

An Instant Esthetic Approach to Treat a Complicated Crown Fracture: A Case Report

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ABSTRACT

Background: Coronal fractures of anterior teeth are most common form of traumatic dental injuries. Most commonly affected teeth are maxillary central incisors because of its position in the dental arch. When the fractured fragment is available root canal treatment followed by reattachment with fiber post is a good option. It provides immediate esthetics and functional rehabilitation. This paper reports a complex tooth fracture successfully managed by fragment reattachment with help of post and adhesive resin.

Keywords: Fragment reattachment, fiber post, coronal fracture, adhesive resin.

INTRODUCTION

Complicated crown fractures involving the enamel, dentin, and pulp constitute a major share of all dental injuries and are most common in maxillary central incisors. Coronal fractures of anterior teeth are the most frequent form of acute dental injury that mainly affects children and adolescents. A fractured anterior tooth requires immediate clinical attention and, if untreated can cause damage to dentition and even have a psychological impact on the patient. Management of complicated crown fractures is a multifactorial process influenced by the extent and pattern of fracture (biological width violation, endodontic involvement, alveolar bone fracture), restorability of fractured tooth (associated root fracture), secondary injuries (soft tissue status), presence/absence of fractured tooth fragment and its condition for use (fit between fragment and the remaining tooth structure), occlusion, esthetics, finances, and prognosis. In case of complicated fractures where the fractured segments are closely approximating, root canal treatment (RCT) followed by reattachment of the fractured segment with fiber post reinforcement is a feasible option. It has been

suggested that fiber-post luted with resin cement increases the retention of the segment and also provides a monoblock effect.

CASE REPORT

A 22 yr old patient was referred to the department of conservative dentistry [KIDS, KIIT UNIVERSITY] with complicated fracture of 11, history of trauma 3 days back. Clinical examination revealed a fracture line in the middle 3rd labially running obliquely on palatal surface with line of fracture extending little sub-gingival involving enamel, dentin, pulp [Figure-1]. The tooth was tender on percussion with a mobile coronal fragment. Radiographic examination revealed oblique fracture line running mesial to distal. No periapical pathology, no periodontal bone loss, no root fracture was seen [Figure-2]. Apex was fused. Single visit root canal treatment with immediate reattachment of the fragment was planned. Under local anaesthesia fracture segment was removed atraumatically [Figure-3,4]. Pulp tissue was removed from chamber, and fragment was stored in normal saline to avoid dehydration. Tooth was isolated by rubber-dam application, access cavity

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Fig 1: Pre operative clinical photograph.



Fig 2: Pre operative radiograph.



Fig 3: Fracture fragment.

prepared and pulp tissue extirpated from root canal. Single visit root canal was performed by step-back technique of bio-mechanical preparation, obturation done by gutta-percha and AH-26 sealer



Fig 4: Fractured fragments removed.



Fig 5: Post space prepared.



Fig 6: Immediate post operative image.



Fig 7: Radiograph at 12 month follow-up.



Fig 7b: 12 months follow up.

by employing cold lateral condensation technique. Post space was prepared and 4mm of gutta-percha was left to maintain apical seal [Figure-5]. Pre-fabricated fiber-post (Parapost-Fiber, Coltene Whaledent) was selected and cut at desired length. A groove was prepared in the pulp chamber of fractured fragment by round bur so that it fits comfortably to the remaining tooth without any interference from overlying post. Post space was etched with 37% phosphoric acid for 15 seconds and rinsed off. Bonding agent (ADPER SINGLE BOND2, 3M ESPE) was then applied to the root canal walls and light-cured for 15 seconds. Bonding agent was also applied to the light transmitting post. Post was cemented with help of dual cure resin cement, excess cement was removed and light cured for 40 seconds. Both fracture segment and tooth enamel and dentin was acid etched with 37% phosphoric acid, rinsed with water and air dried, coated with bonding agent and cured for 10 sec. fracture segment was reattached with flowable composite applied on the inner fragment surface. Excess composite was removed and light cured for

40 sec from labial and palatal aspect while the fracture fragment was kept in position under pressure. Occlusion was checked and tooth was polished with Sof-Lex polishing system. Immediate postoperative x-ray shows stable attachment [Figure-6]. At the 3 month recall examination, the fragment was firm and upon recall after 12 months a stable reattachment was observed, with good esthetics and periodontal health [Figure-7(a,b)].

