Case report: The infiltration technique for MIH using abrasives

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Introduction

The infiltration concept (Icon) is very effective in infiltrating hypomineralised enamel with a carious origin. Is it also effective in Molar Incisor Hypomineralisation (MIH) cases? Let us find out…

Diagnosis

Freek (8) was referred for discoloration on his two central incisors: 11 and 21. Due to hypomineralisation of the first permanent molars, Molar Incisor Hypomineralisation (MIH) was diagnosed as the cause for the enamel defects in the central incisors. The hypomineralisation extended completely to the surface of the enamel. We know that in the case of MIH, hypomineralisation extends all the way to the dentin-enamel junction (DEJ); therefore the lesions were as thick as the enamel in this case. (Fig. 1, 2)

Fig. 1: Lesions on both 11 and 21 showing yellow and white lesions.

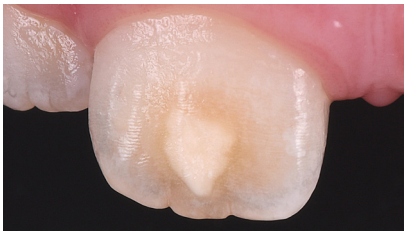

Fig. 2: Close-up of 11.

Bleaching

In order to get a better colour for the hypomineralisations, bleaching was carried out with 10% carbamide peroxide for 5 days for only 2 hours a day. Carbamide peroxide breaks down in contact with water into hydrogen peroxide and urea. Hydrogen peroxide is responsible for the oxidation of the double bonds of the chromogens and causes the bleaching effect. An extra very important effect of carbamide peroxide is the deproteinising effect of the urea. This ensures a good infiltration procedure later on. After 5 days of bleaching the result was evaluated and another 5 days of bleaching was advised. The result after 10 days was satisfactory and after a 4-week break the infiltration procedure was scheduled, in order to make sure that the oxidative stress was no longer present and good adhesion was possible. (Fig. 3, 4)

Fig. 3: Situation after 5 days of bleaching with 10% carbamide peroxide.

Fig. 4: Situation after 10 days of bleaching with 10% carbamide peroxide.

Infiltration

After topical anaesthesia for the gingiva full rubber dam isolation was carried out. Because the lesion extended to the enamel surface we started using a micro-abrasive slurry with pumice and 35% phosphoric acid, mixed one to one. A special rubber cup with an internal bristle was used and the slurry was applied for 60 seconds each application. During this application about 10-20um of sound enamel was expected to be removed depending on the force applied. Since the superficial enamel is already hypomineralised we expect the abrasiveness to be a lot higher. (Fig. 5, 6)

After every application we rinsed thoroughly with water and after four applications we checked the permeability with ethanol. There was already pretty good permeability, but still not good enough. When applying ethanol it is important to let it evaporate in order to give the liquid sufficient time to show the full infiltration capacity. (Fig. 7, 8)

Since more permeability was required 2 more applications of 15% HCl were carried out for 120 seconds. With each application, approximately 40um of sound enamel was removed, but it must be kept in mind that hypomineralised enamel will be more aggressively removed by hydrochloric acid. After the second session ethanol application showed full permeability so infiltration could be carried out. (Fig. 9, 10)

Infiltration was carried out for about 15 minutes in order to achieve the best result possible. After 10 minutes there were still a few non-infiltrated areas observed with the microscope. Infiltration is carried out in low light conditions, to prevent premature setting of the infiltrant. When infiltration is completed the lesion is light cured for 40 seconds. (Fig. 11, 12)

Fig. 5: Rubber dam isolation with the help of floss ligatures.

Restoration
In order to restore the shape and texture of both teeth, the application of composite resin was required. For optimal adhesion the infiltrated enamel was air-abraded very shortly, etched with 35% phosphoric acid and bonded with a total-etch system. After light cure (20 sec), composite was applied and after a further light cure (40 sec) the restoration was finished, polished and cured again with glycerine gel. (Fig. 13, 14)

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Evaluation
After two weeks we evaluated the final result. Both the patient and his parents were very pleased with the final result. When the hypomineralisation extends to the enamel surface it is not always necessary to be very aggressive with the micro-abrasion. In this case we used a mild abrasive paste in order to be as minimally invasive as possible. (Fig. 15, 16)


Fig. 6: Micro-abrasion with a mixture of phosphoric acid and pumice.


Fig. 7: Applying ethanol with the special tip.


Fig. 8: Situation after 20 seconds the ethanol now shows the full infiltration capacity.


Fig. 9: Application of hydrochloric acid for 120 seconds.

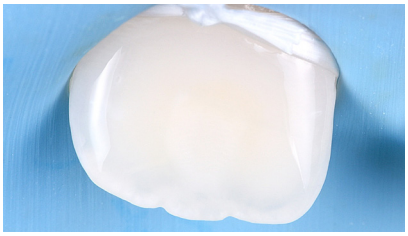
Fig. 10: Ethanol shows full permeability, ready for infiltration.


Fig. 11: Application of the infiltrant, the infiltrant was re-applied every 5 minutes.


Fig. 12: Result immediately after light curing.


Fig. 13: Restoration of the missing enamel with composite resin.


Fig. 14: After finishing and polishing.


Fig. 15: Final result of 11 (close-up).


Fig. 16: Final result after infiltration of 11 and 21.