Management of Gingival Hyperpigmentation by Scalpel Surgical Technique

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Abstracts: Oral pigmentation occurs in all races of man. Although melanin pigmentation is the most common. The gingiva is the most frequently pigmented intra-oral tissues. Various depigmentation techniques have been employed. One of the first, and still popular, techniques to be employed was the surgical removal of undesirable pigmentation using scalpels. The technique is relatively simple and versatile and requires minimum time and effort. If repigmentation occurs, the procedure can be done repeatedly in the same area without limitation or causing any permanent damage. Three cases of gingival hyper pigmentation treated by the scalpel surgical technique are described here. After nine months follow up, none of the cases showed any recurrence of the pigmentation. [Jaladhi P NJIRM 2017; 8(2):183-189]

Key Words: Gingival pigmentation, gingival depigmentation, gingival hyperpigmentation, scalpel surgical technique.

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Introduction: Oral pigmentation occurs in all races of man.[1-5]Although melanin pigmentation is the most common. Carotene, reduced haemoglobin and oxyhemoglobin have been identified as contributors to the normal color of the integument and are found in the masticatory mucosa.[6]Because of the pandemicity of melanin pigmentation, the topic has assumed current diagnostic and anthropologic significance.

The gingiva is the most frequently pigmented intra-oral tissues. Contrary to general opinion, gingival pigmentation is not confined to negroes. French, Filipino, Arabian, Chinese, Indian, German, Italian, Jewish, Greek, Romanian and other ethnic groups have been reported to display clinical gingival pigmentation. There appears to be a positive correlation between gingival pigmentation and the degree of pigmentation in the skin. The degree of pigmentation depends on melanoblastic activity.[7]

Hyperpigmentation of the gingiva is caused by excessive melanin deposition by the melanocytes mainly located in the basal and suprabasal cell layers of the epithelium.[8-9] Brown or dark pigmentation and discoloration of gingival tissue can be caused by a variety of local and systemic factors.[10] Systemic conditions such as endocrine disturbance, Albright's syndrome, malignant melanoma, antimalarial therapy, Peutz-Jeghers syndrome, trauma, hemachromatosis, chronic pulmonary disease, and racial pigmentation are known causes of oral melanin pigmentation.[11] High levels of oral melanin pigmentation are normally observed in individuals of African, East Asian, or Hispanic ethnicity.[12-13]In general, individuals with fair skin will not demonstrate overt tissue pigmentation, although comparable numbers of melanocytes are present within their gingival epithelium.[14] Clinical melanin pigmentation of the gingiva does not present a medical problem although complaints of "black gums" may cause esthetic problems and embarrassment, particularly if the pigmentations are visible during speech and smiling.[15-16]

Melanocytes were first identified in the oral epithelium by Becker in 1927[17]; a few years later they were isolated from samples of gingival tissue by Laidlaw and Cahn.[18] During early intrauterine life, precursors of melanocytes, melanoblasts, migrate from the neural crest to the epidermis and the hair follicles, becoming differentiated dendritic cells.[19-21] The head and neck region represents the first part of the body where melanocytes appear, after approximately 10 weeks of gestation. Melanocytes are located in the basal epithelial layer of squamous mucous membranes and do not contact each other. They are regularly interspersed between the basal keratinocytes. Melanocytic dendrites reach a number of keratinocytes in the close vicinity, and through these dendrites melanin is transported and transmitted to these epithelial cells.[22-25] An age-related increase of oral melanocytes has been observed. The normal melanocytes of the oral mucosa have a small round nucleus and a small amount of a clear cytoplasm, with slender dendrites extending between adjacent keratinocytes. Melanocytes are devoid of desmosomes or attachment plates.[26] Melanin-containing electron-dense vesicles, so-called melanosomes, are formed within the cytoplasm and transported along the dendrites.[24] The use of 3, 4-dihydroxyphenylalanine, a substrate for tyrosinase, represents the most specific histochemical method for labelling melanocytes.[22] Other methods include argentaffinic melanin-labelling techniques such as the

