

Significance of Identifying and Managing Fusion in Primary Teeth: A Case Report

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Abstract

Fusion in primary dentition is a rare developmental anomaly and fusion in primary teeth causes various problems, such as dental caries, malocclusion, tooth impaction, and hypodontia of the permanent successors; therefore, its treatment is important. The present case focuses on the missed diagnosis of fusion with primary maxillary incisors in a 5-year-old male patient and describes the endodontic as well as esthetic management of fused primary maxillary incisors.

Keywords: Digital crown, Fusion, Post and core, Pulpectomy.

INTRODUCTION

Malformed teeth present a significant challenge to dentists due to their potential to complicate diagnosis, treatment planning, and treatment outcomes.^[1] According to Pindborg, fusion is defined as the merging of dentin and/or enamel from two or more separate developing teeth. Depending on when fusion occurs, teeth can unite at the crown, pulp chamber, or root, and may be classified as complete (total) or incomplete (partial).^[2]

In primary teeth, fusion is classified by Aguiló *et al.*^[3] into several types: Type I involves a bifid crown with a single root; Type II exhibits a large crown and large root; Type III shows two fused crowns and a double conical root; and Type IV presents with two fused crowns and two fused roots.^[3] These anomalies can be unilateral or bilateral and may affect dentition, although they are more commonly found in deciduous teeth, with prevalence rates ranging from 0.1% to 0.9% (equivalent to one to nine cases per 1000 individuals).^[4]

According to Shafer *et al.*, the prevailing theory suggests that the fusion of developing teeth may result from physical pressure or force that brings the tooth germs into contact, leading to their fusion. Tomizawa *et al.*, however, propose that conditions such as fusion and gemination likely occur predominantly by chance.^[5] Açikel *et al.* support the idea that fused teeth arise due to physical actions causing tooth germs to touch, potentially resulting in necrosis of intervening tissues. Furthermore, several authors have also indicated heredity as a possible factor in the etiology of fused teeth.^[6]

Fusion in primary teeth can lead to several issues such as dental caries, malocclusion, tooth impaction, and hypodontia in the permanent successors. Early detection and a comprehensive approach involving multiple dental disciplines are crucial to prevent complications and ensure the well-being of both primary teeth and their permanent successors, thereby promoting optimal oral health.^[7]

Treatment strategies for managing fused teeth vary based on intraoral conditions, oral hygiene, and occlusion, as documented in the literature. These include extraction in cases where the fused tooth impacts the eruption of a permanent successor, endodontic therapy when the pulp is compromised, orthodontic intervention to address spacing issues, dental separation for fused crowns, and esthetic procedures to address patient concerns.^[7]

Tooth fusion is an intriguing phenomenon that highlights the intricate nature of dental development. Understanding its clinical implications is crucial for effectively managing and caring for affected individuals. Clinically, fused primary teeth may exhibit a double-sized crown, a bifid appearance, or appear normal in size.^[7]

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This case report discusses the endodontic and esthetic management of fused primary maxillary incisors, emphasizing the challenge of initially misdiagnosing fused teeth based on their clinical presentation in a 5-year-old boy. The treatment described addresses functional, esthetic, and psychological considerations.

CASE REPORT

A 5-year-old male patient reported to the outpatient Department of Pediatric and Preventive Dentistry of Sri Aurobindo College of Dentistry with the chief complaint of discoloration and dull aching pain in his upper front tooth region for 2–3 days. The medical history of the child was unremarkable and the patient did not report any history of dental trauma. Intraoral examination showed a primary dentition with a grossly decayed right maxillary central incisor (51), (Figure 1). The tooth was discolored and radiovisiography (RVG) revealed a well-defined radiolucency involving enamel, dentin, and pulp, confirming the tooth to be non-vital (Figure 1).

Detailed explanations were provided to the patient's parents, and their consent was obtained for the proposed treatment plan. After a thorough clinical and radiological examination, it was decided to perform a pulpectomy on tooth 51, followed by placing a post and core restoration with an esthetic crown.^[8]

The procedure began with the removal of decay using a slow-speed round diamond bur. Local anesthesia was not required as the tooth was non-vital. The tooth was meticulously irrigated with saline, and the working length was determined radiographically using a 15-K file, which measured 8 mm (Figure 1). A temporary dressing was applied. During the subsequent visit, biomechanical preparation was carried out, and the canal was obturated using Metapex since the patient remained asymptomatic.^[9]

On review with RVG (radiographic examination), an unfilled area raised suspicion of a missed canal, (Figure 1) prompting further investigation. It was during this assessment that the absence of the maxillary right lateral primary incisor was noted, leading to the suspicion of tooth fusion involving teeth 51 and 52.

Consequently, the patient was advised to undergo a cone-beam computed tomography (CBCT) scan for definitive confirmation. The coronal and sagittal views from the CBCT revealed an indistinct hypodensity encompassing enamel, dentin, and pulp, indicative of fusion between teeth 51 and 52. In addition, the CBCT confirmed the presence of two separate pulp canals (mesial and distal) within tooth 51, consistent with type IV fusion as classified by Aguiló *et al.*,^[3] which involves two fused crowns and two fused roots (Figure 2).

Further exploration with a 10K file identified the previously missed canal, and a subsequent RVG was performed with two K-files – one in each canal – to verify their respective working lengths (Figure 2). Following these findings, pulpectomy was successfully completed on the fused teeth (Figure 2).

