



# The Use of a Preformed Composite Resin Crown to Treat Molar Incisor Hypomineralization: A Clinical Report

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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**Case Report**

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## **ABSTRACT**

Teeth with molar incisor hypomineralization (MIH) present with substantial dental tissue loss, requiring restorations with materials able to provide satisfactory clinical performance. This paper presents a clinical report of an 11 years of age patient diagnosed with MIH. Repeated previous treatment with composite resin and glass ionomer was reported. A low-shrinkage composite resin was used as a core build-up material. The tooth was prepared for a complete crown. A preformed-malleable composite-resin-based material (Protemp™ Crown Temporization Material; 3MESPE, St. Paul, MN, USA) was used to fabricate the restoration that was cemented definitively with a self-adhesive resin cement (RelyX® Unicem 2, 3MESPE, Seefeld, Germany). The patient was followed for up-to 18 months with excellent gingival health. There was no noticeable wear or significant discoloration of the restoration. Preformed-malleable composite-resin-based material may be a viable treatment approach to restoring teeth with MIH.

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## 1. INTRODUCTION

Molar incisor hypomineralization (MIH) has been reported as systemic and may affect one or all of the first permanent molars as well as permanent incisors [1,2]. Its etiology remains unclear and has been linked to numerous factors that may occur during the pre-, peri-, and post-natal periods [3], caused by dysfunction of amelogenesis [4].

Prevalence of MIH in Europe is between 2.4% and 25% [5-7]; in Kenya, 13.7% [8]; and in Brazil, from 19.8% to 40% [9,10].

To diagnose the severity of MIH, the size of the defects on affected teeth must be considered [2,3]. When a severe defect is found in a molar, the contralateral molar is likely affected too [5]. Enamel defects on molars and incisors may exhibit opacity with different colors, a tendency to fracture, atypical cavities, or coronal deformation [1,11].

Children diagnosed with MIH have an extensive history of dental treatment and often exhibit fear and anxiety [12]. Anesthesia is an important factor in reducing the discomfort of these patients. Since tooth hypersensitivity is usually elevated in cases of MIH, patients are predisposed to poor hygiene, plaque formation [12], and the rapid appearance of carious lesions [13].

The main factors in determining a treatment plan are the severity of enamel defects and the time of intervention [3]. A preventive approach incorporates fissure sealants and materials that promote enamel remineralization and reduce hypersensitivity [14-17].

The physical and mechanical properties of dental tissues are unfavorable for adhesion [3,18], thereby restricting the longevity of restorations [19,20]. Treatment may be performed with restorative materials such as silver amalgam, glass ionomer cements, composite resins, compomers, and preformed metal and ceramic crowns [3]. Research has demonstrated that composite resins are the materials of choice yielding a survival rate of 5 years [16,19].

The purpose of this clinical report is to present the restoration of a maxillary first molar with a preformed malleable composite resin crown.

## 2. CASE REPORT

An 11-year-old patient, who had been treated repeatedly for MIH with composite resin and glass ionomer, was left with a lack of anatomic form and wear of the restoration (Fig. 1a). The mandibular second right molar had extruded, minimizing the interocclusal space (Fig. 1b). After initial consultation and parental consent, treatment commenced. The tooth was anesthetized and isolated under a rubber dam (Fig. 1c). Restorations and infected tissue were removed. An extensive restoration was required to reconstruct the missing tooth structure. A selective enamel etch was performed with 37% phosphoric acid for 30 seconds. A low-shrinkage composite resin with a specific self-etch bonding system was chosen for use. A primer was brushed into the dentin for 15 seconds, air-thinned with a water-free air syringe, and light-polymerized for 10 seconds with a LED light polymerization unit. A bonding agent was applied to both dentin and enamel and then light-polymerized for 10 seconds. Composite resin was applied to the cavity in increments of up to 2 mm, according to the manufacturer's recommendations. Each composite increment was light-polymerized for 20 seconds. After complete filling of the cavity, a crown preparation was performed with the rubber dam in place for patient comfort and easiness of procedure (Fig 1d).

Once the rubber dam was removed, occlusal reduction of the preparation was necessary to provide interocclusal clearance for the restoration. A preformed malleable composite-based crown was used to fabricate the final restoration. Protemp crown is an uncured composite resin material essentially in a molded gel state, therefore the size of the preformed crown was chosen by measuring the mesio-distal length of the prepared tooth. The semi-rigid crown form was rolled in gloved fingers to warm and relax the material somewhat straighten the axial walls. Excess material was trimmed with crown scissors to establish the desired length, and the crown was tried on the moist tooth preparation. The patient was asked to occlude and impress the occlusal surface. During closure the buccal surface was adapted with light finger-pressure. (Fig. 2).

