

CASE REPORT

Comparative Evaluation Between Scalpel and Laser Technique in Gingival Depigmentation: A Case report

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ABSTRACT

Introduction: Aesthetics, the science of beauty, is an inseparable part of today's dental treatment. Excessive gingival pigmentation is a major esthetic concern for many people, especially in patients with a gummy smile. Gingival pigmentation results from melanin granules, which are produced by melanoblasts. The degree of pigmentation depends on melanoblastic activity. Though it is not a pathological problem, several people complain about unpleasant looking dark gums. Gingival depigmentation can be performed in such patients with excellent results.

Case Report: We present a case report for management of gingival pigmentation using a surgical blade and diode laser for achieving predictable esthetics.

Conclusion: The application of diode laser appears to be a safe and effective alternative procedure for the treatment of gingival melanin pigmentation. Its benefits include ease of usage, effectiveness in the treatment of superficial benign pigmented lesions, convenience in dental clinics, as well as decreased trauma for the patient.

Key words: Comedo, Metastasis, Perineural

How to cite this article: Naveen Kumar, Sayani Dutta, Debasmita Mitra, Jay Gopal Ray. Salivary duct carcinoma of sub lingual salivary gland: a rare case report. Int J Contemp Med Res. 2015;2(2):126-130

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Source of Support: Nil

Conflict of Interest: None

INTRODUCTION

Physiologic pigmentation of the oral mucosa is clinically manifested as a multifocal or diffuse melanin pigmentation with variable prevalence in different ethnic groups.¹ Physiologic pigmentation is probably genetically determined, but as Dummett suggested, the degree of pigmentation is partially related to mechanical, chemical, and physical stimulation.² In darker skinned people oral pigmentation is increased, but there is no difference in the number of melanocytes between fair-skinned and dark-skinned individuals. The variation is related to differences in the activity of melanocytes.³ Melanin, a nonhemoglobin derived brown pigment, is the most common of endogenous pigments and is produced by melanocytes present in the basal layer of the epithelium. Though it is not a pathological problem, several people complain about unpleasant looking dark gums. Gingival Depigmentation may be considered as a periodontal plastic surgery, whereby gingival hyperpigmentation is removed by various techniques.

TREATMENT MODALITIES

Different techniques for Depigmentation include.⁴

1. Methods Aimed at Removing Pigment Layer

A. Surgical Methods

- Scalpel Surgical Technique
- Surgical Abrasion
- Cryosurgery
- Electrosurgery
- Lasers

B. Chemical Methods

2. Methods Aimed at Masking Pigmented Gingiva

A. Free Gingival Grafts

B. Acellular Dermal Matrix Allografts

CASE REPORT

A 22-year-old male patient reported to the Department of Periodontics, Army College of Dental Sciences with the complaint of black gums. Oral examination revealed that he had deeply pigmented gingival (Figure:1). The pigmentation was unsightly and hence, depigmentation procedure was decided. The patient was given oral hygiene instructions, and underwent scaling. Gingival depigmentation was planned from first premolar to first premolar.

SCALPEL METHOD

For the maxillary and mandibular right quadrants, scalpel blade was used (Fig 2,3). After adequate local anesthesia (lignocaine with adrenaline in the ratio of 1:100000 by weight), maxillary and mandibular right quadrants with heavily pigmented gingival areas were de-epithelialized using a Bard parker handle and no.15 blade by the scraping method. Depigmentation was carried out from the mucogingival junction towards the tip of the interdental papilla. Pressure was applied with sterile gauze soaked in local anesthetic agent to control hemorrhage during procedure. The entire pigmented epithelium along with a thin layer of connective tissue was removed. Care was taken to avoid pitting of gingival surface and to not remove too much of tissue. The exposed surface was irrigated with saline.

