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Depigmentation using Scalpel and Diode Laser: A Split Mouth Case Report

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Abstract:- In this case report, a split mouth study was carried out to differentiate the usage of scalpel on the 11, 12, 13 region and 810nm diode laser (Denlase) on the 21, 22, 23 region for depigmentation. Re-evaluation was carried out at the end of one month. Healing was uneventful, with faster healing seen on the scalpel side than laser at the end of 1 week. Complete wound healing was achieved at the end of one month. Scalpel is still the most effective technique for gingival depigmentation, although laser has better patient related outcomes like less pain and discomfort post operatively.

Keywords:- *Depigmentation, Scalpel, Surgical, Diode laser.*

I. INTRODUCTION

The harmony of the smile is determined not only by the shape, position, and color of the teeth but also by the gingival tissues.(1) Oral pigmentation is the disolouration of the gingiva along with the hard palate which could be caused by either the endogenous factors like endocrine disturbances, syndromes like Albright syndrome and genetics; or the exogenous factors like heavy metals consumption or habits like smoking. Either way the pigmentation is more pronounced in the anterior labial region, most commonly seen in females than males.

The most common cause of pigmentation is physiologic pigmentation contributed due to the underlying pigments like melanin, oxy hemoglobin, hemoglobin and carotene- out of which melanin is the major contributor. Melanin is deposited in the epithelium by the melanocytes in the basal and suprabasal layers. This degree of pigmentation varies from person to person due to a variety of genetic and environmental factors. This has made the condition very prevalent in country like India where accentuated racial pigmentation is the most common complaint with which patients approach the dentist. (2) This complaint of discoloured gums is quite common in patients with a high smile line or those concerned with the esthetics, where the discoloured gums are visible on smiling- necessitating the depigmentation procedure.

Depigmentation is a periodontal plastic procedure where the pigmented part of epithelium is removed using various techniques like scalpel, laser, cryosurgery, electrosurgery, chemical methods (not in use currently) and using methods of masking discoloured gingiva like free gingival graft. Although any of the above techniques may be employed for depigmentation, selection of a technique should be based on clinical expertise, patient's affordability and individual preferences.(3) This technique selection is also decided by many factors like patient's esthetic demands, lip line, skin tone and lip colour. Surgical depigmentation using scalpel is considered the gold standard, with few limitations, which have necessitated the usage of various other techniques to counteract the same.

The advent of laser has revolutionized the practice of painless medicine and dentistry. The post operative pain from oral and otolaryngological surgical procedures has been claimed to be reduced in laser surgery.(4) Hence, the present case report is a split mouth comparative study between laser and scalpel on the pigmented maxillary labial gingiva.

II. CASE PRESENTATION

A 30-year-old female patient presented with the complaint of black gums to the Department of Periodontology at the AJ Institute of Dental Sciences and Hospital, Mangalore. It had been present since childhood, which suggested physiological melanin pigmentation. The patient had a wheatish brown complexion based on the skin variations given by Aina et al in 1978 (5) with no family history of pigmentation, no underlying systemic condition and no history of any adverse habits. Clinical examination revealed generalized gingival melanin pigmentation in the upper and lower jaws. A diagnosis of score 3 DOPI pigmentation was made and surgical depigmentation was planned following scaling and root planing. The patient was informed about the numerous treatment choices available and the possibility of re-pigmentation after a specific period. Phase I treatment of scaling and root planing was carried out in the first appointment itself. Phase 2 involved the split mouth approach for depigmentation using scalpel and laser.

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0 - No clinical pigmentation (pink gingiva)
1 - Mild clinical pigmentation (mild light brown color)
2 - Moderate clinical pigmentation (medium brown or mixed pink and brown colouration)
3 - Heavy clinical pigmentation (deep brown or bluish black tissue).

Dummett's oral pigmentation index(DOPI) by Dummet and Guptha in 1966

Class 1: Very high smile line – More than 2 mm of the marginal gingiva visible.
Class 2: High smile line – Between 0 and 2 mm of the marginal gingiva visible.
Class 3: Average smile line – Only gingival embrasures visible.
Class 4: Low smile line – Gingival embrasures and cemento-enamel junction not visible.

The smile line classification (Liebart and Deruelle 2004)

III. PROCEDURE

A written informed consent was obtained from the patient after explaining the procedure in detail. A detailed medical history alongwith routine blood investigations were carried out and any possible contraindication for the surgery were ruled out. Based on the smile line, depigmentation was planned from 13 to 23 using split mouth approach with scalpel and laser. First, local infiltration of 2% Lignocaine with adrenaline was administered.

- Conventional Technique - Conventional technique of scalpel was planned for upper anterior region from 13 to 11 using a #15 blade . Pigmented tissue was carefully excised only involving the attached gingiva and interdental papilla, without affecting the normal architecture of the gingiva. Bleeding was controlled by applying pressure pack with sterile gauze.
- Laser Technique- Depigmentation in relation to 21, 22,23 was done using diode laser of 810 nm wavelength (Denlase). The laser was used in continuous mode at a power output of 1.5 W. The melanin pigmented region was successfully ablated with the hollow fiber tip, taking care to remove the necrotic tissue using dampened sterile gauze. The procedure was carried out until the desired depth without exposing the periosteum due to the deep seated pigmentation.

