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Successfully Treatment of Dental Fluorosis using the Simple Technique of Enamel Microabrasion

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Abstract

Dental dyschromias have several origins among them we cite fluorosis. Dental fluorosis is defined as a qualitative anomaly of the enamel, resulting histologically in hypomineralisation due to excessive ingestion of fluorides during amelogenesis. Clinically, it takes the form of opacities in the enamel.

These opacities may affect homologous teeth symmetrically, and generally affect several groups of teeth. Topographically, isolated or confluent white lines or discrete white patches are observed. Interpretismatic spaces are wider, resulting in porous and permeable enamel. On the one hand, this explains the post-eruptive dyschromias, where exogenous pigments penetrate the pores and transform the white opacities into brown. It is classified into 3 categories: mild, moderate and severe. So that this case was moderate fluorosis and appropriated for the treatment with enamel microabrasion. Differential diagnosis for this condition includes: enamel hypoplasia, amoelogenesis imperfecta, and dental caries.

Treatment by enamel microabrasion represents a non- invasive treatment of choice and offers a satisfactory aesthetic result. Enamel micro-abrasion removes the most superficial layer of enamel using a paste combining an erosive agent and an abrasive agent. The erosive agent used may be orthophosphoric acid or hydrochloric acid. The acid/abrasive mixture is applied and rubbed into the enamel using manual or rotary instruments. The key tosuccess therefore is to properly set the indication to properly control the results.

Keywords: Dental Fluorosis; Enamel Microabrasion

Introduction

When faced with dental fluorosis, the clinician must make a correct diagnosis in order to draw up an effective treatment plan. Several therapeutic alternatives have been proposed, depending on the stage of fluorosis. In our case, moderate fluorosis was diagnosed and treatment with enamel microabrasion was proposed. This technique is based on the gradual removal of film from the surface of the tooth enamel, making it possible to improve or even eliminate dyschromia limited to the superficial layers of the enamel. When properly indicated and controlled, it can be the treatment of choice in certain cases of fluorosis. Is microabrasion enough to obtain a good result, or do we need to study the depth of the various discolorations?

Clinical Case

A 14-year-old female patient presented to the Dental Consultation Department, accompanied by her mother, concerned about the unsightly appearance of stains on the vestibular surfaces of her maxillary anterior teeth.

The history revealed that the patient is in good general health. A preliminary prophylactic cleaning allowed a better visualization of the extent of the stains and to rule out their possible extrinsic etiology [12]. Clinical examination undergood light conditions revealed the presence of yellow to light brown stains on the incisal third of the vestibular surfaces of the maxillary permanent incisors.

Clinical Examination

Tooth mapping and transillumination are two clinical parameters that help the practitioner in the elaboration of the diagnosis and therefore to propose a therapeutic approach according to the existing clinical situation.

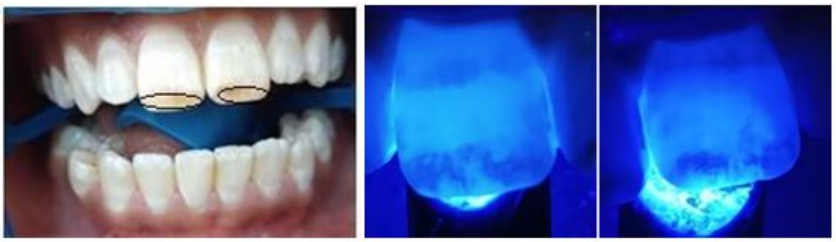

Figure 1: Moderate fluorosis

*Tooth mapping: yellowish spots located on the incisal third of the 11 and 21.

* Transillumination: spots appear with sharp contours on 11 and 21 and indicate that these spots are superficial.

Treatment Plan

The therapy adopted according to the clinical situation consisted of a micro- invasive treatment by micro-abrasion while motivating the patient to oral hygiene and giving her dietary advice.

Figure 2: Setting up the operating field

Figure 3: Opalustre microabrasion paste with its application cup

Figure 4: Application of the opalustre and activation of the product for 10 seconds, then rinse thoroughly with water

Figure 5: Result after 1st cycle of microabrasion

*Installation of protective barriers (goggles and dams) to protect the face and soft tissues from acid projections.

Setting up the Operating Field

Application of the micro-abrasive paste on the vestibular surface of the teeth and brushing with a brush mounted on a contra-angle with low pressure and speed of rotation (300 rpm) at a rate of 10 seconds/ tooth. This cycle was repeated 4 times during each session. Between each cycle, the paste was removed with water and the tooth was carefully dried and evaluated aesthetically. At the end of each session, a polishing with a fluoride paste was performed to remineralize the tooth surface. A total of two micro-abrasion sessions were necessary.

The treatment consisted of: 2 sessions of microabrasion on the enamel, spaced 10 days apart. During each session: an application of micro-abrasive paste on the vestibular surface of the teeth and brushing with a brush mounted on a contra-angle at low pressure and speed of rotation (300 rpm) for 10 seconds per tooth. This cycle was repeated 4 times. Between each cycle, the paste was removed with water and the tooth was carefully dried and assessed aesthetically. At the end of each session, the tooth surface was polished with a fluoride paste to remineralise it.

Figure 6: Result after 2nd cycle of microabrasion

Figure 7: Result after 8th cycle of microabrasion

Figure 8: Microabrasion significantly reduced the unsightly appearance of the two central incisors.

Discussion

The etiology of the dyschromias will allow us to orient the treatment but also and especially to have an idea of the expected result [1,2,4]. Each case being unique, when faced with a dyschromia, choosing the right therapy can be tricky. Treatment should follow the therapeutic gradient from the most conservative to the least invasive. Dr Laurent Elbeze proposes a decision tree to guide the practitioner according to the situation (figure9)[4].

