EGYPTIAN DENTAL JOURNAL

VOL. 64, 2217:2224, JULY, 2018

I.S.S.N 0070-9484

ORAL MEDICINE, X-RAY, ORAL BIOLOGY AND ORAL PATHOLOGY

www.eda-egypt.org • Codex : 94/1807

SURGICAL SCRAPING TECHNIQUE FOR GINGIVAL DEPIGMENTATION: A 6 MONTH CLINICAL STUDY EVALUATING PATIENT SATISFACTION AND RECURRENCE RATE

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ABSTRACT

Background: Elimination of gingival pigmentation is a common demand in dental cosmetic. Various methods have been reported in clinical practice. However, simplicity and safety of the technique and maintenance of the results is often a challenge. The aim of this study is to evaluate the clinical effect, patient satisfaction and recurrence rate of pigmentation following surgical scraping technique for gingival depigmentation.

Subjects and Methods: This time series prospective clinical study included 15 healthy non-smoker patients seeking gingival depigmentation for esthetic reason. The patients' sex and age were recorded. Then pigmented gingiva of the whole arch was scraped using Kirkland periodontal knife until the entire visible pigmentation was removed. Dummett-Gupta Oral Pigmentation Index **(DOI)** was recorded at baseline, 1 month, and 6 months. Patients' satisfaction and frequency of re-pigmentation were also evaluated.

Results: The mean DOI decreased significantly from 2.53 (0.52) at baseline to 0.60 (0.51) after 1 month and the 6 month score was 0.93 (0.59). By the end of 1 month the percentage of cases that showed any sign of pigmentation recurrence was 13.3% and 33.3% by the end of 6 months, 10 patients (66.6%) had persistence results and no cases returned to baseline score. (86.7%) experienced no pain during the surgical procedure and only (33.3%) had severe pain at the day of surgery and all patients were pain free in the first week. (80%) reported marked cosmetic changes by the end of 1st week and 6 months.

Conclusion: The surgical scarping gingival depigmentation technique produced desired and persistence clinical results up to 6 months and all patients were satisfied with the procedure and cosmetic outcomes.

Keywords: gingival depigmentation, surgical scrapping, recurrence rate, patients' satisfaction.

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INTRODUCTION

A smile expresses a feeling of joy, success, sensuality, affection and reveals self-confidence and kindness[1]. The harmony of the smile is determined not only by the shape, the position and the color of the teeth but also by the gingival appearance which is one of the main components of the beautiful smile and may cause patients concerns regarding esthetics particularly in patients having high smile line[2].

The prevalence of gingival pigmentation is higher on the labial gingiva than palatal parts of the arches, with the highest rate observed in the area of the incisors and decreases considerably in the posterior areas[3]. The most frequent cause of gingival pigmentation is melanin pigments, though other pigments, such as carotene, oxyhemoglobin and reduced hemoglobin, may contribute to the normal color of the gingiva[4]. Gingival pigmentation may range from physiologic (e.g. racial pigmentation) to manifestations of systemic illnesses (e.g. Addison's disease, Albright's syndrome and Peutz Jegher's syndrome) or malignant neoplasms (e.g. melanoma and Kaposi's sarcoma) other etiological factors of pigmentation including drugs, smoking, heavy metals and persistence inflammation were also documented[5,6].

Melanocytes synthesize melanin pigments and store in the form of melanosomes; the cell is found in the basal cell layer of the epithelium even in oral mucosal sites with no visible signs of melanin pigmentation[7]. However the pigmented areas are present only when melanosomes are transferred to the keratinocytes in the epidermal-melanin unit previously labeled by Fitzpatrick and Breathnach (1963)[8]. The variations in melanin colorization of the oral mucosa is determined by several factors including the number and melanogenic activity of the melanocytes, differences in number, size, and distribution of melanosomes, differences in the type of melanins, and the masking effect of heavily keratinized epithelium or the background colour determined by degree of vascularization[9].

