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Two-year follow-up of fractured anterior teeth restored with direct composite resin: report of three cases

CASE REPORT

Emre Ozel[1], Meric Karapinar Kazandag[2], Mubin Soyman[3], Gunduz Bayirli

[1]Department of Operative Dentistry, Faculty of Dentistry; [2]Department of Endodontics, Faculty of Dentistry; [3]Department of Operative Dentistry, Faculty of Dentistry, Yeditepe University, Istanbul, Turkey

Abstract – Thirty-five (case 1), 15 (case 2) and 22 (case 3)-year-old female patients presented to Yeditepe University Dental Faculty Clinic because of esthetic reasons. Fractures of maxillar central incisors including enamel and dentin were diagnosed. Beveling with diamond bur was performed in all four cases. Dentin was cleaned with tungsten carbid bur. The teeth were etched with 37% phosphoric acid, restored with an adhesive system and microhybrid composite. Finishing and polishing procedures were performed by discs (Sof-Lex) and burs. Restorations were found successful according to modified United States Public Health Service (USPHS) criteria after 2 years in terms of retention, color match, marginal discoloration, secondary caries, marginal adaptation, and surface texture.

Correspondence to: Emre Ozel, DDS, MSc, PhD, Department of Operative Dentistry, Faculty of Dentistry, Yeditepe University, Bagdat Cad. No:238, Goztepe, Istanbul, Turkey
Tel.: 0090 216 363 60 44
Fax: 0090 216 363 62 11
e-mail: emreozel77@yahoo.com

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Coronal fracture by trauma is the most frequent type of dental injury in the permanent dentition (1). Two generic groups of predisposing factors exist which lead to trauma. Group 1: fracture of previously sound teeth of children and teenagers resulting from trauma during sports activities; from falls and bicycle, skate and ski accidents; or during other leisure activities (2–4). Group 2: fracture of the teeth of adult patients which have been rendered fragile by large restorations, caries lesion, and/or endodontic treatment. Fracture may result from trauma in automobile accidents, sports activities, fights, and even from occlusal function or parafunctional stresses (2–4).

Intensity of trauma, direction of the trauma, elasticity of the substance, and tolerance of the soft tissue are the major factors that determine the extent of the fracture (5). Various injuries may occur on dentition and cause fractures of different classifications (6). The most frequent type is enamel-dentin fracture with or without pulp exposure (3).

There are advantages of using composite resins for the restorations of enamel-dentin fractures, such as shortening chair time, biocompatibility of the materials, low cost, and minimal hard tissue removal (7, 8). As a result of recent developments, adhesion of composite resins to enamel and dentin has improved. Thus, the use of pins can be avoided and direct composite restorations, which are esthetic and enduring to mastication and biting forces, can be performed (9, 10).

The polishability of composite resins has been improved by the new developments of inorganic particle size and ratio. In addition, it is possible to imitate the optical properties of natural teeth by using various dentine and enamel colors and make-up techniques (7). In the present article, 2-year follow-up of an esthetic rehabilitation of fractured anterior teeth restored with direct composite resin is presented.

Case 1

A 35-year-old female patient presented to Yeditepe University Dental Faculty Clinic with an esthetic complaint regarding the maxillar central incisors (Fig. 1). Dental history revealed that she had a traumatic experience when she was 8 years old. During the intra-oral examination, the previously fractured teeth (two maxillar central incisors) were diagnosed (Fig. 1).

Fig. 1. Clinical appearance of the teeth before the restoration for case 1.

The teeth were etched with 37% phosphoric acid after beveling with a diamond bur (Accurata, Germany). The dentinal tissue was cleaned with tungsten carbid burs (Accurata). The teeth were restored with an adhesive system (AdheSE, Ivoclar-Vivadent, Liechtenstein) and microhybrid composite (Miris, Coltene-Whaledent, Switzerland). Finishing and polishing procedures were performed by discs (Sof-Lex; 3M ESPE, St. Paul MN, USA) and diamond burs (Accurata) (Fig. 2).

Restorations were found successful according to the United States Public Health Service (USPHS) criteria (11) at the end of 2 years recall in terms of retention, color match, marginal discoloration, secondary caries, marginal adaptation, and surface texture (Fig. 3). The USPHS criteria is shown in Table 1.

