Fractured Tooth Fragment Reattachment Using Fiber Post: A Case Report

Abstract

The most common form of traumatic injuries are anterior crown fractures. Trauma to maxillary anterior teeth affects the patient both socially and psychologically. The main objective of treating such cases is successful pain management, immediate restoration of its original anatomic form, function, esthetics and phonetics. Reattachment of fractured tooth fragments provides a positive psychological response and is a relatively simple procedure. This article discusses a case report in which tooth was endodontically treated followed by successful reattachment of fractured tooth fragment using the fiber post.

Keywords: Trauma, Crown Fracture, Reattachment, Fiber Post

Introduction

Dental trauma is more common event in permanent dentition of young patients and results in fracture of anterior teeth. These fractures lead to various problems like esthetic, function, and phonetics. Management of dental trauma requires accurate diagnosis and treatment plan [1]. Numerous factors influence the treatment approach for a complicated crown fracture like the level and position of tooth fracture line, availability of displaced tooth fragments, type of occlusion, and prognosis [2,3]. Various techniques have been developed to restore the fractured anterior teeth such as the use of the tooth fragment either as a temporary or permanent crown, crown lengthening or a definitive crown after an orthodontic and surgical extrusion, extraction followed by implant or fixed partial denture, composite restoration and post and core supported restoration [4]. If the intact tooth fragment is available, reattachment of tooth fragments can be considered and this technique is a viable alternative to conventional approach with minimal or without violation of biologic width [5,6]. If the crown fragment is retrieved at the time of injury, its reattachment provides several advantages over the other forms of restorations such as exact restoration of the crown form, colour, surface morphology and minimal violation of biologic width.[5,7]. However, successful reattachment was determined by factors such as the site of fracture, size of fractured remnants, pulpal involvement, periodontal status, maturity of the root formation, occlusion, biological width invasion, material used for reattachment, use of post, and prognosis.[8]

In case of complicated fractures where the fractured segments are closely approximating, root canal treatment followed by reattachment of the fractured segment with fiber post reinforcement is a feasible option [9]. It has been suggested that fiber post luted with resin cement increases the retention of the segment and also provides a monoblock effect [10].
Case report

A 25-year-old male patient presented to the Department of Conservative Dentistry and Endodontics, People’s Dental College, Bhopal, after sustaining a complicated crown fracture to his maxillary right lateral incisor due to fall on the ground.

The patient's medical history was unremarkable. No mobility of the injured tooth was recorded and there was no apparent trauma to the soft tissues in the extraoral and intraoral examination. On hard tissue examination, Ellis Class III fracture was seen in the coronal portion of tooth No. 12, which extended from cervical 3rd of crown on lingual and on the labial aspect. The fractured fragment was loosely attached to the tooth.

The treatment options were presented to the patient and to his legal guardian, including (1) removal of fractured segment followed by restoration with post and core with crown and (2) reattachment of the tooth fragment. After some deliberation about the advantages, disadvantages, prognosis, and cost of every treatment option, the patient opted to have the tooth fragment reattached. It is important to note that the reattachment option was presented only after confirming that the fragment was in good condition and that it fits reasonably well on the fractured tooth.[Figure (a),(b)]

Local anesthesia was administered and the segment was removed with minimal force and recovered and stored in normal saline to prevent discoloration and dehydration. Following a detailed examination, the adaptation of the fragment was checked. The working length was determined with an electronic apex locator (Root ZX, J. Morita Corp., Japan) and confirmed with radiograph. The gates glidden drills (Mani Inc., Japan) were used for coronal enlargement of the root canal. The root canal was enlarged to ISO size 60 at working length. About 3% sodium hypochlorite was used as irrigant during the preparation. The root canal was dried with paper points (Spident, Hand Rolled, Korea) and obturated using endodontic sealer (Sealapex, Kerr, USA) and laterally condensed with Gutta-percha (Spident, Hand Rolled, Korea). The root canal orifice was sealed with a temporary restoration [Figure(c)]. The day after completion of the endodontic treatment, the root canal was prepared for the post placement by removing the gutta-percha from the coronal two third of the canal with peso reamers. The fiber post (FIBRAPOST PD, Switzerland) was tried in the canal and adjusted to the desired length. Space was also prepared in the pulp chamber of the fractured crown fragment for receiving the coronal portion of the post and also the core. The alignment of the coronal fragment was verified with the post in place. The post space, fractured tooth fragment and the prepared hole and the fiber post then etched with 37% phosphoric acid, rinsed, blot

[Figure (a),(b)]
dried, and bonding agent (Prime and Bond NT, Dentsply) was applied and cured. Subsequently, dual cure resin cement (Calibra, Dentsply) was used to fill the post space in the tooth and the prepared grooves into the coronal fragment. The fragment was carefully seated on the remaining tooth and light cured. During curing, firm and stable finger pressure was applied to the coronal fragment to closely oppose it to the tooth. After curing, excess composite was removed with a diamond finishing bur. Afterwards, final polishing was done with Enhance (Dentsply) kit. Follow-up examinations were carried out at 6-month interval. The tooth remained normal in esthetics and function.

Figure : (a) Preoperative view of the fractured tooth 12 (class III fracture)  (b) Tooth fragment  (c) Obturation done  (d) Postoperative image  (e) Postoperative radiograph with fiber post and tooth fragment reattached.  (f) Follow-up after 6 months
Discussion

Protection of mechanical, functional and esthetics are the most important factors in restoring traumatized anterior teeth. If fractured fragment is available intact, the reattachment is the most desired treatment as it is cost effective and alternative rather than restoring it prosthetically[11]. This technique has several advantages such as maintenance of original enamel translucency, similar wear rates as compared to the adjacent teeth, and minimal chair time needed. Different types of post materials have been introduced into the dental practice such as carbon fiber, quartz, and glass fiber[12]. With the recent improvements in the dental materials, resin-based restorative material with tooth-colored fiber posts are of choice because of several advantages such as suitable elastic modulus, esthetics, good bonding between post and cement, lower chair time, and minimal tissue removal. The use of a fiber post with fractured teeth interlocks the two fragments and minimizes the stress on the reattached tooth fragment.[13,14] The dual cure resin cement has a good bond strength, ensures complete curing and reduces microleakage. The coronal fragment was bonded to the remaining tooth using flowable composite resin offers excellent colour stability, minimizes the inclusion of air voids, and helps in achieving higher bond strengths of the fractured segments.

As the biological width was only minimally invaded and the restorative margin could be placed at or above the level of the cementoenamel junction, the bone recontouring through crown lengthening would not be indicated in the present cases. The literature suggested that whenever biologic width is invaded, surgery should be performed with minimum osteotomy and osteoplasty[15].

Occlusal relationship of the patient is critical for successful treatment. Vertical root fracture is an undesirable consequence of trauma, occlusal prematurities, heavy masticatory forces or iatrogenic causes. Reattachment is contraindicated in patients with unfavorable occlusal relations like deep bite or bruxism, which may lead to failure of treatment. At follow-up visits of the present case, the reattached tooth was functional and esthetically agreeable, suggestive of the successful treatment [16]. However, long-term follow-up of cases is necessary to evaluate the longevity of reattached teeth, lack of which is a limitation in our case.

Conclusion

Tooth fragment reattachment procedure offers ultraconservative, cost effective, safe, fast and esthetically pleasing results when fragment is available. Every attempt should be made to locate the missing tooth
structure through a detailed history of the accident, careful examination and roentgenograms. The reattachment of the tooth fragment as a restorative procedure becomes possible only when it is available. This can be improved with different adhesive techniques and restorative materials.

References

