



Research Paper

Comparative Efficacy of Vitamin C along with LASER in treatment of Gingival Hyperpigmentation: A Case Report

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Abstract

Introduction: Gingival hyperpigmentation can be defined as a darker gingival colour beyond what is normally expected and is removed or reduced by using different techniques of gingival depigmentation like scalpel, bur abrasion, LASER, cryosurgery, radiosurgery, electrocautery, chemicals and gingival grafts.

Objective: To evaluate the efficacy of Vitamin C (Ascorbic acid) and LASER in treating gingival hyperpigmentation.

Case Description: Anterior gum region of both maxillary and mandibular arches were anesthetized topically by Lignocaine 15% w/w. The maxillary anterior gingiva was irradiated with 810 nm Diode Laser and the mandibular anterior gingiva was injected with 1-1.5 ml ascorbic acid, using an insulin syringe, once weekly for 4 weeks. Follow up was done at intervals of 15 days, 1 month, 3 months and 6 months follow up. Dummert Oral Pigmentation Index (DOPI) along with patient satisfaction using a 5 grade assessment scale by Hue and pain assessment using Visual Analog Scale was taken at baseline and at respective follow-ups.

Results: Both LASER and Vitamin C showed effective depigmentation of gingiva after 6 months, but LASER showed better results.

Conclusion: Vitamin C seems to be significant in treatment of gingival pigmentation but not at par with LASER.

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I. Introduction

In modern era of dentistry, esthetics has a very important role to play. Gingival hyperpigmentation or “Black gums” is a commonly seen feature in developing countries like India. Even though it is not a clinical problem, clinicians are often faced with a challenge of achieving gingival esthetics. Melanin, a brown pigment, is the most common cause of endogenous pigmentation of gingiva and is the most predominant pigmentation of mucosa. Gingival hyper-pigmentation is seen as a genetic trait in some populations and is more appropriately termed physiologic or racial gingival pigmentation¹. This problem is aggravated in patients with a “gummy smile” or excessive gingival display while smiling. Gingival depigmentation is a process to remove the hyperpigmented gingiva. Most of the pigmentation is physiologic but sometimes it can be a precursor of systemic diseases. Accordingly, treatment of the pigmentation is determined either surgically or chemically. There are various methods of depigmentation which includes the use of scalpel, LASER, electrocautery, radiosurgery, chemicals and gingival grafts. Vitamin C or Ascorbic acid, which is a water soluble vitamin and an anti-oxidant has emerged as an effective non-surgical therapy of gingival depigmentation.

II. Case Description

A 20 year old female patient attended our out-patient department with the chief complaint of black gums in the upper and lower front teeth region which she found embarrassing during smiling. On examination, she had gummy smile and so gingival depigmentation procedure was carried out.

For the maxillary arch, under local anesthesia, depigmentation procedure was carried out by 810 nm wavelength Diode LASER (Sirona, Densply). The fiber optic laser tip having 320 µm at 1 W power in

continuous mode was kept in contact with the pigmented area. Depigmentation was performed in a horizontal direction, using the laser tip in contact mode on the pigmented regions of gingiva. Care was taken not to cause overheating and the area was frequently wiped with gauze soaked in saline. After the procedure, periodontal dressing (non-eugenol Coe-Pak) was applied. No antimicrobial was prescribed and the patient was instructed to avoid hot, acidic and spicy food.

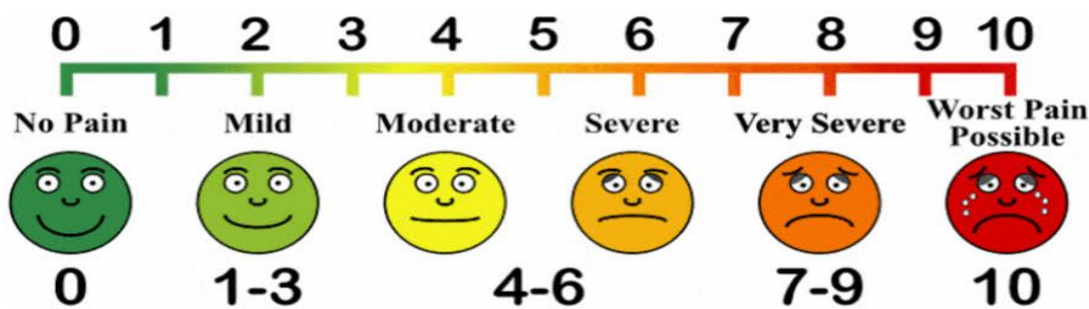
For the mandibular arch, after LA was given topically, 1-1.5 ml vitamin C was injected slowly by an insulin syringe (40 U) in the interdental papilla and other areas of gingiva where pigmentation was present, once weekly for 4 weeks. The patient was recalled after 15 days, 1 month, 3 months and 6 months for follow-up.



