CASE REPORT

Aesthetic and Functional Rehabilitation of Traumatized Maxillary Central Incisors in a Pediatric Patient

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Abstract

Traumatic dental injuries (TDIs) involving the permanent central incisors are common in children and adolescents due to their prominent position and frequent exposure to falls or sports-related accidents. This case report details the successful management of TDIs in a 13-year-old male patient who sustained a complicated crown fracture of tooth 11 and an uncomplicated crown fracture of tooth 21 following a fall. Clinical and radiographic evaluation revealed that tooth 11 had a Ellis class 3 fracture, while tooth 21 had a Ellis class 2 fracture. Tooth 11 was treated with root canal therapy, followed by a post and core buildup and placement of an acrylic crown to restore function and esthetics. Tooth 21 was managed conservatively with a direct composite buildup. The patient was monitored over time with regular follow-up visits, showing satisfactory functional and esthetic outcomes with no signs of pathology. Early and appropriate management not only restores esthetics and function but also plays a key role in preventing long-term complications and ensuring favorable prognosis.

Keywords: Traumatic dental injuries; Central incisors; Complicated crown fracture; Root canal treatment; esthetics.

INTRODUCTION

Traumatic dental injuries (TDIs) are a common clinical problem, especially in the pediatric population, and often pose significant challenges in diagnosis, management, and long-term follow-up.[1] These injuries most frequently occur in the anterior region of the maxilla, particularly involving the permanent central incisors, due to their prominent position and early eruption during childhood.[2]

The causes of TDIs in children typically include accidental falls, collisions during play or sports, and road traffic accidents.[3] Children between 7 and 12 years of age are especially vulnerable, given their active lifestyle and developing motor coordination.[4] The reported prevalence of TDIs in permanent teeth among school-aged children ranges from 10% to 15% in various Indian populations, highlighting the importance of awareness and preventive strategies.[5]

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Crown fractures are the most commonly encountered form of dental trauma and are broadly classified as uncomplicated (involving enamel and dentin without pulp exposure) and complicated (involving enamel, dentin, and pulp exposure).[6] Proper classification and early management are essential to avoid complications such as pulp necrosis, infection, discoloration, and potential tooth loss.[6],[7]

Treatment decisions for crown fractures depend on the extent of tissue involvement, root development, and pulp vitality. While uncomplicated fractures can often be managed with composite restorations, complicated crown fractures may require vital pulp therapy or root canal treatment.[6] In young permanent teeth, preserving pulp vitality is particularly important to allow continued root development.[7]

This case report describes the successful management of a complicated crown fracture in tooth 11 and an uncomplicated fracture in tooth 21 in an 11-year-old male. Treatment included root canal therapy with post and crown for 11, and composite restoration for 21. The case underscores the value of accurate diagnosis and timely intervention in pediatric dental trauma.

CASE REPORT

A 11- year-old male patient presented to the Department of Pediatric dentistry at Kothiwal Dental College and Research Centre, complaining of pain and broken teeth in upper front teeth region since days. He had a history of trauma to the same tooth for the past days/months. His medical history is noncontributory and there was no extraoral abnormality present. Clinical examination revealed complicated crown fracture with mild pain in the upper central incisors (11 and 21). (Fig.1)

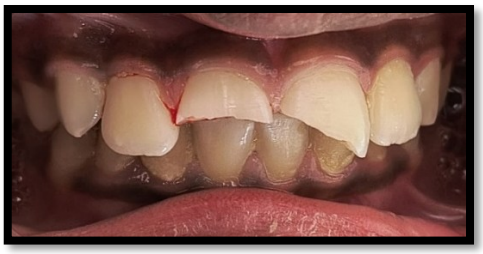

Fig.1: Pre-operative intraoral photograph of 11 and 21.

11 was positive for tender on percussion. On electric pulp testing, 11 did not respond and 21 was sensitive to the test. On radiographic examination, 11 shows periapical radiolucency.
On the first visit, local anesthesia (2% lignocaine with 1:1,00,000 adrenaline) was administered and access cavity was prepared i.r.t 11. Working length was determined using 25 K-file (WL= 23mm). (Fig.2)

Fig.2: Working length of tooth 11.

Biomechanical preparation was done #60 K-file. Triple antibiotic paste and calcium hydroxide was placed and closed dressing was given. Patient was recalled after 14 days.
On the second visit, in the absence of any clinical or radiographic symptoms obturation was done i.r.t 11 and temporary restoration was done. (Fig.3)

Fig.3: Obturation of tooth 11.

