

Fractured Segment Reattachment of Uncomplicated and Complicated Crown Fractures: A Case Series

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ABSTRACT

Maxillary anterior teeth are more frequently traumatized in young individuals. It possesses a major aesthetic and emotional concern to the patient. This case series describes the conservative management of uncomplicated and complicated crown fractures. Reattachment of the fractured segments with additional techniques was chosen as a treatment option as it was less time consuming and teeth are restored in their original anatomy, colour and texture.

Keywords: Dental Trauma, Fractured Segment Reattachment, Uncomplicated and Complicated Crown Fractures.

INTRODUCTION

Dental trauma is seen at the age of 7 to 12 years (1) most commonly involving maxillary and mandibular anteriors (2). Fractures involving the coronal tooth structures can be uncomplicated or complicated crown fractures. The uncomplicated crown fracture involves enamel and dentine and accounts for at least one third to one half of all the dental injuries(3). The fractures involving enamel dentine and pulp are termed as complicated crown fractures with the reported incidence of 2% to 13%(4). The various treatment options for these fractures depends on factors like availability of fractured tooth fragment, remaining dentine thickness, stage of root development, degree of pulpal involvement, level and position of the fracture line(5). Longevity of the reattached segment is the major concern, as it has been reported that 50 % of the reattached fragments gets debonded in 2.5 years(6). Most of the failures are due to the secondary trauma or parafunctional habits, there is requirement of better techniques and materials for increasing bonding in reattachment of the fractured segments. So, the present case series of three case reports aimed to restore the fractured teeth with reattachment of the fractured segments by employing additional techniques like internal dentine grooves, over contour preparation, post placement and intermediate material.

CASE REPORT: 1

A 14-year-old male patient reported to the department of conservative dentistry and endodontic post graduate institute of dental sciences, Rohtak, Haryana with fractured right maxillary central incisor 24 hours after the sports injury [Fig1 (A)]. Patient was having the fractured segment in wet handkerchief. Complete medical, dental history was taken. Periapical radiographs (PA) were taken at different angulations. PA radiograph revealed mature root and complicated crown fracture [Fig 1(G)]. On clinical examination tooth showed normal mobility, negative response to electric pulp test, pulp exposure was visible and was sensitive to stimuli. Root canal treatment with fractured segment reattachment was planned. Local anesthesia was achieved with 2% lignocaine hydrochloride with epinephrine 1:80,000 (ICPA Health Products Ltd, Ankleshwar, India). and the fractured segment was first checked for proper adaptation and then was placed in the saline solution. Single sitting root canal treatment was done using standard protocol. [Fig 1(H)]. The tooth was isolated with rubber dam [Fig 1 (B)]. The internal dentine groove was made on the surface of fractured segment [Fig 1 (C)]. Both the tooth and the fragment were etched with 37% phosphoric acid (Ivoclar Vivadent Eco Etch) for 15 seconds and rinsed thoroughly and dried showing the frosty appearance [Fig 1 (D-E)]. Two coats of bonding agent (Ivoclar Vivadent TE-Econom Bond) were applied and cured followed by flowable composite application (Ivoclar TE-Econom Flow) and

reattachment of the fragment. Every surface was cured for 40 seconds. After reattachment over contouring was done in which a preparation was made on the buccal surface around the fracture line by means of a cylindrical diamond-finishing bur. The surface was then etched, bonded and composite restoration (Ivoclar Vivadent Econom Plus) was done and cured as described earlier. Final finishing and polishing were done with finishing burs and polishing disks (Shofu super snap finishing and polishing kit) [Fig 1(F)]. Final radiograph was taken [Fig 1(I)]. Patient was put on regular follow up for 1 year and showed absence of any radiographic changes [Fig 1 (J)]and clinical signs and symptoms.