Due to severe damage, the teeth underwent restoration with post and core procedures. The post-space preparation involved removing approximately 3 mm of the root canal filling material (Metapex) from the coronal portion. A fiber post was then secured in the canal using resin-modified glass ionomer cement (RMGIC), followed by a core buildup with glass ionomer cement (Figure 3).^[8]

During the subsequent visit, tooth preparation was initiated to create space for a 3D-printed polymethyl methacrylate (PMMA) crown, ensuring 1–2 mm clearance from all sides, including subgingival margins (Figure 4). Digital impressions were taken using a Dentsply oral scanner, and a customized

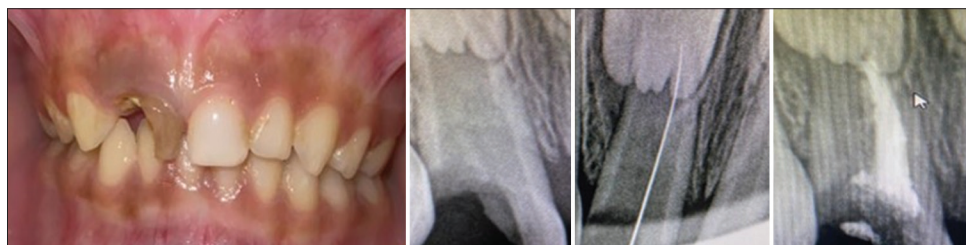


Figure 1: Pre-operative picture, pre-operative radiograph, measurement of working length, and an unfilled canal after obturation

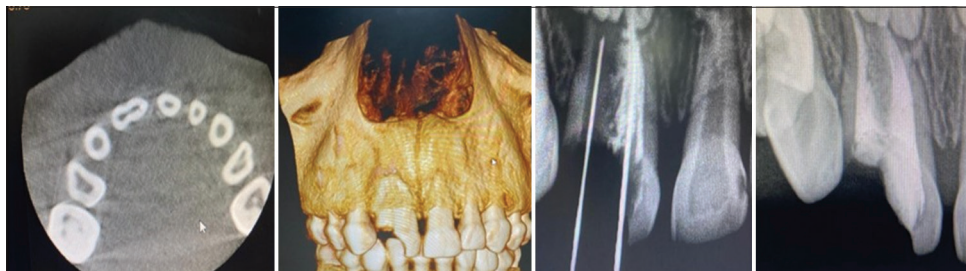


Figure 2: Cone-beam computed tomography image shows fused canals, measurement of working length to differentiate the canals, radiovisiography shows obturation with fused teeth



Figure 3: Radiovisiography showing fiber post, fiber post with fused teeth, glass ionomer cement core build-up

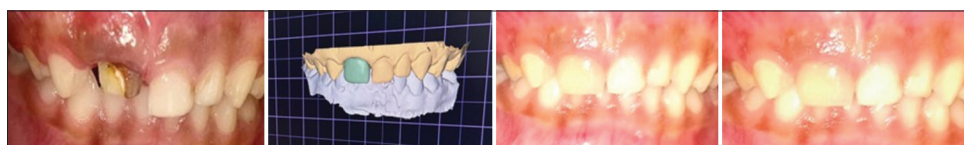


Figure 4: Crown preparation for polymethyl methacrylate (PMMA) crown, designing for PMMA crown, post-operative picture, 3-month follow-up

PMMA crown was fabricated (Figure 4). This esthetic crown was cemented in place with RMGIC after confirming its fit (Figure 4). Firm and consistent pressure was applied to ensure proper positioning until the initial setting of the cement and on follow-up 3 months later, the patient remained asymptomatic, and the crown was intact^[9] (Figure 4).

DISCUSSION

Malformed teeth pose significant challenges for dentists. When teeth are fused, it can lead to various complications such as caries, periodontal problems, abnormal eruption patterns, impaction, and misalignment of successor teeth. Therefore, effective management often necessitates a multidisciplinary approach to ensure both esthetic appeal and proper alignment.

Fused teeth, particularly in primary dentition, are at higher risk of developing caries. In the current case, the teeth were severely damaged, and the fused clinical crowns were not clearly visible. This lack of recognition led to a missed diagnosis of fusion, which became apparent during the root canal treatment when an unfilled canal was encountered. Subsequent CBCT imaging confirmed the diagnosis, identifying the fusion as type IV according to Aguiló *et al.*^[3]

In severely decayed teeth with minimal remaining dental structure, traditional restorative methods often yield unsatisfactory results, necessitating the use of intracanal retention. In our case, where more than half of the crown structure was lost, placing a post in the primary tooth was deemed necessary and appropriate. We chose a glass fiber post and core because they distribute stresses more evenly across the bonding interface compared to rigid posts such as metal or zirconia, potentially reducing the risk of root fractures.^[10]

Based on the patient's chief complaint and the need to restore esthetic function, a tooth-colored crown was planned. Prefabricated crowns were not suitable due to the larger mesiodistal dimension of the fused teeth, which exceeded

commercially available options for primary crowns. In this instance, we opted for a 3D printed PMMA crown, which offered both esthetic appeal and cost-effectiveness compared to alternative crown options.

CONCLUSION

Treatment of fused primary teeth is crucial as they must be preserved in the dental arch until the permanent successor erupts. Periodic review of the treatment is essential. In addition, semi-permanent esthetic restorations not only provide a natural appearance but also enhance the patient's self-confidence.

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