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CLINICAL APPROACHES TO ENDODONTIC THERAPY IN PRIMARY TEETH LACKING PERMANENT SUCCESSORS: A CASE SERIES

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ABSTRACT
The goal of this study is to present a thorough treatment and one-year monitoring of two cases. In the first example, a primary molar without a permanent counterpart was obturated using traditional gutta-percha. The second case involved a similar molar's pulpectomy with the use of bioceramic MTA putty. The management of primary teeth lacking permanent successors is particularly challenging due to the many physiological, aesthetic, and functional considerations. The patients were clinically and radiographically examined at regular intervals for 12 months. Radiographs indicated the absence of any signs of pathosis, root resorption, or reinfection, and the treated teeth functioned and were symptom-free during the follow-up time. This suggests that bioceramic materials such as MTA show comparable outcomes to gutta-percha in the management of primary teeth with no permanent successors.

Keywords: *Hypodontia, Missing successor, Primary molar, Pulpectomy*

INTRODUCTION

A common dental anomaly, hypodontia, refers to the congenital absence of one or more primary or permanent teeth, excluding the third molars. It is the most prevalent dental abnormality and it is estimated that 2-10 percent of the global population has it. Hypodontia in other instances can be linked with other general disorders or genetic syndromes e.g. ectodermal dysplasia.[1]

Two treatment options are available: either extract the primary molar to create space for the first permanent teeth to erupt and close the gap or retain the primary second molar until growth is complete.[2,3]

Endodontic treatment is generally indicated when pulp is compromised, with the goal of preserving the tooth to maintain function and space for the eruption of permanent successors. But where there are no permanent successors to primary teeth, the decision to perform endodontic treatment is more complicated. Such cases are frequently seen in patients having congenital defects, developmental disorders or early deficiency of permanent teeth.[4]

During a standard pulpectomy of a deciduous tooth with pulp involvement and no permanent replacement, one would fill the root canals with gutta-percha and then rebuild the crown. Nevertheless, there are difficulties because of the limitations of creating the curved and delicate roots of primary molars to accept the master apical file. This renders it difficult to achieve proper obturation.[5,6]

The purpose of the case series is to explore clinical strategies in endodontic treatment in primary teeth that do not have permanent successors with a special focus on the issues of treatment planning, treatment protocols, and long- term prognosis. The goal of the article is to contribute to the currently existing body of knowledge on the management of primary teeth with no permanent successor by conducting a thorough case analysis of a number of cases and emphasizing the role of the patient-specific treatment plan and follow-up.

CASE PRESENTATION

Case 1

A 14-year-old male patient came to the pediatric dentistry department complaining about discomfort in his right mandibular area. He had no other health issues. Clinically, the right mandibular deciduous second molar (tooth 85) had occlusal caries and slight discomfort when percussion was applied. Radiographic examination showed carious lesions involving pulp, peri-radicular radiolucency, and congenital loss of the succedaneous mandibular second premolar **(Figure 1 a)**. According to these clinical and radiographic observations, a diagnosis of pulpitis was made for tooth 85. There was no reported family history of dental agenesis in the patient that was reported by the mother.

The patient and his parents were well informed of the objectives of the treatment and the alternatives available and informed written consent was taken. Endodontic treatment was then done after the administration of regional inferior alveolar nerve block. Access to coronal was via BR 41 bur in high-speed hand piece. Tissue of the coronal was excavated by means of a round excavator. Insertion of a No. 15 K-file was used to estimate working length and patency of the canals **(Figure 1 b).** Biomechanical preparation was done using rotary Neoendo Pedoflex files up to 30/06 in each canal and they were irrigated with 1% NaOCl.

