REVIEW

Depigmentation to Repigmentation of Gingiva

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ABSTRACT:

Pigmentation and related disorders are common disorders in the skin and have focused a lot of research work. The oral cavity and more specifically the gingival also exhibits such disorders and the condition termed as gingival vitiligo though uncommon does present to the dentist.

This review discusses the various pathogenic mechanisms behind the condition and different treatment modalities existing.

Key words: Gingival/abnormalities; vitiligo/therapy; tattoo/therapeutic use; esthetics, dental; HIV infections

Introduction

With growing concern pertaining to esthetics in today's population the role of periodontist as a specialist dentist has increased considerably over the past few years. Soft tissue esthetics has become a significant aspect of periodontics. Off late many techniques effectively address issues pertaining to gingival architecture. But, gingival pigmentation still remains a largely neglected scenario with regards to treatment modalities. In health, high levels of gingival pigmentation are normally observed in a wide variety of races usually those of the African, East Asian or the Hispanic backgrounds.[1] Studies have focused attention towards hyper pigmentation but, hypo pigmentation also a condition of esthetic concern has not received much attention. Such hypo pigmentation of gingiva is referred as gingival vitiligo.

Vitiligo

Vitiligo is a term derived from Latin word "Vitium" meaning a defect. It is an acquired, idiopathic, hypomelanotic disease which is characterized by circumscribed depigmented macules[2]. Vitiligo pertaining to the skin has received a lot of attention but, scant amount of literature is available on gingival vitiligo.[3-5] Absence of melanocytes from the lesional area due to their destruction has been suggested to be the key event in the pathogenesis of vitiligo. The etiology of vitiligo is still unknown but, genetic factors, oxidative stress, autoimmunity, neurological factors, toxic metabolites and lack of melanocyte growth factors might contribute a precipitating factor in susceptible individuals.[6]

Prevalence in familial cases of vitiligo varies from 6.25- 38%.[7] The inheritance of vitiligo does not follow the simple Mendelian pattern.[8] It is considered as a complex hereditary disease governed by a set of alleles situated at several unlinked autosomal loci which may be involved in the generation of oxidative stress, melanin synthesis, autoimmunity etc. that could confer the vitiligo phenotype.[9]

Classification of vitiligo:

Based on distribution and extension of lesions three types have been delineated by Nordlund: localized, generalized and universal vitiligo.[10]

Koga classified vitiligo into two clinical types: vitiligo non segmentalis (type A) and vitiligo segmentalis (type B).[11]

Etiopathogenesis of vitiligo:

The three main prevailing theories of pathogenesis of vitiligo are centered on neurochemical, autoimmune and oxidative stress aspects, but none of these hypotheses explain the entire spectrum of the vitiligo disorder.[12]

Neurochemical hypothesis:

Neurochemical mediators that are secreted by the nerve endings such as norepinephrine and acetylcholine are toxic to melanocytes. Alterations in beta endorphins and enkephalin secretion are also reported in vitiligo patients. The met enkephalin levels are found to be higher and this abnormality correlates with the emotional stress which precipitates vitiligo in some patients.

Autocytotoxic/metabolic hypothesis:

Oxidative stress is considered to be the initial pathogenic event in the melanocyte destruction as hydrogen peroxide accumulation is observed in the epidermis of active vitiligo patients[13- 15.] Anti oxidant imbalance in peripheral blood mononuclear cells of active vitiligo patients is also observed. An increased intracellular production of reactive oxygen species appeared to be due to mitochondrial impairment. These findings support the concept of a possible systemic oxidative stress in vitiligo.

Autoimmune hypothesis:

It is based on the studies that have demonstrated an association between vitiligo and autoimmune diseases such as diabetes, pernicious anemia, thyroid diseases, Addison's disease, alopecia etc. and also the presence of circulating antimelanocyte and antikeratinocyte antibodies in the sera of vitiligo patients.

