Case Report

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Reattachment of a Crown Fragment: An Immediate Esthetic Alternative

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Abstract

Traumatic dental injuries in permanent teeth, especially the maxillar incisors, are very common. The ultimate goal of any dental emergency treatment is to re-establish normal tooth position together with normal function. Numerous techniques to restore fractured crowns can be used. The reattachment of fractured fragment is an option that can provide immediate esthetic, functional and biologic restoration.

Keywords: Fiber post; Reattachment; Trauma; Tooth fracture

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Introduction

Teeth trauma management is not a daily task in our practice, it is usually an emergency that needs immediate care, quick decision making and a 'wise' treatment choice.

Traumatic dental injuries in permanent teeth are mostly fractures, about 26-76%. Anterior teeth are the most involved, especially the maxillar incisors (because of their anterior position in the arch, protrusion) [1].

Etiological factors of crown and crown-root fractures of the permanent dentition are falls, sport injuries, car accidents and foreign bodies striking the teeth [2-4].

The ultimate goal of any dental emergency treatment is to re-establish normal tooth position together with normal function [5,6]. Numerous techniques to restore fractured crowns have emerged in the recent years [7]. These modalities are different whether the fractured fragment is available and intact [2,6].

Indirect restoration techniques including stainless steel crowns, porcelain bonded crowns, or jacket crowns, and direct restoration with minimal preparation (using composite resin with acid etch adhesive techniques), are used when the tooth fragment is unfound or damaged [2,6].

The reattchment of a fractured crown using adhesive technique could be the first line of treatment if the fractured portion is intact, and the margins are preserved. This technique can be reinforced with the use of a post as it interlocks the two fragments and minimizes the stress on the reattached fragment [4]. This option, is a promising alternative that can offer many benefits when chosen at the conclusion of a complete analysis of the case.

Case Report

A 15 year old male patient came to our dental office after trauma caused by a fall during a soccer game some hours earlier. The patient's medical history was not significant. At first, soft tissue examination revealed no injuries of the lips, but a marginal inflammation of gingiva at the fractured tooth. In fact, hard tissue examination showed a crown fracture of the maxillary left canine **(Figure 1)**. The patient had stored the fractured segment **(Figure 2)**. Clinical deeper intraoral examination revealed an oblique Ellis Class III fracture, extending from cronal aspect palatally to gingival aspect labially. The limit on labial surface was located about 3 mm from the free gingival margin and could be probed easily with a periodontal probe **(Figure 3)**. The fractured segment was immediately placed in an isotonic solution to prevent

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Figure 1 Left canine fracture.

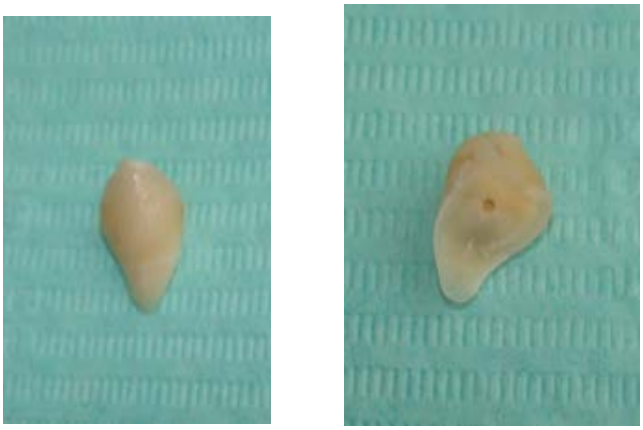

Figure 2 Intact fractured fragment.

Figure 3 The limit of the fracture on the labial surface is subgingival.

discoloration and dehydration.

Pulp exposure was clinically obvious and a preoperative periapical radiograph confirmed it.

No traumatic occlusion was observed. The fractured fragment was checked. It had no structure loss, had intact edges, and was adapted to the remaining tooth structure.

The treatment options explained to the patient were:

1/ Endodontic treatment followed by orthodontic traction, then a post and core with all ceramic or ceramic fused metal crown

2/ Endodontic treatment followed by reattachment of the fractured tooth fragment.

After discussing advantages and disadvantages of each option, the patient opted for the tooth fragment reattachment.

Treatment procedure

An isolation of the operative field was achieved using cheek retractor, cotton rolls and saliva ejector placed in position. The endodontic treatment **(Figure 4)** was performed and completed. A crown lengthening, by gingivectomy with internal bevel incision and raising mucoperiostal flap, then osseous crest remodeling by osteotomy and osteoplasty, was accomplished to expose the line

Figure 4 Proceeding Root canal treatment.

Figure 5 Crown lengthening by gingivectomy with internal bevel incision raising mucoperiostal flap, and osseous crest osteotomy and osteoplasty.

of fracture, and the bleeding was controlled **(Figure 5)**.

The post space was prepared in both radicular portion of the tooth as well as in the fractured fragment removed from the isotonic solution **(Figure 6)**. A light-transmitting fiber post was tried in the canal and cut at the desired length. The fractured fragment was tried on the cut end of the fiber post to confirm that it fits the groove made in it.

The fiber post was cemented into the canal using dual cured resin cement. Any excess cement oozing out of the canal was removed so as not to compromise the fit of the coronal fragment **(Figure 7)**.

The exposed root surface and the fractured fragment were acid etched simultaneously. The groove in the fractured fragment was filled with dual-cure resin cement. The fragment was repositioned and cured from palatal and labial surface for 40 s each **(Figure 8)**. Then the mucoperiosteal flap was sutured **(Figure 9)**.