The canals were dried using sterile paper points. Obturation was achieved using the gutta percha points and zinc oxide eugenol sealer. In order to verify that there was enough canal filling, a periapical radiograph was also performed **(Figure 1d).** Glass ionomer cement was used to fill the cavity, and a stainless steel crown was set over it to provide long-term coverage. A 6-month follow-up radiograph was taken and 12 months follow-up radiograph was taken to determine the success of treatment. **(Figure 1 e,f).**

Sequential steps followed in Case 1, as illustrated in Figure 1.

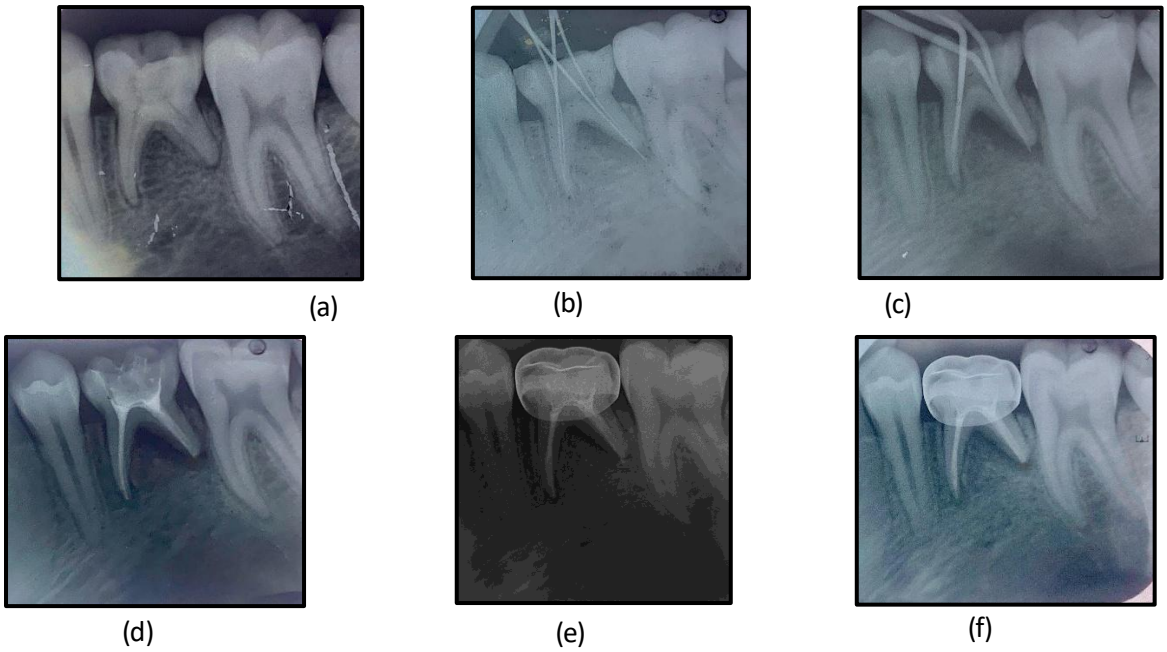

Figure 1: **(a)** Pre-operative radiograph; **(b)** Working length radiograph; **(c)** Determining the mastercone; **(d)** Post-obturation radiograph; **(e)** Six-month follow-up; **(f)** Twelve-month follow-up

Case 2

A 9-year-old girl complained of distress and sharp pain in her left maxillary region when she first arrived at our clinic. No pertinent medical history was disclosed by the parents. A clinical examination showed that the left-side maxillary second primary molar had proximal decay, which was also tender on percussion. Radiographic evaluation confirmed the congenital absence of the permanent left maxillary second premolar. **(Figure 2 a)**.

After administering local anesthesia, isolation was achieved with a rubber dam, and a BR 41 bur was used to prepare coronal access. The operating length was assessed **(Figure 2b)**, and the crown-down approach was used to prepare canals with rotating Neoendo Pedoflex files up to 30/06 in each canal. The canals were irrigated with 1% sodium hypochlorite and then dried with sterile paper points. A bioceramic MTA putty was placed up to the working length. After obturation, a radiograph was taken to ensure it was properly obturated. (**Figure 2 c).** The coronal seal was refilled with glass-ionomer cement and the stainless-steel crown was cemented with luting cement **(Figure 2 d).** The 6-month and 12-month recall was done with a follow-up radiographs (**Figure 2 e,f).** All procedural steps of Case-2 are depicted in Figure 2.

