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Reattachment of Crown Fragment Using Fiber-Reinforced Post: A Case Report 36 Months Follow-Up

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Abstract
Objectives: *The most common dental injury is the crown fractures of the permanent anterior teeth. If the original tooth fragment is retained following fracture,the natural tooth structures can be reattached using adhesive protocols.Extensivetooth fragment can also be aesthetically reattached and strengthen the tooth structure using fiber reinforced posts. These fiber reinforced posts have a modulus of elasticity similar to dentin. This technique is inexpensive, very conservative. This case report presents a clinical technique to reattachment maxillary lateral incisor tooth after trauma using direct fiberreinforced post systems and present the 3-year follow-up.*
Case Report: *In this case report,a 46-yearold woman referred to clinic,because of fracture of the crown in the left maxillary lateral incisor.Clinical and radiographic examination revealed that there was a horizontal fracture between the cervical and mid region of the crown.The patient had percussion and night pain;so endodontic treatment was applied.After this,the post space was prepared on the root canal and crown fragment.The fiber post was placed into the root canal and then crown fragment was attached. Dual-cure adhesive resin cement was used for cementation.Finally,fracture line restored with flowable composite and the residual composites was finished and polished with finishing burs and discs.*

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I. Introduction

Traumatic coronal fractures are an important dental problem affecting individuals as functional and emotional.[1] The maxillary incisors are the most affected from the coronal fractures.[2] Nowadaysthe patients are requesting an attractive and youthful smile.[3]Only single-appointmentdirect restorations can be applied to small or medium-sized loss of the crown.[4]In addition, extensive multisurface defects can be restored with indirect restorations in the best way.[5]But, the higher price of indirect restorations, patients' demand to maintain remaining sound tooth structure, and negative anatomical states may render the direct restoration the first option in many clinical situations.[6,7]

Restoring a crownfracture is one of the hardest things for a physician. The natural tooth structure is preserved by reattachment of the crown fragment. It is easier to get the occlusal alignment, the old contour and the color. Thus, excellent aesthetic and functional results are achieved and less time is spent on the chair.[8]Improvements in adhesive techniques have increased the applicability of restorative treatments before prosthetic treatments. Resin based restorative materials are frequently used in restoration of the fractured teeth. Because of the poor mechanical resistance of these materials, different approaches developed to strengthening resistance of composite resin, such as fiber posts.[9] Tooth-colored fiber posts were introduced in the 1990's and have several advantages, such as esthetic, bond to tooth structure, have a modulus of elasticity similar to that of dentin, but still require dentin preparation to fit into the canal.[10] The aim of this case report is to reattachment of the crown fragment using a fiber post and to present a 36 months follow-up.

Case Report

A 46-yearold woman referred to the faculty of dentistry,because of fracture of the crown in the left maxillary lateral incisor.The medical history of the patient was crucial for the progress of the treatment.It was observed that there was no trauma to the soft tissue in the extraoral and intraoral examination.The fractured tooth fragment was recovered by the patient at the site of the injury (Figure 1). The patient had percussion and night pain; so endodontic treatment was applied. After endodontic therapy, the treatment options were presented to the patient and to her legal guardian. These treatment options were as follows:

- Post-core and crown

- Crown buildup restoration with a resinbased composite
- Reattachment of the tooth fragment using fiber-reinforced post

After some deliberation about the advantages, disadvantages, prognosis, and cost of every treatment option, the patient opted to have the tooth fragment reattached. The root were prepared for the post placement by removing the sealing material with Gates Glidden burs and manual files. The post space was prepared with the Fiber Glass Post drill. At the same time, crown fragment was prepared according to the post (Figure 2). The parallel sided fiber rein-forced post system was placed into the root canal (Figure 3). Dual-cure adhesive resin cement was used for cementation. The crown fragment utilized with dual-cure adhesive resin cement(Panavia SA Cement Plus) too. After then; fracture line that between the sound tooth fragment and crown fragment, was restored with composite materyal. During this process, two steps self-etch bonding system (SE Bond) and flowable composite(3M ESPE Filtek Z350 Supreme).

The residual excess at the restorative margin was finished with a series of finishing burs. Then polished to a high luster using discs. The occlusion was carefully checked and adjusted, and the patient was dismissed after receiving instructions to avoid exerting heavy function on this tooth and to follow regular home care procedures relative to oral hygiene. The patient were informed that the reattachment line might be visible, and, if necessary, this could be managed in future visits. Clinical and ragyographic controls were performed after 1, 6, 12, 24 and 36 months and the resultantwas satisfactory to the patient (Figure 4, 5, 6).

II. Discussion

The aim of restorative dentistry is to provide functional and aesthetic integrity of teeth in long-term.This can be ensured by maintaining anatomic contours and natural tooth structure.The expectation of a conscious patient and the aim of a good dentist is to make a perfect restoration.In this regard, the treatment method described in this case report is consistent with the basic concept of Anderson et al. who aim to protect the teeth.[11] In a series of case reports, researchers have stated that reattachment of the crown fragmentproduces a longer and more aesthetic result.It is also reported that the function is improved and it is a faster and cheaper technique that can be easily accepted by the patient with the protection of tooth structure.[12-15]

Due to the development of adhesive systems and composites, much better results have been obtained from reattachment of the crown fragment.Nowadays, this process is not considered as a temporary restoration.[16]

Reattachment of the crown fragment to a fracturedtooth influences esthetic by retaining naturaltranslucency and surface texture and is firstchoice for crown fractures of anterior teeth.Also, this procedure is relatively simple, atraumatic and inexpensive.[17]

Alaçam benefited from the mills he had prepared with the indirect technique to fix the original tooth fragment in the treatment of fracture restorations. The investigator examined changes in the hard and soft tissues during the 3-month follow-up periods and observed no difference in this process.Trushkowsky reported that his in vivo study on the same subject achieved successful results in 8 months follow-up.[18]Murchison et al. Report on 7-year success in terms of function and aesthetics in various case reports.[19]In this study, an acceptable success was achieved in terms of aesthetics and function at the end of 36 months.

In a study, it has been stated that restorative treatment options for a tooth with excessive loss of structure should be evaluated very well. Also, it has been reported that endodontically treated teeth with excessive loss of structureshould be reinforced.[20]If more than 50% of coronal structure of a tooth is lost, a post-and-core application is recommended before restoration.[21]

It has been observed that fewer root fracture may occur in fiber-reinforced resin post application. Studieshave indicated that dentin-bonded resin post-corerestorations provide significantly less resistanceto failure than cemented custom cast posts andcores.[22,23]Furthermore, fiber reinforced postsuse the surface irregularities andundercuts in order to increase the surface area for better bonding.So, these posts can be used with a minimal preparation.[24]

III. Conclusions

This case report supported the development in adhesive systems. Fiber reinforced resinposts provided an aesthetic restoration and protected the tooth structure.Posttreatment and1 and 3-year follow-up records of this patient showed successful and acceptable results.No recurrent caries or composite defects were observed after 36 months.

Figure1. Pretreatment clinical appearance, radiography and the crown fragment.

Figure2.Preparing the crown fragment according to the post.

Figure3. Placeing the parallel sided fiber rein-forced post system into the root canal.

Figure4. Posttreatment appearance immediately.

Figure5. Posttreatment appearance after 12 months.

Figure6. Posttreatment appearance after 36 months.

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