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Research Article

**SUPERFICIAL ENAMEL DISCOLORATION, MANAGEMENT
METHODS**

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Abstract:

Enamel micro abrasion was developed to improve surface texture, remove superficial intrinsic stains, and repair enamel decalcification and texture defects. Enamel micro abrasion creates a highly polished prismless (abrasion effect), mineral rich surface, such that it takes a longer time for an acquired pellicle and, subsequently, mutans streptococci, to colonize the smooth surface. We aimed by this review to overview the most effective management technique for enamel discoloration treatment. We conducted a search through databases, for relevant studies that discussing the management of enamel discoloration. Superficial stains and irregularities of the enamel are typically what prompt people to seek dental treatment to boost their smile. These stains or problems might be due to hypoplasia, amelogenesis imperfecta, mineralized white areas, or fluorosis, for which enamel microabrasion is primarily suggested.

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INTRODUCTION:

Enamel surface “dysmineralization” can be defined as a disturbance in formation of the inorganic component of enamel during amelogenesis. Such abnormal mineralization of the developing enamel surface area can result in brownish places, white enamel opacities, or various coloured tooth surface issues which can be unattractive [1]. Different methods have actually been suggested to get rid of discoloration such as important or nonvital whitening, microabrasion, macroabrasion, and straight or indirect veneering procedure. Separated brownish or white defects of much less than few tenths of a millimeter deepness can be effectively treated with microabrasion [2].

Several treatments have actually been introduced to the dental market for the reconstruction of dental appearance to a degree that pleases what people seek concerning dental esthetics. These strategies are still being reviewed in order to guarantee a reliable treatment with marginal chair time and inexpensive that is safe for experts and also people. For surface enamel spots or issues, enamel microabrasion is chosen, as it is thought about an esthetic and conservative therapy [1,2]. Given that its introduction by Croll et al [3] in 1986, there have been various reports describing different techniques, relevant items, as well as medical successes [4,5].

The major indication for enamel microabrasion is innate discoloration or appearance alteration because of enamel hypoplasia, amelogenesis imperfecta, or fluorosis [6]. The method removes the porous surface enamel layer, as well as the entrapped discolorations, by scrubbing a gel which contains an acid and also a rough compound in a comparable way that a dental treatment with pumice and water is done. The enamel stain or issue is eliminated by a combination of the abrasive and also unpleasant impacts of the advised combination having reduced acid concentrations and an unpleasant representative, used mechanically making use of a low-rotation micromotor [7]. It needs to be the first choice for the management of teeth with innate discolorations since it eliminates nontransparent, brownish discolorations as well as smoothens surface irregularities by supplying a much more normal as well as shiny surface area [8]. As the strategy is taken into consideration safe and also minimally invasive, it can also be integrated with tooth whitening when essential [5,7,8].

Currently, microabrasion is performed by applying rough slurry of silicon carbide and hydrochloric acid making use of a manual or handpiece driven rubbing activity. This slow-moving elimination of enamel is

easy to regulate. The deepness of the staining cannot be known till efforts are made to remove it. If the discoloration is unfathomable, a corrective option should be thought about [5].

DISCUSSION:

Enamel microabrasion is considered reliable in cases of white, yellow or brownish spots situated in the outer enamel layer. Nonetheless, it is necessary to recognize the intensity of enamel spots when facing fluorosis. Celik et al [8] executed enamel microabrasion with Opalustre in mild-to-severe fluorosed teeth and also located that even more applications were required when lesions were a lot more serious. Moderate staining was treated with five applications, whereas moderate to severe discoloration needed 10 applications. Train et al [9] likewise showed that the look of slightly fluorosed teeth was reasonably enhanced, yet microabrasion only somewhat improved the look of seriously fluorosed teeth. Nevertheless, enamel microabrasion need to still be the very first alternative for people that seek minimally intrusive treatment, also in cases with severe fluorosis. In such cases, removal of opaque white locations or brown spots may raise the success of further therapy, such as bleaching, to accomplish a consistent tooth shade [8]. Castro et al [10] revealed that enamel microabrasion incorporated with at-home tooth whitening efficiently reduced staining in instances of mild to serious fluorosis, enhancing the aesthetic look of the teeth and also the self-perception of the client, without occurrence of adverse effects such as tooth sensitivity. Mechanical application with a low-rotation micromotor was very first indicated in the 1970s, utilizing a blend of 18% hydrochloric acid, hydrogen peroxide and ether [10] Mix with an abrasive agent was later indicated by Murrin et al [11] in 1982, who added pumice to 36% hydrochloric acid, causing a slurry that was used utilizing a rubber mug paired to a micromotor [11].