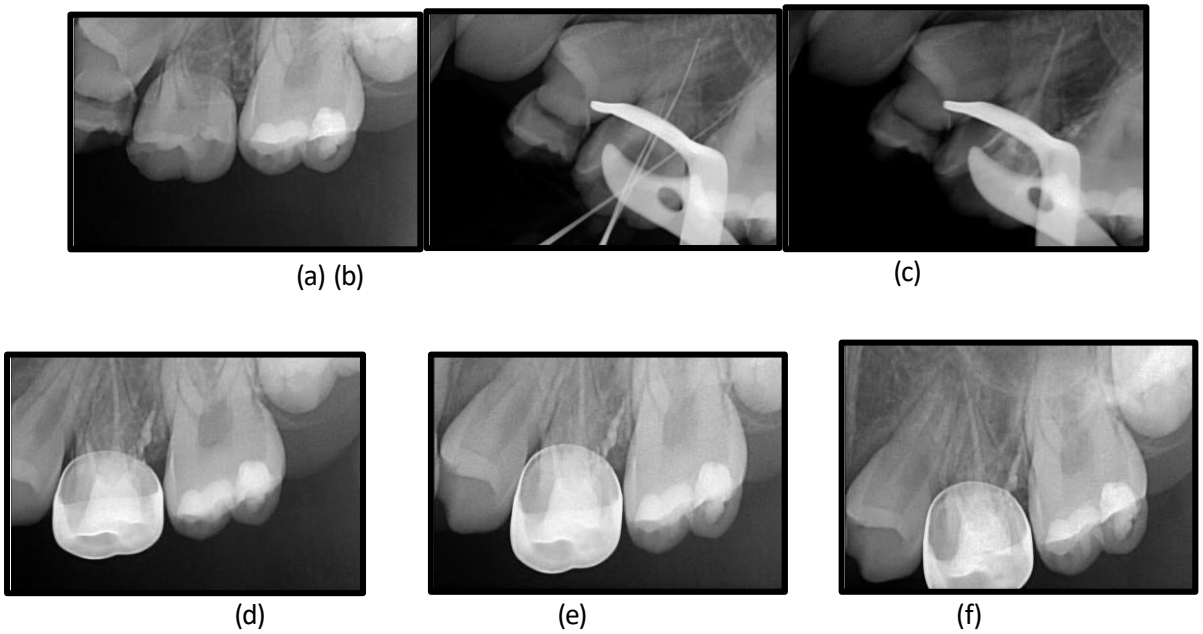

Figure 2: (a) Pre-operative radiograph **(b)** Working length determination **(c)** Obturation done with MTA putty **(d)** Post-operative radiograph **(e)** Six-month follow-up; (**f)** Twelve-month follow-up

DISCUSSION:

The preservation of primary teeth becomes critically important in the absence of successor. In such situations, the ideal obturating material should not resorb and must maintain its integrity over time. Dental agenesis, the most common developmental anomaly in odontogenesis, refers to the congenital absence of one or more teeth. The precise etiology of dental agenesis remains incompletely understood. Kurisu et al.[7] reported that tooth agenesis is frequently inherited as an autosomal overriding attribute, exhibiting partial penetrance and considerable variability in expression. Additionally, agenesis may be influenced by various environmental factors, such as trauma, infections, radiation exposure, and hormonal imbalances. Furthermore, ectodermal dysplasia, a well-recognized genetic disorder, is often associated with congenital tooth absence, including conditions like anodontia, where there is a total absence of teeth.[8]

