



GINGIVAL MELANIN DEPIGMENTATION USING CRYOTHERAPY: A CASE REPORT

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ABSTRACT

Pigmentation of gingiva is a major concern in people of all human races. Especially when it is associated with a gummy smile, it not only becomes an esthetic concern but also a psychological concern for the individual. Although conventional scalpel surgery or laser therapy are currently available modalities for management of gingival depigmentation, however, it may lead to scarring of tissue and may have deleterious effects on speech or swallowing. Hence an alternative non-invasive method becomes necessary when surgery is not desirable or when other treatment modalities fail. Cryotherapy is a method where the tissue is locally destroyed by freezing in situ with cryogen 'liquid nitrogen' that can be advocated for gingival depigmentation. Following article emphasizes on a case report of a 26 year old male patient who refused for scalpel and laser surgeries and opted cryotherapy as a treatment modality for gingival depigmentation.

KEYWORDS : pigmentation, cryogen, cryotherapy, depigmentation.**INTRODUCTION:**

Gingival tissue constitutes the macroelement of dentofacial esthetics along with face, lip, and teeth.¹ Gingiva participates in the harmony of smile with its pigmentation playing a crucial role. Melanin pigmentation of gingiva is considered to be unaesthetic by patients, and it may have a psychological impact on them. This impact is aggravated in patients with "gummy smile" or excessive gingival display while smiling (very high smile line). (Liébert et al, 2004).

Various treatment modalities employed for gingival depigmentation can be broadly classified as: methods aiming at removing the pigmented layer and methods aiming at masking the pigmented area with grafts from less pigmented areas. Methods aiming at removing the pigmented layer include: scalpel surgical technique, cryosurgery, electrosurgery, Lasers (Nd:YAG lasers, Er: YAG lasers, CO2 lasers). Chemical methods are not used nowadays. Methods aiming at masking the pigmented area with grafts from less pigmented areas include: Free gingival grafts, acellular dermal matrix grafts.²

Cryosurgery is a well-known and well-documented treatment modality in orofacial lesions since 1960.³ James Arnot (1857) was the first person to develop an instrument for applying cold as a therapeutic agent. He used this modality of treatment to treat cancer and he pioneered the development of cryosurgery as we know it today.⁴

Cryosurgical systems are classified as 'closed' and 'open'.^{5,6} Closed-system cryotherapy offers a greater degree of temperature control but requires a complex, delicate, and expensive equipment. It is performed by direct contact of the cryoprobe onto the lesional surface. Because of the small and flat contact area of the cryoprobe end, closed-system cryotherapy is usually suitable for treatment of uniform, smooth-surfaced oral lesions less than 1 cm in diameter. Open-system cryotherapy involves directly applying the cryogen to the lesion with either a cotton swab or a portable spray apparatus. It is more difficult to maintain a constant lower temperature in the lesional tissues during the whole treatment period. However, it does not need an expensive equipment. Open-system cryotherapy with the spray apparatus is suitable for treatment of medium and large oral lesions with either a smooth or rough surface.^{6,7}

The mechanisms for cell destruction after cryotherapy are complex involving a combination of direct and indirect effects. Direct effects

consist of extracellular and intracellular formation of ice crystals, which in turn disrupt cell membranes, cellular dehydration, toxic intracellular electrolyte concentration, inhibition of enzymes, protein damage, thawing effects that cause the cell to vacuolate, swell, and rupture and thus there is a thermal shock injury to cells. Indirect effects are vascular changes that lead to ischemic necrosis of the treated tissue and immunological responses that cause cell damage through a cytotoxic immune mechanism.^{8,9}

Based on previous clinical and experimental reports of surgical depigmentation of the gingiva and on cryotherapy (Valappilla NJ 2015, Thanabalan D 2014), cryosurgery was chosen as the mode of treatment for the patient in our case report.

CASE REPORT

A 26-year-old male reported to the Out Patient Department of Periodontics at Y.M.T. Dental College, with the chief complaint of blackish discoloration of gums. On extra-oral examination no abnormalities were detected. Gingival examination revealed Score 2 gingival melanin pigmentation (Dummett CO, Gupta OP, 1964) in the anterior region of maxillary and mandibular jaws (Fig. 1). The patient was a non-smoker, of wheatish skin tone, Maharashtrian, with both the parents born in Maharashtra. The patient asked for a surgical correction for the same.

**Fig 1. Preoperative view**

Patient preparation: Lidocaine topical anesthetic aerosol 15% w/w was sprayed on the anterior segment of both the jaws. The extension of the segments for the application of liquid nitrogen were predetermined, based on patient's smile line (Liébert et al, 2004). Patient was fully draped, and eyes were protected with a protective eyewear.

