

## Complicated Crown Fracture and Reattachment: Case Report

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### Abstract

**Aim:** The purpose of this case report is; It offers partial amputation with calcium silicate-based biomaterial (Biodentin) to the patient who has a complicated crown fracture in the maxillary left lateral tooth as a result of trauma, and protective and aesthetic restoration of the broken tooth piece using the internal dentin groove method.

**Case Report:** Thirty-one-year-old female patient; Three hours after the trauma, she applied to our clinic with complaints of pain and tooth fracture. According to the anamnesis, it was learned that the patient had no systemic disease. As a result of clinical, radiographic and intraoral examination, a slight luxation of the maxillary left central tooth and a complicated crown fracture of the maxillary left lateral tooth were detected. Partial amputation treatment was performed on the patient's maxillary left lateral tooth with calcium silicate based biomaterial. In order to provide better retention of the broken tooth fragment, the dentin tissue was removed and a groove was opened, binding agents were applied to the fracture surfaces, composite resin material was placed into the groove, the fragment was placed with the help of finger pressure and the resin was polymerized. Then, groove bevelling was performed on the fracture line and the aesthetic restoration was completed with composite resin material.

**Conclusion:** In the treatment of crown fractures involving the pulp, partial amputation treatment with calcium silicate-based pulp capping biomaterial and reattachment treatment by removing dentin tissue from the broken part of the tooth (internal dentin groove) in order to increase retention were found to be successful.

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**Key words:** Calcium silicate, reattachment, internal dentin groove.

### Introduction

Dental traumas can appear as problems that can range from a simple injury to serious injuries in the mouth and surrounding soft and hard tissues, depending on the type of accident and the severity of the impact. In cases of dental trauma, a small enamel fracture may occur, as well as dental hard tissue injuries, in which one or more fractures occur in the root or crown. (1) Tooth fractures as a result of dental trauma are a common problem in adults and children. These injuries mostly involve the incisors, especially the maxillary incisors due to their location in the dental arch. (2,3) Maxillary incisors require rapid, aesthetic and functional repair. (4) Crown fractures involving pulp, dentin and enamel tissue are called complicated crown fractures. (5) Crown fractures seen in permanent incisors are observed at a rate of 18-22% in traumas to dental hard tissues.

These are complicated (pulp, dentin and enamel) crown fractures at a rate of 11-15% and simple (dentin and enamel) crown fractures at a rate of 28-44%. (6) Tooth damage, especially in the incisor area, in young patients; Due to its social, psychological and functional effects, a rapid and appropriate treatment option becomes important. An ideal restorative treatment should restore function and aesthetics and protect the remaining tooth and the tissues surrounding the tooth. (7,8) In the treatment of these teeth; Many factors play a role, such as the restoreability of the fracture (presence/absence of a root fracture), the shape of the fracture, the extension of the fracture line (involving pulp or bone), and the presence of a broken tooth piece. (2) In complicated crown fractures; Root canal treatment, amputation (cervical or partial) and direct capping are the treatment options that can be applied. Findings such as the size of the exposed pulp, the

developmental stage of the tooth and its restorability are important when deciding on the treatment to be performed as a result of radiographic and clinical examination. (9) Biodentin is similar to dentin in mechanical properties and is a material that can be preferred in treatments that require regeneration of the pulp-dentin complex. It induces tertiary dentin formation in treatments where it does not cause pulp inflammation and the pulp is vital, and provides reparative dentin production when it comes into direct contact with the vital pulp. (10-12) It has been reported that more than one material and technique is preferred for the restoration of broken teeth caused by trauma, indirect or direct composite restorations, ceramic crowns, and reattachment treatment with the patient's own broken tooth piece. (1) It has been reported that if the patient has his own broken tooth piece, it can be glued to the tooth after the exposed pulp is treated. (5) It has been determined that the fracture strength increases as a result of the removal of the dentin tissue in the broken piece and provides a strength similar to healthy teeth. (13,14) Gluing the broken piece (reattachment technique) technique generally involves fewer complications, is more economical and faster, and also provides a long-lasting and more natural aesthetic appearance because the original surface shape, anatomical form, color, structure and shape of the tooth are preserved. (6,15)

This case report aims to present the partial amputation of the maxillary left lateral incisor tooth with calcium silicate-based biomaterial, which has a complicated crown fracture due to trauma, and reattachment therapy performed by removing dentin tissue from the broken part of the tooth.