The functional occlusion of the canine was transformed from canine protected occlusion to an anterior group function (canine, lateral and central incisor) in order to minimize the stress on the reattached fragment **(Figure 10)**.

The patient was instructed to rinse with a 0, 12% chlorhexidine gluconate solution, twice daily for 7 days. One week later the suture were removed, and the occlusion was checked **(Figure 11)**. Three years later, we notice a good stability of the periodontium, and the esthetic result **(Figure 12)**.

Figure 6 The groove made in the fractured fragment.

Figure 7 Fiber post tried, cut to the right length and cemented.

Figure 8 Fractured fragment reattached.

Figure 9 Gingevectomy done and the muco-periosteal flap sutured.

Figure 10 The left canine occlusion modified.

Discussion

Fractured anterior teeth cause the patient pain, fear and emotional concern about his or her appearance [8]. An immediate restoration of the esthetic appearance by preserving the natural tooth is usually the best option to offer these patients.

Several case reports explain the success of the reattachment of

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Figure 11 One week post-operative showing a correct level of the gingiva margin of the left Canine.

Figure 12 Stability of the result three years later.

uncomplicated tooth fracture cases. When the fractured fragment is intact and available, fragment reattachment may offer a most functional and esthetic treatment option, even for complicated fracture cases, as shown in the present report.

The tooth fragment reattachment may offer the following advantages [4,9]:

✦ Better esthetics, as shade matching and translucency will be perfect
✦ Minimal invasive technique especially with actual advances in dentinal adhesives,
✦ Incisal edge will wear at a rate similar to that of the adjacent teeth
✦Functional rehabilitation
✦Replacement of fractured portion may be less time consuming than what is needed for completion of a provisional restoration
✦A positive emotional and social response from the patient for preservation of natural tooth structure
✦ Considered and used as a transitional restoration for a young patient

Factors influencing the feasibility of such repairs include the site of fracture, size of fracture remnants, periodontal status, pulpal involvement, biological width invasion, occlusion, and time and resources of the operator and the patient [4,6,9].

Depending on these factors, various treatment options are:

✦ Reattachment of fractured fragment

✦ Composite restoration

✦ Orthodontic traction

✦ Crown lengthening

Followed by post and core supported restorations [4,10].

The reattachment of the fractured fragment can be indicated when the fracture site has an easy access, and the size of the fracture is significant. However this option is only possible under some conditions. The remnant fragment has to be intact and kept hydrated and it has to fit accurately onto the tooth without compromising the occlusion. The use of a post depends on the size of the fracture and the pulpal involvement.

A damaged or lost remnant fragment or its small size may indicate a composite restoration. While as the orthodontic or surgical extrusion cannot be avoided when the periodontium is damaged. In fact they are indicated when the fracture line is extended below the alveolar crestal bone with a biological width invasion [4,9]. However, this alternative can impair good esthetic resolution because the cervical diameter of the extruded tooth is smaller than that of the adjacent tooth. Also, the time required to achieve the final results is longer, considering the period of extrusion and stabilization.

In the present case, clinical examination revealed pulpal involvement which indicates an endodontic treatment. The fractured fragment was intact and correctly fitted onto the apical fragment. Since the line fracture extended subgingivally, an access to the most cervical margin of the fracture, without esthetical mutilation of the patient, was required, hence the mucoperiosteal flap with gingivectomy.

According to the amount of the restoration, posts could be used to support the fragment [11]. Their use increases retention and distributes stress along the root. In addition, using fiber post along with self/light cured resin cement, as in the present case, gives a monobloc effect, protecting the bond from rotational and twisting forces that may reduce the potential of success [4,10]. Early retrospective studies indicate that clinical performance of fiber posts is promising and the failure rate recorded is 3, 2% over a period of 4 years [12].

The bonding of the post and the fragment during the surgical procedure is less time consuming, and allows an accurate cervical margin adaptation of the crown fragment. However, it requires perfectly efficient moisture and bleeding control achieved, in this case using cheek retractor, cotton rolls and saliva ejector placed in position since placing a rubber dam was not possible. Suturing the mucoperiosteal flap after bonding was in order to avoid the presence of any periodontal seep that could have compromised resin bonding adhesive application and success of the treatment.

The reattachment of fractured coronal fragments have shown

successful short- and medium-term results according to reports and clinical experience [11,13,14].

Cavaller et al. reported a better long-term prognosis for the reattachment of crown fracture comparing to composite resin restorations [15].

The study conducted by Yucel et al. evaluating the restored teeth using reattachment technique of fractured fragment to the remaining tooth, showed a successful result after a 24 months follow up [16].

In this case the duration of the reattachment has lasted 3 years, with no separation of the crown fragment. The tooth was evaluated clinically and radiographically **(Figure 12)** in order to control esthetic, occlusion, pulpal and periodontal results. We noticed neither color variation of the reattached fragment, nor resorption or mobility.

The improvements in the resin dental materials and the new generation bonding agents contributes to the success of this alternative treatment.

Conclusion

Reattachment of fractured fragment is an option that provides immediate esthetic, functional and biologic restoration. It could be the first choice for crown fractures of anterior teeth as it can be the most conservative and less time consuming treatment. The main conditions to indicate and succeed this alternative treatment are intact edges of the fractured fragment, easy access to the fracture line, and an adequate isolation during the procedure.

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