

Biological Approach for Management of Uncomplicated Crown Fracture of an Anterior Tooth: A Case Report

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Abstract

Crown fractures of maxillary incisors are common form of dental injuries which affects mainly children and adolescents for which patients seek immediate dental treatment. The position of maxillary incisors poses them to significant risk for trauma. During pre-adhesive era fractured tooth used to get restored with either pin retained inlays or cast restoration with acrylic/porcelain facing that use to sacrifice a lot of healthy tooth structure which can be catastrophic for younger children. Recently due to advances in adhesive dentistry an immediate reattachment of the intact fractured tooth fragment is possible if an intact fragment is available which is most conservative. Reattachment of fragment provides good long lasting esthetics with original tooth contour, color. This article presents one such case report of conservative technique of reattachment in a young child using one of the methods which restores original tooth contour, color and aesthetics.

Keywords: Crown fracture; Aesthetics; Light cure resins; Reattachment.

Introduction

The crowns of maxillary central incisors are most susceptible to fractures resulting from direct trauma such as road accidents, falls, sports and fights. It leaves physical and psychological impact on the victims.[1] Crown fracture constitutes almost 92% of all traumatic injuries of the permanent teeth. Central incisor is mostly affected (80%) and lateral incisors (16%) because of anterior position of the maxilla and protrusion.[2,3] This kind of injury mainly affects children and adolescents with boys being at higher risk than girls due to their participation in sports and other dangerous activities.[4] In the past, fractured teeth were restored using acrylic resin or complex ceramic restorations associated with metals. These restorations did not promote adequate long-

term esthetics and also required a significant tooth reduction during preparation which can be catastrophic for younger child. Chosack and Eildeman published the first case report of reattachment of a complicated fractured of an incisor fragment in 1964 which was managed by endodontic treatment followed by a cast post and core.[5]

Recent advances in adhesive dentistry, reattachment of intact tooth fragment has gained popularity. Andreasen FM *et al* gave detailed description of the clinical protocol for treatment of uncomplicated and complicated crown fractures by reattachment with GLUMA.[6] Many studies had reported successful results with reattachment of fractured incisors from 3 month to 3 years.[7-8]

Several factors influences the management of coronal fracture of teeth like site of fracture, extent of fractures, pulpal involvement, maturity of the root formation, periodontal status, alveolar bone fracture, soft tissue injuries, presence or absence of tooth fragment, fit of the fragment, restorability of fractured tooth, occlusion of remaining teeth, financial implications and prognosis. Various techniques like circumferential bevel before reattaching, placing a chamfer at the fracture line after bonding, using a V-shaped enamel notch,

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placing an internal groove or a superficial contour over the fracture line had been advocated to improve retention of fragments.[8-14] Reattachment of tooth fragment is a conservative and cost effective restorative option that has shown to be acceptable alternative restorative technique to resin based restoration. Reattachment of fragment to fractured tooth provides good and long lasting esthetics like original tooth in anatomic form, color, contour, translucency and textures, restores functions, positive psychological impact and is a simple procedure.[6]

Case report

A 9-year-old male patient reported to the Department of Pedodontics and Preventive Dentistry after sustaining an uncomplicated crown fracture to his maxillary left central incisor while playing about 4 hours ago. The fractured tooth fragment was brought within 4 hours of sustaining injury wrapped in a piece of paper. Clinical examination revealed a small laceration of lower lip on the left side. An uncomplicated coronal fracture of 21 at middle third of crown [Figure 1 and 2] of 21 was observed. The fractured fragment was intact

Figure 1 & 2: Uncomplicated crown fracture of 21



Figure 3: Fractured fragment of 21



Figure 4: Fractured fragment reattached to 21



with some craze lines [Figure 3]. The fragment looked dehydrated. There was no abnormal mobility of the injured tooth and the surrounding tissues were healthy. Tooth fragment was fitting well with the tooth involved in fracture. The fragment was disinfected and stored in normal saline for rehydration. A periapical radiograph didn't reveal any abnormality in the affected tooth. The treatment option was explained to the patient and his parents which included reattachment of the fractured fragment. The advantages, disadvantages and prognosis were explained to both the patient and parent. The patient opted to have tooth fragment reattached. Local anesthesia was administered and operative field was isolated with rubber dam. Fractured tooth and fragment were