Masson-Fontana staining. Inactive oral mucosal melanocytes, lacking melanin and melanin precursors, may not stain with this method.[22] Immunohistochemically, the S100 antigen is by far the most common marker used. The S100 staining appears to be stronger in melanocytes lacking pigment. Another commonly used marker is HMB-45, a monoclonal antibody directed against a melanosomal glycoprotein. It is not expressed by melanocytes that lack all melanogenic activity.[22] The main biochemical function of the mature melanocyte is a process called melanogenesis, through which the cell produces and delivers melanin pigment.[20] Eumelanin (brown-black melanin) causes a brown black color of the skin, hair, and eye, and pheomelanin has a reddish color. Neuromelanin, found in some nerve cells, is an unrelated substance.[27] Various stimuli, such as trauma, hormonal changes, medication, and radiation, may result in an increased production of melanin.[28] Melanin functions include absorption of ultraviolet light and scavenging of some cytotoxic compounds.[24]

Gingival Depigmentation Technique: Various depigmentation techniques have been employed (Table 1). Selection of a technique should be based on clinical experience and individual preferences. Removal of gingival melanin pigmentation should be performed cautiously and the adjacent teeth should be protected, since inappropriate application may cause gingival recession, damage to the underlying periosteum and bone, delayed wound healing, as well as loss of enamel.[29] Any treatment intended for ablation of melanin should be no scarring, safe, easy to handle, simple to apply, leave no melanin remnants, and carry a low risk of repigmentation.

One of the first, and still popular, techniques to be employed was the surgical removal of undesirable pigmentation using scalpels. There is only limited information in the literature on depigmentation using surgical techniques.[30,31] The procedure essentially involves surgical removal of gingival epithelium along with a layer of the underlying connective tissue and allowing the denuded connective tissue to heal by secondary intention. The new epithelium that forms is devoid of melanin pigmentation.

Table 1

Methods Aimed At Removing The Pigment Layer
Scalpel surgical technique
Cryosurgery
Electro surgery
Lasers
• Neodymium: Aluminium-Yttrium-Garnet (Nd:YAG) lasers • Erbium: YAG (Er:YAG) lasers • Carbon Dioxide (CO_2) lasers
Chemical methods of depigmentation using caustic chemicals(such as 90% phenol and 95% alcohol) - this method is not used nowadays
Methods Aimed At Masking The Pigmented Gingiva With Grafts From Less Pigmented Areas
• Free Gingival Grafts • Acellular Dermal Matrix Allograft

Gingival abrasion using a round bur is a comparatively simple, safe and non-aggressive method that is both easily used and readily repeated, if necessary, to eradicate any residual or repigmented area.[32]

Removing the gingival margin by gingivectomy or the entire attached gingiva by “push back” procedure may also be used. However, these procedures are associated with alveolar bone loss, prolonged healing by secondary intention, and excessive pain and discomfort caused by exposure and denudation of the underlying bone.[33] Successful surgical removal of portions of pigmented gingiva has been reported by Perlmutter and Tal,[34] and elsewhere by Almas and Sadig.[35]

Cryosurgery is an effective method for tissue cell devitalisation.[36] The lethal mechanisms of freezing include the formation of intracellular ice crystals, cell dehydration, and shrinkage. Cryosurgery denatures the connective-tissue matrix in the skin and possibly in the gingiva.

Laser depigmentation has become widely used recently and is even preferred over scalpel technique by many clinicians. The documented advantages of lasers in periodontal surgery include less bleeding[37] and reduced postoperative pain. Accelerated wound healing with laser use has not been scientifically validated. Negative effects of lasers, especially Nd: YAG and CO2 lasers, include thermal damage to underlying bone when these lasers are used on thin

soft tissue during gingivectomies.[38] Tissue penetration from the laser may cause thermal damage 2 to 4 mm below the surface, causing underlying hard tissue damage. The Erbium: YAG laser has demonstrated the best application of laser use, leaving the least thermal damage. However, there is no scientific evidence to establish that laser depigmentation is superior to scalpel depigmentation. The decision to use a laser should be based on the proven benefits of improved hemostasis keeping in mind the claimed advantage of less postoperative pain with gingivectomy, frenectomy, or other procedures.[39]

The laser and cryosurgical treatment modalities achieved satisfactory results, but they required sophisticated equipment that is not commonly available in hospitals and clinics.

A free gingival graft can also be used to eliminate the pigmented areas. However, it requires an additional surgical site (donor site) and color matching.[40] Furthermore, the presence of a demarcated line commonly observed around the graft in the recipient site may itself pose an esthetic problem.

Case Report: Three cases of gingival hyperpigmentation managed by deepithelialization of the gingiva using a scalpel surgical technique are documented here. The procedures were explained verbally to the patients and the consent forms were signed. Nine months follow up showed no signs of repigmentaion.

