

Cryosurgical depigmentation of the gingiva

A case report

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Abstract. Gingival melanin pigmentation (GMP) occurs in all races of man. Although clinical melanin pigmentation does not present a medical problem, demand for cosmetic therapy is commonly made by fair-skinned people with moderate GMP. The present study was undertaken to test the effectiveness of cryosurgical destruction of the gingival epithelium in the removal of gingival melanin pigmentation. The patient was a fair-skinned Ashkenazi Jew with moderate GMP who demanded any possible "cosmetic therapy" which would convert her "black gums" to "normal". Gingival cryosurgery was carried out by segments. A gas expansion cryoprobe cooled to -81°C was applied to the gingiva for 10 s. Frozen sites thawed spontaneously within 1 min. Superficial necrosis became apparent within a week. Treated sites were covered by epithelium within 2 weeks following freezing and keratinization was completed after 3–4 weeks. The treated gingiva appeared normal and remained depigmented until the present time, 20 months following freezing. It is concluded that cryosurgery may prove to be the treatment of choice when gingival depigmentation is indicated.

Key words: Melanin pigmentation – gingival pigmentation – cryosurgery.

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Oral pigmentation occurs in all races of man (Dummett 1960). While melanin pigmentation is the most familiar, other pigments such as carotene, oxyhemoglobin and reduced hemoglobin may also contribute to the normal color of the integument and are also found in the masticatory mucosa (Goldzieher et al. 1951). The gingivae are the most frequently pigmented intra-oral site (Dummett 1960). Because of the pandemicity of oral melanin pigmentation, the topic has assumed current diagnostic and anthropologic significance (Dummett & Barnes 1967, Dummett 1966).

Contrary to general opinion, gingival pigmentation is not confined to the black population. Other nationalities (French, Filipino, Arabian, Chinese, Indian, German, Italian, Jewish, Greek, Romanian, etc.) have been reported as presenting clinical gingival pigmentation (Monash 1932). A positive correlation between gingival pigmentation and the degree of pigmentation in the skin, seems, however, evident (Dummett 1959).

Although clinical melanin pigmentation of the gingiva does not present a medical problem, complaints of "black

gums" are common. Demand for cosmetic therapy is made, especially by fair-skinned people with moderate or severe gingival pigmentation, since this phenomenon is uncommon in their society.

Recent surveys on the prevalence of physiologic pigmentation of the oral mucosa in Israeli Jews of different ethnic origin have demonstrated that gingival pigmentation was observed in 31% of the entire sample (Gorsky et al. 1984a, b). In the Ashkenazi group, 21% presented gingival pigmentation with no sex predilection. The labial portion of the upper gingiva was pigmented in 20% of the investigated population, but almost all subjects presented physiologic pigmentation in a very mild form.

Information on depigmentation and repigmentation following surgical removal of pigmented gingiva in humans is extremely limited (Perlmutter & Tal 1986). The present communication reports clinical observations following cryosurgical destruction of moderately pigmented gingival epithelium. The results indicate that cryosurgery may be the method of choice for depigmentation of clinically pigmented gingiva.

Case Report

A 32-year-old female presented in the dental clinic at Tel Aviv University, complaining of unusually dark gums. Clinical examination revealed moderate gingival melanin pigmentation in the upper and lower jaws (Fig. 1). The patient was a non-smoker, fair-skinned Ashkenazi Jew, with both parents born in Poland. Other members of her family did not show signs of gingival pigmentation. The patient was reassured that her gingiva was healthy and that the dark color, although uncommon among members of her ethnic group, was not



Fig. 1. Clinical view of moderate gingival pigmentation before treatment.

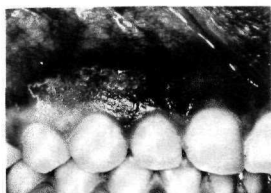


Fig. 2. A higher magnification of the upper right first premolar-to-central incisor segment before treatment.

a rare phenomenon and did not require any treatment. However, the patient demanded any possible "cosmetic therapy" which would convert her "black gums" to "normal".