Analgesic was prescribed for the management of pain. Patient was revaluated at the end of 1 week and 1 month. After 1 month, the patient was recalled and the surgical area was re-examined, which showed complete healing.

The patient experienced no pain or discomfort, and was completely satisfied with the esthetic outcome. The pigmented region of the mandibular anterior gingiva was not of any esthetic concern for the patient, so it was left as it was.

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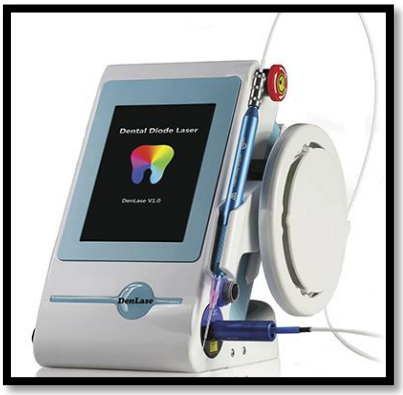
(a) Generalized gingival hyperpigmentation with average smile line and DOPI score 3

(b) Gingival depigmentation from 11 to 13 using scalpel



(c) Gingival depigmentation from 21 to 23 using 810 nm diode laser (Denlase)

(d) Immediate post-operative view post gingival depigmentation

(e) Checking for the gingival exposure immediate post operatively

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(f) Healing on 7th day post operatively. Note sloughing on the side treated with laser (21 to 23)

(g) Healing at the end of 1 month postoperatively

IV. DISCUSSION

Melanin pigmentation is prominently due to the location of melanocytes in the basal and suprabasal layers of the gingival epithelium. The choice of technique selection depends on the extent of the gingival pigmentation and the patient's comfort too.

Scalpel is one of the first methods to be applied for depigmentation that involves removal of the pigmented epithelium along with some amount of underlying connective tissue and allows the wound to heal by secondary intention. It is considered to be the gold standard. Even with the advancements in dental armamentarium, the use of surgical scalpel is still the preferred and more commonly used technique owing to its ease of use and economy compared to other techniques.(1) However, the use of electrocautery and laser as techniques to achieve gingival depigmentation is also employed for their ease and advancement as a surgical technique.(2)

Scalpel technique has an advantage of being effective and requires minimum time and effort; however, its disadvantage is mainly bleeding, postoperative pain, and discomfort. (3)

Recently, laser ablation has been recognized as one of the most effective, comfortable and reliable techniques for gingival depigmentation.(4) This procedure has special characteristics, where the diode laser has an affinity for melanin and hemoglobin therefore it is a better treatment of choice.(6) Taking into account the undue heating that could be caused to the surrounding normal and pink tissues where the melanin pigmentation is absent; a gated pulsed mode should be used for the necessary thermal relaxation as against using a continuous pulse mode.(7) Laser has better patient outcomes- with less hemorrhage at the site of surgery with relatively less post operative pain and discomfort. Also the depigmenation procedure itself in this case was easier when performed with laser while scalpel was more technique-sensitive. The findings of the present case report are consistent with the studies conducted by Lagdive et al (8) and Lee et al.(9) This may be because laser has the ability to cut and coagulate tissues. The protein coagulum formed on the wound surface acts as a biological dressing and seals the ends of the capillaries and venules, reducing the bleeding during laser surgery.(10)

In this particular case, the comparison between laser and scalpel revealed faster healing in case of the scalpel side than the laser side. This is because a sterile inflammatory reaction occurs after laser therapy, and blood vessels in up to 0.5mm of the surrounding tissue are sealed, which leads to a dry postoperative field.(11) However, the depigmented area healed completely by the end of 1 month with normal appearance of gingiva for both the techniques.

Repigmentation is the clinical reappearance of the gingival pigmentation after the surgical procedure. The duration of repigmentation in literature remains controversial from one technique to other. (12) In general, the rate of repigmentation depends on the technique used, intensity of pigmentation, wavelength and setting mode if laser used, and also the habits of the patient like smoking. The diode laser might be absorbed by the pigment-containing cells that may have become arrested in the lamina propria, such as the melanophages or melanophores, and also has some specific effects on the cells that reduced their activity. (13) The functional activity of melanocytes in the basal cell layer of the epithelium is influenced by signals from the neighboring fibroblasts in connective tissues.(14) These factors may explain the lower rate of re-pigmentation in diode laser-treated sites. (15)It might be attributed to the thoroughness of the procedure done and expertise of the clinician.(16) Also, Raut et al (17) showed that the degree and the incidence of pigmentation of the gingiva increase as the complexion changes to the darker shade.

The major limitation of this case report is that the follow-up was conducted at the end of 1 month post operatively, which could have influenced an uneventful outcome. The success of the depigmentation procedure mainly depends on a long term follow-up. Also the usage of periodontal pack is controversial as there are various conflicting reports existing in literature. It has been shown that patients experienced more discomfort with the use of periodontal dressing, and difficulty in eating.(18) So the choice of placement of periodontal pack is best decided by the clinician based on the patient's comfort, which is the

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basis for this case report. Also the intensity of pigmentation could lead to a relatively sooner recurrence on the side subjected to the scalpel while compared to laser due to its higher recurrence rate, which could present as an esthetic problem in the future. So further studies are required for definite correlation between the intensity of melanin pigmentation and the rate of recurrence for better choice of technique and better treatment outcome.

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