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Comparative Clinical Evaluation of Healing Following Application of Non-Eugenol Periodontal Dressing and Isoamyl 2-Cyanoacrylate Tissue Adhesive after Gingival Depigmentation Procedure: Report of Three Cases

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Abstract:
Purpose: To evaluate and compare post-surgical healing and patient's satisfaction in the treatment of gingival melanin hyperpigmentation using Zinc Oxide Non-eugenol periodontal dressing and Isoamyl 2-cyanoacrylate tissue adhesive.
Method. Three patients were selected on the basis of Dummett-Gupta Oral Pigmentation Index [DOPI] (1984) that was seen especially in the maxillary anterior tooth region. Clinical photographs were taken preoperatively. The gingival depigmentation was performed with a combined technique using the scalpel and a high speed diamond bur under local anaesthesia. Subsequently, a split mouth technique was used for application of the post-surgical dressing; wherein isoamyl 2-cyanoacrylate tissue adhesive was applied in the first quadrant (site A), after proper isolation to avoid accidental adherence and a non-eugenol periodontal dressing was placed in the 2nd quadrant (site B). Clinical photographs were taken immediately after the procedures and at the 1st, 2nd, and 4th week postoperatively to evaluate the healing response. The patients were also asked to fill a questionnaire about any pain or discomfort using the Visual analogue scale and the Gingival Index (Loe H and Silness J 1963) was recorded at all the recall visits.
Results: During the 1st postoperative week, at the site A, the patients complained of moderate pain and discomfort and the gingiva appeared erythematous; whereas at site B, the patient did not complain of any pain or discomfort and the healing was uneventful. Two weeks after the procedure, the patient had no complaints and clinically, the gingiva showed almost complete healing at both the sites .Four weeks after the procedure, there was significant improvement in gingival healing response.
Conclusions: The Non-eugenol periodontal dressing and Isoamyl 2-cyanoacrylate tissue adhesive seemed to be effective for gingival depigmentation procedure. However the periodontal dressing showed better and uneventful healing in the first week postoperatively as compared to the tissue adhesive. Eventually after four weeks the results on both the sites were similar.

Key words: *Gingiva, Melanin Hyperpigmentation, Depigmentation, Healing, Periodontal dressing, Isoamyl -2 cyanoacrylate*

1. Introduction

Gingival depigmentation is a periodontal plastic surgical procedure. The foremost indication being the demand by a person for improved aesthetics. The gingival hyperpigmentation is caused by excessive melanin deposition by the melanocytes mainly located in the basal and suprabasal cell layers of the epithelium. Thus the depigmentation procedure aims at removing or reducing this hyperpigmentation by various techniques. [1] However the various techniques used to carry out the depigmentation procedure display different healing patterns postoperatively. Not only the technique but also the uses of post-surgical dressings have an influence on the healing process. [2]

In most cases after the surgical procedures are completed the area is covered with surgical packs. In general these dressings have no curative properties. It minimizes the likelihood of postoperative infections and haemorrhage, prevents surface trauma during mastication and protects against pain induced during contact with food or the tongue during mastication. Thus aids in the healing process to continue undisturbed .[2] There are different types of periodontal dressings like Zinc oxide eugenol dressings, Zinc oxide non eugenol dressings (Coe-Pak), Cyanoacrylates, Tissue conditioners which contain antimicrobial agents, Photo is curing periodontal dressings etc. [3].

In recent times, it has been found that cyanoacrylates have strong adhesion to the tissues in the presence of moisture, workable polymerization time, biodegradability, bacteriostatic ability, haemostasis, reduction in postoperative pain and elimination of dead space. Isoamyl 2-cyanoacrylate in its viscous form is the only cyanoacrylate available which has a gap filling property. [4]

Various studies have been conducted wherein Isoamyl 2-cyanoacrylate has been used as a periodontal dressing after a periodontal flap surgery. It is a well proven alternative to conventional methods displaying successful results. [4] However there are no reported studies till date assessing the healing following a depigmentation procedure after the application of Isoamyl 2-cyanoacrylate .

Hence this study was conducted to compare and assess the postoperative healing following the spilt mouth application of Isoamyl 2-cyanoacrylate and Zinc oxide non-eugenol dressing after the gingival depigmentation procedure.

2. Materials and Method

2.1. Method

Three patients were selected from Out Patient Department of Periodontology who had aesthetic concerns regarding gingival hyperpigmentation. They were classified on the basis of the Dummett-Gupta Oral Pigmentation Index (DOPI) into no, mild, moderate and severe gingival pigmentation. The pigmentation seen was moderate to severe. After taking the patients consent, the depigmentation was performed with blade no. 15 along with a high speed diamond bur (Dia-BURS BR-12EF®, MANI Inc., and Tochigi-ken, Japan) accompanied with copious saline irrigation under local anaesthesia with 2% lignocaine in the anterior maxillary gingiva. Once the procedure was completed isoamyl -2cyanoacrylate tissue adhesive was applied to the surgical site at first quadrant (site A) whereas the second quadrant (site B) was covered with the non eugenol periodontal dressing. The patients were instructed to avoid self-manipulation at operated area, avoid eating spicy food and brushing the operated sites till the next visit.

