

Single-Visit Conservative Biological Restoration of Fractured Tooth via Reattachment Procedure

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Abstract

Trauma to anterior teeth is a very common condition mainly affecting children and adolescents. Such traumatic injury may often result in coronal fracture to the tooth. Dentist must concentrate to save the affected teeth of patients. This article describes the management of coronal tooth fracture when tooth fragment is available and there is no or minimal violation of the biological width via reattachment of fractured fragment. The reattachment procedure of the dental fragment by using post and core can be a viable treatment option that offers advantages of simplicity, immediate esthetics and conservation in cases of dental trauma.

Keywords: Trauma, Fractured tooth, Tooth fragment, Reattachment, Fiber post.

Introduction

Trauma to anterior teeth is a very common condition mainly affecting children and adolescents. Most common site is maxillary central incisors with incidence of approximately one out of every four persons under age of 18.¹⁻³ Dentist must prepare to treat these patients as it may not only leave a physical scar but also psychological impact on victim in addition to reduction in patient's quality of life.

Proper reconstruction of fractured teeth can be achieved through the fragment reattachment procedure, which is also known as "Biological Restoration." If original tooth fragment is retained following fracture, natural tooth fragment can be reattached by using adhesive protocols to ensure reliable strength, durability, and esthetics. Fractured anterior teeth are usually restored with conventional post-core and crown techniques after being treated endodontically. The treatment option depends on the degree of pulpal involvement, level of eruption, apex formation and esthetics requirement of the patient.

Therefore, the present case report is about discussing the single visit endodontic management of a coronally fractured maxillary central incisor through biological restoration that includes the reattachment of tooth fragment with the help of fiber post and core.

Case Report

A 24-year-old male patient reported to the Department of Conservative Dentistry & Endodontics, FDS, BHU, with chief complaint of pain and fractured upper front tooth. The fracture had resulted traumatically due to fall from stairs just one day before. On examination, Ellis class-III fracture was detected in the maxillary left central incisor, i.e., 21 and the coronal fracture line was observed extending horizontally 2 mm supragingivally from labial to palatal (Fig. 1-Pre-operative Intra-oral Photograph). The coronal tooth portion was showing mobility as through-and-through fracture line was detected except slight attachment from palatal side. The adjacent soft and hard tissues showed normal findings on clinical examination. The patient was advised for full mouth radiograph, i.e., OPG to rule out associated signs of any other aberrant findings (Fig. 2-OPG Radiographic Image of Patient). Radiographic examination revealed the horizontal coronal fracture line in the concerned tooth with no discernible vertical root fracture or any other injury to adjacent teeth. The patient was in pain especially on touch as a result of large pulpal exposure. Regarding management, all the relevant options were explained to the patient. But due to esthetic cause, the patient was much willing to save the teeth and showed more interest toward conservation of fractured coronal tooth fragment.

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Figure 1. Pre-operative Intra-oral Photograph



Figure 2. OPG radiographic image of patient

On the basis of clinical and radiographic examination, and the availability of remaining tooth fragment, the reattachment procedure was planned. Firstly, the mobile coronal fragment was completely detached from rest of the tooth (Fig. 3-Intra-oral Photograph after Detachment of Mobile Coronal Tooth Fragment) and the separated tooth fragment has been shown in Fig. 4. According to management plan, under local anesthesia, the pulp was extirpated from 21 and the single-visit endodontic treatment was performed using manual

ProTaper (Dentsply) that included radiographic working length determination (Fig. 5-Working Length Determination), the canal instrumentation up to #F5, irrigation with 3% sodium hypochlorite, 17% EDTA and normal saline alternatively, complete drying of canal with paper points and resin sealer (Resinoseal, Amdent Products) application followed by obturation of the root canal with #F5 gutta percha and accessory cones (Fig. 6-Obtured Root Canal).



Figure 3. Intra-oral photograph after detachment of mobile coronal tooth fragment of 21

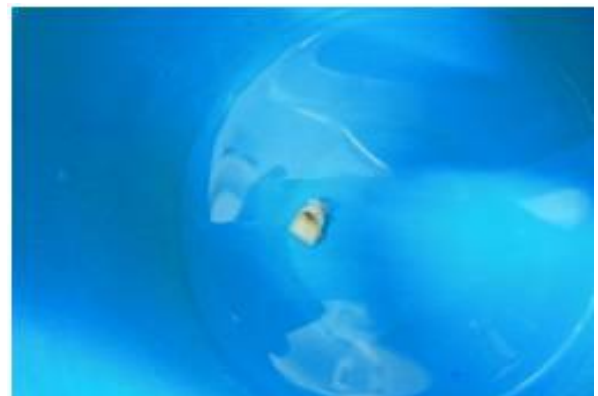


Figure 4. Detached tooth fragment



Figure 5. W.L. determination



Figure 6. Obtured root canal

At the same visit, post-space preparation of root canal was done with the help of peeso reamer (leaving around

