented areas. After completion of procedure no periodontal pack was given. After 1 week surgical area was examined. Healing was uneventful without any post surgical complications.



Figure 1: Preoperative photograph



Figure 2: Immediate postoperative photograph



Figure 3: Periodontal dressing placed



Figure 4: Postoperative photograph after 1 week.



Figure 5: Postoperative photograph after 3 months



Figure 6: Postoperative photograph after 6 months

Depigmentation by laser



Figure 7: Preoperative photograph

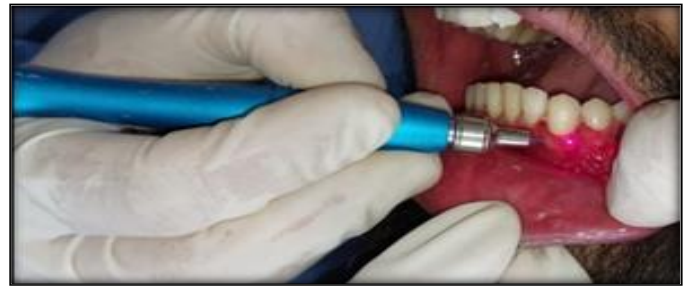


Figure 8: Depigmentation by laser



Figure 9: Immediate postoperative photograph 3 months



Figure 10: Postoperative photograph after



Figure 11: Postoperative photograph after 6 months

Clinical parameters assessed were

Plaque index

Gingival index

Gingival repigmentation

Preoperative and postoperative observations about gingival pigmentation were made according to Dummet and Gupta.^[7]

0_no clinical pigmentation

1_Mild clinical pigmentation

2_Moderate clinical pigmentation

3_Heavy clinical pigmentation (deep brown or bluish black colour).

After treatment, recall visits were made at 1 week, and 1, 3 and 6 months postoperatively. Plaque index and gingival index were taken at baseline and at all recall visits.^[11,12] Sites were examined for clinical repigmentation using Dummet oral pigmentation index at 1 week, 1, 3 and 6 months postoperatively by single calibrated examiner. The collected data was subjected to statistical analysis.

RESULTS

The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as Mean \pm SD and categorical variables were summarized as frequencies and percentages. Graphically the data was presented by bar diagrams. Student's independent t-test or Mann-Whitney U-test, whichever feasible, was employed for comparing continuous variables. Chi-square test or Fisher's exact test, whichever appropriate, was applied for comparing categorical variables. A P-value of less than 0.05 was considered statistically significant. Study results were presented for the amount of

repigmentation for a period of 6 months postoperatively. The mean plaque index and gingival index scores were low at 6 months when compared with baseline as shown in [Tables 2 and 3]. There was no statistically significant difference in plaque index and gingival index between both the groups at all intervals ($p > 0.05$). At recall intervals of 1 week and 1 month, there was no recurrence of pigmentation in both groups. At 3 months, in 20% of sites treated by scalpel scraping and 10% sites treated by diode laser, it showed the recurrence of pigmentation. This was not significant between both the groups ($p > 0.05$). At 6 months, recurrence was seen in 70% of sites treated by scalpel scraping and 60% of laser-treated sites. The laser-treated sites showed lower repigmentation than scalpel scraping technique, which was not significant ($p > 0.05$) [Table 4].

DISCUSSION

Pigmented gingiva has many aesthetic concerns nowadays. Although several techniques are currently in use, the scalpel technique is still the most widely employed as it is most economical compared with other techniques, which require more advanced armamentarium. Therefore, the scalpel technique is highly recommended in consideration of the equipment constraints in developing countries.^[13] The present study has a split-mouth design, which is an excellent method to determine the clinical relevance for comparison of the two different depigmentation techniques to remove gingival melanin hyperpigmentation. By comparing the techniques within a subject, it minimizes the influence of numerous intersubject factors, such as age, facial complexion, etc. The large variation in the time of occurrence of

repigmentation may be related to the race of the patient and type of the technique used in treating depigmentation.

The mechanism of repigmentation is not understood and there is little information on the behavior of melanocytes after surgical injury. According to the migration theory, active melanocytes migrate from the adjacent pigmented tissues to operated areas, causing repigmentation. Repigmentation may also be attributed to the melanocytes that are left during surgery as stated by Ginwalla et al.^[14] These may become activated and start synthesizing melanin. Ginwalla reported repigmentation in 50% of their cases between 24 and 55 days. Dummett and Bolden,^[15] reported repigmentation in 67% of the areas, as early as 33 days after gingivectomy procedure. In our study the mean plaque index at baseline in group A was 1.36 with a SD of 0.43. In Group B mean plaque index was 1.39 with a SD of 0.54 with a p value of 0.98. On the other hand at 6 months mean plaque index was 1.29 in group A with SD of 0.24 and in group B it was 1.28 with SD of 0.27 and a p value of 0.9. In group A mean GI score was 1.29 with SD of 0.36 and in group B it was 1.31 with SD of 0.43. At 6 months GI score in group A was 1.23 with SD of 0.32 and in group B 1.25 with SD OF 0.35 with a p value 0.8 which is statistically non significant. months postoperatively. The mean plaque index and gingival index scores were low at 6 months when compared with baseline as shown in [Tables 2 and 3]. There was no statistically significant difference in plaque index and gingival index between both the groups at all intervals ($p > 0.05$). At 3 months, in 20% of sites treated by scalpel scraping and 10% sites treated by diode laser, it showed the recurrence

