CASE REPORT

Ancillary role of vitamin C in pink aesthetics

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SUMMARY

A smile expresses feelings of joy, affection and self-confidence in an individual. Melanin hyperpigmentation of the gingiva jeopardises the aesthetics of an individual significantly. In the present case, gingival depigmentation was performed with a surgical scalpel along with local applications of ascorbic acid, yielding satisfactory aesthetic results with low subjective pain levels, and no recurrence has been observed after 9 months of follow-up.

BACKGROUND

A 'smile is a curve that sets everything straight'. Gingival tissue plays a pivotal role in contributing to the harmony of a smile along with a plethora of other factors such as shape, position and colour of teeth.¹ Melanin, a naturally occurring brown pigment, contributes to the endogenous pigmentation of skin, gingiva and remainder of the oral mucous membrane.² Although gingival hyperpigmentation is a benign condition, patients report that black gums affect their smile and personality, leading to a loss of self-confidence. The symptom is more prevalent in individuals showing a high smile line and excessive gingival display. Several depigmentation techniques have been employed, including conventional scalpel surgery, cryosurgery, electro surgery, bur abrasion and laser application, but the recurrence of hyperpigmentation poses a major challenge to the clinician. To our knowledge, this is a seminal case report highlighting the potential role of ascorbic acid in the prevention of reappearance of gingival hyperpigmentation after clinical depigmentation was performed with the help of a surgical scalpel. Selection of the case and the technique for depigmentation depends on the experience and the individual preferences of the clinician. The current case report describes the use of a conventional scalpel method for gingival depigmentation along with local applications of ascorbic acid for the prevention of recurrence of gingival hyperpigmentation.

CASE PRESENTATION

A light complexioned 18-year-old female patient working in a multinational company presented to the outpatient department of periodontology with black upper anterior teeth and gums that were visible when she smiled, leading to compromised aesthetics, affecting her self-confidence and overall personality. Medical and dental histories were unremarkable. On extraoral examination, no abnormalities were detected. On intraoral examination, hyperpigmentation of gingiva was observed extending from right upper first premolar to left upper

Figure 1 Preoperative photograph showing gingival hyperpigmentation in the upper arch and inflamed gingival tissue due to poor oral hygiene in the lower arch.

first premolar in the upper arch ([figure 1](#)). The intensity of gingival pigmentation was evaluated using the Dummett-Gupta Oral Pigmentation Index³ and the scoring pattern was as follows: 0=pink tissue (no clinical pigmentation), 1=mild, light brown tissue (mild clinical pigmentation), 2=medium brown or mixed pink or brown tissue (moderate clinical pigmentation), 3=deep brown or blue/black tissue (heavy clinical pigmentation). Both upper central incisors had carious lesion involving enamel and dentine. The oral hygiene status of the patient was fair, as revealed by low plaque scores and gingival index. Owing to the clinical diagnosis of physiological gingival hyperpigmentation (as there was no local or systemic condition that predisposed to gingival hyperpigmentation, and the patient did not smoke), a depigmentation procedure was planned with the help of a surgical scalpel along with local applications of ascorbic acid (250 mg/mL in 2 mL ampoules, Steris Laboratories) for prevention of its recurrence. Additionally, the carious lesions required immediate restoration to further improve the aesthetics of the patient.

INVESTIGATIONS

Routine blood investigations were performed and were found to be within the reference range. Orthopantomogram revealed normal bone topography with carious lesions in both upper central incisors.

DIFFERENTIAL DIAGNOSIS

Multiple causes of gingival hyperpigmentation are known, ranging from physiological to iatrogenic mechanisms, such as implantation of dental amalgam, to complex medical conditions, such as Peutz-Jeghers syndrome and McCune Albright syndrome. Local irritants, such as smoking, may also result in melanosis of varying degrees depending

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on the frequency. Oral pigmented lesions may also result from cellular hyperplasia ranging from benign naevi to fatal oral melanoma. Ethnic predisposition of melanin hyperpigmentation is observed in individuals of African, East Asian or Hispanic ethnicity. However, in the present case the melanin hyperpigmentation was found to be physiological and ethnic in nature.

TREATMENT

Initially, oral hygiene instructions were given followed by scaling and root planing (SRP) to ensure a plaque free operating site. The patient was re-called after 4 weeks to check the response of periodontal tissues, which were found to be in healthy condition as assessed by low plaque scores. The surgical procedure was explained verbally and a written informed consent was taken. The conventional scalpel technique of depigmentation was planned involving upper right first premolar to upper left first premolar. After anaesthetising the concerned area, the pigmented epithelium in upper arch was excised using a number 15 BP blade in a scraping motion. Extra care was taken to remove all the pigmented ruminants in the interproximal region (figure 2). After the surgical procedure was completed, surgical periodontal dressing was placed and postoperative instructions were instituted, and appropriate medications were prescribed. The subjective pain level experienced by the patient was evaluated by means of a visual analogue scale (VAS). The VAS comprises of a horizontal line 10 cm (100 mm) long, anchored at the left end by the descriptor 'no pain' and at the right end by 'unbearable pain'. The patient was asked to mark the severity of the pain. The distance of this point, in centimetres, from the left end of the scale was recorded and used as the VAS score: 0= no pain; 0.1–3= slight pain; 3.1–6= moderate pain and 6.1–10= severe pain. Commercially available ascorbic acid (10%) ampoules were used for local application. The contents of the ampoules were poured into a dappen dish and application was performed, with the help of saturated cotton rolls, on the upper arch at weekly intervals initially for 1 month and at monthly intervals thereafter for 9 months.

