

Case report: Treatment of traumatic hypomineralisation with a combination of infiltration and restoration

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Introduction

The infiltration concept is mainly used to infiltrate hypomineralised enamel lesions. When these lesions extend to the enamel surface creating irregularities, additional treatment with direct composite to restore the defect seems to make a lot of sense.

Diagnosis

Katherina (28) was referred to my practice by a colleague for the treatment of white and yellow discoloration on tooth 21. Since this was the only hypomineralisation present in Katherina's practically sound dentition, the enamel lesion was diagnosed as traumatic hypomineralisation. (Fig. 1, 2)

After examination we concluded that the hypomineralisation was not covered with sound enamel and extended completely to the buccal surface of tooth 21. Moreover, the hypomineralisation showed both yellow and white discoloration. (Fig. 3, 4)

Taking cross-polarized pictures enables an even more meticulously analysis of the hypomineralisation. When taking cross-polarized pictures, both the flashlight (outgoing) and the lens (incoming) of the camera are polarized. This prevents the flash being visible on the pictures and enables better colour analysis. You can distinguish colours even better when you reduce the light by one level. In this case we could clearly see both the white and yellow parts of the hypomineralisation. But, even more importantly, we can also see that a part of the lesion was covered with sound enamel; mainly towards the mesial aspect. We should take this into account during our treatment procedures. (Fig. 5, 6)

Bleaching

Since there was quite heavy yellow discoloration present, home bleaching was advised with 16% carbamide peroxide during the night for 10 days. After 2 weeks we evaluated the result. At first, the result seemed very satisfactory on the photograph, but after analysis of the cross-polarized picture, the advice was to carry out a further 5 days of bleaching. (Fig. 7, 8) Due to the overall whitening effect, Katherina refused further bleaching and we continued the treatment after another 2 weeks rest due to bonding reliability after bleaching.

Infiltration

Before isolation the colours of tooth 21 were analysed with small amounts of the composite that will be used for restoration of the enamel disruption. With cross-polarized photography, selection of the correct composites is less of problem. After analysis, both the Vita shade B1 and the enamel shade EB (enamel bleach) from Ecosite Elements (DMG) were selected for restoration in this case. (Fig. 9, 10)

Once the correct composite shades were selected, full rubber dam isolation was carried out to prevent contact of both the etchant and the infiltrant with the soft tissue. Next, air-abrasion with aluminium oxide was performed to remove the surface layer of the hypomineralisation. The hypomineralisation extended to the surface and air-abrasion will be more aggressive on the hypomineralised part, due to the lower mineral content. (Fig. 11, 12)

For more careful enamel removal we started using hydrochloric acid. After each application, penetration was checked with ethanol. This procedure was repeated until the hypomineralisation showed full penetration capacity. (Fig. 13, 14)



Fig. 1: Extra-oral view of enamel hypomineralisation on tooth 21.



Fig. 2: Photo from an oblique angle shows disruptions of the buccal enamel surface of tooth 21.



Fig. 3: Intra-oral oblique view on the traumatic hypomineralisation shows the absence of sound enamel on the surface.

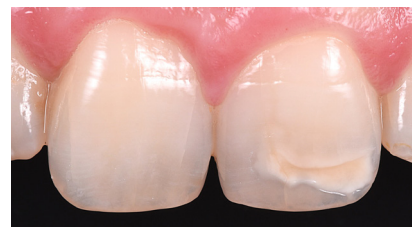


Fig. 4: Both white and yellow discolorations are present in the hypomineralised enamel lesion.

After 3 etching cycles the ethanol was unable to penetrate the hypomineralisation completely on the mesial aspect of the lesion. We had already analysed the cross-polarized pictures and ascertained that there might be some sound enamel covering the lesion, preventing good penetration. In this respect, some sound enamel was removed with a fine diamond burr. After 2 more cycles we were able to confirm good access. (Fig. 15, 16)

Before starting the infiltration procedure a transillumination photograph was taken from the lesion. For this technique we used a light source on the palatal aspect of tooth 21 and took a polarized picture from the buccal without using a flash. I used a light curing device with a special blacklight lens, to reduce the amount of light and to be able to take a photo. With this picture we can analyse the extent of the hypomineralised lesion; the darker the lesion, the greater the extent. So with Katherina we expected to have the greatest difficulties during infiltration on the distal aspect of 21. We started with the infiltration and used 5-minute intervals to activate and check the process of infiltration. (Fig. 17, 18)

After 15 minutes of infiltration we had not been able to reach a desirable outcome; the distal aspect was not completely infiltrated. We decided to wait a little longer, and after 5 more minutes the distal area was successfully infiltrated as well. (Fig. 19, 20)

Before light curing there was clearly a yellowish tint visible of the infiltrant. This is due to the photoinitiator inside the infiltrant. Once light cured the photoinitiator will be completely consumed and the yellow aspect will disappear. It is important to leave no excess of infiltrant before light curing; some air and suction will prove to be of great help.