LASER METHOD

For the maxillary and mandibular left quadrants, a semiconductor diode laser was used for depigmentation of the maxillary and mandibular left anterior gingiva up to the first premolar (Figure: 4,5). As there is no need for anesthesia, only topical lignocaine spray was used. Special eyeglasses should be worn by the patient, operator and the assistant to fulfil the FDA laser safety rules. The properly initiated tip of the diode laser unit (Picasso, AMD laser, USA, wavelength 810 nm) angled at an external bevel of 45 degrees and at energy settings of 0.5-1.5 watts continuous wave was used with small brush like strokes back and forth the surface of the gingiva. A 400µm strippable fiber was used with

a power setting of 1.5 watts initially in pulsed wave mode set at 0.20ms of pulse duration and 0.10 ms of pulse interval for the de-epithelialization procedure. After removal of the overlying epithelial tissue, power setting was increased to 2W to attain rapid ablation for removing the pigments present deep beneath the basement membrane.

Laser ablation was started from the mucogingival junction toward the free gingival margin, including papillae. Remnants of the ablated tissue were removed using sterile gauze dampened with saline solution. This procedure was repeated until the desired depth of tissue removal was achieved. The surgical area was covered with a periodontal dressing. Postsurgical Antibiotics (Amoxicillin 500mg, three times a day for five days), Analgesics (ibuprofen with paracetamol, three times daily for three days)

CLINICAL EVALUATION

A list of clinical observations and patient responses prepared by Ishii et al. and Kawashimae et al.⁵ was used for evaluation (Table-1). Melanin pigmentation index given by Takashi et al.⁶ was used. The degree of melanin pigmentation was determined by melanin pigmentation index based on the following scoring system: Visual analog scale (Table 2).

The visual analog scale (VAS) was used to evaluate the subjective pain level experienced by the patient. The VAS consisted of a horizontal line 10cm 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 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; 1-3=slight pain; 3.1-6=moderate pain; 6.1-10=severe pain.

RESULTS

As the patient was operated upon under anesthesia, evaluation of pain was done 1 day postoperatively (Fig 6). The pack was removed after 10 days. Healing was normal without any complications (Fig 7). At the end of 1 month, re-epithelization was complete and healing was

uneventful. The patient had no complaints of post-operative pain or sensitivity. As compared to scalpel method, laser method was found to be better as there is better hemostasis, increased visualisation of operating area, less discomfort and less mechanical trauma. The gingiva appeared healthy and no repigmentation was observed at the end of 6 months (Fig 8).



Figure-1: Preoperative; Figure-2: Scalpel technique



Figure-3: Post operative; Figure-4: Laser technique



Figure-5: Post-operative; Figure-6: Difference between laser and scalpel - difference between right and left laser method



Figure-7: 12 Days post-operative; Figure-8: 6 months post operative

DISCUSSION

Pigmented gingival tissue often forces patients to seek cosmetic treatment. Several treatment modalities have been suggested in the literature,

Table 1:- A list of clinical observations and patient responses prepared by Ishii et al and Kawashima et al was used for evaluation.

Evaluation Score

Bleeding - A. none, B. slight, C. moderate, D. severe
 Pain -A. none, B. slight, C. moderate, D. severe
 Difficulty of procedure - A. very easy, B. easy, C. difficult, D. impossible
 Wound healing-A. complete epithelization, B. incomplete epithelization, C. ulcer, D. necrosis

Clinical Parameters	Duration	Scalpel	Laser
Bleeding	IMMEDIATE	D	A
	1 st WEEK	A	A
	2 nd WEEK	A	A
	3 rd WEEK	A	A
Pain	IMMEDIATE	-	-
	1 st WEEK	B	A
	2 nd WEEK	A	A
	3 rd WEEK	A	A
Wound healing	IMMEDIATE	-	-
	1 st WEEK	B	B
	2 nd WEEK	A	A
	3 rd WEEK	A	A
Difficulty of procedure		B	A

Table 2:-Melanin pigmentation index

Score 0: No pigmentation.
 Score 1: solitary units(s) of pigmentation in papillary gingiva without extension between neighbouring solitary units.
 Score 2: Formation of a continuous ribbon extending from neighbouring solitary units.

Melanin pigmentation scores.

