

## CASE REPORT

# Management of primary second molar with poor prognosis in patient with bilateral premolar agenesis: A case report with 1-year follow-up

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**Key Clinical Message**

Bilateral mandibular premolar agenesis is rare, and it is essential to retain the primary teeth until they can be replaced with dental implants. Although internal root resorption and periapical lesions in primary teeth have a poor prognosis, MTA dressing and restoring teeth with SSC impede the progress of internal resorption.

**KEYWORDS**

deciduous tooth, mineral trioxide aggregate, root resorption, stainless steel crown, tooth agenesis

## 1 | INTRODUCTION

Premolar agenesis (PA), affecting 1.5%–3.1% of the population, often requires orthodontic therapy and other costly procedures.<sup>1</sup> The etiology of congenital tooth agenesis involves both general and local factors. General factors include genetic conditions such as Down syndrome, cleft lip and palate, and ectodermal dysplasia, with mutations in genes.<sup>2</sup> Additionally, certain syndromes like Rieger syndrome, facial clefts, and ectodermal dysplasia are commonly linked to tooth agenesis. Local factors contributing to tooth agenesis include trauma to the tooth germ, infectious diseases, radiation exposure, and maternal illnesses during pregnancy, such as syphilis.<sup>2</sup> Environmental factors like smoking during pregnancy, exposure to chemotherapy, and radiation therapy can also irreversibly affect tooth formation.<sup>2</sup> Diagnosis typically occurs between ages 8 and 10,<sup>3</sup> and treatment must account for the patient's growth stage, the condition of the deciduous molar, the type of malocclusion, facial profile, and the anticipated treatment duration.<sup>4–7</sup> Treatment options for deciduous

molars include dental implants, removal or controlled slicing, orthodontic space closure, orthodontic mini-screws, dental autotransplantation, and maintenance.<sup>4–6,8–11</sup> A thorough evaluation revealed a 3.3% failure rate for implants, 1% for autotransplantations, and 0.9% for deciduous molar maintenance over 2–3 years.<sup>12</sup> The decision to maintain primary molars depends on factors such as root resorption, infraocclusion, dental caries, and periodontal disease.<sup>5,13</sup> Maintaining deciduous molars is a low-cost, less invasive approach that delays the need for implants or orthodontic treatments. However, severely carious teeth with root canal pathologies, including internal resorption, can pose significant challenges for clinicians and influence their decision on whether to maintain the affected primary tooth.

Internal resorption is characterized by the resorption of the innermost dentin adjacent to granulation tissue in the pulp, often due to inflammation from infection or trauma.<sup>14</sup> The irregularities of the root canal system in internal resorption cases present significant challenges for effective cleaning and obturation. The presence of

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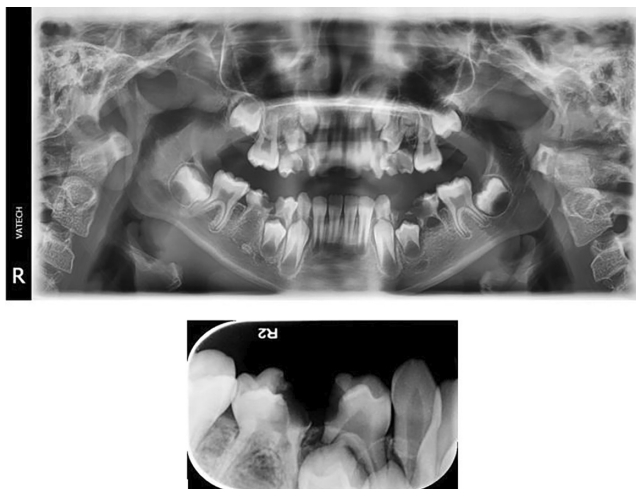
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infected pulp tissue and microorganisms in these irregularities can compromise the success of endodontic therapy.<sup>15</sup> Therefore, complete obliteration of the root canal space is crucial in cases of internal resorption.

Mineral trioxide aggregate (MTA) is highly effective in managing internal resorption due to its excellent sealing capability, ability to set in the presence of blood, bactericidal properties, anti-inflammatory effect, and biocompatibility.<sup>16</sup> MTA is used in various procedures, including pulpotomy, pulp capping with reversible pulpitis, apexification, root perforation repair, and coronal barrier formation.<sup>17,18</sup> However, limited studies have examined using MTA as a material of choice for treating internal root resorption in primary teeth.<sup>14</sup> Therefore, the present case report presents a case of MTA repair of a mandibular second primary molar with an inflammatory resorptive defect in the coronal third of the mesial root canal in a patient with bilateral premolar agenesis.