### Case Report

A thirty-one-year-old female patient was admitted to the clinic of the Department of Dental Diseases and Treatment of the Faculty of Dentistry of Harran University after a domestic accident due to a tooth fracture. When the patient was admitted to the clinic, about three hours had passed since the trauma. As a result of the history taken, it was learned that the patient did not have any systemic diseases. During the extraoral examination, it was found that there were no signs related to trauma. As a result of clinical intraoral examination and radiographic examination, a complicated crown fracture occurred in the maxillary left lateral tooth, while slight luxation was observed in the maxillary left central tooth. It was found that there were no fractures in the alveolar bone and the roots of the teeth. When the patient applied to the clinic, the

broken part of the maxillary left lateral tooth was not with him, but he was told to keep the broken part in a container containing physiological serum because he reported that he could find it (Figure 1-3).



Fig 1: Intraoral view of the patient.



Fig 2: Radiographic image of the patient.

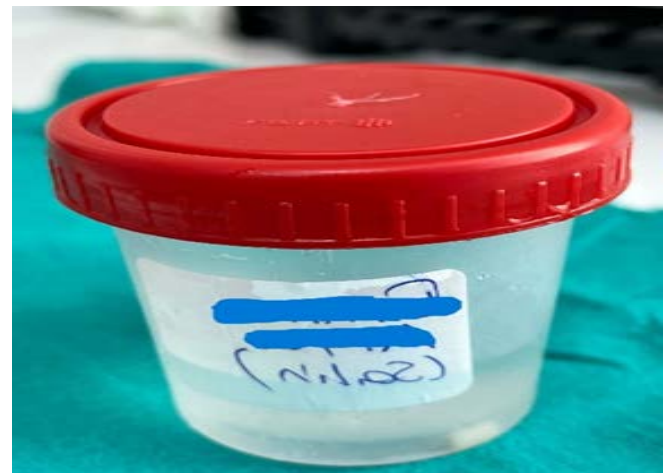


Fig 3: Image of the container containing physiological saline.

A partial amputation cavity was opened for the patient under local anesthesia (Lidofast, Turkey). (Figure 4)



**Fig 4:** Partial amputation preparation applied to the patient.

After cotton impregnated with 5% sodium hypochlorite was placed in the opened amputation area and bleeding control and cavity disinfection were achieved, partial amputation treatment was performed with calcium silicate based biomaterial (Biodentin, Septodont, France). (Figure 5)



**Fig 5:** Partial amputation treatment image with calcium silicate based biomaterial.

The permanent restoration of the tooth was postponed for a day because the patient reported that he could find the broken piece. To prevent microleakage and plaque formation at the forty line, the tooth surface was wrapped with two layers of Teflon tape (Swedent). (Figure 6)



**Fig 6:** Image of the tooth with Teflon tape.

## 2. Seans

The decay on the mesial side of the broken piece was cleaned, and in order to increase the retention of the broken piece, the dentin tissue was removed with a small round bur (Meisinger, Germany) and a retention groove was opened. (Figure 7,8)



**Fig 7:** Image of the broken piece after caries removal and dentin tissue removal.



**Fig 8:** Checking the compatibility of the broken piece with the tooth.



**Fig 9:** Image of 35% orthophosphoric acid applied to the broken piece and the tooth.

After 35% orthophosphoric acid was washed with pressurized water and air dried, Single Bond Universal adhesive (3M ESPE, St. Paul, MN, USA) was applied to both fracture surfaces as a bonding agent. Then, composite resin (3M ESPE Z250, USA) was placed into the dentin groove and the fragment was combined with the tooth with the help of finger pressure and polymerized with a light device (Woodpecker BUILT-INC, China). Aesthetic restoration was completed with composite resin (3M ESPE Z250, USA) by groove beveling on the fracture line. (Figure 10-14)



**Fig 10:** Image of the adhesive applied to the broken piece.



**Fig 11:** View of the broken piece after placement.



**Fig 12:** View of the beveling applied to the fracture line.



**Fig 13:** A view of the aesthetic adjustments made to the tooth and the polishing process of the restoration with finishing burs.



