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RE-ATTACHMENT OF A COMPLICATED CROWN-ROOT FRACTURE: A CASE REPORT

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ABSTRACT: This case report describes the management of complicated crown-root fracture of a maxillary central incisor. Initially, the fractured fragment was stabilized by splinting it with composite wire splint to adjacent teeth. During next appointment single visit endodontic treatment was performed and the fractured crown portion was reattached using fiber post and composite resin. Success was achieved by normality in function, esthetics and healthy tooth and surrounding periodontal structures. Advantages, disadvantages and prognosis of this treatment approach are discussed.

KEYWORDS: Complicated crown- root fracture, Reattachment, Fiber post.

INTRODUCTION: Dental trauma is a relatively common condition that presents restorative challenges. It has been reported that approximately 20% of children experience dental injury to their permanent teeth before leaving school,¹ and approximately one in six adolescents and one in four adults suffer traumatic dental injury during their lifetime.^{2,3} Majority of dental injuries involve single tooth and mostly maxillary central incisors.^{4,5}

Trauma to maxillary incisors is usually associated with overjet, gender, race, ethnicity, contact sports and age.^{6,7,8} Contact sports account for 49% of dental injuries.⁹ The most common type of dental injury in permanent dentition is uncomplicated crown fracture accounting for more than 50% tooth traumas.⁶ The treatment of uncomplicated crown fractures is relatively simple involving recontouring, composite bonding or porcelain veneers. Complicated crown-root fractures on the other hand presents challenge to the restorative dentist for its management because of encroachment of biologic width and its subgingival nature. In case of complicated crown- root fractures, where both the crown and the root are available relatively intact, can be managed by tooth fragment reattachment method, first described by Tennary N. T.¹⁰ (1978) and subsequently by Starkey and Simonsen¹¹ (1979) using acid etch technique. Though not as much predictable but it is advantageous and should be the option of first choice. The objective of this case report is to present conservative approach for managing complicated crown- root fracture of a maxillary central incisor using single visit endodontic treatment and fiber post.

CASE HISTORY: A 21 year male reported to Gentle Dental Care, A Multispecialty Dental Clinic And Implant Center, with chief complaint of fall from motorbike 7 days back, loosening and slight discomfort on biting with upper anterior tooth. On clinical examination, complicated oblique crown-root fracture was noticed with 11. A horizontal fracture line was seen on labial side with its palatal sub gingival oblique extension (Fig. 1). The tooth was tender to vertical percussion, responded negatively to electrical pulp tester and radiographically showed two fracture lines with slight widening of apical PDL (Fig. 2). Based on these findings the diagnosis of complicated crown-root fracture was made and treatment was planned in two phases as Emergency and Definitive, after taking informed consent of the patient.

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Emergency Phase: The goal of emergency treatment was to achieve esthetics, limited function and comfort. During the first appointment when the patient presented, the fractured fragment was held with finger pressure into its original position and was stabilized to adjacent teeth with composite wire splint for one week (Fig. 3). Patient was instructed to avoid further trauma to the splinted tooth.

Definitive Phase: One week after the emergency phase when the patient reported, a putty polyvinyl-siloxane index was prepared to act as reliable positioning guide for reattachment of fragment (Fig. 4). Under local anesthesia the splint was removed and conservative labial and palatal gingival flaps were raised by making intrasulcular incisions to separate the fragment from palatal PDL fibers as well as to determine the extent of fracture line (Fig. 5 & 6). After separation of the fragment, it was stored in normal saline and it was observed that the biologic width was violated validating the need for osseous recontouring.

The tooth was isolated with rubber dam retained by #212 cervical retainer (Fig. 7) and single visit endodontic treatment followed by post space preparation was done to receive a light transmitting fiber post (Fiberlux System, Coltene Whaledent) (Fig. 8). The fiber post was cemented inside the canal using self-etch, dual cure resin cement (3M ESPE) (Fig. 9). The internal aspect of the crown fragment was prepared to accommodate the fiber post; it was then etched, bonded and reattached accurately with resin cement using the silicone index. The remaining margins of the fragment were restored with the composite resin, finishing and polishing was done using the Shofu kit. The gingival flaps were repositioned to their original position and sutured with 3-0 black silk (Fig. 10 & 11). Any occlusal interferences were checked and adjusted. Routine postoperative instructions were given. Immediate post-operative radiograph was taken (Fig. 12).

Follow Up: Patient was examined after one week with the tooth being asymptomatic, normal healing of adjacent soft tissues and stable reattached fragment. The sutures were removed and patient was instructed to avoid further trauma to the tooth. Follow up clinical and radiographic examination was also done one and half year later with normal function, esthetics and comfort (Fig. 13, 14 & 15).

DISCUSSION: The different treatment modalities for management of this situation could be extraction of the tooth followed by single- tooth implant, which should be the option of last resort when more conservative and viable treatment options are available. Because of inadequate ferrule in this case post & core could not be possible without orthodontic extrusion/crown lengthening, which would result in cervical diameter discrepancy as compared to left central incisor and therefore resulting in poor esthetic outcome. The advantages of the reattachment technique that are worth mentioning includes most conservative approach, single visit procedure, use of patient's own tooth as 'natural veneer' maintaining the esthetics and positive psychological impact on the patient.¹²

Use of glass fiber post was essential to support the crown structure coronal to the gingival margin. Fiber post was the logical option as it can be bonded to canal walls, has good physical and mechanical properties, and is esthetic.¹³ It has been also postulated that when resin cement is used for luting glass fiber post its stress distribution pattern reinforces the tooth structure.¹⁴

It is difficult; if not impossible to predict the prognosis of this treatment in terms of function and esthetics due to lack of strong evidence supporting the use of this technique as well as the lack of long term follow ups in the literature. Literature is also scarce because of variability of the pattern of tooth fractures from case to case.

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More and more case reports with long term follow-ups are needed in future to advocate the use of this same technique in different patterns of tooth fractures. With these limitations in mind, still the technique described here is highly conservative, provides adequate function, esthetics and postpones the use of more radical prosthetic solutions.

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Fig. 1: Labial aspect of fracture is noticeable; incisal edge level of 11 can be compared to that of 22.

Fig. 1

Fig. 2: Pre- operative IOPA with 11 can be seen.

Fig. 2

Fig. 3: Fractured crown segment repositioned and splinted with composite-wire splint for stabilization.

Fig. 3

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Fig. 4: Silicone index fabricated with a putty polyvinylsiloxane material to act as reliable repositioning guide.

Fig. 4

Fig. 5: Intrasulcular incisions and raising labial & palatal flaps for access.

Fig. 5

Fig. 6: Fractured fragment detached from PDL fibers.

Fig. 6

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Fig. 7: Rubber dam retained by # 212 cervical clamp for isolation.

Fig. 7

Fig. 8 & 9: Prefabricated light transmitting fiber -post (Fiberluxsystem, ColteneWhaledent) is luted inside the canal with self-etching, dual cure resin cement (3M ESPE).

Fig. 8

Fig. 9

Fig. 10 & 11: Labial and palatal views immediately after reattachment of the fractured fragment, finishing- polishing of composite margins and suturing of soft tissue flaps done.

Fig. 10

Fig. 11

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Fig. 12: Post-treatment IOPA.

Fig. 12

Fig. 13 & 14: Follow-up after 1 ½ year (labial & palatal views).

Fig. 13

Fig. 14

Fig. 15: IOPA after 11/2 year.

Fig. 15

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