## 2 | CASE HISTORY/ EXAMINATION

A 6-year-old girl presented to the Pediatric Dentistry department of Mashhad Dental School on February 9, 2023, with complaints of dental caries and pain. An OPG radiograph revealed that the lower right E tooth was severely damaged and had a periapical lesion (Figure 1). A PA radiograph of the tooth revealed internal resorption in the mesial root canals. It was also determined that the child had bilateral agenesis of permanent successors (second premolars). The child had no history of systemic diseases or drug usage.



**FIGURE 1** Preoperative radiographs of the patient revealed bilateral mandibular second premolar agenesis. Lower right E showed a periapical lesion and internal resorption in the mesial root canal.

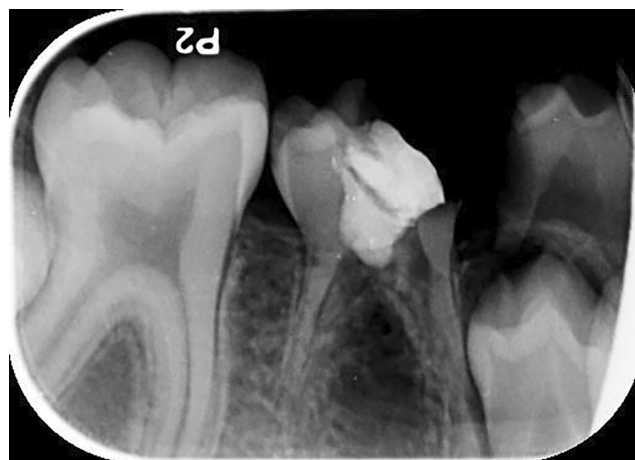
## 3 | METHODS (DIFFERENTIAL DIAGNOSIS, INVESTIGATIONS, AND TREATMENT)

Local anesthesia with an inferior alveolar block using lidocaine was administered. The tooth was isolated with a rubber dam. Dental caries was excavated with a round bur, and an access cavity was prepared with a high-speed fissure bur. Root canals were cleaned using a #15–30 K-file (Mani Inc., Tochigi, Japan) and irrigated with saline and 2 mL of 5.25% NaOCl solution. Significant bleeding was observed from the canals due to resorption. After final irrigation, MTA (ProRoot MTA, Dentsply Sirona, USA) was placed on the floor of the pulp chamber and covered with a moist cotton pellet. The tooth was then temporarily filled with Zonalin (Kemdent, UK).

At the subsequent visit, a PA radiograph was taken (Figure 2). The temporary filling and cotton pellet were removed, and resin-modified glass ionomer was placed over the MTA. Finally, the tooth was restored with a preformed stainless-steel crown (SSC) (3M, Minnesota, US). Oral hygiene instructions were given to the patient, and a regular follow-up visit was recommended.

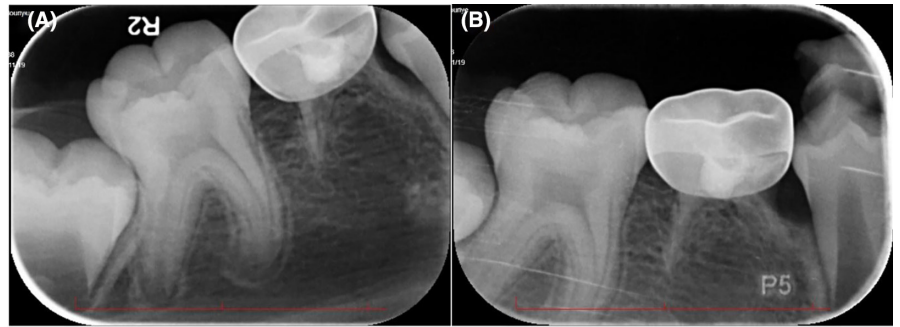
## 4 | CONCLUSION AND RESULTS (OUTCOME AND FOLLOW-UP)

One week postoperatively, the patient was asymptomatic. At the 6-month follow-up, radiographic evaluation showed a progressive resolution of the interfurcal lesion and stabilization of the resorption defect (Figure 3). The 1-year follow-up showed no signs of periapical radiolucency or external resorption (Figure 3), and the clinical appearance was sound (Figure 4).



