CASE REPORT

Posteruptive Intracoronal Resorption in a 9-year-old with Molar Incisor Hypomineralization: A Case Report

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Abstract

Objectives: The case report highlights the management of late-stage sequelae of preeruptive intracoronal resorption (PEIR) with molar incisor hypomineralization (MIH).

Materials and methods: A 9-year-old patient presented with occlusal cavitations in her upper and lower permanent molars with vascularized tissue seen within the dentin, without any connections with the dental pulp, and no evidence of carious activity within the lesion. The affected teeth were debrided, and Biodentine™ was placed to preserve the vital pulp. The permanent molars were restored with Hall crowns, and the case was followed up for 2 years.

Results: The patient remained asymptomatic throughout the follow-up period. The resulting increase in the bite following the placement of the Hall crown settled within 2 months. Pulp vitality was preserved, and no further resorptive activity was seen in the dentition.

Conclusion: Preeruptive intracoronal resorption may go unnoticed and may later present with late-stage manifestations. Patients with PEIR and MIH may end up with an exposed resorptive lesion due to posteruptive breakdown, which may be managed conservatively using Biodentine™.

Clinical significance: Resorptive lesions can be conservatively managed without compromising pulpal health. Their early detection and differentiation from dental caries can prove pivotal in the preservation of the affected teeth.

Keywords: Biodentine™, Case report, Intracoronal resorption, Molar incisor hypomineralization, Pulp capping.

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Introduction

Intracoronal resorption is characterized by the presence of a radiolucency in the coronal portion of the tooth, characterized by dentinal involvement and an intact enamel. If present in developing permanent dentition before eruption, it is termed as preeruptive intracoronal resorption (PEIR). Other terms such as hidden caries, fluoride bomb,[1] or sometimes preeruptive caries[2] have also been used to describe this condition. Most often, mandibular first permanent molars are affected.[2] Diagnosis of these lesions can be incidental, often detected on routine radiographs or when the patient presents with complaints of sensitivity or pain in the affected teeth.

Difficulty in diagnoses generally arises when teeth affected with PEIR have already erupted, with or without signs of caries-induced cavitation or enamel breakdown. It may prove difficult to attribute such a lesion to PEIR, especially in cases where previous radiographs cannot be obtained.[2] In such cases if the clinician suspects intracoronal resorption, it may be referred to as posteruptive intracoronal resorption, a late manifestation of the PEIR.

Molar incisor hypomineralization (MIH) is thought to be multifactorial in origin in which medical, environmental, or systemic factors are implicate.[3] Clinically, these lesions appear as well-demarcated whitish-yellow or yellowish-brown lesions on the enamel. Posteruptive breakdown of affected molar teeth has been more commonly seen as compared to the involved incisors.[4–6] The treatment for such cases varies from prevention, restoration, and even extraction if the case is quite severe.[7]

Biodentine™ is a calcium silicate-based material that has been used as a direct and indirect pulp-capping agent in permanent teeth due to its biocompatible, bioactive and antibacterial nature.[8] It has varying applications in endodontics and minimally invasive dentistry.

