Case Report

Maintaining the Original Anatomy of the Uncomplicated Crown Fracture Using Natural Tooth Structure: Three Case Reports

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Abstract

Epidemiological researches have shown that dental traumatic injuries were widespread in the population and are a frequent pathology among children and teenagers. Crown fractures in an early age population are considered a real and serious public health problem owing to the high prevalence and leading serious problems that can affect the social relationship. The most common dental trauma is the uncomplicated crown fracture. Recent developments in restorative materials and adhesive techniques allow clinician to predictably restore fractured teeth. If the original tooth fragment is retained following trauma, the natural tooth structures can be reattached using adhesive protocols to ensure reliable strength, durability, and aesthetic. This report series aimed to present the treatments of traumatized maxillary central incisors, in three different cases, with reattachment of natural tooth structures.

Keywords: Reattachment, the natural tooth structure, trauma, uncomplicated crown fractures

Introduction

Dentoalveolar traumatic injuries are a real and serious public health problem because of the high prevalence. The global prevalence ratio is suggesting that males are 34%–52% more likely to develop traumatic dental injuries than females.[1] Crown fractures for permanent teeth are the most common type, representing 65%–75% of all such dental traumatic injuries.[2,3] The maxillary central incisors are the most commonly affected teeth, followed by the maxillary lateral incisors.[4] Subsequently, anterior crown fractures may lead to discomfort and serious psychological problems that may affect the social relationship.

During the last century, clinicians utilized a variety of procedures such as pin-retained resin, orthodontic bands, modified three-quarter crowns, full coverage gold with bonded porcelain, porcelain jacket crowns, porcelain-bonded crowns, and porcelain inlays for the restoration of the fractured crown.[5-7] In addition to that treatment options, the more conservative treatment procedure can be applied such as reattaching the fractured part or restoration with suitable composite resins.[8,9] Reattachment technique can be used in case of uncomplicated or complicated coronal fracture.[10,11]

This report series aims to present the treatments of traumatized maxillary central incisors, in three different cases, with reattachment of natural tooth structures.

Case Reports

There were three cases referred to the Faculty of Dentistry, Department of Pedodontics with coronal fractured maxillary central incisors. The patients had brought the fractured fragments from the area of injury to the clinic in different ways and time intervals. No alterations in the dentoalveolar tissues were observed in the radiographic and clinical examination. The treatment plans were formulated to reattach the fragments of the teeth. The parents read the information and give consent for child's treatment.

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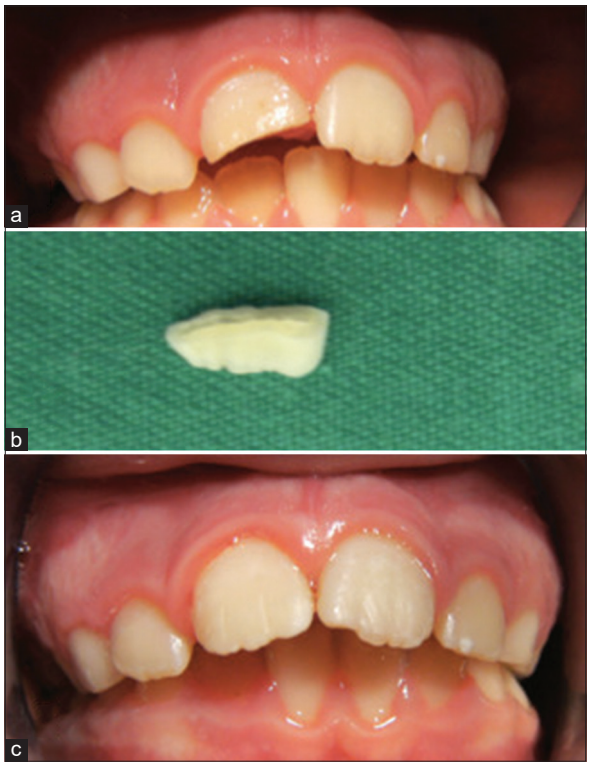

Figure 1: Case 1 (a. Clinical view after trauma, b. Palatal view of the fractured fragment, c. Clinical view after the management).

Figure 3: Case 3 (a. Clinical view after trauma, b. Palatal view of the fractured fragment, c. Clinical view after the management).

Case 1

A 9-year-old boy applied to the clinic at trauma day for tooth #11 [Figure 1a]. The patient had placed the fractured fragment in water [Figure 1b]. The fragment had normal translucency.

