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Periodontics

GINGIVAL DEPIGMENTATION: A CASE SERIES OF SPLIT-MOUTH DE-EPITHELIZATION TECHNIQUES AND A REVIEW LITERATURE.

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KEYWORDS :

INTRODUCTION :

Gingival depigmentation is a periodontal plastic or esthetic surgical procedure whereby the gingival hyperpigmentation caused by excessive melanin is removed or reduced by various techniques.

A pigment is a substance that imparts colour to the gums. Depigmentation is a procedure used in cosmetic dentistryto remove black spots or patches on the gums caused by excessive melanin. The normal color of the gum tissue (gingiva) is coral pink, but excess deposits of melanin (melanin gingival hyperpigmentation) can create what seem to be black spots or patches on the gums, creating an aesthetic or cosmetic problem.Gum pigmentation, like skin and hair color, is primarily determined by genetics. Dark gum discoloration is most directly related to skin complexion and is not an indicator of unhealthy gums or gum disease. Generally, people with fairer skin tend to have pinker gums, while those with dark skin will often have varying degrees of pigmentation (brown to black) around their gums. The pigmentation may affect the entire gums or exist as pigmented patches, and is more noticeable in individuals with gummy smiles or a high smile line. Dark gums are a result of physiologic gingival pigmentation, caused by the deposition of melanin pigment within the gums. Melanin is a natural substance that accounts for skin and hair pigmentation in people with dark complexions. Melanin absorbs harmful UV rays and is the body's way to protect the deeper layers of the skin. Just like your skin can increase melanin deposition as a result of sunlight exposure, gum pigmentation can also increase with chronic exposure to irritants such as cigarette smoke, or smokelesstobacco. Gum pigmentation/discoloration has a negative impact on someone's smile.

The color of oral pigmentation varies depending on :

A. the number and size of the blood vessels
B. thickness of the epithelium
C. degree of keratinization
D. the quantity and depth or location of the melanin pigments

Melanin pigmentation is caused by striated granules in gingival tissue, which are produced in melanosomesof melanocytes which are located in the basal and suprabasal cell layers of the epithelium. In addition, the oral pigmentation is due to the activity of melanocytes rather than the number of melanocytes in the tissue. This pigmentation is seen among all races and at any age and it is without gender predilection. In dark-skinned or black individuals, an increased melanin production has long been known to be the result of genetically determined hyperactivity of melanocytes. Melanocytes of dark skinned or black individuals are uniformly highly reactive, whereas in light skinned individuals, melanocytes are highly variable in reactivity.In general, even though comparable numbers of melanocytes are present within their gingival epithelium, individuals with fair complexion will not demonstrate overt tissue pigmentation. An accurate diagnosis and determination of the etiology will lead to the selection of the the right treatment modality.

Causes:

A. genetic factors(also termed as physiological /racial factors)
B. systemic disorders(endocrine disturbances,addison's disease, albright's syndrome,PeutzJeghers Syndrome,Von Reckling hausen's disease [neurofibromatosis],chronic pulmonary disease, malignantmelanoma, hemachromatosis)
C. tobacco use
D. anti-malarial therapy
E. metallic fillings: amalgam restorations
F. tricyclic antidepressants & various other systemic & local factors Various techniques that can be used :To treat depigmentation and to enhance esthetics, numerous techniques have been employed from time to time.

A. De-epithelization: Scalpel technique
   Gingival abrasion technique using diamond/carbide bur
   Combination of the scalpel and bur
B. Gingivectomy
C. Gingivectomy with free gingival autografting
D. Acellular dermal matrix allograft (ADMA)
E. Electrosurgery
F. Cryosurgery Using liquid nitrogren,Using a gas expansion system
G. Chemical agents 90% phenol and 95% alcohol Ascorbic acid
H. Laser

Nd:YAG

Semiconductor diode laser
CO2 laser
Argon laser

Gingival pigmentation index: Pre-operative and post-operative observations about the gingival pigmentation were made according to Dummett-Gupta Oral Pigmentation Index. [14]

0 - No clinical pigmentation (pink gingiva)
1 - Mild clinical pigmentation (mild light brown color)
2 - Moderate clinical pigmentation (medium brown or mixed pink and brown color)
3 - Heavy clinical pigmentation (deep brown or bluish black color).

This case report demonstrates the management of gingival hyperpigmentation by various split-mouth gingival depigmentation techniques such as laser technique, bur method &electrocautery compared to the traditionalscalpel technique.