**FIGURE 2** Premolar agenesis (PA) radiograph of the patient in the second session before placing the final restoration.

**FIGURE 3** (A) Six-month and (B) 12-month postoperative follow-up radiographs. As depicted, periapical radiolucency was resolved completely.



**FIGURE 4** Postoperative clinical appearance of the treated tooth.

The lower left E tooth was extracted. The patient was referred to the Orthodontics Department, and further follow-ups were recommended so that orthodontic treatment could start when the skeletal and dental growth was appropriate.

## 5 | DISCUSSION

In the present study, a successful treatment of a primary second molar with internal resorption using MTA and SSC is reported. Previously, inflammatory internal root resorption was considered to have a poor prognosis and was typically treated with extraction followed by a suitable space retainer.<sup>19</sup> However, if the lesions are small and not perforated, they can have a good prognosis posttreatment. In this case, the decision to maintain the primary molar was influenced by the agenesis of the permanent successor. After a 12-month follow-up, there were no signs of progression in internal root resorption, nor any signs of physiological root resorption. Similarly, one study found that 44% of 99 participants with mandibular premolar agenesis showed no change in root resorption in their primary molars.<sup>5</sup> Another trial reported no pathologic changes in 51% of the group.<sup>20</sup>

Although the exact cause of congenital tooth agenesis remains unclear, several factors have been identified as potential contributors, including genetic predisposition, metabolic disorders, trauma, infections, radiation exposure, and idiopathic causes.<sup>2</sup> Additionally, studies have suggested that parental consanguinity may play a role in the etiology of dental agenesis.<sup>21,22</sup> However, in the present case, there was no history of parental consanguinity, nor did the parents report any related disorders or history of trauma. As a result, the dental agenesis in this case is likely idiopathic.

Preserving primary teeth in cases of agenesis is a reasonable option. A systematic review indicated that 82%–89% of deciduous molars of the premolar successor remain in the oral cavity for 5–13 years.<sup>23</sup> During the growth phase, implants are prone to surgical and prosthetic issues, including mandibular expansion, which can alter the implant's position both vertically and horizontally.<sup>8</sup> Given the high survival rate of deciduous molars, it seems prudent to retain these molars and delay implants until after the growth period.

Internal resorption typically appears as a radiolucent, round, and symmetrical widening of the root canal space, with the loss of continuity at the resorption site. Chemo-mechanical debridement of teeth with resorptive defects can be challenging due to difficulties in eliminating necrotic tissues within the root canal. As in other studies, mechanical debridement was limited to the gentle use of manual stainless-steel K-files to avoid further weakening the remaining dentin, with an emphasis on chemical debridement. Irrigation was performed with 5.25% sodium hypochlorite to control bleeding, dissolve residual necrotic tissue, and disinfect the canals.<sup>24</sup>

Less invasive alternatives for managing internal resorption include Diapex,<sup>24</sup> Vitapex,<sup>25</sup> and MTA.<sup>14</sup> In this study, MTA was used successfully due to its excellent marginal seal, anti-inflammatory effect, biocompatibility, antibacterial properties, and radiopacity. It is also suggested as a pulpotomy medicament due to its higher clinical and radiographic success rate compared to formocresol.<sup>26</sup> Previous studies have also reported favorable results using MTA for treating internal resorption. Pereira

da Costa et al.<sup>27</sup> reported successful treatment of perforating internal resorption of a maxillary central incisor using MTA. Sari and Sonmez<sup>14</sup> reported successful treatment of a second primary molar with internal resorption in the coronal third of the root canal. MTA's favorable results in treating internal resorptions are due to its favorable anti-inflammatory characteristics.<sup>28,29</sup>

Although there are no long-term follow-up studies on treating primary teeth with internal root resorption, clinical experience, and case reports suggest a favorable prognosis. In this case, a 1-year follow-up showed effective

treatment, with full clearance of the periapical lesion and no progression of the resorption site, without any signs or symptoms of disease.

In conclusion, this case report presents the successful management outcome of a primary second molar with poor prognosis and internal root resorption in a patient with bilateral permanent premolar agenesis. Using MTA in treating internal root resorption can be suggested in primary teeth due to its excellent anti-inflammatory and sealing ability. The case report was prepared in accordance with the PRICE 2020 Guidelines<sup>30</sup> (Figure 5).

