Integrating techniques to re-establish dentogingival esthetics

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Abstract

The aim of this article was to report the clinical case of a male patient of 20 years with hyperpigmented gingiva and moderate fluorosis, whose smile was reestablished by the use of a laser assisted depigmentation procedure, an enamel microabrasion technique, followed by at-home bleaching and subsequent remineralization therapy. The association of these techniques presented excellent results and the patient was satisfied. All techniques are painless, fast and easy to perform, in addition to preserving the hard and soft dental structure. Treatment showed immediate and permanent results; these techniques must be divulged among professionals and their patients.

Introduction

In our beauty-conscious society, people are often judged, and therefore judge themselves, by their smile. It is far too easy to hide ourselves behind the trend, the natural desire of patients to have a “perfect smile.” Clearly, the influence of the media has fostered this desire for whiter and brighter teeth, and pleasing gingival esthetics. The goal of modern esthetic dentistry is to achieve both “white” and “pink” esthetics. “White esthetics” refers to natural dentition or tooth colored restorations. “Pink esthetics” refers to the surrounding soft tissues. The dentogingival esthetic deficiencies can be addressed through simple, conservative procedures or more advanced, invasive restorative options, depending on the severity of the problem and the treatment philosophy. The “progressive treatment concept” is a rational yet simple illustration of a more comprehensive, reasonable approach to functional, biologic, and esthetic dental problems. Accordingly, the treatment options should begin with the most conservative option and progress as needed to more invasive options.

Melanin hyperpigmented gingiva is an esthetic problem for many individuals, particularly if the hyperpigmentation is on the facial aspect of the gingiva and visible during smiling and speech, especially in patients with excessive gingival displays, or “gummy smiles.” Hyperpigmentation of the gingiva is caused by excessive melanin deposition by the melanocytes, which are mainly located in the basal and suprabasal cell layers of the epithelium. Brown or dark pigmentation and discoloration of gingival tissue can be caused by a variety of local and systemic factors including genetics, tobacco use, and the prolonged administration of certain drugs – especially antimalarial agents and tricyclic antidepressants. Systemic conditions, such as Peutz-Jegher syndrome, Addison syndrome, Albright syndrome, Von Recklinghausen disease, malignant melanoma, trauma, hemachromatosis, chronic pulmonary disease and racial pigmentation are other known causes of oral melanin pigmentation.

Gingival depigmentation has been carried out using surgical, chemical (90% phenol and 95% alcohol), electro-surgical, and cryosurgical procedures. Recently, laser ablation has been recognised as one of the most effective, pleasant, less invasive and reliable techniques.

Dental fluorosis manifests itself as white stains on the enamel of teeth exposed to excessive doses of fluoride during their formation. It may be diagnosed as mild, moderate or severe, and in some cases, it may cause the loss of the surface structure of dental enamel. For a number of patients, the degree of fluorosis can be an esthetic concern, especially where patients have moderate to severe fluorosis. Depending on the severity of fluorosis and its clinical appearance, restorative treatments can change the esthetic appearance of teeth. Decisions for changes should be based upon the patient’s perception regarding whether there is a need for treatment.

Fluorosis staining is within the enamel. In cases of mild fluorosis, the enamel discoloration is superficial. For moderate and severe fluorosis, the enamel
staining and mottling can penetrate to deeper enamel levels. For cases of mild fluorosis of esthetic concern to the patient, vital bleaching can be successful in achieving a change that the patient desires.\textsuperscript{13} When the patient presents with mild to moderate fluorosis, microabrasion or macroabrasion may be required. Microabrasion refers to the use of a hydrochloric acid abrasive paste to remove the superficial enamel staining.\textsuperscript{14-16} When the superficial enamel is removed, the white speckled mottling of enamel reveals a more yellow enamel color beneath the surface. For some patients, the loss of the white speckled enamel to yellow is not acceptable. For these cases, combined microabrasion and macroabrasion with vital bleaching is an esthetically acceptable treatment.\textsuperscript{17,18}

This case report presents the esthetic management of hyperpigmented gingiva and fluorosis stained teeth with a combination of minimally invasive and painless procedures: laser ablation of hyperpigmented gingiva and microabrasion followed by remineralization therapy of fluorosis stained teeth and at-home bleaching.