After 1 week, post space was prepared using Peeso reamers. Gutta-percha was removed to a depth of 18 mm, leaving 5 mm apical seal intact. (Fig.4)

Fig.4: Post space of 18mm

The canal was then irrigated with normal saline and dried with paper points. A glass fibre post (Super Post Fiber, Super Endo, China) was selected. The canal was etched with 37% phosphoric acid (Smart Etch, SafeEndo, India) for 15 seconds, rinsed, and gently dried. Bonding agent (Universal Dental adhesive, Ivoclar, Liechtenstein) was applied using a microapplicator tip and light- cured for 20 seconds. The post was cemented using dual-cure resin cement (Root cem viscous, Mani, Germany) under isolation. Excess cement was removed, and the post was light-cured from all angles. Flowable composite (D-Tech Compo-flo, India) was then applied around the post and light cured for 20 seconds. Then, packable composite was applied in increments and each layer was light-cured for 20 seconds. The core was shaped anatomically to facilitate crown preparation.
Minimal circumferential reduction was done to preserve tooth structure. Composite (Ivoclar vivadent shade A-1, Liechtenstein) build up was done i.r.t 21. (Fig.5)

Fig.5: Crown prep. i.r.t 11 and composite build up i.r.t 21

Then, alginate impression was taken and cast was poured using dental stone. Labially facing acrylic crown was made. (Fig.6) The labial side was given an acrylic facing to match adjacent teeth and the palatal side was build using white self-cure acrylic resin for ease of adjustment and better occlusion.

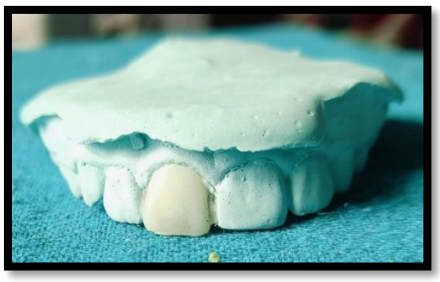

Fig.6: Acrylic facing crown i.r.t 11 on cast

Later, the crown was tried in, adjusted for occlusion and polished. The crown was tried in, adjusted for occlusion, and polished. The crown was then cemented using zinc phosphate cement under isolation. (Fig.7)
Patient was satisfied with appearance and comfort.

Fig.7: Acrylic crown i.r.t 11 and composite build up i.r.t 21

DISCUSSION

Loss of tooth tissue in the anterior region in a young patient may create severe aesthetic and emotional problems. Functional, aesthetic, and biologic restoration of the fractured incisors often presents a daunting clinical challenge.[8]
Biological changes in teeth following endodontic treatment leading to reduced hardness and resistance to shearing have been reported. Restoration with a post following endodontic treatment retains a core to support coronal restoration, particularly when tooth loss is extensive. In recent years, various types of fiber post have been introduced and excellent long-term clinical performance of pulpless teeth has been reported.[9]

As compared to rigid metal posts and/or ceramic posts, the glass fiber posts are white and translucent, radiopaque which is more favorable for esthetic demand for all ceramic crowns. It has a modulus of elasticity, mechanical behavior, and physical properties much closer to dentin in contrast to higher values to a metal post which increases the fracture resistance of the tooth. This also will allow for a better distribution of occlusal forces and reduce substantially if compared with harder materials and the risk of vertical root fracture. A previous case report used prefabricated fiber posts, which showed a high success rate after a certain period, whereas other cases applied cast post; both types of posts resulted in a long survival rate.[10]

Additionally, their translucency allows for light transmission, facilitating the polymerization of resin cements in deep or curved root canals.[11]
The bond strength between GFPs and resin cements is critical for the success of the restoration.[12] Surface treatments, such as etching with phosphoric acid or hydrogen peroxide, have been shown to enhance the bond strength by increasing surface roughness and exposing glass fibers without compromising the integrity of the post.[13] Furthermore, the application of silane coupling agents can improve chemical bonding between the post and the resin cement.[14]

CONCLUSION

The use of glass fiber posts has been shown to enhance the fracture resistance of endodontically treated anterior teeth, providing a favorable outcome in terms of both function and aesthetics. This approach underscores the importance of early and appropriate management in restoring esthetics and function, thereby preventing long-term complications and ensuring a favorable prognosis for young patients with traumatic dental injuries.

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