

# Traumatic Dental Injury Associated with Early Childhood Caries and its Management: A Case Report

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**Abstract:** A 3-year-old female child presented with trauma to the maxillary anterior region following a fall at home. Clinical examination revealed an Ellis Class IX injury involving tooth 51, associated soft tissue injury, and multiple carious lesions consistent with severe early childhood caries. Management was performed in phases and included emergency care, fluoride varnish application, caries control using glass ionomer cement and silver diamine fluoride, extraction of the non-restorable tooth, and esthetic rehabilitation with composite strip crowns and Groper's appliance. Follow-up demonstrated satisfactory healing, restoration of function, maintenance of arch integrity, and improved esthetics. This case highlights the importance of early diagnosis, comprehensive treatment planning, preventive care, and parental involvement in the successful management of traumatic dental injuries associated with early childhood caries.

**Keywords-**Traumatic dental injury; Early childhood caries; Primary dentition; Composite strip crown; Silver diamine fluoride; Groper's appliance; Esthetic rehabilitation; Dental trauma.

## 1. Introduction

Traumatic dental injuries (TDIs) are common in early childhood, particularly among preschool children, with a prevalence ranging from 11% to 30% [1,5]. The maxillary anterior teeth are most frequently affected due to their prominent position, making them more susceptible to trauma, especially from falls at home associated with poor motor coordination [2]. Managing trauma in primary dentition is challenging because of the close relationship with developing permanent tooth buds and the risk of long-term effects on occlusion and esthetics [1,3].

Early childhood caries (ECC) is an aggressive form of caries affecting children under six years of age [5,6]. It progresses rapidly from initial enamel demineralization (white spot lesions) to extensive dentinal involvement and structural destruction. Stage 4 ECC represents the most severe form, characterized by gross crown destruction, root stumps, and pulpal involvement [5]. Teeth at this stage are highly fragile and prone to fracture even under minimal force, often presenting with pain, infection, and abscess formation. Treatment becomes complex, frequently requiring pulp therapy, full coronal restorations, or extraction in non-restorable cases [6].

The coexistence of TDIs with Stage 4 ECC presents a complex clinical challenge requiring a multidisciplinary approach [4]. Management must address both the traumatic injury and underlying caries while considering functional, esthetic, and psychological outcomes. Comprehensive treatment involves preventive strategies such as fluoride therapy and dietary counseling [8,11], restorative procedures like glass ionomer restorations and crowns, and prosthetic

rehabilitation when necessary. Appliances such as Groper's appliance help restore esthetics, maintain arch integrity, and support speech development [9,12]. Parental education and regular follow-up are essential for long-term success. Early diagnosis and timely, holistic intervention are critical to achieving optimal functional, esthetic, and psychological outcomes in pediatric patients.

## 2. Case Report

A 3-year-old female child was brought to the Department of Pediatric and Preventive Dentistry with a chief complaint of fractured upper front teeth following trauma sustained approximately 3 hours earlier due to a fall at home. The child slipped and struck her face, injuring the anterior maxillary region. There was no history of vomiting, seizures, dizziness, or loss of consciousness, thereby ruling out significant head injury. The child's medical and family histories were noncontributory, and her developmental milestones were appropriate for her age.

On extraoral examination, a laceration was observed on the lower lip with mild perioral edema, consistent with soft tissue trauma. No facial asymmetry was observed, and temporomandibular joint movements were within normal limits. Intraoral examination revealed a healing lip laceration, mild gingival inflammation, and generalized plaque accumulation, indicating poor oral hygiene. Hard tissue findings included an Ellis Class IX fracture in tooth 51. Teeth 52, 53, 61, and 62 showed extensive carious lesions (as shown in figure 1 and 2) involving enamel and dentin, along with multiple white spot lesions, indicating active early childhood caries and high caries risk.



**Figure 1:** Preoperative intraoral frontal view showing fractured maxillary incisors

A definitive diagnosis of Ellis Class IX fracture associated with early childhood caries and soft tissue injury was established. A comprehensive and phased treatment plan was formulated with emphasis on treatment sequence.



**Figure 2:** Maxillary occlusal view showing multiple carious lesions

The initial phase involved emergency management, including cleaning of the oral cavity and lip laceration, application of antiseptic agents, and reassurance of the child to reduce anxiety and ensure cooperation. The preventive phase aimed at arresting disease progression and included the application of 5% sodium fluoride varnish to enhance remineralization and reduce caries activity.

The restorative phase included caries excavation followed by placement of glass ionomer cement restorations due to their fluoride-releasing property. Silver diamine fluoride was applied to arrest caries in areas where restoration was difficult.



**Figure 3:** Post-treatment with Groper's appliance and strip crown

Definitive rehabilitation involved composite strip crowns for anterior teeth and Stainless Steel crowns where indicated. Tooth 51 was extracted due to poor prognosis, and a Groper's appliance<sup>9</sup> (as shown in figure 3) was planned to restore esthetics, maintain arch integrity, and support speech development. Regular follow-up visits were advised to monitor healing and oral health.

### 3. Discussion

Traumatic dental injuries (TDIs) in primary teeth require careful evaluation due to the close anatomical relationship between primary tooth roots and developing permanent tooth buds<sup>[1,3]</sup>. Injuries to anterior primary teeth may affect permanent successors, causing enamel hypoplasia, dilacerations, discoloration, or eruption disturbances<sup>[2]</sup>. Therefore, treatment should address both immediate concerns

and long-term effects. Ellis Class IX injuries represent severe trauma with extensive structural loss, often requiring extraction and prosthetic rehabilitation when teeth are non-restorable [2].

Stage 4 early childhood caries (ECC) represents advanced disease with extensive destruction of maxillary anterior teeth, making them highly prone to fracture even with minor trauma [5]. These teeth often exhibit pulpal involvement, discoloration, or crown loss and may present with pain or infection. Management follows a structured approach including pulp therapy, full coronal restorations such as composite strip crowns, or extraction in non-restorable cases, along with preventive strategies [6]. A phased treatment protocol is essential. The initial phase focuses on emergency management and infection control [3]. The preventive phase aims to arrest disease progression through fluoride varnish application, dietary counseling, and reinforcement of oral hygiene practices [8,11]. The restorative phase includes caries excavation and placement of glass ionomer cement restorations due to their fluoride release and adhesive properties [11].

Silver diamine fluoride serves as a non-invasive option for arresting caries, particularly in young or uncooperative children [7]. Definitive rehabilitation includes esthetic restorations such as composite strip crowns for anterior teeth. When extraction is required, prosthetic rehabilitation becomes necessary.

Various options include removable partial dentures, fiber-reinforced composite bridges, and fixed appliances. However, Groper's appliance is preferred in young children due to its advantages [9,12]. Being a fixed appliance, it does not depend on patient compliance, provides excellent esthetics, maintains arch length, and supports speech development. It also prevents mesial drifting of adjacent teeth, preserving space for permanent successors. Proper maintenance, including good oral hygiene, avoidance of hard or sticky foods, and regular follow-up, ensures appliance longevity.

#### 4. Conclusion

Overall, successful management of TDIs associated with ECC requires an integrated approach combining preventive, restorative, and prosthetic care, along with active parental involvement for optimal long-term outcomes.

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