Minimally Invasive Management of MIH-Related Opacities Using 5% Carbamide Peroxide and Resin Infiltration

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Molar-incisor hypomineralisation (MIH) is a qualitative developmental defect of enamel that affects one to four permanent first molars and frequently the permanent incisors. Its prevalence is increasing worldwide, making MIH a common finding in daily clinical practice. Many adolescents seek treatment due to the whitish, yellowish or brownish enamel opacities that are often accompanied by surface breakdown, pits and cracks, rendering the affected teeth highly susceptible to caries. Beyond the clinical implications, MIH-affected teeth can significantly impact self-esteem and may even contribute to experiences of bullying[1]. Management of MIH is therefore essential not only to improve aesthetics and oral health–related quality of life but also – more importantly – to reinforce the compromised enamel structure and enhance fracture resistance[2]. As part of a minimally invasive treatment philosophy, an individualised treatment plan is required for each patient.

Fig. 1–3: MIH-affected teeth, before treatment

Dental bleaching is among the least invasive options to reduce chromatic disparities and lighten the organic, protein-rich components of MIH lesions[2]. Despite its benefits, bleaching often leaves residual white opacities due to the intrinsic mismatch in refractive indices between sound and hypomineralised enamel. Current evidence indicates that resin infiltration is a highly effective micro-invasive modality for reducing these residual white-spot lesions.

This case report describes an alternative, minimally invasive approach for adolescents with MIH, combining 5% carbamide peroxide (CP) bleaching (Flairesse Bleaching Gel, DMG) with vestibular resin infiltration (Icon, DMG).

A 13-year-old patient presented with aesthetic concerns related to MIH-affected teeth, particularly teeth 31 and 32. Figures 1–3 illustrate the initial clinical situation with brownish-whitish opacities accompanied by pits and cracks.

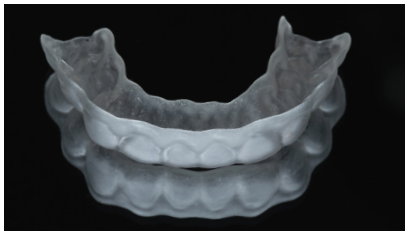

Fig. 4: Bleaching tray

Both arches were scanned using an intraoral scanner and a customised bleaching tray for the lower arch was fabricated using the DentaMile (DMG) workflow (Fig. 4).

The patient applied 5% CP gel (Flairesse Bleaching Gel, DMG) for 3 hours daily over a 4-week period, targeting teeth 31 and 32 to selectively reduce the organic content within the lesions. Half of a bleaching syringe was sufficient to achieve the desired effect. Tooth colour was assessed with a spectrophotometer in single-tooth mode, recording CIELAB values (L, a, b)[3].

The baseline measurements prior to bleaching are presented below:

- Tooth 31–C4.L = 63.8; a = 6.9; b = 34.2.
- Tooth 32–C4.L = 63.6; a = 6.2; b = 39.4.

Following the bleaching phase, tooth colour changes were quantified as shown below:

- Tooth 31–A3.L = 75.1; a = 5.7; b = 31.7.
- Tooth 32–A3.L = 78.4; a = 2.8; b = 28.5.

Colour changes (ΔE*) were calculated using the following formula:

$\Delta E^*ab = \sqrt{[(\Delta L^*)^2 + (\Delta a^*)^2 + (\Delta b^*)^2]}$

- Tooth 31: AE = 11.6 (Much: remarkably apparent alteration)
- Tooth 32: AE = 18.69 (Very much: alteration to another colour)

Colour differences (ΔE) of the bleached teeth were evaluated using the National Bureau of Standards (NBS) assessment criteria (Table 1)[4].

Table 1.
National Bureau of Standards (NBS) criteria for the assessment of colour differences ΔE.

ΔE	NBS Criteria
0.0–0.5	Trace: remarkably slight alteration
0.5–1.5	Slight: slight alteration
1.5–3.0	Noticeable: observable alteration
3.0–6.0	Appreciable: apparent alteration
6.0–12.0	Much: remarkably apparent alteration
12.0 and more	Very much: alteration to another colour

After the desired bleaching outcome was achieved, the bleaching procedure was discontinued, and a 4-week interval was observed prior to resin infiltration to allow for colour stabilisation and enamel rehydration. Transillumination assessment demonstrated a significant alteration in the hypomineralised areas (Fig. 5, 6). Pre-treatment transillumination was used to evaluate lesion depth and its subsequent use facilitated monitoring and optimisation of masking effectiveness[5].

Before infiltration treatment, teeth were isolated with a heavy rubber dam to ensure soft-tissue protection (Fig. 7). Mixed-type lesions were exposed using 29 µm aluminium oxide sandblasting (Fig. 8) and deeper areas were refined with a fine diamond bur (Figure 9) to ensure complete access to the lesion[6]. Fifteen percent HCl acid (Icon Etch, DMG) was applied in four consecutive 120-second cycles (Fig. 10), each followed by a 30-second water rinse (Fig. 11). After every etching cycle, as well as after the final one, ethanol with MDP monomer (Icon Prime, DMG) was applied (Fig. 12) to enhance adhesion, desiccate the lesion and preview the final aesthetic outcome under transillumination (Fig. 13, 14).