2.2. Clinical Evaluation and Patient's Questionnaire

Clinical photographs were taken preoperatively, during the procedure, immediately after the procedures and at 1^{st}, 2^{nd}, and 4^{th} week post operatively. At 1^{st}, 2^{nd} and 4^{th} week follow-up, the patients filled out a questionnaire about pain and discomfort on basis of Visual Analogue Scale [VAS]. The Gingival Index [GI] (Loe H and Silness J 1963) was recorded at all the three weeks of the recall period.

2.3. Case 1

A 32-year-old female had a chief complaint of pigmented gingiva, visible when she smiled and spoke. A severe gingival melanin hyperpigmentation was found on the labial surface of the anterior maxillary gingiva (Fig. 1-A). The patient's medical history was non-significant. After the surgical depigmentation procedure (Fig.1-B), Isoamyl 2-cyanoacrylate tissue adhesive and the non-eugenol periodontal pack was applied on the operated sites in the first and second quadrant (site A and site B) respectively (Fig. 1-C). One week after the procedure, the patients filled out a questionnaire on basis of Visual Analogue Scale (VAS) and the Gingival Index was also recorded (Fig. 1-D,E). It was observed that the VAS scored 2 for site A and 0 for site B. Likewise the gingival index scored 1 for site A and 0 for site B. The site A of the maxillary gingiva showed slower epithelisation than site B. It appeared more erythematous and was covered with more slough than site B. The patient also complained of mild pain at the site A as compared to Site B. Two weeks after treatment, the indices were measured. Clinically, both the sites showed almost complete healing and both the parameters Gingival index and VAS measured 0 ((Fig. 1-F, G). At Four weeks recall, again the indices were recorded and there was a significant improvement in gingival appearance without recurrence of pigmentation or gingival recessions or any other deformities. The patient was satisfied with the esthetically improved gingival color (Fig. 1- H, I).

Figure1: Clinical photographs of case 1
(A) Preoperative photograph. (B) Immediate Postoperative
(C) Application of the tissue adhesive and periodontal dressing
(D)/ (E)-Postoperative, 1st week. (F)/ (G) Postoperative, 2nd week
(H)/ (I) - Postoperative 4th week

2.4. Case 2

A 30-year-old female had a chief complaint of black gums in the upper front region. A moderate melanin hyperpigmentation of the gingiva was found on the labial surfaces of maxillary anterior gingival region (Fig. 2-A). The patient's medical history was non-significant. After the surgical procedure (Fig. 2-B), Isoamyl 2-cyanoacrylate tissue adhesive and the eugenol free periodontal pack were applied at the surgical sites in the first and second quadrant (site A and site B) respectively (Fig. 2-C). One week after the depigmentation, the VAS measured 2 for site A and 1 for site B and gingival index also measured the same for both sides respectively. Excess of the tissue adhesive that remained at the site A was then manually removed (Fig. 2- D, E, F). At two weeks recall visit, again the VAS and gingival index were measured and both sites showed almost complete healing with both the parameters GI and VAS measuring 0 for the same (Fig. 2-G). At the 4th week postoperatively, significant improvements in the gingival depigmentation were seen without gingival recessions or any other deformities. The patient was satisfied with the aesthetically improved gingival color because the maxillary gingival melanin pigmentation was almost not seen while she smiled and spoke (Fig. 2-H).

Figure 2: Clinical photographs of case 2
(A) Preoperative photograph. (B) Immediate Postoperative
(C) Application of the tissue adhesive and periodontal dressing
(D)/(E)/(F)Postoperative, 1stweek.(G) Postoperative, 2nd week
(H) Postoperative 4th week

2.5. Case 3

A 22-year-old female had a chief complaint of pigmented gingiva visible while she smiled and spoke. A severely melanin hyperpigmented gingiva was found at the labial surfaces of the maxilla (Fig. 3-A). The patient's medical history was non-significant. After the procedure, (Fig.3 –B), Isoamyl 2-cyanoacrylate tissue adhesive and the non-eugenol periodontal pack was applied at the surgical site in the first and second quadrant (site A and site B) respectively (Fig.3-C). One week after the procedure, the recording of VAS and gingival index was done. It measured 1 and 0 for site A and B respectively. The gingiva presented slow epithelisation with slow healing at site A, with the patient complaining of mild pain in the maxillary gingival area at the same site (Fig.3-D). At two weeks recall visit, the maxillary gingiva showed almost complete healing and both parameters GI and VAS were recorded 0 (Fig.3-E). At the 4th week postoperative, the gingival color was significantly improved without recurrence of pigmentation or gingival recessions or any other deformities and the VAS and Gingival index measured 0 again. The patient was satisfied with the esthetically improved gingival color (Fig.3-F)