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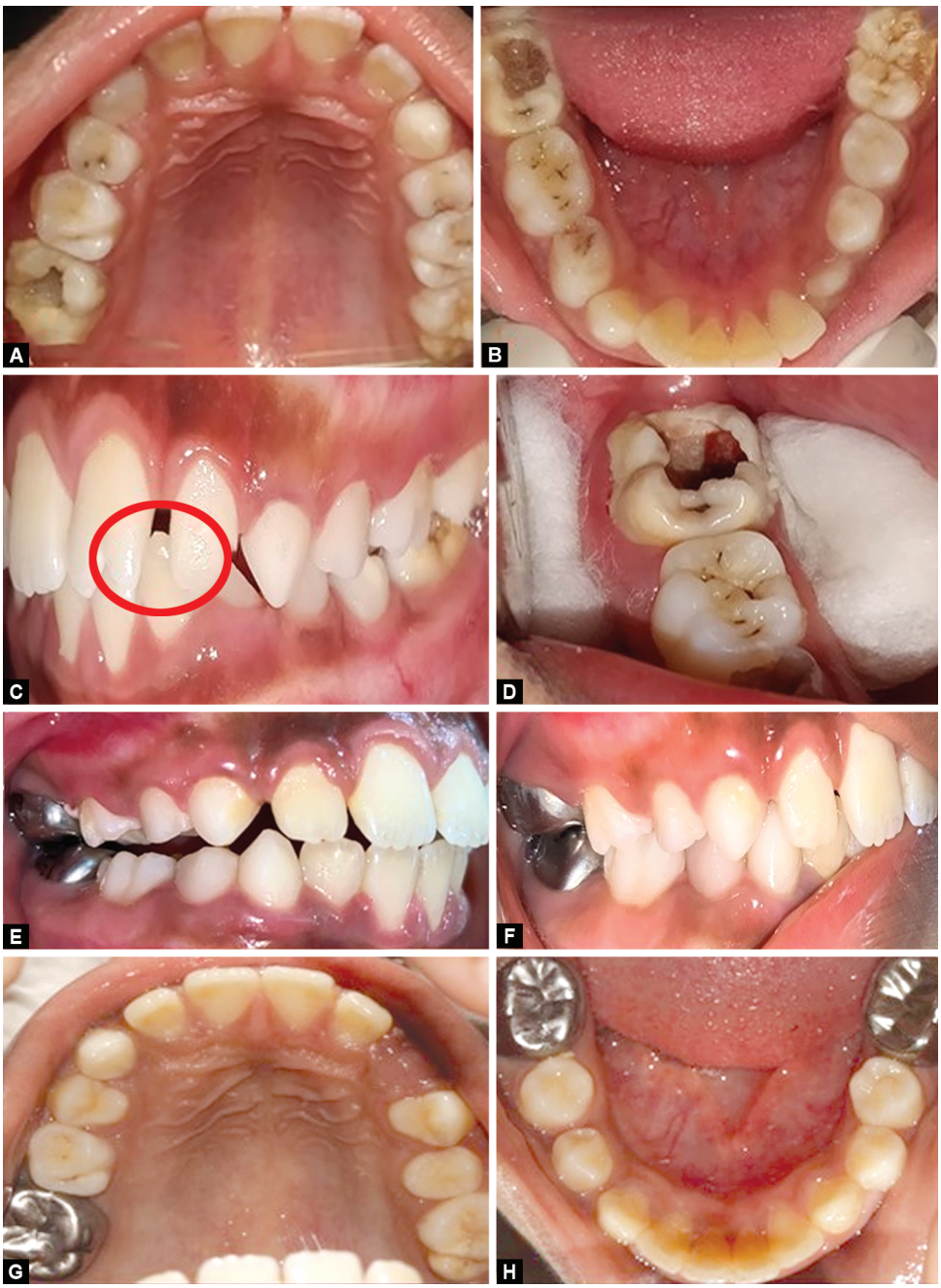
Hall technique is a minimally invasive technique that involves placement of a stainless steel crown over a molar without removing either carious or sound tooth structure.[9] While the technique has been carried out predominantly in primary dentition, its application

in hypomineralized molars having hypersensitivity is worth due consideration. The resultant open bite following crown placement without tooth preparation has been observed to settle over time in a primary or mixed dentition, making it a minimally invasive option in pediatric dentistry.[10]

Case Description

A 9-year-old patient was reported to the operatory with a complaint of holes in her upper and lower back teeth. Her medical, family, and psychosocial history was nonsignificant. She reported mild-to-moderate sensitivity in all her posterior teeth during brushing, eating, and drinking. She had no history of severe pain or nocturnal pain. She routinely used a fluoridated toothpaste and resided in an area with a fluoridated water supply.

