Infiltration with a resin material

A micro-invasive approach to the treatment of white fluorosis spots

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Owing to the increasing demand for cosmetic treatment in dentistry, it has become essential to provide patients with the best possible therapies. Fluorosis-related colour changes on the anterior teeth are a reason that many patients visit their dentist for aesthetic treatment. In the worst-case scenario, these fluorosis spots may result in severe psychological complications for patients. For the treatment of lesions that appear as white spots, the infiltration method is recommended. This very mild approach was originally developed to treat early carious lesions. As a side-effect, it has been found to transform the tooth’s optical properties, making it suitable for masking white spots. The original principle is based on the use of an infiltrating substance, which penetrates the carious lesion after it has been conditioned with an acid and dried.1-3

White fluorosis spots form owing to fluorosis-related hypomineralisation that produces a refractive index that differs from that of healthy tooth enamel. As the lesions do not absorb any wavelength of light, they appear to be white. Infiltration is based on a porous lesion with a highly fluid resin material with a refractive index comparable to healthy enamel, however, it is possible to restore the enamel’s translucency.4 The following case report demonstrates how this treatment can be carried out with maximum protection of tissue.5-7

A young female patient presented at our practice with the request for anterior tooth veneers to mask her fluorosis spots (Fig. 1). It was learned that her fluoride consumption had exceeded the prophylactic dose for many years, as no other prior exposure to fluoride was determined. While the patient’s fluorosis was confirmed and classified as Class II, the clinical examination showed no carious lesions. According to Hattab’s classification,8 a Class II fluorosis is characterised by symmetrical opaque discoloration.

External whitening was performed by means of a vacuum-formed splint, which was worn overnight, and a 10 % carbamide peroxide gel. The treatment took 21 days, during which the results were examined once a week. By increasing the overall brightness of the teeth, whitening masks the smaller white flaws in the enamel. Although the visual results after whitening may be satisfactory, they are often insufficient. In this case, the opaque fluorosis spots were not sufficiently masked by brightening the rest of the teeth (Fig. 2). For this reason, it was decided to perform infiltration one month after the end of the whitening treatment. In order to remove the biofilm and saliva proteins, an initial prophylactic cleaning was carried out using a brush and prophylactic paste (Fig. 3). A dry operating area was established with the help of a rubber dam. This way, moisture can be avoided. Furthermore, the soft tissue is protected from hydrochloric acid.

The next step was to gain access to the hypo-mineralised fluorosis lesions9 through the removal of heavily mineralised apismatic enamel on the surface. This was achieved by etching the surface with a 15 % hydrogen chloride gel (Icon-Etch, DMG) for 120 seconds using an applicator tip (Fig. 4). In order to prevent uneven etching results caused by bubbles forming in the gel, the surface was mechanically activated with a micro-brush. The gel was then suctioned off. The surface was then rinsed with a water spray for 30 seconds and blow-dried with oil-free and water-free air.

After the etching had been completed, it was important to remove the water in the microporous parts of the fluorosis lesions before starting the infiltration with the resin material. The lesions therefore were dried thoroughly using a 35 % ethanol solution (Icon-Dry, DMG), which was applied to the surface of the lesion with a blunt cannula for 30 seconds. At this stage, it was possible to monitor whether the white spots had disappeared or been significantly reduced and to draw conclusions about the potential outcome of the treatment (Fig. 5). If the brightness of the lesion had not regressed sufficiently, this indicates that the lesions’ micropores, covered with a highly-hydropobic layer, are not yet completely accessible. Should this be the case, the etching process should be repeated over a period of 120 seconds (Fig. 6).

Etching a third time should be considered if the white lesions are still recognizable after the second application of Icon-Dry, followed by the final drying process with oil-free and water-free air to allow the ethanol to evaporate. After drying, the lesions will appear more pronounced (white-opaque, bright), which can be explained by the refractive index of air.

After rinsing, drying and repolishing of the ethanol solution, the lesions appeared less bright this time to the extent that they seemed to have almost disappeared (Fig. 7). At this stage, the infiltration was carried out, after the interdental matrices had been fitted. The resin material (Icon-Infiltrant, DMG) was applied with the applicator tip supplied (Fig. 8). Owing to capillary forces, the highly liquid hydrophobic resin penetrates the porous parts of the lesions. This process usually takes about three minutes. Since the resin is light curable, this step has to be carried out away from light.

The solvents were removed with air spray. Excess material on the vestibular surface was removed with dental floss. The material was then polymerised for 40 seconds. Repeating the infiltration helped to reduce the porosity of the surface. At the end of the session, the rubber dam was removed and the surface was polished.

As a result, an immediate improvement in the aesthetic appearance of the patient was achieved (Fig. 10), which has led to significant changes in her personal and social life. Checks were carried out every six months to evaluate the ageing of the resin material over time.8

Editorial note: A complete list of references is available from the publisher.