Case Presentation:-

Case I: A 21 year old female patient reported with a complaint of black gums .Melaninhyperpigmentation was noticed(DOPI SCORE 3). This case was selected as the patient was physically healthy with no history of systemic disease, patient presented with a greater degree of gingival pigmentation compared to her skin colour and was very conscious about esthetics. Based on that, a decision was taken to do a maxillary anterior depigmentation by "A COMBINATION OF SCALPEL & LASER TECHNIQUE". 1)

Laser Method: After applying topical anesthesia (lidocaine 15% topical aerosol USP) from the left first premolar to the left central incisor, diode laser (810 nm) is used for depigmentation method. The gingival epithelium and part of connective tissue is removed using pulsed mode. Pulse length and pulse intervals are used for 80 microseconds. The tip is used in a moving brush stroke to prevent heating of the tissue. The area is irrigated using saline and is covered with periodontal dressing. 2)

Scalpel method:(surgical stripping method)After administering local anesthesia (lidocaine 2% with 1:80,000 epinephrine with a field block tecnique), the pigmented gingival epithelium from right first premolar to central incisor was scraped using no. 15 BP blade while holding it parallel to the long axis of the tooth. Care was taken to include the epithelium at the tip of the interdental papilla and at the mucogingival junction on the other end. Minimum force/pressure was used to avoid post-operative gingival pitting. The surgical wound on both the sites was protected by a periodontal pack. Post-operative analgesics and

antibiotics were prescribed. Oral hygiene instructions were given and the patient was advised to use 0.12% chlorhexidine mouthwash for immediate post-operative 2-week period to aid plaque control. Pack was removed after 1 week and the area was debrided. Patient was re-evaluated at baseline,1 week & 1 month post-operatively. After one week the pack was removed and the surgical area was examined. The healing on both the sides was uneventful and satisfactory. No post-surgical complications were encountered. Fig. I A. armamentarium B. Pre-operative C. immediate post-operative D.1 week follow-up E.1 month follow-up.

Fig.I.A Fig.I.B Fig.I.C Fig.I.D

Fig.I.E

CASE II: A 31 year old male patient reported with a complaint of black gums in the upper arch . melanin hyperpigmentation was noticed (DOPI SCORE 2). This case was selected as the patient was physically healthy with no history of systemic disease. Based on that, a decision was taken to do a maxillary anterior depigmentation by "A COMBINATION OF SCALPEL & BUR TECHNIQUE".

1) Scalpel technique : (described in the procedure above)
2) Bur method :

Round carbide bur method:
For depigmentation with round carbide bur, rotating bur was used on the surface of pigmented gingiva and moved with feather light strokes without giving any pressure(form left first premolar to central incisor)alongwith with copious saline irrigation. It is not kept at one place for long time as it may result in thermal trauma and permanent harm to underlying tissue. Medium size round bur is used because small bur might produce small pits rather then surface abrasion. The bleeding is controlled and checked for any pigmented area remained and removed it to prevent relapse. Bleeding is stopped by applying pressure by a gauze piece on the denuded epithelium. Removal of gingival melanin should be performed carefully ,since inappropriate application may cause gingival recession, damage to underlying periosteum and bone, delayed wound healing, as well as loss of enamel. Fig. II A. armamentarium B. pre- operative C. scalpel depigmentationD.bur technique E. immediate post-operative F.1 week follow-up G.1 month follow-up

Fig.II.A Fig.II.B Fig.II.C Fig.II.D

Fig.II.E Fig.II.F Fig.II.G

CASE III: A 37 year old male patient reported with a complaint of black gums in the upper arch Melanin hyperpigmentation was noticed (DOPI SCORE 2). This case was selected as the patient was physically healthy with no history of systemic disease. Based on that, a decision was taken to do a maxillary anterior depigmentation by "a Combination Of Scalpel Technique & Electrocautery".

1) Scalpel technique : (described in the procedure below)
2) Electrocautery:

Electrocautery was used for depigmentation of the upper left anterior gingiva till first pre-molar. A loop electrode was used for removal of melanin pigmentation. It was used in a light brushing strokes and the tip was kept in motion all the time. Keeping the tip in one place could lead to excessive heat build up and destruction of the tissues. Finally a perio-pack was placed over the wound area and oral hygiene instructions were given. Pack was removed after one week and the area debrided. One month post-operative examination showed well epithelialized gingiva, which was pink and pleasant The healing on both the sides was uneventful and satisfactory. No post-surgical complications were encountered.Figure III A. armamentarium B. Pre-operative C.Scalpel depigmentation D.Electrocauterydepigmentation E.Immediate post-operative F. One week follow-up G.One month follow-up.

Fig.III.A Fig.III.B Fig.III.C Fig.III.D

Fig.III.E Fig.III.F Fig.III.G

RESULTS

Scalpel technique:No post-operative pain, hemorrhage, infection or scarring occurred. Although mild inflammation at the lateral-canine region was observed in one case, healing was uneventful. Patient's acceptance of the procedure was good and results were excellent as perceived by the patient . No repigmentation occurred for the initial 4 weeks , and the patient is being monitored for longitudinal period for any repigmentation.

Laser surgery : The results were similar and comparable to the scalpel technique. Patients' acceptance of the procedure was good and no repigmentation was reported till 4 weeks period , and the patient is being monitored for a long term.

Surgical bur abrasion: The results were similar and comparable to the scalpel technique. Patients' acceptance of the procedure was good and no repigmentation was reported till 4 weeks period , and the patient is being monitored for a long term.