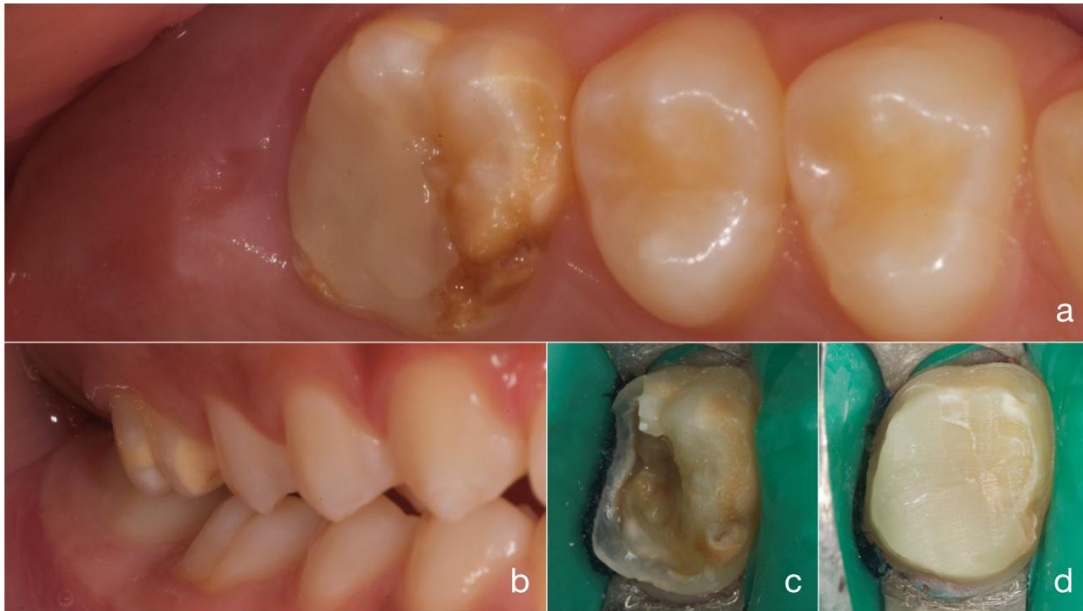
Light was applied to the buccal surface for 2 seconds to partially polymerize and resist

distortion upon removal of the crown. By holding the buccal surface to avoid dislodging the crown, the palatal surface was adapted next and polymerized for 2 seconds. Finally, the occlusal surface was polymerized for 2 seconds.

The restoration was carefully removed, light-polymerized outside of the mouth for 60 seconds, then finished and polished with a rag wheel on a

dental lathe in the laboratory. The occlusion was checked with articulating film and shim stock and adjusted with a cross-cut bur in a slow-speed handpiece.

The intaglio of the restoration was cleaned with a cotton roll soaked in isopropyl alcohol and the surface of the tooth was disinfected with sodium hypochlorite for 30 seconds, washed and dried.



**Fig. 1. a: Defective composite resin restoration on maxillary right first molar; b: Lack of interocclusal space because of supraeruption of opposing tooth; c: Isolation of maxillary right first molar; d: Crown preparation under isolation**