Genetic hypothesis:

A positive family history for vitiligo is reported. Several genes and chromosomal regions have been implicated in susceptibility to vitiligo, but none has been confirmed so far.[16] In addition, several HLA abnormalities have been associated with vitiligo, including association with Dr4, B13, BW35, and A30.[17]

Novel microenvironment-related hypothesis:

Cytokine imbalance in the epidermal microenvironment has been demonstrated in lesional skin in active vitiligo. This could impair normal life and activity of melanocytes; a decrease in cytokines stimulating melanocytes and an increase in cytokines inhibiting melanocytes (in particular, tumor necrosis factor-α) were detected in depigmented lesions.[18]

Convergence theory:

The description of many credible contributory factors to the pathogenesis of vitiligo led to this theory, in which different causal elements may act synergistically or independently to provoke disappearance of melanocytes.[19]

Clinically environmental factors are important in the development of vitiligo. Trauma, eczema, chemical agents and fragility of keratinocytes play a role in the development of vitiligo.[15, 20]

Structure and Morphology Of Melanocytes:

These are melanin producing cells. In the skin they reside in the matrix of the hair follicle of basal layer of the epidermis. Melanocytes are highly dendritic and these dendrites project into the Malphigian layer of the epidermis where they transfer the melanosomes to keratinocytes. Each epidermal melanocyte secretes melanosomes to approximately 36 keratinocytes in the neighbourhood and this entire unit is called "epidermal melanin unit'. Tyrosinase is the key enzyme required for melanin synthesis.[21]

Gingival color

The normal color of the gingiva is coral pink and is produced by the vascular supply, the thickness and degree of keratinization of the epithelium, and the presence of pigment containing cells.[22]

Factors which are responsible for the normal color of the gingiva are[22]

1. Change in colour is an important clinical sign of gingival disease.
2. Normal gingiva is coral pink in colour and is produced by tissue's vascularity and modified by overlying epithelial layers.
3. For this reason gingiva becomes redder when there is an increase in vascularization or the degree of epithelial keratinisation becomes reduced or disappears.
4. The color becomes paler when vascularisation is reduced or epithelial keratinisation occurs.
5. Originally a light red, the color changes through varying shades of red, reddish blue with increasing chronicity of inflammatory process.

Chemical agents responsible for gingival pigmentation[22]

Bismuth, Arsenic and Mercury: produce black line in the gingiva that follows the contour of the margin. The pigmentation may also appear as isolated black blotches involving the marginal, interdental and attached gingiva.

Lead: Bluish red or deep blue linear pigmentation of gingival margin (Burtonian line)

Silver (Argyria): violet marginal line accompanied by a diffuse bluish gray discoloration throughout the oral mucosa.

Gingival pigmentation from systemically absorbed metals results from perivascular recipitation of metallic sulfides in the subepithelial connective tissue. It occurs only in areas of increased inflammation where the increased permeability of irritated blood vessels permits seepage of the metal into the surrounding tissue.

Color changes associated with systemic factors[22]

These abnormal pigmentations are non specific in nature and further diagnosis is necessary. Endogenous oral pigmentations can be due to melanin, bilirubin or iron.

Diseases that increase melanin pigmentation include Addison's disease caused by adrenal dysfunction and produces isolated patches of discoloration varying from bluish black to brown.

Peutz Jeghers Syndrome which produces intestinal polyposis and melanin pigmentation in the oral mucosa and lips. Albright's syndrome and Von Recklinghausen's disease produce areas of oral melanin pigmentation. Jaundice oral mucosa may acquire a yellowish colour. Iron deposition in hemochromatosis may produce a blue gray pigmentation of the oral mucosa. Endocrine disturbances, blood dyscrasias such as anemia, polycythemia and leukemia may also induce color changes.

Exogenous factors capable of producing colour changes in the gingiva include atmospheric irritants such as coal and metal dust and coloring agents in food or lozenges.

Tobacco causes a gray hyperkeratosis of the gingival. Localized bluish black areas of pigment are commonly due to amalgam implanted in the mucosa.

Gingival vitiligo

Gingival vitiligo can be considered as a condition with no clinically visible pigmentation on all buccal and labial attached gingiva. The labial mucosa of the lower lip also demonstrates a loss of pigmentation terminating at the vermillion border.

Methods of autologous transplantation of melanocytes have been developed to repigment lesions that are stable, as well as those that are refractory to medical therapies.

Data existing till date on gingival vitiligo was about a case report of a fourty year old black female patient from Kenya.[1]

Current treatment options recommended for vitiligo[23]

Treatment type	Activity
Corticosteroid cream + UVA	6 months 1x/day cream, 2x/wk UVA
UVB 311nm	1 year, 2x/wk, 4 follow up visits
PUVA	1 year, 2x/wk, 4 follow up visits
UVB broadspectrum	1 year, 2x/wk, 4 follow up visits
Minigrafting	100cm2 (2 sessions)
Split skin grafting	100cm2 (1 session)
Depigmentation laser	1 year, 6 sessions
Depigmentation cream	12 months, 1x/d application

Various treatment options do exist for the management of gingival vitiligo and they include the possibility of fabricating a pigmented denture base to cover the natural gingiva, the tattoo method. However considering the bulkiness and associated discomfort for the patient gingival tattooing might provide the most reliable, esthetically pleasing and hopefully permenant result.

