

Fragment Reattachment for the Management of a Traumatic Enamel–Dentin Fracture: A Case Report

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ABSTRACT: Traumatic dental injuries are common in children and adolescents, and the prompt management of the fractured fragment significantly influences treatment outcomes. This case report presents the clinical management of an 11-year-old boy who sustained an uncomplicated crown fracture of the maxillary left central incisor following a fall at school. The fractured fragment, transported in water, showed no signs of dehydration and was suitable for reattachment. Clinical examination revealed no pulpal exposure, and vital treatment was performed. Following appropriate isolation, an adhesive reattachment protocol was completed. The restoration demonstrated favorable esthetic and functional results. This case highlights the critical importance of early presentation and proper fragment preservation in achieving successful outcomes with fragment reattachment techniques.

KEYWORDS: Traumatic dental injury, Adhesive restoration, Fragment reattachment.

INTRODUCTION

Traumatic dental injuries are a frequent problem in pediatric and adolescent populations; uncomplicated enamel–dentin crown fractures of anterior teeth are among the most commonly encountered types (1,2). When the fractured fragment is available and maintained in a hydrated state, reattachment represents a conservative, esthetically superior alternative to composite restorations, preserving the original tooth structure, translucency, and surface texture — advantages that are especially meaningful in young patients (3). The success of fragment reattachment is influenced by several critical factors: the hydration status of the fragment, the time elapsed between trauma and clinical intervention, the stage of root development, fracture configuration, and the adhesive protocol employed (4,5). Experimental and clinical studies have demonstrated that properly hydrated fragments show significantly higher fracture resistance after reattachment than fragments that suffered dehydration (5). Moreover, long-term clinical follow-ups indicate satisfactory survival rates for reattached fragments when storage conditions and bonding procedures are optimized (6). Given these findings, fragment reattachment stands out as a preferred treatment modality in suitable crown fractures — particularly in young permanent teeth where preservation of tooth structure and esthetic integrity is paramount (7). In this case report, we describe the clinical management and successful adhesive reattachment of an enamel–dentin crown fragment in an 11-year-old patient, whose fragment was preserved in water immediately after trauma and promptly referred for treatment. We discuss the therapeutic steps undertaken and reflect on factors affecting prognosis, in the light of current literature.

CASE REPORT

An 11-year-old male patient presented to the clinic following a fall at school that resulted in a crown fracture of the maxillary left central incisor. Clinical examination revealed an uncomplicated enamel–dentin fracture of tooth #21 (Figure 1). No pulpal exposure was observed, and vital treatment was performed.

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Figure 1. Initial clinical presentation showing the enamel–dentin crown fracture of tooth #21.

Local anesthesia was administered using a digital anesthesia device (SleeperOne® 5, Dentalhitec, France; Figure 2). Isolation was achieved with cotton rolls and a saliva ejector. The fractured fragment had been transported in water by the patient's guardian, and no signs of dehydration were noted. The fragment was clinically examined and cleansed with saline, followed by disinfection with 2% chlorhexidine (Figure 3).



Figure 2 Administration of local anesthesia using a digital anesthesia device.



Figure 3. The hydrated, intact tooth fragment brought in water by the patient.

The fragment was assessed for passive fit, and internal dentin grooves were minimally prepared on both the fragment and the tooth to enhance mechanical retention. The adaptation of the fragment was re-evaluated and confirmed prior to bonding. Both the fragment and tooth surface were etched with 37% phosphoric acid (3M ESPE, USA). An adhesive system was then applied (G-Premio Bond, GC Corporation, Tokyo, Japan), following which the fragment was repositioned using a flowable composite resin (G-aenial Universal Flow, GC Corporation, Tokyo, Japan) and light-cured.

After placement, excess composite was removed, and finishing and polishing procedures were completed. Occlusion was checked and minor adjustments were made as necessary. The final restoration exhibited satisfactory esthetics, alignment, and marginal integrity (Figure 4). The patient was discharged without complications and scheduled for routine follow-up.

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Figure 4. Final clinical appearance following adhesive fragment reattachment and finishing procedure

DISCUSSION

Fragment reattachment has been widely recommended as a conservative treatment modality for uncomplicated crown fractures, as it preserves the natural tooth structure, maintains original esthetics, and minimizes operative intervention. Current literature emphasizes that when the fractured fragment is available and anatomically compatible, reattachment offers superior esthetic outcomes compared with direct composite restorations, largely due to the preservation of the tooth's natural translucency, texture, and morphology (8). In the present case, the fragment was stored in water immediately after trauma, preventing dehydration. Maintaining fragment hydration is critical, as dehydrated fragments show reduced bond strength and altered optical properties, whereas properly hydrated fragments demonstrate improved reattachment resistance and favorable esthetic integration (4).

Another key factor influencing prognosis is the time elapsed between trauma and clinical management. Early intervention reduces bacterial contamination, prevents pulpal complications, and allows for more predictable bonding. Studies consistently report that prompt treatment contributes to improved survival of reattached fragments and reduces the need for further restorative intervention (9). In the present case, the patient was referred immediately after trauma, allowing vital pulp therapy to be applied in the absence of pulpal exposure. Maintaining pulpal vitality is essential in young permanent teeth, as it supports continued root development, pulpal healing, and long-term tooth survival (10).

The adhesive protocol also plays a decisive role in the biomechanical performance of reattached fragments. Contemporary total-etch and adhesive systems have been shown to enhance fracture resistance through improved micromechanical interlocking and hybrid layer formation. Various studies demonstrate that the combination of phosphoric acid etching and a high-performance adhesive significantly improves the durability of fragment bonding, particularly when used in conjunction with flowable resin materials that optimize adaptation at the fracture interface (1). In this case, a total-etch approach followed by adhesive application and reattachment using a flowable composite resin achieved stable adaptation and satisfactory esthetic and functional outcomes.

CONCLUSION

Fragment reattachment represents a conservative, biologically respectful, and esthetically favorable treatment option for managing uncomplicated crown fractures in young permanent teeth. In the present case, the immediate presentation after trauma, the preservation of the fragment in a hydrated medium, and the absence of pulpal exposure were decisive factors that contributed to the positive clinical outcome. The use of an appropriate adhesive protocol enabled successful reintegration of the fragment, restoring both function and esthetics. This case highlights the importance of rapid intervention, proper fragment handling, and adherence to adhesive principles for achieving predictable and long-lasting results in dental trauma management.

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