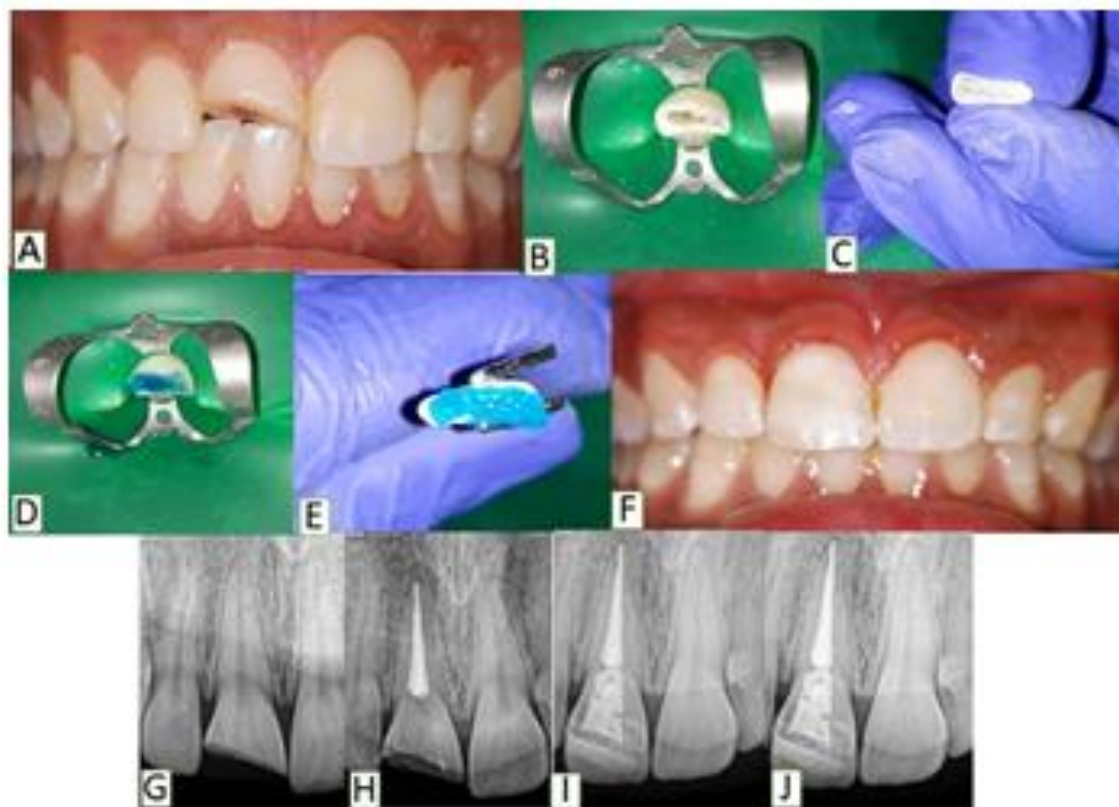


Fig 1, Case Report 1: (A) Pre-operative clinical picture. (B) Rubber dam isolation. (C) Groove made in fractured tooth segment. (D-E) Etching of tooth and segment. (F) Post-operative clinical picture after fragment reattachment. (G) Pre-operative radiograph. (H) Radiograph after single sitting root canal treatment. (I) Post-operative radiograph. (J) Radiograph at 1 year follow up.

CASE REPORT: 2

A 20 years old female reported to the department of endodontics and conservative dentistry post graduate institute of dental sciences, Rohtak, Haryana with fractured right and left maxillary central incisors 4 hours after the trauma [Fig1 (A)]. Patient was having the fractured segment immersed in water. Complete medical, dental history was taken. Periapical radiographs (PA) were taken at different angulations and revealed un complicated crown fracture [Fig 1(G)]. On clinical examination tooth showed normal mobility, positive response to electric pulp test and was not tender on percussion. Fractured segment reattachment was planned. The segments were placed in saline. The tooth was isolated with rubber dam [Fig1 (B)]. The internal dentine grooves were made on the surface of fractured segments [Fig 1 (C)]. Both the teeth and the fragments were etched with 37% phosphoric acid (Ivoclar Vivadent Eco Etch) for 15 seconds one by one, rinsed thoroughly and dried showing the frosty appearance [Fig 1 (D-E)].Two coats of bonding agent (Ivoclar Vivadent TE-Econom Bond) were applied and cured followed by applying flowable composite (Ivoclar TE-Econom Flow) and reattaching the fragment. Every surface was cured for 40 seconds. After reattachment over contouring was done same as in the 1st case report. The surface was then etched, bonded and composite restoration (Ivoclar Vivadent Econom Plus) was done and cured as described earlier. Final finishing and polishing were done with finishing burs and polishing disks [Fig 1(F)] (Shofu super snap finishing and polishing kit). Final radiograph was taken. [Fig 1(H)]. Patient was put on regular follow up for 1 year and showed absence of any radiographic changes and clinical signs and symptoms [Fig 1(I)].



Fig 2, Case Report 2: (A); Pre-operative clinical picture (B); Rubber dam isolation (C); Groove made in fractured tooth segment (D-E); Etching of tooth and segment (F); Post-operative clinical picture (G); Pre-operative radiograph (H); Post-operative radiograph (J); Radiograph at 1 year follow up.