Obturating material is required to be non-resorbable and environmentally friendly in order to preserve primary teeth in the absence of permanent teeth. For preserved primary teeth without successors, gutta-percha, mineral trioxide aggregate (MTA) and biodentine must be considered as tooth canal fillings. These substances are considered non-resorbable and biocompatible.[4]

MTA is a bioactive dental material known for its exceptional ability to promote periapical healing and create a robust, effective seal in root canal treatments. It has been widely regarded for its biocompatibility, tissue- regenerative properties, and high resistance to bacterial infiltration (Subramaniam & Babu, 2011)[9]. Despite these advantages, MTA's use is often limited by its technique sensitivity and relatively high cost. Nonetheless, in Case 2, MTA yielded favorable outcomes, showing no evidence of root resorption or reinfection, underscoring its clinical effectiveness in managing compromised deciduous teeth.

Gutta-percha, though traditionally avoided in primary teeth due to lack of resorption, becomes a viable choice when long-term retention is desired (Ramar & Mungara, 2010)[10]. In Case 1, the use of thermoplasticized gutta- percha showed no adverse effects and maintained periapical health. In a different case reported by Tunc and Bayrak in 2010,

they chose to retain the mandible's second primary molars for an extended period of time due to the absence of the succeeding premolar. White MTA was used to conduct the pulpectomy. For tracking reasons, subsequent appointments were planned on a regular basis. Three years later, the tooth was functioning normally.[11] In 2024, Abdelhamied Saad reported a review on endodontic therapy for young teeth lacking permanent successors. Several techniques were utilized for pulpectomy for non-vital pulps using Gutta percha and vitapex. The findings showed that continued monitoring produced positive results. It was determined that endodontic treatments can maintain the health of the tooth pulps of the first and early permanent teeth while also preserving tooth arches and the adjacent periodontium.[12]

Numerous investigations have been carried out to assess different materials, such as the customary Gutta Percha (Rai and Ghiraiya, 2014)[13]. Because these teeth won't experience resorption anytime soon, there won't be any more concerns about difficulties brought on by root resorption or issues following the extraction of primary teeth. Moreover, it is thought that applying such a prolonged treatment may lessen the possibility of any residual resorption. Preserving the space until the patient is capable of undergoing more complex procedures, including implants and prostheses, is one of the main goals of this.

In treating primary molars without a permanent replacement, this case series compares and evaluates the radiographic results of bioceramic MTA material and traditional gutta-percha during a year-long monitoring period. Gutta-percha and MTA both showed comparable radiographic yields over the expanded observation phase at the one-year examination. Furthermore, there were no clinical indications of any sort of discomfort in every treatment group. The findings show that the new bioceramic material with its superior sealing property and biocompatibility can be used instead of the traditional gutta-percha in primary molar filling where a permanent alternative is not available. Although, gutta-percha still is the gold standard because it has long-term clinical efficacy, bioceramic materials, including MTA, have shown promising results in regard to tissue regeneration and reinfection prevention, making them an appropriate alternative in that regard.

CONCLUSION:
Conclusively, we have provided two case reports that have varied treatment strategies. The former involved the use of the conventional gutta-percha procedure that has been generally considered as the most dependable procedure of providing treatment to primary molars whose counterparts are not permanent. In the second one, bioceramic MTA putty was applied, a material that is becoming an option of possible alternative to pulpectomy in nonvital primary teeth that have no permanent replacement. In order to compare the clinical and radiological results of a year monitoring, both instances were deemed effective. While gutta-percha was previously considered the conventional technique for filling primary teeth without a permanent substitute, this paper has shown that contemporary biocompatible materials, including MTA, can be used to seal the teeth as well. Nevertheless, this condition needs to be further investigated clinically to demonstrate long-term advantages and safety of bioceramic materials. Moreover, it is important to comprehend the causes of root resorption to select the effective treatment plan and eliminate the factors that cause this complication.

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