

Reattachment of Fractured Fragment in an Immature Young Permanent Incisor Teeth – A Case Report

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Abstract: Coronal Fracture of anterior teeth is a relatively common outcome of trauma to the teeth. If the fractured teeth fragments are recovered by the patient and brought to the dental office, the fragments may be reattached to the tooth structure. Reattachment of fractured tooth fragments using dental adhesive techniques offers some advantages, including restoration of the function, aesthetics, shape, texture and brightness of the surface. This article reports management of a case of a 9-year-old boy with fractured maxillary central incisors. The procedure described in this case report for reattachment of the fractured fragment is reasonably simple, and provides long-lasting esthetics, improved function, positive psychologic response with a very conservative approach.

Key Words: Complicated crown fracture, dental trauma, maxillary central incisor, fragment reattachment, mineral trioxide aggregate

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I. Introduction

Anterior tooth fracture, involving mainly enamel and dentin, is the most frequent traumatic dental injury.¹ In addition, crown fracture of permanent teeth is the most common type of traumatic dental injury.² 7 to 15 years old male patients are mostly affected, and the common etiological factors are falls, sports activities, and traffic accidents. Maxillary central incisors are the most commonly involved teeth due to its position in arch and labial proclination, whereas the mandibular central incisors and the maxillary lateral incisors are less frequently involved.³ Dental trauma often requires urgent treatment to relieve pain, decrease the exposure of the teeth involved, and restore function, thereby improving prognosis.⁴

The restorative treatment options for dental trauma include direct resin composite restorations, indirect restorations, or reattachment of the dental fragment.⁵ The choice for treatment is determined by assessing the extent of periodontal damage, the quality of the remaining tooth structure, and, when applicable, the conservation of the dental fragment.⁴ The restoration of fractured teeth should re-establish functional and esthetic characteristics, including color, shape, and occlusal contacts.⁶ Tooth fragment reattachment is the best option, since it maintains the original characteristics of the teeth.⁴ Introduction of resin composites made reattachment of the fragment a permanent treatment of choice. In cases where this treatment is not possible, esthetic materials, such as composite resins, provide excellent results in restoring damaged teeth with minimal sacrifice of additional tooth structure.¹

This article reports management of a clinical case of fractured maxillary incisors by reattachment of the fractured tooth fragment, thereby re-establishing biological, functional, and esthetic factors in a young patient.

II. Case Report

A 9-year-old male patient accompanied by his parents presented to the Department of Pedodontics and Preventive Dentistry, with the chief complaint of a fractured upper front teeth following a fall on the floor at his school approximately 10 days ago. He had insignificant medical and dental histories. Extraoral examination revealed absence of soft tissue injury. On intraoral examination the upper right central incisor (tooth no.11)

showed a complicated crown-root fracture extending from the cervical-third of crown and going on to palatal aspect beyond the cervical line subgingivally and left central incisor (tooth no.21) showed Ellis class II fracture [Figure 1]. The fractured fragment of 11 had Grade III mobility, the remaining intact tooth structure exhibited no mobility. The involved tooth was tender on vertical percussion. The remaining maxillary and mandibular anterior teeth were intact. Intraoral periapical radiograph showed incomplete root development of right permanent central incisor with no root fracture and an intact periodontal ligament space [Figure 2].

The treatment plan was decided as follows: removal of the fractured fragment with 11, completion of endodontic treatment, followed by reattachment of fractured fragment and composite build-up with 21.

After administration of local anesthesia, under aseptic conditions the fractured tooth fragment was removed [Figure 3] and disinfected with 5 % sodium hypochlorite, then stored in normal saline during entire period to avoid dehydration throughout the dental treatment [Figure 4]. MTA apexification was performed with 11 [Figure 5]. After that, a groove was made inside the fractured fragment and both the fractured fragment and the remaining tooth structure were etched with 37% phosphoric acid for 15 s. The etched solution was rinsed with water spray and dried. The bonding agent (Single bond 3M ESPE) was applied and cured for 10 s, then the fractured fragment was reattached to the remaining tooth structure with a flowable resin composite filling materials (3M ESPE, St. Paul, MN, USA). The margins were light cured for 40 s and then polished using diamond stones and a composite polishing kit (Shofu Dental Corporation, Kyoto, Japan) [Figure 6].