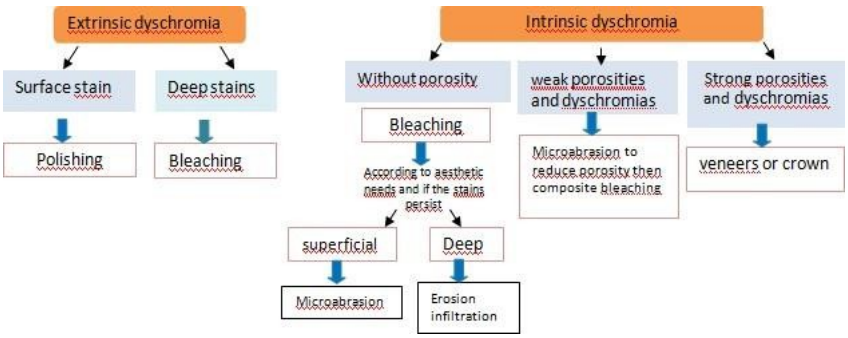

Figure 9: Therapeutic decision tree according to the aesthetic diagnosis and the clinical picture of the dyschromia [4]

The patient's wishes

The patient's wisches guides the choice of treatment [11]. The patient in the clinical case complained only of the yellowish discoloration located on the incisal third of the two central incisors, the parchment-like appearance on the rest of the teeth does not pose an aesthetic problem for the patient. She wanted a conservative treatment that was not expensive and quick. Focal microabrasion was performed to remove these stains.

Microabrasion

The most important factors contributing to the success of enamel micro- abrasion are the thickness and depth of enamel discolourations [3,5,7,9]. However, determining the depth of the dyschromia is not straightforward as the available means [8]. The practitioner implements certain diagnostic tools such as transillumination and tooth mapping.

Tooth Mapping

The practitioner analyzes the clinical situation from the photos taken during the first consultation. The analysis and understanding of the different parameters collected by the tooth mapping and transillumination are necessary to avoid hazardous results [11].

Transillumination

This procedure can be performed using an LED or halogen light curing lamp placed at the palatal or lingual surface of the tooth. An enamel opacity is superficial if its contours are clear, deep if its contours are blurred. From the point of view of thickness, a darker color indicates a thick opacity since it does not let the light pass and conversely [10]. Another way reported by Park et al (2016) [7] and proposed to use Quantitative Laser Fluorescence (QLF) which is a diagnostic device to detect early carious lesions, as it can analyze the initial ameliorative lesions (white spot) and thus help to assess the limits of micro-abrasion [8] but this way remains limited for other cases of dyschromia. It seems important to estimate this depth of dyschromia on wet teeth. Indeed, the refractive index of light is stronger between air and enamel than between water and enamel [10].

Microabrasion also requires standardization of the protocol. In studies, each author has adapted the protocol, thereby influencing the results. In fact, many secondary assessments depend on the protocol. The erosive agent used may be orthophosphoric acid (between 30 and 40%) or hydrochloric acid (between 6 and 18%). The abrasive agent is generally alumina, silicon oxide or silicon carbide particles. The acid/abrasive agent mixture can be used with a rotating handpiece at very low speed with pressure applied to minimise enamel loss.

The residual thickness after microabrasion treatment depends on various parameters: duration of the procedure, pressure, number of cycles and location of the point. The relationship between enamel loss and the duration of the procedure has been demonstrated for some time and appears to be between 200 and 300µm for a duration of 4 minutes. The pressure used during the microabrasion procedure is also crucial: the higher the pressure, the more enamel is removed. Manual application results in 152µm of enamel loss, while mechanical application results in 274µm. The number of cycles also has an impact on enamel loss with an average loss of 12µm for the first application and an average loss of 26µm for subsequent applications. The enamel on the vestibular surface of the maxillary incisors has an average thickness of 1.00mm on the incisal third, 0.90mm on the middle third and 0.3mm on the cervical third. Enamel loss does not have an equivalent impact on crown surface.

However, Croll [6] considers that quantifying enamel loss is of little importance if the function or appearance of the tooth is not impaired. The enamel can be removed progressively, with the aesthetic result monitored at each stage and each of its parameters monitored to keep a watchful eye on tissue loss. Microabrasion affects the surface properties of enamel [6].

A reproducible scale, usable by all evaluators, was needed. This scale should evaluate the aesthetic result but also all the parameters

defined by Croll for an ideal microabrasion procedure: insignificant enamel loss, no damage to the pulp or periodontal tissues, patient satisfaction and permanent results obtained in a short clinical period without discomfort for the patient. No scale in the literature meets all of these criteria. Many authors have used a scale that rates improvement in the appearance of stains (ranging from 1 to 7). A comprehensive and accurate scale using photomicrographic analysis has been described, but to improve management by the dentist, an easy-to-use aesthetic score could be proposed to standardize the evaluation of enamel discoloration treatment. This score should take into account the extent of the defect, the appearance of the stain, the boundaries of the defect, the opacity of the discoloration and the color of the stain [6].

Regarding the side effects of microabrasion, (2018) conducted a systematic review, in which they reported that the occurrence of adverse events (tooth sensitivity and gingival irritation) was transient and remains acceptable for microabrasion treatment [13].

Conclusion

Enamel microabrasion is a conservative technique to improve or eliminate discoloration limited to the superficial layers of enamel. The most important factors contributing to the success of enamel microabrasion are the location, depth and thickness of the discoloration. In this case, moderate fluorosis was diagnosed. By taking into account the patient's expectations and by controlling different parameters: procedure duration, pressure, number of cycles and stain location, a satisfactory aesthetic result was achieved.

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