Pain Assessment Using a Visual Analog Scale in Patients Undergoing Gingival Depigmentation by Scalpel and 970-nm Diode Laser Surgery

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INTRODUCTION
Gingival hyperpigmentation is seen as a genetic trait in some populations irrespective of age and gender, hence it is termed physiologic or racial gingival pigmentation. Melanin, a brown pigment, is the most common natural pigment contributing to endogenous pigmentation of gingiva and the gingiva is also the most predominant site of pigmentation on the mucosa. Melanin pigmentation is the result of melanin granules produced by melanocytes in the basal layer of gingival epithelium.

Physiological pigmentation of the oral mucosa is clinically manifested as variable amounts of diffuse or multifocal melanin pigmentation in different ethnic groups. Although hyperpigmentation presents no medical problems, patients who display a high lip line frequently desire reduction of this pigmentation. Gingival depigmentation is a periodontal plastic surgical procedure which removes or reduces hyperpigmented gingiva. Various methods have been used for depigmentation, including gingivectomy, free gingival autograft, electrosurgery, cryosurgery, chemical agents such as 90% phenol and 95% alcohol, abrasion with diamond bur, CO$_2$ laser, Nd:YAG laser, and Er:YAG and diode lasers.

Recently lasers have been used as an effective, comfortable, and reliable technique for gingival depigmentation. However, patient discomfort during periodontal treatment, and postoperative pain and postoperative dentin hypersensitivity are common clinical events associated with many periodontal procedures. There has been no evidence in the literature comparing the levels of pain and discomfort during different depigmentation procedures.

The aim of the current study was to determine the intraoperative and postoperative pain levels by Visual Analog Scale (VAS) during gingival depigmentation procedures using scalpel surgery and lasers and also to determine whether the pain responses were influenced by the age and gender of the patient.

MATERIALS AND METHODS
The study was conducted at the Department of Periodontics, Saveetha Dental College, Chennai, India. Twenty subjects, both males and females, were included. Inclusion criteria of the subjects enrolled were patients older than 18 years of age, with no psychological disorders. Excluded from the study were patients on analgesics or tranquilizers; those presenting with acute periodontal or pulpal pain, abscesses, dentinal and root hypersensitivity; and presence of a decayed tooth, attrition, cervical abrasions, and wear facets in proximity to the field of surgery.

Patients were randomly allocated into two groups: Those undergoing depigmentation by scalpel surgical procedure and those undergoing laser therapy.
The entire procedure and the possibility of recurrence was explained to each patient. A complete medical and family history along with blood investigations were undertaken to rule out contraindications for surgery.

For the scalpel procedure (Figure 1a-c), local anesthesia (lignocaine hydrochloride with 1:200,000 adrenaline bitartrate; Lox 2%, Neon Laboratories Ltd., Mumbai, India) was administered. A Bard-Parker handle with a No. 15 blade was used to de-epithelize the pigmented epithelium along with a thin layer of connective tissue. All remnants of pigmented epithelium were removed, and the area was irrigated with normal saline. Adequate hemostasis was achieved and the surgical area was covered with a periodontal dressing.

For the laser procedure (Figure 2a-c), topical anesthesia (lignocaine hydrochloride; Lox 2% jelly, Neon Laboratories Ltd.) was applied. A 970-nm diode laser (SIROLaser, Sirona Dental Systems, Bensheim, Germany) was used at 2 W in a pulsed mode for the procedure. A sweeping motion with the fiber in a contact mode was used to remove the pigmented area. If the patient experienced pain, local anesthesia was administered. The fiber tip was continuously moved across the site to avoid heat accumulation at any one site. Then the area was wiped with a gauze soaked in normal saline. The patient was prescribed vitamin E (Evion™ 400 capsules, Merck Company (India) Ltd.) to be applied over the surgical wound for 3 days. No periodontal dressing was placed.

The patients were instructed to take analgesics (ibuprofen 200 mg) if they experienced severe pain. No other medications were prescribed.