Based on previous clinical and experimental reports of surgical depigmentation of the gingiva on the one hand (Perlmutter & Tal 1986, Dummett et al. 1964, Dummett & Bolden 1963), and on our experience in cryotherapy of superficial lesions of the oral mucosa on the other hand (Tal & Stahl 1985, Tal 1983, Tal et al. 1982), it was felt that cryosurgical destruction of the pigmented gingival epithelium would lead to the best results.

Before making final recommendations, it was decided to test the patient's tissue reaction to cryosurgery in a limited area of the gingiva. An area measuring 5 × 5 mm apical to the upper right first molar was exposed to a gas expansion cryoprobe* cooled to -81°C for 10 s. Water-soluble k-y gel** was applied between the probe and the gingiva to improve thermal conductivity. The frozen site thawed spontaneously within one min and mild erythema developed. During the next week, superficial necrosis became apparent and a whitish slough separated from the underlying tissue leaving a clean granulating surface. After 2 weeks, the treated site was covered by 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.

During the initial freezing procedure, the patient endured some pain but preferred to continue the treatment without

local anesthesia. The treatment was limited to visible areas only (i.e., mesial to the first upper molars. The gingiva in this area was divided into 3 segments; the right lateral incisor-to-molar area was treated first (Figs. 2, 3), followed by the left lateral incisor-to-molar area. The remaining anterior pigmented gingiva was treated 1 month later.

Clinical follow-up during the next 20-month-period revealed no change in the pigmentation of the treated area. Photographic comparisons did not show any significant changes in the border contour lines of the depigmented areas (Fig. 4).

Discussion

Cryosurgery, an effective method of tissue destruction by freezing, has become a firmly established surgical technique in medical and dental practice. Physical and chemical changes induced by freezing lead to cell destruction and tissue death. While most vital tissues freeze at approximately -2°C, ultralow temperatures (below -20°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 & Gill 1967). The uneventful healing in the present case was not surprising. During cryosurgical treatment of mucosal lesions in 3 black patients with moderate gingival pigmentation, segments of gingival epithelium were accidentally exposed to the cryoprobe. A side-effect of the treatment was depigmentation of the affected sites in the gingiva which

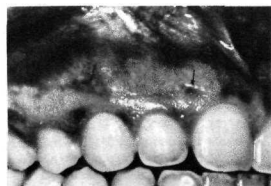


Fig. 3. Three weeks following treatment of the upper right first-premolar-to-central incisor; normal keratinization and complete depigmentation is obvious. Reddish healing limited zones still present (arrows).



Fig. 4. Twenty months after healing; the gingiva appears pink with no signs of repigmentation.

erroneously contributed to the initiation of the present study.

The cryodose of 10 s × -81°C was selected, based upon previous experience. The same dose resulted in complete epithelial destruction with minimal damage to the underlying connective tissue in the cat gingiva (Tal & Stahl 1985). But the cryodose may be changed depending on the cryoprobe in use; larger probes require less time to freeze the epithelium than smaller ones.

In the present case, clinical repigmentation had not occurred during the follow-up period, i.e., 20 months. Previous studies have reported that gingival repigmentation had been observed in 6 out of 9 cases following surgical depigmentation (Dummett & Bolden 1963). In the remaining 3 cases, repigmentation had not occurred up to 120 and 431 days post surgery. In another study, clinical repigmentation did not occur until 2 years post operatively in 1 case and the surgized area remained depigmented for 8 years in another case (Perlmutter & Tal 1986).

It is generally accepted that pigmentation of mammalian skin is conferred upon it by the activity of melanin-producing melanocytes; these are derived from the neural crest and migrate into the epidermis, as do the melanocytes of the oral mucosa (Rawles 1947, 1940). The melanin is transferred from the melanocytes to the epidermal cells by "cytochrome" activity (Rawles 1948). The melanocytes in the epidermis are believed to be a self-perpetuating population, independent of the tissue surrounding the mature cells (Masson 1948).