Electrosurgery: Mild post-operative burning and no post-operative hemorrhage and infection occurred. Patient's acceptance of the procedure was not as good as contralateral surgery and the results were not as promising. The patient kept saying that the previous procedure was better . Although the patient is under observation for any scarring, a difference in the color and texture between the two procedures was apparent .Although electrosurgery has advantages of minimal bleeding and a cleaner work field, it requires more expertise and caution. The results with the conventional scalpel technique are excellent and better than electrosurgery. This conclusion was also supported by the patients' feedback.

DISCUSSION:

Oral pigmentation occurs in all races of humans with no significant differences in between males and females. The intensity and distribution of pigmentation of the oral mucosa may be variable, not only between races, but also between different individuals of the same race and within different areas of the same mouth. Physiologic pigmentation is probably genetically determined, but as Dummett suggested, the degree of pigmentation is also related to mechanical, chemical, and physical stimulation .Active melanocytes located in the basal layer of the oral epithelium secrete melanin leading to the melanin pigmentation. Pigmentations can be removed for esthetic reasons. Different treatment modalities have been used for this aim. The selection of a technique for depigmentation of the gingiva should be based on clinical experience, patient's affordability and individual preferences.

Scalpel technique - One of the first, and still popular, techniques to be employed was the surgical removal of undesirable pigmentation using scalpels. The procedure involves surgical removal of gingival

epithelium & the underlying connective tissue and healing of the denuded connective tissue by secondary intention. The new epithelium that forms does not contain melanin pigmentation. An attempt was made to remove gingival pigmentation surgically on the maxillary right quadrant of all the patients. The scalpel method of depigmentation proved satisfactory from both clinical and patients point of view. However, scalpel surgery causes unpleasant bleeding during and after the operation, and it is necessary to cover the surgical site with periodontal dressing for 7–10 days. The area healed completely in about 10 days resulting in normal healing of gingiva.

We found that the scalpel technique was relatively simple and versatile and that it required minimum time and effort.

Diode-Laser method– Lasers combine the advantages of rapid healing of the scalpel surgery and the minimal bleeding of electrosurgery. Easy handling, short treatment line, hemostasis, sterilization effects and excellent coagulation (small vessels and lymphatics) are its known advantages. The treated area should be left exposed for the purpose of healing. The myofibroblasts present in the base of the wound cause minimal contraction and scarring, mostly without any restriction in movement of the soft tissues. However, laser surgery does have some disadvantages. Delayed type of inflammatory reaction may occur with mild post-operative discomfort lasting up to 1 week. Epithelial regeneration is delayed resulting in a lack of wound contraction as compared to conventional surgery. Moreover, expensive and sophisticated equipment makes the treatment very expensive. [40] 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.

Bur technique - The process of healing in this method is similar to the scalpel technique. It is also a comparatively simple and non-aggressive method that can be easily performed to eradicate any residual repigmentation. These techniques are very economical as it does not require any expensive & complicated equipment. Pre- and post-surgical care is similar to that of the scalpel technique. However, extra care should be taken to control the speed and pressure of the handpiece bur so as not to cause unwanted abrasion or pitting of the tissue. Least pressure should be apllied using feather light brushing strokes alongwith abundance of saline irrigation.Do not hold the bur in one place for long ,as it may alter the desirable results.

Electocautery - According to Oringer's "Exploding cell theory," it is predicted that electrical energy leads to the molecular disintegration of melanin cells of the operated and surrounding sites. Thus, electrosurgery helps in retarding the migration of melanocytes. However, electrosurgery requires more expertise than the techniques mentioned above. Prolonged or repetetive application of current to the tissues induces heat build-up resulting in tissue destruction. Contact of current with the underlying periosteum and vital teeth should be avoided & it is to be used in light brushing strokes and the tip has to be kept constantly moving.

Our cases described a split mouth comparison of 4 popular techniques: Scalpel, laser, bur abrasion and electrosurgery. Although we found that electrosurgery increased the efficacy of our work, giving a cleaner and a neater work field, it required a lot of precision. The results obtained till 4 weeks post-treatment suggested excellent results with the scalpel technique compared with other techniques. Taking into consideration the advantages and disadvantages of the various de pigmentation techniques available, scalpel de-epithelization serves to be the best treatment modality so far with minimum post operative complications. Further research is required on repigmentation to study the factors affecting the rate and length of time required for recurrence of pigmentation. Research should also focus on finding a solution for preventing recurrence and, till then, repeated depigmentation should be done to eliminate the unsightly pigmented gingiva.

CONCLUSION:

Various local, systemic, environmental, genetic factors may lead to Gingival melanin pigmentations . For a successful treatment outcome, the potential cause or agents aggravating the pigmentation should be targeted and eliminated. Since various techniques are available with some advantages and disadvantages, the correct choice of the technique always depends on individual preference, clinical expertise and patient affordability. Still more research and precise understanding is required on these comparative techniques to ensure the long-term predictability and successful treatment outcomes.

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