All patients were asked to define their level of pain and discomfort by using a visual analog scale (VAS) consisting of equal units from 0 to 100 (a line of 100 mm). On this scale, 0 and 100 represented “no pain/discomfort” and “worst pain/discomfort imaginable,” respectively. Pain was assessed at three time points: intraoperatively, 24 hours postoperatively, and 1 week after the procedure. Each subject was given a single assessment sheet for all three time points. The subjects were not permitted to refer to previous VAS markings.

STATISTICAL ANALYSIS

All statistical analysis was done using SPSS analytical software (SPSS Inc., Chicago, Ill., USA) Version 17.0. A nonparametric test (Mann-Whitney test) was used to determine the correlations between the two groups.

RESULTS

A total of 20 subjects was enrolled in the study. All subjects completed all three comparisons. The study group comprised both females and males (age range was 20 to 45 years). Demographic data of the subjects is shown in Table 1.

Comparison of the mean VAS scores concerning the levels of pain, during and after surgical and laser depigmentation, is given in Table 2.

Analysis showed statistically significant differences in the patients’ pain levels between the two treatment types during the intraoperative period (P < 0.05), with the laser group demonstrating less pain intraoperatively. However, there was no statistically significant difference between the two groups during the remaining two time points, i.e., 24 hours postoperatively and 1 week postoperatively.

Figure 3 shows a deviation bar diagram comparing the VAS scores between the two groups at all three time points.
Age Correlations
In the scalpel group the VAS scores showed a negative correlation with the age of the patient at two time points mainly, after 24 hours and 1-week postoperative. However, these values were statistically significant only for 1-week postoperative pain levels (Figure 4).

In the laser group the VAS scores showed a negative correlation with the age of the patient at two time points mainly, after 24 hours and 1-week postoperative. These values were not statistically significant.

Gender Correlations
The VAS scores were not influenced by the gender of the patient in both scalpel and laser groups.

DISCUSSION
Demand for cosmetic therapy of gingival melanin pigmentation is common and various methods have been used for depigmentation, each with its own merits and limitations. Repeated and prolonged use of electrosurgery induces heat accumulation and undesired tissue destruction. Cryosurgery can be followed by edema and exudation. The use of scalpel technique for depigmentation is the most economical as compared to other techniques, which require more advanced armamentarium. Lasers have the advantages of easy handling, short treatment time, hemostasis, and bactericidal effects. But this approach requires sophisticated and costly equipment that may not be commonly available at all places and makes the treatment more expensive.

The experience of pain is a complex phenomenon, influenced by psychological, environmental, and physical factors. The Visual Analog Scale as a method for assessing pain is easy to use, the results are reproducible, and can be applied in a variety of practice settings. VAS is sensitive to treatment effects and the data derived can be analyzed using parametric statistical techniques. VAS is a reliable method to assess pain in clinical settings when compared to the verbal rating scale. In our study, VAS was used for the evaluation of pain.

The laser group experienced less pain intraoperatively compared to the scalpel group. It can be theorized that this may be due to protein coagulum that is formed on the wound surface, thereby serving as a biological wound dressing and sealing the ends of sensory nerves.

There was no significant correlation between the pain levels and gender. This is in accordance with a study by Kelly who found that gender and age did not significantly influence the minimum clinically significant difference in VAS pain scores.

Further studies with larger sample sizes are required to confirm these findings.
CONCLUSION
Within the limits of this study, it can be concluded that laser procedures for gingival depigmentation produce less intraoperative pain and discomfort compared to scalpel procedures.

AUTHOR BIOGRAPHY
Dr. Gurumoorthy Kaarthikeyan graduated in 2001 from the Tamil Nadu Government Dental College, Chennai, India, and received his postgraduate degree in Periodontics from Saveetha Dental College, Chennai, in 2007. He is currently working as an assistant professor in the Department of Periodontics at Saveetha University and also maintains a private practice. He has published and presented scientific papers at the national and international levels. Dr. Kaarthikeyan may be contacted by e-mail at drkarthik79@yahoo.co.in.

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REFERENCES