An intraoral examination revealed localized brownish discoloration on the occlusal surface of all her permanent first molars. She had posteruptive breakdown on her permanent maxillary right first molar and permanent mandibular left and right first molars (Figs 1A and B), and hypomineralized enamel on her permanent mandibular left lateral incisor (Fig. 1C). The posteruptive breakdown over permanent maxillary right first molar and permanent mandibular right first molar had led to



Figs 1A to H: (A and B) Presence of MIH and intracoronal resorption in a 9-year-old—pre-op view of the maxilla and mandible; (C) Hypomineralized enamel on mandibular left permanent lateral incisor; (D) Access to the lesion established in permanent mandibular right first showing a thin band of vascular tissue; (E) Stainless steel crowns placed on permanent molars using Hall technique; (F) Settling of bite after 2 months; (G and H) 8-year clinical follow-up of maxillary arch and mandibular arch

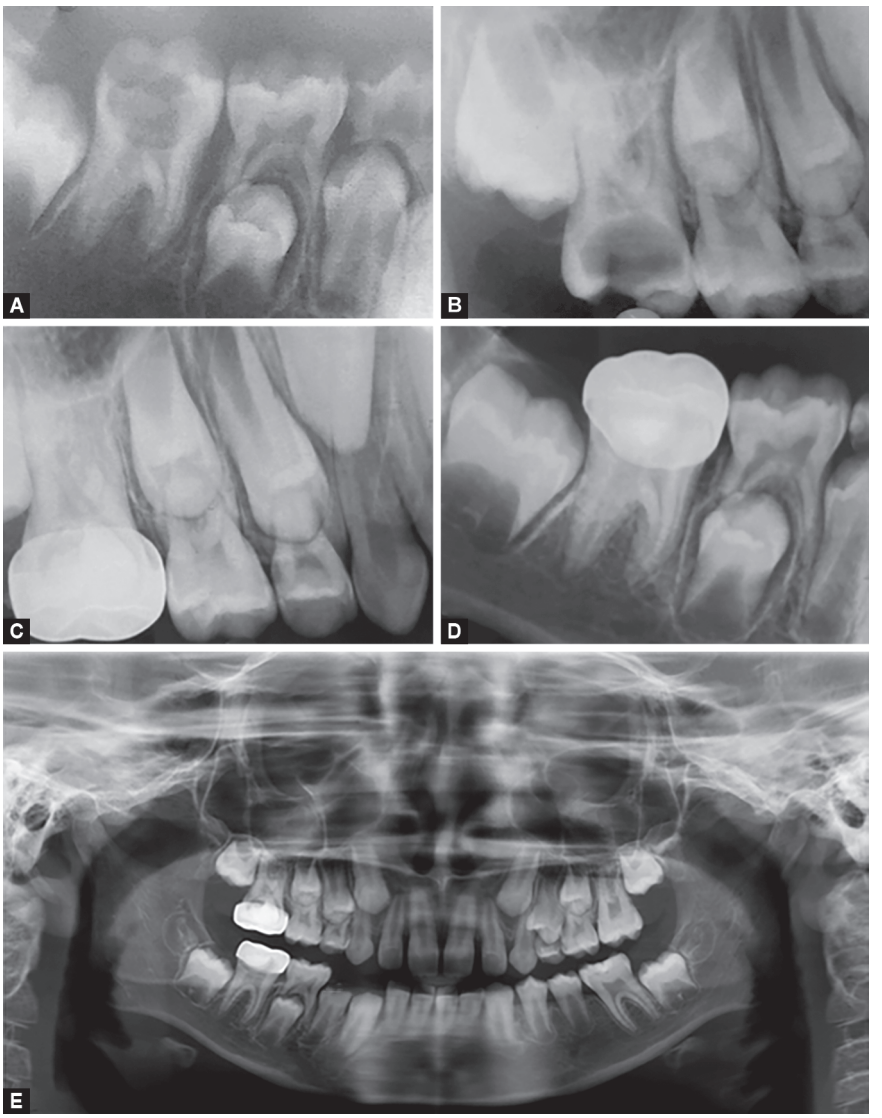
cavitation of the tooth structure, revealing an underlying dentinal destruction.