Materials used: Cryocan containing cryogen (Liquid Nitrogen),

small cotton pellets, a metal bowl and tweezers. Fig 2a, 2b



Fig 2a: Cryocan



Fig 2b: Apparatus apparatusMaterials used

Method of application: After adequate anesthesia was achieved, small cotton pellets were dipped in the liquid nitrogen (-196 °C) (Bishop K, 1994), carried in a bowl and applied on the melanin pigmented gingiva on the anterior sextant on both the maxillary and mandibular jaws. The cotton pellets were held with tweezers and were applied on the sextant with light pressure, for 30 secs (Darbandi A, Shahbaz NA. 2004.), so that the pellet does not stick to the mucosa. The frozen site thawed spontaneously within one minute and mild erythema developed. Subsequently, the cotton pellet was gently lifted and the procedure was continued on all the pigmented gingiva of the sextant. Fig.3.



Fig 3. Method of application Immediate postoperative view

On one week post-operative follow up, a superficial necrosis was apparent and a whitish slough separated from the underlying tissue leaving a clean granulating surface. The sextant was checked thoroughly for any specks of pigmentation and the procedure was repeated only on the particular area, during the same appointment. Fig3



Fig 3. One week postoperative view

On 2 weeks post-operative follow-up, the treated site was covered with epithelium. Keratinization was completed after 3-4 weeks, and the treated gingiva was similar in color to other areas of the gingiva which did not present clinical pigmentation. Fig 4



Fig 4. Two weeks postoperative view

DISCUSSION:

Cryosurgery is most widely accepted method of gingival depigmentation.^{10,11} It involves freezing of gingiva with the application of different materials, i.e. cryogen such as liquid nitrogen at very low temperatures. Most commonly used cryogens are: Liquid nitrogen (-191°C), Nitrous oxide (-81°C) and Carbon-dioxide (-79°C). The clinical responses of oral soft tissues to cryotherapy usually include courses of tissue edema, subepithelial hemorrhage, blister formation, necrosis, sloughing, and repair.

Cryodestruction enables quick healing, practically without leaving scars, while providing excellent cosmetic effect. Postoperative restorative period is shortened significantly, which allows for large increase in the number of patients. Occurrence of repigmentation following cryosurgery gingival depigmentation was reported as early as 4 months to as late as 2 yrs.

(Tal H 1987, 1988, 1991)

While most vital tissues freeze at approximately -20°C, ultralow temperatures (below -200°C) result in total cell death (Frazer & Gill 1967). Superficial gingival cryosurgery as well as full thickness gingival freezing in humans and animals have demonstrated healing by "complete regeneration" and "sterile inflammatory reaction" (Tal & Stahl 1985. Tal 1983. Tal & Altini 1982, Tal et al. 1982, Mayers et al. 1971. Frazer & Gil 1967).

In the present case report, liquid nitrogen (-196°C) for 30s was used. The study conducted by Darbandi A, Shahbaz NA in 2004¹² showed a similar result, wherein 10 patients with gingival melanin pigmentation were treated with liquid nitrogen using cryoprobe. Patients were recalled after four weeks; all pigmented parts were cured and no recurrent lesion was observed in any of patients. Shirazi AS, Moeintaghavi A, Khorakian F, Talebi M. 2012¹³ treated gingival pigmentation in 15 adolescents using liquid nitrogen approximately 20 seconds. After 2 weeks, the gingival color was ideal for all patients. No postoperative scar formation, pain, or other complications were seen during this period.

Compared to conventional and laser modalities of treatment for gingival depigmentation, cryosurgery is neither associated with bleeding and scar formation, nor does it require a regional anesthesia, complicated instruments for the procedure or periodontal dressing. In the present case report topical anesthetic spray was used to avoid any irritation due to the low temperature liquid nitrogen being applied directly on the gingiva. Special care was taken such as making the patient wear protective eyewear, to prevent any inadvertent contact with the medium used. The main difficulty of liquid nitrogen use is maintenance since it needs special storage boxes or cylinders.

In our case report, the patient was concerned of his gingival melanin pigmentation and the cryosurgery was acceptable to him, since it was not time consuming, painless and did not cause bleeding.

Thus minimal traumatic consequences, short time of operation, and the absence for the need of regional anesthesia, essentially broadens the circle of patients, for whom other surgical operations are contraindicated effectively, makes cryosurgery to be the most prudent choice for treatment. 14

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