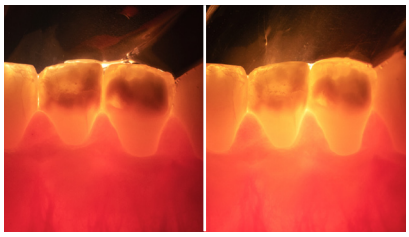

Fig. 5–6: Evaluation of the results with transillumination before (left) and after

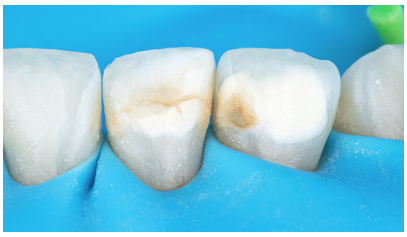

Fig. 7: Isolation with heavy rubber dam

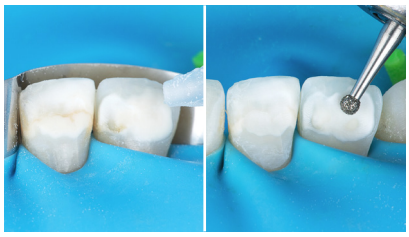

Fig. 8–9: Removal of outer enamel layer with sandblasting and diamond bur

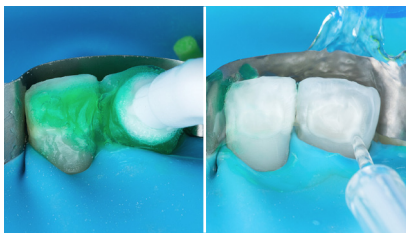

Fig. 10–11: Icon Etch and rinsing

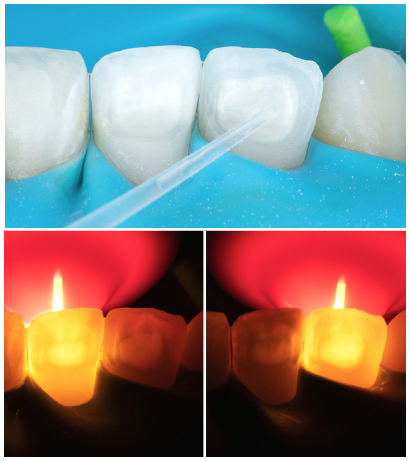

Fig. 12–14: Icon Prime and evaluation with transillumination

Once a favourable visual effect was achieved, the lesions were ready for infiltration. The teeth were separated with clear matrix bands, and the first infiltration time was extended to 30 minutes to ensure deep resin penetration[6], which not only improves aesthetics but can reduce enamel opacity (Fig. 15). To prevent the resin from curing prematurely, the chair light was switched off during the infiltration phase. The excess of infiltrant was removed and the material was then light-cured (Fig. 16). A second infiltration cycle was performed for one minute.

The missing enamel surface was subsequently restored with composite bonding. This included sandblasting for optimal bonding, etching (Fig. 17), application of a two-step adhesive system to improve adhesion (Fig. 18)[7] and composite placement (Fig. 19). Meticulous finishing and polishing were then performed, yielding the immediate postoperative result (Fig. 20, 21). This step is crucial for achieving aesthetic outcomes[8], smoothing enamel surfaces to minimise bacterial adhesion [9] and ensuring long-term clinical success.

Final outcomes were assessed two weeks later using visual examination (Fig. 22, 23) and transillumination (Fig. 24, 25), confirming a stable and satisfactory aesthetic improvement.

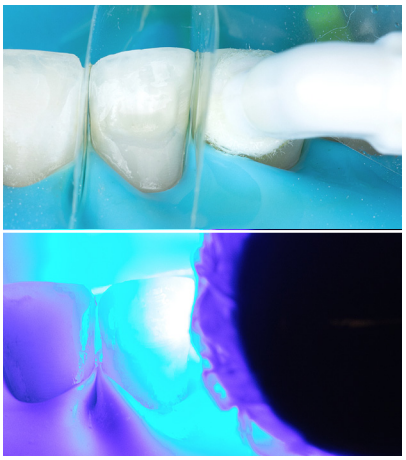

Fig. 15–16: Icon Infiltrant and lightcuring

Fig. 17–19: Etching, adhesion system, composite bonding

Fig. 20–21: Immediate postoperative results

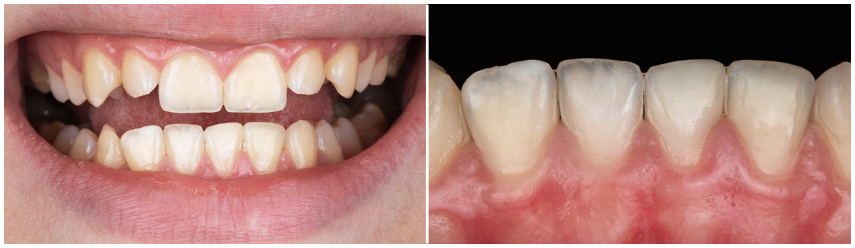

Fig. 22–23: Final results two weeks after treatment

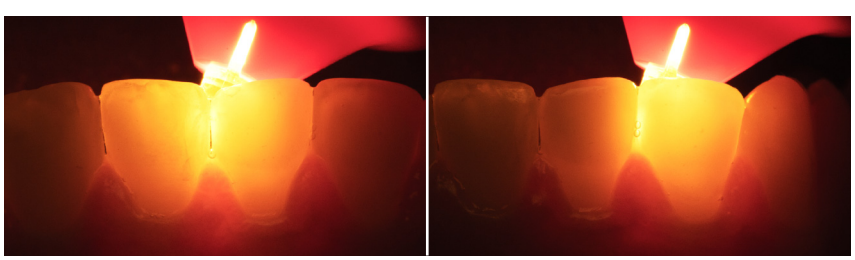

Fig. 24–25: Transillumination two weeks after treatment

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