Many methods have been used for treating gingival hyperpigmentation including the scalpel surgical technique, cryosurgery, Lasers [Neodymium; Aluminum-Yitrium Garnet (Nd- YAG) lasers, Erbium-YAG lasers, Carbon-di-oxide CO2 laser and Diode laser] and electrosurgery. Other methods aimed for masking the pigmented gingiva with grafts from less pigmented area including free gingival graft and acellular dermal matrix allograft[6,10,11]. Recently non-invasive pharmacological agents which may decrease melanin synthesis and lightens color of oral epithelium are being evaluated as Vitamin C[12].

The successful elimination gingival pigmentation by using various methods has been reported in clinical practice. However, laser, electrosurgical and cryosurgical treatment modalities although achieved satisfactory results[13–15], but they require sophisticated equipment, which is not commonly available in clinics, and also they are expensive for the patient[16]. And the surgical masking of pigmented gingiva was limited by possible morbidity and patient discomfort from surgical procedure, while the intraoral formulations of pharmacological agents are still under research[10].

Gingival repigmentation refers to the reappearance of melanin pigmentation following clinically pigmented tissues were depigmented which starts with the migration of melanocytes from the adjacent gingiva. The extent and time interval of recurrence varies with regard to the treatment modalities used and the duration of follow-up[17]. All methods for treating gingival melanin pigmentation had a certain percentage of recurrence of pigmentation ranged from 8.9% to 1.1% which was reported in a recent systematic review; in which studies shows variation in the timing for early repigmentation and the recurrence has been documented to occur, following the depigmentation procedure, within 24 days to 8 years long period[18].

Gingival depigmentation technique selection should primarily be based on clinical experiences

and patient's demand for improved esthetics. One of the earlier and most commonly used depigmentation techniques due to simplicity and safety is the surgical removal of the undesirable pigmentation using scalpel which involves removal of gingival epithelium along with a layer of the underlying connective tissue and allowing the denuded connective tissue to heal by secondary intention[10]. Surgical scraping of gingival epithelium until the undesired pigmentation is removed was also reported to be efficient in different case series and clinical studies[1,16,19,20]. However, reports of re-pigmentation and patient satisfaction are quite limited and varied[19,21].

This study aimed to assess the clinical effect, frequency of pigmentation recurrence and patient satisfaction using a standardized satisfaction questionnaire following surgical scraping technique for gingival depigmentation.

PATIENTS AND METHODS

Patient's Selection

Fifteen consecutive patients who were unsatisfied about their gingival dark colour were recruited for this time series prospective clinical study from the outpatient clinic of Oral Medicine, Periodontology, Oral Diagnosis department at Faculty of Dentistry, Ain Shams University.

Patients free from any systemic diseases with age range (15-40 years) were included if they have diffuse continuous physiologic pigmentation, involving facial aspect of maxillary or mandibular quadrant of the gingiva. While, pregnant and lactating females, previous or current smokers or patients taking medication that may induce gingival pigmentation as well as patients diagnosed as having periodontal disease, thin gingival biotype or had surgery involving the gingiva were excluded.

The study was performed in accordance with the ethical standards laid down in the Declaration of Helsinki. Patients' agreements were obtained after they understand the procedures and the purpose of the study.

Treatment Protocol

- Each eligible patient underwent professional scaling; one week before therapy.
- Under perfectly aseptic conditions and infiltration anesthesia, the pigmented gingival epithelium starting from the distal surface of the last tooth on the right side to the distal surface of the last tooth on the left side was scraped in one direction using Kirkland knife ***(No 15/16 KK15/166 Hu Friedy. Chicago. USA)*** **(Figure 1a)**. Hemostasis was obtained with sterile gauze and direct pressure.
- The entire visible pigmentation was removed, exposing the underlying connective tissue. Care was taken to remove any remnants of pigmented areas including the epithelium at the base of the interdental papilla and at the mucogingival junction on the other end[16] **(Figure 1b)**.
- Topical analgesic and anti-inflammatory mouth wash ***(Tantum Verde; Benzydamin hydrochlorid 0.15%. EPICO, Cairo. Egypt)*** was prescribed to all patients and post-operative systemic analgesic ***(Brufen 400mg; Ibuprufen. Kahira Pharmaceuticals & Chemical Industries Co, Cairo, Egypt)*** as needed.
- Oral hygiene instructions were given to all patients.