Composition :
 Each 1.5 ml contains :
 Vitamin-C IP 150 mg
 Water for Injections IP q. s.
 Appropriate overage of vitamin is added.
 Storage : Store protected from light.
 Dosage : As directed by the Physician.

Fig 1: Diode LASER (Left), Vitamin C and its composition (Right)

Pain and itching were reported by the patient after the surgical procedure and following each injection visit using visual analogue scale (VAS) by Reich et al⁷. The visual analogue scale (VAS) is divided into vertical and horizontal parts. The horizontal part (numerical) consists of 10 cm line with two end points represents "no pain" to "worst pain possible".



While the vertical scale (verbal) measured by 5 points (Table 1), patient satisfaction was performed by using a 5- graded self-assessment analysis given by Hue et al⁶ (Table 2).

POINTS	ASSESSMENT
0	No itching
1	Mild itching
2	Moderate itching
3	Severe itching
4	Extremely severe

GRADE	ASSESSMENT	REMARKS
4	Excellent	Improved over 75%
3	Good	Improved 50-75%
2	Moderate	Improved 25-50%
1	Fair	Improved less than 25%
0	No change or worse	Not improved or darkened

Table 1: Vertical Scale (Verbal) **Table 2: 5- graded self-assessment analysis given by Hue⁶**

During and after the intra-epidermal injection, itching was the predominant unpleasant sensation which enforced the patient's desire to scratch. Its evaluation ranges between verbal questionnaire and severity assessment (using visual analogue scale).

After the first visit of vitamin C injection, the patient was asked about the intensity and the duration of itching. According to the patient's answer, the dose is adjusted. If itching lasted for the whole night or to the next day with the same intensity, this is an indicator for higher dose usage or deeper introduction of the vitamin during injection. Lower dose or shallower injection was done in the following visits.

III. Results

The degree of gingival color, patient satisfaction, pain and itching score were measured for both the treatment modalities.

Table 3: DUMMET ORAL PIGMENTATION INDEX (DOPI) Values

	VITAMIN C	LASER
Pre-Operative	3	3
15 days Post-Op	2	1
1 month Post-Op	2	0
3 months Post-Op	1	0
6 months Post-Op	1	0



Figure 1: Treatment with LASER

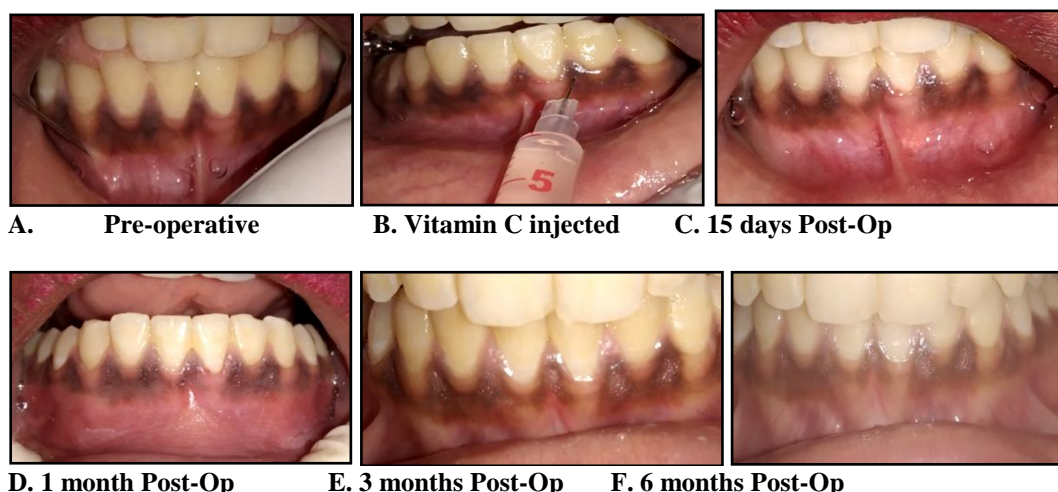


Figure 2: Treatment with VITAMIN C

Table 4: VISUAL ANALOG SCALE

	VITAMIN C	LASER
Pre-Operative	3	0
15 days Post-Op	2	0
1 month Post-Op	1	0
3 months Post-Op	0	0
6 months Post-Op	0	0

b) Vertical part

	VITAMIN C	LASER
Pre-Operative	3	3
15 days Post-Op	3	1
1 month Post-Op	2	0
3 months Post-Op	1	0
6 months Post-Op	0	0

a) Horizontal part

	VITAMIN C	LASER
Pre-Operative	0	0
15 days Post-Op	1	1
1 month Post-Op	1	4
3 months Post-Op	2	4
6 months Post-Op	3	4

