

Minimally Invasive elimination of white spots

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Treatment

- Resin infiltration (DMG Icon) upper laterals
- Combined resin infiltration and direct composite upper centrals

Initial consultation

A 27-year-old female presented requesting an improvement to her smile with reference to the white discolouration to her upper front teeth (*Figures 1, 2*)

Medical history:

- Unremarkable
- Extra-oral: NAD, TMJ non clicking, no pain on loading or palpation.
- Intra-oral:
 - Good general dental health
 - Moderate fluorosis affecting the upper incisors
 - The fluorosis was markedly worse on the upper centrals where there was a marked white opacity
 - Molar-incisal hypoplasia was ruled out due to absence of

lesions on the first permanent molars.¹

Treatment options discussed

Enamel is the most highly mineralised tissue in the body, 96% hydroxyapatite and 4% organic fluids. In white lesions, part of the mineral phase is replaced by organic fluids however, the surface layer is constantly being re-mineralised by the saliva. This means that, histologically, white spots are characterised by hypo-mineralised subsurface enamel with a relatively intact surface layer. As the structure of the white lesions is less mineralised and less organised than healthy enamel, this causes a change in the lesions' optical properties (refractive index). Light entering the lesion is reflected back to the eye much brighter than



Figure 1



Figure 2

Figure 3



light entering healthy enamel giving the lesions its bright white appearance. Historically, treating white lesions in a minimally invasive way has been particularly difficult, with some practitioners advocating the extended use of MI paste, with varying success rates.

Often, if the lesions were to be covered completely, patients underwent aggressive restorative treatment plans. Recent advancements in dental technology now allows the masking of the white spots by modifying the optical properties of the white lesion through resin infiltration.

Resin infiltration is a technique where the overlying mineralised layer is removed with hydrochloric acid, allowing a low viscosity resin with a similar refractive index to natural enamel,² to be infiltrated into the more porous and hypomineralised white lesion. As the resin has a refractive index close to that of healthy enamel, once infiltrated, it allows the lesions to mimic the translucent properties of healthy enamel more

effectively, restoring natural translucence.

It was discussed with the patient that it would be best to first approach her teeth with a minimally invasive treatment plan using a combination of home tooth whitening and, if necessary, resin infiltration. If she was not satisfied with the results then other treatment could be explored; such as resin or ceramic veneers.

The patient was advised that, before resin infiltration, she should carry out a course of home tooth whitening. This would reduce the contrast between the white lesions and her natural tooth colour. In some cases, this is enough to achieve the aesthetic demands of the patient without resorting to further treatment with resin infiltration, as the reduction in contrast between the white lesions and natural tooth colour can make the white lesions less noticeable. The patient was satisfied with her current tooth colour, so it was decided to go ahead with the resin infiltration treatment without home

tooth whitening. It was explained to the patient that resin infiltration would still be possible, however the results with resin infiltration alone would not be as predictable due to the relatively dark shade of her natural teeth. It was discussed that if she wished for the best possible resolution, it may be necessary during treatment, to remove a thin layer of superficial enamel with a bur in order for the resin to be able to reach the full depth of the white lesion. This would result in a shallow labial defect following infiltration, which would need to be restored with a thin layer of composite resin. The patient was happy with this proposed approach.

Protocol

As Icon treatment requires working with a strong acid, it is important to isolate the soft tissue from the area you will be working on. Isolation was achieved from upper first molar to upper first molar with a heavy gauge non latex dental dam (Unodent) with wedgits distal to the canines as this negates the need for local anaesthetic (*Figure 3*).

Figure 4

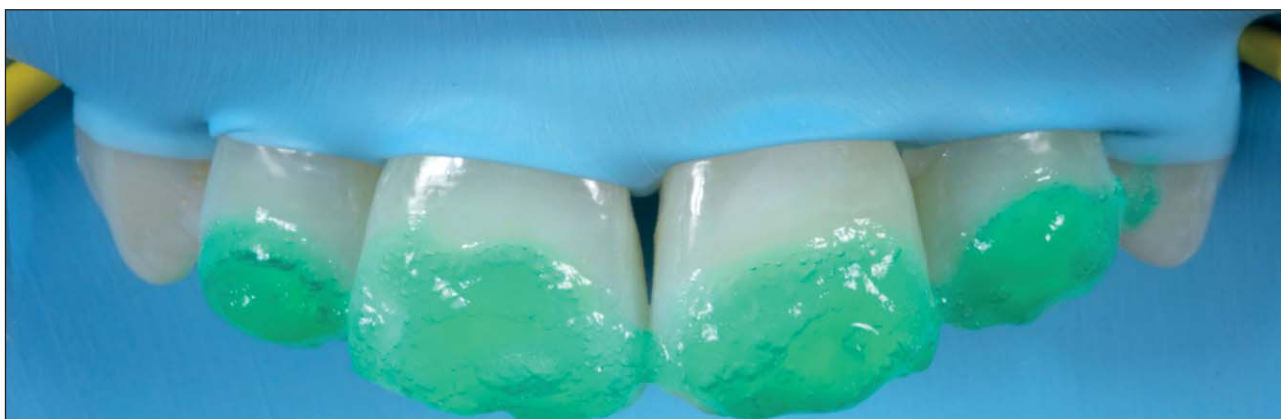


Figure 5



The areas to be treated were coated with Icon-Etch which is a 15% Hydrochloric Acid Gel, for two minutes before being washed off to leave the typical post acid etch frosted appearance (*Figures 4,5*). Following rinsing and drying, the lesions were then 'previewed' using the Icon-Dry ethanol solution provided (*Figure 6*). Icon-Dry has a