Assessment

The selected sites in eligible patients were examined clinically and the following measurements were recorded;

Dummett- Oral Pigmentation Index scoring criteria (DOI)

The gingival melanin pigmentation scoring were made according to **Dummett's** criteria[22];

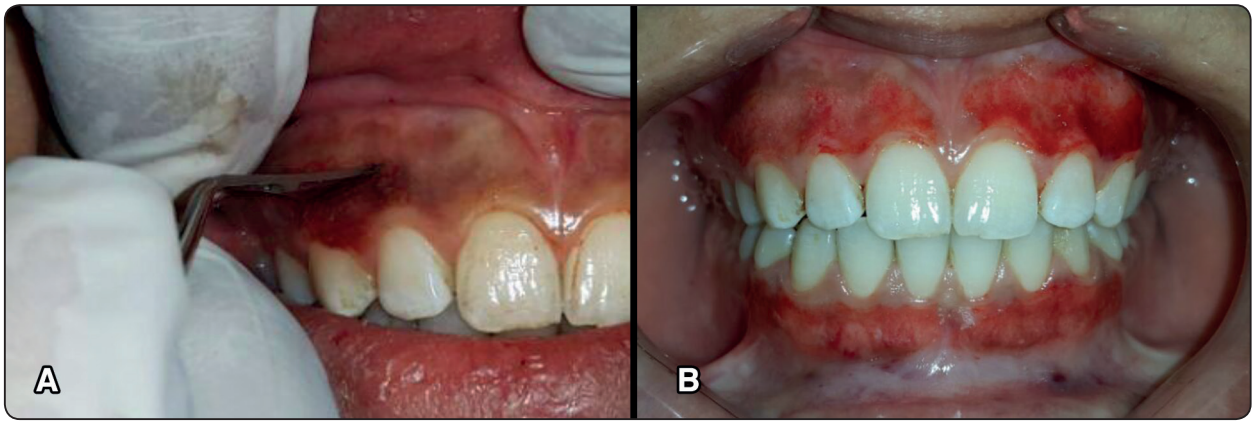

Fig. (1) (a) Surgical scraping of pigmented gingiva using Kirkland knife (b) All pigmented areas were scraped to include the epithelium at the base of the interdental papilla and at the mucogingival junction on the other end

in which no clinical pigmentation (pink gingiva) was scored **(0)**, mild clinical pigmentation (mild light brown color) was scored **(1)**, score **(2)** was given to moderate clinical pigmentation (medium brown or mixed pink and brown color) and **(3)** for heavy clinical pigmentation (deep brown or bluish black color). Four different sites for each arch will be measured and taking the average for the final reading. The measurement didn't include the gingival margin to avoid any influence from the degree of gingival inflammation[12].

(DOI) was recorded at baseline before depigmentation then 1 month and 6 months postoperatively.

Patient Satisfaction Questionnaire (PSQ)

By the end of the 6 month study a patient satisfaction questionnaire modified from McGill Pain Questionnaire[23] to score degree of pain experienced during and after treatment and the degree of patient satisfaction with the cosmetic results of the procedure was applied **Table (1)**.

Recurrence Rate of the Pigmentation

Percentage of the cases which showed clinical reappearance of gingival melanin pigmentation was recorded on completion of the first month, and after 6 months postoperatively.

Table (1): Patient Satisfaction Questionnaire

Question	Scoring
Was the treatment painful?	**1**, no pain; **2**, mild pain; **3**, severe pain
Did you experience pain on treatment day?	**1**, no not at all; **2**, mild; **3**, severe
Did you experience pain during the 1st week?	**1**, no pain; **2**, mild pain; **3**, severe pain
Did you notice a cosmetic change in 1 week?	**1**, no not at all; **2**, moderate; **3**, marked
Did you notice a cosmetic change in 6 months?	**1**, no not at all; **2**, moderate; **3**, marked
Did the treatment meet your expectations?	**1**, no ; **2**, yes; **3**, over and above
Would you repeat the treatment if necessary?	**1**, no ; **2**, yes; **3**, over and above

Statistical Analysis

A total sample size of 13 patients was calculated using G-power analysis[24] program based on the difference between baseline and 6 months gingival pigmentation measured by (DOI) scoring to be sufficient to detect effect size (f = 1) according to Kaur et al[16] and considering level of significance $\alpha = 0.05$, and power 90%. The number was increased to 15 patients to compensate for any drop outs.