Table 5: PATIENT SATISFACTION

IV. Discussion

Recently, Vitamin C which is a potent antioxidant, has emerged as a new agent for depigmentation. Enzyme tyrosinase (Cu containing) is responsible for melanin production. Enzyme Tyrosinase is converted to Dopaquinone with the help of an enzyme called Tyrosinase. A Series of chemical reactions convert this dopaquinone into melanin. Vitamin C interacts with the copper ions at the tyrosinase active site and inhibits action of the enzyme tyrosinase, thereby reducing melanin formation². There was a statistically significant reduction in the pigmentation scores and surface area of pigmentation after four weeks. No recurrence of pigmentation was observed after three months. Injectable Vitamin C is a considerably effective, economic and minimally invasive technique of depigmentation especially in individuals with a thin gingival biotype.

Stages of color improvement during vitamin C injection:

1-Immediately following injection; the gingival tissues fainted and then darkening of the pigmented areas occurred.

2-Stage 1 (15 days): fainting of the whole color of the gingival tissue and the tissues became glossy and stretched. The areas of least pigmentation turned pink

3-Stage 2 (1 month): More fainting action appeared in relation to the whole gingival tissues and the pinkish color began to spread. A whitish coat covering the gingival tissues appeared clearly, which could be rubbed off easily using cotton. This coat resembled material Alba. On rubbing, the underlying tissues appeared totally healthy and intact.

4-Stage 3 (3 months): Further fainting with the pink color predominated. The gingival tissues became glossier and highly stippled.

5-Stage 4 (6 months): almost pinkish gingival tissue detected.

The tissues treated with vitamin C depigmentation usually took longer time for remodeling than the ones treated with LASER. Vitamin C inhibits melanin synthesis through downregulation of tyrosinase enzyme activity³.

Another study used Dermapen to deliver Vitamin C to the affected area also revealed significant results⁴. The **dermapen** was used in intermittent motion on the sextant gingival area for 30-40 seconds/tooth. When bleeding pinpoints were observed on all areas of pigmented gingiva, the gingival mucosa was irrigated with a saline solution and sterile gauze was applied to dry the area. Then, topical AA powder (1000 mg/ml) was mixed with saline in a small glass dish forming a paste. The mixed slurry paste was applied to the gingival mucosa using for 10 minutes as and the treated area was left without dressing⁴.

Another study comparing the efficacy of Vitamin C as a minimally invasive non surgical technique with conventional surgical technique of depigmentation yielded similar results with a drawback of time consumption as Vitamin c takes minimum 4 weeks to respond. This also shows that Vitamin C has a future of delivering atraumatic depigmentation procedure to the patient⁵.

Literature cites various studies where Diode LASER has been used for depigmentation of gingival epithelium. Superior to other techniques, application of a LASER results in homogeneous ablation of epithelial and rete pegs as well. Diode LASER with 810 nm wavelength is used in soft tissues for coagulation and cutting. Also, LASER has high affinity to penetrate haemoglobin and melanin¹². Diode LASER can be used in both pulsed and continuous mode. Application of LASER in pulsed mode prevents overheating of surrounding tissues that may cause necrosis and jeopardize healing. So, considering previously published studies^{8,9,10,11}, Diode LASER is used in continuous mode in this study.

In a systematic review, various studies incorporating the use of Vitamin C in reducing melanin pigmentation, found that Vitamin C can be effectively used for depigmentation³ and no recurrence has been found till date.

V. Conclusion

Cosmetic expectations have increased with time and nowadays patients are more concerned with gingival esthetics and smile designing. Gingival pigmentation especially on the labial aspect of anterior teeth has become an important component of esthetics. Gingival pigmentation though not a major complication, yet it greatly affects the facial appearance. The patient's medical history is important in determining its cause whether physiological or pathological. Vitamin C as a non-surgical gingival depigmentation agent was found to be effective in mild gingival melanin hyperpigmentation but not at par with LASER.

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