Case report

Presentation and clinical examination

A 20-year-old man reported to the department of conservative dentistry and endodontics with the concern of unesthetic smile. His chief complaint was black colored gingiva and brown/yellow stained teeth (Fig 1). He wanted the least invasive and painless treatment to change his smile. Melanin hyperpigmented gingiva was found on the labial surface of both maxillary and mandibular arches. The color of his gingiva was dark to black. Staining was present on the anterior and posterior teeth in the esthetic zone, with most significant staining on the maxillary anterior teeth; teeth 11, 12, 21 and 22 contained brown streaks in the middle third of the facial surfaces. A review of his past history and a complete dental examination revealed his place of origin as central India. He reported childhood friends as having the same discoloration of their teeth. The pattern of tooth discoloration and the presence of a contributory fluoride history suggest a putative diagnosis of mild to moderate fluorosis (determined by using Dean's Fluorosis Index) with gingival hyperpigmentation. The etiology is attributed to early exposure to high concentrations of fluoride ingested from drinking water. A review of his medical history and past dental history revealed no contraindications to dental treatment.
Treatment

In consideration of his age, the patient was not interested in treatment options that involved significant removal of tooth structure, such as porcelain or composite resin veneers or any surgical procedures for the rehabilitation of his hyperpigmented gingiva. A treatment plan was presented to the patient that would fulfill his request for minimally invasive treatment, which proposed laser assisted depigmentation for hyperpigmented gingiva, followed by microabrasion of the superficial enamel staining, remineralization using amorphous calcium phosphate and casein phosphopeptides, and at-home bleaching.

Laser assisted depigmentation

After oral prophylaxis, Lignocaine 15% spray (ICPA Health Product) was administered to the operatory field. In compliance with FDA rules, patient and staff used safety glasses (Diode Laser Safety Glasses, Model 66, VS Eyewear) for protection when using a 980 nm diode laser. The semiconductor 980 nm diode laser (Diogen Diode Laser, DoctorMed) application was started on all pigmented areas with 1.2 to 1.5 W, in contact and pulse mode. The motion of ablation was performed as light brushing strokes and the tip was kept in motion at all times, localized only on the pigmented regions (Fig 2). The depigmentation procedure continued until no visible pigments remained. After wiping of the operative fields for the last time, there was slight bleeding. No periodontal pack or additional material was applied to support the healing procedure and the patient reported that the procedure was completely painless.

The patient was instructed to avoid smoking, alcohol, acidic beverages, and hot and spicy foods. He was advised to keep his wound area clean by using 0.12% chlorhexidine mouth wash for 2 weeks and brushing with a soft toothbrush for the first week. No analgesic was prescribed.

At 1-week recall, satisfactory gingival epithelial healing was observed. On the 7th day after treatment, the patient was asked whether he had experienced any
pain or discomfort within the past week. He revealed that he had a slight sensitivity on his maxilla about 12 h postoperatively but did not need any medications and this did not cause any change in his usual routine. Laser ablation was carried in the mandibular arch gingiva, with the same procedure. At 15 days follow-up, the gingival healing was uneventful and appeared visually similar to the normal untreated gingiva, completely without melanin pigmentation, and was pink and healthy looking (Fig 3).

Restorative phase I: microabrasion

After receiving a routine oral prophylaxis, the maxillary teeth in the esthetic zone (16 to 26) were isolated with a dental dam to protect the gingival tissues and the acidic microabrasion paste (Opalustre, Ultradent Products) was applied to the vestibular surfaces of the maxillary teeth. Using a right-angle latch type slow-speed handpiece at 1,000 rpm, a hybrid bristle brush-cup was used to apply the microabrasion paste for three separate applications of 30 to 40 s each (Fig 4). Between each application, the microabrasion paste was rinsed and dried from the tooth surfaces. This procedure was repeated three times. Similarly, microabrasion was performed on the mandibular teeth in the esthetic zone. At the completion of the microabrasion technique (Fig 5), the etched enamel surfaces were polished with a cup-shaped porcelain polishing rubber abrasive (Jazz, SS White Burs) to smooth and polish the enamel surface. To remineralize the acid attacked enamel surface, fluoride trays filled with APF gel were placed for 4 min. The excess fluoride was suctioned and the patient was instructed not to eat or drink for at least 30 min. Then an amorphous calcium phosphate-casein phosphopeptide paste (MI Paste Plus, GC America) was rubbed onto the enamel surfaces with a gloved finger.

For the next 3 weeks, the patient placed amorphous calcium phosphate-casein phosphopeptide paste (MI Paste Plus, GC America) in his custom bleaching trays and slept with the trays in place. The patient was informed that because of the dental dam isolation and
the etching process of the microabrasion paste, evaluation of the final color and appearance of the teeth was to be done 1 week after treatment. In case there would be the need for postoperative tooth bleaching, maxillary and mandibular impressions were made for subsequent bleaching tray fabrication if indicated. The patient did not return until 3 weeks after treatment because of travel plans.