**Fig 14:** The final view of the tooth restoration.

In the radiographic and clinical examinations performed at the patient's 1st and 6th month follow-up sessions after the restoration, it was observed that the tooth responded positively to vitality tests, the periapical region was healthy, there were no symptoms in the tooth, and the broken piece maintained its current shape and position. It was observed that the patient was satisfied with the result (Figure 15-17).



**Fig 15:** The patient's 1st month radiographic image.



**Fig 16:** Intraoral view of the patient at the first month.



**Fig 17:** Intraoral image of the patient at the 6th month.

### Discussion

While dental traumas cause damage to the mouth, teeth and surrounding soft tissues, depending on the severity of the impact and the type of accident, they generally cause function, phonation, aesthetics, pain and psychological problems. (6) The treatment to be preferred in complicated crown fractures is; It varies depending on the contamination level of the pulp tissue, root development and the size of the perforation. (9)

In this case, partial amputation treatment was

preferred because 3 hours had passed since the trauma and there was a large pulp exposure area.

Biodentin is a promising and convenient material in amputation treatment. It is similar to dentin in mechanical properties and can be preferred in treatments that require regeneration of the pulp-dentin complex. It induces tertiary dentin formation in treatments where it does not cause pulp inflammation and the pulp is vital, and provides reparative dentin production when it comes into direct contact with the vital pulp. It has been reported that there are differences in the success of calcium hydroxide and biodentin. It has been determined that biodentin has better radiographic and clinical success and more regenerative potential than the calcium hydroxide group. MTA and biodentin materials are tolerable by the pulp and have been found to form a dentin bridge under the coating agent. (10-12) However, it has been determined that MTA takes more time to place into the cavity, is more difficult to manipulate, and has a longer hardening time than biodentin. (16) In this case, biodentin was preferred in amputation treatment because it has a higher regenerative potential, easier manipulation, shorter hardening time and better results in terms of bond strength compared to other materials.

For the restoration of teeth broken as a result of trauma; Many techniques have been developed from past to present, such as indirect or direct composite restorations, resin crowns, strip crowns, indirect ceramic veneer crowns and re-gluing of the broken piece. (13) When performing permanent restoration of traumatized teeth, if there is a broken piece and it can be used in the restoration of the tooth, it is bonded to the tooth. It is preferred over other treatment options. (9) There are different methods for using the broken tooth piece in restoration and re-attaching it to the tooth after dental trauma. (13) Pusman et al. In their study where they investigated the effect of the abrasion technique and the material used in bonding the broken tooth piece to the tooth on the fracture strength, they used internal dentinal groove, simple re-bonding and overcontour techniques as the abrasion technique. They determined that the highest fracture strength was obtained by reattaching the broken piece with the internal dentin groove technique, and the lowest fracture strength was obtained by the simple re-gluing technique of the broken piece. (13,17) Therefore, in our case, in order to increase retention, dentin tissue was removed from the broken piece of the tooth (internal dentin tissue). reattachment treatment was applied. It has been determined that by re-gluing the broken piece, the transparency and color tone of the

tooth will have a more original appearance, the incisal edge will show wear similar to that of the adjacent tooth, less time will be spent than required to complete the restoration, and the natural tooth structure will be preserved. (2)

## Conclusion

In the treatment of crown fractures involving the pulp, partial amputation with calcium silicate-based pulp capping biomaterial and reattachment treatment by removing dentin tissue from the broken part of the tooth (internal dentin groove) in order to increase retention were found to be successful. Thus, it was seen that aesthetic expectations could be met with short-term clinical treatment procedures while preserving the vitality and continuing function of traumatized teeth.

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