- **ENAMEL MICROABRASION INDICATIONS:**

The proper indications for enamel microabrasion are summarized in [Table 1] [8]. Dental fluorosis is the most common indication [8], which arises from demineralization of enamel caused by too much fluoride intake. Fluorosis produces nontransparent white locations or yellow to dark brownish discolorations with porosities on the enamel surface area, depending on extent [12]. Fluoride-induced enamel modifications range from slim, white, opaque lines representing perikymata running across the tooth surface area, to a completely milky white surface area [12]. They are identified by the presence of bilateral,

scattered, and also horizontal striations observed on all teeth that mineralize at the same time (**Figure1A**) [13]. Enamel microabrasion normally enhances esthetic look in cases of moderate and modest fluorosis (Thylstrup-Fejerskov Index 1-7) [8,11], as well as need to constantly be taken into consideration the first option in the monitoring of these cases [8, 14]. Even in

circumstances with yellow or brownish staining, enamel microabrasion can enhance the aesthetic look of the teeth [14]. As these discolorations are formed by the discoloration of demineralized surface areas and from outside sources, the deepness of the tarnish is most likely connected with the infiltration of the tarnishing representatives [8,14].

Table 1: Summary of indications and advantages of the Enamel microabrasion Technique

Indications	Requirements	Advantages
Stains or defects restricted only to enamel	Shallow alterations just in the enamel surface	Safe and conservative treatment
Dental fluorosis	Use of rubber dam	Minimal loss of enamel
Mineralized white stains	After completion of orthodontic treatment, if necessary	Leaves enamel surface lustrous, shiny and glass-like
Correction of surface irregularities	Supplemented with bleaching, if necessary	Roughness and microhardness alterations easily resolved by saliva
Localized enamel hypoplasia		Reduced bacterial colonization on enamel surface
Polishing of enamel and auxiliary removal of composite resin residues after orthodontic therapy		Lasting and stable esthetic results

Microabrasion treatment may be indicated for correction of surface irregularities on oral enamel, which may be triggered by incomplete enamel development or obtained after the removal of orthodontic appliances [6], such as the removal of residual material composite from brackets with diamond burs, and also causing a smooth and polished enamel surface area [15]. Microabrasion is likewise shown for nontransparent, white areas or discolorations, despite having porosities, from the demineralization/remineralization procedure usual in the enamel area beside orthodontic bands or braces (**Figure1B**), or from disturbances in the mineralization process, such as hypocalcification [6]. The white areas caused by orthodontics should initially be treated with mineralizing agents, such as sodium fluoride, or with an infiltration technique [15].

Infiltration of the enamel by resin was recently established as a means to obstruct the diffusion paths for acids and liquified minerals [16]. The materials made use of have low viscosity, high surface area tension, as well as low get in touch with angle with the enamel, in addition to a refraction index comparable to enamel. The infiltration technique might also be made use of in cases of mineralized sores [15]. The method needs pre-conditioning of the surface with 15% hydrochloric acid, which eliminates approximately 40 μm of enamel surface area, to ensure material infiltration [16]. This way, the thickness of the enamel removed for resin seepage is similar to microabrasion. However, there are no professional tests examining the discoloration, abrasion wear or bacterial colonization of resin-infiltrated surfaces.



Figure 1: Tooth staining from A: Fluorosis; B: Mineralized white spots.