Refractive Index significantly nearer to that of healthy enamel than air. Because of this, after it has been applied and allowed to penetrate the lesion for 30-40 seconds and, whilst it is still wet, it enables you to preview the effect of resin infiltration on the white spot lesion. This preview allows the operator to see if the lesion has been sufficiently penetrated to thoroughly mask the

white lesions. If the lesion is still visible during the application of the Icon dry, further etch cycles are needed, if the lesion disappears it is safe to proceed to infiltration.

Initially, the process of etch, rinse and application of icon dry was carried out three times with no resolution of the white lesions on the centrals (*Figure 6*). This was



Figure 6

Figure 7



discussed with the patient and permission was granted to remove a thin layer of superficial enamel in order to access the white lesion to depth. A red band rugby ball bur was used to remove approx. 0.2-0.3mm of superficial enamel (Figure 7). The process of etch, rinse, and application of Icon-Dry was repeated two more times (Figure 8) until the majority of the white lesions were no longer visible following preview

with the Icon-Dry ethanol solution (Figure 9).

Once satisfied with the preview stage, the teeth are dried to a frosty post-etch appearance with a further application of the Icon-Dry ethanol solution being allowed to evaporate over 60s (Figure 10). The operating light was then switched off to prevent premature curing of the Icon resin and the hydrophobic Icon resin was

then applied to the teeth. The resin was then left to infiltrate for three minutes and excess resin was then removed from the labial surface using a cotton wool roll. Pre cure, contacts were then flossed to prevent the teeth being bonded together. Each lesion was then light-cured for 40s. This resin application process was then repeated one more time. Immediately post cure, the Icon treatment leaves the teeth slightly

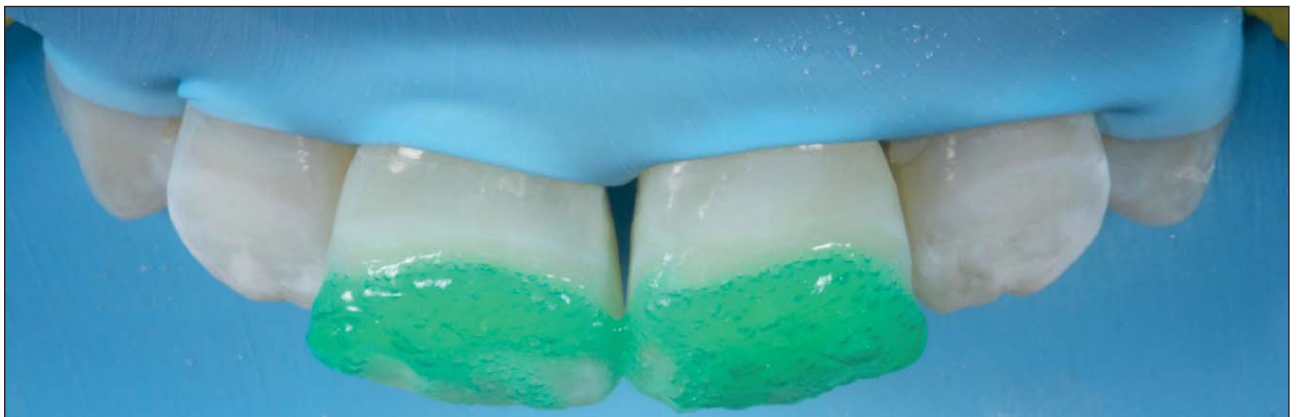


Figure 8



Figure 9

Figure 10



Figure 11



rough due to excess resin being present on the surface of the teeth (Figure 11). The defect caused by the removal of superficial enamel is also still present. According to the literature it is possible to bond to freshly cured icon resin without further conditioning as it exhibits its own oxygen inhibition layer.³ In the author's experience, there is sometimes a problem with delamination around the margins of

any composite resin added, which causes a problem during polishing and finishing. The literature suggests that the bond can be further strengthened though the addition of a bonding resin prior to composite addition.

A thin layer of FL bottle 2 (Kerr) was painted over the defects and cured before the addition of a thin layer of achromatic composite (3MESPE,

Filtek Supreme XTE White enamel) which was cured for 40s before being cured again for a further 40s under a glycerine barrier. This final cure under the glycerine barrier serves to remove the sticky oxygen inhibition layer that can clog finishing and polishing instruments making them less effective⁴ (Figures 12,13). The teeth were polished with the Astropol (Ivoclar Vivadent) system until the surface of the composite



Figure 12

Figure 13



Figure 14



resin was smooth and any excess Icon resin had been removed. This excess resin requires removal to prevent staining.

Results

The patient was reviewed one month later and final review photos were

taken (Figures 14,15). The patient was thrilled with the huge improvement that the treatment had made to her smile. This was particularly significant as she had previously been told that nothing could be done and had reluctantly accepted that she may need veneers at some stage. She was so happy that she was able to get the result

she wanted in such a conservative and biologically respectful way.

References

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Figure 15