The exact mechanism of skin repigmentation is unclear, but the "migration theory" seems to be favored (Land 1962). According to this theory, active melanocytes from normal skin and hair matrix proliferate and migrate into the depigmented areas. Clinical repigmen-

* Nasal cryoprobe No. 2226. Frigitorics Inc. of Shelton Connecticut, USA.

** Johnson and Johnson Product Inc., NJ, USA.

tation of depigmented areas may occur spontaneously also after subtotal gastrectomy, exposure to ultraviolet light or dermabrasion (Hu et al. 1959, Lowenthal 1957).

As previously shown, following epithelial destruction by cryosurgery, epithelial migration covers the denuded connective tissue and histologically, regenerates rapidly (Tal & Stahl 1985). It may be speculated on that either "migration" of melanocytes did not occur during the 20 months follow-up period, or that the melanocytes which had migrated were not active. Further experimental histological animal studies are currently underway in the hope of answering this speculation.

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Zusammenfassung

Kryochirurgische Depigmentation der Gingiva. Ein Fallbericht

Melanin pigmentiertes Zahnfleisch (GMP) kommt bei Angehörigen aller menschlichen Rassen vor. Obwohl die klinische Melanin pigmentierung kein medizinisches Problem darstellt, so wird von hellhäutigen Patienten mit mässiger GMP eine depigmentierende Behandlung der Gingiva aus kosmetischen Gründen gewünscht. Die Studie wurde konzipiert, um die Effektivität kryochirurgischer Destruktion des Zahnfleischepithels bei der Entfernung gingivaler Melanin pigmentierung zu bestimmen. Der Patient, eine hellhäutige Ashkenazi-Jüdin mit mässiger GMP, war an einer jeden im Bereiche des Möglichen liegenden Therapie interessiert, die instände war ihr "schwarzes Zahnfleisch" zu "normalisieren". Die Gingiva wurde abschnittsweise kryochirurgisch behandelt. Eine Gasexpansions-Kryo sonde, die auf -81°C abgekühlt war, wurde 10 Sekunden lang an das Zahnfleisch angelegt. Die gefrorenen Regionen tauchten innerhalb einer Minute spontan auf. Innerhalb einer Woche kam es zu oberflächlichen Nekrosen. Epithel deckte die behandelten Regionen bereits 2 Wochen nach der Kryobehandlung ab und die Keratinisation war nach 3-4 Wochen vollständig abgeschlossen. Die behandelte Gingiva erschien normal und ist bis zum gegenwärtigen Augenblick - 20 Monate nach der Gefrierbehandlung - immer noch von Pigment befreit. Es wird gefolgert, dass die Kryochirurgie die Behandlung der Wahl sein kann, wenn eine Depigmentierung der Gingiva indiziert ist.

Résumé

Elimination des pigmentations gingivales par la cryochirurgie. Compte rendu d'un cas

On peut dans toutes les races humaines rencontrer des pigmentations gingivales par la mélanine (PGM). Bien que la pigmentation clinique par la mélanine ne représente pas un problème médical, les personnes dont la peau est claire et qui présentent une PGM modérée demandent souvent un traitement esthétique. La présente étude a été entreprise pour tester l'efficacité de la destruction cryochirurgicale de l'épithélium gingival lorsqu'on veut supprimer une pigmentation gin-

givale par la mélanine. La patiente considérée était une juive "Ashkenazi" une peau claire et une PGM modérée: qui désirait subir un "traitement esthétique" pouvant transformer ses "gencives noires" en gencives "normales". La cryochirurgie gingivale a été pratiquée par segments. Un cryocautére refroidi à -81°C par expansion d'un gaz a été appliqué pendant 10 secondes sur la gencive. Les sites congelés se dégelèrent spontanément en l'espace d'une minute. Une nécrose superficielle apparaissait en l'espace d'une semaine. Les sites traités étaient recouverts d'épithélium dans les 2 semaines suivant la congélation; la kératinisation était accomplie après 3-4

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semaines. La gencive traitée était d'aspect normal; elle est restée dépigmentée jusqu'à présent, 20 mois après l'intervention. En conclusion, la cryochirurgie est peut-être susceptible de devenir le traitement de choix lorsqu'une dépigmentation gingivale est indiquée.

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