of pigmentation. This was not significant between both the groups ($p > 0.05$). At 6 months, recurrence was seen in 70% of sites treated by scalpel scraping and 60% of laser-treated site. The advantage of the diode laser is the maintenance of a relatively bloodless surgical and postsurgical course. The mechanisms by which the diode laser leads to ablation or decomposition of biological materials are photochemical-, thermal-, or plasma-mediated. Thermal ablation means that the energy delivered by the laser is coupled into irradiated material by an absorption process, yielding a temperature rise in that tissue. As the temperature increases at the surgical site, the soft tissues are subjected to warming (37–60°C), protein denaturation, coagulation (>60°C), welding (70–900°C), vaporization (100–150°C), and carbonization (>200°C). The rapid rise in intracellular temperature and pressure leads to cellular rupture, as well as release of vapor and cellular debris, termed the laser plume. Moritz et al in an in vitro and in vivo study showed a bactericidal effect of diode laser. They found an extraordinarily high reduction of bacteria.

CONCLUSIONS

The methods used here produced desired results and above all, the patient was satisfied with the outcome, which is the ultimate goal of any therapy, i.e., carried out. However, a larger series of patients are needed to offer conclusive evidence of the efficacy of both the procedures. The scalpel remains the gold standard because of its convenience and cost effectiveness, but with proper adherence to safety measures, the diode laser can also be used to remove gingival pigmentation efficiently.



REFERENCES

1. Bhardwaj A, Grover HS, Lal S. Gingival depigmentation with scalpel and diode laser. *World J Dent.* 2012;3(4):359-362. DOI: 10.5005/ jp-journals-10015-1190.
2. Suchetha A, Shahna N, Bhat D, Apoorva SM, Sapna N. A review on gingival depigmentation procedures and repigmentation. *Int J Appl Dent Sci.* 2018;4(4):336-341.
3. Mokeem SA. Management of gingival hyperpigmentation by surgical abrasion: report of three cases. *Saudi Dent J.* 2006;18(3):162-166.
4. Patil KP, Joshi V, Waghmode V, Kanakdande V. Gingival depigmentation: A split mouth comparative study between scalpel and cryosurgery. *Contemp Clin Dent.* 2015;6(Suppl 1):S97-S101. doi: 10.4103/0976-237X.152964.
5. Grover HS, Dadlani H, Bhardwaj A, Yadav A, Lal S. Evaluation of patient response and recurrence of pigmentation following gingival depigmentation using laser and scalpel technique: A clinical study. *J Indian Soc Periodontol.* 2014;18(5):586-92. doi: 10.4103/0972-124X.142450.
6. Thangavelu A, Elavarasu S, Jayapalan P. Pink esthetics in periodontics - Gingival depigmentation: A case series. *J Pharm Bioallied Sci.* 2012;4(Suppl 2):S186-90. doi: 10.4103/0975-7406.100267.
7. Dummett CO. A classification of oral pigmentation. *Mil Med.* 1962;127:839-40.
8. Leston JM, Santos AA, Varela-Centelles PI, Garcia JV, Romero MA, Villamor LP. Oral mucosa: variations from normalcy, part II. *Cutis.* 2002;69(3):215-7.
9. Guf ran K. A comparative evaluation of two different techniques for esthetic management of gingival melanin hyperpigmentation: a clinical study. *J Dent Res Rev.* 2016;3(1):13. DOI: 10.4103/2348-2915.180109.
10. Dummett CO, Gupta OP. Estimating the epidemiology of oral pigmentation. *J Natl Med Assoc.* 1964 Sep;56(5):419-420.
11. Silness J, Loe H. Periodontal disease in pregnancy. *Acta Odontol Scand.* 1964;22:121-135.
12. Loe H, Silness J. Periodontal Disease in Pregnancy. I. Prevalence and Severity. *Acta Odontol Scand.* 1963;21:533-51. doi: 10.3109/00016356309011240.
13. Bhusari BM, Kasat S. Comparison between scalpel technique and electrosurgery for depigmentation: A case series. *J Indian Soc Periodontol.* 2011;15(4):402-5. doi: 10.4103/0972-124X.92580.
14. Ginwalla TM, Gomes BC, Varma BR. Surgical removal of gingival pigmentation. (A preliminary study). *J Indian Dent Assoc.* 1966;38(6):147-50.
15. Dummett CO, Bolden TE. Postsurgical clinical repigmentation of the gingivae. *J Oral Surg Oral Med Oral Pathol.* 1963;16:353-365.

Source of Support: Nil, Conflict of Interest: None declare