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Conservative treatment of traumatic anterior teeth via reattachment technique: Two case reports

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Abstract
In the present case reports, it was aimed to present the treatment of 2 non-complicated crown fracture trauma cases using reattachment technique. In the first case 12-years-old patient was applied to our clinic due to crown fracture. In the clinic examination the tooth's mobility was within the normal limits and tooth was not tender to percussion. There was also cold-sensitivity due to the expose of dentin surface. In periapical radiographic examination of the relevant teeth, no root fracture or alveolar fracture accompanying the crown fracture was observed. The teeth were treated using reattachment technique. In follow-up examination, it was determined that the tooth maintained its vitality, and that it was asymptomatic and free of periapical pathology. In the second case 14-years-old patient was applied to our clinic due to crown fracture. As a result of the clinic examination, non-complicated crown fracture was observed in left maxillary central tooth. There was cold-heat sensitivity due to the expose of dentin surface. The mobility was within the normal limits, and ordinary response was obtained for percussion test. In periapical radiographic examination, no accompanying fracture was observed in relevant tooth and adjacent tissues. The teeth were treated using reattachment technique. In follow-up examination, it was determined that the tooth maintained its vitality, and that it was asymptomatic and free of periapical pathology. Reattachment technique brings the function and aesthetic back especially to the adolescent patients. It can be used as a conservative treatment option in the presence of the fractured parts.

Keywords: Reattachment, Restorative, Trauma, Conservative, Crown Fracture

1. Introduction
Majority of the dental injuries consists of crown fractures seen on the permanent anterior teeth. It was reported that almost one fourth of the population experienced dental injuries related with the crown fractures in anterior teeth. The main causes of such injuries are the sport injuries, falling down, and motor vehicle accidents [1, 2]. The anterior tooth fractures are seen on central incisor teeth (80%) and lateral incisor teeth (16%) [3]. The reason for anterior teeth being affected more is believed to be being exposed more to traumatic effects due to the protrusive position during eruption [3, 4]. Because of its negative effect on the aesthetic appearance of the person, the treatment of anterior crown fractures requires prioritization [5].
Many factor play role in determining the treatment option for coronal tooth fractures. Dimension of fracture (elongation towards the biological gap, involvement of alveolar bone fractures, and involvement of pulp), fracture pattern and its restorability (involvement of root fractures), involvement of secondary injuries (status of soft tissue), presence/absence of the fractured tooth part and its usability (compliance of the parts, resting tooth tissue), occlusion, aesthetic and financial situation, and the prognosis of fractured tooth were reported to be the factors playing role in treatment selection [6].
For the treatment of crown fractures, many treatment options such as reattachment of fractured part, direct composite restorations, and indirect ceramic restorations were recommended [7]. Reattachment method, which is also an option for the treatment of coronal tooth fractures, can be applied when the biological width is not wide or is at minimal level [8]. Even though composite resins does not have, hydroxyapatite crystals, and dentin tubules, because of composite resin secondary optic features such as opacity and translucency, and composite resin can be used when the fractured part is absent or is unusable. Despite that, none of the materials is capable of completely mimicking the aesthetic features and color stability of real

Tooth nowadays [9].

The first case report, where the fractured anterior tooth part has been reattached, was prepared by Chosack *et al*. [10] in year 1964, and followed by the reports of Tennery [11], Starkey [12] and Simonsen [13], where the same method was applied. Thus, the reattachment of fractured tooth part became an important option for the treatment of fractured anterior teeth. Besides the perfect restoration incisor function and surface anatomy, some of its fundamental advantages are its low cost, and lower damage to the tooth tissue [14].

In the present case reports, it was aimed to represent treatment of 2 cases, which were diagnosed for non-complicated crown fracture, via their own fractured parts.

2. Case Report

2.1 Case 1

Twelve-year-old boy patient applied to our clinic with the complaint of fractured anterior teeth. It was learnt that the tooth fracture occurred due to falling-down 2 days before the application. It was determined that the patient had no systemic disease.

As a result of the clinic examination, non-complicated crown fractures were observed in right maxillary central and right maxillary lateral teeth (Figure 1). While the fractured surface in right lateral maxillary tooth elongating towards the edge of gingiva, it wasn't elongating towards the biological gap. Beside the absence of mobility and percussion in relevant teeth, there was also the cold-sensitivity due to the expose of dentin surface. In periapical radiographic examination of the relevant teeth, no root fracture or alveolar fracture accompanying the crown fracture was observed. It was learnt that the patient brought the fractured tooth parts with him. The possible treatment options were told to the patient and his parent. After analyzing the fractured tooth parts, a consensus on the application of reattachment method was arrived. In order to prevent the further dehydration of fractured tooth parts, fracture parts were kept in saline solution for 30 minutes.