Upon exploring the lesion, the dentin was soft, grayish, and mushy, with a thin band of vascular tissue within the cavitation (Fig. 1D). There was no pulp involvement, and electrical and thermal testing revealed the tooth to be vital. Lesion exploration was done without a local anesthetic to gauge the patient's response to the excavation of the soft dentin. The patient demonstrated dentinal hypersensitivity. Periapical radiographs of both molars showed a coronal radiolucency involving the enamel and dentin, with no pulpal involvement or periapical changes (Figs 2A and B).

The following differential diagnoses were considered: deep dentinal caries, molar hypomineralization (MIH) with posteruptive breakdown, dentinal fluorosis, fluoride bomb, and PEIR. Since only the molars and a lateral incisor showed hypomineralized enamel, dental fluorosis was ruled out, and MIH was considered. As the affected molars had already undergone cavitation, PEIR and fluoride bomb were ruled out. No carious tissue was encountered upon lesion exploration, and dentinal caries was ruled out as well. The dentinal destruction was attributed to resorptive activity within the dentin that may have been initiated during crown development and ultimately exposed in the oral cavity following posteruptive enamel breakdown.

A final diagnosis of intracoronal resorption and MIH was determined, following the European Academy of Paediatric Dentistry (EAPD) criteria.[7] The intracoronal resorption was considered a late-stage manifestation of PEIR, that had cavitated due to hypomineralization-induced posteruptive breakdown. As the pulp was vital, an indirect pulp capping with Biodentine™ (Septodont Ltd., Saint-Maur-des-Fossés, France) was planned, followed by a full-coverage restoration. The hypomineralized left mandibular first molar with enamel breakdown was planned for restoration with glass ionomer cement (GIC) (GC Fuji IX, GC Corporation, Tokyo, Japan).

The parents of the patient were informed about the diagnosis, treatment options available, and prognosis. Informed consent from the parent was obtained prior to the initiation of dental treatment. The treatment was conducted in two clinical visits.



Figs 2A to E: Radiographic examination of intracoronal resorption (A and B) pre-op intraoral periapical radiograph of permanent maxillary right first molar and permanent mandibular right first molar; (C and D) Post-op intraoral periapical radiograph of permanent maxillary right first molar and permanent mandibular right first molar after placement of stainless steel crowns; (E) Panoramic radiograph of the entire dentition

In the first visit, the softened dentin was removed from the permanent maxillary right first molar and permanent mandibular right first molar using a sharp spoon excavator, following which indirect pulp capping with Biodentine™ was done, and the teeth were restored with GC Fuji IX. The left mandibular first molar was also restored with GC Fuji IX. After 1 month, preformed stainless steel crowns were placed over the permanent maxillary right first molar and permanent mandibular left and right first molars using the Hall technique (Fig. 1E). Hall technique was chosen due to hypersensitivity in the affected molars secondary to MIH, which remained unresponsive to local anesthetic, possibly due to chronic pulp hyperemia. The occlusion was stabilized within 2 months (Fig. 1F). After a 2-year follow-up, both the permanent maxillary right first molar and permanent mandibular right first molar showed no periapical pathologies radiographically (Figs 2C and D) and were clinically asymptomatic (Figs 1G and H). A panoramic radiograph of the patient revealed no intracoronal resorption in the developing permanent maxillary and mandibular second molars and the rest of the dentition (Fig. 2E).

Discussion

There is limited availability of prevalence data on intracoronal resorption.[11] It has been more commonly observed in developing mandibular premolars, mandibular permanent molars, maxillary permanent first molars, and permanent mandibular canines.[2] Etiology of PEIR is unclear. It is believed that the ectopic position of adjacent teeth could play a role in initiating the inflammatory process responsible for the resorption of dentin. It has also been associated with occult caries.[2] The most accepted theory for PEIR states that invagination of mesodermal tissue in the developing tooth germ causes differentiation of the cells into odontoclasts that act on the dentin.[12] In cases where affected teeth are already erupted and intracoronal resorption is present, it might be considered a manifestation of PEIR. Since the patient presented after complete eruption of the affected teeth and with the absence of any previous radiographic records, we could suspect that the tooth had undergone PEIR that went undetected and untreated.