- **Technique Effectiveness:**

Enamel microabrasion has been shown as an efficient and also traditional treatment [8,9,14]. According to reports by Sundfeld et al [6], 5 to 10 applications of microabrasive systems (35% phosphoric acid with pumice, Opalustre) can cause the loss of 25 to 200 μm of enamel, which is acceptable for medical problems (**Figure 2**). A current research study revealed that 120 s of microabrasive therapy decreases about 10% of the enamel thickness [5], recommending it is a risk-free as well as conventional treatment. According to Dalzell et alia [17], the stress used during the microabrasion procedure is important for total enamel removal, such that the greater the stress, the higher the quantity of enamel got rid of. Furthermore, enamel wear from the microabrasion strategy is time-dependent [18].

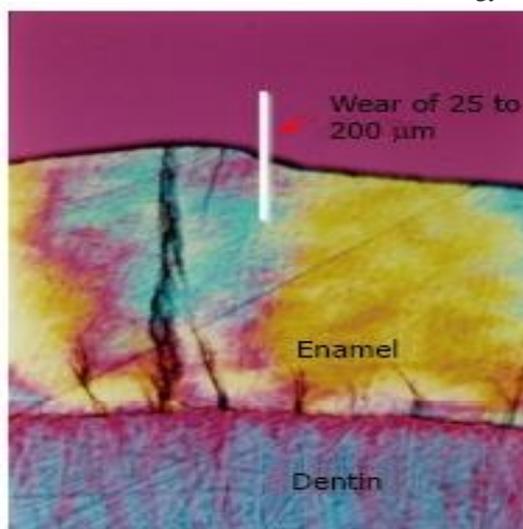


Figure 2: Depth of enamel removal. Polarized light microscopy showing the ground tooth section after enamel microabrasion with Opalustre

Microabrasion may be utilized in cases of local or idiopathic enamel hypoplasia that is limited to the outer enamel layer [19] Although this problem can occasionally need a restorative approach with composite resin or laminate veneer (**Figure 3**) [20], microabrasion must be taken into consideration as the very first therapy choice [8,20] In addition to enhancing esthetics, it may decrease the demand for enamel wear for a corrective technique, which is

primarily vital in young patients [20]. However, the infiltration technique might be used in instances with deeper stains not dealt with by microabrasion, and also may be an option for the invasive restorative method [21]. Even if all creamy colored parts of a lesion do not entirely disappear, the infiltration method normally brings about considerable improvement in look and covers up the enamel discolor [22].



Figure 3: Deep enamel staining due to hypoplasia. A: Hypoplasia; B: Ineffective microabrasion treatment

CONCLUSION:

Superficial stains and irregularities of the enamel are typically what prompt people to seek dental treatment to boost their smile. These stains or problems might be due to hypoplasia, amelogenesis imperfecta, mineralized white areas, or fluorosis, for which enamel microabrasion is primarily suggested. Enamel microabrasion involves using acidic as well as rough agents, such as with 37% phosphoric acid and pumice or 6% hydrochloric acid and also silica, related to the modified enamel surface area with mechanical stress from a rubber cup combined to a rotatory mandrel of a low-rotation micromotor. If needed, this therapy can be safely integrated with lightening for far better esthetic results. Current researches reveal that microabrasion is a conservative therapy when the enamel wear is minimal as well as clinically imperceptible. One of the most essential factors adding to the success of enamel microabrasion is the deepness of the issue, as much deeper, nontransparent discolorations, such as those resulting from hypoplasia, cannot be resolved with microabrasion, and require a corrective strategy. Surface area enamel modifications that arise from microabrasion, such as roughness as well as microhardness, are conveniently restored by saliva. Scientific researches sustain the effectiveness and longevity of this safe and also minimally invasive therapy.