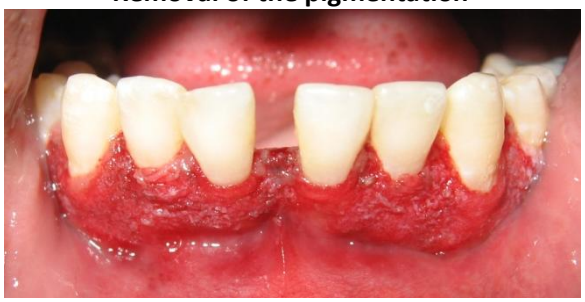
Case 1: A 20-year-old male reported to a department of dentistry of Government Medical College, Bhavnagar, Gujarat with the concern of his unesthetic anterior gingiva. Melanin hyper-pigmented gingiva was found on the labial surface of both maxillary and mandibular arches. The color of his gingiva was dark to black. The gingiva was depigmneted by scalpel surgical technique under local anesthesia. A periodontal pack was placed to reduce the postoperative discomfort. The healing was uneventful with a considerable improvement in aesthetics.

Pre operative

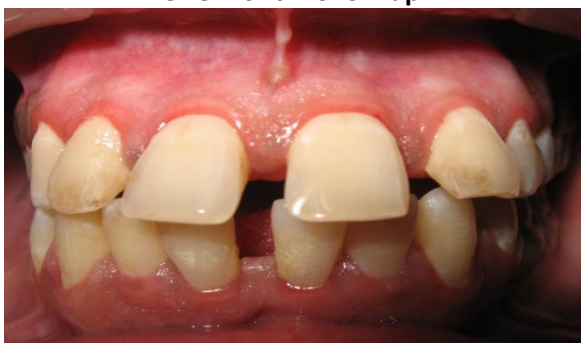
Pre operative

Removal of the pigmentation

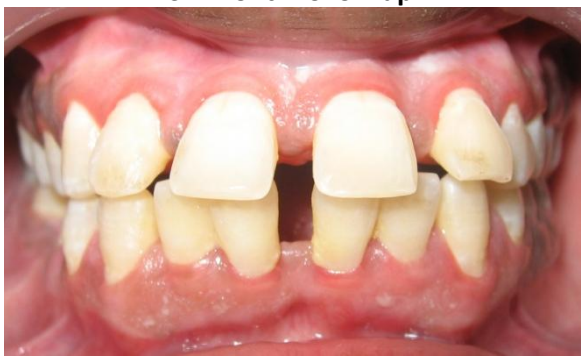
Removal of the pigmentation



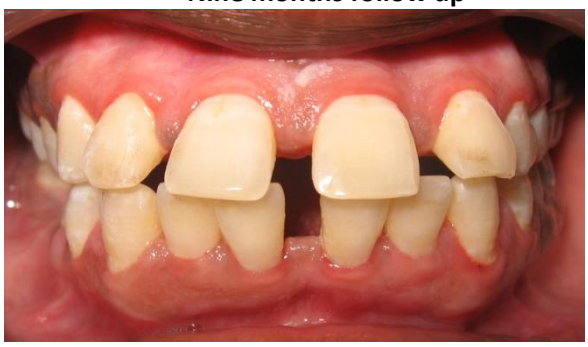
One month follow up



Six month follow up

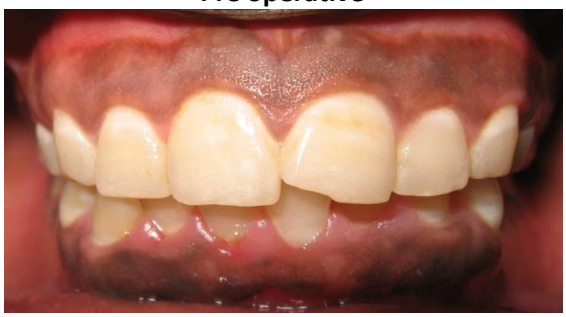


Nine months follow up

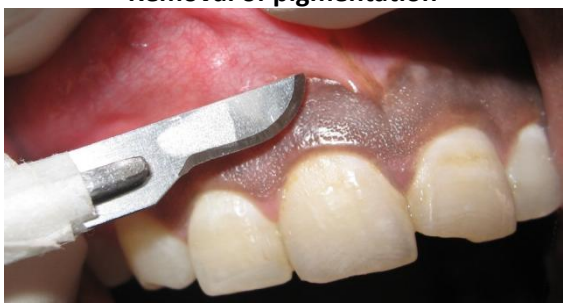


Case 2: A 22-year-old male had a chief complaint of "black gingiva". The procedures were performed with the same parameters and methods as in the previous case. The wound healed well after 2 weeks. No pain or bleeding complications were found. The gingiva became pink and healthy within 5 weeks. The patient was routinely checked every 1 month. At 9- month follow up, there was no recurrence of gingival hyperpigmentation.

