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Minimally invasive treatment of localised enamel hypoplasia using micro abrasion and resin infiltration.

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Abstract

Enamel hypoplasia occurs when the organic matrix fails to form during the growth of dental enamel. Minimally invasive treatments of the slightly altered enamel add to the increased longevity of the teeth and avoid relapse into the repeated cycle of restoration. The purpose of this case report is to demonstrate a consecutive method of mini Mally invasive treatments for Esthetic resolution in the anterior teeth. Hypoplastic spots on the incisal thirds of the maxillary lateral incisor were treated with two rounds of micro abrasion using phosphoric acid and pumice stone and six sessions of resin infiltration. Mas king of spots was done with this series of treatments which re-established the color harmony.

Keywords: Resin infiltration technique, Micro abrasion, White spot lesions.

Introduction

One of the most esthetically significant factors among patients seeking dental care who are worried with the look of their teeth is tooth color.1 The harmony of the mouth is also impacted by flaws on the teeth surface in addition to dental color. These elements might also obstruct the normal growth of the dentition.2 Systemic or environmental variables can lead to structural flaws in teeth, which can lead to alterations during the for amative phases of dental growth. This may have a direct impact on quality and quantity of enamel produced by the ameloblasts. Reduced enamel matrix development is

the primary cause of enamel hypoplasia. Depending on the degree of disruption the teeth experienced, such developmental flaws may result in depressions, spots, cracks and grooves.[3,4] Treatment choices in these situations include veneers and crowns. However, they may lead to the elimination of more sound tooth tissue.[5] Therefore, minimally invasive treatments like resin penetration, bleaching and micro abrasion could be taken into consideration. These treatments help teeth last longer and keep them from returning into the constant cycle of restorations.

Bleaching of the tooth is the most conservative method and it is frequently the first choice for hypoplastic spot masking and brighter teeth. [6,7] If the spot is not masked, enamel micro abrasion can be performed which pro motes the selective removal of the enamel surface layer with structure or color change and exposing the sublayer of enamel.[8,9]

Resin Infiltration (Icon, DMG), a novel material on the dental market, is a third option. This is a low-viscosity resin that is applied to the molar surface and infiltrates the enamel micropores. Because these pores provide diffusion paths for dissolved acids and minerals, this material seeks to seal the microporosities within the lesion.[10,11] This pore filling alters the optical properties of the teeth, masking the enamel stains while requiring no tooth removal [12-14]. As a result, the current research demonstrates the clinical steps of micro abrasion and resin infiltrant application as a sequence of methods for removing or masking hypoplastic spots in the maxillary central incisor.

Clinical case report

A 20-year-old female patient reported to the department of conservative dentistry and endodontics with the chief complaint of brownish white discolouration on upper front teeth. Patient gave a history of fall in childhood, but however doesn't recall the exact age.

On examination whitish brown discoloration was noted on the incisal third of tooth #22. (Fig.1) There was no tenderness on percussion or palpation noted. Periodontal probing depth and mobility was within the normal range. Diagnosis of localised enamel hypoplasia secondary to trauma was made.

The treatment plan proposed to the patient included enamel micro abrasion followed by subsequent resin infiltration treatment. Isolation was done with rubber dam, after which the micro abrasion technique was per formed using Opalustre (6.6% hydrochloric acid slurry with silicon carbide microparticles) which was placed on the labial surfaces of #22.

A polishing cup (Opal cups, Ultra dent Products, Inc) was then applied for 1 minute with a slow-speed contra-angle handpiece. Intermittent water rinses were implemented. This procedure was repeated two times. At the end of each session, the teeth were polished with super fine so flex disc (3M) and Platina Hi-Gloss Composite Polishing Paste (PREVEST Den Pro) and the transparent and neutral 2% fluoride gel was applied for 4 minutes. (Fig.2).

A resin infiltration system (Icon, DMG) was used in accordance with the manufacturer's instructions. Before etching tooth #21and #23 were isolated using Teflon. The labial surfaces of tooth #22 were etched with icon-etch gel for 2 minutes, after which it was washed for 30 seconds. This process was repeated 3 times according to manufacturer's instructions. After the teeth had been rinsed with water and dried, Icon-Dry was applied for 30 seconds. (Fig.3) Ideally if body of lesion has been reached the whitish opacity would disappear after drying with icon dry.

The whitish-opaque coloration on the etched enamel has not diminished. Hence according to the protocol, etching and drying was repeated for 2 more rounds. The whitish-opaque coloration on the etched enamel had diminished, which indicates that resin in filration process can be initiated. An ample amount of Icon-Infiltrant was app lied onto the treated tooth surfaces and incubated for 5 minutes, then light-cured for 40 seconds. Icon infiltrant was re-applied for 1 minute and light cured. (Fig.3C).

Since 5 rounds of etching had been done, there had been sufficient loss of enamel leading to a scooped-out depression at the area of the lesion.