OUTCOME AND FOLLOW-UP

The patient was re-called 10 days postoperatively. The dressings were removed and healing took place uneventfully (figure 3). Oral hygiene instructions were again reinforced. SRP were performed at each follow-up so as to improve patient compliance. The local application of ascorbic acid yielded excellent results with no recurrence noted at 9-month follow-up (figures 4 and 5). VAS scores of 1.8 and 1.5 were obtained intrasurgically and during the first follow-up at 10 days, respectively. The applications of ascorbic acid were not associated with any discomfort or pain. Patient acceptance was also assessed during follow-up visits, using a three-point rating scale, as described by Purwar

Figure 3 Postoperative photograph after 10 days of follow-up.

*et al.*⁴ The carious lesions in the central incisors were restored with aesthetic restorative material during follow-up visits.

DISCUSSION

Gingival hyperpigmentation appears as a diffuse, deep purplish discolouration or as irregularly shaped brown patches. It appears in the gingiva as early as 3 h after birth.⁵ The colour of the gingiva is determined by the degree of vascularisation, the thickness of the keratinised layer, and the number of pigment containing cells.⁶ The pigmentation is mostly localised at the anterior labial gingiva, affecting females more than males.⁷ Melanin pigmentation is caused by melanin granules present in gingival tissues, which are synthesised by melanosomes and stored in melanocytes.⁸ Melanocytes are dendritic cells located in the basal and spinous layers of the gingival epithelium. Tyrosinase enzyme plays a key role in melanin synthesis as dopa-quinone; the precursor of melanin is formed by the oxidation of tyrosine.⁹ In the present case the degree of gingival pigmentation was evaluated using the Dummert-Gupta Oral Pigmentation Index, and the score was found to be 3 for the upper arch, indicating the severity of gingival hyperpigmentation in the present case, thus affecting the overall personality of the concerned patient.

The techniques used for gingival depigmentation include chemical cauterisation, gingivectomy, a scalpel scraping procedure and abrasion of the gingiva.¹⁰ Recent techniques of gingival depigmentation are cryotherapy, free gingival autograft and laser therapy; these have achieved satisfactory results. On comparative evaluation of different surgical protocols, the conventional scalpel technique is simple, convenient to perform and healing is faster in comparison to other surgical techniques.¹¹ The major challenge for the clinician does not lie in the management of gingival hyperpigmentation, but in preventing its subsequent recurrence. We have also found that use of soft tissue lasers in the depigmentation procedure can significantly delay the period of clinical repigmentation owing to the toxic effect of lasers on

Figure 2 Intrasurgical photograph immediately after depigmentation with scalpel.

Figure 4 Local applications of ascorbic acid in upper and lower arch at weekly intervals.

Figure 5 Clinical picture at 9 months of follow-up.

oral melanocytes; but this effect is rather speculative than scientific.¹¹

Oral repigmentation refers to the clinical reappearance of melanin pigmentation after a period of clinical depigmentation resulting from chemical, thermal, surgical, pharmacological or idiopathic factors.¹² Reappearance of hyperpigmentation has been noted irrespective of the recommended treatment modalities.¹³ The underlying mechanism suggested is the proliferation of melanocytes from the skin into the depigmented area. However, no definitive evidence exists regarding the factors affecting rate and length of time required for the recurrence of pigmentation. Some authors speculate that repigmentation occurs due to transfer of melanin granules to keratinocytes and have labelled the association as epidermal melanin units.⁶

In the present case, we attempted to prevent the reappearance of gingival hyperpigmentation by repeated local applications of ascorbic acid at weekly intervals initially, followed by monthly applications. The regimen used for local application of ascorbic acid coincided with the turnover rate of melanocytes from the basement membrane. The use of ascorbic acid in the prevention

of oral repigmentation stemmed from the fact that ascorbic acid directly downregulates dopaquinone formation, a precursor in melanin synthesis, thus inhibiting melanin formation.¹⁴ Although the treatment of the carious upper central incisor lesions, which act as reservoirs of plaque, was planned in the initial visit, the patient was reluctant to undergo it. However, after seeing the results of the surgical depigmentation procedure, she agreed to have the upper central incisors restored, and is currently undergoing rehabilitation in the department of conservative dentistry.

CONCLUSION

The results obtained were satisfactory and offered tangible benefits to the patient as evident by high satisfaction ratings. Larger sample size studies with longitudinal design should be performed to investigate the efficacy of ascorbic acid in delaying the repigmentation of gingiva after clinical depigmentation has been performed.

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Contributors VS was involved in case selection and management. PP contributed in manuscript writing and in taking photographs. JD participated in the supervision of the case. PR contributed in the manuscript revisions.

Competing interests None declared.

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Patient's perspective

As communicated by the patient:

I am highly satisfied with the treatment and would rate it a score of 3 (highly satisfied) on the grounds of pre surgical, surgical and post surgical protocol and cost effectiveness of the treatment.

Learning points

- Treatment of gingival hyperpigmentation can be easily and effectively performed using a surgical scalpel.
- In our case, local applications of ascorbic acid improved the results of depigmentation achieved by the scalpel.
- The surgical technique does not result in increased pain or discomfort, as investigated by visual analogue scale.

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