Figure 5: Photograph at recall



cleaned with prophylactic paste to remove dental plaque. Simple circumferential enamel bevels were given on recipient tooth structure and the fragment. The approximating surface of recipient tooth and fragment was etched [DeTrey Conditioner 36-DENTSPLY] for 20 seconds and rinsed. Care was taken not to completely dry the etched surface and some amount of moisture was retained in etched surface. The bonding agent XP bond [DENTSPLY] was applied to the fragment and the tooth and was cured with LED for 20 seconds. Flowable composite resin (Dyract® flow-DENTSPLY) was applied on both the approximating surfaces. Then fragment was properly positioned on the recipient surface of 21. Excess resin was removed and the area was cured with LED for 40 seconds from labial and palatal aspect. Composite resin [Esthet•X® HD-DENTSPLY] was applied circumferentially over the beveled surface of tooth and was cured with LED. Margins were finished with diamond finishing burs and polished with Astropol finishing kit [Vivadent] [Figures 4]. The patient was kept on recall at the interval of 1 month, 3 months and 1 year. An excellent esthetic result was observed with this conservative and cost-effective approach. Clinical and radiographic examinations were carried out regularly over a period of 1 year. The reattached fragment and tooth remained clinically and radiography asymptomatic and occasionally required polishing to remove some mild stains. [Figure 5]

Discussion

Fracture of a tooth is one of the most traumatic experiences for a young child and it has been found that there is strong emotional and social response from the patient and parents to preserve the natural tooth structure.[1] Reattachment of intact coronal fragment is the most conservative treatment option, less time consuming and most economical option for a crown fracture. Reattachment of tooth fragment is possible if an intact fragment is present with good

adaptation to the remaining tooth structure. Whenever possible, reattachment of the fractured tooth segment is one of the best techniques for the restoration of a fractured anterior tooth especially in a young child. It is esthetically more predictable for translucency, opalescence, fluorescence, characterizations and texture of the surface.[6,14,15]

Various studies and clinical experience had shown that reattachment of coronal fragment with modern adhesive system has short term to medium term successful results.[7-8] In a clinical study of 334 reattached fractured incisors good long lasting retention of the fragment in terms of esthetics and preservation of pulp vitality was observed. They found 50% and 25% retention after 2, 5 and 7 years respectively.[6] Studies have also shown that neither the different techniques nor the materials were able to attain the fracture resistance obtained from intact teeth.[16] Unfortunately, the amount of strength recovery needed to maintain the reattached fragment in function for long term is not known but recovery rates at 50-60% of the fracture resistance are likely to be sufficient.[3]

However Reis *et al* have shown that simple reattachment recovered 37.1%, buccal chamfer recovered 60.6% and over contouring and internal groove technique nearly reached intact tooth fracture strength, recovering 97.2% and 90.5%, respectively.[14]

Another factor which affects the bonding of the fragment is hydration of the fragment.

Every effort should be made to prevent dehydration of the tooth fragment by storing in physiological solution such as 0.5% normal saline until the bonding procedure as dehydration decreases bond strength and makes fragment lighter in color.[8]

Dehydration of dentin causes collapse of collagen fibers and obstruction to adequate penetration resin monomer, resulting into a poor adhesion between dentin and composite material.[17] In present case to increase rehydration of fragment and the bond strength we stored the fragment in normal saline.

Circumferential enamel bevel provides

additional retentive feature. The composite resin was applied circumferentially along enamel bevel to increase bond strength and to mask the reattachment line in this reattachment technique of the case reported here for better esthetic. One-year follow-up of the patient has showed this technique to be satisfactory in maintaining the tooth in function. Presence of a circumferential bevel at the margins of the fragment increases the fracture resistance of the fragment when compared with the one without any bevel. Circumferential bevel provides increased surface area for retention of the reattached fracture segment. The increased retention can be attributed to the higher bonding area obtained after bevel at the enamel interface.[18]

When an intact tooth fragment is present reattachment procedure offers simple, conservative, economical, less time consuming which restores functions and esthetic of the tooth. This technique provides long term predictable outcome than when direct composite is used for restoration of a fractured tooth.[16,19]

Conclusion

Reattachment of the intact fractured segment can be considered as an ultra conservative method which restores original tooth aesthetics. This procedure helps us to preserve maximal natural tooth structure. The superior quality adhesive materials make this procedure viable. In view of this we must educate the population to preserve the fractured fragment and seek immediate dental treatment. Essential advantage of the reattached teeth is the fact that all the alternative methods such as direct adhesive resin restoration, veneers and crowns can be performed in case of failure at later date.

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