CASE REPORT: 3

A 22-year-old male patient reported to the department of conservative dentistry and endodontics post graduate institute of dental sciences, Rohtak, Haryana with fractured left maxillary canine 4 hours after the trauma. [Fig1 (A)]. Patient was having the fractured segment in bottle containing water. Complete medical, dental history was taken. Periapical radiographs (PA) were taken at different angulations. PA radiograph revealed mature root and complicated crown fracture. On clinical examination tooth showed slight mobility, negative response to electric pulp test. The tooth was fractured at the junction of middle and cervical third of the crown extending sub-gingivally on the palatal side [Fig3 (A, B)]. The fractured segment was checked for proper adaptation and was found to be adequately fitting from all the sides. Root canal treatment with post placement for the reattachment of fractured segment was planned. Local anesthesia was achieved with 2% lignocaine hydrochloride with epinephrine 1:80,000 (ICPA Health Products Ltd, Ankleshwar, India). The fractured segment was placed in the saline solution.

The tooth was isolated with rubber dam [Fig3 (C)]. Single sitting root canal treatment was done using standard protocol followed by post space preparation and selection of metal post that fits into the canal. Rubber dam was removed. A hole was made in the fractured segment as made during the access opening just below the cingulum area [Fig3 (F)]. Then the adaptation of the segment was checked by placing the post in the root canal and making sure the post is not extending out of the hole created in the segment. The post was then cemented and palatal flap was raised [Fig3 (D, E)]. After maintaining proper isolation, fragment and the tooth etched with 37% phosphoric acid (Ivoclar Vivadent Eco Etch) for 15, rinsed thoroughly and dried showing the frosty appearance. Two coats of bonding agent (Ivoclar Vivadent TE-Econom Bond) were applied and cured followed by applying flowable composite (Ivoclar TE-Econom Flow) and reattaching the fragment [Fig3 (G, H)]. Every surface was cured for 40 seconds. The flap was sutured. Final finishing and polishing were done with finishing burs and polishing disks (Shofu super snap finishing and polishing kit). At follow up of 1 year there were no clinical and radiographic signs and symptoms and tooth was in normal function [Fig3 (I)].



Fig 3, Case Report 3: (A, B) ; Preoperative picture buccal and palatal view(C); Rubber dam isolation; (D,E); Metal post cementation buccal and palatal view(F); Fractured segment (G,H); Reattachment of fractured segment buccal and palatal view(I); Follow up at 1 year.

DISCUSSION

Dental trauma to the maxillary anterior region possess a great concern regarding aesthetics and emotional problems(7). Fractured segment reattachment is one of the conservative approach in, managing such trauma. This procedure was first described by Cho sack and Eidelman in 1964(8). Reattaching the segment provides various advantages like the natural aesthetics, surface texture, anatomy and perfect shade of the teeth are restored(9). The incisal edge will wear at the same rate as of the adjacent teeth. The procedure is economical and is less time consuming(10–12). There are various techniques that can be used to reattach the fragment. These includes a simple reattachment without any additional preparations, using intermediate material with the adhesive system, beveling the enamel before reattachment, circumferential chamfer preparations, internal dentine groove, over contouring with the layer of composite(13).

In the first two case reports the internal groove in the dentine and over count our preparation was done. These both additional techniques provide highest fracture strength recovery(11,14), highest bond strength recovery(11)and highest fracture strength(15) in comparison to simple reattachment or a circumferential chamfer at the bonding line and filling it with the composite. In the third case report simple reattachment with post placement (to impart more strength) was selected as the fracture was extending sub-gingivally it was difficult to create the dentin groove. For bonding the restoration in the present case series, a total etch adhesive system was employed as it has shown higher fracture strength than the self-etching systems(16). Different types of intermediate materials have been proposed like light- dual- or self-cured luting cements, or conventional or flowable composites(17,18). These intermediate materials may improve the mechanical properties of the bonding interface (17). We used flowable composite as an intermediate material for our cases but the different type of intermediate materials has no influence on the impact strength of the reattached fractured segment(13). Over contouring was done with the thin layer of composite resin as it possess a higher fracture strength in comparison to compomer, resin

modified glass ionomer and resin cements(19). There are certain disadvantages of the reattachment procedure like excessive dehydration of the segment possess a risk of discoloration(20). In the present cases we had a benefit that the segments were already brought in hydrated condition by the patient and further the fragments were placed in sterile saline at 37degrees centigrade to prevent the dimensional change (10,12). Another problem that may occur is the fractured segments may get debonded following the second trauma or if proper technique is not followed. So far in all of our cases at 1 year follow up the teeth are in proper function with no clinical signs or symptoms and any radiographic changes.

CONCLUSION

Since the fracture segment reattachment is the conservative approach and is less time consuming, the choice of treatment should depend on the clinical situation, the factors which may influence the longevity of tooth (additional design features) and patients expectations.

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