Restoration

Because we planned to carry out some adhesive bonding, only 1 infiltration cycle was performed. After infiltration, a normal adhesive protocol for enamel was carried out; sandblasting with aluminium oxide, etching with phosphoric acid and (total-etch) bonding. (Fig. 21, 22)

Because there was still a little yellow discolouration present in the hypomineralisation, an initial layer of B1 Ecosite Elements was applied, as it has better abilities to block the colour underneath. After light curing, a very thin layer of EB Ecosite Elements was applied and polished after light curing with a diamond coated silicone spiral. (Fig. 23, 24)

The immediate result after treatment is difficult to analyse, due to the dehydration effects of rubber dam application. We could see a nice intact buccal surface, but still a little yellowish tint present... (Fig. 25, 26)

Evaluation

After 2 more weeks the final evaluation was complete. Katherina was very happy with the result. The teeth rehydrated and the discolouration was almost gone. Only when analysing a cross-polarized underexposed picture could we still distinguish a very small amount of discolouration. (Fig. 27, 28, 29, 30)

Final extra oral results are pleasing and show the possibilities when the infiltration concept (Icon) is combined with direct composite (Ecosite Elements). In the authors view it makes sense to combine both techniques and we would encourage other clinicians to do so when necessary. (Fig. 31, 32)



Fig. 5: Using cross-polarized photography there is no disturbance due to flash when analysing the colours of the tooth.

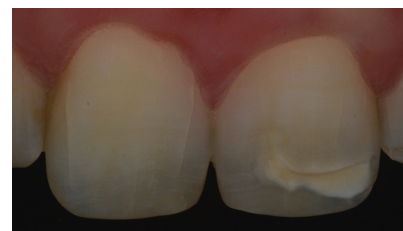


Fig. 6: When using one level lower of light, an even a better colour analysis can be achieved.



Fig. 7: Result after 10 days of home bleaching, seems pretty good?



Fig. 8: Better analysis with cross-polarized photography shows us that the yellow discolouration is actually still present...



Fig. 9: In this case an enamel shade EB (enamel bleach), a Vita shade B1 and an enamel shade EL (enamel light) from Ecosite Elements (DMG) were applied from mesial to distal.

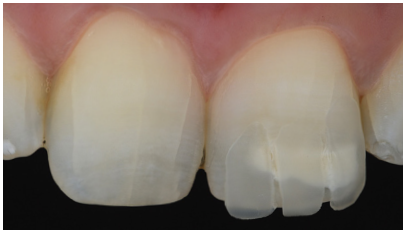


Fig. 10: Underexposed cross-polarized photography is very useful for easy analysis.

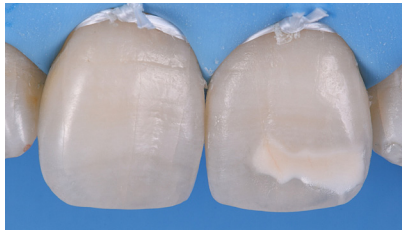


Fig. 11: Full rubber dam isolation using floss ligatures.

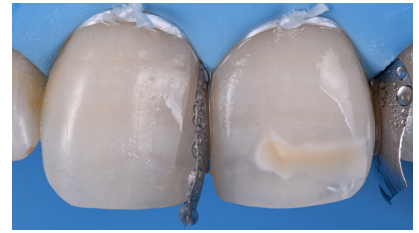


Fig. 12: Air-abrasion with aluminium oxide for superficial enamel removal.

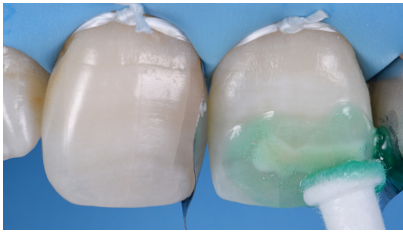


Fig. 13: Application of hydrochloric acid is carried out with active motion to enhance the etching effect.



Fig. 14: Checking the penetration of ethanol into hypomineralisations is one of the key factors of success for the infiltration procedure in aesthetic cases.