At 6 weeks follow-up, the patient reported with no signs and symptoms of clinical and radiographic failure [Figure 7,8].

III. Discussion

Uncomplicated and complicated anterior crown fractures are mostly seen in children and adolescents and most commonly affected teeth by trauma are the maxillary incisors, with a reported incidence of 96% of all the crown fractures (80% central incisors and 16% lateral incisors).³ Various treatment modalities have been described for the management of the fractured teeth, which include Fragment removal followed by restoration, fragment reattachment, orthodontic extrusion with/ without gingivoplasty, forced surgical extrusion, vital root submergence and extraction followed by implants.⁷

Reattachment of the fractured fragment to the tooth structure instead of using other dental restorations such as composite build-up or full coverage crown is included in the guidelines for trauma management.⁸ This treatment is considered as a realistic and conservative approach, in young patients. The procedure of tooth fragment reattachment was first reported by Chosack and Eidelman in 1964 and for years it remained as a theoretical technique, but now it has been shown to be a viable and conservative treatment option for fractured incisors.⁹ Advances in adhesive systems and resin-based composites have made reattachment procedures more achievable.

Other restorative treatments, such as ceramic laminates or crowns, tend to sacrifice large amounts of tooth structure, making the color matching to the adjacent teeth difficult.¹⁰

The materials, such as adhesive systems and composite resins, combined with the skill and knowledge required to mimic the shape, color, and texture of a tooth make the direct composite resin restorations difficult.¹¹ Thus, fragment reattachment becomes a fast, simple, and conservative technique that provides excellent rehabilitation of the esthetics and function.¹²

The success of reattachment depends on various factors including time elapsed after trauma, fracture location, the size of the fractured part, pulpal involvement, the status of root formation, periodontal condition, invasion of biological width, hydration of the fractured fragment while outside oral cavity and the type of post as well as the material used for reattachment.¹³

Dehydration of the fragment may result in a change in color and a decrease in the fracture strength of the tooth. Proper rehydration of the fragment has the capability of restoring both color and strength.¹¹

It has been found that making a preparation increases the fracture strength of the tooth when compared to direct bonding without any type of preparation.¹⁴ However, neither direct bonding nor the use of preparations reaches the initial fracture strength. In addition, it has been argued that the adhesive is ultimately responsible for the bond strength of the fragment to the tooth and the preparation is less important.¹⁵

Reports and clinical experience indicate that the reattachment of fractured coronal fragments results in successful short and medium term outcomes.¹¹ Long term follow-up of cases is necessary to evaluate the longevity of reattached teeth.

IV. Conclusion

The reattachment of a tooth fragment is a viable technique that restores function and esthetics in a very conservative manner, and it should be considered while treating younger patients with coronal fractures of the anterior teeth. Patient cooperation and understanding of the limitations of the treatment is of utmost importance for good prognosis. The need of the day is to make the population aware of preserving the fractured segment

and seek immediate dental treatment. It is the dentist's responsibility to undertake periodic follow-up and to perform clinical, radiographic, and periodontal examinations as well as pulp vitality tests in order to ensure the integrity, esthetics, and the functional health of the fractured element.

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Figure 1: Intraoral photograph showing complicated crown fracture with tooth #11 and Ellis class II fracture with tooth #21



Figure 2: Periapical radiograph showing open apex



Figure 3: Intraoral photograph after removal of the fractured fragment with tooth #11



Figure 4: The fractured tooth fragment stored in normal saline solution



Figure 5: Intra oral periapical radiograph showing MTA Apexification with tooth # 11



Figure 6: Intraoral photograph showing reattachment of fractured fragment of tooth #11 by flowable composite and composite build-up with tooth #21



Figure 7: Clinical evaluation after 6 weeks



Figure 8: 6 weeks follow-up Intraoral periapical radiograph

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