Pre operative



Removal of pigmentation



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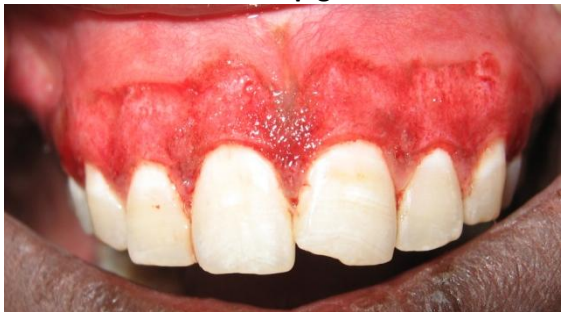
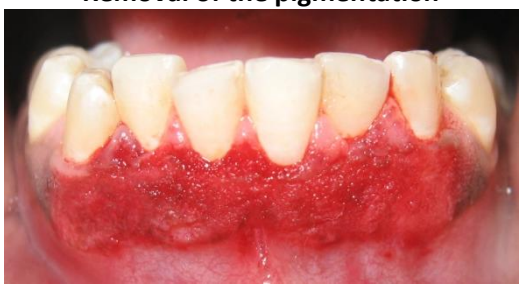


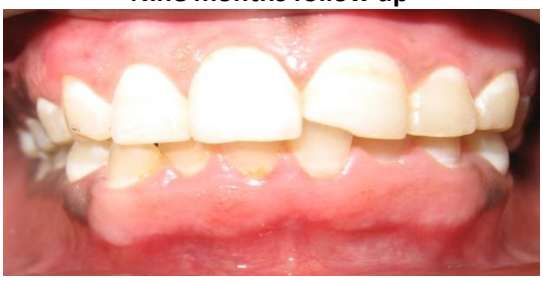
Removal of the pigmentation



One week follow up

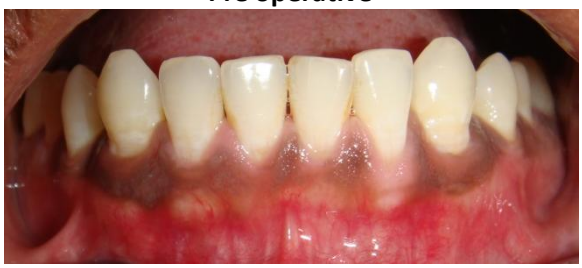
Six month follow up

Nine months follow up



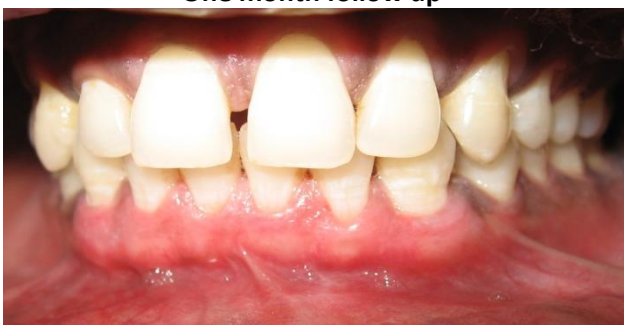
Case 3: A 22-year-old male had a chief complaint of unesthetic gingiva. The patient's medical history was non-contributory. The scalpel surgical depigmentation was performed identically to the other two cases. The melanin hyper pigmented gingiva from #13 to #23 in lower was removed with the surgical scalpel under local anesthesia. After the procedure, the gingiva was examined for thoroughness of pigment removal. Postoperative instructions were given. The gingival color changed to pink at the end of 4 weeks. The patient was followed up to 9 months with no evidence of repigmentation.