The collected data was tabulated in an excel sheet and statistically analyzed using Statistical Package for Social Sciences ***(SPSS Inc., Chicago, IL, version 11.0 for Windows)***. Quantitative variables were expressed in terms of mean and standard deviation [mean (SD)] and qualitative or categorical variables were described as frequencies and percentages [n (%)]. Paired *t* test was applied to compare each variable at different time interval, while comparisons between subgroups were performed using Student *t* test. Spearman's correlation coefficient was used to determine significant correlations between different quantitative variables. Statistical tests were two sided and significance level was set at 0.05.

RESULTS

The study included 15 subjects; 9 females (60%) and 6 males (40%) with no significant difference regarding sex distribution among the study population. Their mean age was [24.6 (5.7)] years ranged between 18 years and 37 years old. All patients were committed to treatment protocol and to all follow up visits. And the average time of the procedure from anesthetic administration to patient dismissing was 41.3 (5.8) minutes.

The clinical scoring of gingival pigmentation revealed that mean DOI decreased significantly from 2.53 (0.52) at baseline **(Figure 2a)** to 0.60 (0.51) after 1 month with restoration of normal features of the gingiva without any scar formation **(Figure 2b)** while the difference between 1 month score and 6 month score [0.93 (0.59)] was not significant **(Figure 2c)**. The percentage of cases that showed any sign of pigmentation recurrence by the end of 1 month was 13.3% while by the end of 6 months it was 33.3%. However 10 patients (66.6%) had persistence results and no cases returned to baseline score **Table (2).**