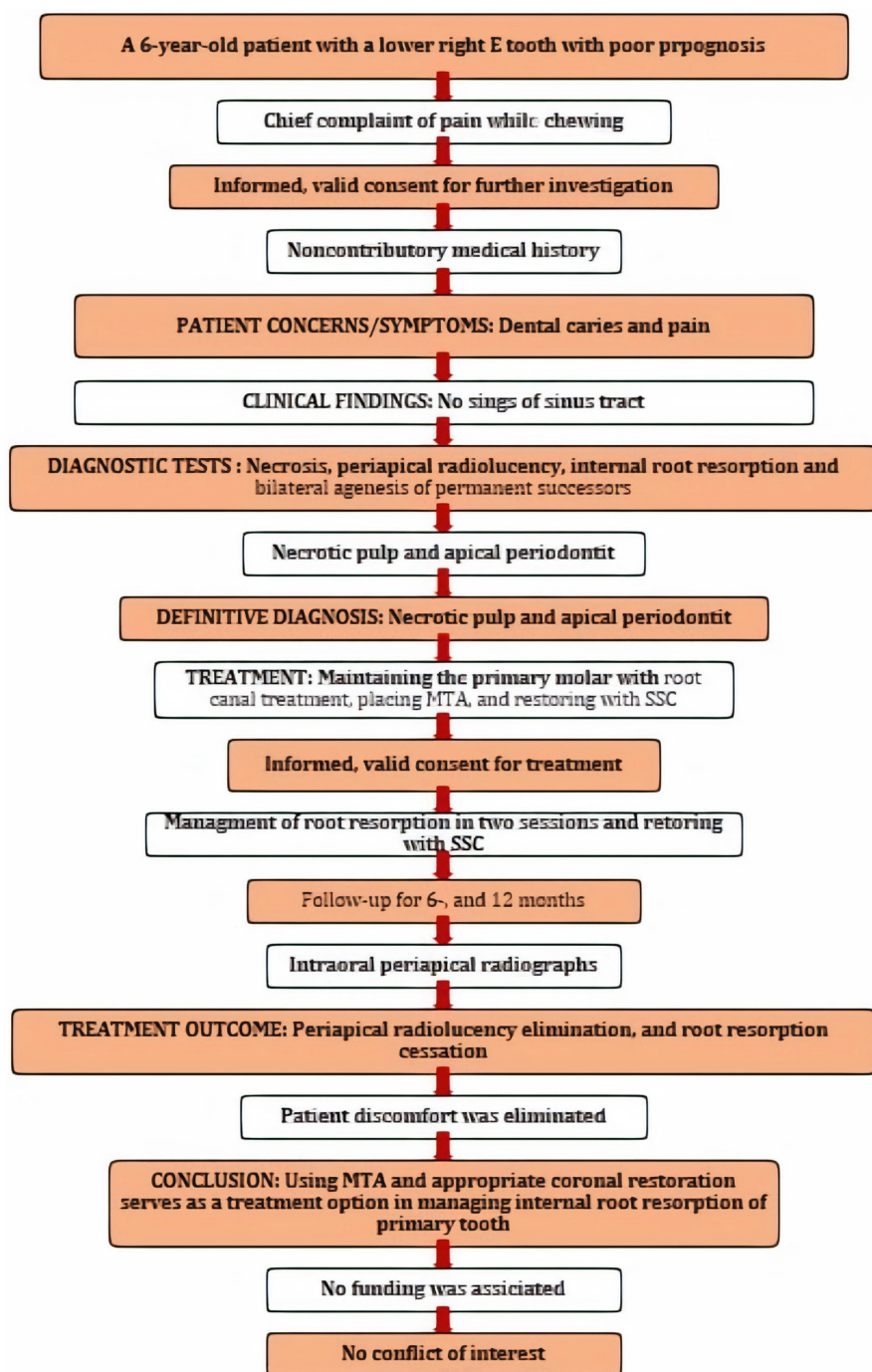


FIGURE 5 PRICE 2020 flowchart.

## AUTHOR CONTRIBUTIONS

**Nikoo Rajabi:** Conceptualization; investigation; writing – review and editing.

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## CONFLICT OF INTEREST STATEMENT

The author declares that they have no competing interests.

## DATA AVAILABILITY STATEMENT

Not relevant.

## ETHICS STATEMENT

None.

## CONSENT

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

## PERMISSION TO REPRODUCE MATERIAL FROM OTHER SOURCES

Not applicable.

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