Pre operative

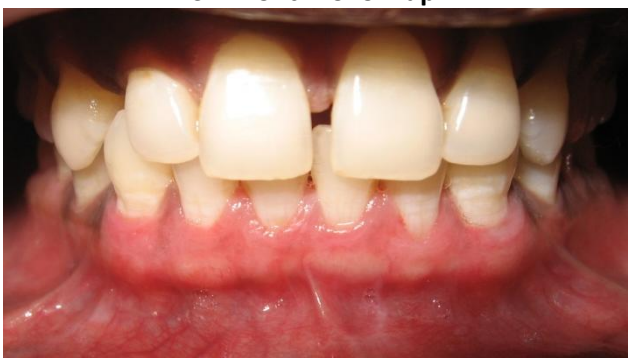


Removal of the pigmentation

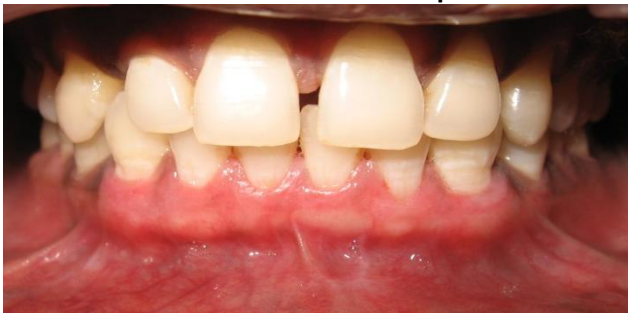
One month follow up



Six month follow up



Nine months follow up



Procedure: A complete medical history and blood investigation was carried out to rule out any systemic contraindication for surgery. Local infiltration anesthesia was given (2 ml of Lignocaine with adrenaline in the ratio 1:100000 by weight). Pigmented epithelium and the superficial part of the connective tissue had been removed by scraping the tissue using #15 and #11 surgical blades. Hemostasis was obtained with sterile gauze and direct pressure. The surgical wound was protected by a periodontal dressing for the immediate one-week postoperative period. Post operative analgesics and antibiotics were prescribed. Amoxycillin 500 mg thrice daily was prescribed for five days and ibuprofen thrice daily for two days was used as analgesic. The patient was advised to use chlorhexidine mouthwashes for the immediate two weeks postoperative period to aid in plaque control. The area healed well after two weeks. Pigmentation was absent from the newly formed epithelium and it appeared red after 3 weeks. Upon final healing, the gingiva appeared pale pink, which was very satisfactory for the patient. A nine-month follow up period did not demonstrate any tendency towards repigmentation of the gingiva.

Discussion: Melanin pigmentation often occurs in the gingiva as a result of an abnormal or increased deposition of melanin. Brown or dark pigmentation and discoloration of gingival tissue, whether of a physiologic or pathologic nature, can be caused by a variety of local and systemic factors. This type of pigmentation is symmetric and persistent, and it does not alter normal architecture. This pigmentation may be seen across all races and at any age, and has no gender predilection.[16] A positive correlation between gingival pigmentation and the degree of pigmentation in the skin, seems, however, evident.[41] Demand for treatment is usually made for esthetic reasons; however, there is not much information in the literature about the depigmentation of gingiva.[42] Elimination of these melanolic areas through surgery and laser surgery, as well as by cryosurgical depigmentation through the use of a gas expansion system, has been reported.[14] These treatment modalities, however, are not widely accepted or popularly used. In the cases reported here, a simple and effective method of depigmentation which does not require any sophisticated instruments was used. The results were excellent and at 9 months follow-up, there were no evidences of repigmentation of the gingiva.

Post surgical repigmentation of gingiva has been previously reported.

Repigmentation is described as spontaneous and has been attributed to the activity and migration of melanocytic cells from surrounding areas. Perlmutter and Tal have also reported gingival repigmentation that occurred seven years after removal of gingival tissues in one patient.

The three cases documented here have been followed up 9 months. Clinical follow-up examination revealed no change in the pigmentation of the treated area.

Conclusion: Today excessive gingival display and gingival hyperpigmentation are major concerns for a large number of patients. Although several techniques are currently in use, the scalpel technique is still the most widely employed. Lasers and cryosurgery may offer less postoperative pain. Additionally, a surgical soft tissue grafting for depigmentation may ensure less chance for recurrence over a five year follow up.[30,31]

Clinical repigmentation of depigmented areas may occur spontaneously following subtotal gastrectomy, exposure to ultraviolet light, or dermabrasion. The exact mechanism of skin repigmentation is unclear but the "migration theory" seems to be favoured. According to this theory, active melanocytes from normal skin and hair matrix proliferate and migrate into the depigmented areas.[43]

In our patients, clinical repigmentation did not occur over the first postoperative 9 months. It may be speculated that either "migration" of melanocytes did not occur during this period, or that the melanocytes which had migrated were not active. Why migration and/or activation of cells occur in some patients soon after clinical healing while in other patients the process is delayed is difficult to explain.

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