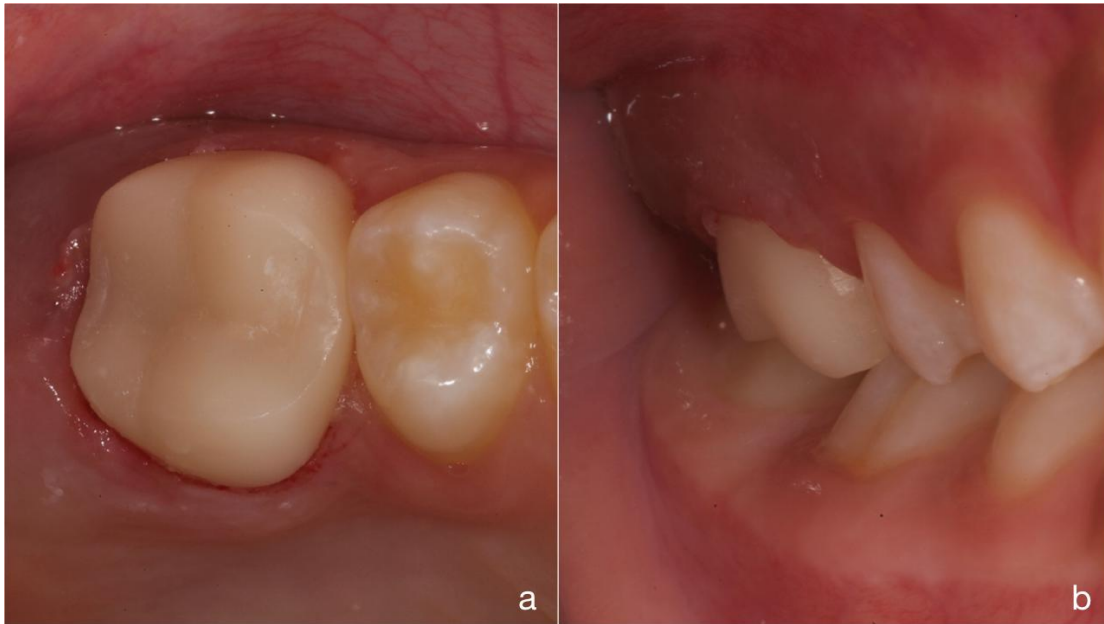


**Fig. 2. Initial seating of resin crown and occlusal impression after gentle closure**

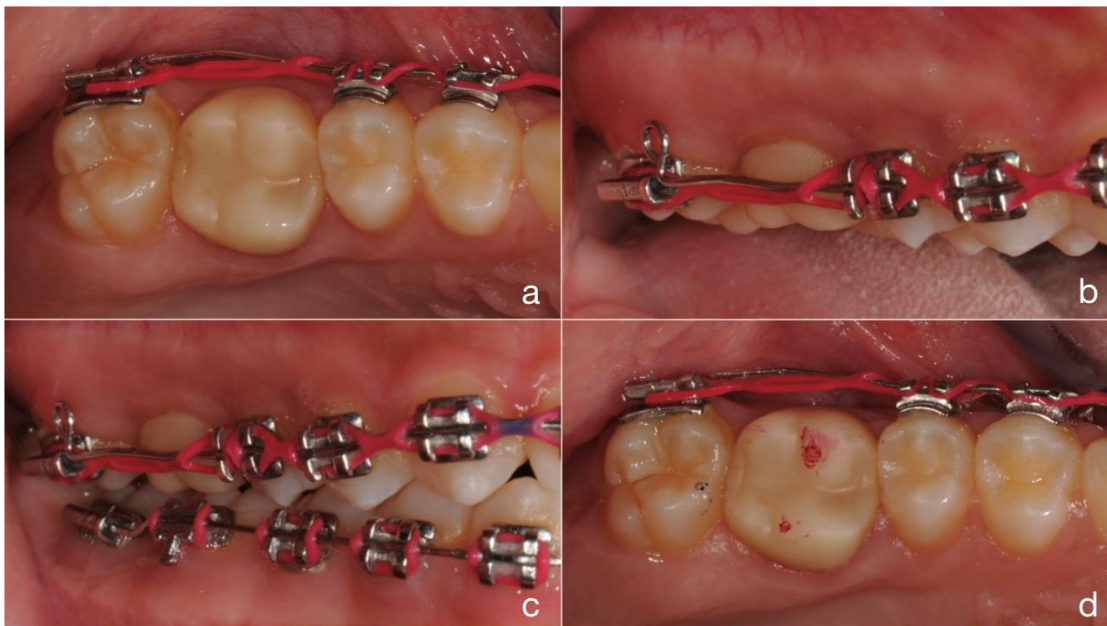
The restoration was luted with a dual-cure self-adhesive resin cement. Excess cement at the margins was light-polymerized for 5 seconds at each surface and then removed. Final curing was achieved by light treatment to the buccal, occlusal and palatal surfaces for 20 seconds.

Patient follow-up included several post-operative visits (Fig. 3).

No noticeable wear of the restoration was visible after 60 months. Marginal adaptation remained intact (Fig. 4).



**Fig. 3. a: Final restoration cemented with self-adhesive resin cement; b: Buccal view at one-week recall**



**Fig. 4. Restoration after 60-month recall. a, occlusal view; b, facial view; c, facial view in occlusion and d, occlusal marking with articulating film**

### 3. DISCUSSION

Stainless steel crowns are the treatment of choice when permanent first molars display moderate or severe defects. However, aesthetics are compromised. Composite resin crowns demonstrate comparable success in restorations of hypomineralized permanent first molars, surviving approximately 4 years [19,20]. Adhesion to the crown preparation and to the crown is a major factor in this success because the enamel defects are sealed and crown retention is enhanced [18].

The advantages of using this treatment include minimal costs compared to conventional laboratory-produced crowns, acceptable aesthetics, conservative intervention, and a relatively long-lasting restoration. The disadvantages include technique sensitivity, patient compliance, and the use of a semi-permanent composite resin crown form.

### 4. CONCLUSION

With the limitations of this case report it can be concluded that a preformed malleable composite resin-based crown may be used as an alternative to restore teeth with hypomineralization. Further clinical trials should be conducted to further evaluate these findings.

### 5. CLINICAL RELEVANCE

The treatment of molar incisor hypomineralization (or MIH) with a resin-based crown offers a viable option for the dental clinician. Function and aesthetics may be restored with the use of this conservative and low-cost approach.

1. An aesthetic long-term treatment approach is proposed in this paper. Esthetics play an important role on treatment plan and the gold standard stainless steel crowns may not be easily accepted.
2. In pediatric dentistry, when possible, a simple technique should be considered. The fabrication of a preformed-malleable composite-resin-based crown returns function and protects the remnant tooth structure, without previous laboratory procedure.
3. Dealing with a moderate-to-severe affected tooth, restoration of function while protecting the remnant dental tissue, may contribute to a better quality of life.

### CONSENT

As per international standard, parental written consent has been collected and preserved by the author(s).

### ETHICAL APPROVAL

As per university standard guideline, ethical approval have been collected and preserved by the authors.

### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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