Management of posteruptive intracoronal resorption and PEIR is similar. PEIR lesions can be divided into two types, that is, static and developing.[13] For practical reasons, certain authors advocate a wait-and-watch approach regarding static lesions.[14] However, in cases where the lesion progresses, treatment should be provided immediately to ensure that the pulp is not exposed.[15] Surgical intervention in unerupted teeth and indirect pulp capping may be done to prevent pulp exposure.[14]

Biodentine™ is a calcium silicate-based material used in restorative dentistry and endodontics. Its powder comprises tricalcium silicate, calcium carbonate, zirconium oxide, and its liquid contains water, calcium chloride, and a hydrosoluble polymer as a water-reducing agent.[8] Compared to other silicate-based materials such as MTA, Biodentine™ has demonstrated superior mechanical properties, color stability with a lesser incidence of tooth discoloration, easier application, and a shorter initial setting time (12–16 minutes vs 3–4 hours). Biodentine™ has been reported to have good clinical efficacy in direct pulp capping procedures in permanent teeth with both open and closed apices. It allows dentine bridge formation, which can be attributed to its biocompatibility, alkalinity, and sealing ability.[8] It was chosen as a pulp capping material in this case, with a favorable healing response seen over two years and has remained so until the patient's latest follow-up. Its ability to release a higher concentration of calcium and silicate ions, and promote hydroxyapatite formation may have allowed a strong barrier around the pulp, further validating its use as a preventive endodontic material.

Molar incisor hypomineralization may appear as yellowish-brown discoloration on molars and incisors. It can lead to an increased risk for caries due to defective, hypomineralized enamel, and in severe cases, it can compromise esthetics. It is also essential to differentiate MIH from enamel hypoplasia, where the borders of enamel in the latter are smooth.[5] Molar teeth are susceptible to caries because of subsurface porosities in the enamel, which easily breaks down once the tooth erupts into the oral cavity. This posteruptive breakdown is more commonly seen in the molars as compared to incisors due to the masticatory forces. Teeth affected with MIH are also hypersensitive to stimuli,[5] and patients can often present with a complaint of sensitivity. In the present case, the involved molars showed posteruptive breakdown.

Treatment of MIH depends on the extent of hypomineralization, symptoms, and age of the patient. Fissure sealants can be useful in MIH if the lesions are small and the enamel is intact.[7] Fluoride varnishes can also be used to mineralize the tooth. Restorative treatment should be considered in larger lesions. The dentist should also be prepared for difficulties that can arise in anesthetizing the tooth because of pulpal inflammation.[5] In our case, local anesthesia was not administered, and the patient did not have any pulpal inflammation or loss of vitality. Adhesive restorative materials like GIC can also be used in MIH cases as an interim restoration until a definitive restoration is placed on the affected teeth.[7] Certain limitations within conventional restorative care in MIH need to be addressed, such as poor bonding due to hypoplastic defects, recurrent caries, and fractured restorations.[7]

Conclusion

The present case report demonstrated successful management of posteruptive intracoronal resorption in teeth affected by MIH. Dentin affected by intracoronal resorption must be distinguished from carious dentin, and the clinician must opt for conservative measures to preserve the health of the pulp. Prior to crown placement, we opted to preserve pulp vitality with indirect pulp capping using Biodentine™ and GIC. Biodentine™ was chosen for its ability to stimulate tertiary dentin formation and protect the pulp.[8,16] In our case, preformed stainless steel crowns were used to treat severely affected permanent maxillary right first molar and permanent mandibular left and right first molars following Hall's technique. The patient has been followed up for 2 years and has remained asymptomatic. The remaining dentition was evaluated with an orthopantomogram, and no resorptive lesions were observed.

Ethics Approval Statement

All procedures were conducted in accordance with the ethical standards of the Institutional Ethics Committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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