Case 2

A 15-year-old female patient presented to Yeditepe University Dental Faculty Clinic with an esthetic complaint about the left maxillar central incisor (Fig. 4). The patient was undergoing an orthodontic

Fig. 2. Clinical appearance of the teeth after the restoration for case 1.

Fig. 3. Clinical appearance of the composite restoration at the end of 2 years for case 1.

Table 1. United States Public Health Service (USPHS) criteria

Category	Scores	Criteria
Retention	Alfa	No loss of restorative material
	Charlie	Any loss of restorative material
Color match	Alfa	Matches tooth
	Bravo	Acceptable mismatch
	Charlie	Unacceptable mismatch
Marginal discoloration	Alfa	No discoloration
	Bravo	Discoloration without axial penetration
	Charlie	Discoloration with axial penetration
Secondary caries	Alfa	No caries present
	Charlie	Caries present
Anatomic form	Alfa	Continuous
	Bravo	Slight discontinuity, clinically acceptable
	Charlie	Discontinuous, failure
Marginal adaptation	Alfa	Closely adapted, no detectable margin
	Bravo	Detectable margin, clinically acceptable
	Charlie	Marginal crevice, clinical failure
Surface texture	Alfa	Enamel-like surface
	Bravo	Surface rougher than enamel, clinically acceptable
	Charlie	Surface unacceptably rough

Fig. 4. Clinical appearance of the teeth before the restoration for case 2.

treatment. During the clinical examination, a class IV fracture that included enamel and dentin was diagnosed. The injuries had occured during a sports activity. The tooth was restored as described in case 1 (Fig. 5).

Fig. 5. Clinical appearance of the teeth after the restoration for case 2.

The orthodontic treatment was finished and the restoration was found successful according to the USPHS criteria at the end of 2 years recall in terms of retention, color match, marginal discoloration, secondary caries, marginal adaptation, and surface texture (Fig. 6).

Case 3

A 22-year-old female patient presented to Yeditepe University Dental Faculty Clinic. Dental history revealed that she had a trauma as a result of fall. It was diagnosed that both maxillary central incisors and the mandibular left central incisor were fractured (Fig. 7). The teeth were restored as described in cases 1 and 2 (Fig. 8).

Restorations were found to be successful according to the USPHS criteria at the end of 2 years (Fig. 9).

Discussion

The prevalence of dental trauma is increasing both for the deciduous and permanent dentition because of higher participation in contact sports (12–15). Some authors reported that 35% of all children and adults suffer dental accidents to their permanent teeth (16–19). Socioeconomic status of the family is less consistently related to dental trauma than sex, age, some behavioral characteristics, and physical and sporting activities (20).

Maxillary central incisors tend to be the most affected. The most frequent type of crown fractures is fracture of enamel and enamel-dentin (21, 22). The beveling procedure is essential and very important in terms of esthetics and adhesion of the composite restoration of fractured

Fig. 6. Clinical appearance of the composite restoration at the end of 2 years for case 2.

Fig. 7. Clinical appearance of the teeth before the restoration for case 3.

Fig. 8. Clinical appearance of the teeth after the restoration for case 3.

Fig. 9. Clinical appearance of the composite restoration at the end of 2 years for case 3.

anterior teeth. The surface area is increased by beveling procedure and this causes a more efficient adhesion (9). In all cases presented in this article, beveling was performed.

Nowadays, microhybrid composite is frequently utilized for anterior restorations. Decreasing particle size of these materials provides more polishability of restorative materials (9). Microhybrid composite was utilized for the restoration of outer surfaces. Thus, more polished and smoother surfaces are obtained.

A second visit is recommended 1 week after the restorative procedure because of the water sorption of composite resins. As most of the water sorption can be observed during the first week, the polishing procedures can be performed in the second visit in order to get a more esthetic view (23, 24). Another advantage of this procedure is to reduce the chair time consumed in the first visit. In the present three cases, 1-week recalls and a second polishing procedure were performed.

There are several treatment alternatives for fractured anterior teeth such as composite resin restorations and prosthetic restorations. However, for the patients who are younger than 18–20 years of age, prosthetic restorations cannot be performed because of the continuing development of the jaws. Composite restorations should be preferred in this kind of patients (7). A composite restoration was performed because of the patient's age in case 2. Due to economical reasons and for the purpose of minimal hard tissue removal, composite restorations were performed in cases 1 and 3.

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