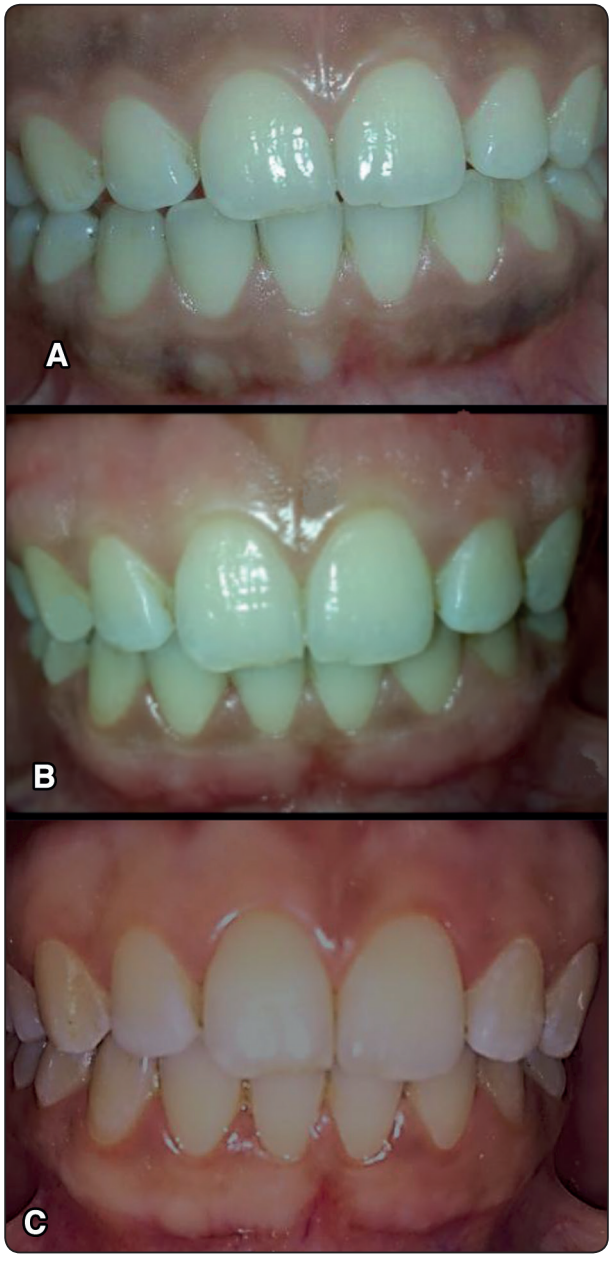

Fig. (2): (a) Pigmented Gingiva at baseline (b) 1 Months after gingival depigmentation using scraping technique (c) 6 Months following gingival depigmentation

Table (2): Changes in Dummett- Oral Pigmentation Index score

	Baseline	1 Months	6 Months	*-P* value
DOI [mean (SD)]	2.53 (0.52)[a]	0.60 (0.51)[b]	0.93 (0.59)[b]	< 0.001*
% of cases with Recurrence n (%)	-------	2/15 (13.3%)	5/15 (33.3%)	

Analysis of patient satisfaction questionnaire demonstrated that only 2 patients (13.3%) experienced mild pain during treatment while the rest of the patients (86.7%) did not report any pain during the surgical procedure. Regarding the treatment day 5 patients only (33.3%) had severe pain while the rest had only mild pain (66.7%). All patients were pain free in the first week.

The patient perception of cosmetic results as revealed in questionnaire showed that by the end of first week 12 patients (80%) reported marked cosmetic changes while the rest noticed moderate changes. These results was persistence tell the end of 6 months as reported also by 80% of patients and all patients confirmed that the treatment met their expectations and that they would repeat the treatment if necessary.

DISCUSSION

The study attempted to evaluate the gingival scraping depigmentation technique as a simple non sophisticated time and cost saving procedure for the clinician regarding patient satisfaction and stability of the outcomes.

Gingival scraping performed in this study used a Kirkland knife because it was precise, definite and under control and it was possible to appreciate the depigmented areas immediately leaving no residual pigments also resulted in minimal hemorrhage and required no postoperative periodontal dressing.

Results of this study showed that the gingival pigmentation mean DOI score reduced to 0.93 post-operatively after 6 months from 2.54 preoperatively which was in accordance with the results obtained by Kaur et al that showed reduction in score from 2.24 to 0.407 after 9 months and used the same scraping technique[16]. Gupta et al also reported change in DOI score from 2.8 to 0.26 after 15 months from using surgical blade scraping technique which was not significantly different from electrosurgery technique[25]. As well as Suragimath et al who reported the change from 2.5 to 0.23 at 6 months with surgical blade depigmination was not significant from the change observed with diode laser[26].

In the present study no repigmentation was observed in 66.6% of the cases until 6 months postoperatively. Though repigmentation was observed in 75% of the cases at varying time intervals with Kaur et al[16], and in 50% of cases with Ginwalla et al between 24 and 55 days[27] after surgical removal of pigmentation. The lower recurrence rate reported in our study may be attributed to our attempt to remove pigmented gingiva starting from the distal surface of the last tooth on the right side to the distal surface of the last tooth on the left side and from mucogingival line to base of the interdental papilla eliminating any possible residual melanocytes at the area that may migrate later.

Post-operative pain and discomfort was minimal with surgical procedure compared to other studies which compared the use of scalpel and laser or electrosurgery probably due to the use of topical and systemic analgesics and anti-inflammatory[25,28]. While patient satisfaction regarding cosmetic outcomes explained by significant reduction in pigmentation score in the first month as well as persistence of the results to 6 months. Moreover, the pattern of recurrence in the cases with re-pigmentation was patchy in distribution and mild which was also in accordance with Kaur et al[16].

Within the limitation of our study we concluded that the surgical scraping technique was relatively simple, easy to perform, cost effective and above all with minimum discomfort and esthetically acceptable to patient, so it is highly recommended in consideration of the equipment constrains in developing countries. However, further studies to be taken up for a longer period along with histopathological assessment to understand the process of repigmentation in cases were recurrence is reported.

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