Local anesthesia was applied to right anterior maxillary region by using 1:100000-epinephrine articaine solution (Ultracaine D-S Forte; Sanofi-Aventis, İstanbul, Turkey). After isolating the teeth with rubber-dam, the buccal marginal edges and the enamel edges of fractured parts were beveled. The enamel edges of teeth and fractured parts were etched for 15 sec. using 37% phosphoric acid (Etch Royale, Pulpdent, Watertown, USA). The teeth and fractured parts were irrigated with pressured water for 30 sec. and then air-dried with pressure in the way allowing the mild-moisture of dentin surface. The gingiva of right maxillary tooth's palatal surface was retracted using retraction cord (Ultrapak, Ultradent Products Inc, GER). Following the 2-step adhesive system (Clearfil SE Bond; Kuraray Dental, Tokyo, Japan) application on the fractured tooth parts and the teeth, the adhesive was thinned using mild air pressure and then polymerized for 20 sec. using LED device (Elipar S10, 3M ESPE, USA). After applying the flowable composite (Filtek, Ultimate, 3M ESPE, USA) on the fractured tooth parts and the teeth surface, the fractured tooth parts were manually placed on their positions. The redundant composite was removed before the tooth's polymerization for 40 seconds. The occlusion was checked, and then the teeth were polished. It was determined that the fracture line was visible in lateral incisor teeth, and it was decided to cover the line of fracture using composite resin. The old colored composite resin on the mesial side of central incisor teeth was renewed and the fracture line of lateral incisor teeth was covered using composite material (Filtek Z350 Universal Restorative; 3M Espe, USA) (Figure 2). In follow-up it was determined that there was mild-inflammation because of the lack of oral hygiene, and that the teeth were free of symptoms and had sufficient aesthetic.

Fig 1: The pre-op clinical appearance of the first case.

Fig 2: The post-op clinical appearance of the first case.

2.2 Case 2

Fourteen-year-old boy patient applied to our clinic with the complaint of fractured left maxillary central tooth. It was learnt that the tooth fracture occurred due to falling-down from the staircase 1 week before the application. It was determined that the patient had no systemic disease.

As a result of the clinic examination, non-complicated crown fracture was observed in left maxillary central tooth (Figure 3). There was cold-heat sensitivity due to the expose of dentin surface. The mobility was within the normal limits, and ordinary response was obtained for percussion test. In periapical radiographic examination, no accompanying fracture was observed in relevant tooth and adjacent tissues. It was learnt that the patient brought the fractured tooth parts with him. The possible treatment options were told to the patient and his parent and a consensus on the application of reattachment method was arrived. It was learnt that the fractured part was kept out of the mouth and, in order to prevent the further dehydration of fractured tooth part, it was kept in saline solution for 30 minutes.

The anesthesia of left maxillary central tooth was performed

using 1:100000-epinephrine articaine solution (Ultracaine D-S Forte), and the teeth were isolated via rubber-dam. After beveling the edges of fractured part and teeth, they were etched using 37% phosphoric acid (Etch Royale) for 15 seconds. After irrigation with pressured water for 30 sec., it was air-dried allowing mild-moisture of dentinal surface. 2-step adhesive system (Clearfil SE Bond) was applied to the tooth and fractured parts, and the polymerization was performed using LED light device (Elipar S10). Using the flowable composite (Filtek Ultimate), the fractured part was placed on its position, and the redundant composite was removed before the 40-sec. polymerization. The mild inconsistency between the fractured surfaced were eliminated using composite filling (Gradia anterior; GC Corporation, Tokyo, Japan) (Figure 4). In follow-up examination, it was determined that the tooth maintained its vitality, and that it was asymptomatic and free of periapical pathology.

Fig 3: The pre-op clinical appearance of the second case.

Fig 4: The post-op clinical appearance of the second case.

3. Discussion

Reattachment technique is a treatment method that can be implemented in case of minimal deterioration in biological width. The quick application of treatment positively affects the patient's psychology, and it also ensures regaining the perfect aesthetic and the natural tooth surface and contour [4, 15]. Reattachment method has certain advantages to the composite resin restorations and prosthetic restorations such as ease of implementation and low cost [18]. The indirect restorations prepared in laboratory cannot fully reflect the aesthetic of natural teeth [19]. Under favor of considerable advances in adhesive resins and resin composites, reattachment technique was passed beyond the temporary restoration. But, its clinic applications are limited, because it can only be used in presence of the fractured part and the perfect compliance between the parts [16].

The reattachment of fractured coronal tooth part was reported to have positive results in mid- and long-term [6]. The reason of potential failure in teeth, where the reattachment method was applied, was reported to mainly be the new trauma occurring in those teeth [4]. Since the fractured parts, which remained dehydrated for longer than 1 hour after the trauma, cause weak prognosis and decrease in fracture resistance of relevant teeth [17], the dehydration periods (2 days for one of our patients and 1 week for the other case) were considered. However, since our patients were young, it was decided to use reattachment technique.

Pulp necrosis is a wide complication that is seen on traumatic teeth, and it is important for the dentist to know when the pulp necrosis occurs. In their study, Wang *et al*. [20] analyzed the pulp prognosis of 603 non-complicated crown fracture cases, where luxation accompanied or did not. According to the results, it was determined that the pulp necrosis occurred in teeth, which were exposed to the trauma, within max. 3 months. In total, 72% of the pulp necrosis was occurred in first 12 months. Thus the authors recommended 1 year and longer follow-up durations for the pulpal healing. For our cases, the pulpal responses in 3 months follow-up examination were normal, and the follow-up period continues.

4. Conclusion: Reattachment technique brings the function and aesthetic back especially to the adolescent patients. It can be used as a conservative treatment option in the presence of the fractured parts.

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