DISCUSSION

Factors determining the treatment plan and prognosis for coronal teeth fractures include the extent of fracture, endodontic involvement, Periodontal status, maturity of root, biological width invasion, pattern of alveolar bone fracture, restorability of fractured tooth, secondary traumatic injuries, presence/absence of fractured tooth fragment and the fit between the fragment and remaining tooth, occlusion, esthetics, and finances.¹ The treatment options for anterior tooth trauma can range from direct resin based composite restoration, tooth fragment rebonding, ceramic Veneer, root canal treatment and tooth fragment rebonding, root canal treatment and crown with or without post and core and extraction followed by replacement.²

First case of reattachment was reported by Chosack and Eeildman in 1964 by using cast post, Tenny in 1988 first used acid etch technique for reattachment.³ In case of complicated fractures when endodontic therapy is required, the space provided by the pulp chamber can be used as an inner Reinforcement thus avoiding further preparation of fractured tooth.^{4,5} The use of post increases retention and distributes the stress along the root. With the help of the glass fiber post the fractured crown can be permanently bonded to the root.⁶ Connecting the fiber post with the resin cement increases the retention of segment and provides a monoblock effect.⁷

Reattachment of the fractured segment should be the choice of the clinician especially when the patient brings it. Fractured segment is the part of natural tooth hence the physical properties are similar. Reattachment results In Better esthetics, because shade match and translucency will be perfect. Incisal edge of attached fragment will wear at a rate similar to that of the adjacent teeth.

Replacement of fractured portion may be less time consuming than needed for completion of a provisional restoration.^{8,9}

Hayashi *et al.*¹⁰ have highlighted that when a tooth has more than 50% of its coronal structure missing, the use of a post and core foundation is recommended prior to restoration. Recent studies have proved that, posts do not strengthen endodontically treated teeth. However, their use is justified for retention of the reattached coronal fragment.^{11,12}

The most common complication in this system is debonding. Root fracture is another cause of failure in post and cores; the use of Parallel sided post in a tapered canal requires considerable enlargement of post space, which weakens the tooth significantly. Fiber reinforced composites have favourable biomechanical properties; of high tensile strength at the same time exhibits elastic characteristics as that of the dentin. This minimizes the risk of root fracture. The even load distribution is supported through friction locked bond between post and the tooth substance due to adhesive actions in the root canal.¹³ Trope et al in 1985 showed that endodontically treated teeth can be

Reinforced with the use of resin composite restoration.¹⁴ The flowable composite used in this case not only reinforces the tooth but also helps in achieving higher bond strengths of the fractured segments. Flowable composite also minimizes the inclusion of air voids. Several studies have shown that replacement of composite using dentin bonding agents give strength to the root. When they are used with resin cements they have a decreased chance of micro leakage. The resin luting cements exhibit good bond strength to the tooth, easy to use and predictable results.¹⁵

A dry and clean working field and the proper use of bonding protocol and materials are the keys for achieving success in adhesive dentistry. Patient co-operation and understanding of the limitations of the treatment is of utmost importance for good prognosis.

CONCLUSION

Re-attachment of fractured anterior teeth offers an alternative to Composite build-ups and

more invasive and time consuming treatment options like orthodontic/surgical extrusion followed by crowns. Hence, reattachment of the intact fractured segment can be considered as an ultraconservative, simple and immediate method for esthetic rehabilitation.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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