Figure 3: Clinical photographs of case 3
(A) Preoperative photograph. (B) Immediate Postoperative.
(C) Application of the tissue adhesive and periodontal dressing.
(D) Postoperative, 1st week. (E) Postoperative, 2nd week. (F) Postoperative 4th week

3. Discussion

Healing is defined as body's response to any surgical procedure to restore normal structure and function.[2] Various techniques have been used for the depigmentation procedure which includes chemotherapy with 90% phenol, abrasion with a diamond bur, gingivectomy, gingivectomy with a free gingival auto grafting, electrosurgery, cryosurgery, have been used with different degrees of success in healing.[2] One of the factors that play an important role for the healing to take place uneventfully is the use of periodontal dressings as mentioned earlier.[3]

Chemical agents, such as 90% phenol and 95% alcohol, have been used in combination; however, these chemical agents are quite harmful to the oral soft tissues. When the deepithelization is performed with a high speed diamond procedure, it is recommended to use the largest size of diamond bur. Small burs cannot make smooth surfaces easily and have a tendency to make small pits in the surgical sites which require further correction [6]. Gingivectomy results in alveolar bone loss, delayed healing by secondary intention, and excessive pain [6]. A free gingival graft usually requires an additional surgical site and a careful concern for color matching. Furthermore, the presence of a demarcated line that is commonly visible around the graft at the recipient site may elicit an esthetic problem itself [7]. Cryosurgery requires the clinician's skilful management of complicated techniques and instruments.[8]

Recently, a laser has been used to ablate cells containing and producing the melanin pigment. The Nd:YAG laser produces invisible, near-infrared light with a wavelength of 1,064 nm. Since Nd:YAG laser has rays that have an affinity for melanin or other dark pigments, it works more efficiently when the beam is applied under the presence of a pigment [9]. However it involves high cost and trained individuals.

Scalpel surgical technique is highly recommended in consideration of the equipment constraints that may not be frequently available in clinics. It is known that the healing period for scalpel wounds is faster than other techniques. However, scalpel surgery may cause unpleasant bleeding during and after the operation, and it is necessary to cover the exposed lamina propria with periodontal dressing for 7 to 10 days. [2]

A wide variety of reasons have been given for the use of periodontal dressings. These reasons fall into two principal groups: a dressing may be employed as a physical adjunct to periodontal surgery, or it may be used therapeutically with or without surgery.

Coepak is the most common & widely used non-eugenol dressing. Supplied as two pastes or as an auto-mixing system in syringe. [2] Coe-Pak is prepared by mixing equal lengths of paste from tubes containing the accelerator and the base until the resulting paste is a uniform color.

In 1965 Dr. S.N.Bhaskar conceived of the idea of the potential of cyanoacrylates as periodontal dressings having a basic formula: CH=C (CN)-COOR. Due to certain advantages as mentioned previously; its use has become popular as a periodontal dressing:[4]

However following disadvantages have been observed with their use: they may be toxic to nasal mucous membrane, throat, eyes; posterior part of oral cavity should be blocked by gauze pieces. Miller et al (1974) also noted some bone resorption in response to Cyanoacrylates, and considered that heat of polymerization might also affect tissues. They cannot dissipate the pull of the lip or immobilize a flap for the time required for it to attach to the underlying tissues. One has to be very careful while applying the tissue adhesive since there are chances of adherence to the surrounding non operated areas to adhere.[4] Delayed healing occurs by foreign body reaction if the material becomes embedded in the tissues or underneath the flap.[7]

The procedure selected in this study is relatively simple and versatile; moreover, it requires a minimum of time and effort.

4. Conclusion

Thus from all the three cases it can be inferred that during the 1st postoperative week, at the site A, the patients complained of moderate pain and discomfort and the gingiva appeared erythematous; whereas at site B, the patient did not complain of any pain or discomfort and the healing was uneventful. Two weeks after the procedure, the patient had no complaints and clinically, the gingiva showed almost complete healing at both the sites. Four weeks after the procedure, there was significant improvement in gingival healing response.

Hence the study concluded that the Non-eugenol periodontal dressing and Isoamyl 2-cyanoacrylate tissue adhesive seemed to be effective for gingival depigmentation procedure. However the periodontal dressing showed better and uneventful healing in the first week postoperatively as compared to the tissue adhesive. Eventually after four weeks the results on both the sites were similar.

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