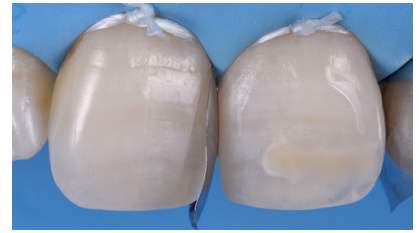


Fig. 15: Once the ethanol was applied after 3 etching cycles, it became clear that the mesial aspect of the lesion was still not completely accessible.

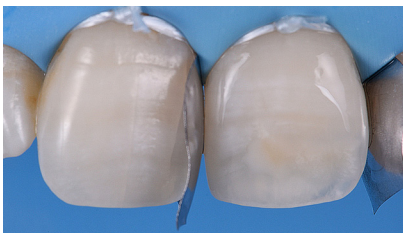


Fig. 16: Finally, after 5 cycles, we observe full penetration of the hypomineralisation.

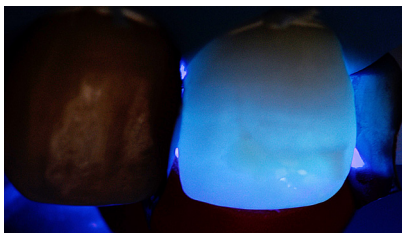


Fig. 17: Polarized transillumination picture to analyse the extent of the lesion in the enamel.



Fig. 18: Application of the infiltrant to start the infiltration procedure.

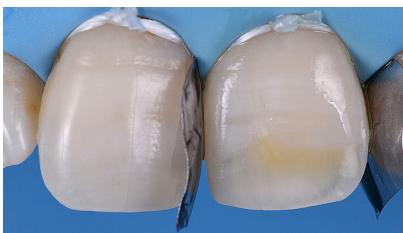


Fig. 19: Situation after 15 minutes of infiltration.

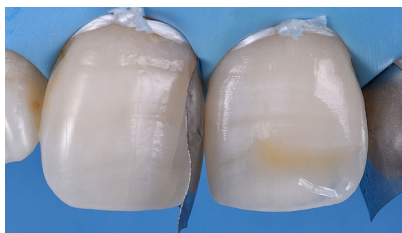


Fig. 20: After 20 minutes in total, complete infiltration of the lesion was achieved.

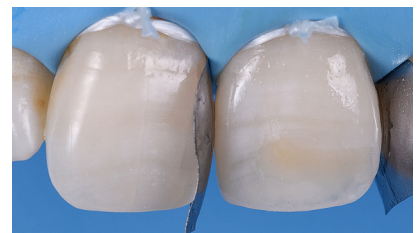


Fig. 21: The yellowish tint is gone after light curing, due to the fact that the photoinitiator is consumed.



Fig. 22: Bonding agent is applied.



Fig. 23: Final enamel composite layer was finished with a fine brush.



Fig. 24: Final polish with a diamond coated silicone spiral.



Fig. 25: Immediately after treatment under rubber dam.

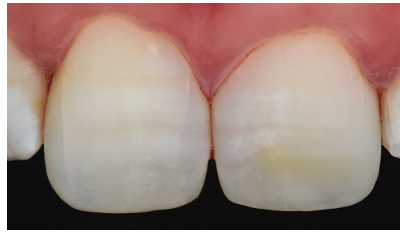


Fig. 26: Cross-polarized analysis which shows us still a little yellow discoloration on the 21.



Fig. 27: Final result after infiltration, the defect is practically invisible.



Fig. 28: Oblique view of the final result; the surface is completely restored.

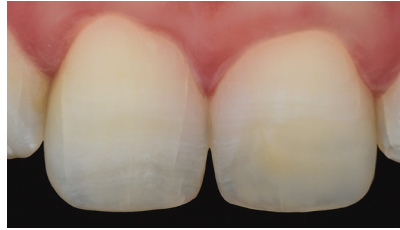


Fig. 29: Cross-polarized picture with normal exposure to analyse the final colours.

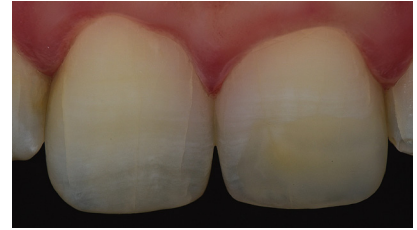


Fig. 30: An under exposed cross-polarized picture is the best way to evaluate the final result; we can still see a small amount of yellow discoloration present.



Fig. 31: Final result.



Fig. 32: Katherina was very pleased with her new smile!

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