Technique of Gingival Tattooing:[24, 25, 26]

A treatment modality for the management of hypopigmentation of the gingiva with satisfactory results is gingival tattooing technique. The entire treatment course extended over a period of 5 weeks.The time lapse between visits could make the evaluation of gingival status and to ascertain the stability of artificial pigmentation. Prior to proceeding with the tattoo technique proper color match at test sites with remaining natural pigmentation should be undertaken as esthetic result should not be compromised. Depending on the patient's smile line the extent to which gingival tattooing should be performed can be determined.

Inorder to achieve optimal and esthetically pleasing outcomes several appointments for refinement of oral pigmentation and a natural like appearance should be scheduled.

Tattoo procedure:[25, 26]

Subsequent to the administration of local anesthesia by apical infiltration (distant from sites being tattooed). Specially constructed sterilized stainless steel hand instruments with 7 to 10 sharp points were dipped into tattoo pigment that was then delivered submucosally within the gingiva. The tattoo pigments consisted of well tolerated water soluble metal salts inks used extensively for skin tattooing. Bleeding will be minimal which could be controlled by gauze pressure .Excess pigment on the surface of gingiva should be readily removed with gauze. Analgesia could be achieved by preoperative administration of NSAID'S followed by post operative medication. Post operative rinsing with chlorhexidine gluconate was also recommended. The treatment outcome over the series of patient appointments will be appreciable pertaining to the normal pigmentation pattern for the individual patient.post treatment analysis can be done with a series of comparative pre and post operative photographs. The treatment outcome will be appreciated by the patient and will elevate the patient psychologically as well as enable enhance the quality of life. Since, this loss of pigmentation of the gingiva is identified in the African countries

as HIV positive affected individuals and hence psychological uplift is very important treatment outcome.

Reports do exist that the pigmentation may slightly fade with time and this may be corrected by additional tattooing .The histological assessment immediate post operative revealed mucosa consisting of mildly hyperkeratinized stratified squamous epithelium overlying a collagenous fibrous tissue. Small foci of pigmentation could be observed in the basal epithelial which was consistent with melanin representing the remaining natural pigmentation. Fragments of black foreign body deposits were demonstrated within the interstitial areas of the submucosal connective tissue ,with no significant foreign body reaction or inflammation.

Adverse effects to the various treatment schemes used to treat vitiligo[27]

Treatment	Adverse effects
UV radiation modalities	Sunburn, solar elastosis, carcinogenesis?
Corticosteroid	Systemic: Adrenal suppression Topical: atrophy, striae, acne
Minigrafting	Infection, cobble stoning, pitted scars (donor site)
Split skin grafting	Infection, epidermal cysts, atrophy (donor site)
Monobenzone	Irritation

Discussion:

Self induced gingival tattooing may represent a traditional practice in certain parts of Africa and the Middle east.[16,17,18] Dermatological reports suggest that vitiligo can arise secondary to HIV infection and may be triggered by a concomitant infection with cytomegalovirus.[28] Till date no cause and effect relationship exists between HIV and gingival vitiligo.[29] Reports suggest that life style and diet modifications could also aid in the management of vitiligo. A healthy balanced diet with nutrients from a variety of sources can be helpful in vitiligo. According to complementary and alternative medicine practitioners, there are foods that are considered either beneficial for or detrimental in vitiligo, but they often lack medical evidence to substantiate their claims. Some ayurvedic specialists insist that certain foods are harmful to the body when a patient is suffering from vitiligo and they include tamarind, tomatoes, citrus foods and juices, grapes, tinned foods, coffee and chocolates. Administration of antioxidants to the affected patients could eliminate the reactive oxygen species (which are involved in the destruction of melanocytes in vitiligo) and thereby inhibhit progression. Omega 3 fatty acids are poly unsaturated fatty acids that are known to be beneficial for psoriasis and autoimmune diseases and also used in vitiligo due to its anti-inflammatory properties, antioxidant and antidepressant effects.[30]

Conclusion

Vitiligo a depigmenting disorder could account for psychological and social embarrassments. The underlying etiopathogenesis has not been clearly established till date. With a strong genetic basis for the condition quest for candidate genes still continues. Gingival vitiligo though a rare condition reported till date is considered a social stigma in some parts of the world and newer techniques for the management of this condition should be sought for psychological enhancement and improvement of patient's quality of life.

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