REFERENCES:

1. Sundfeld RH, Franco LM, Gonçalves RS, de Alexandre RS, Machado LS, Neto DS. Accomplishing esthetics using enamel microabrasion and bleaching-a case report. *Oper Dent.* 2014;39:223–227.
2. Schmidlin PR, Göhring TN, Schug J, Lutz F. Histological, morphological, profilometric and optical changes of human tooth enamel after microabrasion. *Am J Dent.* 2003;16 Spec No:4A–8A.
3. Croll TP, Cavanaugh RR. Enamel color modification by controlled hydrochloric acid-pumice abrasion. II. Further examples. *Quintessence Int.* 1986;17:157–164.
4. Donly KJ, O’Neill MO, Croll TP. Enamel microabrasion: A microscopic evaluation of the “abrasion effect” *Quintessence Int.* 1992;23:175–9.
5. Cvitko E, Swift EJ, Denehy GE. Improved esthetics with a combined bleaching technique: A case report. *Quintessence Int.* 1992;23:91–3.
6. Sundfeld RH, Croll TP, Briso AL, de Alexandre RS, Sundfeld Neto D. Considerations about enamel microabrasion after 18 years. *Am J Dent.* 2007;20:67–72.
7. Benbachir N, Ardu S, Krejci I. Indications and limits of the microabrasion technique. *Quintessence Int.* 2007;38:811–815.
8. Celik EU, Yildiz G, Yazkan B. clinical evaluation of enamel microabrasion for the aesthetic management of mild-to-severe dental fluorosis. *J Esthet Restor Dent.* 2013;25:422–430.
9. Train TE, McWhorter AG, Seale NS, Wilson CF, Guo IY. Examination of esthetic improvement and surface alteration following microabrasion in fluorotic human incisors in vivo. *Pediatr Dent.* 1996;18:353–362.
10. Castro KS, Ferreira AC, Duarte RM, Sampaio FC, Meireles SS. Acceptability, efficacy and safety of two treatment protocols for dental fluorosis: a randomized clinical trial. *J Dent.* 2014;42:938–944.
11. Murrin JR, Barkmeier WW. Chemical treatment of endemic dental fluorosis. *Quintessence Int Dent Dig.* 1982;13:363–369.
12. Kamp AA. Removal of white spot lesions by controlled acid-pumice abrasion. *J Clin Orthod.* 1989;23:690–693.

13. Fejerskov O, Kidd E. *Dental Caries - The disease and its clinical management. 2nd ed.* USA: Wiley-Blackwell; 2008.
14. Pini NI, Sundfeld-Neto D, Aguiar FH, et al. Enamel microabrasion: An overview of clinical and scientific considerations. *World J Clin Cases.* 2015;3(1):34-41. doi:10.12998/wjcc.v3.i1.34.
15. Knösel M, Eckstein A, Helms HJ. Durability of esthetic improvement following Icon resin infiltration of multibracket-induced white spot lesions compared with no therapy over 6 months: a single-center, split-mouth, randomized clinical trial. *Am J Orthod Dentofacial Orthop.* 2013;144:86-96.
16. Paris S, Schwendicke F, Seddig S, Müller WD, Dörfer C, Meyer-Lueckel H. Micro-hardness and mineral loss of enamel lesions after infiltration with various resins: influence of infiltrant composition and application frequency in vitro. *J Dent.* 2013;41:543-548.
17. Dalzell DP, Howes RI, Hubler PM. Microabrasion: effect of time, number of applications, and pressure on enamel loss. *Pediatr Dent.* 1995;17:207-211.
18. Tong LS, Pang MK, Mok NY, King NM, Wei SH. The effects of etching, micro-abrasion, and bleaching on surface enamel. *J Dent Res.* 1993;72:67-71.
19. Wray A, Welbury R. UK National Clinical Guidelines in Paediatric Dentistry: Treatment of intrinsic discoloration in permanent anterior teeth in children and adolescents. *Int J Paediatr Dent.* 2001;11:309-315.
20. Reston EG, Corba DV, Ruschel K, Tovo MF, Barbosa AN. Conservative approach for esthetic treatment of enamel hypoplasia. *Oper Dent.* 2011;36:340-343.
21. Attal JP, Atlan A, Denis M, Vennat E, Tirlet G. White spots on enamel: treatment protocol by superficial or deep infiltration (part 2) *Int Orthod.* 2014;12:1-31.
22. Muñoz MA, Arana-Gordillo LA, Gomes GM, Gomes OM, Bombarda NH, Reis A, Loguercio AD. Alternative esthetic management of fluorosis and hypoplasia stains: blending effect obtained with resin infiltration techniques. *J Esthet Restor Dent.* 2013;25:32-39.