Restorative phase II: tray bleaching

The second phase of the treatment was initiated approximately 3 weeks later. When removing the superficial brownish-white enamel dysmineralization hypomineralization, it is not unusual for the final shade of the teeth to be slightly yellower than the original appearance (whitish speckled discoloration due to fluorosis of the teeth). This was observed with this patient. The patient elected to whiten his teeth further using vital tray bleaching. Fabricated bleaching trays were delivered to the patient along with a 15% carbamide peroxide with potassium nitrate and fluoride bleaching gel (Opalescence 15% PF, Ultradent Products) to be used with overnight application each night for 4 weeks. The patient was told that if he was unable to bleach overnight, he must try to use the bleaching trays for at least 2 h each day. During bleaching, the patient reported mild sensitivity to the initial bleaching application. He treated the tooth sensitivity using a recommendation of placing a desensitizing toothpaste (Sensodyne, GlaxoSmithKline) in the bleaching tray 1 h prior to bleaching then cleaning the tray of the toothpaste and continuing with the bleaching regimen. The patient reported being able to follow the overnight regimen of bleaching for 4 weeks, after 1 week of using the desensitizing toothpaste. The patient was very pleased with the results and now smiles with confidence (Fig 6).

Patient evaluation results were pleasing, with dramatic esthetic improvement and no recurrences of gingival pigmentation at the 12-month follow-up (Fig 7).
Discussion

Esthetics has become a significant aspect of dentistry and clinicians are faced with achieving both acceptable gingival as well as dental esthetics. To meet a patient's esthetic expectations with minimal tissue loss is challenging and requires a comprehensive treatment plan following the completion of a thorough analysis of the patient's biologic, functional, and esthetic needs. Laser ablation, bleaching, microabrasion, enamel remineralization using amorphous calcium phosphate-casein phosphopeptide paste (ACP-CCP), enamel recontouring, and freehand bonding can help to create a more attractive smile with practically no pain and no tissue sacrifice.

The color of the gingiva plays an important role in overall esthetics but the principles and the techniques of the management of the problems associated with gingival melanin pigmentation are still not fully established. There is evidence that supports less bleeding of highly vascular oral tissues and of less pain occurring when using a laser versus a scalpel.24 In our case, topical anesthetic gel was applied, but no infiltration anesthetic was used and we observed less bleeding during laser therapy compared with conventional surgical techniques. It is theorized that less postoperative pain in laser surgery may be due to protein coagulum that is formed on the wound surface, thereby acting as a biological wound dressing24,25 and sealing the ends of the sensory nerves.26 In the present case study, there was no complaint of pain during treatment or postoperatively, and patient satisfaction was high.

In the case of laser depigmentation, the ability of melanin-containing melanocytes to absorb the laser light is dependent on the wavelength of the laser and ability to penetrate tissue. Melanin has an absorption spectrum range between 351 and 1,064 nm. The diode lasers used in dentistry have wavelength spectrum ranging from 800 to 980 nm, which allows high levels to be absorbed by soft tissue, water, and chromophores, such as melanin and oxyhemoglobin, and are considered ideal for depigmentation procedures.19

The results of this case report include a recovery of the esthetics of teeth, disappearance of gingival pigmentation and diminution of the enamel stains and remineralization of the enamel. This kind of treatment is the only appropriate one since it aims at the maximum preservation of the dental structures and avoids the damages that are inflicted during the operative recovery of the dental surfaces affected with fluorosis. According to data from the relevant literature, by means of microabrasion an enamel layer between 100 and 200 μm is removed. The application of ACP-CCP was recommended to reduce the risk of post-treatment sensitivity and to ensure the protection of the teeth from possible demineralization. The method is not time-consuming and provides a solution for the complex situation created by dental fluorosis.27

After completion of the microabrasion, a chairside (power) bleaching or at-home bleaching technique can be indicated to hide residual discolored enamel and to better harmonize tooth color. The reason underlying the improved esthetics with this technique
would probably be due to the greater penetrating ability of hydrogen peroxide after microabrasion, where it is not only confined to superficial enamel but also stains deep into the enamel and sometimes in the dentin. Finally, the application of a desensitizing paste based on fluoride and/or CPP-ACP for 5 to 15 min is recommended. This approach is justified for two reasons. First it reduces the risk of post-treatment sensitivity, and second it protects teeth from possible external demineralization.²⁸

Conclusion

Creating short-term attractive smiles at the expense of long-term dental health and optimal tooth biomechanics by using cosmetic techniques should not be considered as an ethical approach. If nature has not provided an individual with an ideal smile, many conservative procedures can remedy most esthetic deficiencies found in an otherwise healthy dentition.

One also should be aware of the specific indications for the various conservative treatment options and be able to integrate them efficiently into a private practice. Unfortunately, some of these procedures are simply regarded as financially less rewarding and too often are neglected in favor of faster and more profitable, yet more invasive cosmetic treatments. The dentists definitely should be more concerned today about the long-term dental health of the patients than about any short-term cosmetic improvement. The method of laser ablation of hyperpigmented gingiva and acidic microabrasion, followed by remineralization procedures, assures a considerable recovery of the dental surfaces affected by fluorosis.
References