Duration	Scalpel site	Laser site
Immediate preoperative	2	2
1 st Week post operative	0	0
3 rd Month post-operative	0	0
6 th Month post-operative	0	0

ranging from a simple slicing method to free gingival graft. The semiconductor diode laser is emitted in continuous wave or gated-pulsed modes, and is usually operated in a contact method using a flexible fiber optic delivery system. Laser light at 800 to 980 nm is poorly absorbed in water, but highly absorbed in haemoglobin and other pigments. Since the diode basically does not interact with dental hard

tissues, the laser is an excellent soft tissue surgical laser, indicated for cutting and coagulating gingiva and oral mucosa, and for soft tissue curettage or sulcular debridement. The diode laser exhibits thermal effects using the "hot-tip" effect caused by heat accumulation at the end of the fiber, and produces a relatively thick coagulation layer on the treated surface. Diode laser did not produce any deleterious effect on the root surface. Thus, it is generally considered that diode laser surgery can be performed safely in close proximity to dental hard tissue.

Scalpel surgery causes unpleasant bleeding during and after the operation and there are chances of wound contamination. Hence it is necessary to cover the exposed lamina propria with a periodontal pack for 7 to 10 days. The procedure essentially involves surgical removal of the gingival epithelium along with a layer of the underlying connective tissue under adequate local anesthesia and allowing the denuded connective tissue to heal by secondary intention. The new epithelium that forms is devoid of pigmentation. Care must be taken to remove all remnants of the pigment layer (to avoid chances of recurrences) and it should be removed in thin sections to avoid exposing the underlying bone. Scalpel de-epithelization is relatively simple and most economical of all the other techniques available. It does not require any sophisticated armamentarium, is easy to perform. Also, the healing period for scalpel wound is faster than other techniques.

The diode laser causes minimal damage to the periosteum and bone under the gingiva while being used, and additionally it has the unique property of being able to remove a thin layer of epithelium cleanly. A sterile inflammatory reaction occurs after laser usage. Blood vessels in the surrounding tissue up to a diameter of 0.5 mm are sealed; thus, the primary advantage is hemostasis and a relatively dry operating field.

Thermal ablation means that the energy delivered by the laser interacts with irradiated material by an absorption process, yielding a temperature rise. As the temperature increases at the surgical site, the soft tissues are subjected to warming (37 to 60°C), protein denaturation, coagulation (> 60°C), welding (70 to 90°C), vaporization (100 to

150°C), and carbonization (> 200°C).⁷ The rapid rise in intracellular temperature and pressure leads to cellular rupture, as well as release of vapor and cellular debris; termed as the laser plume. Moritz et al showed in an in vitro as well as in an in vivo study the bactericidal effect of diode laser and found that an extraordinarily high reduction of bacteria could be achieved. It creates locally sterile conditions, resulting in a reduction of bacteria.⁸⁻¹⁰

It is also postulated that low output power laser mediates an analgesic effect. However, laser surgery does have some disadvantages. Delayed type of inflammatory reaction may occur with mild post-operative discomfort lasting up to 1-2 weeks. Epithelial regeneration (re-epithelialize) is delayed (lack of wound contraction) as compared to conventional surgery. Moreover, expensive and sophisticated equipment makes the treatment very expensive. Another disadvantage is loss of tactile feedback while using lasers. Nevertheless, in hyperplastic conditions, for bloodless incision, partial thickness dissections and for the removal of soft tissue grafts from the palate leaving a dry wound (avoiding any post-operative bleeding complications), use of lasers is recommended.

CONCLUSION

Growing esthetic concerns require the removal of unsightly pigmented gingival areas to create a pleasant and confident smile, which altogether may alter the personality of an individual. This could be easily attained using any of the above mentioned methods.

The application of diode laser appears to be a safe and effective alternative procedure for the treatment of gingival melanin pigmentation. Its benefits include ease of usage, effectiveness in the treatment of superficial benign pigmented lesions, convenience in dental clinics, as well as decreased trauma for the patient. The patients were satisfied with the outcome, which is the ultimate goal of any therapy.

Acknowledgments- We thank Dr Naveen kumar for clinical assistance and for editing this manuscript.

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