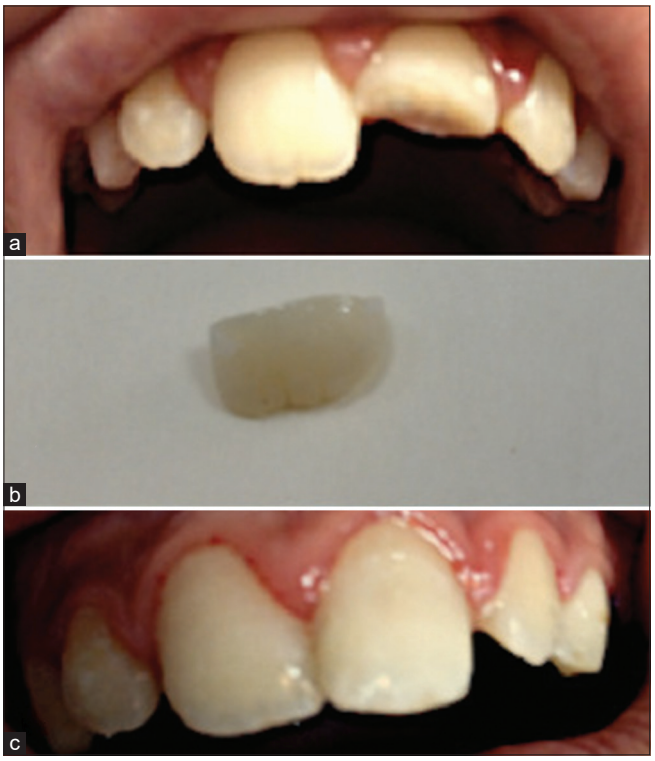

Figure 2: Case 2 (a. Clinical view after trauma, b. Buccal view of the fractured fragment, c. Clinical view after the management).

Case 2

An 11-year-old boy applied to the clinic at trauma day for tooth #21 [Figure 2a]. The patient had placed the fractured fragment in a handkerchief [Figure 2b]. The fragment had acceptable translucency.

Case 3

A 10-year old boy applied to the clinic the next day after trauma for tooth #21 [Figure 3a]. The patient had placed the fractured fragment in a handkerchief [Figure 3b]. The fragment part was dehydrated and lost its translucency.

On the fractured edges of the teeth fragment, an intra-enamel circumferential bevel was applied. The edges were etched with a 37% phosphoric acid for 15 s and rinsed thoroughly with water, the teeth were dried, and dentin-bonding agent (Scotchbond Multi-Purpose, 3M ESPE, 3M Dental Products, St. Paul, MN, USA) was applied and light-cured as per the manufacturer's instruction. The fractured fragments were placed into the proper position of the teeth, and light-cure composite resin material (Filtek™ Z250, 3M ESPE, 3M Dental Products, St. Paul, MN, USA) was applied and photopolymerized for 20 s (Elipar Freelight 2, 3M EPSE, 3M Dental Products, St. Paul, MN, USA). After the procedure, the surfaces were polished with rubber polishing points and discs (Soft-Lex; 3M ESPE, 3M Dental Products, St. Paul, MN, USA). The reattached fragments had acceptable esthetic and function [Figure 1c, 2c, 3c]. There was no functional failure in the 1-year follow-up, and the patients were recalled for further follow-ups.

Discussion

The main goal of restorative dentistry is maintaining the anatomical contours, long-term functional integrity, and esthetics. With the development of adhesive systems and composites, reattaching of the original tooth fragment provides a better prognosis. The procedure is cheap, has short chair-time, long-term success, creates an ideal aesthetic result, improves function, and can easily be accepted by the patient.

The original tooth fragment can be attached using different techniques. The fragment can be placed in the proper position only with bonding agents or bonding agents with the intermediate composite application.[12] In comprehensive research about tooth fragment reattachment by Pusman *et al*., it concluded that regardless of the adhesive technique employed, reattachment of fragments with an intermediate resin composite layer significantly increased the fracture strength recovery.[8] Besides, some studies recommend some preparation of the remaining tooth or fragment using dentin grooves, chamfers, and/or bevels.[13-15] There was no failure occurred such as debonding in the 1-year follow-up of all three cases which bevel applied and reattached with a dentin-bonding agent and an intermediate resin composite layer. Clinical trials and case reports of the long-term follow-up have reported that reattachment with developed bonding agents or adhesive luting systems may achieve esthetic and functional success for up to 7 years.[16]

Color change and lower fracture strength may occur with dehydration of the fragment. Appropriate rehydration of the fragment has the capability of restoring both color and strength.[17,18] In this case report, no pathology occurred during the 1-year follow-up also of the dehydrated tooth structure. However, perfect color matching was not completely achieved, but it was acceptable.

The prognosis and acceptable esthetic results of the clinical follow-ups we have presented have shown that the restorations which are performed with the use of original tooth fragment can be successful in the long term. However, long-term follow-up is essential to predict the durability of the tooth-adhesive-fragment complex and the vitality of the tooth.

As a result, reattaching fragments with dentin-bonding adhesives can be used to restore fractured teeth as a treatment alternative, presumably with sufficient strength. This is a very conservative treatment that allows the restoration to maintain the original dental anatomy, thus rehabilitating function, and esthetics in a short time, by preserving dental tissues.

Declaration of patient consent

The authors certify that they had obtained all appropriate patient consent forms. In the form, the patients have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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