6 mm of G.P. at apical region) in order to receive a fiber post (Fig. 7-Post Space Preparation of Root Canal). Also,

the fragmented coronal portion of fractured tooth was prepared to receive the post passively. Finally, the detached portion of natural tooth along with the light transmitting fiber post (Tenax, Coletene Whaledent) was cemented to the post-endodontically prepared central incisor by using dual cure resin (Paracore,



Figure 7. Post Space Preparation of root canal

Coltene Whaledent) (Fig. 8-Post-operative IOPA Radiograph Showing Fiber Post Bonding) following the exact protocol of resin cementation and finished properly (Fig. 9-Post-operative Intra-oral Photograph after Complete Reattachment).



Figure 8. Post-operative IOPA radiograph showing fiber post bonding



Figure 9. Post-operative Intra-oral Photograph after complete reattachment

At six-month recall visit, the reattached natural tooth was performing satisfactorily and the radiograph demonstrated normal architecture of the surrounding bone. The patient was comfortable with esthetics and functions.

Discussion

Trauma to anterior teeth is a very common condition mainly affecting children and adolescents. Dentist must prepare to treat these patients as it may not only leave a physical scar but also psychological impact on victim in addition to reduction in patient's quality of life. Most common site is maxillary anterior teeth especially the maxillary central incisors as it occupies most vulnerable position in the arch. Usually it involves single tooth but accidents and sports injuries can involve multiple tooth injuries. Incidence is one out of every four persons under the age of 18 sustain a traumatic anterior crown fracture.¹⁻³

Most vulnerable age for dental injuries is between 6 and 13 years and among these injuries, most are uncomplicated crown fractures, i.e., fracture of enamel and dentin without pulpal exposure and have male predominancy.^{1,2,4,5} Many techniques have been developed to restore the fractured crown and the early techniques include stainless steel crowns, basket crowns, orthodontics bands, pin retained resin, porcelain bonded crown and composite resin.¹⁰⁻¹² The first case of reattaching a fractured incisor fragment was reported in 1964 by pediatric dentist at Hebrew University, Hadassah School of Dentistry.¹³

Tennery (1978) was first to report the reattachment of a fractured fragment using acid-etch technique.¹⁴ Several factors influence the management of coronal tooth fracture including extent of fracture (biological width violation, endodontic involvement, alveolus bone fracture), pattern of fracture and restorability of fractured tooth (associated with root fracture),

secondary trauma injuries (soft tissue status), presence and absence of fractured tooth fragment and its condition for use (fitting between fragment and the remaining tooth structure), occlusion, esthetics, economic and prognosis.⁶⁻⁸

Patient cooperation and understanding of limitations of treatment is utmost important for good prognosis. Techniques that speeds and simplifies the treatment, restores esthetics and improve long-term success rates, are therefore of potential value and should be considered.⁹ Proper radiographic evaluation of patient after maxillofacial trauma is extremely important. As long as teeth and dental structures become foreign bodies, they may be at risk for ingestion, inclusion in the surrounding tissue or aspiration. The worst complication is aspiration of foreign bodies that can lead the patient to a variety of chronic airway problems and even death, if not precociously diagnosed.

Diagnosis of horizontal root fracture is based on clinical and radiographic examination. A conventional periapical radiograph and two additional periapical radiographs (one with +15 degree angulation and other at -15 degree angulation) should be taken. In addition, occlusal radiograph may be required to disclose fracture in apical third of root. Horizontal root fracture can be treated by repositioning the coronal fragment and affixing a semi-rigid or rigid splint should be maintained depending on the localization of the fracture.

The vitality of the traumatized tooth should be checked for 2-3 months. In most cases in which pulp in apical fragment remain vital, endodontic treatment of coronal fragment is sufficient; however, if apical pulp becomes necrotic during this period, endodontic treatment should be carried out using one of the following treatment options-endodontic treatment of both fragments, endodontic treatment of coronal fragment and surgical removal of apical fragment, extraction of coronal fragment and endodontic treatment and orthodontic extrusion of the apical fragment.

Conclusion

Reattachment of fractured tooth offers ultraconservative, cost-effective, fast and esthetically pleasing results when tooth fragment is available. This can be improved with different adhesive techniques and restorative materials.

Conflict of Interest: None

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Date of Submission: 13th Feb. 2016

Date of Acceptance: 10th Apr. 2016