In such cases, it is recommended that a thin layer of composite be applied to restore natural morphology. This was done using G-aeneal anterior composite (GC). The patient was recalled after 1 week for final finishing and polishing. Esthetically pleasing results as well as the natural morphology had been restored. (Fig.4)

Discussion

The most frequent cause of developmental disturbance for the succeeding tooth is the intrusion of deciduous tooth.[15,16]

The age at which the trauma occurred, as well as the severity and direction of the trauma, are important factors in determining the sequel of trauma to succeeding permanent teeth. Dis coloration or hypoplasia of enamel is the mildest and most frequent sequel to trauma to primary teeth. Turners' hypoplasia is characterised by a white patch and usually a history of injury to the primary tooth.17 The decrease in enamel mineral phase alters the chemical makeup as well as the optical appearance giving a whitish color. [18]

Two micro abrasion sessions with phosphoric acid and pumice stone were used in this clinical instance and the results were noteworthy. The white spot, however, was not entirely eradicated due to the profundity of the enamel defect. As a result, no more sessions of micro abrasion was done in order to avoid excessive abrasion of dental enamel. Sund feld et al.[9] reported that only micro abrasion was capable of completely removing flaws. To conceal such enamel flaws, they used composite resin in a straight repair.

Despite the increased wear, once diamond bur abrasion and micro abrasion are needed, these treatments take less enamel than traditional preparations for resin or ceramic veneers or laminates. In general, the goal is to eliminate restorative procedures done on the tooth, so that the tooth does not join the repeated restorative cycle and a minimal quantity of enamel is removed. [14, 19]

The ICON resin infiltration technique, which is non-invasive, is a one-visit process that offers mechanical support of demineralized enamel and greater resin penetration. It slows or stops the development of lesions and reduces the chance of secondary caries. There is no danger of surgical sensitivity or pulpal irritation, nor of gingivitis or Periodontitis. It has enhanced masking properties with good patient approval and was found to have a better aesthetic impact when compared to micro abrasion after a 12-month follow-up. 20 Shah room et al. found in a systematic study that ICON is the optimal management choice when compared to other techniques in treating white spot lesions.[21]

ICON has a masking impact, and it has been shown to be effective in treating mild-to-moderate fluorosis and severe hypoplasia.[18] ICON slows the development of caries while also providing camouflage effect.[22]

This camouflage effect is also affected by the extent of the lesion. Studies are still being conducted to determine the long-term impact and longevity of the ICON due to staining and ageing.[23]

The smoothness and glossiness of white spot lesions are improved by micro abrasion because the surface portion

of the lesion is removed by chemical erosion with hydrochloric acid and mechanical abrasion with pumice. Because of fluorapatite supersaturation, the outer 10 to 30 μ of the white spot lesions were thought to be reasonably undamaged enamel.[24] Previous research found that micro abrasion could eliminate up to 250μ of surface enamel. [25]

As a consequence, micro abrasion could remove the comparatively intact outer and inner layers of white spot lesions, resulting in lesions coming into direct touch with saliva for remineralization.[26] The extent of entry of resin infiltration could be greater than 100μ.[27] The lesions cannot be fully removed if the depth of the white spot lesions is greater than the maximal depth of the treatment method. To differentiate the signs of the two metho ds, a way for clinically identifying the depth of white spot lesions is required. Torlakovic et al. discovered a substantial relationship between white spot lesion colour intensity and lesion volume. 28 It was reported that the colour intensity can forecast the depth of enamel demineralization.[29]

A physical occurrence can explain the carious, hypoplastic or fluorotic clinical look of a white spot. The Refractive Index (RI) in this porous region is distinct from the other parts of the tooth and this variation explains why the lesion is whitish. With more porous enamel and larger crystalline spaces, adamantine fluid (RI of water of 1.33) occupies the spaces that enamel hydroxy apatite should have occupied (RI of 1.62). Photo polymerizable polymers with a high penetration rate are used as infiltrant. This substance enters and fills the porous areas of the hypoplastic enamel via capillary forces.[11] Resin infiltration (RI of 1.46) alters the optical characteristics of molars with enamel hypoplasia, concealing white areas.[14]

Certain limitations can be anticipated, such as the need to take precautions to keep the area of application dry, the proper depth of penetration not being known and in cases of trauma where the defects are circular, there is an acute angle formation with the enamel surface, which may impede infiltration and give it an edge effect.[17]

Fig. 1: whitish brown discoloration on the incisal third of tooth #22.

Fig. 2: two rounds of micro abrasion.

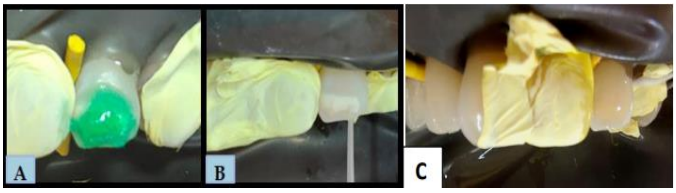

Fig. 3: A, B and C: application of icon etch, icon dry and resin infiltrant.

Fig. 4:one week follow up image.

Conclusion

The combination of minimally intrusive bleaching, micro abrasion and resin infiltration was successful in resolving hypoplastic changes and the pigmentation of the enamel. Clinical effectiveness is directly linked to spot depth, diagnosis and is considered to be the most appropriate therapy option.

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